Enbridge Energy LP
Southern Access Expansion Program
Superior to Delavan Project

Environmental Assessment

Joint Lead Agencies:

Wisconsin Department of Natural Resources, Office of Energy
U.S. Army Corps of Engineers, Regulatory Branch, St. Paul District

Cooperating Agency:

National Park Service, St. Croix National Scenic Riverway Unit

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PURPOSE OF THIS DOCUMENT

This Environmental Assessment (EA) has been prepared to satisfy the Wisconsin Environmental Policy Act (WEPA; Section 1.11, Wisconsin Statutes and NR 150) and the National Environmental Policy Act (NEPA; 40 CFR parts 1500 to 1508 and 33 CFR part 325). The EA will be used to determine the need for an Environmental Impact Statement (FEIS) or to make a Finding of No Significant Impact (FONSI). The rationale for preparation of a joint state/federal EA is provided as follows.

The proposed project will require a permit from the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (33 U.S.C. § 1344) and Section 10 of the Rivers and Harbors Act (33 U.S.C § 403) and permits from the WDNR under Chapter 30, Wisconsin Statutes (ss. 30.12, 30.123, 30.19, 30.20, 182.017, as well as NR 320.08(3) and NR 345.04(3), Wisconsin Administrative Code). The proposed project will also require wetland water quality certification from the WDNR under NR 299.04 and NR 103.08, Wisconsin Administrative Code, and a WDNR endangered resources review and potential incidental take authorization under s. 29.604, Wisconsin Statutes. In addition, the proposed project would cross the Namekagon River, a federal wild & scenic riverway, and will require an analysis by the NPS under Section 7(a) of the Wild & Scenic Rivers Act.

The USACE, the St. Croix National Scenic Riverway unit of the National Park Service (NPS), and the WDNR have a common interest in preparing an environmental analysis document that satisfies both state and federal requirements, and have agreed to the preparation of a state/federal EA for the proposed project. The NPS has agreed to serve as a cooperating agency in the preparation of this EA. Each agency shall incorporate this EA into their respective decision documents for the proposed project.

SUMMARY

Enbridge Energy, LP, proposes to construct approximately 322.5 miles of 42-inch-diameter underground crude oil pipeline and 20-inch-diameter underground liquid diluent return pipeline, from Enbridge's Superior tank farm in Douglas County, Wisconsin to Enbridge's Delavan pump station near Whitewater, in Rock County, Wisconsin.

Two new pipeline pumping stations would be constructed for the 42-inch crude pipeline. The first would be at Enbridge's existing Superior terminal facility in Douglas County and the second would be at Enbridge's Delavan pump station in Rock County.

To construct these pipelines, Enbridge must receive permits and approvals from various government agencies, including the Wisconsin Department of Natural Resources (WDNR) and U.S. Army Corps of Engineers (USACE).

The proposed pipeline covered under these permit applications would be entirely within the State of Wisconsin, along a route previously developed and currently used for two crude oil pipelines. The permanently cleared Enbridge (formerly "Lakehead") pipeline corridor easement will remain at 80 feet in width.

Enbridge proposes construction activities within an additional cleared temporary workspace 100 feet in width, with an occasional need for an additional 40-foot width of extra temporary workspace, where existing constraints require the extra space. The cleared temporary workspace will be revegetated according to agreements reached between Enbridge and property owners.

The proposed project would require 242 crossings of perennial and intermittent streams. The pipeline will cross the Namekagon River, a national wild and scenic river, which is also an Outstanding Resource Water (ORW), and Section 10 Waterway as defined by the U.S. Army Corps of Engineers; six other ORWs (St. Croix River, Tototagic River, Maple Creek, Badger Creek, Tributary #3 to Swan Creek, and Swan Creek); nine Exceptional Resource Waters (ERWs) (Alder Creek, Big Weirgor Creek, Jump River, Lynn Creek, Sevenmile Creek, Main Creek, Carter Creek, Little Roche a Cri Creek, Fordham Creek, and Allen Creek - three of which will be crossed more than once); and seven other section 10 navigable waterways (Nemadji , Chippewa , Thornapple , Black , Wisconsin , Fox (crossed twice), and the Rock rivers).

Installing the pipeline will require approximately 242 temporary bridges over waterways. Enbridge may request a permit to ford a small number of waterbodies due to difficulty in accessing and bridging certain streams.

The proposed pipeline will also feature 757 wetland crossings. However, the pipeline would cross many individual wetland complexes multiple times, so the number of wetland complexes affected would be fewer than the number of crossings. The pipeline would cross wetlands over a total distance of about 68.6 miles. Over this distance, up to 1,265 acres of wetland (including 262 acres of forested wetlands) would be affected to some degree by construction activities across both the permanent easement and the temporary workspace.

Impacts to wetlands and streams would be minimized and mitigated through various measures proposed by the company and additional measures specified in WDNR and U.S. Army Corps of Engineers permits.

The pipeline crosses approximately 115 miles of forest land and would result in the clearing of 1930.5 acres of non-wetland forestlands.

Forestland impacts would last much longer, varying from a few decades for younger forest patches, to more than 100 years for areas with mature trees. The participation of some landowners in forest tax law programs could potentially be affected.

Some incidental take of rare species may occur, but this is not expected to have any appreciable negative impact on the long-term survival of existing populations of these species.

1.0 PROJECT DESCRIPTION

1.1 PURPOSE AND NEED

Use of petroleum products in the United States continues to increase while U.S. domestic crude oil production continues to decrease. To cover the supply gap posed by this situation, Enbridge Energy, LP, has agreed to supply additional crude petroleum to its market customers in the United States. To furnish this additional supply, Enbridge has devised an expansion program, termed the "Southern Access Expansion Program." This program will create a petroleum transportation pipeline to bring substantial additional crude petroleum from the "tar sands" region of northeastern Alberta (approximately 400,000 barrels per day). This crude oil will be refined in the United States into gasoline, jet fuel, diesel oil, and other distillation products.

The "Southern Access Expansion Program" is envisioned as two stages. *Stage 1* will be two new pipelines from Superior, Wisconsin, to the company's "Delavan Pump Station", located in Rock County near Whitewater, following its existing right-of-way (ROW) that currently has 2 pipelines in the ground. A potential future *Stage 2* project would entail the construction, along a new ROW, of a separate crude oil pipeline from the Delavan (Rock County) pump station to an Enbridge terminal facility in northeastern Illinois. The second stage would be built at a later time, pending confirmation of anticipated market conditions. This Environmental Assessment (EA) is limited to description and environmental analysis of only **Stage 1** of this expansion program. This pipeline route ends at the Enbridge Delavan pump station and *does not extend into Walworth County*.

Enbridge Energy owns and operates a liquid petroleum pipeline system comprised of about 2,700 miles of various diameter pipelines in the United States. The system transports crude petroleum from Western Canada to refineries in the Midwest, eastern Canada and New York. Enbridge currently delivers to refineries in the Midwest a volume of petroleum that is about 1/10 th of all U.S. petroleum imports.

Enbridge constructed one pipeline in the ROW from Superior to the state line near Walworth, Wisconsin in 1964 and a second pipe in 1998. The 1998 project was known as the Lakehead Pipeline SEP2 project (see *http://library.enbridge.com/users/folder.asp?FolderID=1667* for a map of all existing Enbridge pipeline routes).

Enbridge proposes to increase the capacity of its existing pipeline system to meet the projected demand for crude oil in the Midwest, by constructing additional pipeline and associated facilities. The crude oil from Alberta is very thick when extracted, and must be thinned with diluent, a light liquid hydrocarbon, to enable it to flow through a pipeline. This diluent will be removed at the refineries and piped back for re-use, via a diluent return pipeline.

Additional information on Enbridge is available on the Web at *www.enbridgepartners.com* and at *www.enbridge.com*.

1.2 DESCRIPTION OF PROPOSED FACILITIES

The Stage 1 Project is a proposal to construct a number of facilities in Wisconsin:

• Approximately 322.5 miles of 42-inch-diameter underground crude oil pipeline from Enbridge's Superior tank farm in Douglas County, Wisconsin to Enbridge's Delavan pump station near Whitewater in Rock County, Wisconsin (see proposed Stage 1 route map, Figure 1).

• Approximately 322.5 miles of 20-inch-diameter underground liquid petroleum pipeline for the purposes of diluent return from Enbridge's Superior tank farm in Douglas County, Wisconsin to Enbridge's Delavan pump station near Whitewater in Rock County, Wisconsin.

• Two new pipeline pumping stations would be constructed for the 42-inch crude pipeline. The first would be at Enbridge's existing Superior terminal facility in Douglas County and the second would be at Enbridge's Delavan pump station in Rock County. The additional station at Superior would contain four new pumping units. The additional station at Delavan would contain three new pumping units. Enbridge anticipates that reconfiguration of its Vesper Pump Station will provide the necessary additional pumping capacity for the new project. These reconfigurations of existing pump stations would include new piping within the facilities, electrical service upgrades, and horsepower upgrades to the pump units.

• Based on the final pipe diameter for the diluent return pipeline (20 inches) the preliminary hydraulic design analysis indicates the need for additional pump units at four existing pumping stations (including Enbridge's Delavan pump station facility and Superior terminal facility). It is anticipated that this new pumping equipment would be located within the current fenced facility footprint at existing pump station facilities on land owned generally in fee by Enbridge. The size and associated horsepower of the new pumping equipment, which is dependent on pipe diameter, will be determined once customer capacity requirements are finalized.

• New mainline gate valves will be installed along the new pipelines in accordance with U.S. Department of Transportation (DOT) criteria prescribed in CFR 49 Part 195 "Transportation of Hazardous Liquids by Pipeline" of the Code of Federal Regulations (CFR).

Table 1
Environmental Permits Required for Construction

Agency	Permit Authorization
FEDERAL PERMITS AND AUTHORIZATIONS	
U.S. Fish and Wildlife Service	Consultation under the Endangered Species Act (ESA), Section 7
U.S. Army Corps of Engineers	Section 404 Permit; Section 10 Permit
U.S. Department of the Interior	Wild and Scenic Rivers
National Park Service	Special Use Permit
Fish and Wildlife Service	
Bureau of Indian Affairs	Right-of-way grant; Archaeological Resources Protection Act Permit
Lac Courte Oreilles Indian Reservation	Land Manager Consultation
Ho Chuck Indian Reservation	Land Manager Consultation
STATE PERMITS AND AUTHORIZATIONS	
Wisconsin Department of Natural Resources (WDNR)	State listed species consultations
	Waterway Crossing Permit, Chapter 30 Permits
	Section 401 Wetland Water Quality Certification
	Construction Stormwater Discharge Permit
	WPDES for discharge of hydrostatic test waters and pit trench dewatering
	Water Appropriation Permit
Wisconsin Historical Society	Section 106 of the NHPA consultation

LOCAL PERMITS AND AUTHORIZATIONS	
Douglas County	Shoreland Zoning Ordinance
Washburn County	Shoreland Zoning Ordinance
Sawyer County	Shoreland Zoning Ordinance
Rusk County	Shoreland Zoning Ordinance
Chippewa County	Shoreland Zoning Ordinance
Taylor County	Shoreland Zoning Ordinance
Clark County	Land Use Permit
Marathon County	Shoreland Zoning Permit
Wood County	Floodplain Zoning Permit
Adams County	Shoreland Zoning Ordinance
Marquette County	Shoreland Zoning Ordinance
Columbia County	Shoreland Zoning Ordinance
Dane County	Floodplain Zoning Permit
	Erosion Control and Stormwater Management Permit (Chapter 14)
	Special Exception Permit
Jefferson County	Zoning and Land Use Permit
Rock County Planning, Economic & Community Development Agency	Conditional Use Permit

These two new pipelines will be placed within the existing 80-foot permanent pipeline easement, parallel to existing 34-inch-diameter and 24-inch pipeline. The easement route passes from Superior, Wisconsin; extending southeast through Douglas, Washburn, Sawyer, Rusk, Taylor, Chippewa, Clark, Marathon, Wood, Adams, Marquette, Columbia, Dane, Jefferson, and Rock counties (see Figure 1). The project proposal includes one 4.5 mile deviation from the existing ROW in Sawyer County to avoid crossing the Lac Courte Oreilles reservation.

The pipelines will be 42 inch and 20 inch diameter steel pipe. The overall pipeline system is being designed and constructed to allow a maximum operating pressure of 1,440 psi. The maximum operating pressure of the 42 inch petroleum line will be 1,275

psi, while the maximum operating pressure of the 20 inch diluent return line will be 1,260 psi. The pipeline will be operated as part of Enbridge's existing pipeline system.

The project cost is estimated to be $730 million for the 42-inch petroleum pipeline and $580 million for the 20-inch diluent return pipeline. Table 2 lists the milepost (MP) locations and length of pipeline to be constructed in each county and Wisconsin Department of Natural Resources (WDNR) administrative region.

To construct these pipelines, Enbridge must receive permits and approvals from various government agencies, including the Wisconsin Department of Natural Resources (WDNR). These are listed in Table 1. These actions are subject to the requirements of the National Environmental Policy Act (NEPA) and Wisconsin Environmental Policy Act (WEPA), whereby state and federal agencies must consider the environmental effects of their actions. This environmental assessment has been prepared to carry out that required analysis.

Table 2
Location of the Pipelines in Wisconsin
STAGE 1

WDNR Region/County	Mileposts by Region	Mileposts by County	Total Miles
Northern	0.0 – 112.3 114.9 – 135.2		**133.9**
Douglas		0.0 – 40.5	40.5
Washburn		40.5 – 59.6	19.1
Sawyer		59.6 – 83.2	24.9 1/
Rusk		83.2 – 112.3	29.1
Taylor		114.9 – 135.2	20.3
West Central	112.3 – 114.9 135.2 – 235.8		**103.2**
Chippewa		112.3 – 114.9	2.6
Clark		135.2 – 162.0	26.8
Marathon		162.0 – 166.9	4.9
Wood		166.9 – 205.1	38.2
Adams		205.1 – 235.8	30.7
Northeast	235.8 – 252.2		**16.5**
Marquette		235.8 – 252.2	16.5
South Central	252.2 – 321.1		**68.8**
Columbia		252.2 – 283.3	31.0
Dane		283.3 – 294.9	11.6
Jefferson		294.9 – 317.7	22.8
Rock		317.7 – 321.1	3.4
Project Total			**322.4**

1/ Enbridge has adopted a route alternative, which has added approximately 1.3 miles of pipeline length in Sawyer County. The Total Miles for Sawyer County has been adjusted to reflect this change; however, the beginning and ending milepost (Mileposts by County) have not been changed.

1.3 Right-Of-Way, Temporary Workspace and Temporary Extra Workspace Requirements

Enbridge owns and operates existing 34-inch and 24-inch diameter pipelines between Superior, Wisconsin and its Delavan pump station. The pipeline is installed in a permanent right-of-way (ROW) that is generally 80 feet in width and held by permanent easement grant. Enbridge maintains its existing 80-foot permanent ROW to provide access and enable aerial inspection.

Enbridge proposes to use a 140-foot-wide workspace to construct the pipelines, including part of the existing 80 foot right-of-way and an additional 100 feet of temporary workspace right-of-way (see Figure 2). Virtually all of the proposed pipeline will be installed within Enbridge's existing right-of-way, generally offset 15 to 20 feet from the existing pipeline. The 100 feet of temporary workspace will be adjacent to the existing 80-foot permanent pipeline easement.

In a few instances where existing constraints pose added challenges, an additional temporary extra workspace of up to 40 feet may be required. Temporary extra workspace will be generally required on each side of road, stream, river, railroad and some wetland crossings, and where it is necessary to cross under the existing pipeline or other utilities. Temporary extra workspaces will also be required for mobilization and demobilization at the beginning and end of each construction segment. Enbridge has been negotiating easements and easement conditions for this temporary workspace with affected private and public landowners.

For 258.1 of its 322.5 miles across Wisconsin (Milepost (MP) 2 to MP 88.2, and MP 174 to 345.9), the proposed pipeline will be on the west side of the nearest existing pipeline. Between MP .4 and MP 2, and again from MP 88.2 to MP 174.0, the proposed pipeline will be on the east side of the nearest existing pipeline. For approximately 44.4 miles the proposed pipeline will be adjacent to electric power lines.

No new land will be purchased for the proposed pump stations. The Superior pump stations will be installed within the existing fence line. At the other four stations, Enbridge would use no more than 3.0 acres of land outside of the existing fence lines to install the new equipment on property already owned by Enbridge. New mainline gate valves will be installed where appropriate along the proposed pipeline within Enbridge's existing pipeline right-of-way.

Enbridge has so far identified nine temporary storage areas (pipe yards) (see table 3) that will likely be used for construction in Wisconsin. Enbridge will notify WDNR in the event additional pipe yards are selected. The table below presents the locations of the currently proposed pipe yards:

Enbridge will also require storage and unloading areas, usually off the right-of-way, for equipment, pipe, and other materials. Nine pipe yard sites selected for these purposes are described in the table above. Other off right-of-way work areas, including contractor yards and storage areas, will be identified before construction and permission obtained from landowners before using them. Each storage area may be about 20 -50 acres. Following construction, Enbridge will retain its existing right-of-way and will restore and return the temporary right-of-way, including temporary extra workspaces and storage areas, to the landowners.

Table 3 Proposed Wisconsin Pipe Yards						
Name	County	Township	Range	Section	Quarter Section	Size
Northern Region						
Solon Springs (Solon Springs-Gordon Airport runway)	Douglas	T33N	R12W	Sec 1 Sec 12 Sec 12 Sec 12	SE ¼; SW ¼ NE ¼, NW ¼ SE ¼, NW ¼ NE ¼, SW ¼	15 A
Stanberry (Hwy 63)	Washburn	T41N	R10W	Sec 34	NW ¼, NW ¼	16 A
Ladysmith (STH 27 at USH 8)	Rusk	T35N	R6W	Sec 16	NE ¼, NE ¼	25 A
West Central Region						
Riplinger	Clark	T27N	R1E	Sec 7	N ½ , SW ¼	11 A
Wisconsin Rapids	Wood	T22N	R5E	Sec 1	E ½, NE ¼	19 A
Wisconsin Rapids - West Side Industrial Park (Engel Rd @ 25th Ave. N.)	Wood	T17N	R5E	Sec 12	NE ¼	25 A
Adams (SW of 14th Dr. @ Dearborn Dr. @ RR line)	Adams	T17N T17N	R6E R5E	Sec 7 Sec 12 Sec 12	NW ¼ , SW ¼ S ½ , NE ¼ NE ¼ , SE ¼	11 A
South Central Region						
Sun Prairie	Dane	T9N	R11E	Sec 2 Sec 2	SE ¼, NE ¼ SW ¼, NE ¼	30 A
Milton (Near CTH N @ Vickerman Rd)	Rock	T4N	R14E	Sec 6	SE ¼, SE ¼	16 A

1.4 Access

Enbridge proposes to access the right-of-way using existing public and private roads and does not anticipate creating new roads or substantially changing existing roads.

1.5 Construction Schedule

Construction is proposed to begin in the winter of 2006-2007 for a limited number of sites of special concern, after Enbridge obtains the necessary permits and approvals. These sites, termed Early Construction Areas (ECAs), include several river and wetland complex crossings, and two miles of pipeline through the Lake Arrowhead Golf Course and an associated residential area (see Table 4 and Figure 3.) The balance of construction is proposed to begin in the spring of 2007. Enbridge proposes to complete construction and begin operating the new pipelines by the first quarter of 2008. Restoration activities will be required immediately after construction and for several years afterward.

1.6 Early Construction Areas

Based on technical, economic, and environmental considerations, Enbridge has identified 10 select areas (Early Construction Areas) along the route that Enbridge proposes to construct beginning in the late fall or early winter of 2006. These select areas would be constructed using specialized contractors and construction methods. Enbridge has procured advanced delivery of limited pipe for construction of the current ECAs. Depending on the scope and need for additional ECA type construction, Enbridge will work with the WDNR to identify whether additional ECAs are feasible, based on the availability of contract resources, pipe and materials. The proposed Early Construction Areas (ECAs) will include approximately 37 miles of pipeline in select locations along the existing pipeline system and will include crossing 93 wetlands and 25 waterbodies.

Additional areas may be identified based on the same criteria listed above. If additional areas are selected for early construction, Enbridge will notify the applicable agencies of these selected locations prior to construction. The proposed ECAs are listed in Table 4 and are shown on Figure 3.

Table 4 Proposed Early Construction Areas					
Location	Approximate Milepost	County	Legal Description	Resource	Comments
ECA #1	0.0 – 6.9	Douglas	T49N R14W, Sec 36 T48N R14W, Sec. 1, 12 T48N R13W, Sec. 7, 18, 20, 29, 33	Seven streams including the Nemadji River and large Wetland Complex	Section 10 Navigable Waterbody
ECA #2	31.5 to 33.3	Douglas	T44N R12W Sec. 25, Sec. 36 T44N R11W Sec. 31	St. Croix River and Wetland Complex	
ECA #3	43.3 to 54.3	Washburn	T42N R11W, Sec. 14, 23, 24, 25, 36 T42N R10W, Sec. 31 T41N R10W, Sec. 6, 7, 8, 17, 20, 21, 28, 33, 34	Wetland Complex Two streams including the Namekagon River	Section 10 Navigable Waterbody Wild and Scenic River
ECA #4	83.2 to 92.6	Rusk	T36N R7W, Sec. 6, 5, 8, 22, 27 T35N R7W, Sec. 1, 2, 12	Wetland Complex Chippewa River	Section 10 Navigable Waterbody
ECA #5	99.8	Rusk	T34N R6W, Sec.16	Flambeau River	Section 10 Navigable Waterbody
ECA #6	118 – 120.4	Taylor	T32N R4W, Sec. 29, 28, 33 T31N R4W, Sec. 4, 3	Wetland Complex	
ECA #7	201.6	Wood	T21N R5E, Sec. 22	Wisconsin River	Section 10 Navigable Waterbody
ECA #8	207.9 – 209.9	Adams	T20N R6E, Sec. 18, 19, 20	Lake Arrowhead and Golf Course	
ECA #9	260.7 – 262.2	Columbia	T12N R10E, Sec. 5, 4	Fox River and Wetland Complex	
ECA #10	312.2 – 313.3	Jefferson	T5N R14E, Sec. 8, 17	Rock River and adjacent Floodplain Wetland	Section 10 Navigable Waterbody

1.7 Construction Methods

Special environmental construction practices required by Enbridge and by permits will be included in the construction contract specifications. These requirements, and any

special landowner conditions, will also be specified on a construction list that will be provided to pipeline construction crews, land agents, and Environmental Inspectors. These methods are described in relevant sections of this Environmental Assessment (EA) and in Enbridge's Environmental Management Plan (EMP).

The trench sizes will vary with field conditions, but typically would be six to 12 feet at the ground surface, four to six feet at the base, and six and one half feet deep, which leaves a minimum three feet of cover over the pipe. Based on the dimensions provided, the volume of earth removed would be approximately 2 cubic yards of material per foot of pipeline installed.

The 100-foot temporary workspace would be on the working side (non-spoil side) of the trench. The spoil pile will typically be placed on the opposite side of the trench, toward the existing Enbridge pipelines. This provides a buffer on Enbridge right-of-way to prevent spoil from spilling onto adjacent properties. Extra workspace will be acquired where excess spoil is generated and the standard construction right-of-way is not wide enough to contain the spoil, including bored road crossings, river crossings and similar areas. Extra workspace, as well as Enbridge's permanent easement area, will also be used to temporarily store topsoil until it can be replaced (see Figure 4.)

1.8 Environmental Mitigation Plan

As part of the application materials, Enbridge has developed an environmental mitigation plan (EMP) to specify measures that it will implement in order to minimize negative environmental impacts. A copy of the EMP may also be found at *www.enbridgepublicinfo.com*.

1.9 Construction Inspection

Adherence to environmental protection and mitigation measures requires diligent, full-time, onsite monitoring. Enbridge proposes to use its own Environmental Inspectors to ensure compliance with all environmental measures proposed in its EMP or required by federal or state permits. In addition the state will require independent third-party environmental inspectors on the project. Wisconsin DNR staff will have a role in hiring these inspectors.

2.0 ALTERNATIVES

2.1 No Action

If the project were not built as proposed, it is likely that Enbridge or another pipeline company or companies would develop proposals to construct pipelines along different corridors. Depending on the route or routes chosen, this would entail the clearing of

substantial new areas of land surface and the creation of new areas of forest, grassland and wetland habitat fragmentation. Construction and maintenance could open new areas to invasion by aggressive, non-native plant species.

Proposing a new major pipeline route could potentially create a far greater volume of landowner and citizen opposition to creation of a new linear corridor. This may act as a catalyst for a renewed consideration of an integrated approach to shaping statewide and multi-state/regional energy policies.

Impacts to wetlands, upland forests, grasslands, and agricultural lands attributable to construction would not occur along the existing corridor. However, it is likely these impacts would merely be displaced to another linear corridor, either in Wisconsin, or across Iowa and Illinois. The impacts of a new corridor may occur over a greater distance and more total acres that under the proposed project.

Delays in delivery of oil from the intended source in Alberta have the potential to create a need for simple conservation measure to constrain demand for refined petroleum products within near-term supply limitations. Given the latitude currently available in public policy, individual choices regarding energy use and conservation, and alternative sources of petroleum supply, it is impossible to predict whether delay of a new pipeline to the Midwest refineries would result in a decrease in petroleum use in the region below current levels. If that did result, there may be a slight decrease in local and regional air pollutants and a resultant decrease in premature deaths, lung diseases, and other health impacts. More people may embrace bicycles for commuting and local errands, with attendant health benefits, and others may establish ride-share arrangements for commuting and transportation to family recreational events.

2.2 Alternatives to Transport Crude Oil

Pipelines are recognized by the National Transportation Safety Board as by far the safest method of overland transportation, ranking hundreds of times safer to the public than trains or truck on a ton/mile basis. Pipelines are financed and built by private companies and do not require any substantial expansion of the public transportation infrastructure - such as highways, ports or other facilities needed by alternative modes of transportation (trucks, rail, barge, etc.). Transporting the planned 400,000 barrels per day would require long trips by about 2,000 transport tankers along public roadways each day. Transportation by truck or train is also substantially more costly than shipment by pipeline. Alternatives such as transport by large tankers (ships) is not an option to move crude oil from oil producing regions in Western Canada into the Midwest markets served by Enbridge's system.

Pipelines currently transport approximately 99% of all crude oil brought to refineries in this region. To significantly increase transport from the oil fields by truck or rail would

require substantial increases in current infrastructure, with attendant environmental impacts. Conversely, Enbridge's proposed pipeline will be installed within an existing, maintained right-of-way. Beyond the temporary impact associated with construction of the project, net long-term environmental impacts will be restricted to those presented in this EA. The pipeline will be powered by electric pumps supplied by existing electric utilities. Truck and train transport are energy inefficient compared to pipelines, and accordingly consume more fossil fuel and generate greater air pollution.

2.3 Alternative routes for the project

The oil to be transported by the project is produced in the oil fields of western Canada, while the demand is in the Midwest refining centers. Therefore, basic route alternatives are geographically constrained. Pipeline route selection weighs several factors and initially focuses on existing pipeline or utility corridors, which is the preferred method under both Federal Energy Regulatory Commission (FERC) policy and the general preferences of regulatory agencies. This approach limits further fragmentation of property and the environment, minimizes the overall number of property owners affected by the pipeline, and promotes public safety by providing common corridors, which allow more frequent right-of-way patrols and other inspections, and increases the likelihood that excavators will be aware of the facilities and be prompted to call the Wisconsin excavation one-call center (Diggers Hotline).

The route is then further evaluated utilizing numerous criteria, including:

- Environmental impacts
- Population density
- Constructability
- Impact to land use
- Miles to construct
- Future operation and maintenance considerations
- Cost to construct

Environmental impacts are extensively reviewed by the Company and regulatory agencies. For example, in the present process with the Wisconsin DNR, all the impacts of the pipeline are evaluated and numerous permits and authorizations are required. Balancing all factors, Enbridge maintains that the proposed route utilizing an existing pipeline right-of-way is superior to other alternatives.

2.4 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.

As of 2006, 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.

2.5 Alternative Construction Methods

Much of the review by WDNR and USACE staff has focused on alternative construction methods at wetland and waterway crossing locations. These methods and the associated impacts are discussed further in section 3.5 and 3.6 below.

3.0 EXISTING ENVIRONMENT AND ENVIRONMENTAL IMPACTS

3.1 GEOLOGY

3.1.1 Existing Geologic Resources

3.1 .1 .1 Physiography and Geology

The pipeline route passes across eight of Wisconsin's 16 Ecological Landscapes. These ecologically-delineated areas are the Superior Coastal Plain, Northwest Lowlands, Northwest Sands, North Central Forest, Forest Transition, Central Sand Plains, Central Sand Hills, and Southeast Glacial Plains. Wisconsin lies entirely within the North-Central Lake-Swamp Moraine Plains subdivision of the Interior Division of the United States. The landscape of this area has been shaped by several glacial advances and retreats, which have produced a variety of erosional and depositional landforms. The predominant surficial geology of the area consists of Wisconsinian age (12,000 to 10,000 years ago) glacial deposits. These deposits comprise glacial moraine till (64%), outwash (21%) and lacustrine deposits (15%) from 0 to 100 feet thick, but sometimes reaching depths of 400 feet or more.

The underlying bedrock includes Precambrian crystalline formations (approximately 2 billion years old) under the northern half of the state and Paleozoic sedimentary formations (600 to 400 million years ago) under the southern half of the state. Most of the proposed pipeline route will not encounter bedrock due to the depth of the overlying surficial deposits. About 1 2.5 miles of the pipeline route may have bedrock within 50 inches of the surface, but Enbridge's experience during construction of the existing pipeline indicates that bedrock contact will be extremely limited. Approximately 10.4 miles of the shallow bedrock are in Wood County. The rest is scattered along the route in 11 counties. Most of the shallow bedrock is soft, but approximately 3.2 miles are hard and will be difficult to excavate without blasting.

3.1.1.2 Mineral Resources

Exploitable mineral resources occur in the counties crossed by the pipeline route. These are primarily crushed stone, sand and gravel, and lime. Metallic minerals are not likely to be found at pipeline depth.

3.1.1.3 Geologic Hazards

Geologic hazards are not anticipated to be a significant factor in the construction, operation, or maintenance of the proposed facilities. Those with some likelihood of posing a risk to pipelines and associated facilities include seismicity, and ground failure.

The pipeline will cross several inactive faults in the Precambrian formations, however, seismicity is not a significant geologic hazard in Wisconsin. Only one earthquake with an

intensity greater than V on the Modified Mercalli Scale has been recorded within the state. This was the 1909 Beloit event with an intensity of VII. Such an event would strongly shake trees and shrubs and would be noticeable to people driving cars, but would only cause minor damage to well-built structures. The integrity of the proposed pipeline would not be affected by such an event.

Ground failure due to slumping or landslides may pose a risk on the steeper slopes. Slope, soil conditions, and precipitation are known to be major factors in slope stability. The risk of slope failure is highest in situations where fine-textured soils occur on steep slopes with an inclination greater than 30%. Under these conditions, ground disturbance from construction may cause zones of weakness that can fail when soils become saturated. Regionally, areas of potentially high susceptibility are limited to the Douglas County Red Clay Region in the first 15 miles of the pipeline, and steep approaches at stream bank areas along the pipeline route.

3.2 SOILS

3.2.1 Existing Environment

Soils were summarized according to important characteristics and limitations which influence the level of impact construction has on a soil. The pipeline will cross approximately 162.6 miles of prime farmland soils. These soils possess few limitations and are highly suitable for agricultural uses. With proper construction practices, the impact of pipeline construction on prime farmland soils can be minimal, and generally less than on more limited soils.

High erodibility is the primary limitation of the soils that will be crossed. Approximately 152.9 miles of the soils crossed by the pipeline route are classified as highly erodible either by wind or water. Droughtiness is the second most common limitation, and dry soils comprise approximately 101 .3 miles of the pipeline route. Other major limitations include rockiness and susceptibility to compaction along 52.3 and 32.0 miles of the pipeline route, respectively.

Northern Region

Prime farmland soils comprise approximately 43.1 miles or 33% of the pipeline route in the Northern Region. The pipeline will cross about 81.2 miles of soils in the Region that are highly erodible by either wind or water, mostly in Douglas, Washburn, and Sawyer Counties. Droughty or dry soils are also common in all but Taylor County, comprising approximately 39.5 miles of the pipeline route. Hydric soils occur along 33 miles of the route. Rocky soils are most prevalent in Washburn County and compaction-prone soils are most common in Douglas County.

West Central Region

Nearly all of the soils crossed by the pipeline in the West Central Region (about 55.1 miles) are prime farmland soils, which are most common in Wood County. Rocky or stony soils, along approximately 12.3 miles of the pipeline route, are the most common limitation in the Region. There are approximately 26.3 miles of hydric soils along the proposed route. Other limitations are uncommon, comprising only a small portion of the proposed route in this Region.

Northeast Region

Approximately six and one-half miles (40 percent) of the soils that are crossed by the route in the Northeast Region are prime farmland soils. Susceptibility to wind erosion and droughtiness are common soil characteristics in this region, comprising 8.3 and 3.5 miles of the route, respectively. The majority of these erodible soils are in Adams County. Hydric soils account for approximately 6.0 miles of the project area in this region.

South Central Region

Approximately 37.5 miles of the soils crossed in the Southern Region are prime farmland soils. High erodibility by either water or wind is the most prevalent limitation, accounting for 33.1 miles of the pipeline route. Doughtiness and susceptibility to compaction are less common but comprise approximately 4.7 and 7.8 miles within the region, respectively. Rocky or stony soils are not common, occurring along only 2.3 miles of the route in this region. There are 13.6 miles of hydric soils along the route in this region.

3.2.2 Potential Construction Impacts to Soils

3.2.2.1 General Construction and Operational Impact

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.

3.2.2.3 Mitigation of Soil Impacts

Provisions in the construction specifications should minimize impacts to soils. All of the proposed new pumps will be installed at existing pump stations and the pipeline right-of-way will be allowed to revert to its previous use; therefore, impact to and loss of prime farmland soil will be negligible. Enbridge proposes to minimize other impacts on soils by using the measures described in its EMP and summarized as follows.

Inspection and Supervision

Successful implementation of environmental mitigation measures requires careful monitoring by full-time, onsite personnel. Enbridge proposes to use Environmental Inspectors to ensure compliance with all environmental measures proposed in its EMP or required by federal or state permits.

Erosion Control

Enbridge proposes to install temporary erosion control devices as soon as possible; no more than 24 hours after soil disturbance. They will be inspected and maintained on a regular basis in areas of active construction, on a weekly basis in areas with no construction, and within 24 hours of a precipitation event of 0.5 inches or greater which results in runoff during active construction periods. Damaged temporary erosion control structures will be repaired within 24 hours of detection.

Slope Breakers - Enbridge proposes to construct slope breakers when necessary across the pipeline right-of-way to slow runoff and move water off the right-of-way. Temporary slope breakers (hay bales, silt fence, and/or earth berms) will be used during construction, and permanent slope breakers will be installed during final grading following backfilling. Permanent slope breakers will only be installed in farm fields and residential areas if requested by the landowner.

Temporary Sediment Barriers - Sediment barriers are temporary erosion control devices such as silt fences and staked hay or straw bales. They protect surface waters and roadways by controlling the flow of sediments on the right-of-way and by preventing the flow of sediments off the right-of-way. Enbridge proposes to install and maintain these devices at the base of slopes adjacent to road crossings, stream crossings, wetlands, and other areas as necessary until permanent revegetation measures have been judged successful and the potential for siltation has passed.

Permanent Trench Breakers - Trench breakers are typically installed to prevent subsurface channeling of water along the trench. They are constructed of sacks of soil or sand installed around the pipe from the bottom of the trench to a point just below the ground surface. Permanent trench breakers will be installed on slopes before backfilling. Topsoil will not be used for trench breakers. The spacing of trench breakers will be determined according to the characteristics of the slope. Trench breakers will also be installed on slopes adjacent to waterbodies and wetlands.

Timing - To minimize the duration of soil disturbance, Enbridge proposes to make every effort to begin cleanup, rough grading and installation of permanent erosion control measures as soon as practicable after backfilling the trench.

3.2.2.4 Protection of Topsoil

Unless requested otherwise by the landowner, during construction Enbridge proposes to strip and segregate topsoil in agricultural lands (cropland, hayfields and pasture), residential areas, and golf courses. Topsoil will be stripped either from the full width of the right-of-way, ditch plus spoil side area, or trench line only. Topsoil will also be stripped in wetlands that are of mineral soils.

Normally, no more than 12 inches of topsoil would be stripped, unless requested otherwise by the landowner, if less than that depth is present, Enbridge will attempt to save what is there. During construction, the stripped topsoil will be stored separately on the right-of-way and not allowed to mix with trench spoil. Following backfilling and rough grading of the right-of-way, the stripped topsoil will be returned to its original position. Topsoil will not be used to pad the pipe or for trench breakers.

Topsoil would not be stripped within the 100-foot temporary work space or any 40-foot extra workspace because it is outside the trench and spoil area. Consequently, except for those areas where grading is needed, the topsoil in the temporary construction right-of-way will be disturbed only by equipment traffic and can be expected to remain in place after construction. As it reverts to forest vegetation, the original topsoil will be present to facilitate the re-establishment of understory species.

3.2.2.5 Compaction and Rutting Mitigation

Under certain moisture conditions, equipment traffic on the right-of-way could cause rutting and soil compaction. These effects, if uncorrected, could have a serious impact on agricultural lands. Enbridge proposes to minimize compaction by suspending some construction activities in these conditions. This decision will be based upon consideration of several factors, including plasticity of surface soil; location and depth of the wetting front; extent of surface ponding; extent and depth of rutting; extent and location of rutting and compaction; and type of equipment and nature of construction operations. Additionally, Enbridge proposes to alleviate rutting and soil compaction by plowing these areas with a chisel plow, paratill, or other deep tillage implement.

3.2.2.6 Rock Removal

Pipeline construction could introduce excess rock into the topsoil during trenching, blasting, and grading activities. In agricultural lands, residential areas, and golf courses, Enbridge proposes to remove, to the extent practicable, excess rock greater than 4 inches in size from the top 12 inches of soil until the size and density of rock on the right-of-way are similar to adjacent undisturbed lands.

Blasting may be necessary if the route encounters bedrock within 6 feet of the ground surface. Because an operating pipeline is adjacent to the proposed trench line, blast

charges would be sized to minimize disturbance beyond the trench line. This should minimize environmental impacts. Potential environmental impacts from localized rock blasting could include disruption of groundwater flow and reduction in the yield and water quality of water supply wells. Blasting at river or stream crossing sites could cause injury or mortality of fish that are present at the blast site. Before rock blasting, Enbridge would determine whether water supply wells are located in the vicinity, and design the blast plan accordingly. If blasting is necessary and results in any documented impacts to water wells, Enbridge would repair or replace the well, or would compensate the landowner appropriately.

3.2.2.7 Agricultural Drainage Systems

If drain tiles are encountered in agricultural areas, the cut ends will be covered to prevent them from being obstructed with soil, rock, and other debris. Following installation of the pipeline, drainage tiles will be internally probed to check for damage beyond the limits of the trench. Damaged tiles will be repaired to their original or better condition as soon as practicable after installation of the pipeline.

3.2.2.8 Irrigation Systems

The pipeline will cross about 4.4 miles of pivot irrigation systems. Enbridge proposes to contact the owners of these systems and either schedule construction outside of the irrigation season, maintain the flow of these and any other crop irrigation systems that may be crossed, or temporarily shut them off. Landowners/farmers would be compensated for any crop losses that result from disruption of irrigation systems. Damaged systems will be repaired or replaced as soon as practical after installation of the pipeline.

3.2.2.9 Restoration of Contours

Enbridge proposes to restore original contours and will construct a slight crown over the pipeline to allow for natural soil subsidence after backfilling; except in wetlands, swales, or drains where it might interfere with natural drainage patterns.

3.2.2.10 Livestock and Landowner Access

Enbridge proposes to maintain existing livestock controls by installing temporary fences or gates across the right-of-way until permanent repairs can be made. If pipeline construction limits access to cropland and grazing areas located off the right-of-way, Enbridge would bridge the trench to enable farm animals and equipment to cross the right-of-way or make other accommodations to minimize inconveniences.

3.2.2.11 Soil Additives

Following final grading and cleanup, Enbridge will condition the right-of-way for planting. This will include preparation of a seedbed and application and incorporation of

lime and fertilizer into the soil at rates determined in consultation with state and federal agencies and landowners. No soil additives will be applied in croplands or wetlands.

3.2.2.12 Seeding and Mulching

Enbridge proposes to seed all disturbed non-cultivated areas except saturated wetlands. Seed mixes, application rates, and stabilization will be determined by Enbridge in consultation with appropriate state and federal agencies and landowners, based on the amount of disturbance, plant community, and soil moisture. Specifics on the seed mixes for revegetation are in the Enbridge Vegetation Management Plan and will be included in permit conditions.

3.2.2.13 Manure Management for Disease Control

Enbridge will work with farmland owners to minimize the risk of spreading manure between farm parcels.

3.3 VEGETATION

3.3.1 Vegetation Cover

The proposed pipeline will cross seven ecological landscapes. Each landscape supports some amount of historical vegetation cover as opposed to agricultural and urban development. For a more detailed description of wetland types within the project area, refer to Section 3.6.1.

The **Superior Coastal Plain** extends through the northern portion of Douglas County. The major landform in this ecological landscape is a nearly level plain of lacustrine clays that slopes gently northward toward Lake Superior. The mouths of many of the streams entering Lake Superior are submerged, creating freshwater estuaries. A ridge of volcanic igneous rock, primarily basalt, forms the southern boundary of portions of this Ecological Landscape. The historical mixed conifer-aspen-poplar boreal forest has been fragmented by agricultural use, and today approximately one-third of this landscape is non-forested. Most of the open land is in grass cover, having been cleared and then subsequently pastured or plowed. Aspen and birch forests now predominate over the boreal conifers.

The **Northwest Sands** ecological landscape that extends through southern Douglas and parts of Washburn County is a large glacial outwash system consisting of flat plains or terraces along glacial meltwater channels, and pitted or "collapsed" outwash plains containing kettle lakes. Soils are deep sands, low in organic material and nutrients. Historic vegetation was dominantly jack pine and scrub oak forest and barrens with some white and red pine forests. Current vegetation is a mix of pine, aspen-birch and oak forest, agriculture, and grassland with some wetlands in the river valleys. Within the

open lands, there is a relatively large proportion of grassland and shrubland, a small but locally important amount of emergent/wet meadow and open water, and very little row-crop agriculture.

The **North Central Forest** ecological landscape occupies much of the northern third of Wisconsin through parts of Washburn, Rusk, Sawyer and Taylor Counties. Its landforms are characterized by end and ground moraines with some pitted outwash and bedrock controlled areas. Kettle depressions and steep ridges are found in the northern portion. Soils consist of sandy loam, sand, and silts. The vegetation is mainly forest, with many wetlands and some agriculture, though the growing season is not as favorable as it is in southern Wisconsin. The historic vegetation was primarily hemlock-hardwood forest dominated by hemlock, sugar maple, and yellow birch. Hemlock has become a minor component of forests due to over-harvesting and lack of regeneration and now the northern hardwood forest is made up of primarily sugar maple, basswood, and red maple, and also including some scattered hemlock and white pine pockets within stands. The aspen-birch forest type group is also relatively abundant, followed by spruce-fir. A variety of forested and non-forested wetland community types also are present.

The **Forest Transition** covering parts of Taylor, Marathon and Wood Counties was primarily northern hardwood forest hardwoods dominated by sugar maple and hemlock, and contained some yellow birch, red pine and white pine. Currently, over 60% of this ecological landscape is non-forested. Forested areas consist primarily of northern hardwoods and aspen, with smaller amounts of oak and lowland hardwoods. Throughout this Ecological Landscape, small areas of conifer swamp are found near the headwaters of streams, and associated with lakes in kettle depressions on moraines. Ground flora show characteristics of both northern and southern Wisconsin, as this ecological landscape lies along the Tension Zone.

The **Central Sand Plains** ecological landscape, located in central Wisconsin through parts of Wood and Adams Counties, occurs on a flat, sandy lake plain, and supports agriculture, forestry, recreation, and wildlife management. This ecological landscape formed in and around what was once Glacial Lake Wisconsin. Soils are primarily sandy lake deposits, some with silt-loam loess caps. Sandstone buttes carved by rapid drainage of the glacial lake, or by wave action when they existed as islands in the lake, are distinctive features of this landscape. The historic vegetation of the area included extensive wetlands of many types, including open bogs, shrub swamps, and sedge meadows. Prairies, oak forests, savannas and barrens also occurred in the Ecological Landscape. Today, nearly half of the ecological landscape is nonforested, in agriculture and grassland. Most of the historic wetlands were drained and are now used for vegetable cropping. The forested portion is mostly oak-dominated forest, followed by aspen and pines.

The **Central Sand Hills** ecological landscape extends into portions of Columbia and Adams Counties at the eastern edge of what was once Glacial Lake Wisconsin. The area is characterized by a mixture of farmland, woodlots, wetlands, small kettle lakes, and cold water streams, all on sandy soils. Historic upland vegetation consisted of oak-forest, oak savanna, and tallgrass prairie. Fens were common in this ecological landscape and occurred along with wet-mesic prairie, wet prairie, and rare coastal plain marshes. Current vegetation is composed of more than one-third agricultural crops, and almost 20% grasslands with smaller amounts of open wetland, open water, shrubs, barren, and urban areas. The major forested type is oak-hickory, with smaller amounts of white-red-jack pine, maple-basswood, lowland hardwoods, aspen-birch, and spruce-fir.

The **Southeast Glacial Plains** ecological landscape makes up the bulk of the non-coastal land area in southeast Wisconsin including portions of Columbia, Dane and Jefferson Counties. Most of this Ecological Landscape is composed of glacial materials deposited during the Wisconsin Ice Age. Soils are lime-rich tills overlain in most areas by a silt-loam loess cap. Most of the rare natural communities that remain are associated with large moraines or in areas where the Niagara Escarpment occurs close to the surface. Historically, vegetation in the Southeast Glacial Plains consisted of a mix of prairie, oak forests and savanna, and maple-basswood forests. Wet-mesic prairies, southern sedge meadows, emergent marshes, and calcareous fens were found in lower portions of the landscape. The current vegetation is primarily agricultural cropland. Remaining forests occupy only about 10% of the land area and consist of maple-basswood, lowland hardwoods, and oak. No large mesic forests exist today except in areas that have topography too rugged for agriculture. Some existing forest patches that were formerly savannas have succeeded to hardwood forest due to fire suppression.

3.3.2 Impacts to Vegetation

The primary impact of pipeline construction to vegetation will be the clearing for the proposed temporary workspace of approximately 1,939 acres of forest and an additional five acres for installation of the proposed pump stations. Most of this clearing would be in Douglas, Washburn, Rusk, Wood and Adams Counties. This will contribute to cumulative forest fragmentation from many human activities throughout the state. The Enbridge pipeline is generally collocated with a large transmission line occupying a 120-foot wide ROW from milepost (MP) 3.5 to MP136. In this segment, wherever forest clearing occurs in the temporary workspace, the result is a 300 foot-wide corridor. Each forest patch will be reduced in size, causing a decline in integrity, and possibly diversity, in the forest patches. Whether the impact is temporary or permanent depends on the forest type and ecology of the site.

When considering the effect of the project on "undisturbed" areas such as 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. Tree clearing will be noticeable within the 100-foot temporary workspace. Disposal of and management of cut wood and woody debris will be, in part, determined by the landowner. Measures may include mulching or chipping, burning or stockpiling. Burning permits and fire safety practices will have to be followed to minimize impacts. Segments where burning of woody debris is undertaken should be selected keeping in mind the forest and ecological conditions at the site. If the biological community is not adapted to this mechanism fire may impact soil conditions and limit natural revegetation.

The post-construction outcome of the temporary workspace is, in part, subject to landowner approval. If left alone, portions of the temporary workspace and temporary extra workspace may:

- be actively converted by landowners to other uses (e.g., replanting with clover for deer management)
- revegetate to a similar community structure and composition after an undetermined number of years
- revegetate to a different community because the plants originally there are unable to reestablish under cleared conditions,

Therefore, it cannot be asserted that temporary workspace will revert to its preconstruction state without landowner consent and without the commitment to active restoration along some portions of the corridor. Some disturbed areas will be restored and seeded with grasses. On page 3-28 of Enbridge's EIR, they indicate that "all of the land outside of the existing right-of-way will be restored, reseeded and allowed to revert to its preconstruction state." However, the Revegetation Plan is vague on the issue as to what extent and where active restoration of the temporary workspace will occur. Determining which sites will require seeding or some other form of restoration should be outlined in Enbridge's Revegetation Plan. 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. Construction on DNR properties may require replanting at the property managers' discretion. Within the 80-foot-wide portion of permanent right-of-way reestablishment of trees is prevented through periodic maintenance.

In addition, post-construction monitoring and management will be needed after restoration (typically 3-5 years) to ensure that natural communities sensitive to clearing

disturbance are reestablished. Enbridge in consultation with the WDNR should indicate in their Revegetation Plan and the mitigation plan those natural community types and MP segments where active restoration and post-construction monitoring and management will be implemented.

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. Still, all upland areas that are currently undisturbed (i.e., where natural communities are present) will be stressed by vegetation clearing and heavy machinery traffic and therefore, more susceptible to invasion by invasive species.

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. 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. These effects will vary in their severity, depending on the ecological conditions at the site. In general, more disturbed communities are more likely to recover with minimal impact.

Exotic plant species should be monitored and discouraged throughout the pipeline route, especially in natural communities. Weed-free mulch and erosion control material should be used. Enbridge will attempt to obtain mulch from local sources to avoid introducing weed species that are not currently present in the area. 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.

3.3.3 Natural Plant Communities

The Natural Heritage Inventory (NHI) database was used to identify natural plant communities within sections of townships and ranges that will be crossed, and could be affected. These communities are identified in Table 5. The NHI database is incomplete, and therefore, this table is also likely to be incomplete. The WDNR knows from previous utility projects undertaken along this corridor as well as County foresters, aerial photos and other WDNR staff that other natural communities or segments with the natural communities listed in this Table are likely to be present along the ROW. This includes approximately 262 acres of wooded wetland, which includes tamarack and black spruce forest and bogs, both of which are identified by the WDNR as rare natural communities. Wetland acreage impacts are summarized in a table provided in Section 3.6. Enbridge

did not complete a field assessment of natural communities along the entire route, but only portions of the route where rare animal species could be present.

Table 5

Documented Natural Plant Communities Located in Sections Crossed by the Proposed Pipeline
STAGE 1

WDNR Region/County	Community	Survey Site	Nearest Mileposts
Northern			
Douglas	Pine Barrens	Solon Springs Sharptail	28.8 – 29.0
Rusk	Northern Mesic Forest	Barrens	111.2 – 111.6
		Mill's Hardwoods	
West Central			
Wood	Northern Wet Forest	Nekoosa Bog	197.3 – 198.3
Adams	Northern Wet Forest	Little Roche-A-Cri Creek	222.8 – 223.8
Northeast			
Marquette	Dry Prairie	Pasque Flower Prairie	242.0 – 242.7
	Calcareous Fen	Summerton Bog-South	245.6 – 245.9
	Wet Mesic Prairie	Kotek Prairie	250.5 – 251.2
South Central			
Columbia	South Central Sedge Meadow	French Creek Fen	255.4 – 256.4
	Calcareous Fen	French Creek Fen	255.4 – 256.4
	South Central Dry Forest	Ostego Oak-Maple Woods	273.25 – 273.75

WDNR staff continues to work with Enbridge to specifically address impacts to natural communities that exist on state lands. Additional field inspections may be needed along portions of the route to determine to what extent these or other natural communities will be crossed. Construction impacts to natural communities are most important within the 100 feet of temporary workspace and extra workspace outside of the existing maintained right-of-way. The 100 foot temporary workspace is not a minimization measure in itself. The temporary workspace will impact natural communities along the route. The environmental impact of corridor clearing is related to the type of community, width, length and particular plant or animal species. As noted in the previous Section 3.3.2, the greatest impact will be to forested communities in uplands or wetlands where tree loss will alter the composition, structure and other ecological characteristics of the community.

WDNR staff continues to work with Enbridge to determine corridor segments and measures to reduce the temporary workspace as well as minimize disturbance to soils and vegetation in the construction footprint.

3.3.4 Federally Endangered or Threatened Plants

U.S. Fish and Wildlife Service (FWS) in their 2 September 2005 correspondence to Enbridge identified three federally listed threatened plant species known to occur in the counties crossed by the proposed project: prairie bush clover, Meads milkweed and the eastern prairie fringed orchid. The FWS indicated that none of the three plant species are known from the vicinity of the project area. Enbridge concludes from this statement that impact to these species will not occur. Presence cannot be precluded without completing a habitat assessment to determine if suitable habitat for these species is present. Enbridge should complete a habitat assessment along the pipeline route in the counties identified by FWS to determine if suitable habitat for these species is present. The prairie bush clover, which is also a state listed endangered species, prefers gravelly or sandy hillside prairies. The eastern prairie fringed orchid, which is also a state listed endangered species, prefers moist, undisturbed, deep-soiled and/or calcareous prairies, and is more rarely found in tamarack fens.

3.3.5 State-Listed Endangered, Threatened, or Special Concern Plants

This Section summarizes the WDNR's coordination with Enbridge on rare plants that might be impacted by the project. This effort is incomplete: additional surveys may be completed prior to disturbance along the pipeline route as construction progresses; and monitoring by environmental inspectors during construction may also identify rare species. In this respect, WDNR continues to work with Enbridge to identify and address potential rare plant impacts as described below. Information from the earlier 1998 Lakehead SEP-2 project (one of the two existing pipelines in the 80-foot ROW) and current NHI data were used to identify occurrences of rare plants located in sections of townships and ranges within 2 miles of the proposed pipeline route, including recent (identified within last 25 years) occurrences of plants for which locations are less precise (within five miles). This search identified 35 species. Twelve of these species were last recorded near the pipeline more than 25 years ago and development has likely removed much of the suitable habitat.

Surveys completed by Enbridge in 2005 address rare plants along only a portion of the project as a result of screening for the looping project, before the project was converted to a continuous pipeline. Enbridge surveyed along the northern portion of the pipeline route between Superior and the St. Croix River (portions from MP 15 to MP 33.4). Although appropriate habitats and conditions were observed for many of the target species, no rare species were encountered throughout the study area. The WDNR

accepts the findings of that survey; however, Enbridge should reconcile the negative results of the 2005 survey with the positive results of the surveys completed in 1996. Those surveys identified nine state-listed plant species on the proposed right-of-way. These included the small yellow water crowfoot, a state listed endangered species; New England violet and arrowhead sweet coltsfoot, both state-listed threatened species; and six state listed special concern species: Flodman's thistle, tea-leaved willow, sparse flowered sedge, showy lady slipper orchid, clustered bur reed, and Vasey's rush.

Enbridge subsequently reviewed the NHI database for the entire project. Enbridge also provided the WDNR with an endangered resources screening for the entire pipeline; and subsequently they submitted an Endangered Species Survey and Mitigation Plan (Plan).

In their 25 August correspondence to Enbridge regarding the Plan, WDNR indicated that there are many listed and special concern plant species that may occur throughout the length of the project. The rare plant survey completed in Douglas County provides an adequate assessment of potential impacts in the survey area, but not other counties. Incidental observations during the wetland delineations as proposed in the Plan may not be an adequate method for identifying rare plant species because the tendency is to focus only on associated dominants, ignore microhabitats, and does not address upland species. The Plan does not propose additional surveys. In that correspondence WDNR recommended that Enbridge:

- provide the full list of plant species in Table G-2 of the EIR, including special concern species (NHI review protocol does not exclude special concern species)
- group the species by community/habitat types
- review the wetland delineations to identify important natural communities (i.e., moderate to high diversity, bogs, coniferous wetlands, large contiguous wetland areas)
- provide a screening for potentially suitable habitat locations for upland species (i.e., focusing on public lands, like the segments on the Douglas County rare plant survey near the Douglas County Wildlife Area or lands with conservation easements), and
- consult further with WDNR on focus areas that may be flagged for pre-construction surveys or impact avoidance and minimization measures such as reducing temporary workspace.

In general, the primary measures to address potential impacts to rare plant species is to identify populations of rare species in the field and avoid these areas through reduction or modification of the workspace and use of alternative access routes. Rare forest plants are the most susceptible to project impacts, because loss of tree cover will alter habitat conditions such as light, moisture and temperature that will make the site unsuitable for their success. Impacts to rare wetland plant species are minimized

through the same measures used to minimize wetland impacts in general, i.e., winter construction, low impact vehicles, topsoil segregation, etc. These measures are described in Section 3.6.4.

3.4 WILDLIFE

3.4.1 Existing Wildlife

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 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.

3.4.2 Impacts to Wildlife

Installing and operating the proposed facilities will cause both 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.

Unlike the 1998 SEP 2 project, much more land will be affected in non-agricultural areas due to the proposed temporary workspace. Approximately 2,160 acres of non-agricultural and non-open land will be affected, approximately 1,932 acres is forested. As noted in Section 3.3.3. Clearcut vegetation within the temporary easement may take many years to reestablish and will not reestablish to preconstruction conditions on its own in all cases. The short-and long-term impacts to wildlife habitat will depend on the plant community and ecology of the site. 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 wildlife species. Rare species that prefer dense canopy or mature trees are generally not benefited. Some rare species such as the Karner blue butterfly (federally endangered) thrive in the protected open space of the ROW because its host plant, wild lupine, also prefers these areas. The opening created by width of the temporary workspace in addition to the permanent easement and the adjacent transmission line ROW will impede the movement of forest dwelling animal species. In this respect, small animals and insects are more vulnerable to the barriers presented by ROWs.

Wildlife impacts in 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 is necessary to ensure that areas are appropriately restored and revegetated to reduce the potential for the pipeline to have a permanent effect on species using these habitats.

3.4.3 Federally Listed Endangered or Threatened Wildlife

The FWS identified six federally endangered or threatened wildlife species known to occur in the counties crossed by the proposed pipeline. These include the bald eagle (federally threatened, state special concern), Higgin's eye pearly mussel (federally endangered, state endangered) Kirtland's warbler (federally endangered, state special concern), piping plover (endangered, state endangered), gray wolf (federally endangered, state threatened), and Karner blue butterfly (federally endangered, state special concern). Three of these species, the bald eagle, gray wolf, and Karner blue butterfly, are known to occur near or within the pipeline route.

The piping plover prefers large isolated cobble beaches on the shores of Lakes Michigan and Superior. Suitable habitat for this species is unlikely to be present in the project area. Kirtland warbler prefers approximately 30 hectares or more of scrubby jack pine (2 to 6 meters high) interspersed with many small openings and minimal ground cover. This species is unlikely to use forest edges for nesting. Most of the pipeline route through forested land is on private or county land that has not been surveyed. So while

impacts to this species is unlikely, WDNR is working with Enbridge to evaluate forested areas along the route and determine where the temporary workspace or restore temporary workspace can be implemented in forested areas (see Other Birds below).

Bald Eagle - Federal Threatened, Wisconsin Threatened

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.

The bald eagle *(Hallaeetus leucocephalus)* is known to occur in Douglas, Washburn, Sawyer, Rusk, Taylor, Chippewa, Clark, Marathon, Wood, Adams, Columbia, and Dane Counties, Wisconsin. Most bald eagle nests near the pipeline route are sufficiently distant (more than 0.25 mile) from the pipeline route to preclude disturbance of nesting bald eagles. However, bald eagle territories with nesting sites that may be less than 0.25 mile from the pipeline route are known near the Wisconsin River in Adams and Wood Counties. Another bald eagle nesting territory is near the pipeline route in Sawyer County. Enbridge proposes to work with the FWS to determine what mitigation, if any, will be necessary to avoid adverse effects on the bald eagle. Possible mitigation may include conducting surveys before construction to determine if any bald eagle nests within 0.25 mile of the pipeline route are active and/or avoiding construction within 0.25 mile of active nests during the bald eagle's nesting season between February 1 and August 15. One other key issue with eagles to address is to look at territories and make sure that the right-a-way expansion is not going to impact future recruitment of nest trees. In Douglas County the St. Croix crossing and south may be important to look at. Future nest trees need to be in clumps to lower the chance of blow down.

Gray Wolf - Federal Endangered, Wisconsin Endangered

The gray wolf *(Canis lupus)* is known to occur in large areas of forestland in Douglas, Washburn, Sawyer, Rusk, Taylor, and Clark Counties, Wisconsin. 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.

Enbridge consulted with the WDNR in 2006 to get current information on wolf den and rendezvous sites. Enbridge was provided a list of milepost segments along the pipeline route in known gray wolf range in Douglas, Washburn, Sawyer, Rusk and Adams Counties. No den or rendezvous sites have been recorded near the pipeline route. However, the exact locations of these sites remain unknown unless the area is thoroughly searched. To ensure the gray wolf is not adversely affected, if wolf activity is seen within the project area during construction, Enbridge will notify WDNR immediately to assist in finding any possible dens nearby; the environmental inspectors will have a list of the nearest mileposts to wolf territory locations to watch for possible wolf den presence; and, if a den is located during construction within ½ mile of the project area the construction timing restriction of March 1 – July 31 will be enforced.

Karner Blue Butterfly (KBB) – Federal Endangered, Wisconsin Special Concern

The Karner blue butterfly *(Lycaeides melissa samuelis)* is known to occur within sporadic locations in Enbridge's ROW in locations in central Wisconsin in Wood and Adams Counties. Enbridge had conducted extensive surveys for lupine and KBB between 1996 and 2003 and in 2006 they completed additional surveys along portions of the line that had not been adequately covered in previous surveys.

KBB surveys completed by Enbridge were scheduled from June through August to coincide with the flowering period for the KBB's only known host plant, wild lupine (*Lupinus perennis*) and the butterfly's flight periods. Initial surveys were completed to find wild lupine patches and potential butterfly sites. Subsequent surveys were completed when the butterfly was in flight to determine if KBB was actually present within a habitat area.

Enbridge is participating in the Karner Blue Butterfly Habitat Conservation Plan (HCP). As a participant in the HCP, Enbridge has incidental take authorization from the FWS for KBB-occupied lands included in Enbridge's Species Habitat Conservation Agreement (CA). As part of the CA, when disturbance and potential take will occur on KBB-occupied lands a project-specific mitigation plan must be submitted to the WDNR's KBB HCP Coordinator. The project will result in temporary impacts to the species and its habitat; however, the species is disturbance dependent and open ROWs such as the Enbridge pipeline help to sustain habitat for KBB. Enbridge has submitted a mitigation plan to the WDNR, which will be approved once Enbridge is able to provide a final estimate of the amount of KBB habitat that will be affected. The mitigation plan includes measures to avoid and minimize take and to restore affected KBB habitat based on established guidelines for temporary impacts. More information on KBB and these guidelines can be found at http://dnr.wi.gov/org/land/forestry/karner/.

3.4.4 State-Listed Endangered, Threatened, or Special Concern Wildlife

As with state-listed plant species, the WDNR and Enbridge continue to work together to complete surveys and define and implement measures to avoid and minimization impacts to rare wildlife species. These actions are summarized by species or group of species below.

Enbridge used WDNR NHI data to identify known occurrences of rare wildlife species in townships within 2 miles of the pipeline route. This search identified 28 species which include: five birds, one mammal, six fish, three turtles, two snakes, eight dragonflies, and three butterflies. Of these, three fish species, the redfin shiner, greater redhorse and weed shiner were last observed near the pipeline route more than 25 years ago. Nine others were observed in townships not crossed by the proposed pipeline.

State and federal agencies have identified site-specific concerns regarding the greater prairie chicken, the western slender glass lizard, rare mussels, rare dragonflies, two rare turtle species, red-shouldered hawk, and osprey as described in this section.

Greater prairie-chicken, Wisconsin Threatened

The Greater prairie-chicken *(Tympanuchus cupido)* is found in Clark and Marathon Counties. It's preferred habitat changes with the seasons. Courtship activities occur in the spring in open areas of short vegetative cover known as booming grounds; nesting occurs in dense, undisturbed vegetative cover that is 11 to 14 inches high; and it feeds in croplands and burned areas. In the summer, the prairie-chicken prefers open and shrubby habitats that have been disturbed by burning, grazing, or haying. In the fall and winter, croplands and disturbed areas that provide winter food are used.

The pipeline will be within 0.5 mile of breeding and nesting grounds at two milepost locations in Clark, Marathon and Wood Counties County, and one in Marathon County. Breeding prairie-chickens may be disturbed by any construction activities that can be seen from these areas, and WDNR has recommended that no pipeline construction occur near these two areas between March 1 and July 15. During that period, all activity should be kept outside the two defined locations. Enbridge will ensure that the permanent workspace is restored to conditions that are beneficial to the prairie chicken. With landowner consent, similar measures may be implemented in the temporary workspace.

Western slender glass lizard, Wisconsin Endangered

The Western slender glass lizard (*Ophisaurus attenuatus*) prefers oak savannas, dry-sand prairies, grasslands, and woodland edges. The breeding season occurs from June through August, but the species is active from May through September. Slender glass

lizards are diurnal, which means they are most active during the day. In summer, the insects that provide their main food source tend to be inactive during the heat of the day, so the glass lizards do most of their foraging between 3:00 and 7:30 p.m. This species is difficult to survey for; it spends much time underground and is therefore seen less often than would be expected. However, one lizard was observed during surveys completed in 2006 along the pipeline route. The pipeline ROW and adjacent temporary workspace both contain potentially suitable habitat along segments of the route in Adams County and southern Wood County.

During construction heavy equipment will compact and otherwise disturb soil both in the temporary and permanent work area. The WDNR has determined that incidental take of the species may occur. Refer to the section below on dragonflies and the following website: http://www.dnr.state.wi.us/org/land/er/take/ for more information on incidential take under Wisconsin's Endangered Species Law. Enbridge is currently in consultation with the WDNR to define the nature and extent of potential incidental take and measures to avoid or minimize take, including restoration of the workspace and restricted activities during portions of the year. If an Incidental Take Authorization is required, it will be noticed to the public.

Dragonflies

The following three state-listed dragonfly species are present in waterways crossed by the pipeline.

The pygmy snaketail (*Ophiogomphus howei*) is state-listed as a threatened species. It prefers clean, fast-flowing, small to large streams with gravel or sand substrates in largely forested watersheds. The extra-striped snaketail (*Ophiogomphus anomalus*) is state-listed as an endangered species. This species prefers fast-flowing, medium-sized, warm water streams (100 to 800 ft. wide) with abundant gravel and excellent water quality in heavily forested watersheds. The Saint Croix snaketail (*Ophiogomphus susbehcha*) is state-listed as an endangered species. They prefer larger streams than other snaketails, with fast flow and clean water and with abundant cobble and gravel with sand substrates in largely forested watersheds. The Department's Natural Heritage Inventory (NHI) database indicates the occurrence of these species within the following waterways crossed by the project: Namekagon, Saint Croix, Chippewa, Flambeau, Jump and Thornapple Rivers. Habitat and limited species surveys were completed in the autumn of 2006 by Enbridge within the construction footprint and 50 feet downstream. A summary of these results indicated suitable habitat at most of the crossings with the exception of the St. Croix; however, the timing and methodology use for the surveys was not optimal to adequately determine the presence of these species at or downstream of the project site.

During construction the project will result in temporary impacts to water quality, bed conditions and vegetation during excavation, placement and backfill of the pipeline. The project may also result in permanent impacts to the bed and banks of the waterway and vegetation because the crossing may require stabilization that changes the natural pre-construction conditions. Vegetation that grows back in the temporary workspace after construction may be different from pre-construction vegetation. Because these actions will occur at locations where potentially suitable or occupied habitat occurs, there is a potential for incidental take of one to all three of these species.

DNR staff have defined conservation measures designed to minimize "incidental taking" that include: strict procedures for response loss of drilling mud, reduction of the temporary workspace, crossing methods that minimize impact, restoration and monitoring of bed, bank and vegetation conditions.

Under the "incidental taking" law, which was approved by the Wisconsin Legislature in 1997, the Department of Natural Resources can authorize the taking of an endangered or threatened species from a location if that removal will not jeopardize the species' survival or recovery in Wisconsin. A proposed Incidental Take Authorization was noticed to the public on 11 October 2006. WDNR staff have concluded that the proposed project will minimize the impacts to the dragonflies by adhering to conservation measures; is not likely to jeopardize the continued existence and recovery of the state populations of these dragonflies or the whole plant-animal community of which they are a part; and has benefit to the public health, safety or welfare that justifies the action. Conservation measures to minimize the adverse effect on the threatened species will be incorporated into the proposed Incidental Take Authorization.

Mussels

Three state or federally listed mussel species as well as some state special concern mussel species may be present in waterways crossed by the project. The state or federally listed species include the Purple wartyback (*Cyclonaias tuberculata*) (state endangered), Bullhead (*Plethobasus cyphyus*) (state endangered), and Higgins' eye pearly mussel (*Lampsilis higginsi*) (federal and state endangered). In general, all three species prefer medium to large rivers, with good water quality, rapid flow and sandy or gravelly bottoms. Juvenile and adult mussels are sedentary attaching themselves to rocks and other structures in the stream bed. Larvae are dependent on host fish species. Similar to dragonflies, direct and indirect disturbance to water quality and bed conditions may impact these species.

Habitat and species surveys for these species were completed along waterways in which they are known to occur. Listed species were found at two waterway crossings at the Chippewa and Flambeau Rivers. At the other survey sites, habitat varied in quality, but

no listed species were identified. Both the Chippewa and Flambeau Rivers will be crossed by directional bore, which will avoid disturbance to mussels or their habitat. In addition, minimization measures included at these waterways for state-listed dragonfly species will also be protective of habitat for the mussel species. For this reason impact to this group of species is unlikely.

Osprey, Wisconsin Threatened

The osprey (*Pandion haliaetus*) prefers large trees in isolated areas in proximity to large areas of surface water, large complexes of deciduous forest, coniferous forest, wetland, and shrub communities. Large lakes and rivers with nearby tall pine trees are preferred for nesting. The breeding season extends from late April through August. Active osprey nests are located near the Enbridge pipeline in Washburn County. To avoid impacts to ospreys, Enbridge will avoid construction within 0.25 miles of active nests during the period from 16 March through 31 July. Because Ospreys do tolerate some activity near their nests, WDNR may approve some exceptions to this timing restriction. In addition, Enbridge will contact the DNR prior to the osprey's active season to ensure that they have the most current monitoring information in their work area.

Red-shouldered hawk

Red-shouldered hawk (*Buteo lineatus*) is a bird listed as threatened in Wisconsin. This species prefers larger stands of medium-aged to mature lowland deciduous forests, dry-mesic and mesic forest with small wetland pockets. Breeding occurs from mid-April through early August. Portions of the route in central and northern Wisconsin may contain wooded areas that are of the appropriate age and structure to provide suitable habitat for this species. Surveys have been completed by an adjacent utility along portions that coincide with the pipeline route and in general, the forested habitat was not suitable and no birds were identified. Segments of the pipeline route that weren't included in these previous surveys may require surveys in the spring of 2007. If red-shouldered hawks are present in the project area, direct disturbance to nests or disturbance near nests during the breeding and nesting season will be avoided.

Other Rare Birds

The county NHI lists and the Wisconsin Breeding Bird Atlas (WBBA) indicate that other threatened, endangered or special concern bird species that prefer forested or open habitats are known to occur within the counties affected by the project, e.g., northern goshawk, cerulean warbler, and Cape May warbler. The northern goshawk was recently listed among the bird species of greatest conservation need on a level similar to red-shouldered hawk. The Natural Heritage Inventory (NHI) database is incomplete. Forest losses in the temporary workspace may impact rare birds due to loss of nesting sites,

direct nest losses, fragmentation (i.e., creating a 300 foot-wide open corridor including the permanent and temporary workspace and the adjacent utility ROW) and changes in the quality of temporary workspace habitat after construction is completed. The magnitude of the impact depends on conditions present in and adjacent to the work space (e.g., size and type of forest, proximity to wetlands and waterways, data from wetland delineations, etc.).

Surveying all potential habitat areas is a prohibitive effort as large areas are predominantly on private lands. However, the WDNR has recommended that Enbridge:

- check WBBA quads where: 1) the pipeline will cross forested areas coincident with recorded presence of rare forest dwelling birds; and 2) construction may be initiated during the breeding and nesting season in areas that support good quality wetlands, fallow fields, grassland, etc. and rare species that prefer open areas are present.
- identify ROW segments that pass through large areas of contiguous forest, are adjacent to wetland areas, or are connected to riparian corridors
- complete nesting surveys in those segments in 2007, depending on the construction schedule to provide an estimate of the potential impact
- minimize width of temporary and extra workspace in forested areas (wetland or upland)
- implement measures to facilitate regrowth to preconstruction conditions in forested areas (e.g., less aggressive clearing methods, reseeding with native seed, salvaging of propagules, preservation of coarse woody debris, etc.)
- engage landowners and provide compensation to facilitate reestablishment of forest cover in the temporary workspace.

Turtles

The wood turtle (*Clemmys insculpta*) and Blanding's turtle (*Emydoidea blandingii*) are both listed as threatened in Wisconsin. Blanding's turtles occur primarily in the central and southern part of the state. Blanding's turtles prefer sedge meadows, southern wet and southern wet-mesic forest, wet and wet-mesic prairie, open-water marshes, backwater sloughs, prairie potholes, and large ponds, slow-moving rivers and shallow lakes. The breeding season occurs from April through September, but the species is active until approximately the end of October.

The wood turtle prefers deciduous forests and open meadows along moderate- to fast-moving streams and rivers. It occurs primarily in the northern and central parts of the state. The breeding season extends from early April through late August, but the species is active from mid-March to mid-October.

The wood turtle has been observed within the Enbridge pipeline ROW. Project construction can result in direct mortality of wood turtles as heavy machinery move through the riparian and wetlands they inhabit. In addition, portions of the pipeline route cross soils and vegetation that provide suitable nesting sites for these species. Clearing of the temporary workspace eliminates vegetation cover that is an essential habitat element for the species.

In 2006 Enbridge completed a habitat assessment along waterways and adjacent wetlands in the state that have recorded occurrences of either species and that will be crossed by the pipeline. Some sites were excluded because they had been surveyed by an adjacent utility. The results at those sites were applied to the Enbridge project. Enbridge will apply avoidance measures to several waterways and wetlands. These primarily include either avoiding the turtles' active period or installing fencing around the workspace to keep turtles out of harms way. The WDNR will develop a plan with Enbridge that will identify the appropriate avoidance measures to use at each site.

Other Special Concern Species

There have been a number of other special concern species of mammals seen in the area of the pipeline. These include: Woodland Jumping Mouse, Pygmy Shrew, Water Shrew, and Franklin's Ground Squirrel

A number of other special concern bird species have also been seen in the project area, including: LeConte's Sparrow (Superior Clay Plains likely has the highest density in the state), Grasshopper Sparrow, Upland Sandpiper, American Bittern, Pipe Siskin, Swanson's Thrush, Black Tern (one of the few remaining nesting colonies in Douglas county occurs just down stream of the St. Croix crossing), Evening grosbeak, Trumpeter Swans (nested and raised young upstream of the St. Croix crossing and lower Lake St. Croix down stream of the pipeline is an important staging area for swans), Merlin,Common Loon, Least Bittern, Common Merganser, Connecticut Warbler, Gray Jay, Black Backed Woodpecker, Boreal Chickadee, Dickcissel, Western Meadowlark, and Sharp tailed Grouse.

Mussel surveys for crossings of larger streams (e.g. the St. Croix) may be warranted.

3.5 WATER RESOURCES

3.5.1 Groundwater

3.5.1.1 Existing Environment

There are no U.S. Environmental Protection Agency–designated sole source aquifers in Wisconsin. The pipeline will cross two aquifers. Generally the quality of groundwater in these aquifers is good and usable for most purposes. The uppermost major aquifer is the sand and gravel aquifer, which consists of unconsolidated deposits of sand and gravel within the glacial drift that covers most of the state. It is present in every county that will be crossed by the pipeline but is least prevalent in Wood County where it occurs

only as valley alluvium within the floodplains of major rivers. Well yields within the sand and gravel aquifer generally range between 5 and 500 gallons per minute (gpm), but most are between 5 and 15 gpm. Well depths within the aquifer typically range from 20 to 200 feet, but most are less than 100 feet deep.

The sedimentary bedrock aquifer is beneath the sand and gravel aquifer. Consisting of Paleozoic-age sandstone and dolomite, these rock formations are able to produce enough water to be considered an aquifer. Well depths can range from 66 to 1100 feet with most wells around 230 feet deep.

There are 23 municipalities along the pipeline route that obtain drinking water from groundwater sources, and are located within about 2.0 miles of the pipeline route. Enbridge has not yet determined the exact location of the wells serving these communities, but it is likely that the wells are within city limits. Most residences not connected to these municipal water supplies probably obtain drinking water from private wells. Since some residences are near the pipeline route, it is possible some wells may be near the pipeline route.

Enbridge reviewed the susceptibility of areas crossed by the pipeline to groundwater contamination associated with surface activities. They concluded that overall the proposed pipeline route is typical of this region and not unusually sensitive to groundwater contamination.

3.5.1.2 Groundwater Impacts

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.

Blasting may be required to excavate the pipeline trench in limited areas where bedrock is exposed or within trench depth of the ground surface (see section 2.1 .2). This technique is commonly used as a safe method for creating the pipeline trench in bedrock areas. Blasting near groundwater wells may cause temporary changes in water level and turbidity. These effects can be minimized by Enbridge's use of proper blasting techniques so rock will only be fractured in the immediate area of the blast locations. Consequently, it is extremely unlikely that groundwater quality and supply systems beyond the right-of-way will be affected by blasting.

Water will be taken from various surface and ground water sources to conduct hydrostatic testing of the pipeline in accordance with state and local permits. These sources have not yet been identified. Testing will be conducted in accordance with procedures set forth in 49 CFR Part 1 95. Enbridge will be required to obtain and comply with all federal and state permits for water withdrawal and discharge.

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.

As previously discussed, 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. Enbridge will make every effort to identify existing private residential wells in the vicinity of the proposed discharge point, and if wells are present, Enbridge will direct the discharge away from them. If a water supply is interrupted, Enbridge will provide a temporary water supply to well owners until repairs can be made and the water supply is restored. Enbridge would appropriately compensate affected property owners for related damages.

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. High capacity wells (greater than 70 gallons per minute) are subject to DNR regulation under Ch. NR 812, Wis. Admin. Code. It is unlikely that dewatering will require use of high capacity wells.

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.

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. A copy of Enbridge's Spill Plan for construction is on file at DNR regional offices.

Groundwater could also be at risk from spills of crude oil 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.

DNR staff have reviewed Enbridge's spill plan and agree that implementing the measures it proposes can effectively limit the impact of spills and adequately clean up after a spill. A commitment to follow the plan should ensure that the impacts of any spills that occur over the service life of the pipeline are contained and minimized.

Installing Additional Valves and Other Measures

The pipeline will be designed, constructed, operated, and maintained in accordance with the U.S. Department of Transportation (DOT) Safety Regulations, Title 49, Code of Federal Regulations, Part 195 (49 CFR Part 195)
"Transportation of Hazardous Liquids by Pipeline." The code regulates mainline valve design and placement. Under the code, valves are required to protect water resources and to meet other specific criteria, and Enbridge will meet or exceed these requirements. Enbridge's design specifications call for between 35 to 40 mainline valves on the proposed pipeline. Additionally, valves are located at each pump station. Most valves will be capable of remote operation and have electrically operated actuators. Although increasing the number of valves on a pipeline provides more opportunity to isolate a section of pipeline, adding more valves does not by itself protect a sensitive resource. Valves isolate a section of pipeline, but their effectiveness in protecting a particular resource depends on distance, terrain, weather and other factors.

Enbridge addresses pipeline safety by emphasizing safe construction methods, leak prevention and detection measures, and emergency response practices. Enbridge believes that it would be impractical to build check dams near every environmentally sensitive feature along a 322.5-mile pipeline. Constructing check dams would most likely entail disturbance and modification of the landscape off the right-of-way, and it would be extremely difficult to anticipate potential source, size, terrain, and other factors to attempt to construct functional check dams that would accommodate an unknown volume from a potential leak in an unknown location.

Enbridge operates a computerized Pipeline Control System which allows 24-hour monitoring of the pipeline and remote shutdown should abnormal conditions (such as pressure drop or other factors signaling a possible leak) occur. In addition to this state-of-the-art system, the new pipeline will be constructed with facilities to allow for a "remote leak detection system" (LDS). This LDS is a mathematical modeling system that further enhances leak detection.

In summary, with swift identification of abnormal conditions or leaks, remote pipeline shutdown and isolation and quick and effective emergency response by trained emergency responders located all along the pipeline system, Enbridge can greatly reduce the risk of and effects from a leak.

3.5.2 Surface Waters

3.5.2.1 Existing Environment

Floodplains

The pipeline will cross 12.8 miles of soils that are flood-prone. The greatest percentage of these soils (about 5.8 miles) are in floodplains of rivers and creeks in Wood County. The floodplain adjacent to the Wisconsin River is probably the largest floodplain that the pipeline will cross. Most of the remaining flood prone soils are in Adams County and Rusk County. None of Enbridge's major aboveground facilities will be located within 100-year floodplains. The construction of the pipeline project will not permanently impact any floodplain if original ground elevations are restored.

Surface Waters

Construction of the proposed pipeline in Wisconsin will require 242 waterbody crossings. Water body crossings include: one National Wild and Scenic River (the Namekagon); six Outstanding Resource Waters (ORW); seven Exceptional Resource Waters (ERW) (three of which will be crossed more than once); and seven Navigable Waterways as defined by the U.S. Army Corps of Engineers (COE). Exceptional Resource Water's and Outstanding Resource Water's are designated by the WDNR and are listed in the Wisconsin Administrative Code Chapter NR 100.

In the following text, water body designations are defined, and discussed by DNR Regions. It should be understood that widths vary seasonally and the numbers given are for average flow conditions:

Outstanding Resource Waters - ORW's are defined as surface waters that provide one or more of the following: valuable fisheries, hydrological or geologically unique features, outstanding recreational opportunities, unique environmental settings, or have been identified by the public, and been adopted by the Natural Resource Board for protection from point source pollution. Also included in this category are all National Wild and Scenic Rivers excluding portions flowing through Indian lands, and all State Wild and Scenic Rivers.

Exceptional Resource Waters - These waters have the same characteristics as the ORW's, but either currently have, or are very likely to have, a point source discharge into the waterbody.

Section 10 Waterways - Navigable Waterways are designated by the COE under Section 10 of the 1899 Rivers and Harbors Act and were identified from the publication *Navigable Waters of the United States Within the State of Wisconsin*

Wild and Scenic Rivers - Rivers designated as Wild and Scenic under the authority of the Wild and Scenic River Act of 1968.

Northern Region

In the Northern Region, construction of the pipeline will require 86 waterbody crossings. High quality waterbodies that will be crossed include the Nemadji River, Amnicon River, Little Amnicon River, Silver Creek, Park Creek, Leo Creek, the St. Croix, Eau Claire, Totagatic and Namekagon Rivers, Bean Brook, Alder Creek, Maple Creek, Badger Creek, Swan Creek, Big Weirgor Creek, and the Chippewa, Flambeau, Thornapple and Jump Rivers.

In Washburn County, the proposed pipeline will cross the Namekagon River. The Namekagon River is the only National Wild and Scenic riverway that will be crossed by the pipeline in Wisconsin. It is also a designated ORW. This river lies within the St. Croix River Basin and has a drainage area of approximately 433 square miles. The river is approximately 141 feet wide at the proposed crossing location.

The Nemadji River in Douglas County, and the Chippewa River and Thornapple River in Rusk County are designated Section 10 Waterways. The Nemadji River is also a migratory passageway for trout spawning in headwater streams of Lake Superior. The widths at these crossings are approximately 118 feet, 251 feet, and 80 feet respectively.

The Amnicon River and St. Croix River in Douglas County, Totagatic River, Swan Creek, Badger Creek, and Maple Creek in Sawyer County are designated ORW's; Alder Creek in Sawyer County and Big Weirgor Creek, Main Creek and Jump River in Rusk County are designated ERW's.

West Central Region

In the West Central Region, the proposed pipeline route will cross 95 waterbodies. The Black River and the Wisconsin River are Section 10 Waterways. The trout streams include Lynn Creek, Big Roche a Cri Creek, Little Roche a Cri Creek, and Fordham Creek. Other important waterways include the Popple River, Yellow River, Beaver Creek, Puff Creek, Hemlock Creek, Dawes Creek, Elm Creek, Sevenmile Creek, Tenmile Creek, Lake Arrowhead, Dead Horse Creek, Dry Creek, Carter Creek, and Bingham Creek.

Northeast Region

In the Northeast Region, the proposed pipeline will cross 14 waterbodies. The only significant water resource includes Good Earth Creek.

South Central Region

In the South Central Region, the proposed pipeline will cross 47 waterbodies. Significant waterbodies include the Fox River (crossed at two locations) and the Rock River. The Rock River is a Section 10 Waterways.

The Fox River, in Columbia County, occurs within the Lake Michigan (St. Lawrence River) Basin. It is approximately 120 feet wide at the first crossing location and approximately 30 feet wide at the second crossing location. WDNR has recommended using directional drilling at this crossing. However, Enbridge proposes to use conventional *(i.e.,* wet trench) construction methods, due to the width and depth of the stream and nature of its fishery resources. The WDNR will determine the final crossing method in the Chapter 30 permit process.

The Rock River is crossed in Jefferson County. It has a drainage basin of approximately 1,850 square miles. The river is about 483 feet wide at the proposed crossing location. Allen Creek is crossed at three points along the proposed route in Jefferson County, and is a designated ERW.

Trout waters include Stoney Brook. ERW waters include Allen Creek. Other significant waterways include the North Branch and Middle Branch of Duck Creek, North Branch Crawfish River, Babcock Creek, Crawfish River, Robbins Creek, and the Maunesha River.

Fisheries—General

Information about fisheries was collected from DNR publications and through contacts with WDNR field personnel. A complete list of fishery designations is in Appendix E of the EIR. The pipeline route crosses 18 trout streams, including 8 Class I trout streams, 6 Class II trout streams, and 4 Class Ill trout streams.

Sturgeon Waters

Waterways that support sturgeon populations include the Namekagon River, Chippewa River, the Flambeau River, the Little Jump River, the Jump River, the Fisher River, the Yellow River, Hay Creek, and the Wisconsin River. All of these are located in the Northern Region except the Wisconsin River.

Lake Sturgeon (*Acipenser fulvescens*) is a fish listed as a state Special Concern species, but with regulated harvest in some portions of the state. It is torpedo-shaped, brownish gray and adults reach 45 inches or more in length. Over most of its range in the United States, it appears to be threatened. However, the waters of Wisconsin sustain one of the largest self-sustaining populations of lake sturgeon in the world. This species prefers large rivers and lakes. Inland it shows a preference for the deepest mid-river areas and pools. The lake sturgeon occurs in the Mississippi, Lake Michigan, and Lake Superior drainage basins. In the northwestern part of the state it occurs in the St. Croix River to Gordon Dam, Namekagon River below Trego Dam, and the Chippewa (and

major tributaries) and Flambeau rivers. Spawning occurs from late April through early June in cold, shallow fast water.

Fisheries-Trout Streams

Trout streams are designated by the WDNR in three Classes. Class I trout streams are high quality waters, with self-sustaining natural reproduction that keeps populations at or near carrying capacity. Class II trout streams have some natural reproduction, but not enough to utilize available resources. Some stocking is necessary to maintain a sport fishery. These streams have a good survival rate and show a carryover of stocked trout. Class Ill trout streams are marginal trout habitats with no natural reproduction. Annual stocking of legal-size fish is required to provide a fishery. There is generally no carryover from one year to the next.

Trout streams are discussed by WDNR Region in the following section:

Northern Region

In the Northern Region, the pipeline will cross 10 trout streams. The trout streams in Douglas County include the Nemadji River, the Little Amnicon River (class III), Silver Creek (class II), Park Creek (class II), and Leo Creek (class II).

The trout stream in Washburn County is Bean Brook (class III).

The trout streams in Sawyer County include Alder Creek (class I), Maple Creek (class I), Badger Creek (class I), and Swan Creek (class I).

The trout stream in Rusk County is Big Wiergor Creek (class III).

West Central Region

In the West Central Region, eight trout streams will be crossed. In Clark County the Black River is a Class III trout stream. The trout streams in Wood County include Lynn Creek (class I), Tenmile Creek (class II), and Sevenmile Creek (class I). Lynn Creek will be crossed three times; at two of which it is both a Class I trout stream and an ERW. In Adams County, one Class I, two Class II, and one Class III trout streams will be crossed.

The trout streams in Adams County include Big Roche a Cri Creek (class II), Carter Creek (class II), Little Roche a Cri (class II) and Fordham Creek (class I). Big Roche a Cri Creek is a designated Class II trout stream, about 36 feet wide at the proposed crossing location. Fordham Creek is a designated Class I trout stream with reproducing populations of brown, rainbow and native brook trout and a designated ERW. Fordham Creek is approximately 15 feet wide at the proposed crossing location

South Central Region

The only trout stream crossed in the South Central Region is Stoney Brook.

Warm-water Fisheries

Warm-water fisheries are warm-water streams/rivers which support fish. The spawning season for all warm-water species occurs between April and June. The proposed pipeline will cross only two significant warm-water fisheries. Both of these fisheries are in Clark County. The Black River is the more significant of the two, containing muskellunge, walleye, northern pike, and small and largemouth bass. The Poplar River supports many of the same species as the Black River, but in smaller populations.

3.5.2.2 Surface Waters Impacts

Floodplain Impacts

No major aboveground facilities will be located within the 100-year floodplain of any river or stream. Impact on floodplains will be minor and temporary. During construction, Enbridge will disturb vegetation, dig a trench, install the pipe and temporarily store spoil in floodplain areas. Following installation of the pipeline, the trench will be backfilled. Disturbed areas within the floodplains will be restored to the extent practicable to original ground elevations, and will be stabilized and reseeded with approved seed mixes. Enbridge will install erosion control fabric and/or rock riprap as required by permits and where necessary to stabilize the right-of-way and prevent erosion.

Surface Water Impacts

Impacts on surface waters will be limited primarily to the period of construction and are dependent on the time, duration, and method of pipeline installation. After the pipeline is installed, waterbody beds and banks will be restored as near as practicable to original condition. Disturbed soils adjacent to the waterbodies will be stabilized and reseeded with approved seed mixes. A detailed discussion of potential impacts on water resources and the mitigation that Enbridge proposes to minimize these impacts follows.

Construction Related Impacts

Installation of a pipeline across a stream or river can temporarily displace stream bed 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.

Standard crossing methods will normally require a gradual and uniform approach to the waterbody to prepare and place the pipeline and provide a suitable work area for

construction equipment. This will usually require removing bank vegetation and grading the banks away from the waterbody, which could temporarily increase the potential for soil erosion until construction is complete and the right of way is stabilized and reseeded.

In certain situations, erosion control measures are placed before construction. For example, vegetative buffers are delineated before construction adjacent to streams and rivers, and erosion control measures (*e.g.,* silt fence) may also be installed before construction at such locations. In practice, installing erosion controls before beginning construction is not well suited for pipeline projects because of the sequential nature of construction activities. The clearing crew must complete its work to allow access by the grading crew. The grading crew will prepare a safe work surface as needed and will install temporary slope breakers as described in Enbridge's EMP. The location and extent of soil disturbance by the grading crew will determine where the environmental crew will install sediment filters such as silt fence and straw bales. If the sediment filters were installed before grading, they would most likely be damaged by grading equipment. Enbridge's EMP specifies installing temporary erosion control measures as soon as practicable after the ground is disturbed, while being aware of weather forecasts and being ready to react to potential rain/thaw event.

Topsoil is typically stripped from the trench and spoil storage area of agricultural lands, residential areas, specialty areas such as golf courses, and from the trench line of unsaturated wetlands. Forested areas usually have relatively thin, poorly developed soils which cannot be effectively handled by standard construction equipment. Attempting to strip the small depth of topsoil present in forest soils would cause more ground disturbance (spoil storage area in addition to the trench) without a significant improvement in the quality of post-construction soil. It is likely that the disturbed portions of the right-of-way can be successfully revegetated using the techniques described in the EMP.

Upon completion of construction, Enbridge will restore original contours and reestablished vegetation on the right-of-way in accordance with applicable permits and its EMP. The only long-term effect of construction will be a minor visual impact at each waterbody associated with the incremental widening of the existing right-of-way corridor during construction. This impact will be greatest at forested crossings, particularly where it is necessary to increase the separation between the existing and proposed pipelines for safety reasons. Although Enbridge generally does not plan to acquire any new permanent right-of-way in these areas, the reestablishment of trees on stream banks could take several years. Enbridge will also install new pipeline markers and signs on stream and river banks that identify Enbridge as the owner and operator of the newly constructed pipelines. Enbridge will also need to restore the preexisting slope, profile and substrate of stream bottoms in order to maintain habitat values and stable

stream hydrologic function. Pre- and post-stream streambed surveys will be required to assure streams are restored to original elevation and conditions.

Wet Trench Construction Method

During a standard wet trench crossing, a trench will be excavated through the stream using draglines or backhoes operating from one or both banks. Trenching and all other in-stream work will be limited to the minimum amount of time necessary to complete the crossing. Spoil will be stored in a containment area made of silt fence and/or staked straw bales located at least 10 feet from the water's edge or in extra workspaces.

In this process some bottom materials will be picked up by the stream current and transported downstream. The amount of material and the distance it is transported depends on the type of bottom material and the stream flow at the time of the disturbance. Fine-grained soils can require less excavation than sandy soils because the trench walls hold their shape better. However, fine-grained soils also settle more slowly and therefore migrate further downstream and can become more widely dispersed than the heavier sands. Impacts to the waterway include: sedimentation of habitat for fish and aquatic invertebrates, degraded water quality, and reduced light penetration affecting photosynthesis.

An earthen "trench plug" will be left in the trench until in-stream excavation is complete to limit intrusion of water into upland areas of the trench and prevent silt-laden runoff from disturbed upland areas from entering the waterbody. After the trench is excavated, the trench plugs will be removed and a prefabricated section of pipeline will be lowered into the trench.

Enbridge proposes to cross 205 streams and rivers using the wet trench method. To use this method, Enbridge will typically need to grade the approaches to the waterbody. Generally, Enbridge will also require temporary extra workspaces on each side of the waterbody for staging the crossing. These temporary extra workspaces will be approximately 50 feet wide by 150 feet long and will be at least 50 feet from the water's edge where conditions permit. Vegetation between the extra workspace and the waterbody will not be removed except within the construction right-of-way.

If trench dewatering is necessary to complete the tie-in welds, dewatering will be conducted so that heavily silt-laden water is not allowed to flow into the waterbody. Backhoes or cranes will then backfill the trench with the excavated material. Excess spoil will be uniformly distributed in upland areas on the construction right-of-way.

Enbridge will use temporary and permanent erosion controls during and following the crossing as appropriate. Temporary erosion controls will typically include storing all excavated spoil in containment areas that prevent the spoil from entering the stream,

and installation of silt fence and/or straw bales to prevent runoff from upland areas from entering the stream.

After backfilling, Enbridge will regrade the right-of-way to its approximate preconstruction contours. Disturbed stream and river banks will be stabilized with geotextile fabric, jute thatching, or bonded fiber blankets. Disturbed soils will be fertilized and seeded with conservation grasses, and mulch will be applied as needed. Temporary bridges that were installed to move equipment across the waterbody will be removed after seeding and mulching are complete. Temporary erosion control measures will be removed after permanent erosion control measures are installed and vegetation is re-established.

Enbridge has determined that the wet trench method may be undesirable at 22 streams and rivers because of engineering constraints or stream sensitivity. At these waterbodies, Enbridge proposes to use one of the following dry crossing methods.

Dry Crossing Construction Methods

Dam and Pump Method

The dam and pump stream crossing method is slower and more expensive than the wet trench method, however it generally reduces the water quality impacts associated with wet trenching. It is also preferred for small streams that are sensitive to sediment loading. This method involves damming the stream upstream and downstream of the construction area before trench excavation using sand bags or other methods that do not add sediment to the stream. Before the dams are installed, one or more water pumps will be placed on the upstream side of the proposed trench and water will be pumped around to the downstream side the construction area. Energy dissipation devices will be used as necessary downstream of the crossing where the pump hose discharges to prevent scouring of the stream bed. Trenching, installation of the pipeline, and restoration of the banks and right-of-way will be completed in the same manner as described for the wet trench method. However, because the stream flow is pumped around the construction area instead of through it, only minimal sediments will be displaced by construction.

Flume Method

The flume method is suitable for small to intermediate streams which have straight channels at the crossing area and are sensitive to sediment loading. Enbridge proposes to use the flume method to cross smaller, high quality fishery streams. Flumes will be aligned in the stream parallel to the water flow. The stream will then be dammed with a diversion bulkhead to direct stream flow through the flumes. A similar bulkhead will be installed at the downstream end of the flumes to prevent backwash from entering the construction area. A trench will then be excavated underneath the flumes. A section of pipeline long enough to span the stream will be welded together and pulled beneath the

flume. The flumes will not be removed at any time during the installation of the pipeline. Backfilling and bank restoration will be completed as described for the wet trench method. Fluming, like the dam and pump method, isolates streamflow from the construction area and allows installation of the pipeline without significant displacement of sediments.

Directional Drill Method

Enbridge currently proposes to directionally drill four waterway crossings (Chippewa River, Flambeau River, Lake Arrowhead, and Wisconsin River). Enbridge has conducted geotechnical investigations at the proposed directional drill river crossings as part of a feasibility assessment to determine if drilling is a viable method from an engineering and environmental perspective. Based on this assessment, they do not anticipate drilling failures. According to Enbridge, based on the geotechnical investigations, the Namekagon River is "not a good candidate for HDD." Directional drilling minimizes the environmental effects of pipeline construction on a waterbody by going beneath and avoiding disturbance of the bed and banks. This technique is especially useful for wide crossings, where navigation traffic is high, areas where bottom sediments are contaminated, or where there are sensitive habitats or cultural resources near the banks. Alluvial soils are generally best suited for this technique.

Environmental impacts associated with this technique include additional workspace requirements for mud storage. Drilling mud (typically bentonite) and cuttings will also require disposal. Finally, pressurized drilling mud may leak to the surface, or "frac-out." Such failures are not easily predicted; however the impacts from failure can be reduced by monitoring mud pressure and drilling head location, inspecting the surface during the drill, and by increasing the depth of the drill path below the bed of the river. In the event that a mud "frac out" does occur, Enbridge will take corrective actions as described below. It should be noted that in most cases the volume of sediment resulting from seepage of drilling mud would be far less than the amount produced by a conventional open-cut crossing.

During a directionally drilled crossing, bentonite mud is forced into the drill hole to lubricate the drill bit, remove drill cuttings and maintain the integrity of the drill hole. During the crossing, drilling mud and slurry is stored away from the river in an earthen berm containment structure or fabricated containment tanks sized to accommodate the volume of mud necessary for the drill. Following completion of directional drilling, mud is disposed of in accordance with applicable state and local requirements. Where landowner permission is available, mud is typically land-spread in upland, agricultural fields and incorporated into the soils (by the landowner) using a disk to improve water-holding capacity in sandy soils. If landowner permission is not available or land-

spreading is not appropriate for some other reason, mud would be disposed of in a landfill or other authorized disposal site.

To use the directional drill method, Enbridge will need to set up temporary workspaces for drilling equipment, measuring approximately 250 feet long by 50 feet wide on the entry side of the crossing. A slant drill unit will be placed on one bank and a small-diameter pilot hole will be drilled under the stream along a prescribed profile. Electromagnetic sensors will be used to guide the path of the drill bit. After the pilot hole has been completed, it will be enlarged to accept the pipeline by pulling a barrel reamer back to the drilling rig. Several passes will be required to enlarge the bare hole. Drilling mud will be continuously pumped into the hole to remove cuttings and maintain the integrity of the enlarged hole. Water from the stream or river being drilled will be used to prepare the slurry of drilling mud and will be appropriated according to applicable permits. After the hole has been reamed, a prefabricated pipeline section long enough for the crossing will be pulled through the hole by the drilling rig.

If an unanticipated frac-out were to occur on land, the drilling mud would be contained to the extent possible with erosion control measures such as silt fences and/or hay bales, then disposed of properly by spreading over an upland area approved by Enbridge, or hauled off-site to an approved location.

If a frac-out occurred in wetlands or in stream, Enbridge would assess impacts and evaluate the potential environmental risks of continued drilling. In the case of an in-stream blowout, Enbridge would stop drilling to assess impacts. Enbridge would contact the appropriate regulatory agency to discuss the blowout situation and explore possible alternatives. If proceeding with the directional drill crossing method would result in significant adverse impacts to waterbodies and fisheries resources, Enbridge would abandon the directional drill method and implement an alternative conventional crossing method. In the case of wetland frac-out, Enbridge would contact the appropriate regulatory agency to discuss the blowout situation and explore possible alternatives. The slurry at the surface would be isolated using silt fence and/or hay bales, then removed by vacuum truck, machinery, or by hand, and disposed of in an acceptable upland location.

St. Croix River Crossing

The St. Croix River crossing is proposed as a modified wet trench crossing (using sheet piling). This area (Gordon Wetland and St. Croix River Area) has provided many challenges for the Enbridge pipeline design team due to constraints such as the highway crossing, associated railway and railroad support and ATC power line. The River crossing design was similarly challenging. Enbridge purports that the modified wet trench crossing is the most feasible alternative due to the technical and environmental constraints associated at this location.

The crossing method at the St. Croix River has not been proposed as a HDD crossing for the following reasons:

To horizontally directionally drill (HDD) this location would require extensive wetland disturbance since the entire drilling operation and set up footprint (entrance and exit) would have to be located in the adjacent wetland complexes on either side of the River. This would obviously increase the overall disturbance footprint in the wetlands, which we felt was a greater impact to the river corridor than using the modified wet-trench waterway crossing method. Also, there are several points of inflection (changes in direction of the pipeline) in the right-of-way layout at this location that would not be conducive to an HDD crossing technique. Additionally, an HDD crossing requires long straight pipe stringing and pipe pull back areas (typically thousands of feet) and at this location these activities would be constrained due to the right-of-way configuration on both sides of the river.

Enbridge has attempted not to create new pipeline corridors and to remain within the current right-of-way. Enbridge feels an HDD crossing at this location would not meet this objective for the above noted reasons.

The crossing was not proposed as a dry-crossing (i.e. dam and pump or dam and flume technique) due to river depth and flow (even during low flow conditions).

The proposed modified wet-trench crossing technique is similar to the one used during the installation of the SEP-2 pipeline in 1998. The duration for completing the modified wet-trench sheet pile crossing is estimated to be approximately two weeks in total. The majority of the time is required to install the sheet piling. It is estimated to take approximately 5 days to install the sheet piling, which will serve two purposes: 1) to protect the existing pipelines and 2) to slow the river flow to accommodate the installation of the pipelines. Excavation, pipe installation and back filling are estimated to take 4-6 days. Final removal of the sheet piling and bank restoration is estimated to take 3-5 days.

The stream substrate appears to be mostly coarse grain sand that Enbridge believes based on past experience not will migrate far downstream. Enbridge has proposed to install downstream turbidity curtains in a staged configuration to minimize downstream sediment flow. The combination of courser substrate and proposed BMPs is expected to prevent significant sedimentation outside of the work zone.

Invasive Species

The linear nature of pipeline construction acts as a vector for spreading invasive species. The WDNR staff noted that zebra mussels are becoming more prolific in Wisconsin and could potentially be spread by construction activities. Based on information provided by the WDNR, Enbridge has concluded that this project will not cross any known zebra mussel-infested waters. To avoid importing zebra mussels from the contractor's previous job site, Enbridge will require its contractors to clean construction equipment before arrival at the construction site.

Other invasive species such as purple loosestrife (Lythrum salicaria), Giant reed grass (Phragmites australis), common and glossy buckthorn (Rhamnus cathartica and frangula) and reed canary grass (Phalaris arundinacea), Eurasian water milfoil (Myriophyllum spicatum), among others, may be spread by construction activities. To avoid importing and spreading such species from the contractor's previous job site, Enbridge will require its contractor to clean construction equipment before arriving at the construction site. In addition, during the wetland delineation, Enbridge determined whether these species are present in any of the wetlands crossed by the project. If present, Enbridge will work with the WDNR to identify and implement measures to avoid transporting the plant during construction.

Operation and Maintenance Related Impacts

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. Table 6 lists spills and leaks report by Enbridge since 1999, after the start of operation of the 34-inch petroleum pipeline installed in 1998.

Table 6 Enbridge Reportable Spills Since 1999 in Wisconsin

Date	Commodity	Spill volume (barrels)	Classification	Description
5/13/2004	Crude oil	40	Corrosion	Superior Terminal pipe corrosion. Contained on site.
4/2/2004	Crude oil	2	Material and/or weld failures	Superior Terminal pipe failure. Contained on site.
1/24/2003	Crude oil	4500	Material and/or weld failures	Piping failure at Superior Tank terminal facility. Release was predominately contained on site, however approximately 450 bbls reached the frozen surface of the Nemadji River. Clean-up included complete remove of free oil and impacted snow and ice. As a result, Superior Terminal containment design was evaluated and upgraded. Containment system evaluation initiated company wide. Response and clean-up was under the oversight of multiple of regulatory authorities.
1/20/2002	Crude oil	10	Material and/or weld failures	Superior Terminal pipe failure. Contained on site.
7/27/2000	Crude oil	1200	Material and/or weld failures	Flange failure on pump at pump building within Superior Terminal facility. Entire release was contained within onsite containment facilities.
11/15/1999	Crude oil	15	Other outside force damage	Dent in piping and casing under road on mainline. Release was result of a dent in the pipeline.
1/16/1999	Natural gas liquid	130	Corrosion	Contained to Enbridge Pipeline Maintenance Facility. Leak in small diameter piping within densitometer building resulting in flaring of NGL.

Proposed Methods to Minimize Waterway Impacts

Enbridge proposes to use a variety of methods to cross streams and rivers. These methods, outlined in detail in the text and drawings of Enbridge's EMP, include the standard wet trench, dam and pump, dam and flume, and horizontal directional drill methods. These are described in the Alternatives Section of this EA.

Enbridge has identified a preferred method for crossing each stream as listed in Table E. They selected their preferred crossing methods based on the physical and engineering characteristics of the crossing, the general environmental sensitivity of the water resource and any input received from regulatory agencies. Enbridge will avoid crossing waterbodies during spawning or other critical periods as directed by the WDNR. Enbridge will work with the WDNR to identify acceptable timing and methods for stream and river crossing. If it becomes apparent that a proposed method is not practical for a particular stream or river, Enbridge will consult with appropriate regulatory agencies to determine an acceptable alternative. Enbridge has requested waivers to construct within the restriction times for 18 waterways.

Enbridge believes that its use of the following mitigation measures will minimize the duration and extent of construction-related disturbance to waterbodies. DNR's permit reviews will specify any additional requirements to protect water bodies and fisheries. The DNR Chapter 30 permit will dictate the construction method at each waterway. Mitigative measures that will decrease the impacts to waterways include wet trenching in waterways only if they have no flow. If flow is present, dry crossing techniques will likely be required, which will decrease the amount of sediment that enters the waterway.

Fisheries Impacts

Potential impacts on fisheries resources that could result from construction and operation of the pipeline include sedimentation and turbidity, destruction of stream habitat, introduction of water pollutants, and entrainment of fish (and aquatic invertebrates) during withdrawal of hydrostatic test water.

Sedimentation and Turbidity

Increased sedimentation and turbidity from the proposed construction have the greatest potential to adversely affect fisheries resources. However, by following the procedures outlined in Enbridge's EMP these impacts can be limited to short-term, temporary disturbances. Construction of perennial stream crossings will occur during the low-flow period whenever possible and avoid critical fish spawning periods. Low flow construction will reduce sedimentation and turbidity and limit impact on spawning areas that may be present in or downstream from crossing areas. If construction occurs during higher flow conditions, high rates of sedimentation and turbidity can impact downstream fisheries.

Trench spoil will be stored on or above the stream banks' and will be protected with silt fences, straw bales, or other erosion control devices that will prevent or significantly reduce sedimentation of the stream. Extra workspace will be at least 50 feet from the water's edge, where topographic conditions permit, to reduce loss of riparian vegetation and limit the probability that these additional cleared areas would contribute to sedimentation.

Trout spawning areas are especially susceptible to increased sedimentation of fines. Increase of fines composition less than 3 millimeters in size can reduce survival of eggs and emerging fry and degrade spawning habitats. Enbridge proposes to minimize this impact by dry crossing trout streams where conventional crossing methods would likely result in sedimentation of spawning areas.

Some of the waterbodies containing trout or significant warm-water fisheries appear to be too deep and/or wide to cross by the dam and flume or dam and pump method.

These include Big Weirgor Creek, the Black River, Tenmile Creek, and Big Roche a Cri Creek. Where the wet-trench method is proposed, increased suspended sediment concentration levels could increase invertebrate drift and reduce fish feeding for brief periods. By following DNR permit conditions and the methods described in its EMP, Enbridge can ensure that this impact is temporary, and concentrations of suspended sediment should return to background levels within 12 - 48 hours after the trench is backfilled.

Loss of Cover and Spawning Habitat

Some in-stream and shoreline cover may be altered or removed at the proposed stream crossings. Stream bank vegetation, in-stream logs, rocks, and undercut banks provide important cover for fish. Fish that normally reside in these areas will be displaced. However, these effects should be short lived and minimal because of the small area affected on each stream (a maximum of 95 feet wide) and the fact that most of the area to be disturbed is existing maintained right-of-way. In addition, Enbridge does not routinely remove in-stream timber and rock in the crossings during maintenance, so this habitat will eventually be reestablished at the crossings.

The greatest risk is destroying fish spawning habitat. Trout redds, in particular, occur in specific substrates which may occur within the pipeline crossing areas. Successful spawning may require groundwater upwelling that could be disrupted temporarily or permanently in the stream pipeline crossing locations.

The pre- and post-construction streambed surveys of each crossing of are the best means of ensuring that the original stream morphology is restored and maintained after covering the pipeline.

Other Impacts

Other potential effects of construction include entrainment of fish (and aquatic invertebrates) during withdrawals of hydrostatic test water, and fish mortality from toxic fuel spills. Some fish, including trout, have spawning runs in the spring, summer, or fall which could be interrupted by pipeline construction. Most runs occur over several days or weeks in small streams. Consequently, in the worst case, migration might be briefly interrupted or sites where eggs were deposited might be destroyed. Some species of fish disperse by drifting upon hatching and the larval fish drift behavior could be interrupted by pipeline construction. Entrainment of adult fish is not likely to occur during withdrawal of water for hydrostatic testing since intakes will be screened. However, capture of larval fish, fish fry and young-of year fish may occur. Intake devices will be designed to limit intake velocities.

Standard construction techniques employ screened intakes for withdrawing water for hydrostatic testing. The screens are sufficiently fine to avoid pump damage from debris.

Enbridge has not observed evidence of fish entrainment during this process in similar previous projects. Enbridge will evaluate a DNR-proposed alternative technique if this is a significant issue at particular crossings.

Spills of fuel or other substances into streams could be toxic to fish, depending on the type, quantity, and concentration of the spill. To reduce the potential for surface water contamination, Enbridge will store fuel and other potentially toxic materials away from streams. The potential for and effects of a spill during operation will be minimized by applying Enbridge's Spill Plan.

3.6 WETLANDS

3.6.1 Existing Environment

The wetlands within the project area corridor are grouped into four major community types: wet meadow, scrub-shrub, emergent and forested wetlands. Emergent type wetlands include shallow marsh, deep marsh and open bog. Scrub-shrub type wetlands include shrub-carr, alder thickets, previously cleared wetlands dominated with shrub vegetation, and coniferous bogs with shrub sized trees. Forested wetlands include hardwood swamp, coniferous swamp and floodplain forest. Some wetland communities are grouped by relatively similar vegetative types to facilitate this assessment. The wetland community types follow accepted terminology for the Wisconsin region and are based on Eggers and Reed (1997).

Wet Meadows

This community type includes wet and sedge meadows, wet prairies and seasonally flooded basins. Seasonally flooded basins are not typically classified as inland fresh meadows; however, they are included in this classification because like wet and sedge meadows, they are dominated by herbaceous vegetation. In addition, only a small number of seasonally flooded basins were identified in the project area.

Wet and sedge meadow, and wet prairie communities, are characterized by a predominance of herbaceous vegetation with a limited amount of woody vegetation. These communities grow on saturated soils but can be dry for much of the growing season. Ponded water is typically present only after floods or snowmelt events. Sedges are the predominant plants in sedge meadows although spike rushes (Eleocharis), bulrushes (Scirpus), nut sedges (Cyperus), rushes (Juncus), and grasses (e.g., blue-joint grass [Calamagrostis canadensis]) may also be present.

Seasonally flooded basins are shallow depressions that typically pond water for a few to several weeks each year, but are usually dry for much of the growing season. Due to

this hydroperiod, these communities are often farmed; however annual hydrophytes such as smartweeds (Polygonum), beggar-ticks (Bidens), nut sedges (Cyperus), and barnyard grass (Echinochloa crus-galli) can establish in these basins.

Floristic Composition of Wet Meadows

Reed canary grass is the primary dominant observed in wet meadow communities in the project area, often forming dense monotypic stands. This species was abundant in a high percentage (greater than 70 percent) of wet meadow communities in counties south of Sawyer County but was infrequently observed in Sawyer, Washburn, and Douglas Counties, except within the pipeline ROW.

Past disturbances along the pipeline corridor likely contribute to the dominance of this species, which is generally found where hydrology and/or vegetation has been altered or disturbed. Wool grass (Scirpus cyperinus), blue-joint grass, and red top grass (Agrostis gigantea) are also very common as dominants or sub-dominants in project area wet meadows. Similar to reed canary grass, the density of wool grass was often high in the permanent pipeline easement which may be partially explained by past disturbances in the corridor. Other species occasionally observed in this community include stinging nettle (Urtica dioica), brown fox sedge (Carex vulpinoidea), fox sedge (Carex stipata), giant goldenrod (Solidago gigantea), common reed grass (Phragmites australis), boneset (Eupatorium perfoliatum), joe-pye weed (Eupatorium maculatum), dark green bulrush (Scirpus atrovirens), path rush (Juncus tenuis), flat top aster (Aster umbellatus), Kentucky bluegrass (Poa pratensis), fall panic grass (Panicum dichotomiflorum), Canada goldenrod (Solidago canadensis), white-panicle aster (Aster lanceolatus), switch grass (Panicum virgatum), various smartweeds (Polygonum spp.), rattlesnake manna grass (Glyceria canadensis), and swamp aster (Aster simplex).

Tussock sedge (Carex stricta), lake sedge (Carex lacustris), bottle brush sedge (Carex hystericina), fringed sedge (Carex crinita), wool grass, and blue-joint grass are the primary dominants observed in sedge meadow communities along the pipeline corridor. Other species occasionally observed in this community include fox sedge, brown fox sedge, joe-pye weed, broad leaved cattail (Typha latifolia), common bur-reed (Sparganium eurycarpum), giant goldenrod, dark green bulrush, boneset, sneezeweed (Helenium autumnale), reed canary grass, blue flag iris (Iris versicolor), rice cut grass (Leersia oryzoides), flat top aster, tear thumb (Polygonum sagittatum), American manna grass (Glyceria grandis), hop sedge (Carex lupulina), calico aster (Aster lateriflorus), and red-stem aster (Aster puniceus). This community often intergraded with the wet meadow community and had an overlap of similar species; however, these communities were differentiated by a dominance of sedges (sedge meadows) or dominance of reed canary grass and/or wool-grass (wet meadows).

Only one wet prairie and five seasonally flooded basin communities were observed in the project corridor. The wet prairie was observed in the permanent easement in Adams County, where it may have been seeded as part of restoration following previous construction activities. It is bordered by a mix of shrub carr and hardwood swamp communities. Wool grass, big bluestem (Andropogon gerardii), and prairie cord grass (Spartina pectinata) are common in this community. The seasonally flooded basins were observed in Douglas, Rusk, and Rock Counties and are all small depressional areas. They are dominated by beggar-ticks, various sedges, dark green bulrush, spike-rushes, nut sedge, and others. All of the seasonally flooded basins observed are associated with farmed wetlands and/or open fields with the exception of the one in Rusk County, which is a depressional area within an upland forest, associated with the Jump River.

Numerous smaller wet/sedge meadows within the permanent pipeline easement appear to have been created from uneven settling of finer-grained backfilled material after previous pipeline projects. These depressional areas provided suitable conditions for the growth of various hydrophytic sedges, grasses, and forbs. Reed canary grass and wool grass were especially common in these disturbed areas.

Functional Values of Wet Meadows

There is relatively less floral diversity in the majority of wet meadow communities observed south of Sawyer County. In these areas, the wet meadows are typically dominated by reed canary grass which often formed dense stands to the exclusion of other species. The density of wool grass was also high within these communities, primarily within the permanent pipeline easement. In communities not dominated by these species, the floral diversity is higher with a mix of forbs, sedges, and grasses. Sedge meadow communities generally had a higher floristic diversity and did not reflect the amount of disturbance observed in wet meadow communities. Several high quality sedge meadows were observed along the pipeline corridor.

The wet/sedge meadow communities provide important habitat for a variety of wildlife. The dense herbaceous vegetation provides cover for white-tailed deer and small mammals such as mice, voles, and rabbit. The presence of small mammals also makes the community important for predators such as raptors, fox, and mink. These communities can also provide cover and food for nesting waterfowl, and various songbirds can utilize the forbs and/or invertebrates in these communities as a food source. Additionally, primarily in the northern counties, wet/sedge meadow communities were common in the permanent pipeline easement and were bordered by extensive hardwood or shrub swamps. In these areas, the wet/sedge meadows provide important travel corridors and increase the diversity of wildlife habitat.

In areas where wet/sedge meadow communities are adjacent to waterways, they typically provide low fishery habitat as they are rarely inundated for sufficient periods.

However, in these locations, these communities can provide shoreline protection as the dense herbaceous cover stabilizes stream banks from erosive forces.

These communities are also important for attenuating flood and stormwater due to their position in the landscape and vegetative density which slows runoff velocity. These communities also act to maintain or improve water quality by filtering nutrients and sediment prior to entry into waterways. This is especially important in the southern counties where agriculture is a widespread land use.

The wet/sedge meadow communities provide groundwater functional values, primarily when adjacent to coldwater streams. In these locations, the communities likely contribute to stream base flow. These communities, which are often dry during much of the growing season (particularly the wet meadows), also help recharge aquifers through infiltration of runoff.

Recreational opportunities provided by these communities include hunting, snowmobiling, and hiking. Wet/sedge meadows in the permanent pipeline easement which are adjacent to shrub and hardwood swamps are especially important for hunting as they provide travel corridors for deer (deer stands were occasionally observed at the edge of the pipeline corridor). Some of the higher quality wet/sedge meadows may also encourage exploration due to the uniqueness of the community. Wet meadow communities can also provide a source of income when cultivated for marsh hay. Several areas of marsh hay cultivation were observed along the project corridor.

Forested Wetlands

This community type includes hardwood and conifer swamps and floodplain forests. Eggers and Reed (1997) separate hardwood and conifer swamps from floodplain forests due primarily to hydrologic setting and degree of soil saturation—floodplain forests occur in riverine systems on alluvial soils while hardwood/conifer swamps are typically associated with ancient lake basins and riverine oxbows. For the purposes of this report, these communities were combined due to their relatively similar structural and vegetative composition.

Hardwood and conifer swamps are forested wetlands characterized by an abundance of lowland hardwood or mature coniferous trees comprising greater than 50 percent canopy cover. Hardwood swamps are dominated by deciduous hardwood trees with a stratified understory of various shrubs, saplings, grasses, sedges, and forbs. This community is underlain by soils that are saturated for much of the growing season and may be inundated by as much as 12 inches of water. Conifer swamps are dominated by balsam fir (Abies balsamea), spruces (Picea spp.), northern white cedar (Thuja occidentalis), and/or tamarack (Larix laricina) trees and typically exhibit similar hydrologic characteristics as hardwood swamps. Hardwood swamps are found

throughout Wisconsin, while conifer swamps are typically found within and north of the tension zone.

Similar to hardwood swamps, floodplain forests are also forested wetlands dominated by deciduous hardwood trees. However, this community is associated with riverine systems and is inundated during flood events, but is somewhat well drained during other portions of the year. These flooding events can limit the density of shrubs and herbaceous species in this community.

Floristic Composition of Forested Wetlands

Dominant trees observed in hardwood swamp / floodplain forest communities include quaking aspen (Populus tremuloides), red maple (Acer rubrum), green ash (Fraxinus pennsylvanica), black ash (Fraxinus nigra), silver maple (Acer saccharinum), and black willow (Salix nigra). Other trees commonly observed in these communities include American elm (Ulmus americana), tamarack, Eastern cottonwood (Populus deltoides), swamp white oak (Quercus bicolor), box elder (Acer negundo), jack pine (Pinus banksiana), basswood (Tilia americana), white pine (Pinus strobus), yellow birch (Betula alleghaniensis), burr oak (Quercus macrocarpa), ironwood (Carpinus caroliniana), and balsam fir.

Common understory vegetation in these communities includes speckled alder (Alnus incana subsp. rugosa), winterberry (Ilex verticillata), glossy buckthorn, common buckthorn, ironwood, and sandbar willow (Salix exigua) shrubs or saplings. Various sedges including lake sedge, tussock sedge, and brome-like sedge (C. bromoides), blue-joint grass, marsh marigold (Caltha palustris), and various ferns including sensitive fern (Onoclea sensibilis), lady fern (Athyrium filix-femina), and interrupted fern (Osmunda claytoniana) commonly dominate the herbaceous layer. Other frequent dominants include flat top aster, reed canary grass, clearweed (Pilea pumila), wood nettle (Laportea canadensis), giant goldenrod, red top grass, and false nettle (Boehmeria cylindrica).

In areas where trees more characteristic of uplands (e.g., jack pine, basswood, and white pine) were observed, hydric soils and an understory dominated by hydrophytes (FACW to OBL species) such as speckled alder and blue-joint grass were present. These areas dominated by typically upland (FACU) trees formed a minor component of this community.

Conifer swamps were a relatively infrequent occurrence in the project area, primarily being observed in Douglas, Washburn, Sawyer, and Rusk Counties. Dominant tree species in this community include balsam fir, black spruce (Picea mariana), white spruce (Picea glauca), and to a lesser extent, northern white cedar, tamarack, and hemlock (Tsuga canadensis). When balsam fir or hemlock was dominant, the community was

often intermixed with hardwood swamp dominants including red maple and aspen. Other common species in the understory of this community include alder and winterberry shrubs, and blue-joint grass.

Many hardwood swamp areas in Taylor, Chippewa, Rusk, and the southern half of Sawyer Counties, had been recently partially harvested or cleared within portions of the temporary and extra workspace at the time of field surveys in 2006. This generally occurs where a proposed high-voltage transmission line, currently under construction, will run parallel to the Enbridge pipeline ROW. Within many of these formerly forested areas, all of the woody vegetation has been recently removed, and the only remaining vegetation at the time of field surveys consisted of a sparse herbaceous layer dominated by various sedges, ferns, and blue-joint grass. Other species commonly encountered include marsh marigold, horsetails (Equisetum spp.), orange jewelweed (Impatiens capensis), and buttercup (Ranunculus spp.). In addition, some of the harvested forests contained a few remaining saplings or shrubs, including American elm, black ash, and red maple.

Functional Values of Forested Wetlands

The hardwood swamps in the project area exhibit a range of floral diversity. Quaking aspen was often dominant, representing a high percentage of the canopy cover with blue-joint grass typically dominant in the understory. Additionally, both glossy and common buckthorn shrubs were commonly observed in hardwood swamps in Rusk, Clark, Wood, and Columbia Counties. These shrubs often formed dense stands that limited herbaceous growth and reduced floral diversity. Several highly diverse hardwood swamps and mixed hardwood/coniferous swamps were observed, primarily within Sawyer County. These are typically dominated by red maple and black ash (and hemlock, fir, and/or spruce in the mixed swamps) with a highly diverse herb layer dominated by several sedges and ferns with many other grasses and forbs.

Forested swamps provide habitat for a variety of wildlife including white-tailed deer, fur bearers, song birds, and ruffed grouse. Important amphibian and invertebrate habitat is also provided by vernal pools within these communities. Wood ducks, herons, and egrets also utilize forested wetlands along riverine systems, and these systems provide important migration corridors for wildlife.

In general, wooded swamps provide limited fishery habitat although floodplain forests can provide refuge from high-velocity flows and spawning habitat for various fish during flooding events. Dense root mats of trees and shrubs adjacent to waterways can also provide bank stability from erosive forces.

As with other wetlands, wooded swamps provide important flood and stormwater attenuation functions due to their position in the landscape and the density of

vegetation typically present in these communities. These communities can also provide a water quality benefit by filtering sediments and nutrients.

As with the wet/sedge meadow communities, forested swamps in the project area provide groundwater functional values. Although springs were not observed in these communities, they likely contribute to stream base flows, especially when adjacent to coldwater streams.

Hunting, trapping, and hiking are the main recreational opportunities provided by forested swamps. Some of the more diverse forested swamps may also encourage exploration and scientific research due to the uniqueness of the community. These communities may also provide commercial value through timber harvesting, although this may be limited to some extent by wet conditions.

The recently harvested or cleared areas, though currently disturbed, will likely provide similar functional values to either the inland fresh meadows (discussed above) or the shrub swamps (discussed below), depending on natural regeneration, post-construction restoration and management, and ROW maintenance after the transmission line construction is complete.

Scrub-Shrub Wetlands

Shrub swamps are wetland plant communities dominated by woody vegetation less than 20 feet tall with a diameter at breast height less than six inches. These communities grow on both organic and mineral soils with hydrology ranging from seasonal saturation to inundation for most of the growing season. Shrub carr and alder thicket communities comprise shrub swamps in Wisconsin.

Shrub carr communities are dominated by willow (Salix) and/or dogwood (Cornus) shrubs with an understory typically comprised of various forbs, grasses, sedges, and ferns. Alder thickets are similar to shrub carr communities except that speckled alder is the dominant shrub. Shrub carrs are found throughout Wisconsin, while alder thickets are typically found in and north of the tension zone.

Floristic Composition of Scrub Shrub Wetlands

Dominant shrubs observed in the shrub swamp communities along the project corridor include speckled alder, sandbar willow, meadow willow (Salix petiolaris), and red-osier dogwood (Cornus stolonifera). Less commonly observed shrubs include winterberry, meadow sweet (Spiraea alba), steeplebush (Spiraea tomentosa), Bebb's willow (Salix bebbiana), glossy buckthorn, common buckthorn, red raspberry (Rubus strigosus), gray dogwood (Cornus racemosa), and silky dogwood (Cornus amomum). Saplings of various tree species were also occasionally observed in these communities. Lake sedge, blue-joint grass, reed canary grass, rattlesnake manna grass, wool grass, broad-leaved

cattail, fringed sedge, marsh bluegrass (Poa palustris), giant goldenrod, calico aster, jewelweed, tussock sedge, joe-pye weed, dark green bulrush, and sensitive fern are common components of the understory in this community.

Similar to the wooded swamps, several shrub swamps had been recently cleared of woody vegetation at the time of field surveys in 2006, primarily in Taylor, Chippewa, Rusk, and Sawyer Counties. In general, these areas currently resemble sedge meadows and are dominated by lake sedge, blue-joint grass, and others, but are largely similar in herbaceous vegetation to the adjacent intact shrub swamp.

Functional Values of Scrub Shrub Wetlands

Floral diversity varies from low to moderate in many shrub swamp communities in the project area, though several high-quality alder thickets were observed which contain very high floristic diversity. In general, higher diversity within the shrub swamps was observed in the northern counties where vegetation from both sedge/wet meadow communities and hardwood swamps was present.

However, as discussed with the forested swamp communities, glossy and common buckthorn are common components of shrub swamps primarily in Rusk, Clark, Wood, Columbia, Jefferson, and Rock Counties, and they tend to degrade the communities where they are abundant. In several shrub carr communities, and to a lesser extent some alder communities, almost no herbaceous layer was observed in areas of heavy glossy buckthorn infestation, likely due to the dense shade provided by this invasive shrub. In addition, sandbar willow often formed dense stands in shrub carr communities in the southern counties. Reed canary grass was often an associate with these lower quality shrub carrs and is dominant in the ground layer in some of the degraded alder thickets. The extent of the three above-mentioned non-native, invasive species within many of the shrub swamps encountered during the surveys resulted in the overall low floristic rating of these communities; however, several of the alder thickets mentioned above were among the highest quality wetland complexes observed.

Shrub swamps are utilized by a variety of wildlife. Songbirds, ruffed grouse, American woodcock, snipe, small mammals, and white-tailed deer use this community for cover and resting areas. Upland game birds, song birds, white-tailed deer, muskrat, and beaver may also utilize willow and alder as a food source (Fassett, 1957). Waterfowl also use shrubs for cover and nesting.

Shrub swamps generally provide limited fishery habitat although shrubs along a steam bank can provide shade and cover. Dense root mats of shrubs adjacent to waterways can also provide important bank stability from erosive forces.

As with the other wetland communities, shrub swamps in the project area attenuate and store flood/stormwater. They may also trap sediments and assimilate nutrients which preserves or improves water quality in nearby waterways.

Shrub swamps may also contribute to base flow maintenance in streams although springs were not observed in these communities during the investigations. During drier periods, shrub swamps may also contribute to groundwater recharge by infiltrating storm / flood waters.

Hunting is the primary recreational opportunity offered by shrub swamps in the project area. Hiking and snowmobiling are likely limited by the dense cover in these communities, which creates thicket-like conditions.

The recently cleared areas, though currently disturbed, will likely provide similar functional values to either the intact adjacent shrub swamps or the inland fresh meadows (discussed above), depending on natural regeneration, post-construction restoration and management, and ROW maintenance after the transmission line construction is complete.

Emergent Wetlands

Shallow open water plant communities are characterized by water depths up to 6.6 feet and are rarely drawn down which precludes establishment of emergent vegetation. Submergent, floating and floating-leaved aquatic vegetation characterize this community type. Shallow marshes have soils that are saturated to inundated by standing water up to a depth of about six inches throughout most of the growing season. Emergent vegetation such as cattails (Typha), bulrushes, arrowheads (Sagittaria), and lake sedges (Carex) are common in this community. These shallow marshes often intergrade with sedge or wet meadows where the soil is drier.

Floristic Composition of emergent wetlands

Dominant vegetation in shallow marsh communities along the project corridor includes broad-leaved cattail, narrow-leaved cattail (Typha angustifolia), and arrowhead. Other vegetation observed in this community includes blue-joint grass, wool grass, rattlesnake and American manna grass, lake sedge, bur-reed, rice cut grass, water plantain, water arum (Calla palustris) and reed canary grass. In addition, when open water was present duckweed (Lemna spp.) and submerged aquatic plants such as pondweed (Potamogeton sp.) were occasionally observed. Many of the open water communities in the project area are excavated features.

Functional Values of emergent wetlands

Plant diversity varies in the shallow marsh communities along the project corridor. The dominant plant species typically observed in these communities (i.e., cattail and

arrowhead) reproduce by rhizomes which can result in dense, monotypic stands of these species that limits growth of other vegetation. Where soil conditions were drier and shallow marsh communities intergrade with sedge and wet meadow communities, diversity is considerably higher.

A diverse assemblage of wildlife utilizes shallow marsh and shallow open water habitats. Herptiles such as frogs and turtles, and various shorebirds, waterfowl, and songbirds use these areas for feeding, breeding, and resting. Mink and muskrat are also common inhabitants of these communities. If connected to a larger waterway, these communities may also provide spawning habitat for fish requiring dense emergent vegetation for egg-laying (e.g., northern pike).

As with other wetland communities, shallow marshes provide flood/stormwater retention functions, and can trap sediments and assimilate nutrients. This can result in water quality maintenance and improvement to downstream areas. Dense emergent vegetation in shallow marshes can also protect shorelines by dissipating wave energy; however this function is very limited in the project area due to the lack of larger water bodies with shoreline emergent vegetation.

Hunting (especially for waterfowl) and possibly fishing are the primary recreational opportunities in these communities. These communities can also be important from an aesthetic standpoint as they provide a relatively unique and open view in the landscape.

Bogs

Bogs are primarily found north of the tension zone in Wisconsin on saturated, acidic peat soils that are low in nutrients. They support a unique assemblage of trees, low-growing shrubs, and herbs growing on a mat of sphagnum moss. Open bogs and coniferous bogs are two community types within this general classification.

Open bogs are composed of a near-continuous layer of sphagnum moss growing over acid peat. Herbs, many from the sedge family, and/or low-growing ericaceous shrubs are also prevalent. Black spruce or tamarack trees, if present, are scattered and immature or exhibit stunted growth. Coniferous bogs are similar to open bogs except that mature black spruce and/or tamarack are the dominant species growing on the sphagnum mat.

Poor to intermediate fens are another community type that can grow on peatland. Fens differ from bogs in their nutrient content, soil pH, and hydrology. These differences result in varying dominant vegetation; however this distinction can be subtle in some instances. For purposes of this report, bogs were not distinguished from fens; however, it is possible that communities under this “bog” classification contained elements of

both bogs and fens (poor to intermediate). Calcareous fens, which contain a unique assemblage of calcium-tolerant plants, were not observed in the project area.

Floristic Composition of bogs

Conifer and open bog communities were largely observed in Douglas and Rusk Counties, but were also present in Washburn, Sawyer, Chippewa, and Taylor Counties. They are primarily dominated by a thick mat of Sphagnum spp. mosses. Commonly observed tree species in these communities include black spruce and tamarack (more abundant in conifer bogs). True open bogs are commonly dominated by ericaceous shrubs and plants from the sedge family, many of these bog obligates.

Commonly encountered species during the survey include Labrador tea (Ledum groenlandicum), leatherleaf (Chamaedaphne calyculata), bog laurel (Kalmia polifolia), bog rosemary (Andromeda glaucophylla), bog birch (Betula pumila), various Vaccinium spp., cotton grass (Eriophorum spp.), and various sedges including few-seeded sedge (Carex oligosperma). While some of the open bogs observed were dominated by the above-mentioned typical bog species, many also contained a mix of typical sedge and wet meadow species. These species, including winterberry, willow, steeplebush, meadowsweet, and speckled alder shrubs; and blue-joint grass, several sedges, wool grass, rattlesnake manna grass, sensitive fern, and blue flag iris, were primarily found along the fringes of the open bogs but also intermixed with typical bog species at a few wetland sites. These species (bog, sedge, and wet meadow species) also formed a large component of the understory within the conifer bogs.

Functional Values of Bogs

The floral diversity in these communities is moderate, but the quality of these wetlands is generally high. Due to the unique conditions in these communities (acidic soils and lower nutrient content), in which few species can thrive, bogs have a characteristically low diversity when compared to other plant community types. However, many of the species encountered in bogs are found only in bogs (obligate species), so despite the generally low to moderate diversity, they represent an important component of Wisconsin's wetland flora. The unique conditions typical of bogs also prevent the establishment of species which are not well-adapted; hence, few invasive plants were observed in these communities during the surveys.

Compared to other wetland communities in the project area, the diversity of wildlife utilizing conifer/open bogs is lower; however, the species present tend to be habitat specialists. Small mammals such the bog lemming, moles, and voles use this community for feeding and cover, while larger mammals such as white-tailed deer and black bear can use conifer bogs for refuge if sufficient canopy cover is present. Additionally, a variety of songbirds inhabit these communities for feeding, refuge, and, breeding. These wetlands do not provide fishery habitat.

As with other wetland communities, this community type provides some flood/stormwater retention functions, although somewhat lesser in the true bogs, which are fed primarily (and sometimes exclusively) by rainwater. By trapping sediments and assimilating nutrients, this can result in downstream water quality improvement. Shoreline protection values are typically not provided by this community.

Because of the relatively unique setting (underlain by extensive peat) and flora that inhabit this community, hiking and nature photography would be recreational activities pursued in this community. Educational opportunities such as class field trips also exist due to the unique vegetation that typically inhabits bogs. Berry harvesting would also be pursued from those who are aware that blueberries and cranberries grow in these environments. This community also provides some commercial value in the form of peat harvesting for horticultural and landscaping markets.

3.6.2 Wetlands of Special Natural Resource Interest

Wetlands of special natural resource interest are defined in Wisconsin Administrative Code NR 103.04 to include those wetlands both within the boundary of designated ASNRI, and those wetlands which are in proximity to or have a direct hydrologic connection to such designated areas. ASNRI include:

- Cold water community as defined in § NR 102.04(3)(a), Wisconsin Administrative Code, including trout streams, their tributaries, and trout lakes.
- Lakes Michigan and Superior and the Mississippi River.
- State- or federally-designated Wild and Scenic River.
- State-designated riverway and scenic urban waterway.
- Environmentally sensitive area or environmental corridor identified in an area-wide water quality management plan, special area management plan, special wetland inventory study, or an advanced delineation and identification study.
- Calcareous fen.
- State park, forest, trail, or recreation area.
- State and federal fish and wildlife refuges and fish and wildlife management area.
- State- or federally-designated wilderness area.
- State-designated or dedicated natural area (SNA).
- Wild rice water listed in § NR 19.09, Wisconsin Administrative Code.
- Surface water identified as outstanding or exceptional resource water in Wisconsin Administrative Code ch. NR 102.

Habitats used by state or federally endangered species are also considered ASNRI, but these areas within the project area, if present, have not yet been defined. A functional

value assessment and floristic quality assessment was completed for the wetlands in or immediately adjacent to ASNRI. In some instances, these analyses were grouped for separate wetlands in close proximity to each other.

Sixty-two wetlands considered to be of special natural resource interest occur within the survey corridor. The total wetland length of these sixty-two areas within the survey corridor is approximately 40,361 feet (7.6 miles). These wetlands are typically comprised of a mix of wetland communities with sedge meadow, wet meadow, hardwood swamp and alder thicket/shrub carr being most common. Based on the functional assessment performed, the majority of the wetlands have an overall rating of about medium. Twelve of the wetlands have a slightly higher rating, meaning they are better suited to perform the evaluated functional values.

3.6.3 Wetland Crossings

Table 7 shows the number of wetland crossings, broken down by county, for Enbridge's Stage 1 project. The total number of wetlands crossed is 757, which does not take into account the connectedness to larger wetland complexes. As we discussed, the total number of distinct wetland complexes crossed would be smaller as there may be several wetland crossings occurring through the same wetland complex.

Table 7 Wetland Crossings by County	
County	Number of Wetland Crossings
Douglas	124
Washburn	44
Sawyer	105
Rusk	110
Chippewa	10
Taylor	87
Clark	60
Marathon	12
Wood	68
Adams	36
Marquette	17
Columbia	43
Dane	14
Jefferson	20
Rock	7

Northern Region
The pipeline will cross 470 wetland areas or approximately 40.2 miles of wetlands in the Northern Region. Fifty of these wetlands crossings are more than 1,000 feet across.

West Central Region
In the West Central Region, the pipeline will cross 186 wetland areas comprising approximately 3.3 19.2 miles of wetlands.

Northeast Region
The pipeline will cross 17 wetland areas comprising 4.3 miles of wetlands in the North Central Region.

South Central Region
The pipeline will cross 84 wetland areas or approximately 10 miles of wetlands in the Southern Region.

The wetland information in this section was in part obtained from Wisconsin Wetland Inventory maps. A complete listing of the mapped wetlands crossed, including the Wisconsin Classification, the approximate crossing length in feet, approximate acreage

affected during construction, and estimated amount of temporary fill associated with trenching in each wetland is presented in the EIR and the Wetland Summary Tables in the application.

3.6.4 Wetland Impacts

A wetland delineation completed for this project identified 757 wetlands, approximately 68.6 miles (approximately 23% of the pipeline route) of the project corridor. Based upon a 40 foot portion of the existing 80 foot permanent easement width and a temporary additional construction workspace width of 100 feet along the corridor, approximately 1,266 acres of wetlands would be temporarily impacted by the project. This includes approximately 625 acres of wet meadow wetlands, 274 acres of scrub-shrub wetlands, 105 acres of emergent wetlands and 262 acres of forested wetlands.

Approximately 361 acres of temporary wetland impact would occur from discharges of dredged or fill material associated with the installation of the two pipes within the 40-foot wide portion of the existing 80 foot existing permanent easement area. The remaining 905 acres of wetland impact would occur from vegetation removal in the 100-foot wide temporary workspace area. There would be no permanent clearing of vegetation beyond the existing 40-foot wide portion of the permanent easement, although landowners may choose to keep the forested temporary workspace as non-forested land. Also, some forested wetlands may not regenerate into forests again.

Table 8

Summary of Wetland Impacts by Acre and by County

County	Permanent Easement	Temporary Workspace	Total	Forested Wetland	Scrub/ Shrub	Other Wetland Types
Douglas	68.4	189.92	258.34	51.21	71.1	136.01
Washburn	30.4	73.51	103.91	21.41	32.08	50.42
Sawyer	15.03	31.33	58.51	12.23	20.03	24.64
Rusk	42.04	111	153.03	29.55	32.19	91.3
Chippewa	4.46	11.27	15.72	1.01	2.49	12.23
Taylor	34.38	85.06	119.44	5.58	36.21	77.65
Clark	22.66	58.8	81.45	16.41	7.95	57.1
Marathon	12.08	29.6	41.69	18.21	2.92	20.55
Wood	46.3	114.49	160.78	54.07	18.69	88.03
Adams	8.96	23.01	31.97	8.73	8.23	15.01
Marquette	20.79	50.19	70.97	25.04	5.98	39.96
Columbia	23.85	58.2	82.05	12.91	15.28	68.66
Dane	5.19	13.03	18.22	0.82	1.13	16.27
Jefferson	15.27	38.74	54.00	4.21	16.39	33.41
Rock	4.17	11.5	15.67	0.97	3.1	11.6
Total	353.98	899.65	1,265.7	262.36	273.77	742.84

Based upon the 40 feet of the existing 80 foot permanent easement width and a temporary additional construction workspace width of 100 feet along the corridor, approximately 1,266 acres of wetlands would be temporarily impacted by the project. This includes approximately 625 (49%) acres of wet meadow wetlands, 274(22%) acres of scrub-shrub wetlands, 105 (8%) acres of emergent wetlands and 262 (21%) acres of forested wetlands. However, other temporary impacts extend beyond the 140 feet described above due to the placement of the trench spoils over the existing pipelines. The total acreage of this has not been calculated, but would be similar to that listed below for the 40 feet of permanent ROW.

Approximately 360 (28%) acres of wetland impact would occur from discharges of dredged or fill material associated with the installation of the two pipes within the existing permanent easement area. The remaining 906 (72%) acres of wetland impact would occur from vegetation removal in the temporary workspace area. However, actual clearing may be less than this amount because a portion of the temporary workspace is located within a previously cleared ROW adjacent to the Enbridge ROW.

Pipeline construction will temporarily disturb up to 1,265.74 acres of wetlands (based on a standard 180-foot construction right-of-way). Depending on the nature of wetlands to be crossed, actual construction workspace needs may be less. Specifically, saturated wetlands will require less additional construction right-of-way space. Most of the affected wetlands (approximately 273.7 acres) are identified as shrub or partially shrub covered. Forested or partially forested wetlands comprise approximately 262.4 acres. However, actual clearing may be less than this amount because a portion of the temporary work space is located within a previously cleared ROW adjacent to the Enbridge ROW. Of the remaining 729.6 acres that will be affected by the pipeline, about 104.9 acres are emergent, partially emergent, open water, or aquatic bed wetlands.

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. Trench breakers will be placed in the trench to prevent lateral flow of water in the backfilled trench. 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.

Staging areas and extra workspace will be needed on both sides of most larger wetlands. These areas will be located at least 50 feet away from the wetland boundaries, where topographic conditions permit, and will be limited to the minimum area needed

for assembling the pipeline. Storage of hazardous materials, chemicals, fuels, and lubricating oils will be prohibited within 100 feet of wetland boundaries.

Temporary sediment filter devices will be installed at the base of cleared slopes leading to wetlands. If there is no slope, sediment filter devices will be installed as necessary to prevent spoil from flowing off the right-of-way into the wetland or to prevent sediment from flowing from adjacent uplands into the wetlands.

During clearing, woody wetland vegetation will be cut at ground level and removed from the wetland, leaving the root systems intact. In most areas, removal of stumps and roots will be limited to the area directly over the trench. . Enbridge will remove stumps from areas outside of the trench line as necessary to provide a safe work surface.

To facilitate revegetation of wetlands, up to 1 foot of topsoil will be stripped from over the trench, except in areas where standing water or saturated soils make it impracticable, where no topsoil layer is evident, or where the topsoil layer exceeds the depth of the trench.

Enbridge proposes to minimize disturbance of wetlands with saturated soils or standing water by using either low ground pressure equipment, or standard construction equipment operating from timber pads. The use of imported rock, stumps, brush, or offsite soil as temporary or permanent fill in wetlands will be prohibited. Following construction, materials used in wetlands to stabilize the right-of-way will be removed.

If the standard crossing method is not practical because of wetness or standing water, Enbridge may use either the push/pull method or winter construction method. Use of the push/pull method is generally limited to large wetlands with standing water and/or saturated soils that have adequate access for pipeline assembly and equipment operation on either side of the wetland. If this method is used, a long section of pipeline will be assembled on an upland area of the right-of-way adjacent to the wetland. Usually this requires use of extra temporary workspace adjacent to the right-of-way. The trench will be dug by a backhoe supported on timber mats. The prefabricated section of pipeline will then be floated across the wetland. When the pipeline is in position, the floats will be removed.

Table 9 – Wetland Impact Summary

Enbridge Pipeline LLC Southern Access Expansion Program Enbridge Expansion: STAGE 1 Wetland Impact Summary [1]				
	Sum of Affected Acreage within Permanent Easement	Sum of Affected Acreage within Temporary Workspace	Sum of Affected Acreage within Extra Workspace	Sum of Affected Acreage Total
Douglas County				
Wet Meadow [2]	56.61	51.74	–	108.36
Emergent [3]	9.49	18.18	–	27.67
Scrub Shrub [4]	0.77	70.33	–	71.10
Forested [5, 6]	1.54	49.67	–	51.21
Douglas Totals	68.40	189.92	–	258.34
Washburn County				
Wet Meadow [2]	24.71	18.74	–	43.45
Emergent [3]	3.12	3.85	–	6.97
Scrub Shrub [4]	1.29	30.79	–	32.08
Forested [5, 6]	1.28	20.13	–	21.41
Washburn Totals	30.40	73.51	–	103.91
Sawyer County				
Wet Meadow [2]	13.52	9.77	–	23.30
Emergent [3]	1.25	1.70	–	2.95
Scrub Shrub [4]	5.45	14.58	–	20.03
Forested [5, 6]	1.87	10.36	–	12.23
Sawyer Totals	22.09	36.42	–	58.51
Rusk County				
Wet Meadow [2]	35.90	43.71	–	79.62
Emergent [3]	3.77	7.91	–	11.67
Scrub Shrub [4]	1.34	30.86	–	32.19
Forested [5, 6]	1.03	28.52	–	29.55
Rusk Totals	42.04	111.00	–	153.03
Chippewa County				
Wet Meadow [2]	2.37	5.16	–	7.53

Enbridge Pipeline LLC Southern Access Expansion Program Enbridge Expansion: STAGE 1 Wetland Impact Summary [1]				
	Sum of Affected Acreage within Permanent Easement	Sum of Affected Acreage within Temporary Workspace	Sum of Affected Acreage within Extra Workspace	Sum of Affected Acreage Total
Emergent [3]	1.98	2.71	–	4.69
Scrub Shrub [4]	0.09	2.41	–	2.49
Forested [5, 6]	0.02	1.00	–	1.01
Chippewa Totals	4.46	11.28	–	15.72
Taylor County				
Wet Meadow [2]	27.44	36.83	–	64.27
Emergent [3]	6.16	7.22	–	13.38
Scrub Shrub [4]	0.76	35.45	–	36.21
Forested [5, 6]	0.02	5.56	–	5.58
Taylor Totals	34.38	85.06	–	119.44
Clark County				
Wet Meadow [2]	21.69	34.48	–	56.16
Emergent [3]	0.30	0.63	–	0.93
Scrub Shrub [4]	0.14	7.82	–	7.95
Forested [5, 6]	0.54	15.87	–	16.41
Clark Totals	22.67	58.80	–	81.45
Marathon County				
Wet Meadow [2]	8.97	10.29	–	19.26
Emergent [3]	0.35	0.95	–	1.30
Scrub Shrub [4]	0.52	2.40	–	2.92
Forested [5, 6]	2.24	15.96	–	18.21
Marathon Totals	12.08	29.60	–	41.69
Wood County				
Wet Meadow [2]	41.79	41.32	–	83.11
Emergent [3]	1.88	3.03	–	4.91
Scrub Shrub [4]	0.64	18.05	–	18.69
Forested [5, 6]	1.99	52.09	–	54.07
Wood Totals	46.30	114.49	–	160.78

Enbridge Pipeline LLC Southern Access Expansion Program Enbridge Expansion: STAGE 1 Wetland Impact Summary [1]				
	Sum of Affected Acreage within Permanent Easement	Sum of Affected Acreage within Temporary Workspace	Sum of Affected Acreage within Extra Workspace	Sum of Affected Acreage Total
Adams County				
Wet Meadow [2]	7.77	6.19	–	13.96
Emergent [3]	0.13	0.91	–	1.05
Scrub Shrub [4]	0.79	7.43	–	8.23
Forested [5, 6]	0.26	8.47	–	8.73
Adams Totals	8.95	23.00	–	31.97
Marquette County				
Wet Meadow [2]	20.06	19.46	–	39.51
Emergent [3]	0.07	0.37	–	0.44
Scrub Shrub [4]	0.08	5.91	–	5.98
Forested [5, 6]	0.59	24.45	–	25.04
Marquette Totals	20.80	50.19	–	70.97
Columbia County				
Wet Meadow [2]	19.54	23.82	–	43.37
Emergent [3]	2.68	7.81	–	10.49
Scrub Shrub [4]	1.13	14.14	–	15.28
Forested [5, 6]	0.48	12.43	–	12.91
Columbia Totals	23.83	58.20	–	82.05
Dane County				
Wet Meadow [2]	3.94	8.93	–	12.86
Emergent [3]	1.12	2.29	–	3.41
Scrub Shrub [4]	0.04	1.08	–	1.13
Forested [5, 6]	0.10	0.73	–	0.82
Dane Totals	5.20	13.03	–	18.22
Jefferson County				
Wet Meadow [2]	10.33	13.94	–	24.26
Emergent [3]	3.35	5.79	–	9.14

Enbridge Pipeline LLC Southern Access Expansion Program Enbridge Expansion: STAGE 1 Wetland Impact Summary [1]				
	Sum of Affected Acreage within Permanent Easement	Sum of Affected Acreage within Temporary Workspace	Sum of Affected Acreage within Extra Workspace	Sum of Affected Acreage Total
Scrub Shrub [4]	1.33	15.06	-	16.39
Forested [5, 6]	0.26	3.95	-	4.21
Jefferson Totals	15.27	38.74	-	54.00
Rock County				
Wet Meadow [2]	1.97	3.77	-	5.74
Emergent [3]	2.02	3.84	-	5.86
Scrub Shrub [4]	0.19	2.91	-	3.10
Forested [5, 6]	-	0.97	-	0.97
Rock Totals	4.18	11.49	-	15.67
Total Wet Meadow [2]	296.62	328.15	-	**624.75**
Total Emergent [3]	37.66	67.19	-	**104.86**
Total Scrub Shrub [4]	14.56	259.22	-	**273.77**
Total Forested [5, 6]	12.21	250.17	-	**262.36**
Grand Total	**361.05**	**904.73**	**-**	**1,265.74**

1/ Wetland community type description based on Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed,1997). Wetland communities include: shallow open water (OW), deep marsh (DM), shallow marsh (ShM), sedge meadow (SM), fresh (wet) meadow (WM), wet to wet-mesic prairie (WP), calcareous fen (CF), open bog (OB), coniferous bog (CB), shrub-carr (SC), alder thicket (AT), hardwood swamp (HS), coniferous swamp (CS), floodplain forest (FP), seasonally flooded basin (SFB).

2/ Wet Meadow Group includes: Fresh (Wet) Meadow, Sedge Meadow, Wet to Wet-Mesic Prairie, Seasonally Flooded Basins, harvested/cleared hardwood swamps (based on remnant sapling cover), and NRCS mapped Farmed Wetlands

3/ Emergent Group includes: Shallow Open Water, Shallow Marsh, Deep Marsh, and Open Bog

4/ Scrub Shrub Group includes: Shrub-Carr, Alder Thicket, harvested/cleared swamps (based on remnant sapling cover), and coniferous bogs (based on density of tree cover)

5/ Forested Group includes: Hardwood Swamp, Coniferous Swamp, Floodplain Forest, and Coniferous Bog

Enbridge Pipeline LLC Southern Access Expansion Program Enbridge Expansion: STAGE 1 Wetland Impact Summary [1]				
	Sum of Affected Acreage within Permanent Easement	Sum of Affected Acreage within Temporary Workspace	Sum of Affected Acreage within Extra Workspace	Sum of Affected Acreage Total

6/ Forested cover based upon criteria of 50% or more cover by overstory trees; if tree cover was less than 50%, areas were mapped and impacts evaluated within the Scrub Shrub Group

and the pipeline will sink into position. The trench will then be backfilled and the original contours will be restored by a backhoe working from construction mats.

Using winter construction techniques, the pipe is installed in wetlands similar to conventional upland construction. Because equipment is supported by frozen soil and ice, temporary mats are not required. The success of winter construction depends on prolonged periods of subzero temperatures, which produce sufficient freezing. Because these conditions are not always predictable the winter construction method is generally not reliable. Ice roads may be used to decrease impacts, They are created by plowing the snow off of the wetland to facilitate the penetration of the frost deeper in the ground.

Following restoration of contours, wetlands will typically be seeded with annual ryegrass as a cover crop. Other measures such as replacement of the original surface soil, with its stock of roots and tubers can facilitate restoration. The wetland will then be allowed to revegetate naturally to preconstruction vegetative covers or as directed by permits. No lime or fertilizer will be added to disturbed wetland areas, unless required in writing by the appropriate state permitting agency. After a period of monitoring, wetlands that do not appear to be regenerating by this process will be seeded with an approved native seed mix.

Operation of the pipeline will not require alteration of wetlands other than infrequent right-of-way management activities such as brush control. Therefore, no permanent filling, dredging or other long-term wetland disturbance is anticipated.

3.6.3 Measures to Minimize Wetland Impacts

The applicant proposes to reduce the width of the temporary workspace in forested wetlands and in other wetland areas when conditions allow for a push-pull method of pipeline construction versus the standard method. For this method of construction, a

pre-fabricated section of pipeline is floated across the wetland and allowed to sink once in position. The trench is then backfilled to preconstruction contours by a backhoe working from construction mats. The method used for pipeline construction is dependant on the soil types encountered and water level/precipitation at the time of construction. The applicant has indicated that pre-determining the construction width is not possible and has stated that the 100-foot wide temporary workspace is the maximum width needed for a worst case scenario. The applicant would make an assessment on site at each location, at the time of construction, to determine the minimum amount of temporary workspace needed. To date, the applicant has preliminarily identified 10 locations where the temporary additional workspace could be reduced.

The applicant further proposes to use timber mats and low ground pressure equipment to minimize disturbance of wetlands with saturated soils. Winter construction methods would be used for selected wetland and waterway crossings. Access to wetland areas would be from public and private roads or within the construction right-of-way. Staging areas and spoil storage areas would be located in upland areas. All woody debris and excess backfill material would be removed to an upland location. Construction equipment would be cleaned before arriving on site to prevent the spread of non-native and invasive plant species. Trench breakers would be installed as necessary to maintain wetland hydrology. The duration of the open trench would be minimized to the extent possible, but not typically longer than 24 hours. All wetlands would be restored to preconstruction contours be seeded with an approved wetland seed mix.

3.6.4 Federal Wetland Compensatory Mitigation requirement

As part of its federal permit requirements, the applicant proposes to compensate for the lost functions and values of the wetlands impacted in accordance with the Guidelines for Wetland Compensatory Mitigation in Wisconsin. Moreover, the applicant has proposed to compensate for all forested wetland impacts (260 acres) within the existing easement and temporary workspace corridor at a 0.5 to 1 ratio. Appropriate compensation would be determined by the Corps, in consultation with USEPA, USFWS and WDNR. Compensatory mitigation plans are pending at this time.

3.7 HUMAN ENVIRONMENT

3.7.1 Existing Human Environment

Land Ownership

Public and private land ownership along the pipeline route was identified from multiple sources. The pipeline route crosses approximately 41.0 miles of public land and approximately 304.9 miles of private land. Publicly owned lands include federal, state,

county, city and Indian reservation lands. Table 2.7-1 summarizes public lands by WDNR Region.

3.7.1.1 Land Use

Land uses along the pipeline route were classified according to vegetative cover and other obvious physical characteristics. They were classified as either agricultural, forest, open (including utility rights-of-way, open water, golf courses, and residential areas) or transportation. Agriculture is the most prevalent land Use along the pipeline route. Forestland is the second most common type of land crossed, followed by open land, and transportation land. The total miles and percentages for each land use category crossed by the pipeline route are summarized by WDNR Regions and county in Table 2.7-2.

Description of Agricultural Land Uses

The pipeline route crosses approximately 181.7 miles of agricultural land, which accounts for 52.5% of total land crossed by the pipeline in Wisconsin. Most agricultural lands are crossed in Rusk, Taylor, Clark, Wood, Columbia, Jefferson and Walworth Counties.

The primary land uses comprising the agricultural category are cultivated croplands and pasture lands. A general discussion of the agricultural land uses crossed by the pipeline is provided below. References to specialty crops and livestock provide a more comprehensive picture of the existing agricultural industries operating in the counties crossed by the pipeline route.

Northwestern counties: Major crops include feed corn, soy beans, alfalfa, and clovers, which are grown to support the large dairy industry in the area. Specialty crops grown near the pipeline route include cranberries, strawberries, raspberries, and ginseng. The pipeline route passes near cranberry bogs near Gordon and Solon Springs. Approximately 1,000 feet of cranberry bog that has encroached on Enbridge's right-of-way will be crossed near Sand Lake in Sawyer County.

TABLE 10

Land Use Types Crossed By the Pipeline

STAGE 1

WDNR Region/ County	Agricultural (miles)	Forest (miles)	Open Land (miles)	Wetlands and Open Water (miles)	Commercial Residential (miles)	Total Miles
Northern						
Douglas	8.8	24.6	1.9	3.2	1.9	40.4
Washburn	3.5	14.8	0.4	0.4	0.0	19.1
Sawyer	4.5	20.1	0.0	0.3	0.0	24.9
Rusk	16.7	11.6	0.1	0.7	0.0	29.1
Taylor	15.3	4.4	0.0	0.6	0.1	20.4
Subtotal	48.8	75.5	2.4	5.2	2.0	133.9
West Central						
Chippewa	1.6	0.8	0.0	0.3	0.0	2.7
Clark	24.1	2.5	0.1	0.0	0.1	26.8
Marathon	3.3	1.5	0.0	0.0	0.0	4.8
Wood	24.7	12.4	0.7	0.2	0.1	38.1
Adams	10.9	14.9	4.4	0.3	0.1	30.6
Subtotal	64.6	32.0	5.2	0.8	0.3	103.0
Northeast						
Marquette	11.6	2.7	1.3	0.9	0.1	16.6
South Central						
Columbia	26.0	3.5	0.1	1.5	0.0	31.1
Dane	11.1	0.5	0.0	0.0	0.0	11.6
Jefferson	20.8	0.9	0.2	1.0	0.0	22.9
Rock	2.9	0.2	0.0	0.1	0.0	3.3
Subtotal	60.8	5.1	0.3	2.6	0.0	68.9
Total	185.8	115.4	9.2	9.5	2.4	322.4
Percent of Total	58	36	3	3	<1	

TABLE 11

Acreages of Land Uses Affected
STAGE 1 [a]

WDNR Region/County	Agricultural (acres)	Forested [b] (acres)	Open Land [c] (acres)	Wetlands/Open Water [d] (acres)	Commercial/ Residential (acres)	Total
Northern						
Douglas	149.4	417.7	152.0	55.1	31.74	805.9
Washburn	59.89	251.3	78.1	7.5	0.0	396.8
Sawyer	90.6	320.8	88.7	9.5	0.0	509.6
Rusk	284.0	196.3	57.0	12.2	0.0	549.5
Taylor	529.1	74.5	21.3	9.5	1.3	635.7
West Central						
Chippewa	26.8	13.0	3.7	4.6	0.0	48.1
Clark	408.5	42.1	14.2	0.7	1.1	466.6
Marathon	56.5	25.8	7.4	0.2	0.0	89.9
Wood	418.5	210.1	72.5	3.6	1.7	706.4
Adams	185.3	254.2	146.5	5.9	1.3	593.2
Northeast						
Marquette	197.0	46.2	34.8	14.9	0.9	293.8
South Central						
Columbia	441.2	59.5	18.8	24.7	0.3	544.5
Dane	187.8	8.3	2.4	0.7	0.4	199.6
Jefferson	352.5	16.1	7.2	17.0	0.4	393.2
Rock	51.2	3.6	1.0	2.4	0.0	58.2
Total	3,438.3	1,939.5	705.6	168.5	39.1	6,291.0
Percent of Total	55	31	11	3	<1	

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[a] Impacts on land use are calculated based upon use of a 140-foot-wide construction limit. Enbridge will install the pipeline within an existing maintained easement. There will be no additional effects from operation of the pipeline on land uses.

[b] Construction impacts on forested land uses are calculated for proposed temporary construction areas only (approximately 100 feet wide).

[c] Construction impacts on open land uses include impacts within Enbridge's maintained permanent easement where located adjacent to forested land uses. Acreage (miles) for forested and open land were determined using the assumption that when crossing forested tracts, 40 feet of the 140-foot-wide right-of-way will be within Enbridge's maintained right-of-way and are therefore considered open land. The remaining 80 feet is considered forested.

[d] Wetlands within this land use category do not include forested wetlands.

Note: Due to rounding, totals may be off by 0.1 place.

West central counties: Dairy farming is the primary agricultural activity in Clark County. Major crops grown in Clark County in support of the dairy industry include feed corn, alfalfa, and clovers. Only minor agriculture and dairy operations exist in Chippewa County. Crops grown in Chippewa County include hay, soy bean, and feed corn.

Dairy operations dominate the agricultural industry in Marathon and Wood Counties. Beef cattle herds and limited dairy operations exist in Adams County. Agricultural crops are grown primarily to sustain the dairy industry, and include feed corn, alfalfa, clovers, and soy beans. The pipeline route crosses four nurseries/tree farms in Adams County. It also crosses four pivot irrigation systems. Cranberries are grown near Nekoosa, in parts of Seneca, and in most of Cranmoor Townships in Wood County, but no cranberry bogs are crossed by the pipeline in these counties.

South central counties: Major dairy operations exist in Columbia, Dane, and Jefferson Counties. A limited dairy industry also exists in Marquette and Rock Counties. Some swine, sheep, and beef cattle herds may also be found in Jefferson, Columbia, and Rock Counties. Agricultural crops grown in support of the dairy industry in the area include corn, soybeans, and alfalfa. Some sweet corn and peas are grown in Columbia and Dane Counties. Specialty crops such as ginseng, strawberry, apples, mint, sod, carrot, and tobacco are also grown in parts of Dane and Jefferson Counties. The pipeline route crosses two nurseries/tree farms in Marquette County and one nursery/tree farm in Columbia County.

Description of Forest Land Uses

The pipeline route crosses approximately 137.9 miles of forested lands. While the land within the existing 80 foot right-of-way is maintained as open land, up to 100 feet of the proposed temporary workspace and another 40 feet of extra temporary workspace adjacent to the permanent right-of-way is forested. Consequently, forest lands can account for a significant part of the total land area that will be affected. In some areas, the width of forest lands that will be affected will be less than 100 or 140 feet since a portion of the pipeline that crosses through forested areas will be installed between the an existing Enbridge pipeline and adjacent electric power lines; therefore, no trees will be affected in these areas.

The pipeline project crosses county forest in Douglas, Washburn, Rusk and Wood counties, as well as an undetermined number of parcels enrolled in Forest Tax Law programs.

Description of Open Land

The pipeline route crosses approximately 20.4 miles of open land. However, open land comprises far more than 5.9% of the land area that will be affected by the project in

Wisconsin. This is because open land includes not only fields, brush lands, and utility corridors, but also previously cleared forestlands within Enbridge's existing right-of-way. Open land may also be disturbed outside of the fence lines of existing pump stations to install the proposed pump stations. Based on preliminary design, open land accounts for approximately 50% of the land that will be disturbed outside of the existing fence line of the Edgewater Pump Station, 67% of the land that will be disturbed outside of the existing fence lines of the Owen and Adams Pump Stations, and all of the land that will be disturbed outside of the existing fence line of the Cambridge Pump Station.

Most open land is crossed in Douglas, Washburn, Sawyer, and Rusk Counties in the Northwest Region, Wood and Adams Counties in the North Central Region, and Jefferson County in the Southern Region.

Industrial lands were included in the open land use category. Industrial areas that will be crossed by the pipeline include the Enbridge terminal facility in Superior, Wisconsin, and existing pump stations owned and operated by Enbridge along the existing right-of-way. The pipeline will also be routed to avoid a municipal/industrial landfill near Spencer, which has encroached onto Enbridge's permanent easement since the installation of the existing 34-inch-diameter pipeline in 1968. The pipeline route does not cross any other known industrial lands.

The pipeline will cross 13 existing underground pipelines and eight electric power lines in the Northern, West Central, and South Central Regions.

Description of Transportation Land Use

Transportation land uses include county and township roads, major state and U.S. highways, railroads, and other rights-of-ways. The pipeline will cross approximately 383 paved roads, 37 gravel/dirt roads, and 20 railroads. The pipeline route crosses one inactive landing field runway located approximately two miles west of Ladysmith, in Rusk County. Together, these corridors comprise approximately 5.9 miles or approximately 1 .7 percent of the pipeline route in Wisconsin.

3.7.1.2 Population Centers and Employment

The pipeline route does not cross through any major cities or major population centers. However, the pipeline will be within one mile of numerous towns, urban areas, and residential development areas. The most populated cities near the pipeline are Superior (population less than 30,000), Marshfield (population less than 20,000), Wisconsin Rapids (population less than 20,000), and Whitewater (population less than 12,000). Population of most towns near the pipeline route are generally less than 5,000.

3.7.1.3 Residential and Commercial Areas

The pipeline route does not cross any commercial areas. However, there are several residential and farm dwellings and structures within 100 feet of the proposed construction right-of-way. Enbridge w*ill confirm the locations of structures near the construction right-of-way during engineering surveys. Enbridge will consult with landowners and make minor changes in the pipeline alignment as necessary to minimize disturbance to existing structures.

3.7.1.4 Recreational, Special Interest, or Specially Designated Areas

The pipeline will not cross sites currently listed in the National Register of Historic Places or the National Registry of Natural Landmarks maintained by the Department of the Interior. However, the pipeline route crosses approximately 8.5 miles of recreational, special interest or specially designated areas. These include an Indian reservation, four State Wildlife Areas, two National Waterfowl Production Areas (NWPAs), a federally designated Wild and Scenic River, a park, three designated state trails, a high school athletic field, and two golf courses. These areas are listed on Table 12. The state wildlife management areas and NWPAs are also discussed in section 3.4.3 of this report.

In Douglas County, the pipeline route crosses the Nemadji golf course and the Douglas County State Wildlife Area. The pipeline route also crosses the St. Croix River and passes near, but does not cross, the Brule River State Forest Annex. The St. Croix River from Gordon Dam to its confluence with the Mississippi River is a federally designated Wild and Scenic River. However, the proposed crossing location is upstream of the designated segment and therefore will not affect the designated wild and scenic portion of the river.

In Washburn County, the pipeline route crosses the St. Croix National Scenic Riverway. This area includes the Namekagon River, a federally designated Wild and Scenic River. The Namekagon and upper St. Croix River were among the eight original rivers to be designated under the federal Wild and Scenic Rivers Act (the Act) with its passage in 1968. The upper St. Croix National Scenic Riverway (upper Riverway) includes the St. Croix River from Gordon Dam to the hydroelectric dam at St. Croix Falls, Wisconsin and the Namekagon River from the Namekagon Dam near Cable, Wisconsin to the confluence with the St. Croix upstream of Danbury, Wisconsin.

The purpose of designating a river under the Act is to preserve its free-flowing character, water-quality, and the outstanding resource values of the river and immediate environment for the use and enjoyment by present and future generations. The original master plan for the upper Riverway points to the outstanding scenic, recreation and fish and wildlife values of the Namekagon River (NPS, 1976). The 1998 update for the area (NPS, 1998) recognizes the high-quality

recreational opportunities and exceptional natural, scenic, cultural, and aesthetic values of the Namekagon River.

The scenic character of the proposed crossing area has already been affected by an over-head electric transmission line and the existing pipeline right-of-way. While there are plans to plant trees in the area that do not reach heights that would interfere with the electric transmission lines, the area is relatively open and treeless compared with adjacent areas just upstream and downstream.

According to the 1998 general management plan, because there are already numerous river crossings, the NPS will discourage new crossings for bridges, roads, trails, railroads, and utility lines. The replacement of bridges and other utility crossings will be permitted only if they meet the requirements of the Act. The NPS will work to consolidate crossings wherever possible, place new bridges and utilities in existing corridors, and find solutions that do not impact Riverway resources.

TABLE 12

Recreational, Special Interest, and Specially Designated Areas
STAGE 1

WDNR Region/County	Beginning Milepost	Area
Northern		
Douglas	1.3	Nemadji Golf Course
Douglas	28.5	Douglas County State Wildlife Area
Douglas	30.5	Douglas County State Wildlife Area
Douglas	32.8	Wild Rivers State Trail
Washburn	53.7	St. Croix National Scenic Riverway (Namekagon River)
Sawyer	69.1	La Courte Oreilles Reservation
Sawyer	73.6	Tuscobia Park Falls State Trail
West Central		
Clark	142.5	Owen High School Athletic Practice Field
Clark	150.2	Rustic Road 73
Wood	178.1	Richfield 360 Recreation Area
Wood	178.7	Richfield Recreation Area Ski Touring Trail
Adams	209.0	Lake Arrowhead Golf Course
Adams	219.7	Ho-Chunk Nation
South Central		
Columbia	253.5	French Creek State Wildlife Area
Columbia	253.9	French Creek State Wildlife Area
Columbia	274.4	National Waterfowl Production Area
Columbia	275.0	National Waterfowl Production Area
Columbia	275.6	National Waterfowl Production Area
Jefferson	300.3	Glacial Drumlin State Trail
Rock	318.3	Lima Marsh State Wildlife Area

In Sawyer County, the pipeline route crosses Tuscobia Park Falls State Trail.

In Clark County, the pipeline route crosses approximately 850 feet of an Owen High School athletic practice field which is several hundred feet southwest of the school's primary football field and outdoor track facility.

The pipeline route crosses the Wood County Richfield Recreation Area and the Richfield Recreational Area Ski Touring Trail. The recreation area is used year-round for hiking, skiing, snowmobiling, and camping, and is equipped with an open parking area and toilet facility. In Adams County, the pipeline route crosses approximately 0.6 mile of golf course and a new housing development near Lake Arrowhead. The pipeline also passes near but does not cross Rustic Road No. 50, which begins on Cottonville Avenue approximately 0.5 mile east of the pipeline route.

In Columbia County, the pipeline route crosses the French Creek State Wildlife Area, and three portions of two NWPA's. In Jefferson County, the pipeline route crosses the Glacial Drumlin State Trail, a bicycle and snowmobile trail developed on an abandoned railroad grade. In Rock County, it crosses the Lima Marsh State Wildlife Area.

3.7.1.5 Visual Resources

Visual resources along the pipeline route include areas near rivers, wayside parks, recreational areas, and some of the specially designated areas discussed in the previous section. Numerous forests and small woodlots are along the ROW, many of which present an appealing feature on the landscape. Some visual resources in the Northern Region include the Nemadji Golf Course, the Namekagon River, and the Tuscobia State Trail. Visual resources in the West Central Region include the Richfield Recreation Area, and a golf course near Lake Arrowhead. State wildlife lands and private woodlots add visual beauty to the areas along the southern portion of the route.

3.7.2 Impacts and Mitigation

3.7.2.1 Effects on Land Ownership and Land Use

Construction and operation of the pipeline and aboveground facilities will not significantly affect land ownership. Enbridge does not anticipate purchasing land in fee for the project and minimal additional right-of-way easement will be obtained. Enbridge intends to exercise existing easement rights and acquire temporary easements where necessary to build the pipeline. Temporary easements will be relinquished to the landowners after construction of the proposed facilities and will not be maintained as permanent right-of-way. Table 11 lists the acreage of various land uses that will be affected in each WDNR Region and county.

Typically, construction disturbance will last between two to four months (the time between initial clearing and final restoration/revegetation activities). Due to the nature of pipeline construction, all land uses within the construction right-of-way will be

temporarily disturbed. When construction is completed, the project area will be restored and returned to its previous existing land use. The temporary workspace right-of-way will be allowed to revert to its pre-construction condition; the permanent right-of-way will continue to be maintained by periodic mechanical clearing.

Land uses within the construction right-of-way will be disrupted during construction. After installation of the pipeline, disturbed areas will be restored to pre-construction conditions to the extent practicable. In non-agricultural areas, the right-of-way will be seeded with grasses. Enbridge anticipates that the project will have minimal long-term impact on existing or future land uses because the proposed pipeline will be installed within Enbridge's existing right-of-way. Preconstruction uses of the existing right-of-way will be allowed to resume following construction. Although some future uses such as the construction of buildings or the planting of large trees will not be allowed on the permanent right-of-way, these activities are already prohibited by existing pipeline easement agreements.

Enbridge will repair damage to roads that results from moving equipment or accessing the right-of-way. Fences and gates that are removed or damaged as a result of right-of-way preparation, construction or maintenance activities will be repaired or replaced. Shelter belts and trees will be protected to the extent possible in a manner compatible with the safe operation, maintenance, and inspection of the pipeline. In residential areas, Enbridge will work with individual landowners to replace landscaping as appropriate.

Agricultural Areas

Construction will affect up to 3438 acres of agricultural land. The greatest percentage of this agricultural land (about 1032.7 acres) is in the South Central Region. The next largest percentage of agricultural land that will be affected is in the Northern Region (about 1112.9 acres). The approximate amounts of agricultural land that will be affected in other Regions are 1097.6 acres in the West Central Region, and 197 acres in the Northeast Region

Construction of the pipeline will temporarily disrupt crops and 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 and crop yields 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.

Landowners will be compensated for crop and nursery losses and damages caused by construction activities, as well as temporary decreases in productivity. Enbridge will also compensate landowners, as appropriate, if future maintenance and repair activities on the pipeline should result in decreased agricultural production. Maintenance equipment will be confined to access routes agreed upon with landowners to prevent soil compaction, drainage alteration, and damage to crop if present.

Pipeline construction will require the cutting of existing livestock fences, could cause short-term disruption to livestock production, and could inconvenience other agricultural activities. Additionally, the open trench could pose a general hazard and temporary barrier to livestock and farm vehicles. Enbridge proposes to take appropriate measures to minimize these impacts. Temporary fences will be erected where necessary to exclude livestock and protect them from falling into the trench. Furthermore, Enbridge will coordinate with landowners to maintain access to fields, structures, storage areas and other agricultural interests where necessary.

The pipeline will cross approximately 1,000 feet of cranberry bog near Sand Lake, in Sawyer County. Enbridge proposes to install the proposed pipeline using conventional construction methods, with construction timed to not unduly disrupt cranberry production.

The pipeline will cross approximately 4.4 miles of pivot irrigation. Enbridge will contact the owners of these irrigation systems and either schedule construction outside of the irrigation season or coordinate with each landowner to temporarily disrupt the flow of these systems. Enbridge will also repair or replace all irrigation or drainage systems that are broken or damaged during construction.

Forested Areas

Construction will require the clearing of up to 1939 acres of forestland adjacent to existing cleared right-of-way and another 3.5 acres of forestland outside the fence lines of its existing pump stations. Enbridge has minimized the need for forest clearing by overlapping the proposed construction right-of-way with its existing right-of-way to the maximum extent possible. Enbridge proposes to minimize the potential for erosion and other effects associated with forest clearing through implementation of its EMP. Following construction, the right-of-way will be restored and seeded with grasses. Enbridge will not maintain the previously forested temporary right-of-way and extra workspaces. These areas will be allowed to revert to forestland and Enbridge will compensate landowners for forestland losses.

Impacts to Private Wood lot Owners

Managed Forest Law (MFL) programs have a cap of 20% on the allowable area of non-productive land (land not used to grow trees). It is possible that some enrolled private woodlot owners may be disqualified from participation in this tax incentive program because clearing may cause them to exceed the non-forest cap, if the species removed were those that typically regenerate poorly under clear-cut conditions. Such species include red pine, white pine, jack pine, northern hardwoods, and oak. These would likely require replanting after the temporary workspace was no longer needed. Other species, especially aspen, jack pine, and white birch, would likely not need replanting. Landowners should contact their county forester to obtain more specific information on the impact of ROW clearing on their eligibility for continued or new participation in the MFL program.

Impacts to County Forests

Four County Forests (Douglas, Washburn, Rusk, and Wood) are impacted by the pipeline right-of-way. Utility rights-of-way, including pipeline corridors, are generally permissible on land designated as county forest. Typically, use of county forest land inconsistent with the purposes set forth in s. 28.11 Wis. Stats. must be withdrawn from the program through a withdrawal process (s. 28.11(11), Wis. Stats.

The Department of Natural Resource's interpretation has been that these lands may continue to be enrolled in county forest law so long as the right-of-way easement still provides for most of the purposes set forth in statute. These include recreational

opportunities, wildlife habitat, watershed protection and stabilization of stream flow. Each of the four counties is independently dealing with Enbridge through their forestry committees and corporation counsels in order to still provide for such uses, as well as to arrange for proper compensation for the easement and the associated workspace.

The temporary 100 foot workspace will result in approximately 257 acres of additional county forest land outside of the 80 foot easement being impacted. The majority of this acreage is wooded and the clearing of these areas will prematurely harvest the timber present. In some cases this will result in loss of product value (e.g. cutting of pulp as opposed to future sawtimber) and in some cases the timber will be harvested prior to it reaching merchantable size.

Harvesting of timber on county forest land is subject to severance taxes on the stumpage value of the forest products removed. Statute (s. 28.11(9)) requires 10% of the stumpage value to be allocated to the Township and 20% to be allocated to the Department of Natural Resources Division of Forestry (if the county has an outstanding loan balance). Timber harvested will therefore require reporting and tracking per normal County Forest timber sale procedures. Administrative time will be needed by county staff to appraise the timber to be harvested, secure a contractor to complete the work, track the volumes and products harvested, and report accordingly. In addition, reforesting or otherwise revegetating the work space will require expense and staff time. The details of the responsibilities for the county and Enbridge will need to be addressed in the easement agreement developed in each county.

All of the county forests along the ROW are third party certified to the principles and standards of either the Sustainable Forestry Initiative (SFI) or the Forest Stewardship Council (FSC). Concern has been raised that the proposed pipeline construction would jeopardize a county's certification status. SFI has responded that counties would not be found at fault for the power line activities they have no control over. For activities for which they do have control over they are expected to exercise their influence in the easement agreements. FSC responded that the scope of the project is small enough as to not impact the certification status of the respective counties. It is expected that water regulation permitting required as part of the project will mitigate many of the negative environmental impacts of the proposed construction.

Forested State Lands

Cutting trees on forested state wildlife areas or other state lands may conflict with approved property management plans. The ROW and associated temporary work space will require harvesting of forest products that will require staff time to appraise, track, and report through normal operating procedures. The premature harvesting will negatively impact the future value of these lands and also result in lower stumpage

prices than if these areas were allowed to grow to maturity. Reforestation or other revegetation of the temporary workspace after clearing will also require expense and staff time. The details of harvesting will need to be spelled out in the easements / agreements.

Open Lands

Construction of the pipeline and proposed pump stations will disturb approximately 705.6 acres of open land. Most this land is associated with the existing cleared pipeline right-of-way where it crosses forest land. The Northern Region accounts for approximately 297.1 acres of the 705.1 acres of open land that will be affected by the pipeline. Most of the rest of the open land that will be affected by the pipeline is in the West Central (approximately 244.3 acres) and South Central Regions (approximately 29.4 acres). 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.

The proposed pump stations will be located at Enbridge's existing sites, within or adjacent to existing station fence lines. The location of new valves has not been identified but will be on Enbridge's existing right-of-way, generally near existing valves. Therefore, industrial land use will not change significantly as a result of pipeline construction.

Enbridge's existing right-of-way has been encroached on by a solid waste landfill on both sides of the right-of-way near Spencer, Wisconsin. The landfill operated from 1970 to 1974 and accepted municipal and industrial waste. Contaminants from the 10-acre landfill include volatile organic compounds and metals which have impacted soil and groundwater. While the landfill operator reportedly did not spread waste over the preexisting Enbridge right-of-way, the landfill caps appears to infringe on the right-of-way. The remedial action completed at the landfill in 1985 includes a landfill cap, a leachate collection system, and a long-term monitoring program.

Due to the possibility of encountering contaminants, Enbridge will reroute the right-of-way to avoid the immediate area. In addition, Enbridge will conduct soil and groundwater tests along the reroute to confirm that contaminated materials will not be encountered during construction. The route around the landfill is shown on the following figure.

Potential effects on water resources and Enbridge's proposed mitigation are discussed in section 2.5.2 of this report.

Transportation

Construction will affect approximately 67.9 acres of transportation land including 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. Crossing the abandoned airfield runway will not affect air traffic. Enbridge will restore the grade and contours of the runway, if requested by the land owner.

3.7.2.2 Effects on Cities and Population Centers

During construction, cities and population centers located near the pipeline route will experience a short-term increase in demand for goods and services by pipeline 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.

3.7.2.3 Effects on Residential and Commercial Areas

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. This project will not notably increase the ambient noise levels at the fence lines of these existing facilities.

Construction and 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.

3.7.2.4 Effects on Recreational, Special Interest, and Specially Designated Areas

The pipeline will affect approximately 97.9 acres of recreational, special interest, and specially designated areas. These areas include a federally designated Wild and Scenic River, four State Wildlife Areas, two National Waterfowl Production Areas, two golf courses, 2 state designated trails, an Indian reservation, a county recreational area, and a high school athletic practice field.

Construction through these areas could affect individuals using these areas, and cause short-term visual and noise impacts. Enbridge proposes to contact and work with representatives of these areas to minimize disturbances during construction and operation of the pipeline. Following completion of the construction, the right-of-way will be restored and revegetated as arranged with the affected landowner or as directed by applicable permits.

Hunting and other recreational activities may be temporarily disrupted during construction through the two NWPAs and the state wildlife areas. In some instances, Enbridge may be able to schedule construction to avoid heavy use periods in these areas. Enbridge has initiated consultations with the WDNR officials to address specific concerns with respect to crossing the Douglas County State Wildlife Area, French Creek State Wildlife Area, Lima Marsh State Wildlife Area, and Turtle Creek State Wildlife Area, and has contacted the FWS regarding the two NWPAs. A comprehensive discussion of state wildlife areas and NWPAs is provided in section 3.4 of this report.

Trails on State Recreation Lands. On state recreation land trails, Enbridge will be asked to adequately mark and barricade construction sites with flashing lights and barricades posted at 500 feet and 100 feet before the trail/access way meets the right of way easement, to forewarn users approaching from either direction. Appropriate signs and temporary barricades will be placed to indicate short term trail closures or temporary detours.

Construction work will be allowed only Monday through Friday. Enbridge will need to repair damage to the trail that is caused by construction activities, at the end of each working day, to maintain safe trail usage by the public.

Northern Region

Enbridge currently plans to construct through the Nemadji golf course in the fall of 2006. Enbridge will contact the club manager of the Nemadji golf course to address specific concerns and mitigation measures. Construction through the golf course will be coordinated with club managers to minimize disturbance to golfers, and the course will be restored to original conditions.

Construction through the Douglas County State Wildlife Area could temporarily disrupt recreational uses on and adjacent to the right-of-way. As discussed in section 3.4, Enbridge will work with the WDNR to minimize this disruption.

Enbridge has contacted and is working with the NPS to address concerns for crossing of the Namekagon River and St. Croix National Scenic Riverway. Initial consultations with the NPS identified concerns about additional tree clearing adjacent to the river and disruption of recreational uses of the river and river banks. The NPS also expressed concern about the potential effect of construction on rare species that are suspected to inhabit the river near the proposed crossing area. Section 2.4.5 of this report contains a discussion of rare species near the proposed crossing location.

Enbridge is working with the NPS to minimize impact on the river and adjacent land. If feasible, Enbridge proposes to directionally drill the Namekagon River, which will avoid physical disturbance to the river and river banks and minimize the clearing of trees and

riparian vegetation adjacent to the river. Enbridge will continue to coordinate closely with the NPS to develop an acceptable river crossing plan.

The advantages of the directional drill method include no river bed or bank disturbance, it may avoid approach slope disturbance, it maintains stream flow, and it maintains fish passage. The disadvantages are that it requires substantial workspaces at entry and exit locations, it requires subsurface geology conducive to success of the method, there is the potential of an inadvertent release of drill mud, and construction activity at the location is longer in duration.

If directional drill proves to be infeasible, Enbridge proposes to cross the Namekagon River by dam and pump method. Additional evaluation, particularly of aquatic impacts of the dam and pump method on the values for which the Namekagon River was designated under the Wild and Scenic Rivers Act will be provided in a Section 7(a) evaluation that the NPS will prepare in response to the Corps public notice for the river crossing. Section 7(a) of the Wild and Scenic Rivers Act prohibits federal agencies from assisting in the construction of any water resources project that would have a direct and adverse effect on a river established under the Act. Section 7(a) states:

"no department or agency of the United States shall assist by loan, grant, license or otherwise in the construction of any water resources project that would have a direct and adverse effect on the values for which such river was established, as determined by the Secretary charged with its administration."

The dam and pump method is a water resources project subject to Section 7(a) of the Act. It will require federal assistance in the form of a permit from the U.S. Army Corps of Engineers. The Section 7(a) evaluation will provide additional evaluation of the effect of pipeline crossing on the values for which the Namekagon River was designated under the Act.

The upland impacts of the dam and pump method (resulting from trenching, spoil storage and equipment maneuvering) would be as follows:

- Vegetation – riparian vegetation would be cleared along Enbridge's existing permanent easement and within the proposed temporary work area located adjacent to the permanent easement. To minimize the impacts of vegetation clearing, Enbridge would reduce the temporary construction work area within the Namekagon River riparian zone from 100 feet to 15 feet. Enbridge would mow herbaceous riparian vegetation just above ground level within the proposed construction work area adjacent to the river (with the exception of the trench line) and selectively cut trees and woody vegetation within the upland areas. Care would be taken to minimize tree removal. The total area of selectively cut trees and woody vegetation

within the Riverway boundary would equal 3.98 acres. A site specific restoration and revegetation plan is being developed in consultation with the NPS which will include special plantings of herbaceous and woody vegetation in disturbed areas.

- Wildlife – Terrestrial wildlife that would be expected to occur in the area include white-tailed deer, rabbits, squirrels, birds, and rodents. Birds including neo-tropical migrants such as kingbirds, flycatchers, orioles, goldfinches and red-wing blackbirds and raptors such as the bald eagle and osprey. Impacts to wildlife at the Namekagon River crossing would be similar to that described in section 2.4.2 above. Impacts to wildlife would be mitigated by the site-specific restoration and revegetation plan for the Namekagon River.

- Scenic values – The project would impact scenic values through disturbance and removal of vegetation. These impacts would be minimized by minimizing the removal of vegetation. The site-specific restoration and revegetation plan that is being developed in consultation with the NPS would mitigate these impacts.

- Cultural Values – Enbridge completed archaeological investigations along portions of the SEP-2 pipeline corridor in 1996. Enbridge has also completed additional archaeological investigations as part of the STAGE 1 project. Surveys did not find any cultural resources eligible for listing on the National Register of Historic Places at the Namekagon River.

- Recreation Values– The Namekagon River provides high-quality river canoeing along with multi-day canoe camping along a scenic, publicly managed, and relatively undeveloped river shoreline. The impact of the Enbridge pipeline project on recreational values would be minimized by completing the work in late fall/winter which is the low use season. Impacts to the scenic values enjoyed by recreational users will be minimized through the implementation of a site specific restoration and revegetation plan.

Enbridge proposes to bore the Tuscobia State Trail. Construction will create temporary noise and may disturb trail users, but it will not disrupt trail traffic or have a long-term impact either trail. Enbridge will work with trail managers regarding the timing of construction and restoration of the right-of-way to minimize the impact of the pipeline on hikers and other trail users.

West Central Region

Enbridge's proposed crossing of the Owen High School athletic practice field should not disrupt uses of the primary athletic field and track facilities. It will, however, temporarily

disrupt and displace activities on the practice field. Enbridge will work with high school officials regarding timing and construction techniques to minimize this impact.

Construction may restrict public access to the parking lots and trails at the Richfield County Recreation Area. However, these effects will be temporary and parking lots and other public facilities in the recreational area will be restored after installation of the pipeline. Enbridge currently plans to construct through the golf course near the Lake Arrowhead residential development in the fall of 1 997. Enbridge will coordinate with golf course managers to minimize disturbance to golfers, and the course will be restored to original conditions.

South Central Region

Construction through the NWPAs and French Creek and Lima Marsh State Wildlife Areas could temporarily disrupt recreational uses on and adjacent to the right-of-way. As discussed in section 2.4 of this report, Enbridge proposes to work with the managers of this area to minimize these disruptions and maintain safe operation of the trail. Enbridge proposes to bore the Glacial Drumlin State Trail. Construction wil create temporary noise and may disturb trail users, but it will not disrupt trail traffic or have a long-term impact on the trail. Enbridge proposes to work with trail managers regarding the timing of construction and restoration of the right-of-way to minimize the impact of the pipeline on hikers and other trail users.

3.7.2.5 Effect on Visual Resources

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.

The visual impact of aboveground facilities will be small. The proposed pump stations will be installed at existing pump station sites and the valves will be small, visually unobtrusive, and positioned within the existing right-of-way.

The impacts to the visual resources of the Namekagon River are described above. Enbridge anticipates that the pipeline will have virtually no long-term impact on the scenic quality of the Namekagon River. The proposed pipeline will be installed adjacent to the existing pipeline and an overhead electric power line. Enbridge also proposes to directionally drill the Namekagon River if technically feasible, which should greatly reduce short term visual impacts.

Enbridge's proposal to bore Tuscobia Park Falls and Glacial Drumlin State Trails will avoid direct impact on the trail. However, the clearing of vegetation and grading of soils on right-of-way north and south of the trail crossings will temporarily affect the viewshed from the trails until the right-of-way is revegetated. The clearing of trees adjacent to the existing right-of-way will also temporarily widen the existing pipeline corridor following construction. Enbridge proposes to work with the WDNR to determine ways to minimize the duration of these effects.

Construction will also temporarily affect the visual character of the Richfield Recreation Area. This effect will be limited primarily to the periods of construction and revegetation. Enbridge will work with managers of the area to minimize visual impacts and restore the visual character of the area.

Visual impacts on the Nemadji and Lake Arrowhead golf courses will be minimized by timing construction during the fall and restoring the area before the start of the spring golfing season if weather permits. In the flatter, less-forested southern part of the state, woodlots make up a significant visual feature. Loss of woodland from clearing the temporary ROW can create a significant degradation to these local visual resources.

3.7.2.6 Effects on Cultural and Historical Resources

A reconnaissance cultural resources survey (Phase I and Phase II surveys) has been completed on 198 miles of 207 miles in the archeological survey target area within the proposed Stage 1 pipeline corridor. The survey corridor is 140 feet wide beginning at the existing pipeline and extending west. The survey corridor was expanded on both sides of road, railroad, stream, and river crossings, extending 50 feet west of the 100-foot-wide survey corridor and 100 to 300 feet to each side of the road, railroad, stream, or river. Sizes of pipe yards and pump station locations vary. The nine pipe yards and two pump station sites proposed for use in the Stage 1 project were surveyed as part of the stormwater permit application process.

The surveys have located, to date, 115 archaeological sites and three standing structures. The majority of these sites are prehistoric lithic scatters discovered in cultivated fields. National Register of Historic Places evaluations (Phase II archaeological investigations) are currently underway. Approximately half of the 101 sites have been or will be evaluated. No additional work is recommended for the other sites. Twenty-five

evaluations have been completed to date. One site, a twentieth century cutover farm, has been recommended as eligible for the National Register. Enbridge will take protective measures to avoid impacting this site during construction.

Enbridge has also undertaken Native American consultation following recommendations from the Wisconsin State Historic Preservation Office (SHPO).

A report on survey work conducted during 2005 and 2006 was reviewed and approved by the WDNR archeologist and submitted to the Wisconsin SHPO. The WDNR archeologist confirms with the report's conclusion that because construction corridor will be restricted within the "Area of Potential Effects," there would be no impacts expected to occur to the identified historic archeological resources along the pipeline ROW.

3.7.3 Cumulative Impacts

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.

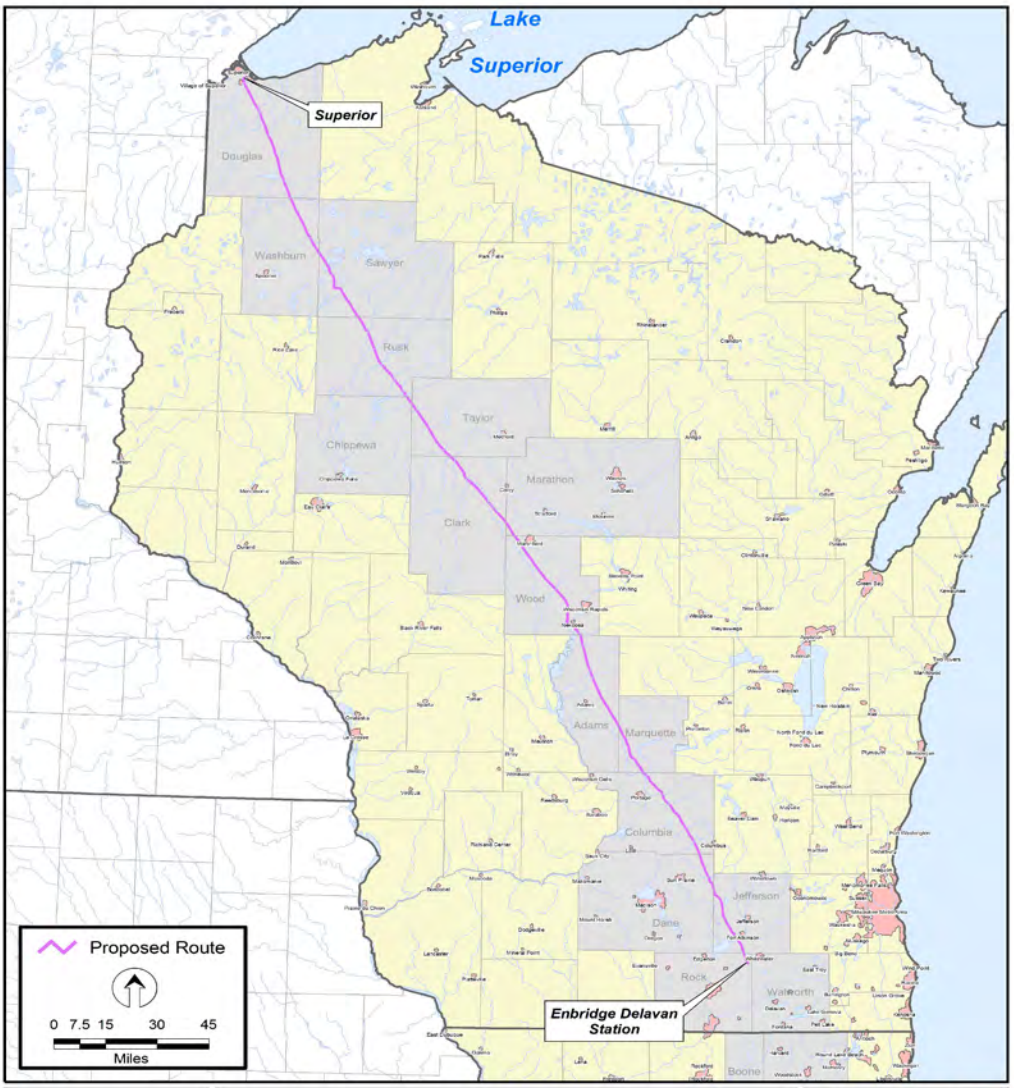
3.7.4 Secondary Impacts

There will be secondary impacts as a result of the operation of this pipeline, as distinct from its construction. However, these secondary 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 Pembina Institute scientists in Alberta (Pembina Institute, 2005) 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.



ENBRIDGE

Figure 1
Stage 1 Route Map

DATE: 11/28/05
REVISED: 10/24/06
SCALE: 1:2,500,000
DRAWN BY:KJANDERSON
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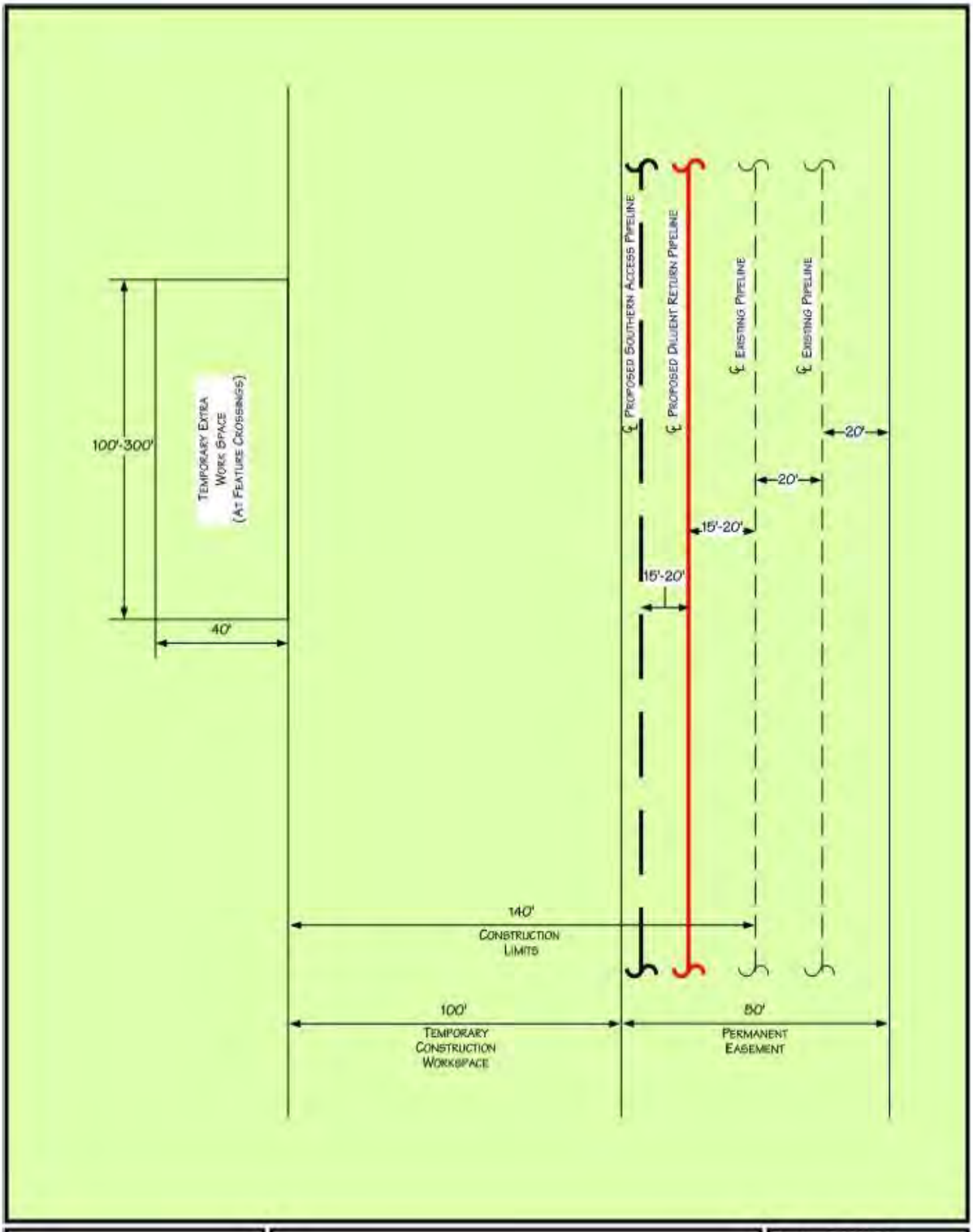
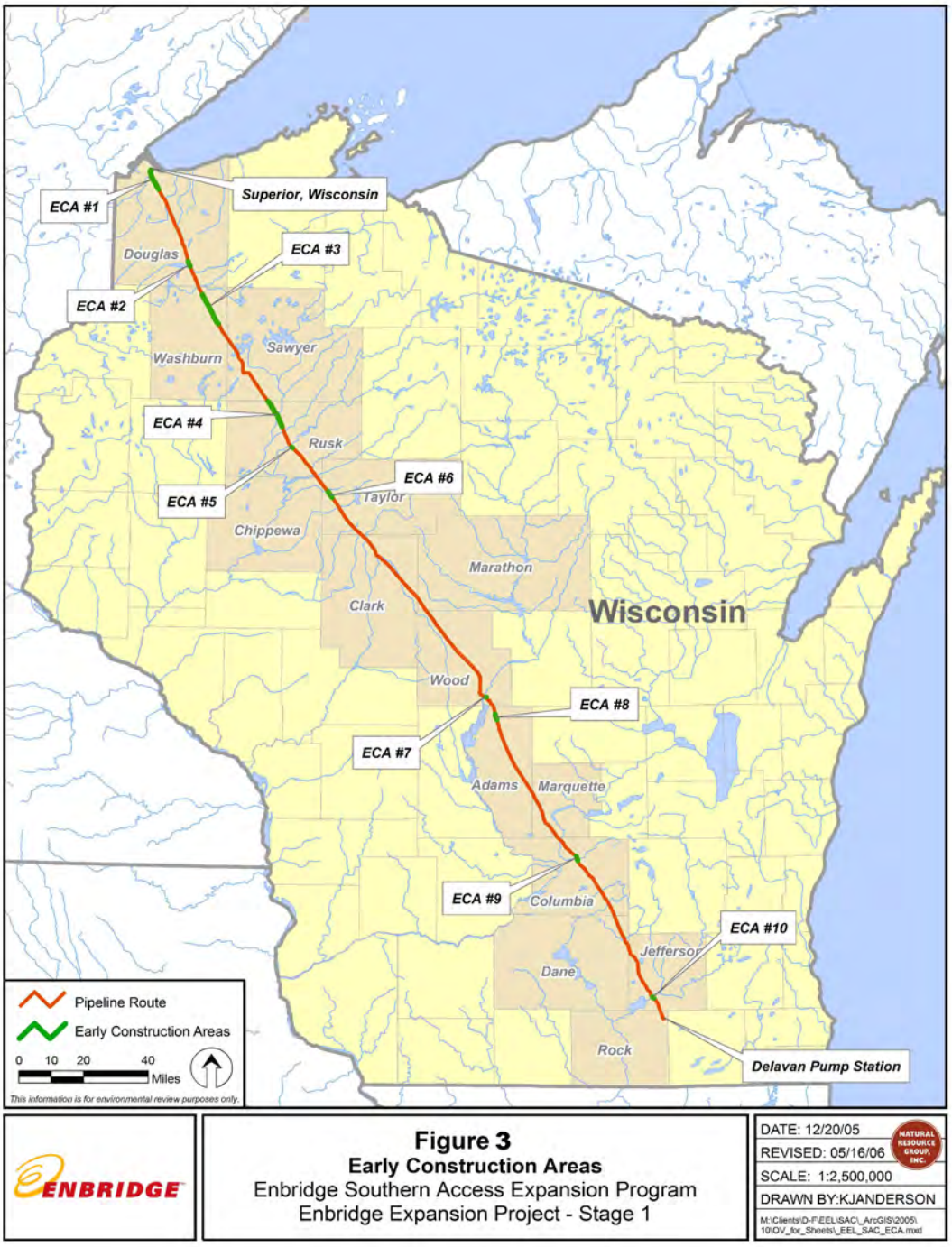
NATURAL RESOURCE GROUP, INC.



ENBRIDGE

Figure 2
Typical Construction Layout and Workspace Configuration

DATE:	7/13/2005
REVISED:	8/9/2006
SCALE:	Not to Scale
DRAWN BY:	KJAnderson



ENBRIDGE

Figure 3
Early Construction Areas
Enbridge Southern Access Expansion Program
Enbridge Expansion Project - Stage 1

DATE: 12/20/05
REVISED: 05/16/06
SCALE: 1:2,500,000
DRAWN BY:KJANDERSON
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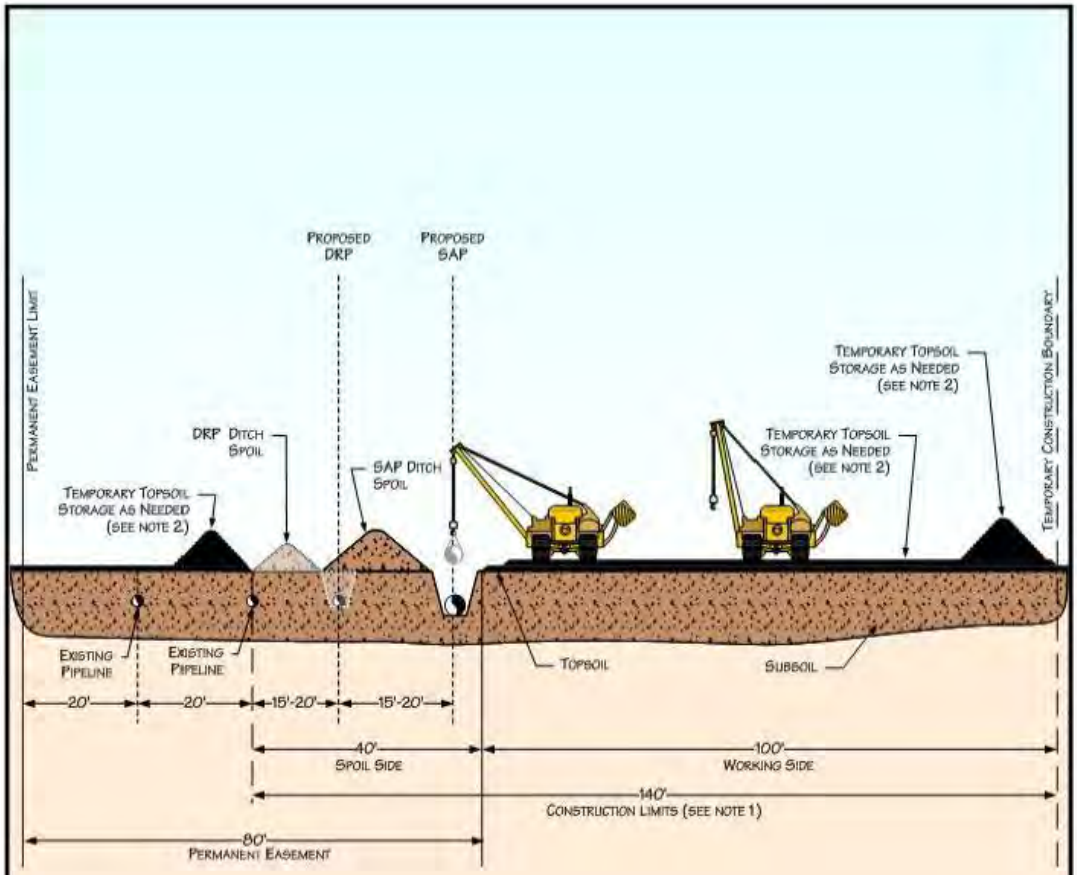
NATURAL RESOURCE GROUP, INC.



PROFILE

NOTES:

1. CONSTRUCTION LIMIT WILL TYPICALLY BE 140' WIDE. THE SPOIL SIDE WILL BE APPROXIMATELY 20'-40' WIDE AND GENERALLY WITHIN THE EXISTING MAINTAINED RIGHT-OF-WAY. THE WORKING SIDE WILL BE 100' WIDE AND OUTSIDE THE EXISTING MAINTAINED RIGHT-OF-WAY.
2. THIS DRAWING REFLECTS "DITCH PLUS SPOIL SIDE" TOPSOIL STRIPPING PROCEDURE. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATIONS APPROVED BY THE COMPANY.
3. THE OFFSET FROM NORTHERNMOST OR SOUTHERNMOST EXISTING PIPELINE, WHERE APPLICABLE, WILL BE 15'-20' FOR MOST LOCATIONS BUT MAY BE INCREASED OR DECREASED DEPENDING ON THE SITE SPECIFIC CONSTRUCTION REQUIREMENTS.
4. SAP: SOUTHERN ACCESS PIPELINE - 42" DIAMETER
   DRP: DILUENT RETURN PIPELINE - 16" - 20" DIAMETER

ENBRIDGE

Figure 4 - Typical Construction Layout

DATE:	7/9/2001
REVISED:	8/9/2006
SCALE:	NTS
DRAWN BY:	KMKENDALL

K:\335\2005-094\420\ROW3.VSD

Project Name: **Enbridge Southern Access Expansion Program Stage 1– Superior to Delevan Project.**

Counties: Douglas, Washburn, Sawyer, Rusk, Taylor, Chippewa, Clark, Marathon, Wood, Adams, Marquette, Columbia, Dane, Jefferson, and Rock.

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
Jeffrey C. Schimpff	10/31/2006

Number of responses to news release or other notice: 43

Certified to be in compliance with WEPA	
Environmental Analysis and Liaison Program Staff	Date Signed
Jim Paral	11/27/2006

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.

Wisconsin Department of Natural Resources
DNR Office of Energy - Central Office - Madison
PO Box 7921
Madison WI 53707
Phone: (608) 266-6790 Fax: (608) 264-6293

For Release: October 23, 2006

Contact(s): Jeff Schimpff, DNR Office of Energy, (608) 267-7853

Environmental Assessment of Southern Access Expansion – Stage 1 Petroleum pipeline project available

Citizens invited to comment

MADISON, Wis. – Citizens are invited to comment on an Environmental Assessment of the. proposed Southern Access Expansion – Stage 1 petroleum pipeline project. The Environmental Assessment (EA) will evaluate the environmental effect of the proposed pipeline.

Enbridge Energy Company, Inc., 119 N. 25th Street East, Superior, WI 54880-5247, has applied to the Wisconsin Department of Natural Resources (the Department) for permits needed to allow construction of a 42-inch petroleum pipeline, a 20-inch diluent return pipeline, and associated pump station improvements along a 321-mile route from Superior to near Whitewater. The pipeline is intended to transport extracted "tar sands" or "oil sands" petroleum from the Alberta, Canada to refineries in northern Illinois and other destinations.

The pipeline would be along a route previously developed and currently used for a crude oil pipeline. The permanently cleared Enbridge pipeline corridor easement will remain at 80 feet in width. Enbridge proposes construction activities within a temporary workspace 100 feet in width, with an occasional need for an additional 40-foot width of extra temporary workspace, where existing constraints require the extra space. The cleared temporary workspace will be revegetated according to agreements reached between Enbridge and property owners.

The proposed project would require 242 crossings of perennial and intermittent streams, including the Namekagon River, a National Wild and Scenic River. The proposed pipeline will also cross 471 wetlands, over a total distance of about 70 miles.

The application is available on Enbridge's web-site at the following address: http://www.enbridgepublicinfo.com/.

The Department has prepared an EA to assess the environmental effects of the proposed project. The construction activities are not expected to result in significant adverse environmental effects. Most impacts will be short-term in nature, with the exception of loss of some acres of mature forest land. Permit conditions would specify methods for crossing streams and wetlands that would minimize adverse impacts and maintain habitat, hydraulic and other functions. The Department has made a preliminary determination that an environmental impact statement will not be required.

Copies of the environmental assessment that led to the DNR's preliminary determination, can be obtained from Jeff Schimpff, DNR Office of Energy, at 608-267-7853. Schimpff can also be reached by e-mail: jeff.schimpff@wisconsin.gov.

Public comments, either written or oral, on the environmental assessment are welcome and must be submitted to Jeff Schimpff no later than 4:30 p.m., November 7, 2006.

The public affairs manager for the DNR Office of Energy is: Natasha Kasulke - (608) 261-8446.