United States Department of State

Final Environmental Assessment

For the

SOUTHERN LIGHTS 20-INCH CRUDE LINE PROJECT

"LSr PIPELINE PROJECT"

Applicant for Presidential Permit:

Enbridge Pipelines (Southern Lights) L.L.C.

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U.S. Army Corps of Engineers (COE)

U.S. Environmental Protection Agency (EPA)

Natural Resources Conservation Service (NRCS)

Farm Service Agency (FSA)

Assisting Agency

U.S. Department of Transportation – Pipeline and Hazardous Material Safety Administration (PHMSA)

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ACRONYMS AND ABBRVIATIONS

°F	degrees Fahrenheit
ACHP	Advisory Council on Historic Preservation
Alberta Clipper	Alberta Clipper Pipeline Project
AMP	Agricultural Mitigation Plan
AP	Aspens Parkland
APE	Area of Potential Effect
API	American Petroleum Institute
ARPA	Archaeological Resources Protection Act
BA	Biological Assessment
bpd	barrels per day
BWSR	Minnesota Board of Water and Soil Resources
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAPP	Canadian Association of Petroleum Producers
CECP	Construction Environmental Control Plan
CEQ	Council on Environmental Quality
C.F.R	Code of Federal Regulations
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CWA	Clean Water Act
CWI	County Well Index
dBA	Decibels
DOI	U.S. Department of Interior
DoS	U.S. Department of State
DOT	U.S. Department of Transportation
DWSMAs	Drinking Water Supply Management Areas
EA	Environmental Assessment
ECS	Minnesota Ecological Classification System
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EMP	Enbridge's Environmental Mitigation Plan
Enbridge	Enbridge Energy, Limited Partnership
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERP	Emergency Response Plan
ESA	Endangered Species Act
EWP	Emergency Watershed Protection
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FRP	Facility Response Plan
FSA	Farm Service Agency
FWS	U.S. Fish and Wildlife Service
GAP	National Gap Analysis Program
GHG	Greenhouse gases
GIS	Geographic Information Systems
gpm	gallons per minute

ACRONYMS AND ABBRVIATIONS (cont'd)

HAP	hazardous air pollutants
HCA	High Consequence Areas
HDD	Horizontal Directional Drill
HUC	Hydrological Unit Code
IMA	Institute for Minnesota Archaeology
IMP	Integrity Management Plan
Keystone	TransCanada Keystone Pipeline, LLC
L_{eq}	daytime and nighttime equivalent sound level
L_{dn}	day-night noise level
LSr	Southern Lights 20-inch Crude Line
LULC	Land Use and Land Cover
MACT	Maximum Achievable Control Technology
MBTA	Migratory Bird Treaty Act
MCEA	Minnesota Center for Environmental Advocacy
MDA	Minnesota Department of Agriculture
MDC	Minnesota Department of Commerce
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MDOT	Minnesota Department of Transportation
mg/l	milligrams per liter
MLRAs	Major Land Resource Areas
MP	Milepost
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NDDH	North Dakota Department of Health
NDGFD	North Dakota Game and Fish Department
NDPSC	North Dakota Public Service Commission
NEB	National Energy Board
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NHP	MDNR Natural Heritage Program
NHPA	National Historic Preservation Act
NNSR	Non-attainment New Source Review
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRI	National Rivers Inventory
NSPS	New Source Performance Standards
NSR	New Source Review
NWI	National Wetland Inventory
O_3	Ozone
OPEC	Organization of Petroleum Exporting Countries
OPS	Office of Pipeline Safety

ACRONYMS AND ABBRVIATIONS (cont'd)

OSHA	Occupational Safety and Health Administration
PADD	Petroleum Administration for Defense District
Pb	Lead
PCSMP	Petroleum-Contaminated Soil Management Plan
PEM	Palustrine emergent
PFO	Palustrine forested wetlands
PHMSA	Pipeline and Hazardous Materials Safety Administration
PM_{10}	particulate matter having an aerodynamic diameter of 10 microns or less
$PM_{2.5}$	particulate matter having an aerodynamic diameter of 2.5 microns or less
ppmw	parts per million by weight
PSD	Prevention of Significant Deterioration
psig	pounds per square inch, gage
PSS	Palustrine scrub-shrub
RHA	Rivers and Harbors Act
RIM	Reinvest in Minnesota Program
RRP	Red River Prairie
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SSURGO	Soil Survey Geographic
TMDL	Total Maximum Daily Load
tpy	tons per year
U.S.DA	U.S. Department of Agriculture
U.S.GS	United States Geological Survey
VOC	Volatile organic carbon compounds
WCA	Minnesota Wetland Conservation Act
WEG	wind erodibility group
WMA	National Wildlife Management Area
WRP	Wetlands Reserve Program

EXECUTIVE SUMMARY

Enbridge has applied to the DoS for a Presidential Permit for the construction, operation, and maintenance of a pipeline facility on the United States-Canada border. DoS considers applications for Presidential Permits for facilities such as pipelines pursuant to the authority delegated to it by the President of the United States under EO 13337, as amended (69 Federal Register 25299). DoS has determined that issuance of a Presidential Permit for the proposed Enbridge pipeline project would necessitate the preparation of an EA providing sufficient evidence and analysis for determining whether to prepare an EIS or a FONSI as set forth in NEPA (42 U.S. Code § 4321 et seq.). This document provides an assessment of the existing environment along the proposed pipeline route, an analysis of human and environmental impacts that could potentially result from pipeline right-of-way preparation, construction, operation, and maintenance of the proposed pipeline facilities, and a summary of the protection and restoration measures to be implemented to avoid and/or minimize environmental impacts.

As designated by EO 13337, the DoS is the lead federal agency reviewing the project in accordance with the requirements of NEPA. A number of other federal agencies have permitting, environmental review, and regulatory roles with respect to the LSr Project. State and local agencies were also consulted to identify issues arising during their permitting reviews.

On March 24, 2008, an Administrative Law Judge for the MPUC found that construction of the LSr pipeline would serve the public interest and recommended to the MPUC that a certificate of need be issued for the pipeline and that Enbridge's preferred alignment be approved. The matter is now pending for a decision before the MPUC. The NDPSC issued a certificate allowing construction of the LSr pipeline on December 31, 2007.

PURPOSE AND NEED FOR THE PROPOSED PROJECT

The purpose of the LSr Project is to efficiently transport light and medium sour crude petroleum originating in the northern Williston Basin in Saskatchewan to the United States, while allowing Enbridge to avoid an existing bottleneck in its system at the crude oil receipt point at Cromer, Manitoba. The LSr pipeline is not being designed to transport heavy crude from the Alberta oil sands and is distinct from other expansions that have been proposed.

AGENCY CONSULTATIONS AND PUBLIC OUTREACH

On April 9, 2007, Enbridge submitted to the DoS an environmental report in support of its application for a Presidential Permit for the U.S. – Canadian international border crossing associated with the LSr Project pipeline. On July 27, 2007, the DoS issued in the Federal Register a NOI to prepare an EA for the LSr Project. The NOI provided the public with a description of the proposed action, announced plans for scoping meetings, invited public participation in the scoping process, and solicited public comments for consideration in establishing the scope and content of the LSr Project EA. The scoping period ended on September 10, 2007 but comments received after this date were considered in this EA. On November 28, 2007, DoS published a NOA in the Federal Register of the draft EA for the project. The public comment period closed on January 11, 2008. Comments received from the public and governmental agencies are addressed in this EA.

The DoS, in conjunction with the MDC who advises the MPSC in its role of issuing various state certifications and permits, convened public scoping meetings at six locations near the project route to provide the public opportunities to comment on the scope of the EA. Meetings were held in each Minnesota county crossed by the LSr Project. The initial meeting held in Kennedy, Minnesota was located about 9 miles from the Minnesota - North Dakota border to afford North Dakota participants the

opportunity to participate in the meeting and the affected public along the North Dakota portion of the proposed LSr route were notified of this public comment meeting.

Concerns and comments raised by the public and identified by consulted agencies generally include impacts on existing land uses (agricultural impacts), impacts of construction on nearby residences, effects to wetlands and waterbodies, and impacts on soils. Issues raised during agency consultations and public scoping meetings are addressed in section 1.5 of this EA.

PROPOSED ACTION AND ALTERNATIVES

The LSr Project pipeline would generally be collocated along existing Enbridge pipeline routes through North Dakota and Minnesota. The proposed LSr Project would require construction and operation of approximately 136 miles of new 20-inch-diameter underground petroleum pipeline on or adjacent to existing Enbridge right-of-way from near Neche, North Dakota at the United States-Canada border in Pembina County (MP 773.7) to Enbridge's Clearbrook terminal in Clearwater County, Minnesota (MP 909.3); piping modifications to use existing pumping units within the existing Enbridge pump station sites at Donaldson, Minnesota (MP 814.1) and Plummer (MP 877.1), Minnesota; and mainline valves at major waterbody crossings and over the length of the pipeline route. Enbridge proposes to begin construction of the project in mid-2008. Construction would occur over approximately 6 months, with an in-service date on or before December 31, 2008.

Alternatives to the LSr Project were analyzed to determine whether reasonable and environmentally preferable options exist compared to the proposed action. Alternatives to the proposed project were evaluated based on input received from the public as well as regulatory agencies. Route considerations weighed several factors including significant environmental advantages, ability to meet LSr Project objectives, and design and cost feasibility and implementation.

Under the No Action Alternative, the DoS would not issue the Presidential Permit and the project would not be constructed. Environmental impacts discussed in this EA would not occur if the proposed action were not realized. Although these impacts would not occur under this alternative, the purpose and need of the proposed action would not be met. The bottleneck in the Enbridge delivery system would not be resolved, resulting in less efficient delivery of Canadian crude oil to the United States. The No Action Alternative would necessitate other delivery strategies to be employed which may or may not offer significant environmental advantages. Given the relatively high level of activity to connect reliable sources of Canadian petroleum supply with U.S. demand, these alternative strategies would likely result in some level of environmental impact. Even if other currently proposed projects including TransCanada's Keystone Project are realized, the supply and demand component of the proposed LSr Project serves different supply markets. The No Action Alternative could result in more costly and less reliable crude oil supplies for U.S. markets which in turn could result in more expensive products for end users.

System Alternatives considered include expansion of existing Enbridge facilities, the Keystone pipeline system, and trucking crude oil from source to delivery points. Although it is theoretically conceivable to move some portion of the increased volumes from Canada through the existing Enbridge system in North Dakota to Clearbrook, Minnesota through the Enbridge Pipelines (North Dakota) System via the "Portal Link" crossing the international border to the west of the proposed LSr Project, the North Dakota System is currently at full capacity and will not accommodate this additional volume of crude oil. Expansion of the Enbridge North Dakota system to accommodate the objectives of the LSr Project would require either full looping or twinning of this pipeline. The resulting action would result in a longer route for crude oil deliveries and would be cost prohibitive compared to the proposed action. Therefore, the

Enbridge North Dakota system could not be considered a system alternative and additional comparison with other system alternatives is not required.

Keystone is proposing the construction of a new 1,833 mile crude oil pipeline system from Hardisty, Alberta, Canada to Patoka, Illinois. Keystone is also planning the construction of a 291-mile lateral pipeline to Cushing, Oklahoma. In total, Keystone would construct 1,365 miles of new pipeline in the United States if the Cushing lateral is constructed. The Keystone pipeline would deliver crude oil to Midwestern markets but does not connect to the Minnesota, Wisconsin and greater Chicago area markets that the Enbridge Mainline System currently serves and the proposed LSr Project pipeline would serve. The Keystone Pipeline aims to meet other market demands and would not meet the market need and in-service date proposed for the LSr Project. Therefore, it is possible that supply and demand for western Canadian crude oil could support the construction of both the Keystone Pipeline and the LSr Project.

As an alternative to the LSr Project, Enbridge could transport petroleum supplies from its Cromer, Manitoba facility to the Clearbrook tankage facility by truck. This alternative is characterized by higher public safety and environmental risk, unreasonable logistics, and higher incremental cost. Collectively, the alternative would add 124,917,600 miles per year of additional truck traffic to Minnesota highways, and the trucks would consume approximately 27,759,467 gallons of fuel per year. The estimated trucking costs that incorporate operation and maintenance along with average fuels costs is greater than the existing alternative, which is the primary reason trucking currently is not used to move petroleum. The safety and environmental risks, logistical requirements, and high cost eliminate the trucking option as a viable alternative.

Another potential alternative to the Project would be transporting petroleum supplies from Enbridge's Cromer, Manitoba facility to the Clearbrook tankage facility by rail. However, a massive capital investment would be required to create rail infrastructure at the existing Enbridge Cromer and Clearbrook terminal facilities, since both locations do not have facilities for loading/unloading crude oil rail cars. In addition, there is currently no rail access into Clearbrook. A new rail line would have to be constructed from the Bemidji, Minnesota area, creating a new rail right-of-way corridor. There are significant regulatory hurdles involved with obtaining the necessary permit and right of way for such a rail corridor. Assuming the rail corridor could be permitted and built, an estimated additional 3,120 rail cars for liquid service would be needed. Finally, the existing rail system linking Cromer to Bemidji may not have sufficient capacity to handle this increase in traffic, necessitating the construction of additional rail capacity in this corridor. With estimated service costs of over $300 million per year, and significant environmental impacts and risks, rail service is not a viable alternative to the LSr Project.

Two major route alternatives were examined to determine the most feasible route which would result in the fewest environmental impacts while meeting the project objectives. While the Direct Route Alternative would be 2.4 miles shorter than the Proposed Route Alternative, the new corridor would not take advantage of any existing pipeline corridor. Land use along this route is similar to the proposed route, characterized primarily by actively cultivated agricultural lands. Based on publicly available GIS data, there are about 30 percent more wetland crossings and about 25 percent more waterbodies that would be crossed along the Direct Route Alternative than the Proposed Route Alternative. Because the Direct Route Alternative would require the establishment of new construction and permanent right-of-way, approximately 150 acres of additional land would be required for the permanent right-of-way. The Direct Route Alternative would create a new utility corridor through the region, in addition to Enbridge's existing pipeline corridor. Therefore, landowners near both ends of the Direct Route Alternative where it deviates from the existing Enbridge corridor could potentially have two pipeline corridors on their properties.

Minor route variations were examined along the proposed route where construction of the LSr Project would pose challenges due to impingements on the construction corridor from existing features including sensitive environmental resources, residences, and areas of difficult terrain. Since the LSr Project corridor follows Enbridge's existing pipeline corridor for the vast majority of its route, the presence of existing pipelines limits routing options in areas containing such features. Therefore, minor route variations were designed based on discussions with landowners, agency personnel, and project engineers to alleviate potential impacts on resources of concern. These are discussed in the EA.

POTENTIAL IMPACTS AND MITIGATION

Air Quality

Construction of the proposed pipeline and associated facilities and the pump station modifications could result in intermittent and short-term fugitive emissions. Pipeline construction proceeds at a relatively rapid pace. Consequently, air emissions would be localized, intermittent, and short term in duration. These emissions would include dust from soil disruption and combustion emissions from the construction equipment. During construction, residences in proximity to construction activities would be exposed to short-term increases in construction-related noise and dust. Some minor dust emission is inevitable in any construction project; however, dust control measures would be used on the construction right-of-way and access roads near residential areas as needed to minimize dust during active construction. During periods of high winds, work may be temporarily suspended if control measures are ineffective and if dust is excessive for the area. Control practices may include wetting soils on the right-of-way and limiting working hours in residential areas. After construction is completed, the right-of-way would be stabilized and revegetated to prevent construction-related ongoing dust emissions.

Emissions from construction are not expected to cause or significantly contribute to a violation of an applicable ambient air quality standard because the construction equipment would be operated on an as-needed basis, primarily during daylight hours. While some odors are generated during construction (burning of non-merchantable timber during clearing, welding, joint coating, equipment refueling, etc.), odors generated during the course of construction are anticipated to be localized, intermittent and short term. Because of the relatively sparsely populated regions through which the LSr Project pipeline is located, odors are not anticipated to significantly affect the local population.

No operational emissions from the proposed project would be generated by the stationary sources at the pump station facilities because they are a closed system and electric powered. As with construction, air emissions during the operation of the pipeline would be located primarily at the Clearbrook terminal and would be limited in nature. All pipeline pumps would be electric-driven and no aboveground storage tanks are proposed to be installed in association with the LSr Project. Therefore, there would be no long-term combustion or fugitive hydrocarbon emissions from project operations except for very small fugitive emissions from valves and pumping equipment.

Geology, Mineral Resources, and Paleontology

No unique geological features that have received state or federal protection would be disturbed by the LSr Project. Construction and operation of the proposed LSr Project would result in minor impacts on topography and geology. Primary impacts would be limited to construction activities and consist of temporary alteration of slopes on the construction right-of-way due to grading and trenching operations. These disturbances would be necessary to create a level and safe construction corridor. Impacts would be minimized by returning contours to pre-construction conditions to the extent practicable.

The proposed pipeline route does not cross active mining areas. Because the proposed pipeline would be installed adjacent to existing Enbridge pipelines and primarily within existing maintained rights-of-way, any sand and gravel deposits in the project area are currently unavailable for mining.

There is some potential for discovery of Pleistocene-era fossils during pipeline grading and trenching where the proposed pipeline route would cross continental glacial drift in North Dakota. Any significant fossils incidentally excavated during pipeline construction would be recovered or studied for the scientific record. Disposition of such finds would be handled in accordance with the directives of the State Geologist in the respective state in which such finds are made.

No impacts associated with seismic activity within the project area are anticipated. Due to the limited potential for large, seismically induced ground movements, there is minimal risk of earthquake-related impacts on the pipeline. No additional disturbance or loss of unique geological features, mineral resources, or scientifically important fossils would occur during operations because there would be no additional surface disturbance required beyond that used for construction.

Soils

Construction activities such as clearing, grading, trench excavation, and backfilling, as well as the movement of construction equipment along the right-of-way, may result in impacts on soil resources. Vegetation clearing temporarily removes protective cover and exposes soil to the direct effects of wind, sun, and precipitation, which may increase the potential for soil erosion and movement of sediments into sensitive environmental areas (such as wetlands). Grading and construction equipment traffic may compact soil, reducing porosity and percolation rates, which could result in increased runoff potential. Trench excavation, spoil storage and backfilling could result in mixing of topsoil and subsoil and may introduce rocks to the ground surface from deeper soil horizons. Contamination from spills or leaks of fuels, lubricants, and coolants from construction equipment also could impact soils.

Erosion control measures may include installation of silt fences, slope breakers, temporary sediment barriers, permanent trench breakers, and revegetation and mulching of the construction right-of-way. Erosion and sedimentation controls would be inspected and maintained as necessary until final stabilization is achieved. Impacts on prime farmland from construction would be mitigated using measures that include topsoil segregation, compaction testing and alleviation, removal of excess rock, restoration of contours, repair of existing agricultural drainage systems, and the installation and maintenance of erosion control features to preserve prime farmlands and other farmlands. To minimize topsoil disturbance and topsoil and subsoil mixing associated with pipeline construction, Enbridge would remove and segregate topsoil in wetlands, cropland, hay fields, pasture, residential areas and other areas as requested by the landowner. Topsoil would be segregated from the ditch-plus-spoil side in active cropland unless full construction right-of-way width topsoil segregation is requested by the landowner. The trench-line-only soil segregation method would be used in unsaturated wetlands or where the width of the construction right-of-way is insufficient for other methods to be used. Topsoil would be stripped to a maximum depth of 12 inches east of the Red River Valley and 18 inches (or as otherwise agreed to with Minnesota Department of Agriculture) within the Red River Valley. If less than 12 inches of topsoil are present, every effort would be made to segregate to the depth that is present. The segregated topsoil and subsoil would be stockpiled separately and replaced in the proper order during backfilling and final grading of the construction right-of-way.

Approximately 60 percent of the pipeline route is underlain by soils that are prone to compaction. Counties with the largest amount of compaction prone areas along the proposed pipeline route include Pembina, Kittson, and Marshall. In addition, approximately 4 percent of the pipeline route would cross soils with organic surface horizons. These horizons also may be susceptible to rutting during pipeline

construction. Measures to address these concerns would include temporarily suspending certain construction activities on susceptible soils, conducting compaction testing, and taking active steps such as using paraplows or other deep tillage equipment to alleviate soil compaction in agriculture areas where compaction is detected.

None of the proposed pipeline route would cross areas with shallow bedrock (i.e., bedrock within 5 feet of the surface). If bedrock is encountered within the trench, Enbridge would only backfill with this rock to the depth of the original bedrock layer. Although less than 1 percent of the pipeline route would cross stony or rocky soils, Enbridge would use rock pickers or other rock removal equipment where necessary to remove rocks greater than four inches in diameter from the upper 12 inches of soil.

Approximately 20 percent of the proposed pipeline route would cross soils classified as droughty soils. Measures to minimize impacts on droughty, non-cultivated soils include timely reseeding using species adapted to dry conditions and by applying mulch. Enbridge would consult with appropriate soil conservation authorities to develop seed mixes and seeding dates to be applied to the project area, including droughty soil areas.

Accelerated soil erosion, compaction, construction related spills or other impacts on soils could potentially result from pipeline operation and maintenance activities. However, any operational impacts on soils are anticipated to be very localized and not significant. Enbridge would patrol its existing right-of-way on an ongoing basis during operation of the pipeline system. If areas of active soil erosion or poor vegetation growth are observed, maintenance crews would evaluate underlying causes and implement appropriate repair or restoration measures to preserve soil resources and pipeline cover.

Water Resources

Pipeline construction across waterbodies could result in temporary and long-term adverse environmental impacts if not mitigated. Temporary impacts from in-stream trenching could include an increase in the sediment load downstream of the crossing location. Sustained periods of exposure to high levels of suspended solids can cause fish egg and fry mortality and other impacts on fisheries and other aquatic resources. Surface runoff and erosion from the cleared right-of-way also could increase in-stream sedimentation during construction resulting in the deposition in pools and reduction of the quality of spawning beds and benthic substrate.

Long-term impacts on water quality could result from alteration of the stream banks and removal of riparian vegetation. Soil erosion associated with surface runoff and stream bank sloughing could also result in the deposition of sediments in waterbodies. Sediments deposited on streambed gravel may result in increased fish egg mortality and damaged spawning habitat. Removal of riparian vegetation could also lead to increased light penetration into the waterbody, causing increased water temperature which could potentially be detrimental to fisheries.

Enbridge is proposing to utilize HDD at six river crossings; the Pembina, Red, Tamarac, Middle, and Red Lake Rivers and an unnamed waterbody in Marshall County, Minnesota. Since HDD does not involve direct disturbance to the waterbody, channel bed, or stream banks, no impact on the rivers is expected for these crossings. At present, Enbridge is planning open-cut crossings for the most of the waterbodies; however, a dry crossing method such as the dam-and-pump or flume method may be used where warranted by site conditions, permit requirements, stream type and/or the presence of sensitive species. For open-cut crossings, the extent of increased suspended solids concentrations and downstream sedimentation impacts would be affected by the flow conditions at the time of construction, the channel substrate, and duration of in-stream construction.

Mitigative measures include limiting the duration of construction within waterbodies and limiting equipment operation within waterbodies to the area necessary to complete the crossing. Disturbed areas at crossings would be restored and stabilized as soon as practical after pipeline installation. Alternative construction techniques (such as HDD or dry crossing methods) may be used at selected waterbodies to minimize impacts. Selective replanting of woody species at five locations with riparian forests would further mitigate impacts associated with tree clearing along stream banks.

Spills from refueling operations, fuel storage, or equipment failure in or near a waterbody could affect aquatic resources and contaminate the waterbody downstream of the release point. These impacts would be minimized by implementing measures such as immediate spill response actions including the use of spill kits, containment measures, and proper disposal of contaminated materials and soils.

Water used for hydrostatic testing would typically be discharged on land or returned to the waterbody where it was appropriated. If test water is discharged to an upland area, energy dissipation devices such as straw bale structures would be used to minimize the potential for erosion and subsequent release of sediment into nearby surface waters and wetlands. If hydrostatic test water is discharged directly into waterbodies, energy dissipation devices would be used to reduce the discharge energy to prevent stream bottom scour. No chemical additives are anticipated to be introduced to the water used to hydrostatically test the new pipeline, and no chemicals would be used to dry the pipeline following the completion of hydrostatic testing.

The PHMSA prescribes pipeline design and operational requirements that limit the risk of accidental releases (leaks or spills) from pipelines. Over the operational life of the LSr Project pipeline there would be a very low likelihood of a petroleum release that could enter surface water resources and drinking water supplies. No significant impacts on surface waters are anticipated as a result of ongoing practices.

Construction of the pipeline project is not expected to have long-term impacts on groundwater resources. Construction activities such as trenching, backfilling, and dewatering that encounter shallow surficial aquifers may result in minor short-term fluctuations in groundwater levels within the aquifer. Once the construction activity is complete, the groundwater levels typically recover in a short period of time. If wells are identified, the locations of these wells will be noted and adjustments to the location of the pipeline may be made. The introduction of contaminants to groundwater due to accidental spills of construction related chemicals, fuels, or hydraulic fluid could have an adverse affect on groundwater quality, most notably near shallow water wells. Spill-related impacts from pipeline construction are primarily associated with improper fuel storage, equipment refueling, and equipment maintenance. Enbridge's SPCC Plan outlines measures that would be implemented to prevent and respond to releases of fuels and other hazardous substances during construction including measures for clean up, documentation, and reporting of spills. By implementing the protective measures set forth in the SPCC Plan, groundwater contamination due to construction activities is not anticipated.

As part of the pipeline operation, and in compliance with regulations issued by PHMSA, Enbridge has an ongoing inspection program to monitor the integrity of the pipeline system. Monitoring activities include regular inspection of the cathodic protection system, which addresses the corrosion potential of a steel pipe installed below the ground surface. In addition, Enbridge utilizes computerized internal inspection tools to periodically test the integrity of the pipeline. Lastly, Enbridge also performs regular aerial flyovers to inspect the pipeline right-of-way. Enbridge has existing emergency response plans which have been filed and approved by PHMSA and shared with appropriate regulatory agencies to address pre-planning, equipment staging, notifications, and leak containment procedures to be implemented in the event of a pipeline leak.

No wetlands would be permanently filled or drained as a result of constructing the project including at all above ground facilities. Construction would result in temporary wetland disturbance and, in forested wetlands, an incremental change in plant species composition. Temporary wetland impacts include loss of wetland vegetation and wildlife habitat as a result of construction activities; soil disturbance associated with trenching and equipment movement; and increases in turbidity and alterations of hydrology as the result of trenching, dewatering and soil stockpiling activities.

Approximately 100.3 acres of palustrine emergent wetland would be temporarily affected by pipeline construction. There would be no long-term impacts on emergent wetlands. The wetlands would be restored to preconstruction conditions and the herbaceous vegetation would be allowed to naturally revegetate in these areas. Approximately 5.1 acres of palustrine scrub-shrub wetland and approximately 2.7 acres of palustrine forested wetland would be cleared and temporarily disturbed during pipeline construction. The impacts on scrub-shrub wetlands and forested wetlands would be of longer duration than emergent wetlands because the woody vegetation would require a longer time to re-establish on the temporary right-of-way after restoration.

The construction right-of-way width would be reduced to 75 feet through wetlands to minimize potential effects. Pipeline construction through wetlands must comply, at a minimum, with Clean Water Act Section 404 permit requirements. Impacts in wetlands would be minimized by implementing mitigative measures including; wetland vegetation would be cut off at ground level and removed from the wetland areas; construction mats would be used, as needed, to facilitate equipment access and pipeline installation; temporary erosion control devices would be installed prior to trenching activities; the top 1 foot of topsoil or the amount of topsoil present, whichever is less, would be stripped over the trench line, segregated, and replaced in unsaturated wetlands; surface water flow would be maintained during construction to the extent practicable; wetlands would be restored to preconstruction contours; wetland hydrology would be maintained by using trench breakers when necessary, and sufficiently compacting the pipeline trench; unsaturated wetlands would be revegetated with a temporary cover crop; and wetland vegetation would be allowed to naturally revegetate with wetland plants common to the area.

After the pipeline is constructed, a maximum of an additional 50 feet of right-of-way would be maintained relatively free of larger-diameter trees along the existing right-of-way. This additional maintained right-of-way would result in the permanent conversion of approximately 0.65 acres of forested wetland to emergent or scrub-shrub wetland. Enbridge would develop a specific wetland mitigation plan based on consultations with the COE and other state and federal agencies outlining criteria for successfully restoring, rehabilitating, creating or enhancing wetland mitigation sites.

Terrestrial Vegetation

Clearing of herbaceous vegetation during construction would be a short-term impact. Active revegetation measures and rapid colonization by annual and perennial herbaceous species in the disturbed areas would restore most vegetative cover within the first growing season. Clearing of woody shrubs and trees would be the primary long-term impact on vegetation associated with the project. Woody shrubs and trees would be allowed to recolonize the temporary construction right-of-way and extra workspaces. However, recolonization of disturbed areas by woody shrubs and trees would be slower than recolonization by herbaceous species. As natural succession is allowed to proceed in these areas, the early successional or forested communities present before construction would eventually be reestablished.

The clearing of trees in the construction right-of-way could affect forest vegetation growing along the edges of the cleared areas. By exposing some edge trees to elevated levels of sunlight and wind, evaporation rates and the probability of tree knockdown could increase. Due to the increased light levels penetrating the previously shaded interior, shade intolerant species would be able to grow and the species

composition of the newly created forest edge may change. Clearing could also temporarily reduce local competition for available soil moisture and light and may allow some early successional species to become established and persist on the edge of the uncleared areas adjacent to the site. However, the proposed project is on or adjacent to Enbridge's existing, maintained right-of-way, therefore these impacts are incremental and not a significant change in existing cover type.

To minimize potential damage to adjacent trees, clearing crews would be directed to fell trees toward the cleared right-of-way. Upon completion of construction, Enbridge would revegetate disturbed areas in accordance with revegetation plans to be developed in consultation with the NRCS unless otherwise directed by landowners or land managing agencies. Timely restoration of the construction right-of-way and reseeding with an appropriate seed mix would minimize the duration of vegetative disturbance.

The proposed pipeline route would cross five areas of sensitive species or plant communities. Enbridge would implement best management practices as detailed in the EMP and CECP and continue consultation with the MDNR to minimize impacts from construction on these sensitive species and habitats.

Measures to address the control and spread of noxious and invasive species include identifying and marking areas containing noxious and invasive species during preconstruction inspections, allowing only clean equipment onto construction work areas, cleaning equipment after working in areas of known noxious and invasive species, using mulch and seed that are free of noxious and invasive species seeds, and conducting final seeding operations within 24 hours of final grading, pending weather and soil conditions, to prevent the establishment of noxious and invasive weed seeds that may be present in the existing seed bed.

Pipeline operation and maintenance would have minimal impact on revegetated areas. Maintenance impacts would be limited to infrequent vehicular traffic along the pipeline right-of-way. Routine vegetation clearing within the permanent right-of-way generally would be conducted as necessary to maintain access to the right-of-way for maintenance and enable aerial patrol of the pipeline. Collocating the proposed pipeline on or adjacent to the existing maintained Enbridge right-of-way effectively minimizes change in cover type resulting from operation of the proposed pipeline.

Wildlife and Fisheries

Temporary effects would occur during construction from clearing of vegetation and movement of construction equipment along the right-of-way. Long-term impacts would be limited to the incremental loss of forest habitat adjacent to the existing right-of-way due to clearing of the temporary construction right-of-way and extra workspaces in forested areas. Clearing the construction right-of-way would remove vegetative cover and would result in temporary displacement of species along the pipeline route. The construction right-of-way and extra workspaces would remain relatively clear of vegetation until restoration is completed. Most wildlife, including the larger and more mobile animals, would disperse from the project area as construction activities approach. Displaced species may recolonize in adjacent, undisturbed areas, or reestablish in their previously occupied habitats after construction has been completed and suitable habitat is re-established. Some smaller, less mobile wildlife such as amphibians, reptiles, and small mammals may experience direct mortality during clearing and grading activities.

Clearing of herbaceous and shrub communities on the existing right-of-way and adjacent open areas would be required for pipeline construction. This clearing would cause a short-term impact due to the relatively quick recolonization of plant species that comprise these communities. Herbaceous cover would be seeded on disturbed upland areas following the completion of construction and it is expected

that pre-existing herbaceous and shrub habitats would quickly re-establish. Consequently, it is expected that the wildlife species that use these habitats would also return within one growing season of construction completion.

Temporary right-of-way and extra workspaces would be seeded with herbaceous species and allowed to revegetate naturally with tree and shrub species common to the area. Direct and long-term impacts on wildlife that use forests include the temporary conversion of forest edge habitat to herbaceous-dominated habitat on the temporary construction right-of-way. It is expected that wildlife displaced from the cleared areas would relocate to nearby forest. Over time, natural growth and succession would restore the temporary portion of the construction right-of-way and extra workspaces to a forested community and wildlife typically inhabiting forest habitats would return.

A potential long-term impact on wildlife is associated with the clearing of forest vegetation. For this project, impacts on wildlife species would be limited because the pipeline is proposed to be collocated with the existing Enbridge pipeline right-of-way. The project would involve the permanent removal of approximately 21.6 acres of forested habitat for the maintained right-of-way. These areas would be converted to non-forest habitat for the life of the pipeline. It is anticipated that the incremental loss of this forested habitat along the existing cleared right-of-way would be offset by mitigative measures such as replacing lost forest habitat within the affected watershed basins. Overall, construction and operation of the project is not anticipated to significantly alter the character or composition of the vegetative communities along the pipeline route.

Normal pipeline operations would have minimal effects on terrestrial wildlife resources. Direct impacts on wildlife species populations and habitats from maintenance activities such as pipe inspections would be similar to those discussed for construction; however, these activities are typically infrequent and localized. Disturbed areas would be restored to re-establish vegetative cover following maintenance activities.

Movement of fish upstream and downstream of the crossing site may be temporarily affected during installation of the pipeline across waterbodies due to disturbances associated with construction. The physical disturbance of the streambed may temporarily displace adult fish and may dislodge other aquatic organisms, including invertebrates. Some limited mortality of less mobile organisms such as small fish and invertebrates may occur within the immediate area of the crossing. Aquatic plants, woody debris, and boulders that provide in-stream fish habitat would also be removed during trenching. Noise upstream and downstream of the site would deter fish that may otherwise inhabit the area. These disturbances are temporary and are not expected to significantly affect fisheries resources. Natural re-colonization of the disturbed areas would begin soon after restoration of the streambed and would be completely re-colonized within one year after construction.

Sediment loads would be temporarily increased downstream during open-cut stream crossings. These increased loads may temporarily affect the more sensitive fish eggs, fish fry, and invertebrates inhabiting the downstream area. However, sediment levels would quickly attenuate both over time and distance and would not adversely affect resident fish populations or permanently alter existing habitat. The crossing would be completed as quickly as possible and the suspended sediment levels would return to preconstruction levels after in-stream work is completed.

Some riparian vegetation would temporarily be removed during construction. After construction, the permanent right-of-way would be maintained in an herbaceous state, and trees and shrubs on adjacent temporary rights-of-way would be allowed to reestablish. Changes in the light and temperature characteristics of some waterbodies may affect the behavioral patterns of fish, including spawning and feeding activities, at the pipeline crossing location. This incremental increase in maintained right-of-way

is not anticipated to have a significant impact on stream temperature and light conditions due to the highly localized nature of this effect. Shrubby vegetation would be allowed to reestablish on stream banks further diminishing potential impacts on water temperature.

To minimize the potential for adverse impacts on the fisheries at the river and stream crossings, erosion and sediment control measures would be implemented including limiting the duration of construction in these waterbodies, and complying with timing restrictions and other requirements identified in stream crossing permits issued by appropriate regulatory agencies.

The accidental release of petroleum could affect terrestrial wildlife in the area of the spill. During construction, Enbridge would follow procedures outlined in the SPCC Plan to minimize the potential for spills, and to respond in a timely and appropriate manner if a spill occurs. During operations, Enbridge would follow its ERP and HCA Management Plan if a spill occurred during the operation of the LSr pipeline.

Land Use

The proposed pipeline route would affect approximately 1,553.8 acres of agricultural land that would be temporarily disturbed during construction, or 92.7 percent of total construction disturbance. Construction activities may also interfere with planting or harvesting, depending on the timing of construction. Following construction agricultural activities would resume within the pipeline corridor.

During construction, access would be maintained to fields, storage areas, structures, and other agricultural facilities and irrigation and drainage systems that cross the right-of-way to the extent practicable. Drainage systems located during construction would be flagged and repaired if damaged to the landowner's satisfaction following pipeline construction. Agricultural land in the construction right-of-way would generally be taken out of production for one growing season and would be restored to its previous condition following construction. Landowners would be fairly compensated for crop loss and other damages caused by construction activities.

The proposed pipeline route does not cross any known center-pivot irrigation systems. Measures to avoid, minimize or mitigate potential impacts on soil productivity include topsoil segregation, drain tile repair, stone removal (greater than 4 inches in diameter), restoration of contours and drainage patterns, and measures to minimize and alleviate soil compaction.

Private roads and farm lanes damaged during construction would be repaired. Appropriate measures would be taken to protect livestock during construction, including minimizing the length of time that the trench is open and coordinating with landowners to accommodate on-going livestock operations. Where appropriate, temporary access would be maintained across the trench to allow the passage of livestock, and would erect temporary fences (including gates) as necessary to contain and protect livestock from construction related hazards. After completing construction, fences and gates would be rebuilt to their former condition or better.

Approximately 58.8 acres of forest land would be cleared during construction. Approximately 21.6 acres of forest would be converted to shrub and herbaceous cover types as the result of routine maintenance practices of the permanent right-of-way. The 37.2 acres of trees temporarily cleared from the temporary construction right-of-way and extra workspaces would be allowed to revert to pre-existing cover types.

Localized short- and long-term effects would result from the construction of the proposed pipeline route through forested areas. Trees and brush would be removed from the construction right-of-

way and temporary workspaces. Overlapping the construction right-of-way with Enbridge's existing maintained right-of-way to the greatest extent possible effectively minimizes impacts on forest land. This existing permanent right-of-way is maintained in an herbaceous state to facilitate pipeline access and enable patrol of the pipeline right-of-way.

Following construction, the permanent right-of-way would be seeded to promote herbaceous cover types and would be maintained in an herbaceous state. Forested areas within the temporary right-of-way and extra workspaces would be allowed to revert to forest cover. The rate of forest reestablishment would depend upon the type of vegetation cleared, as well as the natural fertility of the areas affected. It is anticipated that early successional species would begin to colonize the right-of-way within a few years after construction, followed by establishment of later successional species.

Approximately 55.3 acres of open water and wetlands would be temporarily affected by construction of the proposed project. The open water would be affected at crossings of rivers, streams, and agricultural ditches (the proposed pipeline does not cross any lakes). Wetlands would be allowed to revegetate naturally.

Approximately 3.1 acres of open land would be temporarily disturbed during construction of the proposed project. Open land would be temporarily disturbed during grading, trenching, backfilling, and restoration. After final construction cleanup, open land in upland areas would be reseeded and mulched.

During construction, residences in close proximity to construction activities may be exposed to short-term increases in construction-related noise and dust. Construction-related dust emissions would generally be of short duration and dependent on soil type, weather conditions, and the extent of ground disturbance. Enbridge would implement dust control measures as needed on the construction right-of-way and access roads near residential areas. After construction is completed, the right-of-way would be stabilized and revegetated to prevent ongoing dust emissions.

The heavy construction equipment needed to construct the pipeline would generate unavoidable short-term increases in ambient noise levels. Typical bulldozers, backhoes, and sideboom tractors used to install large-diameter pipelines typically generate 80 to 90 decibels within 50 feet of the equipment. Increases in ambient noise levels due to heavy equipment operation would be limited to the period of construction. Construction activities would generally be limited to daylight hours. No noise would be generated along the pipeline right-of-way after completion of construction during normal operations.

Appropriate regulatory agencies would be consulted prior to construction to determine whether construction activities may encounter known contaminants. If existing contamination is encountered, measures would be implemented to avoid or minimize contact with the known sites and include proper notification of company and agency personnel as well as steps to ensure the safety of personnel in the vicinity of contaminated sites.

Construction methods would vary among roadway types crossed by the pipeline. Most paved roads and railroads would be bored allowing them to remain open during construction. Open-cut construction is typically proposed for unpaved roads, which would require temporary closure and detours. If no reasonable detour is available, at least one traffic lane would be maintained, except for brief periods essential to pipeline construction. Construction disturbance at each open-cut road crossing would typically be limited to one day, which is not expected to have a significant impact on local traffic patterns. Detour, warning, traffic control, and safety signs would be posted as prescribed by federal, state, and local (county) DOT. Attempts would be made to avoid road closures during peak-traffic time periods.

Following construction the right-of-way would typically be allowed to revert to previous land uses. Right-of-way easements restrict certain development activities, such as the construction of permanent structures within the easement. Landowners are compensated for loss of these uses when the permanent easement is established. Collocation of the proposed pipeline on or adjacent to the existing Enbridge right-of-way minimizes alteration of existing land use patterns and avoids new severances of parcels or encumbrances on parcels. Also, roads and railroads would be restored after construction. Therefore, long-term impacts on land use are not anticipated.

Cultural Resources

Measures to minimize cultural resources identified within the project APE would be implemented during construction and include routing the pipeline to avoid identified sites, installing the pipeline beneath the sites using conventional bore or HDD technology, fencing sites or portions of sites to ensure that they are not disturbed during construction, monitoring of construction activities by an archaeologist; or archaeological data recovery at the sites.

If unanticipated cultural resources are encountered during construction, procedures would be implemented as outlined in unanticipated discoveries plan developed for each state crossed by the LSr Project pipeline. These plans describe measures to be followed in the event that a previously undocumented cultural resource site is discovered during construction activities. These measures include: documenting and evaluating the site; consulting with the DoS and the appropriate SHPO; notifying appropriate law enforcement authorities when human remains are discovered; and implementing measures to avoid, minimize, or mitigate adverse impacts on the site if the site is eligible for listing on the NRHP. With the implementation of these measures, no impacts are anticipated during the operational phase of the project.

Native American Consultations

The lead federal agency is responsible for consulting with federally recognized Indian tribes as part of the Section 106 NHPA process. For the LSr Project, the DoS directed consultations with tribal organizations with the assistance of the COE. While no specific mitigative measures were identified during these consultations, a number of tribes requested results of the cultural resource surveys. Neither the construction nor operation of the proposed project would cross any Native American reservations. Any Traditional Cultural Properties that may be affected by the LSr Project would be treated in accordance with the NHPA and its implementing regulations, as well as other applicable federal statutes.

Social and Economic Conditions

Although several of the counties affected by the LSr Project have higher percentages of minorities and higher poverty levels than the average in the states in which they are located, the proposed pipeline route effectively bypasses all concentrations and densely populated residential and commercial areas. Most of the proposed pipeline route is located on already existing pipeline corridors. Therefore, the potential adverse impacts that may be associated with the proposed project would not disproportionately affect minorities or those living below the poverty level. This is because the project would impact all areas, whether above or below the state minority or poverty levels, equally. In addition, the proposed project is expected to create economic benefits for local communities, regardless of race, by generating employment opportunities and local expenditures by workers. Completion of the project would also result in an increase of state and local property tax revenues that would benefit local communities.

Local communities would benefit from monies paid to construction workers, both local and non-local, throughout the construction period. Workers would spend a portion of their earnings locally, thereby providing significant revenues to local communities. Both local and non-local workers would use hospitality services such as restaurants, grocery stores, and gasoline stations. Non-local workers would require temporary housing in addition to hospitality services. Construction contractors and subcontractors would also purchase certain materials from local vendors and lease land and equipment for temporary field offices and material storage areas.

Operation of the proposed pipeline would require Enbridge to hire up to four additional full-time employees. The new employees would be based locally. The new permanent jobs would contribute to local economies through payroll taxes and by the use of services such as hospitality services, retail vendors, and other businesses. Local communities also would benefit from periodic employment created by pipeline operation and maintenance activities. Workers for these activities may be local or non-local. Communities would benefit from the monies spent by temporary workers on local hospitality services and temporary housing. Additionally, construction contractors or Enbridge employees may purchase materials from local vendors.

Public Health and Safety

The introduction of contaminants to the environment due to accidental spills of construction related chemicals, fuels, or hydraulic fluid could have an adverse effect on groundwater and surface water quality, sensitive ecosystems, and soils. Spills from refueling operations, fuel storage, or equipment failure in or near a waterbody could affect aquatic resources and contaminate the waterbody downstream of the release point. Measures that would be implemented to prevent accidental releases of fuels and other hazardous substances include response, containment, and cleanup procedures.

To prevent pipeline failures resulting in inadvertent releases, Enbridge would construct and maintain the LSr Pipeline to meet or exceed industry and federal pipeline safety regulatory standards. As a safety factor, and in compliance with PHMSA regulations, the proposed LSr Pipeline would be designed to withstand pressures over and above its normal operating pressures. All pipe would be inspected and integrity-tested at the factory and transported per the highest technical standards and in accordance with federal pipeline safety regulations. All of the pipe would be manufactured with fusion-bonded epoxy coating to protect against corrosion. The actual installation of the pipeline and all construction and testing records would be subject to inspection by PHMSA and its state agent, the Minnesota Office of Pipeline Safety. Once installed, the pipeline would be subjected to testing to verify its integrity and compliance with specifications. Such testing would include checking coating integrity, examining by X-ray 100 percent of field welds, internally inspecting the entire length of each line by using an in-line inspection tool, and hydrostatically testing the line to qualify the maximum allowable operating pressure. The pipeline would be placed into service only after inspection to verify compliance with all construction standards and requirements are met.

Accidental leaks from the pipeline system during operations can also potentially affect the natural and human environments. Enbridge has an Operating and Maintenance Procedures Manual, subject to regulatory inspections, which establishes procedures to prevent corrosion, material defects, third party excavation damage, operator error and safe operating to prevent pipeline leaks. As part of the Integrity Management Plan, the pipeline will undergo periodic computerized internal inspection tools that travel through the inside of the pipeline to check pipe integrity. Other facilities are tested and inspected on a prescribed preventative maintenance schedule and regular aerial flyovers are completed to inspect the pipeline right-of-way. Enbridge maintains an Emergency Response Plan, which will be amended upon operation of the LSr Project. The ERP, which has been reviewed and approved by PHMSA, addresses

pre-planning, equipment staging, notifications, and release containment procedures to be implemented in the event of an inadvertent pipeline release.

This new pipeline would be externally coated to resist corrosion, internally inspected at regular intervals using in-line inspection technology, and equipped with a cathodic-protection system to prevent external corrosion. Enbridge's pipeline rights-of-way are patrolled and inspected by air at least every three weeks but not less than 26 times per year to watch for abnormal conditions or dangerous activities (e.g., unauthorized excavation along the pipelines). Enbridge also conducts extensive public education and outreach programs that exceed industry (API Recommended Practice 1162) and federal (49 CFR 195.440) requirements concerning public awareness of pipelines and pipeline-safety matters. All Enbridge lines are marked with signage and warnings, per federal regulations, at road and highway crossings, railroad crossings, navigable rivers, and other locations to alert the public to the presence of underground lines and to provide information, contact numbers, and emergency data. Such measures would be implemented for the LSr Project pipeline.

Pipeline workers and contractors performing critical tasks are qualified under OSHA safety standards and PHMSA "operator qualification" rules and are subjected to federal drug and alcohol testing requirements.

Connected Actions/Cumulative Impacts

The LSr pipeline project is independent of other planned or approved pipeline projects that would transport heavy, synthetic Canadian crude oil from the oil sands projects in Alberta to the United States. While it will connect with other pipelines in the United States, the LSr pipeline will be designed to meet a specific need for the more efficient transportation of light and medium sour crude oil from the Williston Basin in Saskatchewan to the United States. The LSr pipeline is not a connected action relative to either the Alberta Sands oil project or any pipelines that would serve that project. The Alberta Clipper pipeline proposed by a related Enbridge entity to transport heavy oil sands crude to the United States and the construction by Enbridge of another pipeline that would bring diluent north to the oil sands project, will be addressed in a separate EIS that is being prepared for the Alberta Clipper project by the DoS working with other agencies.

No significant cumulative air quality impacts, or impacts on greenhouse gas emissions, are anticipated as a result of the LSr pipeline operation. The Canadian-origin crude oil transported by the pipeline will largely replace crude oil from domestic or other foreign sources that would be refined at U.S. refineries, including those in the Upper Midwest. Upper Midwest refineries are already working at near capacity and no refineries have announced expansion plans to handle the light and medium sour crude that would be transported by the LSr pipeline. It is impossible to assess the air quality impacts of the transportation of the LSr crude at any specific refinery since Enbridge will operate the pipeline as a common carrier facility and thus it is not known precisely where any of the transported crude oil may be destined.

The majority of other cumulative impacts associated with the project would be temporary and minor, particularly given the existing pipeline corridor and abundance of agricultural land along the majority of the pipeline corridor. Long term cumulative impacts from construction of the Alberta Clipper Project would be insignificant since the additional pipeline would be constructed within the LSr Project pipeline construction corridor and impacts associated with its construction would be minimized through the implementation of mitigative measures as discussed throughout this assessment (e.g., compensatory mitigation of forested wetlands, riparian habitat, native revegetation). Short term cumulative benefits would be realized through additional employment opportunities, purchases of goods and services, and local housing demands. Long term cumulative benefits would be realized through tax revenues.

1.0 INTRODUCTION

Enbridge Pipelines (Southern Lights) L.L.C. (Enbridge) has applied to the U.S. Department of State (DoS) for a Presidential Permit for the construction, operation, and maintenance of pipeline facilities on the United States-Canada border. DoS considers applications for Presidential Permits for facilities such as pipelines pursuant to the authority delegated to it by the President of the United States under Executive Order (EO) 13337, as amended (69 Federal Register 25299). DoS has determined that its consideration of the issuance of a Presidential Permit for the proposed Enbridge pipeline project necessitates the preparation of an Environmental Assessment (EA) providing sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) as set forth in the National Environmental Policy Act of 1969 (NEPA) (42 U.S. Code § 4321 et seq.). This document provides an assessment of the existing environment along the proposed pipeline route, an analysis of human and environmental impacts that could potentially result from pipeline right-of-way preparation, construction, operation and maintenance of the proposed pipeline facilities, and a summary of the protection and restoration measures to be implemented to avoid and/or minimize environmental impacts.

1.1 BACKGROUND AND OVERVIEW

Enbridge proposes to construct and operate a petroleum pipeline and related facilities from Cromer, Manitoba, Canada to Clearbrook, Minnesota in the United States. The project, known as the Southern Lights 20-inch Crude Line or referred to herein as the "LSr Project," would have the capacity to deliver 186,000 barrels per day (bpd) of Canadian-sourced light and medium sour crude oil from a supply hub near Cromer, Manitoba to an existing terminal in Clearbrook, Minnesota.

In total, the LSr Project would consist of approximately 313 miles of new pipeline. The proposed system expansion would include the construction of approximately 136 miles of new 20-inch-diameter pipeline from the United States-Canada border near Neche, North Dakota to the existing Enbridge tank farm in Clearbrook, Minnesota for the transportation of petroleum. Enbridge proposes to construct the pipeline generally along its existing pipeline right-of-way. In Canada, the project would involve the construction of approximately 178 miles of new pipeline from Cromer, Manitoba to the United States-Canada border. The general location of the project is shown on figure 1.1-1. Appropriate regulatory authorities in Canada have conducted an independent environmental review for the Canadian facilities. Enbridge received approval from the National Energy Board (NEB) of Canada in February 2008 for the construction of the LSr Project in Canada. The decision issued by the NEB can be found online at: https://www.neb.gc.ca/ll-eng/livelink.exe?func=ll&objId=499563&objAction=browse.

The LSr Project also requires a Certificate of Need and a Routing Permit from the State of Minnesota Public Utility Commission (MPUC). As part of the process the Minnesota PUC has held hearings regarding the project and on March 24, 2008 the Administrative Law Judge recommended that the Minnesota PUC issue the Certificate of Need and Routing Permit. The Finding of Facts, Conclusion and Recommendation is attached in Appendix A. The North Dakota Public Service Commission (NDPSC) issued an order on December 31, 2007 issuing a Certificate for Corridor Compatibility and Route Permit. The order is attached in Appendix A.

The LSr Project would require modifications at existing pump stations and the construction of delivery facilities and mainline valves. Modifications of the pump stations would occur at locations necessary to maintain adequate flow through the pipeline. Mainline valves would be installed and located as dictated by the hydraulic characteristics of the transported petroleum. Enbridge proposes to begin construction of the project in mid-2008. Construction would occur over approximately 6 months, with an in-service date on or before December 31, 2008.

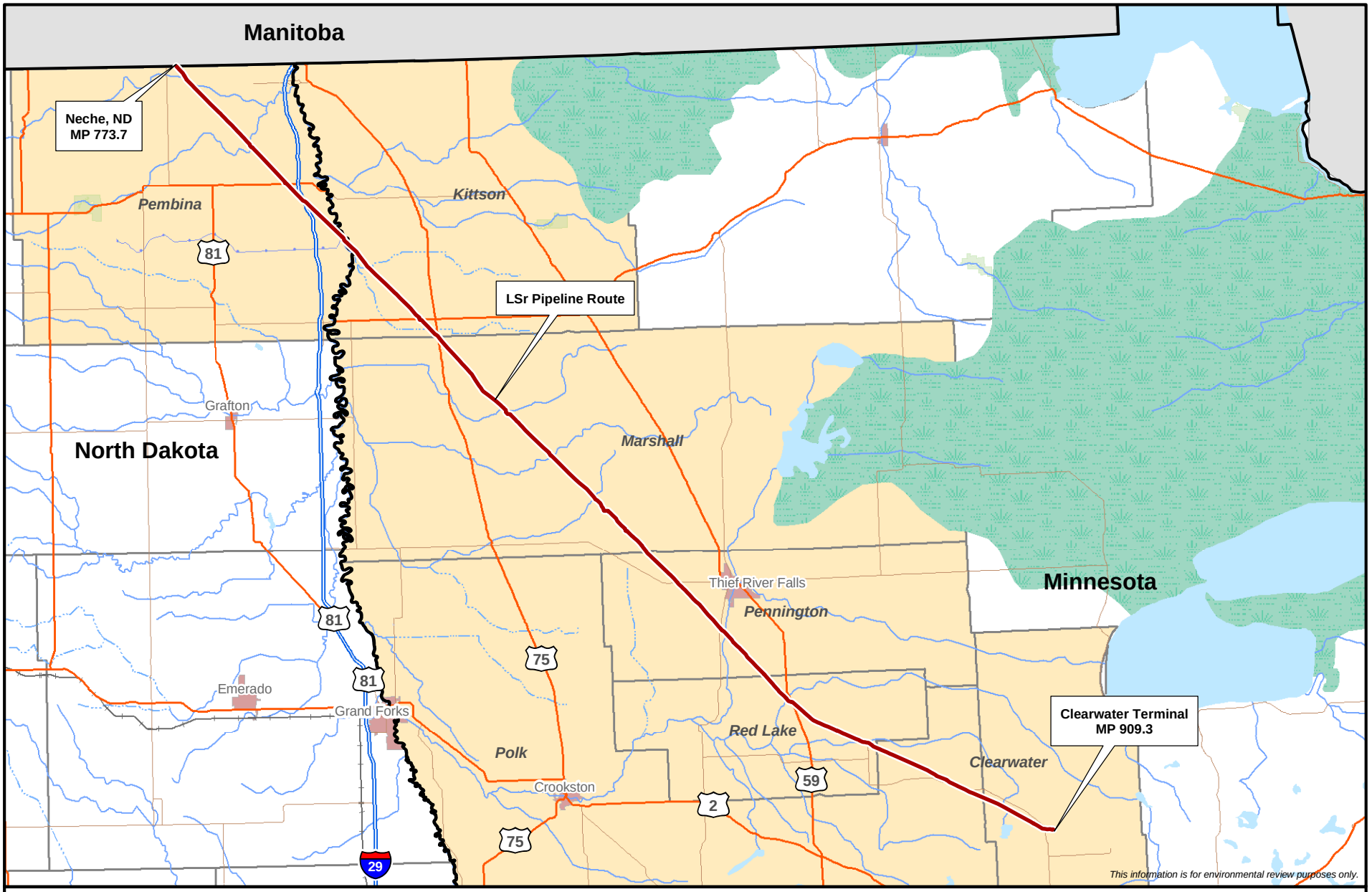

Figure 1.1-1

Southern Lights 20-Inch Crude Line

Enbridge Pipelines (Southern Lights) L.L.C

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1.2 PURPOSE AND NEED FOR THE PROJECT

The purpose of the LSr Project is to transport light and medium sour crude petroleum from existing Enbridge facilities received at the Enbridge terminal in Cromer, Manitoba to meet the demand of refinery markets in the United States. This new pipeline would provide the capacity needed to transport increasing supplies of light and medium sour crude oil produced in western Canada, primarily in Saskatchewan. The crude oil transported via the LSr pipeline would be traditional oil pumped from production wells in northern Williston Basin. The LSr pipeline is not being designed to transport heavy crude from the Alberta oil sands.

Demand for crude oil transportation on the Enbridge System has been increasing in recent years, rising from 1.34 million bpd in 2005 to 1.54 million bpd on average in 2007 (increasing to a projected 1.69 million bpd in 2008). The LSr Project is needed in a timely manner to relieve a bottleneck on the Enbridge Mainline System that has developed at the crude oil receipt point near Cromer, Manitoba. Regardless of whether other potential Enbridge pipeline projects are constructed, this new petroleum pipeline would be constructed due to the supply and demand components discussed below. The capacity provided by this new pipeline would provide independent utility to Enbridge and its customers, who would use the pipeline for the transportation of light and medium sour crude to Clearbrook, Minnesota breakout tanks for subsequent delivery to interconnected existing pipeline systems to the south (via Minnesota Pipeline, which is owned by others) and east (via the Enbridge Mainline System) of Clearbrook, Minnesota.

The need for the project is dictated by a number of factors including:

1. eliminating a bottleneck in the Enbridge pipeline system at Cromer, Manitoba, while enhancing petroleum supply capacity on the Enbridge pipeline system by the net amount of approximately 219,000 bpd until mid 2010, when other changes in the Enbridge system will reduce the capacity increase to approximately 47,000 bpd;

2. decreasing U.S. domestic crude oil supply coupled with long-term increasing crude oil demand in the United States, and, therefore, necessitating more imported crude oil to replace domestically produced crude oil (despite the contribution made in conservation of petroleum use and/or increased use of alternative fuels); and

3. the opportunity to reduce United States dependence on foreign offshore oil through increased access to stable, secure Canadian crude oil supplies.

1.2.1 Petroleum Supply and Demand in the Midwest

The petroleum-using public in the U.S. Midwest consumes over 5.2 million bpd of refined petroleum products according to recent statistics available from the U.S. Energy Information Administration (EIA), a statistical arm of the Department of Energy, which includes gasoline, jet fuel, asphalt, heating fuel and petrochemical products produced from crude oil. To meet this demand, refineries in the Petroleum Administration for Defense District (PADD) 2 region as defined by the U.S. Department of Energy which comprises 15 states in the U.S. Midwest (North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Minnesota, Iowa, Missouri, Wisconsin, Illinois, Michigan, Indiana, Kentucky, Tennessee, and Ohio) processed 3.3 million bpd of crude oil in 2005. Major Upper Midwest refineries located in Minnesota, Wisconsin, Illinois, northern Indiana, Michigan, and Ohio are currently served directly or indirectly by the Enbridge System. The two refineries located in Minnesota currently have a combined capacity of 349,300 bpd. Over 70 percent of the crude oil feedstock for the Minnesota refineries is met with deliveries off the Enbridge System at Clearbrook. An expansion of the Minnesota

Pipe Line between Clearbrook, Minnesota and the Minneapolis/St. Paul area, currently under construction, would result in increased deliveries off the Enbridge System. Since Enbridge operates as a common carrier, the crude oil delivered via the LSr pipeline would not involve long-term commitments to specific refineries. It is impossible to determine how much petroleum would be delivered to any customer or any delivery point at any time in the future or the specific capacity that may be transported by the LSr pipeline.

A key purpose of the LSr Project is to relieve a bottleneck in the existing Enbridge system at Cromer, Manitoba so as to ensure a consistent and stable supply of crude oil for Midwest refineries. The LSr Project is not tied to any refinery expansion plans and in fact the LSr Project is not solely devoted to deliveries at Clearbrook or to the two Twin Cities refineries. Other refineries could also benefit, dependent upon the current capacity of existing pipeline systems downstream of the Clearbrook Terminal.

A significant portion of the total refined petroleum products consumed in the Midwest is refined within the Midwest. The other major supply region for refined petroleum products into the Midwest include refineries located primarily in the Gulf Coast Region. Refined product "imports" into the Midwest from this region averaged 1.17 million bpd according to EIA.

Demand for petroleum products as an energy source and for other purposes is growing and will continue to grow throughout the Midwest area as population grows and economic activity expands. The growth in the use of petroleum products would occur despite energy conservation, use of alternative fuels and efficiency measures. EIA's Annual Energy Outlook anticipates that U.S. oil consumption will increase by one-third to approximately 27.6 million bpd by 2030. Satisfying this demand requires importation of crude oil into the Midwest, as production in PADD 2 has fallen to approximately 0.44 million bpd, compared to a high of over 1 million bpd in the mid-1980s.[1] Historically, a significant portion of the crude petroleum required to satisfy the public demand for refined products has been sourced from crude oil production areas in various western Canadian provinces and has been transported to the U.S. Midwest through common carrier pipelines such as the Enbridge System.

Following the construction of the LSr pipeline, planned for completion at the end of 2008, the net increase in pipeline capacity resulting from the LSr Project would be about 219,000 bpd. This figure is based on a design capacity of 186,000 bpd for the LSr pipeline and a modification being made in Canada to Enbridge's existing Line 2, which will increase the capacity of Line 2 by 33,000 bpd. The net capacity increase will decline to 47,000 bpd by around mid 2010, when other changes are made to the Enbridge system.

1.2.2 Increasing Canadian Crude Oil Production

The Canadian Association of Petroleum Producers' (CAPP) current oil supply forecast for Canadian crude production covering the period 2006 to 2020 anticipates overall Canadian crude oil production to grow from 2.5 million bpd in 2005 to 4.6 million bpd by 2015, with further potential growth to 4.9 million bpd by 2020. Within that overall production forecast, the western Canadian crude oil production is anticipated to grow from 2.2 million bpd in 2005 to 4.7 million bpd in 2020. Included in

[1] U.S. Department of Energy, EIA "Annual Energy Outlook 2007 with Projections to 2030," Report No. DOE/EIA-0383(2007). The Outlook was updated in 2008 and includes the impact of the Energy Independence and Security Act of 2007 (EISA 2007). While these and other conservation measures will reduce the amount of energy imports, net crude oil imports of 11.1 million barrels per day is anticipated in 2030. See, Statement of Guy Caruso, Administrator, U.S. Department of Energy EIA before the US Senate Committee on Energy and Natural Resources, March 4, 2008. Similarly, the ALJ in the Minnesota PUC Certificate of Need process was aware of state conservation and greenhouse gas reduction measures and nevertheless found that the state requirements for a Certificate of the Need were met. MPUC Docket No. PL9/CN-07-464 (Certificate of Need) Summary of Testimony at the Public Hearings, Findings of Facts, Conclusions and Recommendations at page 52.

this production is the portion of Canadian light and medium crude oil production that enters the Enbridge System at Cromer, Manitoba, currently totaling approximately 183,000 bpd.

While producers in western Canada can and do deliver into other refinery markets, the Midwest offers the largest refinery demand and, therefore, is an attractive and stable market. Western Canadian crude oil has been transported directly south of Alberta into the northern Rockies; however, with increased production from Montana and North Dakota, and increasingly limited pipeline capacity out of the Rockies and the Midwest, the Enbridge System remains the more preferable market destination. Canadian crude oil thus offers Midwestern consumers and refiners the needed supply source to meet consumer demand for petroleum products. Enbridge has a number of current and planned expansions, including the LSr Project, which would allow Midwestern refiners the needed access to supply sources of light and medium sour crude to meet consumer demand for petroleum products.

1.2.3 Constrained Pipeline Capacity Outside of Western Canada

As early as 2008-2009, light and medium crude capacity on the Enbridge System would be at or near capacity, and recent forecast updates conducted by CAPP have prompted its request for Enbridge to remove a bottleneck in the existing system as soon as possible. Today, the current capacities of large-diameter crude oil pipelines tasked with transporting western Canadian petroleum production to refinery markets ex-western Canada are in approximate balance with current production levels and market demand. The May 2006 CAPP forecast identifies current pipeline capacity as being in a modest surplus position (320,000 bpd combined light and heavy crude capacity) compared to the production volumes available to ex-western Canada markets.[2] Without pipeline expansions, as Canadian production volumes increase, this capacity surplus erodes to a capacity deficiency of 1.65 million bpd by 2015 and 2.0 million bpd by 2020.[3]

1.2.4 LSr Project Increases Pipeline Capacity into the Midwest

The LSr Project would deliver volumes of light and medium sour crude into the Enbridge terminal facilities at Clearbrook, Minnesota for subsequent delivery to non-affiliated connecting carrier, Minnesota Pipe Line, or for reentry into the Enbridge System for further transportation into Midwest refinery markets. The construction of the LSr Project, along with the other Enbridge System expansions planned or underway, would efficiently align the Enbridge System with the supply patterns of the crude oil producing community, and maximize capacity for transportation to refinery centers. Once other modifications to the Enbridge system are made in mid 2010, the net capacity increase resulting from the LSr Project would be 47,000 bpd.

1.2.5 Advantages to U.S. Refinery Sector and the U.S. Public

Domestic U.S. onshore production of crude oil, particularly in the onshore U.S. Gulf states, has been declining and will continue to decline, as is evident from the annual crude oil production forecasts distributed by the EIA.[4]

Canadian-produced crude affords Midwest refiners and consumers a supply source that is reliable, ample, secure, and economical. For such reasons, demand by Midwest refiners for Canadian crude has been increasing. Access to Canadian crude is now, and can be in the future, a secure means of satisfying public need and demand for petroleum products. Interstate and international transmission

[2] Canadian Crude Oil Production and Supply Forecast 2006 – 2020. Canadian Association of Petroleum Producers. May 2006.

[3] Ibid.

[4] U.S. Department of Energy, Energy Information Administration's "Annual Energy Outlook," http://www.eia.doe.gov/oiaf/aeo/

pipelines, such as those operated by Enbridge, offer a practical and secure means of meeting the Midwest's need for petroleum. No combination of railroad tank cars and/or tanker trucks could as effectively and economically move the huge quantities of crude oil needed to keep the Midwest refineries functioning.

Refineries that can obtain and process economical Canadian crude oil may enjoy lower supply costs as well as more dependable sourcing and expeditious delivery than is otherwise available. Ultimately, consumers benefit as enhanced, low cost crude supplies help restrain product prices, secure product availability, maintain the Midwest refining industry and its economic contributions to the area, and may act to cushion the Midwest market against supply disruptions caused by natural phenomena and world oil shocks and consequences thereof.

1.2.6 Other Enbridge System Expansions

Historically, in response to expanding refinery demand and corresponding increases in western Canadian production, Enbridge has expanded a number of times to increase transport capability from western Canada and, to a lesser extent, North Dakota.

In addition to the LSr Project, Enbridge is currently expanding and extending its system via a project referred to as the Southern Access Expansion Program. The first stage of this Program is a new 42-inch-diameter pipeline adding 146,000 bpd of capacity from Superior, Wisconsin to the Chicago area that is currently under construction for start-up in early 2008. The second stage of the Southern Access Expansion continues the construction of the new 42-inch-diameter pipeline to Flanagan, Illinois (southwest of Chicago) for completion in early 2009. When complete, these two stages will add 400,000 bpd of capacity on the Enbridge System. In a third stage of the Southern Access Extension Program, Enbridge seeks to extend its pipeline system from Flanagan, Illinois to the Patoka, Illinois hub. In Canada, Enbridge Pipelines Inc. also has separate projects underway that add pipeline capacity from the northern Alberta oil sands region to Edmonton, Alberta to connect with the Enbridge System and other interconnecting pipelines transporting to markets in Canada and the United States. Enbridge is also seeking a Presidential Permit for the Alberta Clipper Pipeline Project (Alberta Clipper), which would be used to transport heavy crude from the oil sands region of Alberta to Superior, Wisconsin. A separate environmental review of that distinct project is currently underway.

1.3 FEDERAL APPROVAL PROCESS AND AUTHORIZING ACTIONS

The DoS is the lead federal agency reviewing the project in accordance with the requirements of NEPA. A number of other federal agencies have permitting, environmental review, and regulatory roles with respect to the LSr Project, and are summarized below. State and local agencies were also consulted to identify issues arising during their permitting reviews. These issues are addressed in this EA.

1.3.1 Lead Agency - U.S. Department of State

EO 11423, as amended by EO 12847 and EO 13337, governs the DoS' issuance of Presidential Permits authorizing the construction of pipelines carrying petroleum, petroleum products, and other liquids across United States international borders. Within the DoS, the Bureau of Economic and Business Affairs, Office of International Energy and Commodity Policy, receives and processes Presidential Permit applications. Upon receipt of a Presidential Permit application for a cross-border pipeline, the DoS is required to request the views of the Secretary of Defense, the U.S. Attorney General, the Secretary of the Interior, the Secretary of Commerce, the Secretary of Transportation, the Secretary of Energy, the Secretary of Homeland Security, the Administrator of the U.S. Environmental Protection Agency (EPA),

and other government department and agency heads as the Secretary of State deems appropriate. The DoS also solicits comments from the public through publication of a notice in the Federal Register.

In evaluating Presidential Permit applications, the DoS complies with the environmental review requirements of NEPA, as well as other applicable statutes and regulations. After consideration of the views obtained from various authorities and interested party commenters, the DoS makes a determination whether the proposed project would serve the national interest. If it is determined that the project would serve the national interest, the DoS prepares a Presidential Permit that includes terms and conditions as the national interest may, in the DoS' judgment, require. The DoS is further required to notify those agencies required to be consulted of its proposed determination. If any of those agencies disagree with the determination within 15 days of notification, it may ask the DoS to refer the matter to the President of the United States for his/her consideration and a final decision. If no agency disagrees within the 15-day period, the DoS shall issue or deny the permit in accordance with the proposed national interest determination.

1.3.2 Cooperating Agencies

The following agencies serve in a cooperating capacity with the DoS in the NEPA process for the LSr Project.

1.3.2.1 U.S. Army Corps of Engineers

Section 404 of the Clean Water Act (CWA) is jointly administered by the U.S. Army Corps of Engineers (COE) and the EPA. The COE issues section 404 permits for the discharge of dredge and fill materials into the waters of the United States, including their adjacent wetlands. The LSr Project would be under the jurisdiction of the Omaha and St. Paul Districts of the COE. Enbridge conducted a desktop analysis and started field surveys in fall 2006 to identify COE jurisdictional waters of the United States. Enbridge completed wetland delineations during 2007 for waterbodies that would be crossed by the project. Enbridge filed this information with the COE in support of obtaining a CWA section 404 permit as well as a permit under section 10 of the Rivers and Harbors Act (RHA).

1.3.2.2 U.S. Environmental Protection Agency

The EPA has jurisdiction over the discharge of pollutants to receiving waters of the U.S. under provisions of the CWA (section 402). For the states of Minnesota and North Dakota, the EPA has delegated the authority to administer permits for discharges that require a National Pollutant Discharge Elimination System (NPDES) permit to these states. Under section 404 of the CWA, the EPA reviews and comments on individual COE section 404 permit applications. The St. Paul and Omaha Districts of the COE have coordinated EPA review of the LSr Project section 404 permit application via the COE public notice procedures. In August, 2007, the COE St. Paul District issued a public notice announcing the proposed LSr and Alberta Clipper Projects, advising agencies and the public that the LSr proposal is eligible for evaluation under the Minnesota General Permit (MN GP-03) and inviting comment on the proposal. The EPA provided a comment letter in response to this notice, requesting that the pipeline projects be evaluated under an individual permit procedure. Subsequently, the COE decided to issue an Individual Permit instead of MN GP-03 based on the EPA's and Minnesota Pollution Control Agency's (MPCA) decision to not waive section 401 CWA Water Quality Certification for the project. The St. Paul District provided public notice for the Individual Permit on January 23, 2008.

Under 40 Code of Federal Regulations (C.F.R) 112 (Oil Pollution Prevention), the EPA requires the development of an EPA approved Facility Response Plan (FRP) and Spill Prevention, Control, and Countermeasure (SPCC) Plan for certain non-transportation-related facilities. Since Enbridge's

Clearbrook terminal is an integral part of a pipeline transportation facility and all tanks are defined as part of the pipeline facility, the emergency procedures are covered under the Pipeline Safety Act of 2002 (as amended) and further under the Oil Pollution Act of 1990, and 49 C.F.R 194 (see letter dated May 20, 2008 from Enbridge to EPA, Appendix A). Enbridge has an existing Emergency Response Plan (ERP) submitted and approved by U.S. Department of Transportation (DOT), Pipeline and Hazardous Materials Safety Administration (PHMSA). Thus the EPA's SPCC Plan is not required for this facility. Modifications to the existing Clearbrook facility required by the LSr Project are covered under the existing (already incorporated) PHMSA-approved ERP.

1.3.2.3 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (FWS) is responsible for enforcing the Endangered Species Act (ESA). The DoS, as the lead federal agency, is responsible for determining whether the proposal could affect threatened or endangered species and/or their critical habitat, and consulting with the FWS. The DoS, or the applicant as a non-federal party, is required to consult with the FWS to determine whether any federally listed or proposed endangered or threatened species or their designated critical habitat occur in the vicinity of the proposed project. If, upon review of existing data, the DoS determines that these species or habitat may be affected by the proposed project, the DoS is required to prepare a Biological Assessment (BA) to identify the nature and extent of adverse impact and to recommend mitigation measures that would avoid the habitat and/or species or that would reduce potential impact on acceptable levels. If, however, the DoS determines that no federally listed or proposed endangered or threatened species or their designated critical habitat would be affected by the proposed project, no further action is necessary.

1.3.2.4 Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) administers the Wetlands Reserve Program (WRP) whereby conservation easements are purchased from landowners for the purposes of protecting and restoring wetlands. The NRCS may purchase 30-year or permanent easements under the provisions of the WRP. Program eligibility is based on the determination that land is farmed or converted wetland, that involvement in the program benefits wildlife and wetlands, and that enrollment in the program would likely lead to successful restoration of such lands. WRP lands are subject to use restrictions. The LSr Project would cross land currently enrolled in the WRP. The NRCS also is responsible for protecting prime agricultural lands under the Farmland Protection Policy Act. The LSr Project would cross prime farmland.

1.3.2.5 Farm Service Agency

The Farm Service Agency (FSA), under the U.S. Department of Agriculture (U.S.DA), administers the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP), and the Farmable Wetlands Program. These programs protect resources by creating set-aside lands eligible for such protection. The LSr Project would cross lands currently enrolled in the CRP program.

1.3.3 Assisting Agency

The following agency is providing technical assistance to the DoS during the environmental review process for the LSr Project.

1.3.3.1 Pipeline and Hazardous Materials Safety Administration

The Office of Pipeline Safety (OPS), PHMSA, within the DOT is the primary enforcement agency that regulates the safety of interstate transportation of hazardous liquids by pipelines, including crude oil. To comply with federal regulations (49 C.F.R Parts 194 and 195), Enbridge would implement its ERP for the LSr Project and areas of operation.

1.3.4 Consulting Agency

The following agency has been consulted by the DoS during the environmental review process for the LSr Project.

1.3.4.1 Advisory Council on Historic Preservation

Section 106 of the National Historic Preservation Act (NHPA), as amended, requires the lead federal agency to take into account the effects of its undertakings on historic properties or historic resources that are listed in, or eligible for listing in, the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment if there would be adverse effects on NRHP-eligible properties. Historic properties are defined as prehistoric or historic districts, sites, buildings, structures, objects, or properties of traditional religious or cultural importance, which are listed or eligible for listing in the NRHP, including artifacts, records, and material remains related to such a property or resource.

The DoS, as the lead federal agency, is responsible for NHPA section 106 compliance for all lands, both public and private, affected by the LSr Project. The DoS is using the services of Enbridge, as the applicant, to prepare information, analyses, and recommendations necessary to comply with section 106 in accordance with ACHP's regulations at 36 C.F.R Section 800.2.

Enbridge has completed a record review for the proposed action study areas (i.e., Class I inventories). Field inventories (i.e., Class II surveys) and architectural surveys were conducted in 2007 for the proposed pipeline route. Information from record searches and field inventories have been compiled into reports submitted to the DoS and other jurisdictional agencies, as appropriate. The DoS reviewed these reports and consulted with each state's State Historic Preservation Office (SHPO) to determine site eligibility for the NRHP and the project's effects on historic properties within the Area of Potential Effect. If the proposed project would adversely affect historic properties, the DoS would require the preparation and implementation of treatment plans to mitigate adverse effects. No construction would begin in these areas until the required consultations and approvals are received. Section 3.8 discusses the results of survey and consultations.

As the lead federal agency, the DoS is also responsible for complying with sections 1 and 101(d) of the NHPA and the American Indian Religious Freedom Act. Compliance involves contacting Native American groups with an interest in the lands affected by the proposed LSr Project (see section 3.9).

1.4 PERMITS AND RELATIONSHIP TO NON-FEDERAL POLICIES, PLANS, AND PROGRAMS

A preliminary list of federal, state, and local permits and approvals is provided in table 1.4-1.

TABLE 1.4-1

Permits and Approvals for the LSr Project

Name of Agency	Permit/Activity	Application Submittal/ Consultation Date
FEDERAL		
U.S. Army Corps of Engineers (COE)	Section 10 Rivers and Harbors Act and Section 404 Clean Water Act Authorization for work in waters of the U.S.	June 2007
U.S. Department of State	Presidential Permit for Facility on the United States – Canada Border	April 2007
U.S. Fish and Wildlife Service	Section 7 Endangered Species Act consultation	August 2006
STATE OF NORTH DAKOTA		
Public Service Commission	Certificate of Corridor Compatibility and Route Permit	April 2007
Department of Health- Division of Water Quality	Section 401 Water Quality Certification (concurrent with COE review)	
	NPDES Hydrostatic Test Water Discharge Permit	February 2008
	NPDES Construction Dewatering Discharge Permit	February 2008
	NPDES Construction Stormwater Discharge Permit	February 2008
State Water Commission- State Engineer	Sovereign Land Use Permit	November 2007
State Water Commission	Temporary Water Use Permit, water appropriations for hydrotesting	February 2008
Department of Game and Fish	Endangered and threatened species consultation	August 2006
State Historical Preservation Office	Section 106 Historic Preservation Act Consultation	December 2007
STATE OF MINNESOTA		
Public Utilities Commission	Certificate of Need	April 2007
Department of Commerce	Route Permit	April 2007
Pollution Control Agency	Section 401 Water Quality Certification (concurrent with COE review)	
	NPDES/SDS Individual Permit	February 2008
	NPDES/SDS Construction Stormwater Discharge Permit	February 2008
	NPDES/SDS Construction Dewatering Discharge Permit	February 2008
	NPDES/SDS Hydrostatic Test Water Discharge Permit	February 2008
	NPDES/SDS Stormwater Discharge Permit for Pipe Yards	February 2008
Department of Natural Resources	License to Cross Public Waters	December 2007
	Water Appropriation Permit	February 2008
	State Protected Species Consultation	August 2006
State Historic Preservation Office	Section 106 Historic Preservation Act Consultation	December 2007
Department of Agriculture	Agricultural Mitigation Plan	December 2006
Department of Transportation	Road Crossing Permits	February 2008
LOCAL/REGIONAL – WATERSHED AND CONSERVATION DISTRICTS – MINNESOTA		
Two Rivers Watershed District	Watershed District Permit	December 2007
Middle-Snake-Tamarac Watershed District	Watershed District Permit	December 2007
Red Lake Watershed District	Watershed District Permit	December 2007
Local Governmental Units	Wetland Conservation Act exemption requests	February 2008
Kittson County	Conditional Use Permit for construction/pipe yard	October 2007

1.5 AGENCY CONSULTATIONS AND PUBLIC OUTREACH

On April 9, 2007, Enbridge submitted to the DoS an environmental report in support of its application for a Presidential Permit for the U.S. – Canadian international border crossing associated with

the LSr Project pipeline. On July 27, 2007, the DoS issued in the Federal Register a Notice of Intent (NOI) to prepare an EA for the LSr Project. The NOI provided the public with a description of the proposed action, announced plans for scoping meetings, invited public participation in the scoping process, and solicited public comments for consideration in establishing the scope and content of the LSr Project EA. The scoping period ended on September 10, 2007 but comments received after this date were accepted by DoS. The DoS issued in the Federal Register a Notice of Availability (NOA) of the draft EA for the LSr Project on November 28, 2007. The NOA asked for comments on the draft EA from the public by December 28, 2007 however, comments were accepted until mid January 2008. Comments received by federal, state, and local agencies are summarized in Appendix A.

Enbridge initiated consultation with federal and state agencies in August 2006 regarding the proposed project. Consultations have been ongoing during the course of environmental review for the LSr Project. A summary of meetings between Enbridge and these agencies is included in Appendix A. Additionally, Enbridge initiated preliminary outreach with landowners and local, county, state, and federal elected officials along the proposed pipeline route. Comments received by Enbridge and during the scoping process are discussed in the following sections.

1.5.1 Public Outreach and Open Houses

Enbridge initiated preliminary outreach with landowners and local, county, state, and federal elected officials along the proposed pipeline route. All landowners of record received a mailing introducing the project in their area. Included in the distribution were mayors, city managers, city council members, county commissioners, treasurers, assessors, engineers, economic development directors, governors, attorneys general, state agency commissioners, state legislators and legislative leadership, and members of the U.S. Congressional delegation. The letters dated August 30, 2006 and September 1, 2006 provided an overview of the project and a fact sheet addressing the specifics of the project along with a map depicting location. A website was established to provide stakeholders with an array of information about the project, including maps and points of contact if more information is needed.

At the suggestion of the Minnesota Department of Agriculture (MDA), Enbridge sponsored an informational booth at the Minnesota Canola Growers Council Conference on February, 19, 2007. The purpose was to solicit input from local farmers and seed company representatives on preferred pipeline construction methods in agricultural lands. Results of the dialogue are summarized in table 1.5.1-1.

Enbridge met in early March 2007 with county commission chairs in the counties along the proposed route. In some counties, the meetings were also attended by additional commissioners, county auditors, assessors and deputy auditors.

The commissioners anticipated the pipeline would have minimal opposition from constituents because the proposed route is adjacent to the existing right-of-way and county residents are very familiar with pipelines due to Enbridge's long-term presence in these communities. Based on the dialogue with county commissioners, it was recommended that Enbridge incorporate messaging regarding easement compensation, safety, environmental stewardship, land use and reclamation, road crossings and tax benefits into their open house displays and information materials. Enbridge consulted with the county commissioners regarding possible public information/open house locations and venues.

TABLE 1.5.1-1

Summary of Issues Identified During Preliminary Stakeholder Consultation

Issue/Entity	Letter / Meeting Date	Comments
AGRICULTURAL ISSUES		
Local Farmer, Pennington County Commissioner	Minnesota Canola Conference February 19, 2007	Minimize spread of Canadian Thistle.
Fertilizer Business	Minnesota Canola Conference February 19, 2007	Requests that construction be completed in the same way as in the past.
Bunge	Minnesota Canola Conference February 19, 2007	Keep soil compaction and width of workspace to a minimum.
Local Farmer	Minnesota Canola Conference February 19, 2007	Disturbance to the topsoil should be kept to a minimum.
Local Farmer	Minnesota Canola Conference February 19, 2007	Impact of tile crossing if pipe is less than 48 inches in diameter.
Pioneer Seed	Minnesota Canola Conference February 19, 2007	Thief River Falls, Oklee, and Red Lake areas are currently installing a great deal of new tiling. New pipeline construction would encounter much more tiling than during past pipeline construction.
Interstate Seed Co.	Minnesota Canola Conference February 19, 2007	Seeks confirmation that pipelines would not rise over time.

1.5.2 Agency Coordination and Consultation

An initial meeting was held between the DoS and Enbridge in October 2006 to discuss Enbridge's expansion plans and DoS involvement. A follow-up meeting was held in December 2006 further exploring the environmental review process being undertaken by DoS. In February 2007, meetings were held between Enbridge and DoS, COE, NDPSC, MPUC, and the Minnesota Department of Natural Resources (MDNR) to further discuss interagency coordination, to describe individual agency review processes, and to identify opportunities to streamline the review process. A brief summary of issues identified through these consultations is provided in table 1.5.2-1.

The Minnesota Department of Commerce (MDC), MPUC, and NDPSC have siting authority for liquid petroleum pipelines in their respective states. On December 31, 2007, the NDPSC issued a Certificate of Corridor Compatibility and Route Permit to Enbridge to construct the LSr Project in North Dakota. On March 24, 2008, the Administrative Law Judge presiding over the public hearings for the LSr Project in Minnesota issued a Summary of Testimony at the Public Hearings, Findings of Fact, Conclusions and Recommendations. The judge recommended that the MPUC and MDC issue a Certificate of Need and Route Permit for the LSr Project. The MPUC decision regarding a Certificate of Need is anticipated in April 2008 and the MDC decision regarding a Route Permit is anticipated in May 2008 authorizing construction of the project in Minnesota. The COE is responsible for authorizing pipeline work in wetlands and rivers protected under CWA section 404 and RHA section 10, respectively. These agencies have requested that they be fully apprised of routing issues and alternatives assessments related to the proposed project by federal reviewing agencies.

TABLE 1.5.2-1

Summary of Issues Identified During Preliminary Agency Consultation

Issue/Agency	Letter / Meeting Date	Comments
AGENCY COORDINATION		
U.S. Army Corps of Engineers (COE)	September 20, 2006	Coordinate with COE on route changes and identify new disturbances resulting from route changes.
AGRICULTURAL ISSUES		
Minnesota Department of Agriculture (MDA)	December 15, 2006	Recommended process for implementing the Agricultural Mitigation Plan (AMP) for route permit: - early public meeting to inform stakeholders and gather individual and geographic concerns; - draft the AMP using a previous example as the template; and - include the AMP with the Public Utilities Commission application.
PROJECT DESCRIPTION		
Minnesota Department of Natural Resources (MDNR)	October 25, 2006	Provide MDNR information about the products in the lines and why they can't be mixed.
RESTORATION		
U.S. Fish and Wildlife Service (FWS)	November 2, 2006	Minimize disturbance to fish and wildlife resources in project area by reseeding disturbed areas with mixture of native grass and forb species.
North Dakota Game & Fish Department (NDGFD)	December 12, 2006	Recommend trees and shrubs be replaced 2:1.
SENSITIVE RESOURCES		
MDNR	October 3, 2006	Request that pipeline construction occur outside of Canadian Pacific Railway right-of-way to protect prairie remnants.
MDNR	October 3, 2006	Avoid construction within mesic prairie remnants along Burlington Northern and Santa Fe railroad right-of-way crossings by using directional boring / drilling techniques.
MDNR	October 3, 2006	Disturbance to the "Sites of Biodiversity Significance" should be kept to a minimum.
COE	September 20, 2006	Identify special aquatic sites along route such as fens, trout streams.
MDNR	October 3, 2006	Avoid or minimize impact on bald eagle nesting areas (March 15 – May 15).
FWS	November 2, 2006	Minimize disturbance to fish and wildlife resources in project area by installing and maintaining appropriate erosion control measures.
MDNR	October 3, 2006 December 21, 2006	Minimize or avoid impact on groundwater in close proximity to protected fen in northwest Minnesota. Consult with Wetlands Program Coordinator if fen could be impacted.
FWS	November 2, 2006	Construction resulting in impacts on FWS fee owned or lands protected by easements would require Special Use permits.
STREAM CROSSING METHODS		
MDNR	October 3, 2006	Impact on mussels at crossing locations and beds downstream of crossings. MDNR recommends directional boring / drilling techniques.
COE	September 20, 2006	Identify directional boring locations.
FWS	November 2, 2006	Precautions needed to restore natural basin contours where burying pipeline in wetland basins / stream channels re: sufficiently compacting trenches to prevent drainage.

TABLE 1.5.2-1 (cont'd)

Summary of Issues Identified During Preliminary Agency Consultation

Issue/Agency	Letter / Meeting Date	Comments
FWS	November 2, 2006	Minimize disturbance to fish and wildlife resources in project area by avoiding construction in river channels from April 15 – June 1 (fish migration and spawning period).
FWS	November 2, 2006	Make no stream channel alterations or changes in drainage patterns to minimize disturbance to fish and wildlife resources in project area.
FWS	November 2, 2006	Minimize disturbance to fish and wildlife resources in project area by deferring timing of construction to late summer (after July 15) or fall (waterfowl or other wildlife nesting season).
NDGFD	December 12, 2006	North Dakota stream crossing construction should not take place between April 15 - June 1 if horizontal directional drill is not feasible.
WETLAND CROSSING METHODS		
FWS	November 2, 2006	Minimize disturbance to fish and wildlife resources in project area by locating construction to avoid placement of fill in wetlands along the pipeline route.
FWS	November 2, 2006	Minimize disturbance to fish and wildlife resources in project area by replacing unavoidable losses of wetland habitat 2:1.
NDGFD	December 12, 2006	Recommend aboveground appurtenances not be placed in wetland areas, and no alterations be made to existing drainage patterns.
MDA	December 15, 2006	Identify farmed wetlands for MDA and COE.

Agricultural Impacts

The MDA requires that pipeline companies seeking Route Permits from the MDC create and submit for consideration Agricultural Mitigation Plans (AMPs) to establish procedures for the protection of agricultural resources. The AMP, when approved by the MDA, becomes a condition of the state route permit and describes measures that would be employed to protect agricultural resources during construction and operation of proposed new pipeline facilities. Enbridge has developed a draft AMP that would be subject to agency and stakeholder review during the Minnesota Route Permit process. The AMP is discussed in section 3.3 and included as Appendix B.

Cumulative Effects

The MDNR raised potential concerns over the width of the pipeline corridor, especially in side slope areas, but anticipates a narrower corridor may be possible in wetlands and other sensitive areas. These issues are discussed in section 3.13.

Restoration

The MDNR, FWS, and North Dakota Game and Fish Department (NDGFD) provided preliminary recommendations regarding restoration of the right-of-way following construction (see Appendix A). Restoration measures are discussed in section 3.

Routing

The initial pipeline route would have crossed a small portion of the Juhl National Wildlife Management Area (WMA) in Pembina County, North Dakota (approximately milepost (MP) 791.5). The Juhl WMA is designated an Avoidance Area by the NDPSC. Enbridge has adopted a route that avoids this parcel.

The St. Paul District of the COE requested that Enbridge coordinate with the agency on any route changes and notify them of any resulting disturbances. They also require the identification of any horizontal directional drilling (HDD) locations along with any special aquatic sites on the pipeline route such as fens or trout streams.

Sensitive Resources

The MDNR identified a calcareous fen located near MP 844.4 in Marshall County, Minnesota. The MDNR noted that effects on the fen resulting from construction and the potential to impact groundwater in the vicinity of the calcareous fen should be avoided. The MDNR also identified several potentially sensitive waterbody crossings in Minnesota supporting populations of protected mussels or other aquatic resources that may be affected by construction activities. These issues are addressed in sections 3.4.3 and 3.6.3.

Stream Crossings

The MDNR, FWS, and NDGFD provided comments to address potential waterbody crossing impacts. Those issues are addressed in section 3.4.

Wetland Crossings

The FWS, NDGFD, and MDA provided comments on potential wetland crossing issues. Wetland crossing impacts and effects are discussed in section 3.4.3.

1.5.3 Public Scoping Process

The DoS, in conjunction with the MDC, convened public scoping meetings at six locations near the project route to provide the public opportunities to comment on the scope of the EA. Meetings were held in each Minnesota county crossed by the LSr Project. The initial meeting held in Kennedy, Minnesota was located about 9 miles from the Minnesota - North Dakota border to afford North Dakota participants the opportunity to participate in the meeting. Meetings were held at the following locations, with dates and number of attendees noted:

- August 13, 2007 – Kennedy, Minnesota (Pembina County, ND and Kittson County, MN). 6 attendees
- August 13, 2007 – Stephen, Minnesota (Marshall County). 15 attendees
- August 14, 2007 – Thief River Falls, Minnesota (Pennington County). 17 attendees
- August 15, 2007 – Oklee, Minnesota (Red Lake County). 5 attendees
- August 15, 2007 – Gully, Minnesota (Polk County). 3 attendees

- August 16, 2007 – Clearbrook, Minnesota (Clearwater County). 7 attendees

Table 1.5.3-1 summarizes the issues raised during the public scoping process. The table also references the section of the EA where the concern is addressed.

TABLE 1.5.3-1

Summary of Issues Identified During Public Scoping Meetings

Issue	Section Where Addressed	Comments
PURPOSE AND NEED	1.2	Need for the LSr Project; existing system capacity.
PROJECT DESCRIPTION	2.1	Distance between existing pipelines and proposed new line; construction debris management; quality of crude oil compared to existing pipeline petroleum.
LAND USE, RECREATION, SPECIAL INTEREST AREAS, AND VISUAL RESOURCES	2.1	Close proximity to existing structures; impacts on Conservation Reserve Program status; construction activities affecting cattle breeding; movement of livestock through construction areas; maintenance and restoration of livestock gates.
SOCIOECONOMICS	3.10	Potential loss of revenues and taxes to local governments; potential loss of conservation easement and lease payments to landowners.
SOILS	3.3	Crop productivity impacts from subsoil mixing with topsoil; impact of pipeline affecting subsurface drainage including drain tile function.
WILDLIFE RESOURCES	3.6	Impacts on deer hunting habitat.
WATER RESOURCES	3.4	Depth of cover at ditch crossings.

1.5.4 Comments on the Draft EA

During the comment period on the draft EA, DoS received six comment letters from government agencies, one response from an environmental advocacy group, and no comments directly from the public. The EPA, MDNR, MPCA, and COE described specific concerns regarding construction impacts on sensitive resources in the project area. Responses to these concerns are summarized in Appendix A and incorporated in appropriate sections of this EA.

The North Dakota Department of Health (NDDH) reiterated concerns expressed in their letter to Enbridge dated August 13, 2007 regarding dust and noise control and protection of water resources. NDDH noted that "…environmental impacts from the proposed construction would be minor and can be controlled by proper construction methods" (see Appendix A). These issues are addressed in section 3.

The U.S. Department of Interior (DOI) identified the Pembina River in North Dakota as nominated for inclusion on the list of Nationwide Rivers Inventory (see Appendix A). DOI concurs that the proposed crossing technique (HDD) has the potential to avoid impacts on the river and would not result in affecting the values that make the segment of the river crossed by the project eligible for listing. Construction techniques including HDD are discussed in sections 2.1.3.3 and 3.4.1.

The Minnesota Center for Environmental Advocacy (MCEA) raised concerns about the purpose and need for the project, connected actions, and indirect and cumulative impacts associated with the project (correspondence included in Appendix A). These issues are discussed in section 3.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

Enbridge is proposing to construct the LSr Project to provide petroleum delivery from Enbridge's existing facilities in Cromer, Manitoba to its tank farm in Clearbrook, Minnesota. The LSr Project pipeline would generally be collocated with existing Enbridge pipelines through North Dakota and Minnesota. The proposed LSr Project would require construction and operation of the following:

- approximately 136 miles of new 20-inch-diameter underground petroleum pipeline on or adjacent to existing Enbridge right-of-way from near Neche, North Dakota at the United States-Canada border in Pembina County (MP 773.7) to Enbridge's Clearbrook terminal in Clearwater County, Minnesota (MP 909.3);

- piping modifications to use existing pumping units within the existing Enbridge pump station sites at Donaldson, Minnesota (MP 814.1) and Plummer, Minnesota (MP 877.1); and

- mainline valves at major waterbody crossings and over the length of the pipeline route.

A general location map depicting the pipeline route is included as figure 1.1-1. The LSr Project pipeline would generally follow existing Enbridge right-of-way along the entire route in North Dakota and Minnesota. The pipeline would cross portions of the following counties: Pembina, North Dakota; and Kittson, Marshall, Pennington, Red Lake, Polk, and Clearwater, Minnesota. Table 2.1-1 summarizes the length of pipeline proposed in each county.

TABLE 2.1-1

Location and Length of the LSr Project Pipeline Route

County, State	Mileposts	Pipeline Length (miles) [a]
Pembina, North Dakota	773.7 – 801.8	28.0
Kittson, Minnesota	801.8 – 817.1	15.3
Marshall, Minnesota	817.1 – 851.7	34.7
Pennington, Minnesota	851.7 – 871.4	19.7
Red Lake, Minnesota	871.4 – 886.9	15.6
Polk, Minnesota	886.9 – 900.5	13.5
Clearwater, Minnesota	900.5 – 909.3	8.8
Total		136.0

[a] The total crossing length differs from the sum of each county crossing due to rounding.

Enbridge proposes to begin construction of the project in mid-2008. Construction would occur over approximately 6 months, with an in-service date on or before December 31, 2008.

2.1.1 Land Requirements

Table 2.1.1-1 summarizes the overall land requirements for the proposed LSr Project.

TABLE 2.1.1-1

Summary of Land Requirements for Construction of the LSr Project [a]

Facility	Dimensions	Area Affected (acres)
Pipeline Facilities		
Temporary Construction right-of-way [b]	100 feet in uplands, 75 feet in wetlands and at wooded waterbody crossings	1,676.9
New Permanent right-of-way	35 feet	574.2
Ancillary Facilities [c]		
Access Roads	Variable	To Be Determined
Pipeyards	Variable	46 acres
Contractor Yards	Variable	To Be Determined

[a] Aboveground facilities associated with this project would be constructed entirely within existing Enbridge facilities.
[b] Temporary construction right-of-way acreages include temporary extra workspaces.
[c] Access roads associated with the LSr Project are not known at this time. See sections 2.1.1.3 and 2.1.1.4.

2.1.1.1 Pipeline Right-of-Way

Construction of the proposed pipeline would generally require a 100-foot-wide construction right-of-way to allow for temporary storage of topsoil and spoil and to accommodate safe operation of construction equipment (see figure 2.1.1-1). The spoil side (i.e., topsoil and ditch spoil stockpile area) would typically be 25 feet wide and generally located partially within the existing maintained right-of-way. The working side (i.e., equipment work area and travel lane) would typically be 75 feet wide and generally located outside the existing maintained right-of-way. Following construction, Enbridge would generally maintain an additional 35-foot-wide permanent right-of-way for operation of the pipeline.

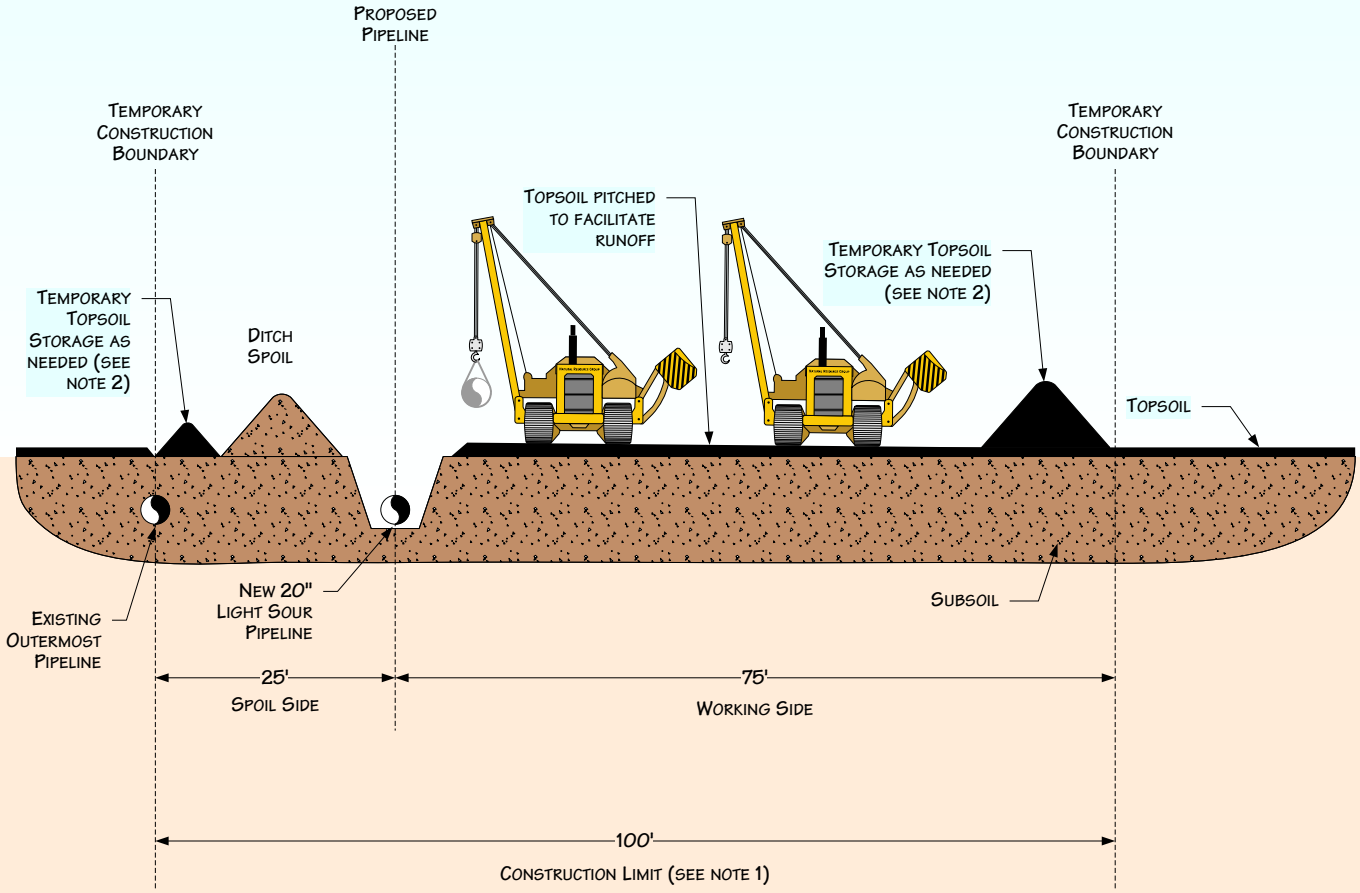
The LSr Project pipeline would be collocated along existing Enbridge right-of-way for the majority of its length. A total of 1.8 miles of new right-of-way would be needed for construction to accommodate minor route variations. Ownership of land crossed by the LSr Project pipeline route is identified in table 2.1.1-2.

TABLE 2.1.1-2

Ownership of Lands Crossed by the LSr Project Pipeline Route

Land Type/Location	Crossing Length (miles)	Percentage of Route
Federal lands	0.0	0
State Lands	0.0	0
County Lands	0.3	<1
Incorporated Areas:		
Plummer	2.0	1
Oklee	0.7	<1
Trail	0.8	<1
Private Land Outside Incorporated Areas	132.2	97
Total	136.0	100

[a] The total crossing length differs from the sum of each land type crossing due to rounding.



Profile

Notes:

1. Construction Limits will typically be 100' wide. Spoil side will be approximately 25' wide.
2. This drawing reflects "Ditch Plus Spoil" side topsoil stripping procedure. Stockpile topsoil separately from ditch spoil shown or in other configuration approved by company.
3. The offset from outermost existing pipeline will be 25' for most locations but may be increased or decreased depending on the site specific construction requirements.

For environmental review purposes only.

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Figure 2.1.1-1
Typical Construction Right-of-Way

DATE:	7/9/2001
REVISED:	03/13/07
SCALE:	NTS
DRAWN BY:	KMKENDALL

Natural Resource Group, Inc.

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2.1.1.2 Additional Temporary Extra Workspace Areas

Additional temporary extra workspace areas are anticipated to be needed at other locations where the project would cross features such as waterbodies, roads, railroads, foreign pipelines and utilities, HDD sites, and other special circumstances. These temporary extra workspaces are construction areas that are needed outside of the typical construction right-of-way to stage equipment and stockpile spoil material. Schematics showing the general locations and dimensions of the temporary extra workspaces are provided in Appendix C. Table 2.1.1-3 lists the typical dimensions of temporary extra workspaces that would be used for pipeline construction.

TABLE 2.1.1-3

Typical Dimensions of Temporary Extra Workspaces for the LSr Project

Feature	Dimensions On Each Side of Feature [a]
Open-cut Road Crossings	100 feet X 75 feet and 50 feet X 100 feet
Bored Road and Railroad Crossings	100 feet X 75 feet and 100 feet X 75 feet
Foreign Pipeline and Utility Crossings	100 feet X 75 feet and 100 feet X 75 feet
Pipeline Cross Unders	300 feet X 75 feet
Waterbody Crossings >50 feet wide	300 feet X 75 feet
Waterbody Crossings <50 feet wide	200 feet X 75 feet
Horizontal Directionally Drilled Waterbody Crossings	200 feet X 75 feet and 300 feet X 75 feet
Wetland Crossings	200 feet X 75 feet

[a] Areas are in addition to the 100-foot-wide construction right-of-way.

2.1.1.3 Pipe Storage and Contractor Yards

During construction, Enbridge would temporarily use off-right-of-way areas for pipe and materials storage. In addition, construction contractors would require off-right-of-way areas to park equipment and stage construction activities. Additional yards would require landowner permission and environmental clearances prior to use.

TABLE 2.1.1-4

Pipe Storage and Contractor Yards for the LSr Project

Yard	Use	Location	Acreage
Kennedy	Pipe Storage/Contractor	0.5 mile north from Kennedy, MN	13.4
Viking	Pipe Storage/Contractor	0.1 mile south from Viking, MN	15.0
Trail	Pipe Storage/Contractor	Directly north from Trail, MN	18.0

2.1.1.4 Access Roads

Approximately 43 access roads used for previous Enbridge pipeline expansion projects have been identified for use on the LSr Project. Public roads would typically be used to gain access to the construction right-of-way. In areas where public roads are limited, existing privately owned roads may be used to provide access to the construction right-of-way. Use of private access roads and modifications to existing non-private roads would require obtaining landowner/jurisdictional agency permission and completion of environmental surveys prior to use. Although the general setting of the project is rural in nature, sufficient road infrastructure exists so that no new access roads would likely need to be constructed for the LSr Project.

2.1.1.5 Aboveground Facilities

Aboveground facilities associated with the LSr Project would involve modifying existing pump station service to accommodate the new pipeline. New aboveground facilities include one pig receiver at the Clearbrook terminal and mainline valves (see table 2.1.1-5). Existing pumping facilities would be used at two Enbridge station sites; one near Donaldson, Minnesota and the other near Plummer, Minnesota. At both sites, three existing pump units each have a maximum 2,000 horsepower rating sufficient to provide service for the LSr Project. The valves to be installed would be 20-inch ANSI 600, weld end by weld end, full port, rising stem gate valves. These valves would be manufactured in accordance with API Standard 6D "API Specification for Steel, Gate, Plug, Ball and Check Valves for Pipeline Service." The maximum allowable operating pressure of the valve would be 1,440 pounds per square inch gauge (psig). When not located at pump stations, mainline valves would be constructed within a fenced area approximately 50-feet by 50-feet area centered on the permanently maintained right-of-way.

Aboveground facilities associated with the LSr Project would be located either within existing Enbridge facilities or near road crossings in actively cultivated agricultural lands. Table 2.1.1-5 lists aboveground facilities associated with the LSr Project.

TABLE 2.1.1-5

Aboveground Facilities Associated with the LSr Project

County, State	Facility	Milepost
Pembina, North Dakota	Pembina R. – Mainline Valve	776.1
	Red River North – Mainline Valve	801.1
Kittson, Minnesota	Red River South - Mainline Valve	805.6
	Donaldson Pump Station – New Pump and Mainline Valve	814.1
	Tamarack R. – Mainline Valve	829.4
Marshall, Minnesota	Middle River – Mainline Valve	836.5
	Viking Station – Mainline Valve	848.2
Pennington, Minnesota	Red Lake River North – Mainline Valve	864.0
	Red Lake River South – Mainline Valve	865.1
Red Lake, Minnesota	Clearwater River – Mainline Valve	875.0
	Plummer Pump Station – New Pump and Mainline Valve	877.1
Polk, Minnesota	Oklee/Lost River – Mainline Valve	888.0
Clearwater, Minnesota	Clearbrook Terminal – Mainline Valve and Receiver	909.5

2.1.1.6 Right-of-Way Acquisition Process

The LSr Project would be constructed within or adjacent to Enbridge's existing right-of-way between the United States-Canadian border near Neche, North Dakota and Clearbrook, Minnesota. Construction of the proposed pipeline would generally require a 100-foot-wide construction right-of-way to allow temporary storage of topsoil and spoil and to accommodate safe operation of construction equipment. The spoil side (i.e., topsoil and ditch spoil stockpile area) would typically be 25 feet wide and generally located within the existing maintained right-of-way. The working side (i.e., equipment work area and travel lane) would typically be 75 feet wide and generally located outside the existing maintained right-of-way. Following construction, up to 50 feet of permanent right-of-way in addition to the existing permanent right-of-way would be maintained for operation of the pipeline.

Enbridge would seek to acquire any additional right-of-way for the LSr Project by negotiating easements with landowners along the pipeline route. Enbridge would negotiate permanent easements that

would grant the company the right to construct, operate, and maintain the pipeline in the permanent right-of-way. Enbridge would also negotiate temporary easement for additional workspace needed to construct the pipeline. Landowners would receive monetary compensation in return for granting easements, including compensation for temporary loss of use during construction, crop damages, and the restoration of unavoidable damage to property during construction. If an easement cannot be negotiated with the landowner, Enbridge may acquire easements needed for pipeline construction under state eminent domain laws. State statutes define the prerequisites to utilizing eminent domain and set forth the eminent domain process in each state.

2.1.2 Construction Procedures

Enbridge plans to construct the LSr Project pipeline during the summer of 2008. The project would require approximately 350 construction personnel plus about 100 personnel providing inspection services and construction management.

A schematic depicting a typical pipeline construction sequence is provided on figure 2.1.2-1. Construction associated with aboveground facilities (i.e., mainline valves, station modifications) involves pipe reconfigurations and installation of equipment. The typical construction sequence is described below. Specialized construction techniques (e.g., waterbody crossings) are discussed in section 2.1.3.

Throughout all phases of construction, Enbridge would employ full-time, professional environmental inspection personnel. Qualified environmental inspectors would have appropriate educational credentials, demonstrated experience on pipeline construction projects including compliance oversight with environmental permit conditions, and the ability to communicate effectively with construction contractor personnel, landowners, agency compliance monitors, and agency personnel. Environmental inspectors would become familiar will all environmental requirements for the project and would conduct environmental training for all construction personnel. The roles and responsibilities of the environmental inspectors are described in the LSr Project Construction Environmental Control Plan (CECP) in Appendix J.

Enbridge has committed to fund third-party agency compliance monitors during the LSr Project. The AMP created in cooperation with the MDA provides for an Agricultural Monitor and Agricultural Inspectors with responsibilities covering pipeline construction in agricultural lands in Minnesota. In addition, Enbridge proposes to provide funds for a MDNR Monitor who would monitor compliance with environmental requirements set forth by MDNR permits issued for the project. Although funded by Enbridge, the activities of the third-party compliance monitors would be directed by MDA and MDNR (or as otherwise arranged between the stakeholder agencies). In general, the compliance monitors would serve in an auditing capacity and work closely with Enbridge's environmental inspectors to verify that construction activities are implemented correctly and are effective in minimizing impacts on protected resources. Enbridge would provide resumes of qualified compliance monitor candidates to MDNR who would have the option of selecting personnel.

Enbridge's CECP outlines the organizational structure of construction management, including lines of authority and communication between Enbridge, construction contractor personnel, environmental inspectors and third-party agency compliance monitors. Enbridge would coordinate with MDA and MDNR and other agencies to further define the roles and responsibilities of the compliance monitors.

1. Survey and Staking
2. Clearing
3. Front-End Grading
4. ROW Topsoil Stripping
5. Restaking Centerline of Trench
6. Stringing Pipe
7. Field Bending Pipe
8. Line-Up, Initial Weld
9. Fill & Cap, Final Weld
10. As-Built Footage
11. X-Ray Inspection, Weld Repair
12. Coating Field Welds
13a. Trenching (wheel ditcher)
13b. Trenching (backhoe)
13c. Trenching (rock)
14. Inspection & Repair of Coating
15. Lowering Pipe into Trench
16. As-Built Survey
17. Pad, Backfill, Rough Grade
18. Hydrostatic Testing, Final Tie-in
19. Replace Topsoil, Final Clean-Up, Full Restoration

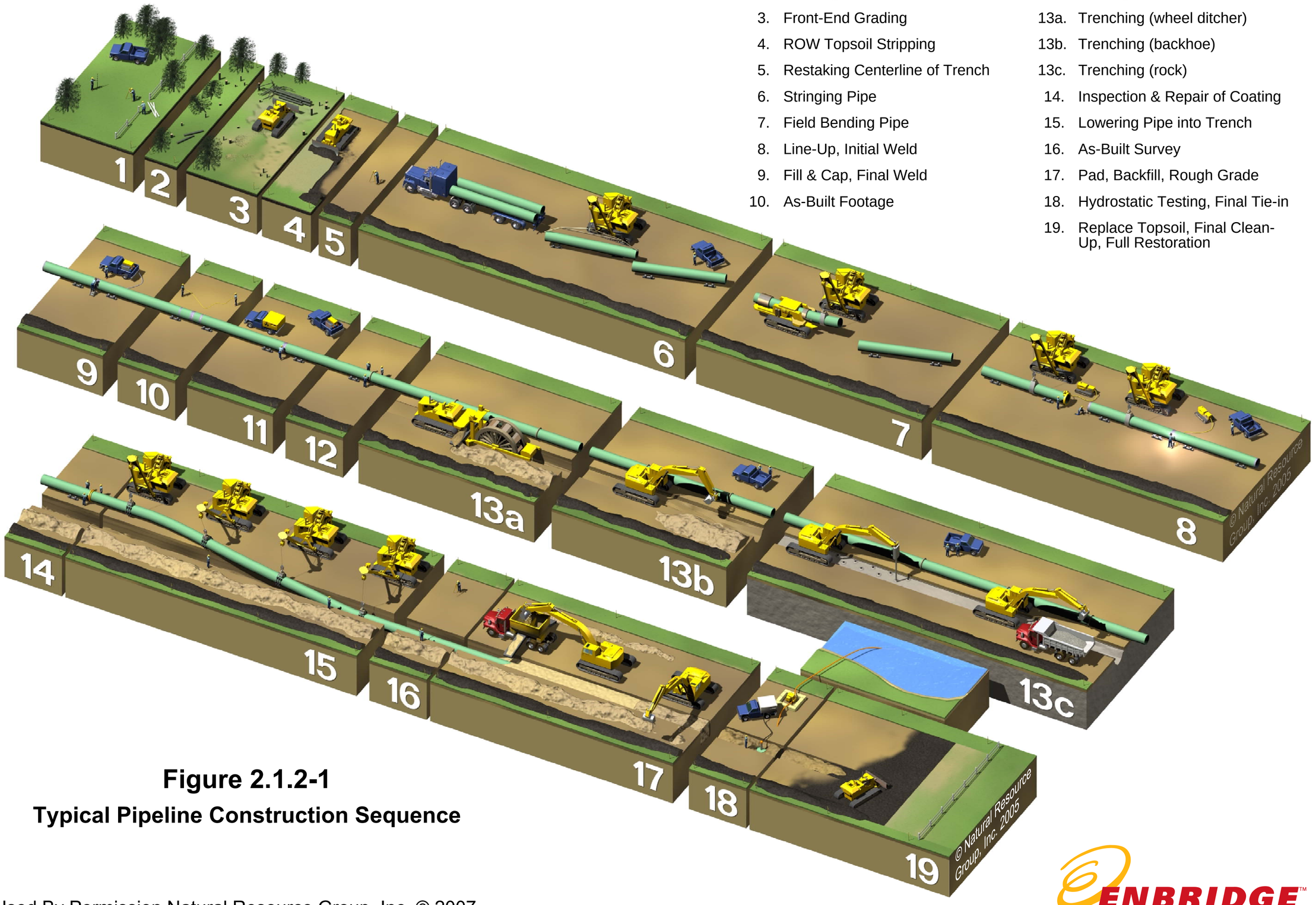

Figure 2.1.2-1

Typical Pipeline Construction Sequence

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Survey and Staking

Before construction, Enbridge crews would survey and stake the centerline and exterior boundaries of the construction right-of-way. The exterior boundary stakes would mark the limit of approved disturbance areas which would be maintained throughout the construction period. The applicable state One Call system would be contacted to identify and mark the locations of underground utilities. During this period, equipment involved in pipeline construction would be moved onto the right-of-way using existing roads for access wherever practicable. Enbridge would mark the boundaries of wetlands that would be disturbed by construction at a location on each side of the right-of-way that will remain in place throughout construction, to facilitate post-construction wetland restoration and monitoring.

Clearing and Grading

In upland areas, Enbridge would clear the 100-foot-wide construction right-of-way and temporary extra workspaces of shrubs and trees. The clearing crew would typically mow, chip, mulch and/or haul off all non-merchantable timber. Burning of non-merchantable wood may be allowed when the contractor has the necessary permits and approvals. All timber would be property of the company unless prior arrangements have been made with the landowner.

For waterbody crossings other than those employing the HDD crossing technique, Enbridge would leave a 20-foot buffer (from the waterbody bank) of undisturbed vegetation on all stream banks until 24 hours before the crossing is to be initiated, except where grading is needed for bridge installation. Enbridge would properly install and maintain sediment control measures at this buffer to streams immediately after clearing and prior to initial ground disturbance. In all wetlands and at all forested waterbody crossings, the construction right-of-way width would be necked down from the typical upland width of 100 feet to 75 feet. See section 2.1.3.3 regarding construction techniques at waterbody and wetland crossings.

Following clearing, grading of the ground surface may be done to provide a relatively smooth working surface and a safe working area. Temporary bridges may be installed at waterbodies, except for drainage ditches, intermittent waterbodies, and other non-fisheries water, along the pipeline route to provide temporary access for equipment traveling along the construction right-of-way. In addition, temporary erosion control measures would be installed in accordance with Enbridge's Environmental Mitigation Plan (EMP) (see Appendix D).

Erosion Controls

Temporary and permanent erosion and sedimentation control measures are discussed in the EMP (see Appendix D). Specifications for the need and installation of such measures, including silt fence, staked straw bales, temporary and permanent slope breakers, trench breakers, and application rates and criteria for temporary and permanent seeding and soil amendments are further described in the CECP developed for this project (see Appendix J).

Topsoil Stripping

Topsoil would be stripped and segregated in agricultural areas, cropland, hayfields, pasture, and other areas along the pipeline route in accordance with Enbridge's AMP (see Appendix B) and in consultation with the landowner. The maximum depth of topsoil stripping would be 12 inches in North Dakota and east of the Red River Valley. In these locations topsoil would be stripped from ditch-plus spoil locations. Within the Red River Valley a maximum of 18 inches (or as otherwise agreed to with

MDA) of topsoil would be stripped directly over the trench. In other areas, a maximum of 12 inches of surficial soils would be stripped from directly over the trench, in accordance with the EMP and CECP.

Stringing and Bending

Before excavating pipeline trenches, individual joints of pipe would be strung along the construction right-of-way and arranged to be accessible to construction personnel. This operation typically involves specially designed stringing trucks to deliver pipe from pipe yards to the right-of-way. Prior to trenching operations and in order to minimize soil compaction, stringing trucks would travel along an alignment which corresponds closely to the pipeline centerline, in accordance with the AMP (see Appendix B). Small portable cranes and/or side-boom tractors are used to unload the stringing trucks and place pipe along the right-of-way. A mechanical pipe-bending machine would bend individual joints of pipe to the desired angle to accommodate natural ground contours or pipeline alignment. In certain areas, prefabricated fittings would be used where field bending is not practicable.

Welding and Coating

After stringing and bending are complete, pipe sections would be aligned, welded together, and placed on temporary supports along the edge of the trench. Enbridge would inspect the welds, both visually and radiographically. The pipe is typically delivered with a factory coating of fusion-bonded epoxy or similar material to prevent corrosion. Enbridge would apply coating at welded joints and would electronically inspect the pipeline coating before the pipe is lowered into the trench.

Trenching

Backhoes and/or ditching machines would be used to excavate trenches in accordance with the DOT, which stipulates a minimum 30 inches of cover for normal excavations and 18 to 30 inches of cover in rocky areas. The trench walls would generally be kept vertical to the extent practicable and the trenches would typically be 3 feet wide at the base of the trench. In unstable and saturated soils, trenches may be wider, up to 10 feet wide. Enbridge would limit the amount of excavated open trench to two days of anticipated welding production or 14,000 feet. It is common practice to allow an equivalent length of open trench equal to one day of welding production ahead and one day behind the welding operation. The welding production is anticipated to be 7,000 feet per day. This limitation would mitigate against unfortunate weather events as runoff water would not accumulate to such an extent in the trench causing significant erosion.

Where trench dewatering is needed, water would be discharged directly to the ground if there is adequate vegetation along the right-of-way to filter the water effectively. Where vegetation is sparse or absent, or in environmentally sensitive areas (e.g., adjacent to waterbodies or wetlands), straw bale dewatering structures or suitable filtering alternatives would be used to minimize siltation in adjacent waterbodies.

Lowering-in and Backfilling

After welding and coating are completed and the trench is excavated, the pipe would be lowered into the trench by side-boom tractors. Bladed equipment or a specially designed backfilling machine would be used to backfill the trench to the approximate ground surface elevation. This generally consists of replacing the material excavated from the trench. In areas where topsoil has been segregated, subsoil would be replaced first, and topsoil would be spread uniformly on top. Directly above the pipeline, an excess of soil or “crown” would be placed to allow for future settling. Construction debris, including wooden supports, welding rods, containers, brush, trees, or refuse of any kind, would not be permitted in

the backfill. If an excessive amount of rocks are present in the backfill, the pipeline would be protected with rock shielding or similar protective coating and/or backfilled with clean padding prior to backfilling with the rocky material.

Hydrostatic Testing

After backfilling, Enbridge would hydrostatically test the pipelines in accordance with regulations of the OPS within the DOT's PHMSA to ensure that the system is capable of operating at the design pressure. The testing process would involve filling a segment of the pipeline with water and maintaining a prescribed pressure for a specified amount of time.

The length of individual test segments would be determined by topography and water availability. The location and number of test sections depend upon the point source of water along the pipeline route as well as elevation factors. Hydrostatic test sections, location of water sources and discharges, and volumes of water to be appropriated for testing are depicted in table 2.1-2. Hydrostatic testing activities would be done in accordance with state authorizations required to obtain hydrostatic testing water and for the disposal of this water. Permits would be obtained from the MDNR and the North Dakota State Water Commission for appropriations. Adequate flow would be maintained in surface water sources to protect aquatic life and allow for downstream uses. Water appropriation rates would vary from 1,200 to 4,000 gallons per minute (gpm), dependent upon local flow conditions. The test water would be discharged through energy dissipation devices to the ground surface in well vegetated upland areas or to a nearby waterbody. Permits to discharge test water would be obtained from the MPCA, and the NDDH – Division of Water Quality. Hydrostatic testing would be conducted starting in June 2008 through October 2008 as test sections are constructed.

TABLE 2.1-2

Hydrostatic Test Sections for the LSr Project

Test Section	Milepost	Length (miles)	Volume (gallons)	Source/Discharge
Pembina River Horizontal Directional Drill (HDD)	775.5	0.3	24,000	Pembina River
I-29 / Burlington Northern HDD	795.0	0.3	24,000	Red River (source); discharge to ground
Test 1 – Spread 1	773.7 - 802.4	28.7	2,374,000	Red River
Red River HDD	801.7	0.3	24,000	Red River
Test 2 – Spread 1	802.4 - 829.5	27.1	2,220,000	Red River
U.S. 75 / Burlington Northern HDD	817.0	0.2	19,000	Tamarac River
Tamarac River HDD	828.8	0.2	16,000	Tamarac River
Middle River HDD	835.9	0.3	21,000	Middle River
Test 3 – Spread 1	829.5 - 848.2	18.7	1,530,000	Tamarac or Middle River
Test 4 – Spread 1	848.2 - 875.5	27.3	2,300,000	Clearwater River
Red Lake River HDD	864.3	0.6	45,600	Red Lake River
Test 5 – Spread 1	875.5 - 909.3	33.8	2,800,000	Clearwater or Lost River
Total		137.8	11,397,600	

Cleanup

After the backfilling is completed, Enbridge would grade and restore work areas as nearly as practicable to the original contour of the land. Topsoil would be redistributed over areas from which it was originally removed. Permanent soil stabilization efforts would primarily include revegetation of the

right-of-way. Fences that are removed to install the pipelines would be reconstructed across the right-of-way. Throughout construction, all waste and construction debris would be collected and disposed of at licensed disposal facilities.

Restoration and Revegetation

Following installation and final cleanup, original grade and contours would be restored to the extent practicable and permanent erosion controls would be installed. Disturbed areas would be revegetated in accordance with Enbridge's CECP (see Appendix J), other permit requirements, and site-specific landowner requests.

Enbridge proposes to perform full right-of-way restoration of the LSr Project work area as if no further construction is anticipated. Restoration would occur in a continuous fashion as pipeline construction is completed. By so doing, the need for special mitigation measures (e.g., erosion control, stream bank stabilization) directly related to two different pipelines would be minimized or avoided. Enbridge would ensure that stabilization (erosion control and revegetation measures) of areas disturbed during LSr construction, including areas that could be redisturbed by subsequent Alberta Clipper construction (if approved), would be monitored and corrective measures would be taken as needed until construction of the Alberta Clipper project commences. For areas affected by LSr construction outside of the Alberta Clipper project construction footprint, Enbridge would continue to monitor restoration progress during successive growing seasons and implement additional corrective measures as needed.

2.1.3 Special Construction Procedures

In addition to standard pipeline construction methods, Enbridge would use special construction techniques where warranted by site-specific conditions. These special techniques would be used when constructing across paved roads, highways, railroads, steep terrain, waterbodies, wetlands, and when blasting through rock. These special techniques are described below.

2.1.3.1 Road, Highway, and Railroad Crossings

Enbridge would typically construct the pipeline across paved roadways and railroads using road-boring equipment. This equipment installs the pipeline beneath the transportation corridor, thereby avoiding disruptions to vehicular or railcar movement and physical impacts on road/railroad beds. Unpaved roadways would be crossed by boring or by using the open-cut method. The latter method could temporarily disrupt road traffic as the pipe trench is excavated across the roadway. To minimize traffic delays at open-cut crossings, Enbridge would establish traffic detours before excavating the roadbed. If no reasonable detours are feasible, at least one traffic lane of the road would be maintained, except for brief periods when road closure is essential to install the pipeline. Enbridge would minimize the duration of open-cut crossings and in most cases would complete these road crossings in one day or less. Enbridge would notify local authorities prior to road closures. Additionally, Enbridge would attempt to avoid closing roads during peak traffic hours.

2.1.3.2 Steep Terrain

Additional grading may be required in areas where the proposed pipeline route would cross steep slopes. Steep slopes often need to be graded to create a gentler slope for safe operation of construction equipment and to accommodate pipe-bending limitations. In such areas, the slopes would be excavated prior to pipeline installation and reconstructed to their original contours during restoration.

In areas where the proposed pipeline route would cross laterally along the side of a slope, cut and fill grading may be required to obtain a safe, flat work terrace. Topsoil would be stripped from the entire right-of-way and stockpiled prior to cut and fill grading on steep terrain. Generally, on steep side-slopes, soil from the high side of the right-of-way would be excavated and moved to the low side of the right-of-way to create the level work terrace. After the pipeline is installed, the soil from the low side of the right-of-way would be returned to the high side and the slope's original contours would be restored. Topsoil from the stockpile would be spread over the surface, erosion control features installed, and seeding implemented.

In steep terrain, temporary sediment barriers such as silt fence and straw bales would be installed during clearing to prevent the movement of disturbed soil into wetlands, waterbodies, or other environmentally sensitive areas. Temporary slope breakers consisting of mounded and compacted soil would be installed across the right-of-way during grading and permanent slope breakers would be installed during restoration. Following construction, seed would be applied to steep slopes and the right-of-way would be mulched with hay or non-brittle straw or covered with erosion control fabric. Sediment barriers would be maintained across the right-of-way until permanent vegetation is established.

2.1.3.3 Waterbody Crossings

Enbridge is planning to install the pipeline under most waterbodies using the open-cut method; however, a dry crossing method, such as the dam-and-pump or flume method, may be used where warranted by site conditions, stream type, and/or presence of sensitive species. Enbridge is proposing to use the HDD method at six waterbody crossings (the Pembina, Red, Red Lake, Tamarac, and Middle Rivers, and an unnamed waterbody at MP 817.0 in Marshall County, Minnesota). During the construction of the LSr Project, 17 perennial, 51 intermittent, and 19 other waterbody crossings (e.g., canals, ditches) would occur. Waterbodies affected by the LSr Project are discussed in further detail in section 3.4.1.

Clearing and Grading

Enbridge would clear existing vegetation from the construction right-of-way as necessary to prepare for grading operations. A 20-foot buffer of undisturbed vegetation would be maintained on stream banks until 24 hours prior to trenching at the stream crossing. Woody vegetation within this buffer may be cut manually and removed during clearing. Additionally, some limited grading at stream banks may be necessary to install temporary bridges across waterbodies. Removal of woody vegetation at river banks will only occur where an open-cut or dam and pump methodology is used. Typically, the removal of woody vegetation along the bank itself is reduced to the minimum width as possible to only allow for the trench and one travel lane to allow equipment to cross. For HDD crossings, no clearing of woody vegetation would occur between the drill sites and water's edge on both sides of the crossings. Grading would be directed away from the waterbody to reduce the potential for material to enter the waterbody. Spoil containment devices such as silt fence and/or straw bales would be installed and set back from the waterbody bank to minimize the potential for sediment to flow off the construction right-of-way and back into the waterbody.

Prior to trenching, Enbridge may need to grade approaches to waterbodies to create a safe working surface and to allow for limitations on pipe bending. Temporary erosion control measures (e.g., silt fences, straw bales) would be installed as necessary to minimize the potential for disturbed soils to enter the waterbody from the right-of-way (see the EMP and CECP in Appendices D and J, respectively). Extra workspaces at waterbody crossings would typically be set back 50 feet from the water's edge where topographic and other site conditions permit. Nearby workspace is necessary to facilitate waterbody crossings to allow them to be completed safely and quickly. A significant reduction in workspace or in

the setback distance resulting in an increased relay distance of material back away from a crossing can ultimately result in additional or different impacts on the resource.

Excavated material would be stored in the nearest extra workspace. These workspaces have been designed and located to minimize additional tree removal/clearing along riparian corridors. Spoil containment devices such as silt fence and/or straw bales would be installed and set back from the waterbody bank to minimize the potential for sediment to migrate off the construction right-of-way and back into the waterbody.

Temporary Equipment Bridges

To allow the passage of equipment along the construction right-of-way, temporary bridges would be installed across waterbodies with the possible exception of waterbodies that are too wide to bridge and minor waterbodies that are not a state-designated fishery, such as agricultural and intermittent drainage ditches. Equipment bridges would generally be installed during the clearing and grading phase of construction. Construction equipment, with the exception of clearing/bridge installation equipment, would be required to use the bridge to cross over the waterbody. The clearing equipment must typically cross the waterbodies prior to bridge installation. Care would be taken to minimize bed and bank disturbance during bridge installation.

Equipment bridges would consist of one of the following: clean rock placed over flume pipes; prefabricated construction mats placed over the waterbody with or without a culvert; or flexi-float or other temporary bridging. Equipment bridges would be designed to pass the maximum foreseeable flow of the stream, and would be maintained to prevent flow restriction while the bridge is in place. Bridges would be cleaned as necessary to minimize loose soil from equipment entering the stream. Bridges would be removed during final cleanup of the right-of-way.

Trenching and Installation

After the initial clearing and grading is completed, the pipeline would be installed across the waterbodies using one of these four methods: open-cut, dam-and-pump, flume, or HDD (see figures in the EMP provided in Appendix D). These methods are described below.

Open-cut Method

The open-cut method (also known as the “wet trench” method) is a waterbody crossing technique that often minimizes total duration of in-stream disturbance. This method would involve excavating the trench through the waterbody or ditch using draglines or backhoes operating from the stream banks. Spoil excavated from the waterbody bed or banks would be temporarily placed on the right-of-way at least 10 feet from the water’s edge or in extra workspaces typically set back 50 feet from the water’s edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. Spoil containment devices such as silt fences and/or straw bales would be installed to contain the spoil and to minimize the potential for sediment to migrate off of the construction right-of-way and back into the waterbody.

During excavation of the in-stream trench, earthen “trench plugs” would be left at each end of the excavation to isolate the in-stream trench segment from the adjacent pipeline trench and to prevent the stream flow from entering the adjacent excavated pipeline trench. When the trench through the waterbody is excavated to the appropriate depth, the trench plugs would be removed and a prefabricated section of pipe would be positioned and lowered into the trench. The trench then would be backfilled and the pipeline ends would be tied into the adjacent pipeline segments.

Enbridge would attempt to complete in-stream trenching and backfilling within 24 hours for minor waterbodies (less than 10 feet wide) and within 48 hours for waterbodies greater than 10 feet wide but less than 100 feet wide. Site-specific crossing conditions, permit requirements, or weather conditions may extend the completion of crossings beyond these time frames.

Dam-and-Pump Method

The dam-and-pump method is a dry crossing method used for sensitive waterbodies with low gradients and flow or sensitive waterbodies with meandering channels. This method involves constructing temporary dams, generally consisting of sandbags, plastic sheeting, and/or steel bulkheads, across the waterbody upstream and downstream of the crossing prior to excavation. Pumps would be used to transport the stream flow around the construction area. Screens would be installed at pump intakes to limit the entrainment of aquatic life and intakes would be positioned in the stream to prevent bottom scouring. Pumping activities would commence simultaneously with dam construction to prevent interruption of downstream flow. The downstream discharge would be directed into an energy-dissipation device (e.g., splash pup, concrete weight, or equivalent) where required to prevent scouring of the waterbody bed or adjacent banks. The pump capacity would be greater than the anticipated flow of the waterbody being crossed. The pumping operation would be staffed continually and pumping would be monitored and adjusted as necessary to maintain the flow of water downstream and prevent excessive drawdown of the waterbody, upstream of the construction area. Additionally, a backup pump or pumps would be onsite in the event that the primary pump(s) fails.

Once the dams and pumps have routed the stream flow around the construction area, the water from the area between the dams would be pumped into a straw bale structure or similar dewatering device. Dewatering structures would be located in well-vegetated upland areas, if present, and would be designed in a manner to prevent the flow of heavily silt-laden water into waterbodies or wetlands. Backhoes working from one or both waterbody banks, or within the isolated waterbody bed, would excavate the trench across the waterbody to the appropriate depth. Spoil would be temporarily stockpiled on the construction right-of-way at least 10 feet from the water's edge and/or in temporary extra workspaces at least 50 feet from the water's edge and contained by silt fence and/or staked straw bales.

After the trench is excavated to the proper depth, a prefabricated section of pipe would be positioned and lowered into the trench. The trench then would be backfilled with the material excavated from the stream, unless otherwise specified in federal or state stream crossing permits. The bottom contours of the streambed and the stream banks would be restored as near as practicable to preconstruction condition prior to removing the dams and restoring the stream flow. Water that accumulated in the construction area would be pumped into a straw bale structure or similar dewatering device prior to backfilling and/or removal of the dams.

Flume Method

The flume method is a dry crossing method used for sensitive, relatively narrow waterbodies free of large rocks and bedrock at the trench line and that have a relatively straight channel across the construction right-of-way. The flume method generally is not appropriate for wide, deep, or heavily flowing waterbodies. This method would involve placing one or more pipes (i.e., flumes) in the waterbody bed to convey stream flow and isolate the construction area. The capacity of the flume(s) would be sufficient to transport the maximum flows that can be generated seasonally within the waterbody. Flume(s) typically would be 40 to 60 feet in length and would be installed before trenching. Flume pipes would be aligned to prevent impounding of water upstream of the construction area or to cause back-erosion downstream.

The upstream and downstream ends of the flume(s) would be incorporated into dams made of sandbags and plastic sheeting (or equivalent). The upstream dam would be constructed first and would funnel stream flow into the flume(s). The downstream dam would then be constructed to prevent water from flowing back into the area to be trenched. The dams would be monitored and adjusted as necessary to minimize leakage. The flume would remain in place until the portion of the pipeline under the stream is installed, the trench is backfilled, and the stream banks are restored.

Prior to trenching, the area between the dams would typically be dewatered. Then, backhoes located on one or both waterbody banks, or working within the isolated segment of the waterbody bed, would excavate a trench across the waterbody and under the flume(s). Excavated spoil material would be placed on the construction right-of-way and/or in temporary extra workspaces and would be contained by silt fences and/or staked straw bales. Water that accumulates in the construction area would be pumped into a dewatering structure prior to backfilling or removal of the dams.

After the trench is excavated to the proper depth, a prefabricated section of pipe would be positioned and lowered into the trench beneath the flume pipe(s). The trench then would be backfilled with the material excavated from the stream unless otherwise specified in federal or state stream crossing permits. The bottom contours of the streambed and the stream banks would be restored as near as practicable to preconstruction conditions prior to removing the dams and flume pipes and returning the stream flow.

Horizontal Directional Drilling Method

Enbridge would evaluate use of the HDD method at selected waterbody crossings. This method can be used to minimize or avoid impacts on the streambed, banks, and associated riparian vegetation at the waterbody crossing. The feasibility of this method is dependent on subsurface geology and length of the drill path. The HDD method also requires temporary extra workspaces on both sides of the drilled area for materials and equipment associated with the drilling operation and to fabricate the pipeline segment that would be installed under the waterbody.

The HDD method would be accomplished in three general stages. The first stage would consist of drilling a small diameter pilot hole along a pre-determined path under the waterbody. The second stage would involve incrementally enlarging or "reaming" the pilot hole to a diameter that would accommodate the pipeline. The third stage would involve pulling a prefabricated segment of pipeline through the enlarged hole and then welding the pipe segment to the adjoining sections of pipeline.

Throughout the process of drilling and enlarging the pilot hole, a bentonite clay slurry ("drilling mud") would be circulated through the drilling tools to lubricate the drill bit, remove drill cuttings, and stabilize the open hole. Drilling mud would be recycled to the extent practicable, and after the pipeline is installed, the mud would be disposed of according to applicable regulations.

Enbridge conducted geotechnical investigations to evaluate the feasibility of using the HDD method at the selected waterbodies. Geotechnical investigations are necessary because the pipeline route would cross regions with soils that may not be conducive to HDD technology, such as soils containing cobbles, boulders, layers of gravel, and/or non-cohesive sands. These investigations were used to determine whether there could potentially be installation problems using the HDD method at the waterbody crossing. For the Pembina River, soft fat clay soils were encountered during test borings. These soils tend to flow and may lead to borehole collapse during HDD operations. However, previous HDD crossings of this river by Enbridge were successful. Fat clay soils characterize the subsurface setting at the Red River. These soils offer suitable characteristics for successful HDD operations. The soils encountered at the Red Lake River during geotechnical studies varied by depth with and included

layers of cobble which present challenges to conducting HDD operations. Subsurface investigations at the Tamarac River revealed sand/silt layers with the presence of some cobbles underlain by clay. Although the unconsolidated till soils present pose challenges to HDD operations, the conditions at this crossing are likely to support the use of HDD. The Middle River soils were similar to those at the Tamarac River.

An alternate, environmentally acceptable method has been specifically designed for each crossing in the event that the HDD method cannot be completed (see section 3.4.1).

Restoration and Revegetation

The following discussion on restoration and revegetation applies to waterbodies crossed using the open-cut, dam-and-pump, and flume crossing methods. Typically, stream bank and streambed restoration and stream bank revegetation would not be necessary when the stream is crossed using the HDD method.

After the trench is excavated to the proper depth, a prefabricated section of pipe would be lowered into position and the trench would be backfilled with the material excavated from the stream. Backfilling would commence after the pipe is positioned in the trench at the desired depth. Backfill material would consist of the spoil material excavated from the trench unless otherwise specified in federal or state stream crossing permits. The bottom contours of the streambed and the stream banks would be restored as near as practicable to preconstruction contours and condition. Steep stream banks would be re-contoured to a more stable configuration. If there is a potential for significant bank erosion, the disturbed banks would be stabilized with rock riprap or other bank protection measures. Jute thatching or erosion control blankets would be installed on the stream banks upslope of the riprap or on the entire bank if no riprap is used. The banks and adjacent disturbed areas would be seeded in accordance with seeding recommendations and/or permit stipulations, and mulch would be applied as needed on slopes. Stream banks would be stabilized and temporary sediment barriers would be re-installed within 24 hours of completing the crossing (weather and soil conditions permitting) to minimize the potential for sedimentation. Trench breakers would be installed at the stream banks, as needed, where slopes are adjacent to the waterbodies.

Flumes and temporary dams would be removed from the streambed after the crossing has been returned to original grade and the banks have been reconstructed and stabilized with erosion control materials. Temporary erosion control measures would be installed and maintained until permanent erosion control measures are installed and effective. Permanent slope breakers would be installed, where needed, across the full width of the right-of-way during final clean-up.

Where necessary for access, the travel lane portion of the construction right-of-way and the temporary bridge would remain in place until final clean-up activities. Temporary bridges would be removed after final clean-up, seeding, mulching, and other right-of-way restoration activities have been completed. The temporary erosion control measures would be removed after vegetation has been re-established.

The pipe section installed under the stream would be connected (tied-in) to the pipeline. If trench dewatering is necessary during the tie-in process, the water would be pumped into a dewatering device located in a well vegetated area and in a manner to prevent flow of heavily silt laden water into waterbodies or wetlands.

2.1.3.4 Wetland Crossings

For routing and planning purposes, National Wetland Inventory (NWI) data was used to estimate the number, size, and locations of wetlands along the pipeline route. Wetland delineation surveys were subsequently conducted along the pipeline route in the fall of 2006 to more accurately identify the wetlands that would be affected during project construction. Additional wetland surveys were completed in 2007. Wetlands were identified and mapped in general accordance with the Routing Determination method as specified in the *Corps of Engineers Wetland Delineation Manual* (COE, 1987). Wetlands affected by the LSr Project are discussed in section 3.4.3.

Typical pipeline construction in most wetlands would be similar to construction in uplands and would consist of clearing, trenching, dewatering, installation, backfilling, cleanup, and revegetation. However, due to the unstable nature of some wetland soils, construction activities may differ somewhat from standard upland procedures. Construction activities would be minimized in wetlands and/or special construction techniques would be used to minimize the disturbance to vegetation and soils and to maintain wetland hydrology. Where a wetland cannot support construction equipment, construction activities would be accomplished from timber construction mats or by the use of low ground pressure equipment, thus limiting disturbance to the wetland. Typical construction schematics illustrating wetland crossings are provided in the EMP in Appendix D.

Clearing and Grading

Vegetation within wetlands would be cut off at the ground level, leaving existing root systems intact to preserve natural sources of rootstock and to facilitate revegetation of the native wetland species after construction. Stumps would only be removed over the trench line and where necessary for safe operation of equipment. Enbridge would neck down from the typical upland construction right-of-way width of 100 feet to a 75-foot-wide construction right-of-way in all wetlands and at all forested waterbody crossings.

Trees, shrubs, and stumps that are removed would be properly disposed of outside of wetlands. Timber construction mats, if needed, and temporary erosion control measures would be installed at this time. Extra workspaces at wetland crossings would typically be set back 50 feet from the wetland's edge where topographic and other site conditions permit. Spoil containment devices such as silt fence and/or straw bales would be installed and set back from the wetland edge to minimize the potential for sediment to migrate off the construction right-of-way and into the wetland (see figures in the EMP, Appendix D).

Trenching and Installation

The pipeline trench would typically be excavated in wetlands using a backhoe excavator. In unsaturated wetlands up to 1 foot of topsoil would be stripped from the trench line and stockpiled separately from trench spoil.

If the soils in the wetland area are stable and capable of supporting equipment with or without timber construction mats, the pipe would be strung, welded, and lowered into the trench as in upland areas. When water is present in the trench, the trench may be temporarily dewatered and/or the pipe flooded to sink it into the trench.

It may not be feasible to use the construction methods described above for crossing large wetlands with standing water and saturated soils. In these wetlands, the trench would be dug by a backhoe supported on timber mats but it is often not feasible to separate topsoil. The pipe would be assembled in an upland area and floated across the wetland in the excavated trench using the "push-pull"

and/or "float" techniques. When the pipeline is in position, floats, if used, would be removed and the pipeline would be sunk into position and the pipe tied into the upland portion of the pipeline.

After the pipe has been installed, the trench would be backfilled and the original contours would be restored to the extent practical. In areas where the topsoil has been segregated, the topsoil would be replaced after backfilling to facilitate the natural revegetation process. Any excess backfill material would be removed to an upland area.

Cleanup and Revegetation

Cleanup and rough grading would begin as soon as practical after the trench is backfilled. Timber mats, if used, would be removed during the cleanup operations. Disturbed wetland areas would be revegetated with a cover crop in accordance with COE and MDNR recommendations, unless standing water is prevalent or as otherwise directly by landowners or regulatory agencies. No fertilizer, lime, or mulch would be applied in wetlands.

2.1.3.5 Blasting

Blasting may be required if bedrock is encountered within the depth of the trench. However, the likelihood of blasting is low, as none of the proposed pipeline route would cross areas with shallow bedrock. If blasting is required, Enbridge would conduct these activities in accordance with applicable regulations.

Blasting to install the pipeline in a bedrock aquifer has the potential to adversely affect water quality and water yields in nearby water wells. However, as indicated previously, no areas of shallow bedrock have been identified within the project area, therefore blasting is not anticipated to be necessary as part of this project.

2.1.3.6 Residential Construction

Enbridge reviewed 2005 aerial photography to identify areas containing residences within 50 feet of the construction right-of-way. Based on examination of aerial photographs, there are approximately 74 residences within 500 feet, of which three residences are within 50 feet of the proposed construction work area. Many of these residences and most of the residential land are located along the eastern portions of the pipeline route. Prior to construction, Enbridge would verify the proximity of buildings to the pipeline and determine if the structures are occupied residences. Enbridge would develop site specific construction plans to address construction near residential and commercial structures. Such measures may include routing the pipeline away from structures, narrowing the construction right-of-way near residences and other structures, and limiting the hours of operation during construction near occupied structures.

2.1.3.7 Fences and Grazing

Fences would be crossed or paralleled during construction of the LSr Project. Before cutting any fences for pipeline construction, each fence would be braced and secured to prevent slacking of the fence. To prevent the passage of livestock, each fence line opening would be temporarily closed when construction crews leave the area. If gaps in natural barriers used for livestock control are created by pipeline construction, the gaps would be fenced according to the landowner's requirements. All existing improvements, such as fences, gates, irrigation ditches, cattle guards, and reservoirs would be maintained during construction and repaired to pre-construction conditions or better.

2.1.4 Operation and Maintenance

Enbridge would operate and maintain the project facilities in accordance with DOT regulations in 49 C.F.R Parts 194 and 195 and other applicable federal and state regulations.

During normal operations and routine maintenance, the pipeline would be inspected periodically from the air and on foot as operating conditions permit but no less frequently than as required by 49 C.F.R Part 195. These surveillance activities would provide information on possible encroachments and nearby construction activities, erosion, exposed pipe, and other potential concerns that may affect the safety and operation of the pipeline.

In order to maintain accessibility of the right-of-way and to accommodate pipeline integrity surveys, woody vegetation along the pipeline right-of-way periodically would be cleared over the pipeline. Cultivated croplands (such as wheat and corn) would be allowed to grow in the permanent right-of-way. Large trees would be removed from the permanent right-of-way. Enbridge would use mechanical mowing or cutting along its right-of-way for normal vegetation maintenance.

2.1.5 Future Plans and Abandonment

The LSr Project pipeline would initially be capable of transporting 186,000 bpd on an annual average. The ultimate capacity of the pipeline is designed to transport approximately 300,000 bpd. To achieve this capacity, additional pumping horsepower would need to be installed. Although Enbridge does not currently plan to expand the LSr Project pipeline beyond the initial capacity, future customer need could drive future expansion and additional pumping would need to be installed at existing pump stations. There are no plans at this time to expand the pipeline's capacity beyond 186,000 bpd.

Enbridge is currently planning to convert its existing 18-inch-diameter liquid petroleum pipeline, designated as Line 13, by reversing the flow along 136 miles between Clearbrook, Minnesota, and the Canadian border near Neche, North Dakota. This pipeline would remain in liquid petroleum service but would be converted to export service with light petroleum hydrocarbons into Canada. Minimal environmental impact would result from the reversal of pump units, which would take place within existing fenced station facilities.

Additionally, Enbridge is planning to construct, own, and operate a new 325-mile-long, 36-inch-diameter crude oil pipeline, commercially known as the Alberta Clipper. The pipeline would originate in Alberta and terminate at Enbridge's existing tank farm located in Superior, Wisconsin. Alberta Clipper would be constructed generally within or immediately adjacent to the existing Enbridge pipeline right-of-way. Enbridge is planning a proposed in-service date of December 2009.

An additional 25-foot-wide permanent easement would typically be necessary for the Alberta Clipper Pipeline (the same area to be utilized for the 20-inch-diameter LSr Project pipeline). The 50-foot-wide temporary workspace to be used for the LSr Project pipeline would be re-used during construction of Alberta Clipper, as well as an additional 40 feet of temporary workspace. This additional 40 feet of temporary workspace is required due to the larger pipe diameter for Alberta Clipper and the associated need to use larger construction equipment for the larger pipeline, and to account for the separation distance between the LSr Project and Alberta Clipper Pipelines (typically 15 to 25 feet, depending on field conditions).

The planned Alberta Clipper pipeline would be constructed adjacent to the proposed LSr Project pipeline for the entire distance from the international border to Clearbrook, Minnesota. In addition, Alberta Clipper would primarily be located within or immediately adjacent to existing Enbridge right-of-

way from Clearbrook to Superior, Wisconsin. Construction of the LSr Project must be complete prior to the Line 13 reversal, and is anticipated to be completed prior to construction of Alberta Clipper.

Enbridge plans to utilize the pipeline as long as demand for its service exists. The length of time for pipeline service is expected to be long-term, but indefinite at this point. The anticipated economic life of the LSr Project pipeline would be no less than 25 years. The company has no plans for the pipeline at this time that is beyond this scope of analysis or any future abandonment plans. Any future abandonment would be the responsibility of Enbridge and would be conducted in accordance with applicable laws, regulations and landowner easement agreements.

2.2 ALTERNATIVES

Alternatives to the LSr Project were analyzed to determine whether reasonable and environmentally preferable options exist compared to the proposed action. A rational and defensible route selection process for new pipeline facilities involves consideration of environmental, engineering, and economic factors in a multi-disciplinary and iterative fashion. Alternatives to the proposed project were evaluated based on input received from the public as well as regulatory agencies. Route considerations weighed several factors including significant environmental advantages, ability to meet LSr Project objectives, and design and cost feasibility and implementation.

While the Enbridge system provides a relatively direct route to transport petroleum between supply regions in Canada and the Midwestern United States, other routes were considered in light of the criteria mentioned above. The existing Enbridge pipeline system provides significant opportunities for collocating along existing Enbridge rights-of-way, an important aspect of reducing environmental impact.

2.2.1 No Action Alternative

Under the No Action Alternative, the DoS would not issue the Presidential Permit and the project would not be constructed. The LSr Project would not be built and, therefore, additional capacity would not be achieved, which would preclude enabling additional transportation of light sour crude petroleum from Western Canada to reach markets in the Midwest as described in section 1.2.

Environmental impacts discussed in this EA would not occur if the proposed action were not realized. Although these impacts would not occur under this alternative, the purpose and need of the proposed action would not be met. Without the LSr Project, the increasing supply of western Canadian crude oil would continue to encounter a bottleneck in delivery options to refinery markets in the Midwest.

With the increased supply of Canadian crude oil and demand of U.S. refineries, the No Action Alternative would necessitate other delivery strategies to be employed which may or may not offer significant environmental advantages. Given the relatively high level of activity to connect reliable sources of Canadian petroleum supply with U.S. demand, these alternative strategies would likely result in some level of environmental impact. Even if other currently proposed projects including TransCanada's Keystone Pipeline, L.P. (Keystone) are realized, the supply and demand component of the proposed LSr Project remains valid. The No Action Alternative could result in more costly and less reliable crude oil supplies for U.S. markets which in turn could result in more expensive products for end users.

2.2.2 System Alternatives

System alternatives are options to the proposed action that would make use of other existing or proposed pipeline or transportation systems to meet the stated objectives of the project. Such alternatives

would make it unnecessary to construct all or part of the LSr Project although modifications would be necessary to system alternatives to accommodate the increase in capacity sought by the proposed action. The purpose of considering system alternatives is to weigh the environmental factors of such proposals in light of the proposed action and to determine if the proposed action's objectives could be met without significantly increasing environmental impact.

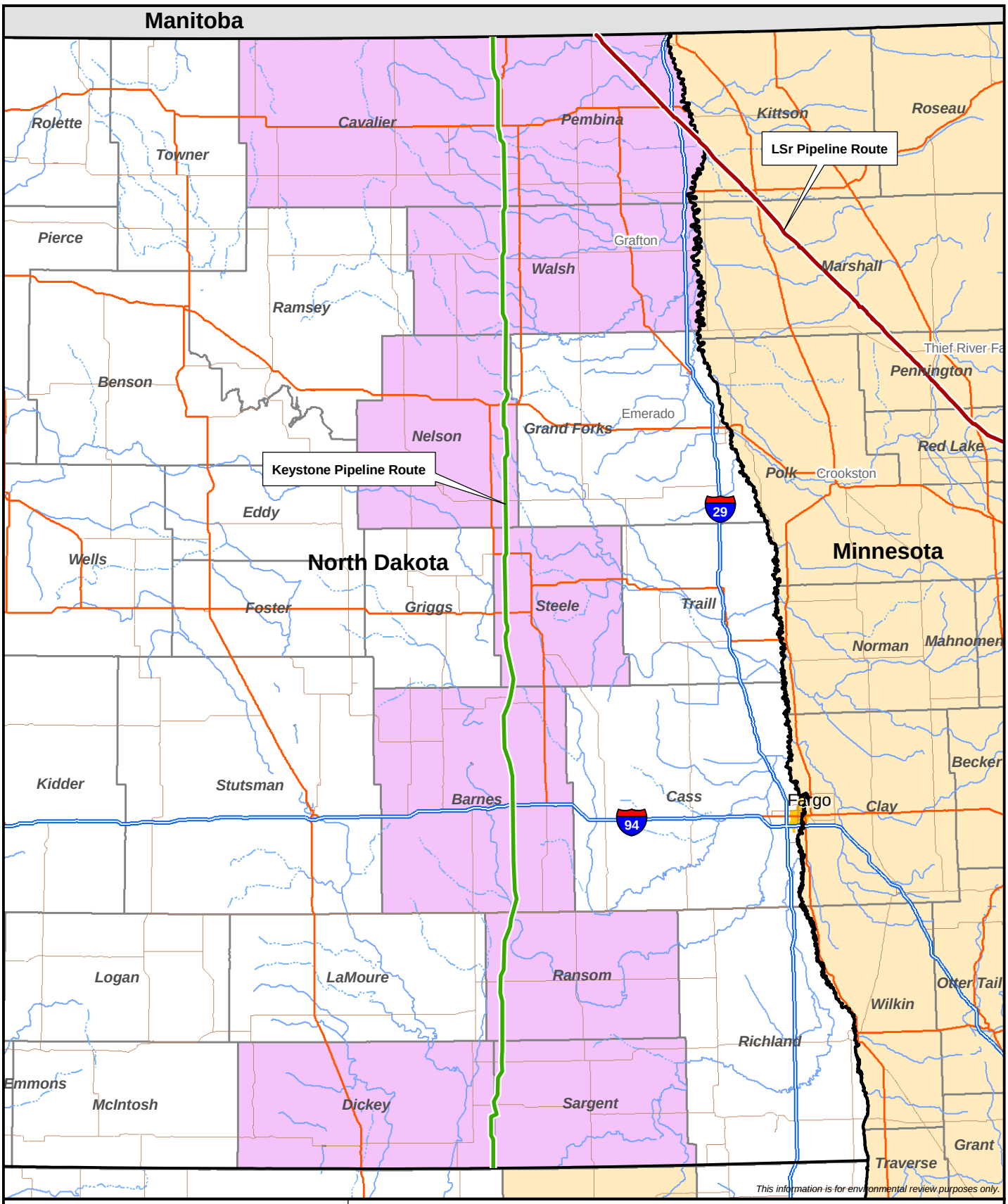
2.2.2.1 Expanding Existing Enbridge Facilities

Although it is feasible to move some portion of the increased volumes from Canada through the Enbridge Pipelines (North Dakota) L.L.C. system ("Enbridge North Dakota System") to Clearbrook, Minnesota through what is known as the "Portal Link" crossing the international border, the Enbridge North Dakota System is currently at full capacity and would not accommodate this volume of crude oil. Enbridge has efforts underway to increase capacity of the system from 80,000 bpd to 110,000 bpd on average. Despite this expansion, the system is not designed for the additional volumes of crude oil involved in compensating for the LSr Project. Expansion of the Enbridge North Dakota System to accommodate the objectives of the LSr Project would require either full looping or twinning of this pipeline. The resulting action would result in a longer route for crude oil deliveries and would be cost prohibitive than the proposed action. Therefore, the Enbridge North Dakota System could not be considered a system alternative.

In the United States, the existing Enbridge system consists of five, 136-mile-long, 18- to 48-inch-diameter pipelines from the United States-Canada border near Neche, North Dakota to the Clearbrook, Minnesota tankage terminal. This existing Enbridge system does not contain any discrete pipe segments (loops). Adding new looping was found to be inadequate as a new continuous line for petroleum is needed. However, if looping was feasible to ship product, the operation and maintenance costs associated with additional pump stations and horsepower would not be reasonable. Due to these factors expansion of existing facilities was dismissed from further consideration. The alternatives would not meet the objective of maintaining current delivery capacity of Canadian petroleum to customers receiving service from Enbridge's Clearbrook tank facility. Additional take-away capacity at the Clearbrook, Minnesota tankage terminal would not be realized by these alternatives.

2.2.2.2 New Pipeline System Alternative – Keystone Pipeline

TransCanada Keystone Pipeline, LLC (Keystone) is proposing the construction of a new crude oil pipeline system from Hardisty, Alberta, Canada to Patoka, Illinois. According to publicly available information, the Keystone Project would entail construction of approximately 1,833 miles of pipeline. In the United States, Keystone is proposing to construct and operate a new 1,073-mile-long pipeline (the Keystone Mainline). This facility would include 1,018 miles of 30-inch-diameter pipeline between the Canadian border in Pembina County, North Dakota and Wood River, Illinois and a 55-mile-long segment of 24-inch-diameter pipeline between Wood River, Illinois and Patoka, Illinois. Keystone is also planning the construction of a 291-mile-long, 30-inch-diameter lateral pipeline to Cushing, Oklahoma. In total Keystone would construct 1,365 miles of new pipeline in the United States if the Cushing lateral is constructed. An overview map depicting the proposed Keystone Pipeline facilities in North Dakota is provided on figure 2.2.2-1.



Keystone Pipeline Route - 09/15/2006

Proposed LSr Oil Pipeline

0 10 20 Miles

N W E S

Figure 2.2.2-1

Keystone Pipeline Route in North Dakota

Southern Lights 20-Inch Crude Line

Enbridge Pipelines (Southern Lights) L.L.C

Source: Keystone Pipeline, LLC

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The Keystone Pipeline would have the capacity to initially deliver approximately 435,000 bpd with expansion to 600,000 bpd through increased pumping capacity. Keystone realized demonstrated commitment from shippers to deliver 340,000 bpd of crude oil to its intended markets in the Midwest and Eastern U.S. Keystone expects that the remainder of the proposed system's capacity would be utilized by non-contract shippers. The Keystone Pipeline would deliver crude oil to Midwestern markets but does not connect to the Minnesota, Wisconsin and greater Chicago area markets that the Enbridge Mainline System currently serves and the proposed LSr Project pipeline would serve. The Keystone Pipeline aims to meet other market demands and would not meet the market need and in-service date proposed for the LSr Project.

2.2.2.3 Trucking

As an alternative to the Project, Enbridge could potentially transport petroleum supplies from its Cromer, Manitoba facility to the Clearbrook tankage facility by truck. This alternative is characterized by higher public safety and environmental risk, unreasonable logistics, and higher incremental cost. Accident data consistently illustrate that pipelines are the safest form of transportation for bulk liquids, including petroleum. The safety risk is magnified significantly by the impact created by increased truck traffic on Minnesota highways. A typical truck transport would carry 150 barrels of petroleum. Truck frequency for 186,000 bpd on a per annum basis would require 326 trucks (assuming 4 loads per day per truck) between Cromer, MB and Clearbrook. The trucks would primarily use U.S. Highway 59 in northern Minnesota which already carries a significant burden of commercial traffic. Collectively, the alternative would add 124,917,600 miles per year of additional truck traffic to Minnesota highways, and the trucks would consume approximately 27,759,467 gallons of fuel per year. Finally, the estimated trucking costs that incorporate operation and maintenance along with average fuels costs is greater than the existing alternative, which is the primary reason trucking currently is not used to move petroleum. The safety and environmental risks, logistical requirements, and high cost eliminate the trucking option as a reasonable alternative.

2.2.2.4 Rail Transport

Another potential alternative to the Project would be transporting petroleum supplies from Enbridge's Cromer, Manitoba facility to the Clearbrook tankage facility by rail. As in the trucking scenario, rail is characterized by increased risk to public safety and the environment, massive infrastructure requirements, questionable logistical feasibility, and operating/capital costs significantly higher than the proposed LSr Project. The transport of petroleum by rail involves significantly higher risk than by pipeline[5]. In addition, the construction of substantial infrastructure would be required for rail transport, with significant associated costs and environmental impacts.

A massive capital investment would be required to create rail infrastructure at the existing Enbridge Cromer and Clearbrook terminal facilities, since both locations do not have facilities for loading/unloading crude oil rail cars. In addition, there is currently no rail access into Clearbrook. A new rail line would have to be constructed from the Bemidji, Minnesota area, creating a new rail right-of-way corridor. There are significant regulatory hurdles involved with obtaining the necessary permits and right of way for such a rail corridor, so the feasibility of this alternative is questionable. Assuming the rail corridor can be permitted and built, an estimated additional 3,120 rail cars for liquid service would be needed. Finally, the existing rail system linking Cromer to Bemidji may not have sufficient capacity to handle this increase in traffic, necessitating the construction of additional rail capacity in this corridor. With estimated service costs of over $300 million per year, and significant environmental impacts and risks, rail service is not a viable alternative to the LSr Project.

[5] See MPUC Findings and Recommendations (Appendix A) at 30.

2.2.3 Route Alternatives and Variations

Several routing options were evaluated by Enbridge to determine whether environmental or landowner impacts could be avoided or reduced. These studies were designed to define a preferred route that achieves project objectives, is technologically and economically feasible to construct, and minimizes impacts on landowners and the environment. The following sections provide an analysis of the various route alternatives and minor variations evaluated for the project.

2.2.3.1 Major Route Alternatives

Two major route alternatives were examined to determine the most feasible route which would result in the fewest environmental impacts while meeting the project objectives. As stated in the project objectives, the project would originate at the North Dakota – Canada border near Neche, North Dakota where the Canadian portion of the LSr Project would deliver crude oil into the U.S. and the delivery point would be located at Enbridge's Clearbrook, Minnesota terminal. The origin and delivery points are the same for both the major route alternative and the proposed route. No intermediary delivery or receipt points comprise the LSr Project.

Proposed Route Alternative

The proposed pipeline route from Neche, North Dakota to Clearbrook, Minnesota is predominantly collocated with existing Enbridge pipeline facilities and nearly a direct route between the international border crossing and the Clearbrook terminal (refer to figure 1.1-1). However, the Enbridge right-of-way from Neche to Clearbrook already contains multiple pipelines and in some instances, feature crossings, workspace, or right-of-way is constrained by the presence and proximity of these multiple existing pipelines.

This route was assessed with the intent of maximizing use of existing Enbridge right-of-way to the extent feasible while identifying specific areas where collocation may not be feasible. The locations where it may not be feasible to use existing right-of-way are discussed in section 2.2.3.2. The setting in which the existing pipeline corridor and proposed route lies is characterized predominantly by agricultural land. The LSr Project pipeline would be located generally on the southwestern edge of the existing right-of-way.

Direct Route Alternative

The Direct Route Alternative was designed to provide the shortest point-to-point route from the delivery point at the international border crossing to the receipt point at the Clearbrook terminal. The Direct Route Alternative would not be collocated with Enbridge's existing pipeline corridor; the route would establish a new pipeline corridor generally north of the existing corridor (see figure 2.2.3-1).

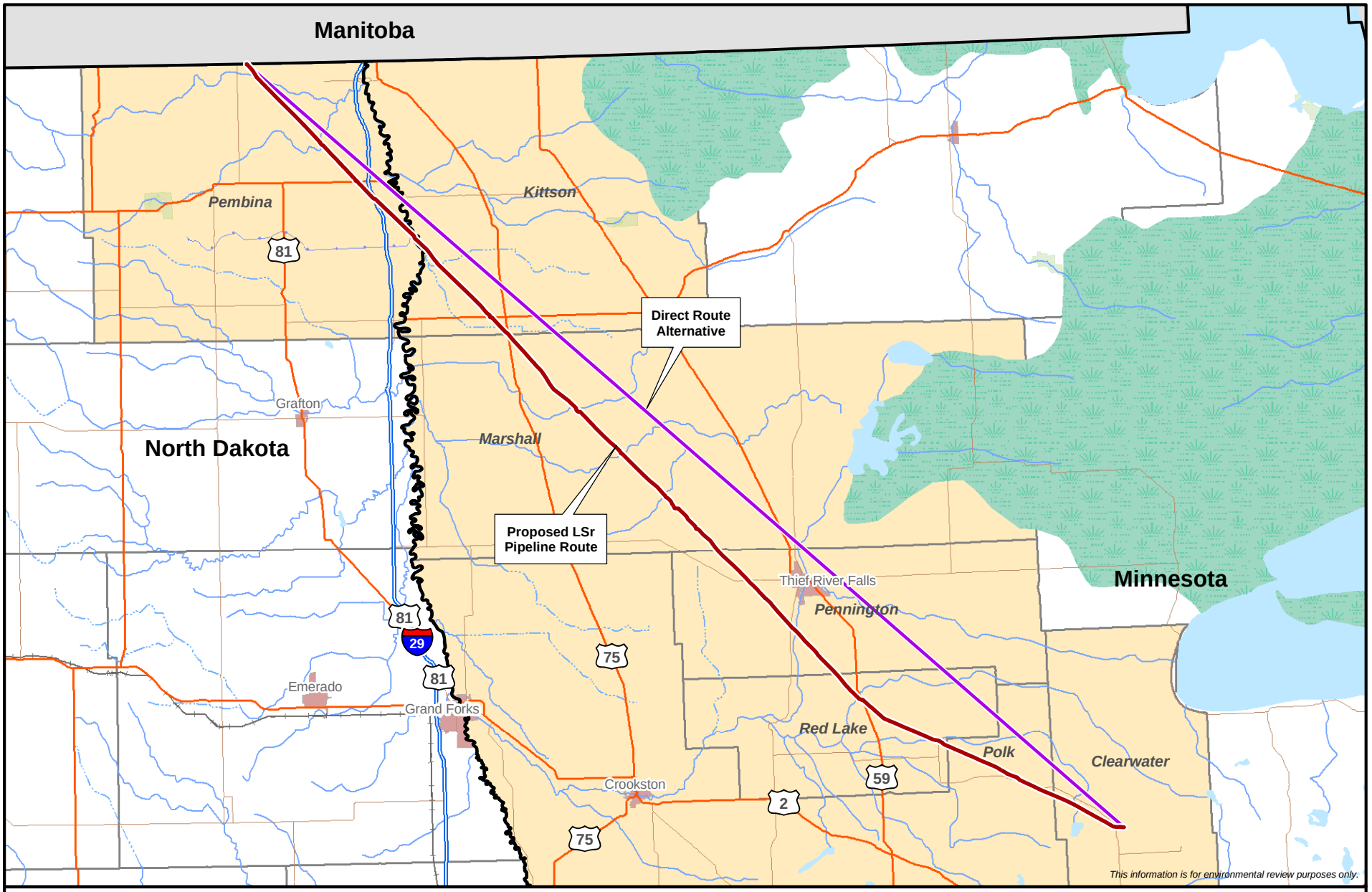

Figure 2.2.3-1

Direct Route Alternative

Southern Lights 20-Inch Crude Line

Enbridge Pipelines (Southern Lights) L.L.C

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Based on a Geographic Information System (GIS) analysis of the Direct Route Alternative (see table 2.2.3-1), there would not be less environmental impacts compared to the proposed route. While the Direct Route Alternative would be 2.4 miles shorter, the new corridor would not take advantage of any existing pipeline corridor. Land use along this route is similar to the proposed route, characterized primarily by actively cultivated agricultural lands. Based on publicly available GIS data, there are about 30 percent more wetland crossings and about 25 percent more waterbodies that would be crossed along the Direct Route Alternative than the Proposed Route Alternative. Because the Direct Route Alternative would require the establishment of new construction and permanent right-of-way, approximately 150 acres of additional land would be required for the permanent right-of-way. The Direct Route Alternative would create a new utility corridor through the region, in addition to Enbridge's existing pipeline corridor. Therefore, landowners near both ends of the Direct Route Alternative where it deviates from the existing Enbridge corridor could potentially have two pipeline corridors on their properties.

TABLE 2.2.3-1

Comparison of the Proposed Route and Direct Route Alternative

Environmental Features	Unit	Proposed Route Alternative	Direct Route Alternative
Length	miles	136.0	133.3
Adjacent to Existing Right-of-Way	miles	133.9	0
Construction Right-of-Way[a]	acres	1,584.6	1,620
Permanent Right-of-Way[b]	acres	574.2	810
Delineated Wetlands Crossed	no.	210	126
Waterbodies Crossed	no.	93	85

[a] Construction right-of-way calculations for the Proposed Route are based on a detailed construction footprint. Calculations for the Direct Route Alternative are based on a typical right-of-way width of 100 feet.

[b] Permanent right-of-way width for the Proposed Route is typically 35 feet (collocated) and 50 feet (greenfield) for the Direct Route Alternative. Additional right-of-way would be required for aboveground facilities along the Direct Route Alternative.

2.2.3.2 Minor Route Variations

Minor route variations were examined along the proposed route where construction of the LSr Project would pose challenges due to impingements on the construction corridor from existing features including sensitive environmental resources, residences, and areas of difficult terrain. Since the LSr Project corridor follows Enbridge's existing pipeline corridor for the vast majority of its route, the presence of existing pipelines limits routing options in areas containing such features. Therefore, minor route variations were designed based on discussions with landowners, agency personnel, and project engineers to alleviate potential impacts on resources of concern. As with the analysis of major route alternatives, a detailed quantitative analysis of environmental resources was conducted along each minor route variation. One minor route variation that was identified near the Donaldson Station in Minnesota is discussed below.

Donaldson Station Variation

The existing pipeline corridor enters into the west side of Donaldson Station at MP 814.0 (see figure 2.2.3-2). The Donaldson Station Variation would depart from the existing pipeline route northeast of the station. The existing corridor is approximately 3,274 feet in length and would encounter utility congestion between Minnesota Highway 11 and the pump station's southern boundary.

Proposed LSr Oil Pipeline

Alternative Routes

0 250 500 Feet

N

Figure 2.2.3-2

Southern Lights 20-Inch Crude Line

Donaldson Station Variation

Enbridge Pipelines (Southern Lights) L.L.C.

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The Donaldson Station Variation would be about 3,220 feet long. The route would turn south west of the Donaldson Station property boundary and be located adjacent to the existing Enbridge pipeline right-of-way between the station and existing high voltage electric transmission lines to the west. Once south of the station, the Donaldson Station Variation would continue south under Minnesota Highway 11 and then be located between an existing electrical substation and an abandoned residence further to the south. The route would then turn southeast and then east to cross a county road before rejoining the south side of the existing Enbridge pipeline right-of-way. Table 2.2.3-2 provides a comparison of environmental features for the two routes.

TABLE 2.2.3-2

Comparison of the Donaldson Station Variation and Existing Pipeline Corridor

Environmental Features	Unit	Donaldson Station Variation	Existing Pipeline Corridor
Length	miles	0.61	0.62
Adjacent to Existing Right-of-Way	feet	521	3,274
Greenfield Route	feet	2,700	0
NWI-mapped Wetlands Crossed	feet	0	0
Highly Wind Erodible Soils [a]	feet	0	0
Depth to Water Table (≤ 6 feet) [b]	feet	0	0
Shallow Bedrock	feet	0	0
Hydric Soils	miles	0.39	0.36
Prime Farmland Soils	miles	0.39	0.36
Forest Land Affected	miles	0.01	0.02
Agricultural Land Affected	miles	0.58	0.33
Herbaceous Land Affected	miles	0	0.02
Open Water Crossed	feet	0	0
Intermittent Waterbodies Crossed	no.	1	1
Perennial Waterbodies Crossed	no.	0	0
Railroad Crossings	no.	0	0
Interstate and Highway Crossings	no.	1	1

[a] Indicates length of the pipeline route where project would cross soils with a wind erodible index of a potential for a loss of 134 to 310 tons per acre per year.

[b] Indicates length of route where project could encounter groundwater within 6 feet of the surface.

Neither route would cross NWI-mapped wetlands, shallow bedrock, or highly wind erodible soils. Both routes would traverse similar flat terrain comprising agricultural and commercial land before reconnecting with the existing route alignment. Also, both routes would cross road ditches along each road crossing; however, the existing pipeline corridor route would pose construction constraints due to the existing utilities and Minnesota Highway 11. The Donaldson Station Variation would cross 3,062 feet of agricultural land compared to 1,742 feet for the existing pipeline corridor. The Donaldson Station Variation would cross 2,059 feet of hydric and prime farmland soils while the existing pipeline corridor would cross 1,901 feet. The existing pipeline corridor would be confined along Minnesota Highway 11 which would present difficulty during construction.

3.0 ENVIRONMENTAL ANALYSIS

This section addresses the natural and human resources potentially affected by the LSr Project. The description of the Affected Environment is based on existing environmental information, including data collected during field surveys in support of the LSr Project. Sources of existing information and data include, but are not limited to, aerial photography, U.S. Geological Service (U.S.GS) topographic maps, NWI maps, publicly available databases, Geographic Information Systems (GIS) files downloaded from the appropriate resource-based information system, and data requested from federal and state agencies for the project area. This data was compiled, quantified, and evaluated for the EA. Construction and operation impacts and mitigation for each resource is discussed in this section.

1. For the Proposed Action and all alternatives, the term "Construction Phase" is defined fully in section 2.0. Activities in this phase include the surface-disturbing activities needed to construct the pipeline including modifications to existing pump stations, Enbridge's Clearbrook Terminal, valves, and permanent access roads so that the pipeline system can be placed into service. It also includes restoration activities for areas where the surface has been disturbed.

2. For the Proposed Action and all alternatives, the term "Operation Phase" is defined fully in section 2.0. Activities in this phase include the transportation of light and medium sour crude petroleum in the Enbridge LSr pipeline. This definition also includes normal operations, routine pipeline ground and aerial inspections, emergency response activities, routine internal and external integrity inspections and repairs along short segments of the entire pipeline, and future reclamation activities such as reseeding and repair of erosion control structures. Enbridge's pipeline integrity and emergency response measures are summarized in Appendix F.

3. Prior to abandonment, Enbridge would coordinate with appropriate federal and state agencies to ensure that abandonment procedures comply with federal pipeline regulations and follow applicable procedures at that time.

4. For all affected resources, unless otherwise stated, short-term impacts are those that would occur over a 5-year period or less, while long-term impacts are those that exceed 5 years.

3.1 CLIMATE AND AIR QUALITY

The climate and air quality section in this EA describes the regional climate and meteorological conditions that influence transport and dispersion of air pollutants and discusses the existing levels of criteria air pollutants in the region. Preparation of the air quality portions of this assessment involved the collection of data from the NDDH, MPCA, and the EPA's Aerometric Information Retrieval System database.

3.1.1 Regional Climate

The United States portion of the proposed LSr Project would be approximately 136 miles long and would traverse a total of seven counties located in North Dakota and Minnesota. The regional climate of the proposed project area is predominantly classified as continental. Surface wind direction and precipitation vary in the proposed project area due to significant geographical features. However, the specific characterization of the local weather, based on data compiled from February 1890 to December 2005 for Argyle, Minnesota (near the midpoint of the United States portion of the LSr Project), indicates

an average annual maximum temperature of 49.8 degrees Fahrenheit (^{o}F) and an average annual minimum temperature of 26.7 ^{o}F with an average annual precipitation of 19.92 inches (High Plains Regional Climate Center, 2006). The average annual snowfall in Argyle, Minnesota is 38.9 inches.

3.1.2 Ambient Air Quality

Federal and state air regulations are designed to ensure that ambient air quality, including background, existing, and new sources, are in compliance with regulatory standards. The EPA has designated all areas of the United States as "attainment" (a geographic area that meets or does better than the national ambient air quality standard), "non-attainment" (an area that doesn't meet this standard), or "unclassified" with respect to ambient air quality standards.

Air quality data reports from the NDDH, MPCA, and monitoring data provided by the EPA were reviewed to characterize background air quality related to regulated criteria pollutants. The criteria pollutants are sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter having an aerodynamic diameter of 10 microns or less (PM_{10}), particulate matter having an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$), and lead (Pb). The EPA has established National Ambient Air Quality Standards (NAAQS) for these seven pollutants. The NAAQS were set at levels the EPA believed were necessary to protect human health (primary standards) and human welfare (secondary standards). The areas of North Dakota and Minnesota affected by the project are classified as attainment for all criteria pollutants. The federal and state air quality standards are listed in table 3.1.2-1.

TABLE 3.1.2-1

National and State Ambient Air Quality Standards

Air Pollutant	Averaging Period	NAAQS Standards	NDDH Standards	MPCA Standards	Significant Impact Level ($\mu g/m^3$)
Sulfur Dioxide (SO_2)	1-Hour		715 $\mu g/m^3$ / 0.3 ppm	1,300 $\mu g/m^3$ / 0.5 ppm	
	3-Hour	0.5 ppm	Not Applicable	1,300 $\mu g/m^3$ / 0.5 ppm	25
	24-Hour	0.14 ppm	260 $\mu g/m^3$ / 0.10 ppm	365 $\mu g/m^3$ / 0.14 ppm	5
	Annual [a]	0.03 ppm	60 $\mu g/m^3$ / 0.02 ppm	80 $\mu g/m^3$ / 0.03 ppm	1
Carbon Monoxide (CO)	1-Hour	35 ppm	40 mg/m^3 / 35 ppm	30 mg/m^3 / 35 ppm	2,000
	8-Hour	9 ppm	10 mg/m^3 / 9 ppm	10 mg/m^3 / 9 ppm	500
Nitrogen Dioxide (NO_2)	Annual [a]	0.05 ppm	100 $\mu g/m^3$ / 0.05 ppm	100 $\mu g/m^3$ / 0.05 ppm	1
Ozone (O_3)	8-Hour	0.08 ppm	0.12 ppm [b]	0.8 ppm	NA
Particulate Matter (PM_{10})	24-Hour	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$	5
	Annual [a]	50 $\mu g/m^3$	50 $\mu g/m^3$	50 $\mu g/m^3$	1
Particulate Matter ($PM_{2.5}$)	24-Hour	65 $\mu g/m^3$	Not Applicable	65 $\mu g/m^3$	NA
	Annual [a]	15 $\mu g/m^3$	Not Applicable	15 $\mu g/m^3$	NA
Lead	3-Month	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	NA

[a] Annual average concentration.

[b] The North Dakota standard is a maximum 1-hour concentration not to be exceeded more than once per year.

NAAQA = National Ambient Air Quality Standards
NDDH = North Dakota Department of Health
MPCA = Minnesota Pollution Control Agency
$\mu g/m^3$ = micrograms per cubic meter
mg/m^3 = milligrams per cubic meter
ppm = parts per million
NA = Not Available

The proposed pipeline would not have consequential air emissions under normal operating conditions. The pump stations are closed systems and electric driven, and would not contribute to local air emissions. Construction would result in a temporary increase in fugitive emissions, which is discussed in section 3.1.4.1.

3.1.3 Regulatory Requirements for Air Quality

Air emission sources in North Dakota and Minnesota are regulated at the federal level by the Clean Air Act (CAA), as amended, and at the state level by the NDDH Division of Air Quality - Air Pollution Control Rules and the MPCA, Air Quality Division - Minnesota Rules. The significant federal regulations established as a result of the CAA and incorporated in the NDDH and MPCA rules that are potentially applicable to the project include:

- New Source Review (NSR)/Prevention of Significant Deterioration (PSD) review;
- New Source Performance Standards (NSPS);
- Title V Operating Permits;
- National Emission Standards for Hazardous Air Pollutants (NESHAPs);
- Federal Class I Area Protection;
- Conformity of General Federal Actions; and
- state regulations.

New Source Review/Prevention of Significant Deterioration Review

Separate procedures have been established for federal pre-construction review of certain large proposed projects in attainment areas versus non-attainment areas. The federal pre-construction review for new or modified major sources located in attainment areas is the PSD review. The review process is intended to prevent the new source from causing existing air quality to deteriorate beyond acceptable levels. The federal preconstruction review for new or modified major sources located in non-attainment areas is commonly called Non-attainment New Source Review (NNSR).

Prevention of Significant Deterioration

The emission threshold for “major stationary sources” varies under PSD according to the type of facility. As defined by Title 40 C.F.R. § 52.21(b)(1)(i), a facility is considered major under PSD if it emits or has the potential to emit 250 tons per year (tpy) or more of any criteria pollutant, or 100 tpy for specified source categories. The Enbridge pump station sources are not one of the specified source categories; therefore, the PSD threshold for these facilities is 250 tpy. The pump stations on the Enbridge system are electric powered and would be below the 250 tpy PSD thresholds for all criteria; therefore, the project sources would not be subject to PSD permitting. In addition, no new tankage is expected at the Clearbrook facility at this time.

Non-attainment New Source Review

All facilities located in non-attainment areas with proposed emissions that exceed the applicable major source thresholds are subject to NNSR provisions, particularly the application of lowest achievable emission rate and a requirement to obtain emission offsets. The facilities associated with this project would be located in attainment areas; therefore; the project emission sources would not be subject to NNSR permitting.

New Source Performance Standards

NSPS, codified in Title 40 C.F.R. §60, establish pollutant emission limits and monitoring, reporting, and recordkeeping requirements for various emission sources based on source type and size. The NSPS apply to new or reconstructed sources. There are no NSPS regulations that apply to this project.

Title V Operating Permits

Title V of the CAA requires states to establish an air operating permit program. The requirements of Title V are outlined in Title 40 C.F.R. § 70 and the permits required by these regulations are often referred to as Part 70 permits.

If a facility's potential to emit exceeds the criteria pollutant or hazardous air pollutant (HAP) thresholds, the facility is considered a major source. The major source threshold level for an air emission source is 100 tpy for criteria pollutants. The major source HAP thresholds for a source are 10 tpy of any single HAP or 25 tpy of all HAPs in aggregate. Potential HAP emissions estimates from the proposed pump station facilities would not exceed the 10/25 tpy major source thresholds. The potential emissions for each pollutant at the pump stations would not exceed the Title V thresholds; therefore, the proposed pump station modifications would not be major sources of air emissions requiring a Part 70 permit.

Currently, the Clearbrook terminal operates under an "Option A Registration Permit" issued by the MPCA. Facilities with emission units that are subject to certain NSPS regulations and that have a potential to emit below major source thresholds are eligible for Option A registration permits.

National Emission Standards for Hazardous Air Pollutants

The NESHAPs, codified in 40 C.F.R. Parts 61 and 63, regulate HAP emissions. Part 61 was promulgated prior to the 1990 Clean Air Act Amendments (CAAA) and regulates only eight types of hazardous substances: asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride.

The 1990 CAAA established a list of 189 HAPs, resulting in the promulgation of Part 63. Part 63, also known as the Maximum Achievable Control Technology (MACT) standards, regulates HAP emissions from major sources of HAP emissions and specific source categories that emit HAPs. Part 63 defines a major source of HAPs as any source that has the potential to emit 10 tpy of any single HAP or 25 tpy of HAPs in aggregate.

The proposed pump station modifications and the existing terminal are not one of the source categories regulated by Part 61; therefore, the requirements of Part 61 are not applicable. Additionally, there are no MACT standards that apply to the facilities proposed as a part of this project; therefore the requirements of Part 63 do not apply.

Federal Class I Area Protection

In 1977, the U.S. Congress designated certain lands as Mandatory Federal Class I (Class I) areas. Class I areas were designated because air quality was considered a special feature of the area (e.g., national parks or wilderness areas). These Class I areas, and any other areas that have been redesignated Class I areas since 1977, are given special protection under the PSD program. The PSD program establishes air pollution increment increases that are allowed by new or modified air emission sources. If the new source is a major PSD source and is near a Class I area, the source is required to determine its

impacts on the nearby Class I area(s). The source is also required to notify the appropriate federal land manager(s) for the nearby Class I area(s).

As determined previously, the proposed pump station modifications and the existing terminal are not anticipated to be subject to the PSD regulations. Therefore, the federal Class I area protection provisions would not apply to this project.

Conformity for General Federal Actions

According to Section 176(c) of the CAA (Title 40 C.F.R. § 51.853), a federal agency must make a conformity determination in the approval of a project having air emissions that exceed specified thresholds in nonattainment and/or maintenance areas. The project does not pass through nonattainment or maintenance areas. Consequently, general conformity analysis would not be required for this project.

State Regulations

North Dakota air emissions are regulated by the North Dakota Century Code Chapter 23 to 25. Minnesota air emissions are regulated by the Minnesota Rules, Chapter 7001 to 7030. The North Dakota and Minnesota regulations incorporate much of the federal regulatory requirements for air quality and, therefore, the state requirements are met through the federal program. No further state requirements outside of the federal program would apply to the LSr Project.

3.1.4 Potential Impacts and Mitigation

- Fugitive dust generation from pipeline construction equipment and unpaved road traffic.
- Hydrocarbon combustion emissions from construction equipment.

The air emissions potentially resulting from construction of the proposed facilities and presented in this final EA represent worst-case scenarios based on currently available equipment. No dust control or mobile emissions permits from state agencies would be required.

Construction Emissions

Construction of the proposed pipeline and associated facilities and the pump station modifications could result in intermittent and short-term fugitive emissions. Pipeline construction proceeds at a relatively rapid pace. Consequently, air emissions would be localized, intermittent, and short term in duration. These emissions would include dust from soil disruption and combustion emissions from the construction equipment.

Fugitive dust (particulate matter) generated by construction is dependent on the extent of surface disturbance, soil characteristics, the type of equipment causing surface disturbance, and the duration of disturbance. Local dust concentrations increase as the silt fraction in the soil increases and as excavation and clearing equipment increase in size. During construction, residences in proximity to construction activities would be exposed to short-term increases in construction-related noise and dust. Some minor dust emission is inevitable in any construction project; however, dust control measures would be used on the construction right-of-way and access roads near residential areas as needed to minimize dust during active construction. During periods of high winds, work may be temporarily suspended if control measures are ineffective and if dust is excessive for the area. Mitigative measures would continue to be applied throughout any work suspensions. After construction is completed, the right-of-way would be stabilized and revegetated to prevent construction-related ongoing dust emissions.

Emissions from construction are not expected to cause or significantly contribute to a violation of an applicable ambient air quality standard because the construction equipment would be operated on an as-needed basis, primarily during daylight hours. Emissions from the gasoline and diesel engines would be minimized because the engines must be built to meet the standards for mobile sources established by the EPA mobile source emission regulations (Title 40 C.F.R. Part 85). In addition, the EPA required that the maximum sulfur content of diesel fuel for highway vehicles be reduced from 500 parts per million by weight (ppmw) to 15 ppmw by mid-2006, making lower sulfur diesel available nationwide.

While some odors are generated during construction (burning of non-merchantable timber during clearing, welding, joint coating, equipment refueling, etc.), odors generated during the course of construction are anticipated to be localized, intermittent and short term. Because of the relatively sparsely populated regions through which the LSr Project pipeline is located, odors are not anticipated to significantly affect the local population. Activities associated with the preparation of pipeline installation located at construction yards may contribute to odors. The location of these yards would be in areas of previous similar use such as light industrial sites. The overall contribution of odors from these yards is not anticipated to vary significantly from ambient air quality.

Enbridge's EMP (see Appendix D) specifies that to minimize dust generated from construction activities, the contractor would take all reasonable steps to control dust near residential areas and other areas as directed by Enbridge. Control practices may include wetting soils on the right-of-way, limiting working hours in residential areas, and/or additional measures as appropriate based on site-specific conditions. The use of dust suppression techniques would minimize fugitive dust emissions during construction of the project, thereby minimizing potential air quality impacts on nearby residential and commercial areas. The NDDH generally recommends that all necessary measures be taken during construction to minimize fugitive dust emissions (see Appendix A).

Operating Emissions

No operational emissions from the proposed project would be generated by the stationary sources at the pump station facilities because they are a closed system and electric powered. Enbridge does not need to obtain air quality construction or operating permits for the proposed pump station modifications.

Enbridge estimates the project will potentially increase volatile organic compounds emissions from withdrawal loss emissions at the Clearbrook terminal by 10.37 tpy. The potential emissions increase is the result of additional withdrawal losses from increased storage tank throughput. Withdrawal losses are generated when crude oil is removed from the storage tanks. Storage tank standing and external floating roof landing losses would not increase as a result of the LSr Project. The LSr Project does not include the construction of additional tanks at the terminal or modifications to the existing tanks. In addition, there would be a small increase in fugitive emissions from piping components (valves, flanges, etc.). Due to the small increase, the LSr Project would not require a change in the MPCA's Option A Registration Permit operating permit status of the terminal or an air quality construction permit.

Air emissions during the operation of the pipeline would be located primarily at the Clearbrook terminal and are limited in nature. All pipeline pumps would be electric-driven and no aboveground storage tanks are proposed to be installed in association with the LSr Project. The potential increase in withdrawal losses from the project would not significantly increase emissions at the Clearbrook terminal above any re-permitting threshold.

3.2 GEOLOGY, MINERAL RESOURCES, AND PALEONTOLOGY

3.2.1 Existing Terrain and Geology

The LSr Project is located within the Western Lake section of the Central Lowlands Physiographic Province. Surface features in this area were formed mainly during the Wisconsin Glaciation. Topography is characterized by large, gently rolling till plains, hilly areas formed by glacial moraines, and outwash plains. In addition, this area contains glaciolacustrine deposits from Glacial Lake Agassiz, which covered eastern North Dakota and northwestern Minnesota during the Wisconsin Glacial Age.

Surficial geology in the project area is characterized by Holocene and Pleistocene glacial lake deposits and river sediments deposited by the Des Moines, Wadena, and Superior Lobes of the Wisconsin Glaciation (Ojakangas and Matsch, 1982; see figure 3.2.1-1). Topography includes nearly level to gently rolling glacial lake plains rolling to steeply irregular moraine complexes, and low to fairly prominent drumlins as well as numerous lakes and wetland areas that have formed in depressions. Elevations in the project area range from approximately 765 feet to 1,366 feet above mean sea level and generally increase from north to south (see table 3.2.1-1 and figure 3.2.1-1).

TABLE 3.2.1-1

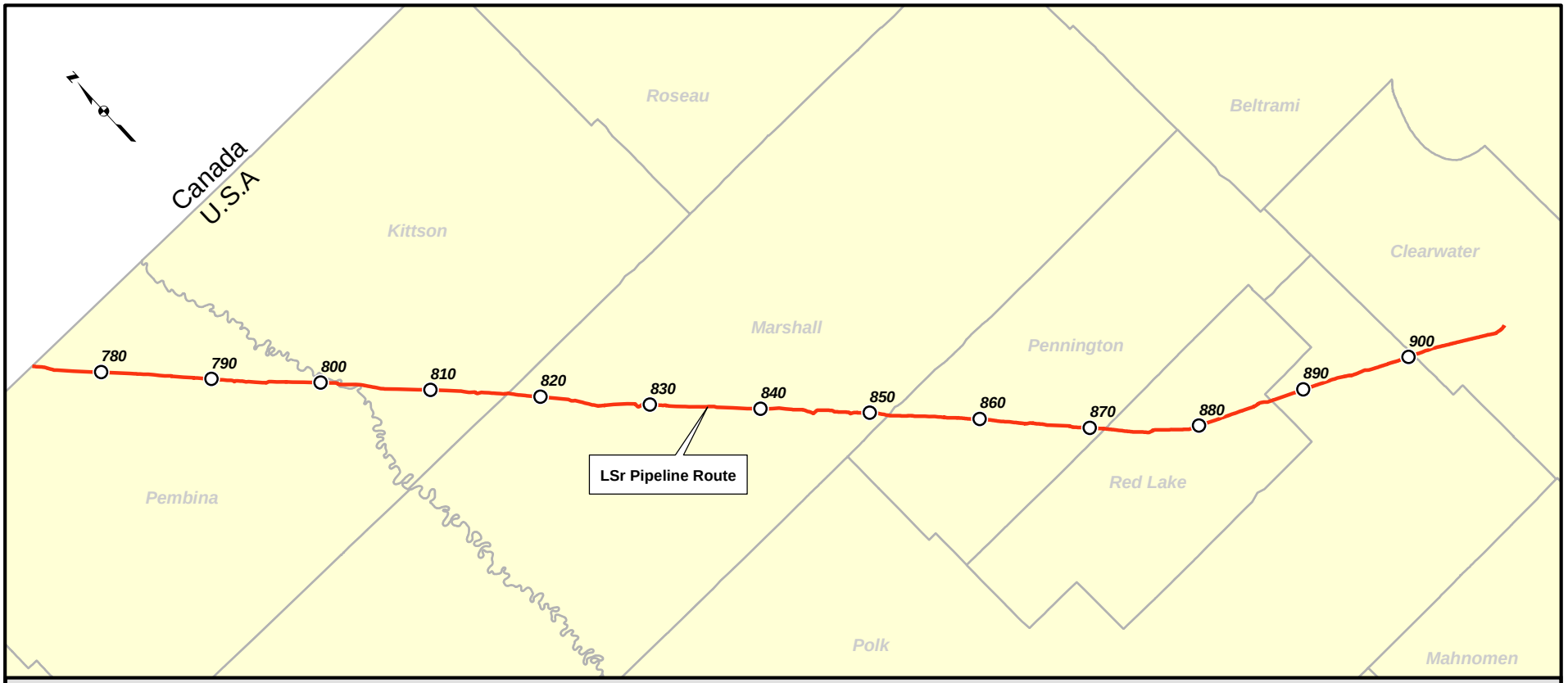
Elevation Along the LSr Project Pipeline Route

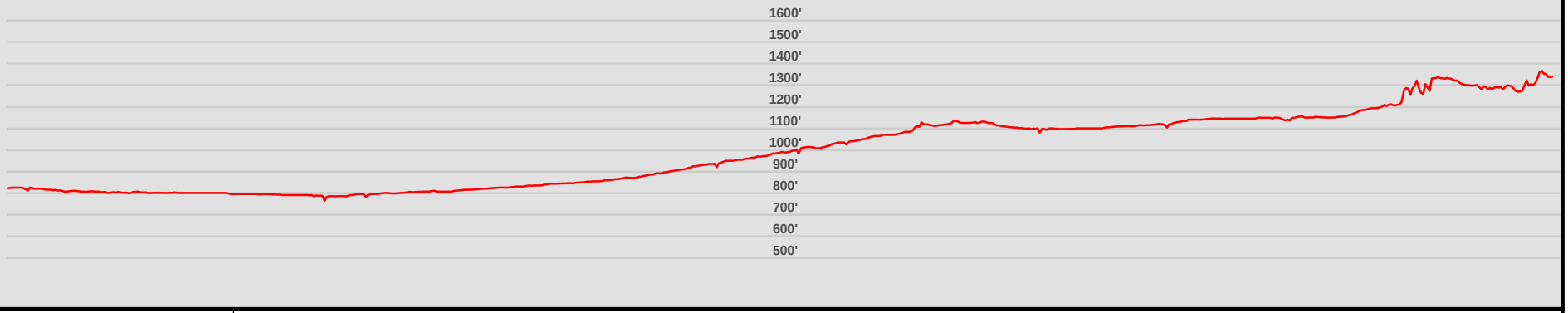
	Approximate Milepost		Elevation Above Mean Sea Level (feet)		
County, State	Beginning	Ending	Lowest	Average	Highest
Pembina, North Dakota	773.7	801.8	786	803	826
Kittson, Minnesota	801.8	817.1	765	804	826
Marshall, Minnesota	817.1	851.7	826	932	1,072
Pennington, Minnesota	851.7	871.4	1,075	1,108	1,138
Red Lake, Minnesota	871.4	886.9	1,105	1,136	1,155
Polk, Minnesota	886.9	900.5	1,151	1,217	1,338
Clearwater, Minnesota	900.5	909.3	1,270	1,305	1,366

The project region is underlain by Jurassic sedimentary rocks, Ordovician rocks, Late Archean to Middle Proterozoic metamorphic and igneous rocks, as well as Middle Ordovician to Cretaceous rocks along the eastern portion of the pipeline route (see figure 3.2.1-2). Bedrock along the pipeline route consists mostly of granite, shale, basalt, sandstone, siltstone, limestone, dolomite, gypsum, and anhydrite. Along the pipeline route, however, depth to bedrock can exceed more than 450 feet (Ojakangas and Matsch, 1982). None of the soils crossed by the pipeline route contain bedrock at depths of less than 5 feet. In areas where the pipeline is installed using HDD techniques, bedrock could be at a depth where it may be encountered. These areas would be identified from geotechnical borings at the HDD crossings and would be factored into the design of the crossings.

Near-surface deposits in the project area generally consist of thick sequences of Late Quaternary Age glacial deposits (see figure 3.2.1-3). The pipeline route would cross large areas of Lacustrine deposits, as well as various moraine complexes and outwash plains.

There is a low probability of an earthquake of significant intensity or other seismic event in the project area. In addition, the pipeline route does not cross any Quaternary-age faults (National Atlas of the United States, 2006).





Milepost

LSr Pipeline Route

Figure 3.2.1-1

Southern Lights 20-Inch Crude Line

Elevation Profile Along The Route

Enbridge Pipelines (Southern Lights) L.L.C.

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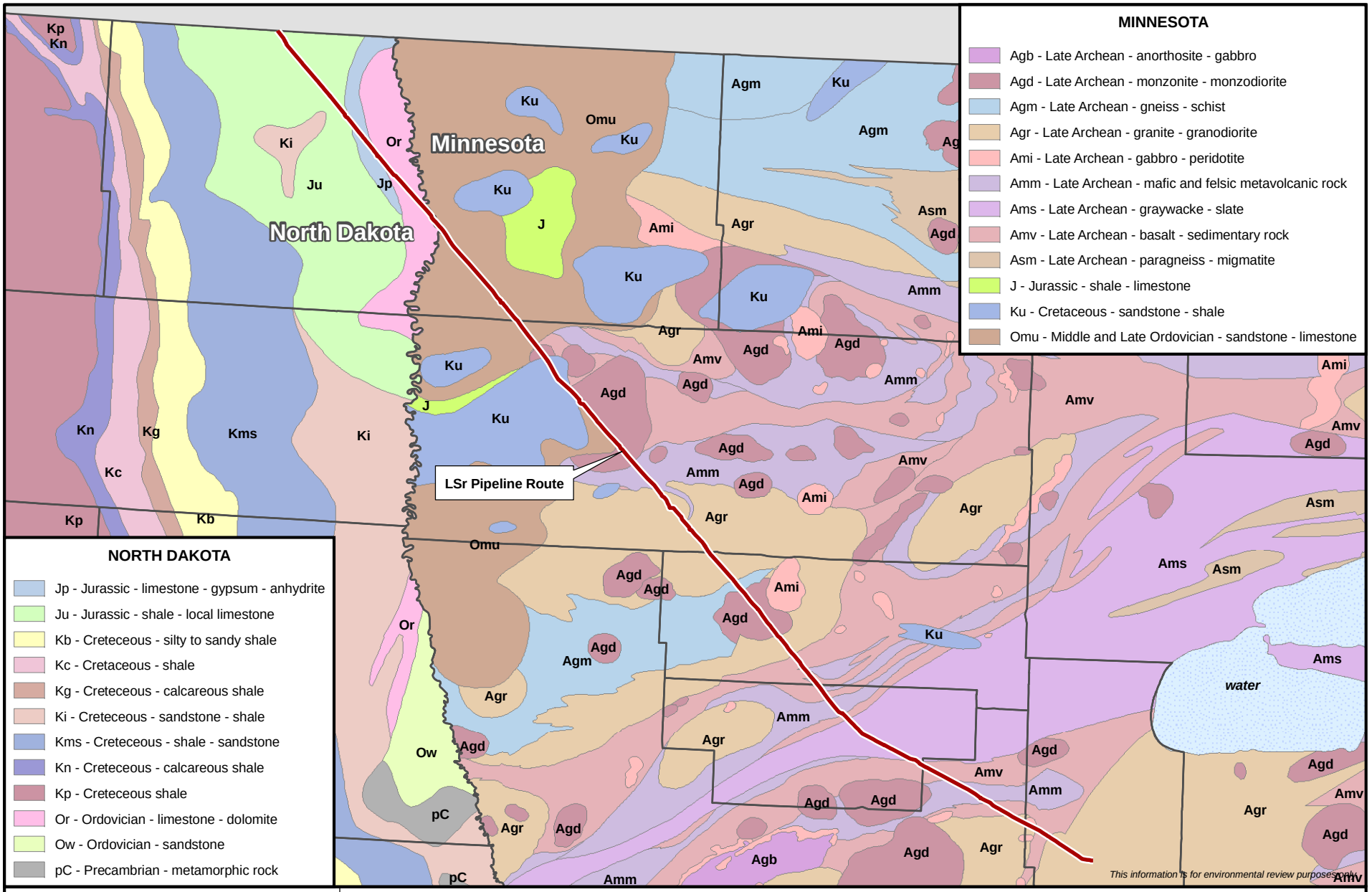

Figure 3.2.1-2

Southern Lights 20-Inch Crude Line

Bedrock Geology in the Project Area

Enbridge Pipelines (Southern Lights) L.L.C.

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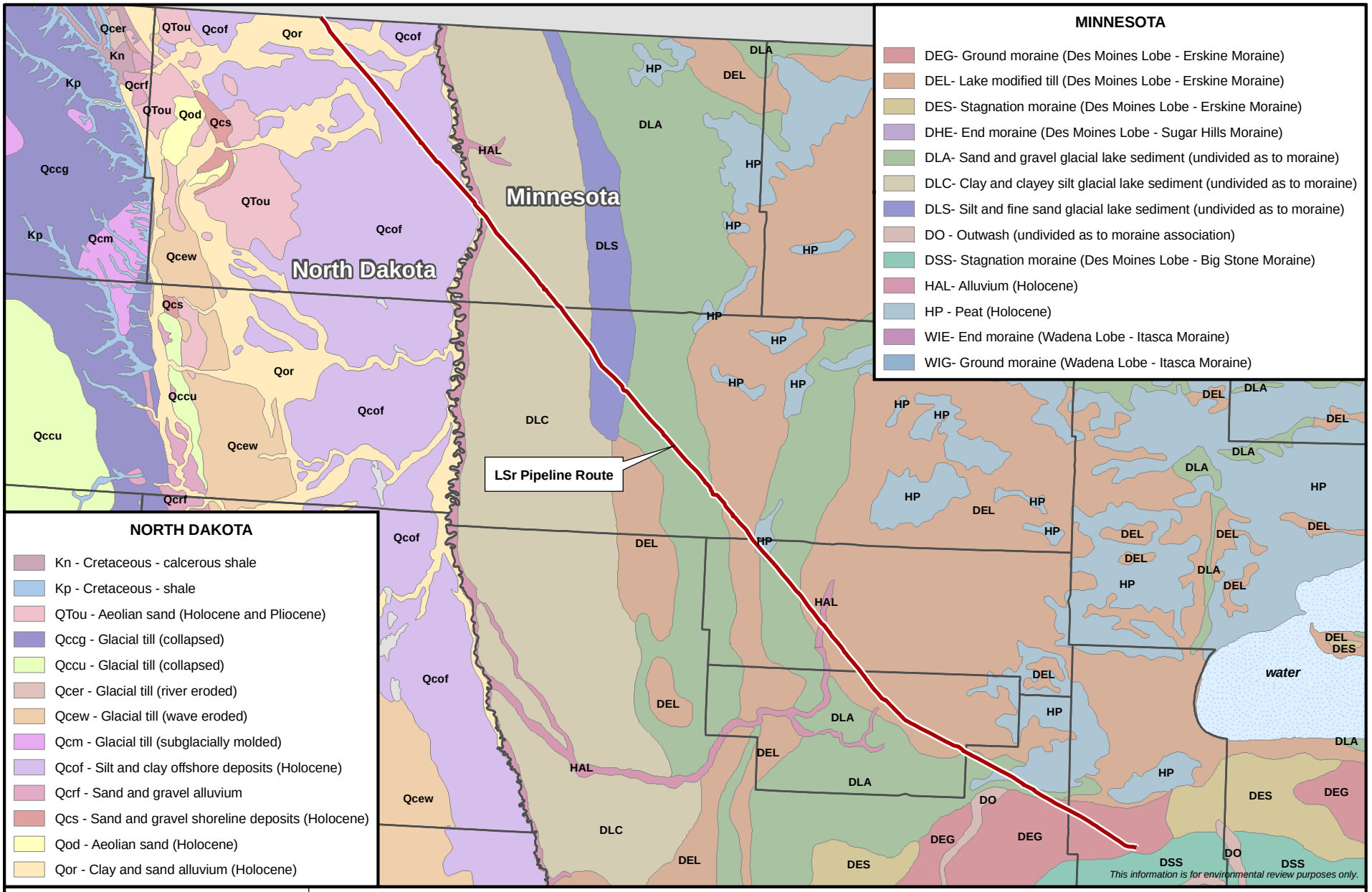

Figure 3.2.1-3

Southern Lights 20-Inch Crude Line

Surficial Geology in the Project Area

Enbridge Pipelines (Southern Lights) L.L.C.

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3.2.2 Mineral Resources

Mineral resources in North Dakota and Minnesota include industrial (e.g., sand, gravel, crushed stone) and metallic (e.g., iron ore, nickel, titanium) minerals. Based on a review of U.S.GS 7.5-minute-series topographic maps and aerial photographs of the proposed route, two gravel pits were identified within 500 feet of the proposed pipeline route at MP 846.5 and MP 853.3. No other active mining operations have been identified within the vicinity of the project area.

3.2.3 Paleontology

In isolated places where the Upper Cretaceous rocks are at or near the surface, there is the potential of finding various fossils of marine organisms that lived in shallow seas that covered the area in late Cretaceous time. These animals include turtles, fish, and invertebrates (clams, cephalopods, gastropods, corals, and crustaceans) (Walhalla, North Dakota, undated). The glacial deposits may contain fossils of large vertebrates including mastodon and mammoth (Paleontology Portal, 2003). Enbridge does not anticipate constructing in areas of shallow bedrock for this project. Therefore, paleontological resources are not likely to be encountered during construction.

3.2.4 Potential Impacts and Mitigation

- Disturbance of unique geological features that are protected under state or federal programs.
- Loss of access to underlying mineral resources from installation of pipeline facilities.
- Potential loss of vertebrate or invertebrate fossils that are considered by paleontologist to have scientific importance.

Construction

No unique geological features that have received state or federal protection would be disturbed by the LSr Project. Construction and operation of the proposed LSr Project would result in minor impacts on topography and geology. These impacts would not be significant or would be mitigated to less than significant. Primary impacts would be limited to construction activities and consist of temporary alteration of slopes on the construction right-of-way due to grading and trenching operations. These disturbances would be necessary to create a level and safe construction corridor.

Impacts would be minimized by returning contours to pre-construction conditions to the extent practicable. In addition, Enbridge would implement the erosion control measures described in the EMP and CECP (see Appendices D and J). These measures include the installation of slope breakers, temporary sediment barriers, and permanent trench breakers, and revegetation and mulching of the construction right-of-way.

Blasting may be required if bedrock is encountered within the depth of the trench. The likelihood of blasting is very low, as the proposed pipeline route would cross no areas with shallow bedrock. If blasting is required, however, Enbridge would conduct these activities in accordance with applicable regulations.

The proposed pipeline route does not cross active mining areas. However, there is a potential that future use of sand and gravel resources would be precluded where the pipeline is installed across deposits of these resources. Because the proposed pipeline would be installed adjacent to existing Enbridge

pipelines and primarily within existing maintained rights-of-way, any sand and gravel deposits in the project area are currently unavailable for mining.

There is some potential for discovery of Pleistocene-age fossils during pipeline grading and trenching where the proposed pipeline route would cross continental glacial drift in North Dakota. Any significant fossils incidentally excavated during pipeline construction would be recovered or studied for the scientific record. In the event that paleontological resources are discovered during construction of the proposed project, those resources would be managed in accordance with the Unanticipated Discoveries Plans that were developed in consultation with the DoS and the Minnesota and North Dakota SHPOs and are found in Appendices H and I, respectively.

Operation

No impacts associated with seismic activity within the project area are anticipated. Due to the limited potential for large, seismically induced ground movements, there is minimal risk of earthquake-related impacts on the pipeline. No additional mitigation beyond designing the proposed pipeline to currently accepted industry specifications is appropriate.

No additional disturbance or loss of unique geological features, mineral resources, or scientifically important fossils would occur during operations because there would be no additional surface disturbance required beyond that used for construction.

3.3 SOILS

The proposed pipeline route would cross the Red River Valley of the North and Northern Minnesota Gray Drift Major Land Resource Areas (MLRAs). The Red River Valley of the North MLRA consists of a nearly level glacial lake plain that is bordered on the east by outwash deposits, gravelly beaches, and dunes. The dominant soils in this area are Aquolls. These deep, somewhat poorly to poorly drained soils have a sandy to clayey texture and a frigid temperature regime. The Northern Minnesota Gray Drift MLRA consists of rolling glacial moraines and associated outwash areas that have short, choppy, and complex slopes. The dominant soils in this area are Udalfs. These deep, well- to moderately-well drained soils have a medium texture, a frigid temperature regime, and mixed mineralogy (U.S.DA, 1978).

3.3.1 Identification of Soil Conditions

3.3.1.1 Background and Methodology

Detailed soil characteristics along the pipeline route were identified and assessed using the Soil Survey Geographic (SSURGO) database (U.S.DA, NRCS, 2003). The SSURGO database is a digital version of the original county soil surveys developed by the U.S.DA, NRCS for use with GIS. It provides the most detailed level of soils information for natural resource planning and management. The mapping scales in the project area generally range from 1:12,000 to 1:20,000, with a minimum delineation size of 1.4 to 4.0 acres. SSURGO is linked to an attribute database that gives the proportionate extent of the component soils and their properties for each map unit (U.S.DA, NRCS 1995). The SSURGO database was used to define soil characteristics along the pipeline route.

SSURGO attribute data consist of physical properties, chemical properties, and interpretive groupings. Attribute data apply to the whole soil (e.g., listed hydric, prime farmland soils or slope class) as well as to layer data for soil horizons (e.g., texture or permeability). The soil attribute data can be used in conjunction with spatial data to describe the soils in a particular area.

3.3.1.2 Soil Characteristics and Assessments

Tables 3.3.1-1 and 3.3.1-2 provide a summary of significant soil characteristics identified along the pipeline route by county. These characteristics include: highly erodible soils, prime farmland and hydric soils, compaction-prone soils, presence of stones and shallow bedrock, droughty soils, depth of topsoil, and percent slope. Table 3.3.1-3 lists topsoil depths for prime farmland crossed by the pipeline route by county. Approximately 5.8 miles of the pipeline route cross soils classified as saline, which in severe cases precludes their use for agricultural production. This saline area is predominantly wetland or grassland and near the portion of the pipeline route by the Juhl WMA near MP 791.4. Individual soil characteristics are discussed separately below.

TABLE 3.3.1-1

Soil Characteristics in the LSr Project Area

County, State	Total Acres [a]	Prime Farmland	Hydric Soils	Compact. Prone	Highly Erodible		Reveg. Concerns	Stony/ Rocky	Shallow to Bedrock
					Water	Wind			
	Acres (percent)								
PERMANENT EASEMENT [b]									
Pembina, North Dakota	118.3	81.0	74.6	106.7	0.2	-	-	-	-
Kittson, Minnesota	65.1	63.6	53.5	60.0	-	-	-	-	-
Marshall, Minnesota	148.3	105.6	63.2	55.3	0.8	36.7	55.2	-	-
Pennington, Minnesota	81.5	55.5	56.1	42.1	-	11.0	22.2	-	-
Red Lake, Minnesota	66.3	57.7	53.7	42.2	-	2.0	12.2	-	-
Polk, Minnesota	57.3	22.5	31.5	22.2	1.1	30.6	24.1	-	-
Clearwater, Minnesota	37.1	30.0	17.0	15.8	0.3	2.8	1.4	0.5	-
Pipeline Total	573.8 (100.0)	415.8 (72.4)	349.5 (60.9)	344.3 (60.0)	2.3 (0.4)	83.2 (14.5)	115.2 (20.1)	0.5 (0.1)	-
TEMPORARY EASEMENT [c]									
Pembina, North Dakota	346.4	236.5	218.6	312.8	0.5	-	-	-	-
Kittson, Minnesota	191.3	188.8	158.2	177.0	-	-	-	-	-
Marshall, Minnesota	436.4	313.1	184.2	164.0	0.9	109.2	164.8	-	-
Pennington, Minnesota	236.6	163.4	161.0	121.5	-	32.1	65.1	-	-
Red Lake, Minnesota	197.9	174.4	161.0	127.2	-	6.1	36.0	-	-
Polk, Minnesota	161.1	65.0	85.5	58.1	3.0	84.2	70.9	-	-
Clearwater, Minnesota	106.9	88.9	45.8	41.5	0.8	6.8	4.6	1.1	-
Pipeline Total	1676.6 (100.0)	1230.0 (73.4)	1014.1 (60.5)	1002.1 (59.8)	5.2 (0.3)	238.4 (14.2)	341.3 (20.4)	1.1 (0.1)	-

[a] Acreage was determined through spatial GIS queries of soil map unit composition within the permanent easement and the temporary construction easement (including necessary extra workspace). Areas requiring a reduction in workspace for construction in wetlands were accounted for. Acreage does not include areas mapped as open water in the applicable soil survey.

[b] Permanent easement is typically 35 feet wide, 25 feet and 10 feet on each side of the pipeline centerline.

[c] Temporary construction easement is 100 feet wide and includes temporary extra workspace. Acreage includes areas where the construction workspace has been necked down to cross wetlands, waterbodies, etc.

TABLE 3.3.1-2

Topsoil Depths and Slope Class in the LSr Project Area [a]

County, State	Total Acres [a]	Topsoil Depth (inches) in Acres (percent)				Slope Class (percent) in Acres (percent)[b]				
		0-6	>6-12	>12-18	>18	0-5	>5-8	>8-15	>15-30	>30
PERMANENT EASEMENT										
Pembina, North Dakota	118.3	18.5	4.2	26.4	69.2	117.2	0.5	0.2	0.4	-
Kittson, Minnesota	65.1	0.5	57.1	7.5	-	65.1	-	-	-	-
Marshall, Minnesota	148.3	0.8	96.4	17.6	33.6	147.6	-	-	0.8	-
Pennington, Minnesota	81.5	2.7	59.4	12.9	6.6	80.8	-	-	0.2	-
Red Lake, Minnesota	66.3	1.1	64.0	-	1.1	66.3	-	-	-	-
Polk, Minnesota	57.3	-	33.5	8.7	15.1	47.3	-	3.5	6.6	-
Clearwater, Minnesota	37.1	1.3	30.9	-	4.9	36.3	-	0.8	-	-
Pipeline Total	573.8 (100.0)	24.9 (4.3)	345.4 (60.2)	73.1 (12.7)	130.4 (22.7)	560.5 (97.8)	0.5 (0.1)	4.4 (0.8)	7.9 (1.3)	-
TEMPORARY EASEMENT										
Pembina, North Dakota	346.4	50.9	12.2	80.7	202.6	342.9	1.90	0.51	1.1	-
Kittson, Minnesota	191.3	0.7	168.0	22.6	-	191.3	-	-	-	-
Marshall, Minnesota	436.4	0.9	281.4	53.4	100.7	435.5	-	-	0.9	-
Pennington, Minnesota	236.6	7.8	173.4	36.7	18.8	234.8	-	-	0.6	-
Red Lake, Minnesota	197.9	2.8	192.2	-	2.8	197.9	-	-	-	-
Polk, Minnesota	161.1	-	98.8	24.1	38.2	132.1	-	9.8	19.22	-
Clearwater, Minnesota	106.9	3.4	92.4	-	11.1	104.2	-	2.6	-	-
Pipeline Total	1676.6 (100.0)	66.6 (4.0)	1018.2 (60.7)	217.6 (13.0)	374.2 (22.3)	1638.6 (97.8)	1.90 (0.1)	12.9 0.8)	21.9 (1.3)	-

[a] Acreage was determined through spatial GIS queries of soil map unit composition within the permanent easement and the temporary construction easement (including necessary extra workspace). Areas requiring a reduction in workspace for construction in wetlands were accounted for. Acreage does not include areas mapped as open water in the applicable soil survey.

[b] Acreage does not include soil amp units indicated as open water, or as miscellaneous land types with no data provided in the SSURGO2 Database (e.g., quarries, pits, landfills).

TABLE 3.3.1-3

Topsoil Depths on Prime Farmland in the LSr Project Area [a]

County, State	Total Acres [a]	Topsoil Depth (inches) in Acres (percent)			
		0-6	>6-12	>12-18	>18
PERMANENT EASEMENT					
Pembina, North Dakota	81.0	2.05	2.5	18.9	57.6
Kittson, Minnesota	63.6	-	56.1	7.5	-
Marshall, Minnesota	105.6	-	71.3	1.2	33.1
Pennington, Minnesota	55.5	-	42.7	8.0	4.8
Red Lake, Minnesota	57.7	-	57.7	-	-
Polk, Minnesota	22.5	-	14.7	7.8	-
Clearwater, Minnesota	30.0	-	30.0	-	-
Pipeline Total	415.8 (100.0)	2.05 (0.5)	275.0 (66.1)	43.4 (10.4)	95.4 (23.0)
TEMPORARY EASEMENT					
Pembina, North Dakota	236.5	2.9	7.6	59.0	167.1
Kittson, Minnesota	188.8		166.2	22.6	-
Marshall, Minnesota	313.1		210.1	3.4	99.6
Pennington, Minnesota	163.4		126.4	22.8	14.2
Red Lake, Minnesota	174.4		174.4	-	-
Polk, Minnesota	65.0		43	22.0	-
Clearwater, Minnesota	88.9		88.9	-	-
Pipeline Total	1230.0 (100.0)	2.9 (0.2)	816.5 (66.4)	129.8 (10.6)	280.9 (22.8)

[a] Acreage was determined through spatial GIS queries of soil map unit composition within the permanent easement and the temporary construction easement (including necessary extra workspace). Areas requiring a reduction in workspace for construction in wetlands were accounted for. Acreage does not include areas mapped as open water in the applicable soil survey.

Prime Farmland and Topsoil Thickness

The U.S.DA defines prime farmland as “land that is best suited to food, feed, fiber, and oilseed crops” (Soil Survey Division Staff, 1993). This designation includes cultivated land, pasture, woodland, or other lands that are either used for food or fiber crops or are available for these uses. Urbanized land and open water are excluded from prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent, prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by controlling soil moisture conditions through artificial drainage). Approximately 26 percent of the soils affected by the project are prime farmland soils with no limiting factor. An additional 47 percent of the soils affected are considered prime farmland only if a limiting factor is mitigated.

Topsoil thickness is the result of factors such as wetness, topography, climate, and the predominant vegetation present when the soil was being formed. Other factors being equal, prairie soils have more topsoil than forest soils; and wet soils have more topsoil than dry soils. According to data presented in tables 3.3.1-2 and 3.3.1-3, topsoil depths along the majority of the Minnesota portion of the pipeline route are generally less than 12 inches but are thicker in some areas. Approximately 80 percent of the soils affected in North Dakota have topsoil depths greater than 12 inches.

Soil Compaction and Rutting

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. Construction equipment traveling over wet soils could disrupt the soil structure, reduce pore space, increase runoff potential, and cause rutting. The degree of compaction depends on moisture content and soil texture. Fine-textured soils with poor internal drainage that are moist or saturated during construction are the most susceptible to compaction and rutting. Approximately 60 percent of the pipeline route is underlain by soils that are prone to compaction. In addition, approximately 4 percent of the pipeline route would cross soils with organic surface horizons. These horizons also may be susceptible to rutting during pipeline construction.

Erosion by Wind and Water

Erosion is a continuing natural process that can be accelerated by human activity. Factors that influence the degree of erosion include soil texture, soil structure, length and percent of slope, vegetative cover, and rainfall or wind intensity. Soils most susceptible to erosion by water are typified by bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Wind erosion processes are less affected by slope length or steepness. Clearing, grading, and equipment movement could accelerate the erosion process and, without adequate protection, result in discharge of sediment to adjacent waterbodies and wetlands. The majority of the soils affected by the project (greater than 99 percent) are underlain by soils that are not likely to be susceptible to water erosion (see table 3.3.1-1); these soils are generally found on terrain with slopes that are less than or equal to 5 percent. Approximately 14.5 percent of the soils affected by the project have a wind erodibility group (WEG) classification of two or lower and, therefore, are considered susceptible to wind erosion.

Droughty Soils

Droughty or dry soils were identified on the basis of surface texture and drainage class. Well drained to excessively drained soils with a coarse surface texture (i.e., fine sand or coarser) may be difficult to revegetate. Drier soils contain less water to aid in the germination and eventual establishment of new vegetation. Coarser textured soils also have a lower water holding capacity, which could result in moisture deficiencies in the root zone, creating unfavorable conditions for many plants. Twenty percent of the soils affected by the project are classified as droughty soils.

Stony/Rocky Soils and Shallow Bedrock Soils

Trenching or grading can bring stones or rocks to the soil surface where they can damage farm equipment. Similarly, backfilling shallow bedrock could redistribute rock to an overlying soil horizon, which may reduce soil moisture-holding capacity. Less than 1 percent of soils affected by the project are stony or rocky soils, all of which are located in Clearwater County. None of the soils affected by the project contain shallow bedrock (i.e., bedrock within 5 feet of the surface).

3.3.2 Potential Impacts and Mitigation

- Accelerated wind or water erosion on disturbed areas during construction and operation (including maintenance activities).

- Reduced soil productivity resulting from accelerated erosion, soil mixing, compaction, construction-related spills, or disturbance of irrigation or drainage features.

- Hydrocarbon contaminated soils encountered within the pipeline trench caused by releases from adjacent pipelines.

Construction

Pipeline construction activities such as clearing, grading, trench excavation, and backfilling, as well as the movement of construction equipment along the right-of-way, may result in impacts on soil resources. Vegetation clearing temporarily removes protective cover and exposes soil to the direct effects of wind, sun, and precipitation, which may increase the potential for soil erosion and movement of sediments into sensitive environmental areas (such as wetlands). Grading and construction equipment traffic may compact soil, reducing porosity and percolation rates, which could result in increased runoff potential. Trench excavation, spoil storage and backfilling could result in mixing of topsoil and subsoil and may introduce rocks to the ground surface from deeper soil horizons. Contamination from spills or leaks of fuels, lubricants, and coolants from construction equipment also could impact soils. Enbridge would minimize impacts on less than significant or avoid these impacts on soils by implementing the mitigation measures described in the AMP, EMP, SPCC Plan, and the CECP (see Appendices B, D, G, and J, respectively).

Erosion by Wind and Water

A majority of the pipeline route (greater than 85 percent) is underlain by soils that are not likely to be susceptible to water or wind erosion (see table 3.3.1-1). These soils are generally found on terrain with slopes that are less than or equal to 5 percent (see table 3.3.1-2).

Enbridge would implement the erosion control measures described in the EMP and CECP to minimize erosion during and after construction activities. These measures may include installation of silt fences, slope breakers, temporary sediment barriers, permanent trench breakers, and revegetation and mulching of the construction right-of-way. Erosion and sedimentation controls would be inspected and maintained as necessary until final stabilization is achieved. Enbridge also would implement dust mitigation measures, including the use of water to moisten the right-of-way, as needed, to minimize impacts from wind erosion.

Prime Farmland and Other Farmland

Impacts on prime farmland from construction of the pipeline could include interference with agricultural drainage or irrigation (if present), mixing of topsoil and subsoil, and compaction and rutting of soil. These impacts could result from right-of-way preparation, trench excavation and backfilling, and vehicular movement within the construction corridor. With the mitigation measures specified in Enbridge's AMP, EMP, and CECP (see Appendices B, D, and J, respectively), however, these impacts are anticipated to be temporary and would not result in a permanent decrease in soil productivity. Enbridge would implement the mitigation measures described in these plans, include topsoil segregation, compaction testing and alleviation, removal of excess rock, restoration of contours, repair of existing agricultural drainage systems, and the installation and maintenance of erosion control features to preserve prime farmlands and other farmlands.

Topsoil Segregation

To minimize topsoil disturbance and topsoil and subsoil mixing associated with pipeline construction, Enbridge would remove and segregate topsoil in wetlands, cropland, hay fields, pasture, residential areas and other areas as requested by the landowner. Topsoil would be segregated from the ditch-plus-spoil side in active cropland unless full construction right-of-way width topsoil segregation is

requested by the landowner. The trench-line-only soil segregation method would be used in unsaturated wetlands or where the width of the construction right-of-way is insufficient for other methods to be used. Topsoil would be stripped to a maximum depth of 12 inches east of the Red River Valley and 18 inches (or as otherwise agreed to with MDA) within the Red River Valley. As defined in the AMP (see Appendix B), the Red River Valley includes the Minnesota counties of Kittson, Marshall, Pennington, and Red Lake. The exact point of demarcation between these two methods would be mutually agreed upon with MDA prior to construction reaching that point. If less than 12 inches of topsoil are present, every effort would be made to segregate to the depth that is present. All segregated topsoil and subsoil would be stockpiled separately and replaced in the proper order during backfilling and final grading of the construction right-of-way.

The depth of soil to be removed would be the actual depth of the topsoil or to a specified maximum depth as discussed above and defined in the AMP. The AMP as discussed and coordinated with MDA identifies a protocol for communicating the appropriate depth of topsoil stripping to construction personnel. The Agricultural Inspector or the designated Enbridge environmental inspector will observe topsoil operations so that appropriate depths are removed. In areas of active Cropland outside of the Red River Valley, the topsoil would be removed from the area to be excavated above the pipeline and the adjacent subsoil storage area. On active cropland within the Red River Valley, the topsoil would be removed from only the area to be excavated above the pipeline.

Additional procedures may be developed in consultation with stakeholders, including the MDA, to minimize adverse impacts on crop yields that could occur as a result of construction.

Implementation of proper topsoil segregation as detailed in the EMP and AMP would minimize the potential for loss of crop productivity, improve the success of post-construction revegetation, and minimize the potential for long-term erosion problems.

Soil Compaction and Rutting

Approximately 60 percent of the pipeline route is underlain by soils that are prone to compaction. Counties with the largest amount of compaction prone areas along the proposed pipeline route include Pembina, Kittson, and Marshall. In addition, approximately 4 percent of the pipeline route would cross soils with organic surface horizons. These horizons also may be susceptible to rutting during pipeline construction.

Enbridge would minimize compaction and rutting impacts by implementing the measures described in its AMP and EMP. These measures may include temporarily suspending certain construction activities on susceptible soils, conducting compaction testing, and taking active steps such as using paraplows or other deep tillage equipment to alleviate soil compaction in agriculture areas where compaction is detected.

Stony/Rocky Soils and Shallow Bedrock Soils

None of the proposed pipeline route would cross areas with shallow bedrock (i.e., bedrock within 5 feet of the surface). If bedrock is encountered within the trench, Enbridge would only backfill with this rock to the depth of the original bedrock layer.

Less than 1 percent of the pipeline route would cross stony or rocky soils. Enbridge would use rock pickers or other rock removal equipment where necessary to remove rocks greater than 4 inches in diameter from the upper 12 inches of soil. Rock removal would be considered complete when the size and density of stones on the right-of-way are similar to undisturbed areas adjacent to the right-of-way.

Droughty Soils

Approximately 20 percent of the proposed pipeline route would cross soils classified as droughty soils. Enbridge would minimize impacts on droughty, non-cultivated soils by timely reseeding using species adapted to dry conditions and by applying mulch in accordance with the specifications of the EMP and CECP to conserve soil moisture. Enbridge would consult with appropriate soil conservation authorities to develop seed mixes and seeding dates to be applied to the project area, including droughty soil areas.

Operation

Accelerated soil erosion, compaction, pipeline spills during the operation-phase or other impacts on soils could potentially result from pipeline operation and maintenance activities. Prevention and response to spills is extensively covered in the Operating and Maintenance Procedures and Emergency Response Plan in compliance with federal pipeline safety regulations under 49 C.F.R. Parts 194 and 195. Any impacts on soils caused by spills during future operations are, therefore, anticipated to be localized and not significant, as the impact would be mitigated by the containment and cleanup requirements of the Emergency Plans and specific spill response oversight by federal and state agencies. Enbridge would patrol its existing right-of-way on an ongoing basis during operation of the pipeline system. If areas of active soil erosion or poor vegetation growth are observed, maintenance crews would evaluate underlying causes and implement appropriate repair or restoration measures to preserve soil resources and pipeline cover.

3.4 WATER RESOURCES

3.4.1 Surface Waters

Surface waters crossed by the LSr Project pipeline route are located within the Red River of the North Basin. The major (6^{th} level Hydrological Unit Code (HUC)) drainage basin crossed by the proposed project is the Lower Red, HUC 090203. Within the Lower Red Basin, the following hydrologic units would be crossed:

- Pembina – 09020313;
- Lower Red – 09020311;
- Snake – 09020309;
- Thief – 09020304;
- Lake – 09020303; and
- Clearwater – 09020305.

The Red River of the North Basin encompasses a 35,530-square-mile surface drainage area to the main stem of the Red River of the North within the United States. The basin represents an important hydrologic region where good quality water is a valued resource vital to the region's economy. Additionally, the drainage flows northward into Manitoba, Canada and is of international concern. The Red River of the North receives most of its flow from its eastern tributaries largely as a result of regional patterns in precipitation, evapotranspiration, soils, and topography. Annual runoff varies greatly, but most runoff occurs in spring and early summer from rains falling on saturated soils.

Primary drainages along the proposed pipeline route in Minnesota are shown on figure 3.4.1-1. This information is not available graphically for North Dakota, but is discussed below. The larger waterbody crossings in North Dakota include the Pembina and Tongue Rivers and the Red River of the North. The larger waterbody crossings in Minnesota include the Tamarac, Middle, and Red Lake Rivers. Table 3.4.1-1 summarizes the waterbodies crossed by the LSr Project. Individual waterbodies crossed by the LSr Project are listed in Appendix K. Waterbody widths at the point of each crossing would be determined pending field review. Enbridge would determine the appropriate crossing method for each waterbody upon further consultation with appropriate regulatory agencies.

TABLE 3.4.1-1

Summary of Waterbodies Crossed by the LSr Project Pipeline Route [a]

County, State	Perennial	Intermittent	Wild & Scenic	Nationwide Rivers Inventory-Listed	Minnesota Protected Waters[b]	State/County Canoe Routes[c]	Minnesota-Designated Trout Streams[d]
Pembina, North Dakota	3	21	0	1	NA	1	NA
Kittson, Minnesota	1	7	0	0	2	1	0
Marshall, Minnesota	4	13	0	1	4	1	0
Pennington, Minnesota	3	13	0	1	4	1	0
Red Lake, Minnesota	4	6	0	0	2	0	0
Polk, Minnesota	5	5	0	0	0	0	0
Clearwater, Minnesota	6	2	0	0	6	0	0
Total	26	67	0	3	10	4	0

[a] Based on field surveys conducted during the summer and fall of 2006 and 2007.
[b] Verified by the Minnesota Department of Natural Resources (MDNR).
[c] Recreational canoeing rivers (North Dakota Parks and Recreation, www.ndparks.com; MDNR, www.dnr.state.mn.us
[d] Designation, per Minnesota Rules 6264, Subp.4.

Floodplain data was obtained from Federal Emergency Management Agency (FEMA) National Flood Insurance Program digital data depicted on Flood Insurance Rate Maps. In North Dakota, 100-year floodplains would be crossed between MPs 773.7 (beginning at the North Dakota - Canada border) and 784.0 (Pembina River), MPs 785.3 and 787.0 (Tongue River), and MPs 793.5 and 801.8 (Red River). In Minnesota, 100-year floodplains would be crossed between MPs 801.8 and 807.2 (associated with the Red River), and at the following rivers Tamarac River (MP 828.9 to 829.1), Middle River (MP 835.9 to 836.1), and Red Lake River (MP 864.3 to 864.5). There are no 500-year floodplains that would be crossed by the LSr Project.

Water Quality

The CWA, section 303(c), requires that each state review, establish, and revise water quality standards for all surface waters within the state. To comply with this requirement, each state crossed by the proposed LSr Project has developed its own beneficial use classification system to describe state designated use(s). Regulatory programs for water quality standards include default narrative standards, nondegradation provisions, a Total Maximum Daily Load (TMDL) regulatory process for impaired waters, and associated minimum water quality requirements for the designated uses of listed surface waterbodies within the state.

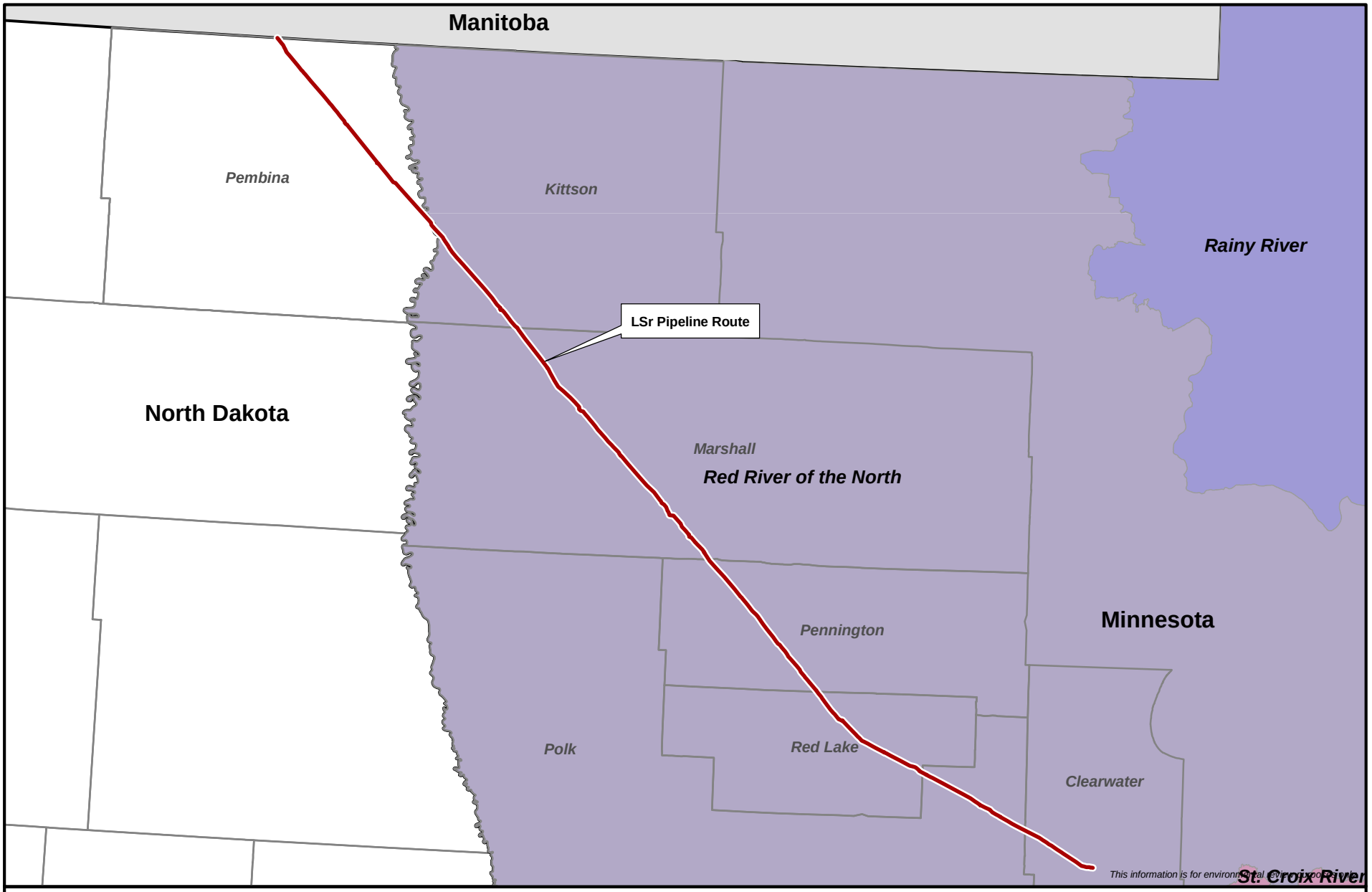

Figure 3.4.1-1

Southern Lights 20-Inch Crude Line

Primary Drainage Basins in Minnesota

Enbridge Pipelines (Southern Lights) L.L.C.

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The LSr Project pipeline route would cross two rivers listed in the North Dakota 2004 Integrated Water Quality Assessment Report list of impaired waters (303(d) list). Table 3.4.1-2 lists the waterbodies, their designated use, and reason for impairment.

TABLE 3.4.1-2

Proposed Crossings of North Dakota Impaired Waters

Stream	County	Milepost	Designated Use	Use Support	Impairment
Pembina	Pembina	775.6	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform
Red River of the North	Pembina	801.7	Fish Consumption	Not Supporting	Methyl Mercury

The Pembina River is listed as a Priority 2 River and is scheduled for development of TDMLs within the next 10 years. TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet the water quality standard for that water body as set by the states and/or Tribes. The TMDL calculation must include a margin of safety to ensure that the waterbody can be used for the purposes designated and must consider seasonal variations in water quality. The Red River of the North is listed as a Priority 3, which is impaired for fish consumption due to methyl-mercury contamination. While there are many potential sources of methyl-mercury, both anthropogenic and natural, to date there have been no specific causes or sources identified for the mercury present in North Dakota fish.

The LSr Project would cross eight impaired rivers as identified by the Minnesota 2008 Final Draft section 303 (d) CWA TMDL List of Impaired Waters. Table 3.4.1-3 lists these waterbodies, their designated use, and reason for impairment.

TABLE 3.4.1-3

Proposed Crossings of Minnesota Impaired Waters

Waterbody	County	Milepost	Designated Use	Use Support [a]	Impairment
Red River of the North	Kittson	801.7	Aquatic Consumption	5A	Mercury Fish Consumptive Advisory (FCA), PCB FCA [b]
Tamarac River	Marshall	828.8	Aquatic Life	5C	Fish IBiotic Impairment [c]
Middle River	Marshall	835.9	Aquatic Life	5A	Turbidity [d], Dissolved Oxygen [d]
Black River (County Ditch)	Pennington	855.0	Aquatic Life	5A	Turbidity [d], Dissolved Oxygen [e]
Red Lake River	Pennington	864.3	Aquatic Consumption	4A	Mercury FCA [f]
Clearwater River	Red Lake	875.4	Aquatic Consumption	4A	Mercury FCA [f]
Lost River	Red Lake	885.8	Aquatic Recreation	5C	Fecal Coliform [g]
Silver Creek	Clearwater	907.1-907.8	Aquatic Recreation	5C	Fecal Coliform [g]

[a] Category 5 has the following three sub-categories: 1) 5A: Impaired by multiple pollutants and no total maximum daily load (TMDL) study plans are approved by the EPA; 2) 5B: Impaired by multiple pollutants and at least one TMDL study plan is approved by EPA; 3) 5C: Impaired by one pollutant and no TMDL study plan is approved by the EPA. Category 4A is an impaired or threatened water that has completed TMDL study(ies).

[b] TMDL start date 1998, 2002, completion dates 2001 and 2015, respectively.

[c] TMDL start date 2010.

[d] TMDL start date 2009.

[e] TMDL start date 2011.

[f] TMDL Plan approved 2008.

[g] TMDL start date 2006, anticipated completion date 2009.

For impaired waters in Minnesota, table 3.4.1-4 lists the proposed crossing methods and also the alternative methods that would be used in the event site conditions do support the use of the preferred crossing technique. When the HDD method has not been recommended, Enbridge has changed the proposed crossing method from open cut as identified in the draft EA to the dam and pump method in order to minimize environmental impacts.

TABLE 3.4.1-4

Summary of Crossing Methods for Impaired Waters Along the LSr Project in Minnesota

Milepost	Waterbody	Reach	Crossing Method	Alternative Crossing Method	Crossing Width (bank to bank)	Substrate
801.7	Red River of the North	Unnamed creek to Two Rivers	HDD	N/A	500 feet	Muck/Silt
828.8	Tamarac River	Florian Park Res. to Stephen Dam	HDD	Dam & Pump	20 feet	Muck/Silt
835.9	Middle River	Headwaters to Snake River	HDD	Dam & Pump	30 feet	N/A
855.0	County Ditch/Black River	Headwaters to Little Black River	Dam & Pump	HDD	30 feet	Mud/sand
864.3	Red Lake River	Thief River Falls Dam to Unnamed Creek	HDD	Dam & Pump	170 feet	N/A
875.4	Clearwater River	Ruffy Bk to Lost River	Dam & Pump	N/A	60 feet	Muck/Silt
885.8	Lost River	Anderson Lake to Hill River	Dam & Pump	HDD	70 feet	Sand
907.1 907.4 907.7	Silver Creek	Headwaters to Anderson Lake	Dam & Pump	HDD	20 feet	Gravel

No waterbodies containing contaminated sediments in the vicinity of the LSr Project pipeline crossings were identified based on publicly available data.

3.4.1.1 Potential Impacts and Mitigation

- Water quality degradation from temporary increases in suspended solids concentrations above background levels during in-stream construction or runoff from disturbed lands.
- Increased sedimentation in waterbodies resulting from either in-stream construction or construction activities on adjacent upland areas.
- Channel and bank modifications that affect channel morphology and stability.
- Reduced flows in waterbodies where water is withdrawn for hydrostatic testing.
- Water quality degradation in waterbodies, lakes, impoundments, or surface water-based public water supplies from pipeline spills or leaks, or from spills or leaks of fuel, lubricants, or hazardous materials during construction or operations.

Construction

As described in section 2.1.3.3, Enbridge would cross waterbodies using one of the following waterbody crossing techniques:

- HDD
- Open Cut
- Dry Flume
- Dry Dam and Pump

Enbridge is proposing to use the HDD crossing method at six waterbody crossings (the Pembina, Red, Red Lake, Tamarac, and Middle Rivers, and an unnamed waterbody at MP 817.0 in Marshall County, Minnesota). The Pembina River would be crossed using the HDD method to avoid further damage to the river banks and associated dykes and to avoid jeopardizing the status of this portion of the river which was listed on the Nationwide Rivers Inventory (NRI) in 1982. The Red River of the North is proposed to be crossed using the HDD method because of the size of the river and because it was successfully crossed in 1998 using this method. The unnamed ditch at MP 817 would be crossed using HDD because of its proximity to U.S. Highway 75 and a nearby railroad, and all 3 features would be crossed simultaneously by the HDD. The Tamarac River would be crossed using HDD to avoid further degradation of the river banks, which contain extensive rock riprap on both sides. The Middle River would be crossed using HDD to avoid impacts on an adjacent parallel segment of the river at this location. For the Red Lake River, HDD is proposed because it was used successfully during a past pipeline expansion project and to avoid impacts on DNR protected species associated with this waterbody.

Since HDD does not involve direct disturbance to the waterbody, channel bed, or stream banks, no impact on the rivers is expected for these crossings. Inadvertent releases could result in siltation of waters either through direct releases into the waterbody, or from on-land releases migrating to water. Such releases could affect aquatic fauna by inhibiting oxygen uptake. Sustained periods of exposure to high levels of suspended solids can cause fish egg and fry mortality and other impacts on fisheries and other aquatic resources. Enbridge has prepared a Drilling Mud Containment, Response, and Notification Plan that identifies procedures to address the potential for the inadvertent release of drilling mud during HDD operations (see Appendix E). These procedures include: actions to be taken by construction personnel when a release is observed; response actions when releases occur in wetlands, waterbodies, and upland areas; containment, clean up (i.e., vacuuming and dilution), and notification procedures (inspection personnel and regulatory agencies); and steps to be taken to restore affected areas (e.g., revegetation, monitoring).

It should be noted that, although the HDD crossing method is generally effective at minimizing impacts on riparian areas and associated resources, such a method is not always feasible and may have other drawbacks as different resource impacts may occur in the event of a drilling mud release. Subsurface conditions, such as shallow bedrock, large cobbles in the subsoil, or unstable or fractured substrata can make an HDD crossing difficult or impossible. In addition, the possibility of a release of drilling muds (or “frac-out”) is always an important consideration, especially when attempting to cross under or near sensitive resources such as calcareous fens. Based on these factors as well as an assessment of impacts cause by the need for additional work space at the drill sites on both sides of the crossing, an overall cost-and-risk-benefit assessment leads to the recommended crossing method. Due to the economic and resource-specific drawbacks of HDD, this method is chosen in limited conditions.

Enbridge would cross the remaining waterbodies using either the open-cut or dam and pump crossing methods (see table of waterbody crossings, Appendix K). For impaired waters that would not be crossed using the HDD method, Enbridge has changed its proposed crossing method from open cut to the dam and pump method to minimize environmental impacts. Crossing methods at waterbodies were determined in part by existing site conditions and previous construction methods used for installation on earlier Enbridge projects.

The construction methods at impaired waters have been determined as discussed below. The Red River would be crossed by HDD due to the breadth of the river at the crossing location and based on Enbridge's successful HDD crossings of this feature on previous projects. An HDD crossing is proposed at the Tamarac River based on an evaluation of current site conditions along the waterbody; specifically steep and eroded stream banks. The Middle River would be crossed using the HDD method. The HDD at this location would be 1,000 feet or greater due to a road crossing, topography and proximity to the river (meandering, resulting in being parallel to the pipe). The Black River would be crossed using the dam and pump method in lieu of the HDD method due to the minimal length of the waterbody crossing and the absence of other sensitive features. The Red Lake River would be crossed with an HDD due to the greater relative length of the river crossing and based on Enbridge's previous successes with this method at this feature. The Clearwater River would not be crossed with the HDD method (dam and pump would be used instead). Records of past crossing attempts of the Clearwater River were reviewed and showed that Enbridge (then Lakehead) had encountered multiple failed HDD attempts in 1998 due to the existence of subsurface glacial erratics. Although HDD technology has improved since 1998, the geotechnical analysis conducted then and again in 2007 for the LSr Project indicates the presence of substantial boulders that would cause an HDD to fail. Both the Lost River and Silver Creek would be crossed using the dam and pump method due to the minimal length of the waterbody crossings. Additionally, this crossing method is not anticipated to contribute to the impairment at either feature.

Additional HDD or dry crossing procedures may be considered at select crossing locations pending determination of crossing-specific resources and state stream crossing regulatory review. For open-cut crossings, the extent of increased suspended solids concentrations and downstream sedimentation impacts would be affected by the flow conditions at the time of construction, the channel substrate, and duration of in-stream construction. Although Enbridge is planning to install the pipeline under most waterbodies using the open-cut method, a dry crossing method, such as the dam-and-pump or flume method, may be used where warranted by site conditions, waterbody type, and/or presence of sensitive species.

Pipeline construction across waterbodies could result in temporary and long-term adverse environmental impacts if not mitigated. Temporary impacts from in-stream trenching could include an increase in the sediment load downstream of the crossing location. Sustained periods of exposure to high levels of suspended solids can cause fish egg and fry mortality and other impacts on fisheries and other aquatic resources. Surface runoff and erosion from the cleared right-of-way also could increase in-stream sedimentation during construction resulting in the deposition in pools and reduction of the quality of spawning beds and benthic substrate.

Long-term impacts on water quality could result from alteration of the stream banks and removal of riparian vegetation. Soil erosion associated with surface runoff and stream bank sloughing could also result in the deposition of sediments in waterbodies. Sediments deposited on streambed gravel may result in increased fish egg mortality and damaged spawning habitat. Removal of riparian vegetation could also lead to increased light penetration into the waterbody, causing increased water temperature which could potentially be detrimental to fisheries. Subsequent to the issuance of the draft EA for this project, Enbridge has revised the construction alignment at the Tongue and Snake River crossings so as to minimize the amount of tree clearing along the banks of these rivers.

To address the concern about the insufficient vegetative cover in areas across the existing, maintained pipeline corridor, Enbridge proposes to replant shallow-rooted woody vegetation in 25–foot-deep buffers adjacent to waterbodies and between all of the pipelines (new and existing) where the pipes are buried sufficiently deep to allow growth of such vegetation, with approval from the landowner. Enbridge would consult with MDNR to select the extent of and preferred vegetation in these areas.

Enbridge reviewed waterbody crossing locations where riparian vegetation includes trees (see table 3.4.1-5). At five of the six proposed crossings using the HDD technique (where no clearing would occur between the drill site work spaces), woody vegetation would be planted across the existing right-of-way (approximately 125 feet wide). The sixth crossing (MP 817) location does not have riparian forest present. At the five locations, woody species would be planted from the stream bank on both sides of the crossing up to 25 feet away from the bank across the 125-foot-wide existing right-of-way. A 10-foot area directly centered over each existing pipeline (five total) would not be replanted to facilitate operational inspection. The replanting area associated with each of the five HDD crossings would be approximately 3,750 square feet.

TABLE 3.4.1-5

Locations of Woody Vegetation Replantings for Forested Waterbodies Crossings

Waterbody	Milepost	Replanting Area (square feet)
Horizontal Directional Drill (HDD) Crossings		
Pembina River	775.5	3,750
Red River of the North	801.7	3,750
Tamarac River	828.2	3,750
Middle River	835.9	3,750
Red Lake River	864.3	3,750
Non - HDD Crossings		
Tongue River Tributary	782.6	5,750
Tongue River	786.2	5,750
Unnamed	839.8	5,750
Snake River	843.1	5,750
Snake River Tributary	847.3	5,750
Clearwater River	875.4	5,750
Lost River Tributary	902.9	5,750
Lost River Tributary	903.6	5,750
Lost River Tributary	904.0	5,750
Silver Creek	907.1	5,750
Silver Creek	907.9	5,750
Unnamed	908.9	5,750
Silver Creek Tributary	909.2	5,750
Total		93,500 (2.15 acres)

At the remaining waterbody crossings that currently support a riparian forest, up to 50 feet of new right-of-way would be replanted, in addition to the existing 125-foot-wide permanent existing right-of-way. As with the HDD sites, the plantings would extend from the stream bank on both sides 25 feet away. A 10-foot area directly over both the new pipeline and the existing pipelines would not be replanted (six total pipelines). The replanting area associated with each of the 13 non-HDD forested waterbody crossings would be approximately 5,750 square feet.

The total area proposed for replanting would be approximately 93,500 square feet (2.15 acres) (see table 3.4.1-5).

Enbridge would avoid and minimize impacts on less than significant on waterbodies by implementing the measures described in its EMP and CECP (see Appendices D and J, respectively) as well as those recommended by the FWS and NDDH (see Appendix A). These measures include limiting the duration of construction within waterbodies and limiting equipment operation within waterbodies to the area necessary to complete the crossing. Construction would not occur during fish migration and

spawning periods, typically from April 15 to June 1. Disturbed areas at crossings would be restored and stabilized as soon as practical after pipeline installation.

MDNR had suggested that full right- of- way re-vegetation along river corridors. However, the right of way must generally remain clear of woody vegetation to allow access in the event of an emergency, allow for efficient aerial inspection, protect the pipeline from pipeline coating damage associated with tree roots and also to delineate a well-defined corridor to reduce the potential of unknowing parties from striking the pipeline.

Spills from refueling operations, fuel storage, or equipment failure in or near a waterbody could affect aquatic resources and contaminate the waterbody downstream of the release point. Enbridge would minimize the potential impact of spills of hazardous materials by implementing the measures described in its SPCC Plan (see Appendix G).

Enbridge would hydrostatically test the new pipeline as described in section 2.1.2 to verify its integrity prior to placing the pipeline in service. Enbridge would obtain applicable water appropriation and discharge authorizations from state agencies prior to conducting hydrostatic testing activities.

Water used for hydrostatic testing would typically be discharged on land or returned to the waterbody where it was appropriated. Appropriation and discharge authorizations would be obtained in North Dakota from the State Water Commission and NDDH, respectively and in Minnesota from the MDNR and the MPCA, respectively. If test water is discharged to an upland area, energy dissipation devices such as straw bale structures would be used to minimize the potential for erosion and subsequent release of sediment into nearby surface waters and wetlands. If hydrostatic test water is discharged directly into waterbodies, energy dissipation devices would be used to reduce the discharge energy to prevent stream bottom scour. No chemical additives are anticipated to be introduced to the water used to hydrostatically test the new pipeline, and no chemicals would be used to dry the pipeline following the completion of hydrostatic testing. Hydrostatic testing would be conducted in accordance with applicable permit conditions. As noted in section 2.1.2, water would be appropriated from and discharged to the same waterbody for each test. Therefore, no aquatic nuisance species, pathogens or other organisms would be transferred beyond their watershed of origin.

All aboveground facilities would be located outside of the 100-year floodplains, except for mainline valves. These remotely operated valves would be sited in locations near major river crossings in accordance with DOT regulations (49 C.F.R. §195.260). These valves could be quickly activated to shut down the pipeline in the event of an emergency.

Operation

The PHMSA prescribes pipeline design, and operational and emergency preparedness requirements that limit the risk of accidental releases (leaks or spills) from pipelines. Over the operational life of the LSr Project pipeline there would be a very low likelihood of a petroleum release that could enter surface water resources or drinking water supplies. Enbridge has developed emergency response plans and would incorporate the LSr Project pipeline into its existing and ongoing pipeline operation and maintenance practices and emergency response planning (pertinent sections of these plans are included in Appendix F). The amended Emergency Response Plan would be submitted and approved by PHMSA. No significant impacts on surface waters are anticipated as a result of these ongoing practices.

Normal operations would not adversely affect surface water resources. Minor surface disturbance activities from pipeline inspection and maintenance may occur infrequently.

3.4.2 Groundwater

Groundwater quality and quantity is primarily a function of the region's geologic and hydrogeologic setting. Thick glacial sediments, including till, outwash, and lacustrine deposits, cover much of the project area. Groundwater yields from these glacial deposits vary but typically range from less than 1 gpm in till and lacustrine deposits to greater than 500 gpm from surficial and buried outwash deposits (Kanivetsky, 1979). Well depths in the glacial deposits typically range from approximately 30 to 380 feet (U.S.GS, 1985).

Groundwater is the primary source of water for private, public, and industrial uses in residences, communities, and commercial facilities located along the pipeline route. Groundwater occurs in surficial aquifers (water-bearing unconsolidated material deposited above the bedrock surface), buried drift aquifers, and bedrock aquifers.

3.4.2.1 Surficial Aquifers

Surficial aquifers occur above the bedrock in unconsolidated sediments deposited by glaciers, waterbodies, and lakes. The depth of the material is generally less than 100 feet, but may reach several hundred feet in some areas (Adolphson et al., 1981). Short-term groundwater yields from unconfined surficial aquifers vary, but can range from 10 gpm to approximately 3,000 gpm. The LSr Project pipeline route lies entirely within the glaciated Central Lowlands physiographic province.

Surficial aquifers are an important source of groundwater for much of the northern half of the project area and can provide adequate water volumes to supply municipalities and irrigation systems. There are a few surficial drift aquifers near the southern end of the project, except in the alluvial deposits of major drainage ways. Figure 3.4.2-1 shows major surficial aquifers crossed by the proposed pipeline route. Water quality of these surficial aquifers can be affected by surface activities, including industrial and agricultural land use, due to the relatively shallow depth of the water table and the relatively coarse texture of the material overlying the aquifer.

3.4.2.2 Buried Drift Aquifers

Buried drift aquifers (see figure 3.4.2-1) are composed of clean sands and gravels typically deposited in bedrock valleys, alluvial channels, and outwash plains under fluvial conditions by glacial meltwater. These deposits subsequently were covered by fine-textured materials, such as glacial till or lacustrine silts and clays, which form a confining layer above the aquifer. The confined buried sand and gravel deposits typically are less than 30 feet thick but may extend to 150 feet thick locally. Buried drift aquifers have limited potential use for high capacity wells, but constitute an important source of groundwater in the region (MPCA, 1999). Well yields range from approximately 10 gpm to 1,000 gpm (Adolphson et al., 1981). The confining layer (e.g., clay material) above the aquifer generally protects it from contamination resulting from human activity at the surface. Water quality is typically very good in buried drift aquifers.

3.4.2.3 Bedrock Aquifers

The Red River-Winnipeg Aquifer underlies several hundred feet of till and lake sediment of Glacial Lake Agassiz in northeastern North Dakota and northwestern Minnesota, and is composed primarily of sandstone, limestone, and shale formed during the Paleozoic era (225 to 600 million years ago). Water is under confined conditions throughout most of the aquifer. Artesian wells into this aquifer have recorded flows of 60 gpm and pumping wells commonly range from 100 to 250 gpm, with localized

flows to 500 gpm. The aquifer, which has a great potential for providing large supplies of water, is seldom used because the water is highly mineralized and has dissolved-solids concentrations ranging from 3,000 to 60,000 milligrams per liter (mg/l) and has large iron, sodium, and chloride concentrations.

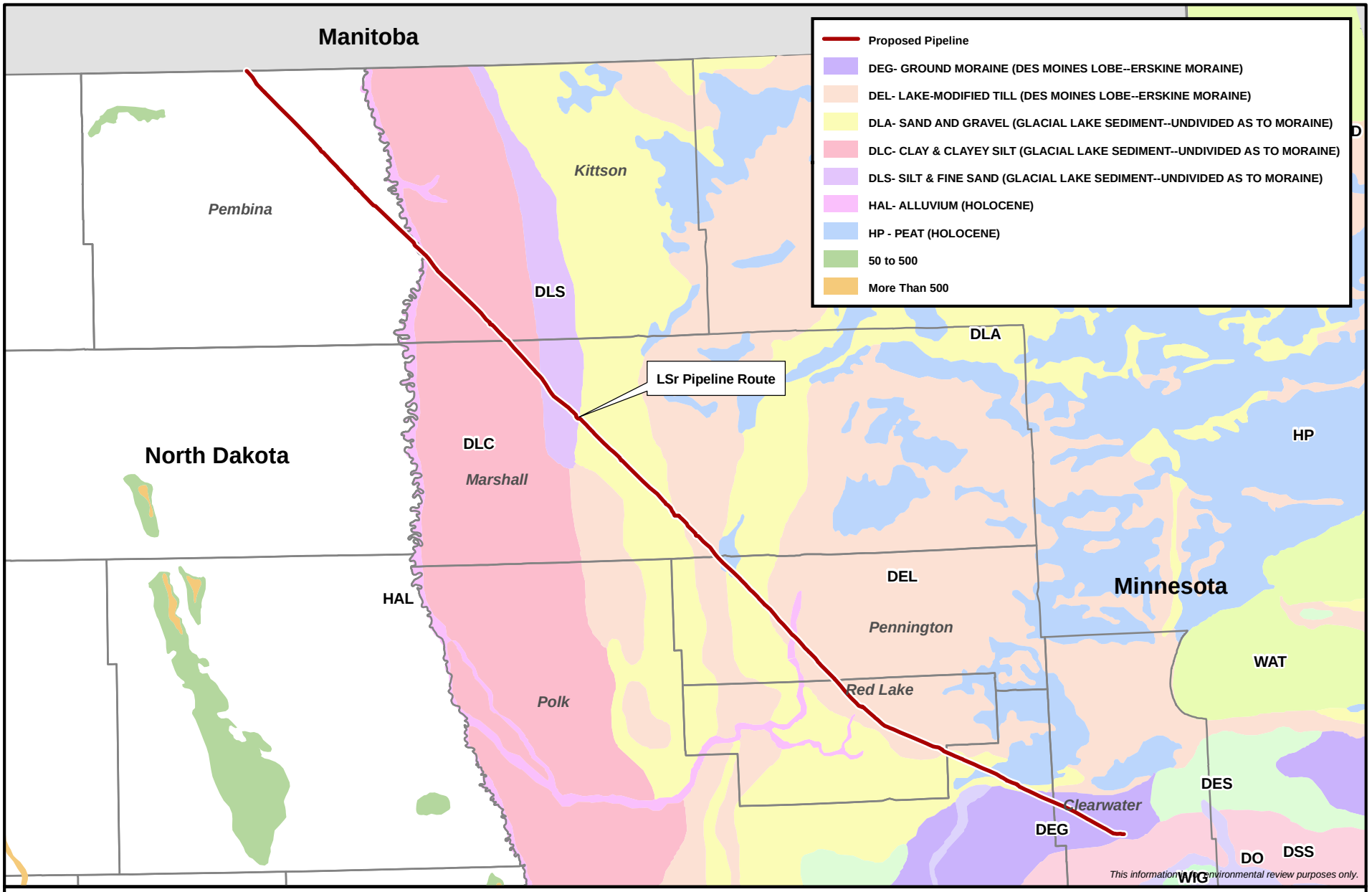

Figure 3.4.2-1

Southern Lights 20-Inch Crude Line

Surficial Aquifers in the Project Area

Enbridge Pipelines (Southern Lights) L.L.C.

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The Cretaceous Aquifer in western and southwestern Minnesota was formed between 65 to 136 million years ago and consists of sandstone lenses near the base of predominantly gray, soft, argillaceous (solidified mud and clay) shale sections. This aquifer was generally confined and where present, ranges from 280 to 620 feet below the surface. Wells using this aquifer commonly yield 10 to 250 gpm, with local yields ranging up to 1,000 gpm. This aquifer is not widely used for ground water except where drift aquifers are absent or where well yields are poor. Most water use from this aquifer is for rural domestic and livestock supplies, and the potential for development of large municipal and industrial water supplies is low.

The Precambrian undifferentiated aquifer consists of granite, greenstone, and slate, which yield limited supplies of water to rural domestic and livestock wells in southwestern, central, and northeastern parts of Minnesota where fractures, faults, and weatherized zones provide porosity and permeability. These rocks generally do not support aquifers in the rest of the region. Wells using this aquifer are generally at a depth of 30 to 450 feet and provide flows of 5 to 25 gpm with localized wells exceeding 100 gpm. Yields generally increase where the bedrock is overlain by thick drift, and some wells are drilled several hundred feet into the rocks so that the drilled hole acts as reservoir. Calcium magnesium bicarbonate water is more common in this aquifer and dissolved-solids concentrations are generally less than 300 mg/l.

3.4.2.4 Water Supplies and Wells

North Dakota

No public source water protection areas would be crossed by the LSr Project in North Dakota based on a review of available information on public drinking water supplies through the EPA Region 5 and the NDDH. The cities of Pembina, approximately 31 miles downstream of the point of the pipeline crossing on the Red River and Drayton, approximately 16 miles upstream of the point of the pipeline crossing on the Red River are the closest communities to the project and both obtain water from the Red River for public drinking water supplies (NDDH, 1999). The LSr Project pipeline route would not cross any EPA-designated sole-source aquifers in North Dakota.

The North Dakota State Water Commission computerized database contains basic information for over 30,000 wells drilled in North Dakota. The data is derived from water well contractors' logs of geologic materials encountered during drilling. Based on a review of the database, no domestic water supply wells within 500 feet of the pipeline route in North Dakota were identified.

Minnesota

No public source water protection areas located in the vicinity of the pipeline route would be crossed in Minnesota based on a review of the Minnesota Department of Health (MDH) water well database and subsequently confirmed by MDH (see Appendix A). The pipeline route would not cross any EPA-designated sole-source aquifers in Minnesota. However, it would cross about 0.4 mile of one Drinking Water Supply Management Areas (DWSMAs) near MP 886.4 in the vicinity of Oklee, Minnesota. The MDH rates the vulnerability of the Oklee area as low. In Minnesota, DWSMAs are considered a type of SWPA in accordance with the rules of the Minnesota Wellhead Protection Program (Minnesota Rules, Chapter 4720.5100 -4720.5590). The city of Thief River Falls obtains water for public use from the Red Lake River approximately 8 miles downstream of the point of the LSr Project pipeline crossing.

The County Well Index (CWI) is a computerized database maintained by the Minnesota Geological Survey that contains basic information for over 340,000 water wells drilled in Minnesota.

CWI data is derived from water well contractors' documentation of geologic materials encountered during drilling. Based on a review of the CWI database, one domestic well within 200 feet of the pipeline route was identified. The well is located at Enbridge's existing Viking Pump Station, about 23 feet northeast of MP 848.4 in Marshall County (Minnesota CWI, 2006).

3.4.2.5 Potential Impacts and Mitigation

- Groundwater quality degradation during or after construction from disposal of materials, pipeline spills or leaks that seep into shallow aquifers used for domestic, agricultural, or public water supplies.

- Groundwater level fluctuations in shallow and surficial aquifers from construction.

Construction

Construction of the pipeline project is not expected to have long-term impacts on groundwater resources. Ground disturbance associated with pipeline construction is primarily limited to the upper 10 feet which is above the water table of most of the regional surficial aquifers. Construction activities such as trenching, backfilling, and dewatering that encounter shallow surficial aquifers may result in minor short-term fluctuations in groundwater levels within the aquifer. Once the construction activity is complete, the groundwater levels typically recover in a short period of time. Enbridge will work with landowners along the pipeline route to determine if they are aware of the presence of cased wells in close vicinity to the right-of-way. If such wells are identified, the locations of these wells would be noted and adjustments to the location of the pipeline may be made in accordance with applicable state and federal laws.

Blasting to install the pipeline in a bedrock aquifer has the potential to adversely affect water quality and water yields in nearby water wells. However, as indicated previously, no areas of shallow bedrock have been identified within the project area, therefore blasting is not anticipated to be necessary as part of this project.

The introduction of contaminants to groundwater due to accidental spills of construction related chemicals, fuels, or hydraulic fluid could have an adverse affect on groundwater quality, most notably near shallow water wells. Spill-related impacts from pipeline construction are primarily associated with improper fuel storage, equipment refueling, and equipment maintenance. Enbridge's SPCC Plan (see Appendix G) outlines measures that would be implemented to prevent and respond to releases of fuels and other hazardous substances during construction including measures for clean up, documentation, and reporting of spills. By implementing the protective measures set forth in the SPCC Plan, groundwater contamination due to construction activities is not anticipated.

Operation

Accidental releases from the pipeline system during operations could potentially affect groundwater. As part of the pipeline operation, which is regulated by the PHMSA, Enbridge has an ongoing maintenance, inspection and integrity testing program to monitor the safety of the pipeline system. Monitoring activities include regular inspection of the cathodic protection system, which addresses the corrosion potential of a steel pipe installed below the ground surface. In addition, Enbridge utilizes computerized inspection tools that travel through the inside of the pipeline to check pipe integrity. Enbridge also performs regular aerial flyovers to inspect the pipeline right-of-way. These and other procedures are detailed in a comprehensive set of written Operating and Maintenance Procedures, many of which are subject to periodic audits conducted by PHMSA, or its agent, the Minnesota Office of

Pipeline Safety. As required by federal regulations under 49 C.F.R. Part 194, Enbridge has existing emergency response plans, which have been reviewed and approved by appropriate regulatory agencies to address pre-planning, equipment staging, notifications, and leak containment procedures to be implemented in the event of a pipeline leak (see Appendix F).

MDH recommends that special safeguards be implemented to protect the DWSMA near MP 886.4 (J. Walsh, 2008). Specifically, MDH recommends that leak detection efforts be enhanced in this area and that in the event of a spill or leak, cleanup be initiated in an aggressive fashion and the Wellhead Protection Manager for a given DWSMA be contacted as soon as possible.

As described in Appendix A (section G: Public Health and Safety), Enbridge notes that it employs a leak detection subsystem as part of its Pipeline Control System that exceeds federal regulations and implements a public awareness program that contributes to education of residents in observing and reporting abnormal conditions. As evidenced by the reporting of very small leaks (see table 3.11.2-1), Enbridge is able to detect or learn of small leaks to ensure rapid response, control and restoration. In the event of a leak, Enbridge would work aggressively to initiate clean up activities and contact the appropriate Wellhead Protection Manager to coordinate leak containment and clean up.

3.4.3 Wetlands

Wetlands along the LSr Project primarily include depressional wetlands as well as those associated with floodplains and basin drainages. Enbridge conducted a comprehensive wetland delineation survey of its pipeline right-of-way during the 2006 and 2007 growing seasons. Field delineation surveys verified information collected using NWI map data in digital format. The resulting field data allowed digital analysis of wetland crossings using GIS software. Aerial photographs of the pipeline route were used in conjunction with the field data to determine the number, size, and locations of wetlands along the pipeline route and if wetlands adjacent to the proposed right-of-way could be affected by pipeline construction.

Wetlands were identified and mapped in general accordance with the Routing Determination method as specified in the Corps of Engineers Wetland Delineation Manual (COE, 1987). A total of 209 wetlands were identified within a 150-foot-wide survey corridor along the pipeline route. One wetland crossed is identified as 57-3W on Minnesota Protected Waters maps (see section 3.4.3.1). A summary of the wetlands crossed by the project is provided in table 3.4.3-1. A complete list of wetlands crossed by the LSr Project is included in Appendix K.

A total of approximately 14.2 miles of wetlands would be crossed by construction of the project. Predominant wetland types crossed by the project are Palustrine emergent (“PEM”, approximately 100.3 acres), Palustrine scrub-shrub (“PSS”, approximately 5.1 acres), and Palustrine forested wetlands (“PFO”, approximately 2.7 acres). Common plant species identified in these wetlands include: broad-leaved cattail (*Typha latiolia*), reed canary grass (*Phalaris arundinacea*), lake sedge (*Carex lacustris*), water sedge (*Carex aquatilis*), speckled alder (*Alnus rugosa),* black willow (*Salix nigra*), black ash (*Fraxinus nigra*), tamarack (*Larix laricina*), and black spruce (*Picea mariana*).

The LSr Project would cross a total of 22 wetlands for a total of 2.5 miles in North Dakota. The construction right-of-way of the LSr Project would include approximately 17.7 acres of wetlands. Within North Dakota, the LSr Project would be close to, but would not cross, wetlands associated with the Juhl WMA. Enbridge has consulted with the COE, FWS and other appropriate agencies regarding construction near these wetlands. In Minnesota, construction of the LSr Project would cross a total of 150 wetlands, for a total of 11.7 miles or 90.8 acres.

3.4.3.1 Protected Wetlands

The pipeline route would cross one wetland (public water wetlands) listed on the MDNR Protected Waters Inventory (e.g., Public Water Wetlands). Public Water Wetlands are Type 3, 4, and 5 wetlands, as defined in the FWS Circular No. 39 (1971 edition), that are 10 acres or larger in unincorporated areas or 2.5 acres or larger in incorporated areas. Type 3, 4, and 5 wetlands include inland shallow fresh marshes; inland deep fresh marshes; and inland open fresh water, shallow ponds, and reservoirs. These wetlands are regulated as public waters under the MDNR's Public Waters Permit Program. The public water wetland referred to as "57-3W" by MDNR, is located as MP 853.7 and would be crossed by the pipeline route for about 710 feet.

TABLE 3.4.3-1

Summary of Wetland Types Crossed by the LSr Project Pipeline Route

County	Wetland Type [a]	Number of Wetlands	Centerline Crossing Length (miles)	Area Affected (acres)[b]
Pembina				
	PEM	21	2.5	17.7
	PFO	1	<0.1	0.0
	PSS	0	0.0	0.0
	PUB	0	0.0	0.0
Pembina Total		22	2.5	17.7
Kittson				
	PEM	7	0.3	2.1
	PFO	1	0.0	0.2
	PSS	0	0.0	0.0
	PUB	0	0.0	0.0
Kittson Total		8	0.3	2.3
Marshall				
	PEM	20	1.6	11.9
	PFO	3	<0.1	0.6
	PSS	9	0.4	3.6
	PUB	0	0.0	0.0
Marshall Total		32	2.1	16.1
Pennington				
	PEM	45	2.5	17.7
	PFO	1	<0.1	0.2
	PSS	2	0.1	1.2
	PUB	3	<0.1	0.5
Pennington Total		51	2.7	19.6
Red Lake				
	PEM	17	1.67	11.4
	PFO	3	0.2	1.6
	PSS	0	0.0	0.0
	PUB	1	0.0	<0.1
Red Lake Total		21	1.8	13.0
Polk				
	PEM	11	2.8	25.2
	PFO	1	0.0	0.1
	PSS	0	0.0	0.0
	PUB	0	0.0	0.0
Polk Total		12	2.8	25.3
Clearwater				
	PEM	24	1.9	14.3
	PFO	0	0.0	0.0
	PSS	2	<0.1	0.3
	PUB	0	0.0	0.0
Clearwater Total		26	2.0	14.6
Grand Total		172 [c]	14.2	108.5

[a] PEM = Palustrine Emergent; PSS =Palustrine Scrub-Shrub; PFO = Palustrine Forested; PUB = Palustrine Unconsolidated Bottom (Cowardin Classification, 1979)

[b] Based on a 75-foot wide construction right-of-way. Portions of PFO wetlands associated with HDD crossings in Pembina, Kittson, Marshall, and Pennington Counties would not be cleared for construction (see section 3.4.1.1).

[c] The total represents wetlands crossed by the pipeline construction right-of-way. Wetlands listed in Appendix K (n= 209) also include wetlands within the survey corridor, but not the construction right-of-way.

Calcareous fens are defined in Minnesota as peat-accumulating wetlands dominated by distinct groundwater inflows having specific chemical characteristics. The water associated with these fens is neutral to alkaline with high concentrations of calcium and low dissolved oxygen. Calcareous fens are protected in Minnesota as "outstanding resource value waters" in water quality regulations administered by the MPCA (MR Chap. 7050.0180) and they are given special protection through Minnesota Rules part 8420.1010 through 8240.1060. The Minnesota Wetland Conservation Act (WCA) states that calcareous fens may not be filled, drained, or otherwise degraded, wholly or partially, by any activity, except as provided by the MDNR.

The MDNR identified a calcareous fen in the vicinity of the proposed corridor near MP 844. The proposed pipeline route avoids directly crossing this wetland and lies approximately 300 feet down gradient. During field wetland delineation surveys completed in 2007, one previously undocumented calcareous fen was discovered in the vicinity of MP 853 along the LSr Project pipeline route. In consultation with MDNR, Enbridge relocated the proposed route north of the existing corridor which lies north, up gradient of the fen.

3.4.3.2 Potential Impacts and Mitigation

- Potential modifications in wetland productivity because of modifications to surface and subsurface flow patterns from pipeline construction.
- Temporary and permanent modifications in wetland vegetation community composition and structure from clearing and operational maintenance.
- Loss of wetlands due to backfilling or draining.
- Wetland soil disturbance.
- A temporary increase in turbidity and fluctuations in wetland hydrology.
- Construction through wetlands could affect the water retaining substrate and result in permanent alterations to their water holding capacity.
- Degradation of calcareous fen.

Construction

No wetlands would be permanently filled or drained as a result of constructing the project. Construction would result in temporary wetland disturbance and, in forested wetlands, an incremental change in plant species composition from forested to non-forested species. Enbridge will adhere to the COE's mitigation measures with respect to the replacement for trees and shrubs. The NDGFD recommends that any loss of trees associated with forested wetlands in North Dakota be replaced on a 2:1 basis (see Appendix A). Temporary wetland impacts include loss of wetland vegetation and wildlife habitat as a result of construction activities; soil disturbance associated with trenching and equipment movement; and increases in turbidity and alterations of hydrology as the result of trenching, dewatering and soil stockpiling activities.

Approximately 100.3 acres of palustrine emergent wetland would be temporarily affected by pipeline construction. There would be no long-term impacts on emergent wetlands. The wetlands would be restored to preconstruction conditions and the herbaceous vegetation would be allowed to naturally revegetate in these areas.

Approximately 5.1 acres of palustrine scrub-shrub wetland and approximately 2.7 acres of palustrine forested wetland would be cleared and temporarily disturbed during pipeline construction. The impacts on scrub-shrub wetlands and forested wetlands would be of longer duration than emergent wetlands because the woody vegetation would require a longer time to re-establish on the temporary right-of-way after restoration.

Pipeline construction in wetlands is described in section 2.1.3.4. The construction right-of-way width would be reduced to 75 feet through all wetlands to minimize potential effects. Pipeline construction through wetlands must comply, at a minimum, with CWA section 404 permit requirements. Enbridge would minimize impacts in wetlands by implementing the mitigative measures specified in the EMP and CECP, including:

- wetland vegetation would be cut off at ground level and removed from the wetland areas;
- construction mats would be used, as needed, to facilitate equipment access and pipeline installation;
- temporary erosion control devices would be installed prior to trenching activities;
- the top 1 foot of topsoil or the amount of topsoil present, whichever is less, would be stripped over the trench line, segregated, and replaced in unsaturated wetlands;
- surface water flow would be maintained during construction to the extent practicable;
- wetlands would be restored to preconstruction contours;
- wetland hydrology would be maintained by using trench breakers when necessary, and sufficiently compacting the pipeline trench;
- unsaturated wetlands would be revegetated with a temporary cover crop;
- wetland vegetation would be allowed to naturally revegetate with wetland plants common to the area; and
- no aboveground facilities would be constructed in wetlands.

Enbridge would continue to seek further guidance from MDNR and COE regarding the presence and control of noxious and invasive species in wetlands.

Construction techniques employed near the fen (MP 853) would avoid impacts on this protected wetland such that any loss of function or degradation would be avoided. The fen is located south of the proposed construction corridor. The construction right-of-way would be rerouted to the north, further away from the fen. This approach has been developed in consultation with MDNR. MDNR suggested employing the HDD method to cross this area. However, the nature of soils in beach ridge formations is not conducive to a successful implementation of this technique. Beach ridges typically contain stratified layers of silts, clays, sands and gravel in laminated formations. The presence of the fen and wet meadow communities in this area is a strong indicator of near-surface hydrologic flow. Enbridge is concerned that a HDD crossing would likely result in movement of bentonite clay ("drilling mud") through soil fissures either to the surface ("frac-outs") or, of even greater concern, laterally within the substrate thereby causing interference with subsurface water movement. The effects could result in releases of drilling mud into nearby wetland features or inalterable changes in wetland hydrology. While groundwater may likely

be encountered during open trenching through this area, the impacts on the wetland would be temporary and be less than the risk of a major frac-out if an HDD failed.

Consistent with applicable policies, regulations and rules governing compensatory wetland mitigation for purposes of section 404 CWA, including, but not limited to: the Draft St. Paul District Compensatory Mitigation Policy for Minnesota, dated March 14, 2007; the Interagency Memorandum of Understanding regarding Wetland Mitigation Guidelines entered into by the Minnesota Board of Water and Soil Resources (BWSR) and the St. Paul District, COE, May 20, 2007; and St. Paul District mitigation guidelines for linear infrastructure projects, Enbridge would provide compensatory wetland mitigation for unavoidable permanent and temporary impacts on forested wetland and scrub shrub wetland. The impact areas would include estimates of the wooded component of mixed emergent and wooded wetland, as well as areas where trees and shrubs were dominant.

The overall objective of the proposed compensatory wetland mitigation would be to compensate for wetland resource functions lost as a result of the proposed project taking into consideration what is available, practicable, and capable of being done. Proposed project wetland mitigation would be in place, as defined by applicable guidelines, in that it would be located within one or more of the watersheds, counties or wetland bank service areas in which the wetland impacts occur. Appropriate and practicable compensatory wetland mitigation ratios would be established in consultation with the St. Paul District; the factors used to determine mitigation ratios would be those specified in applicable policies and rules, such as whether the proposed mitigation is in kind or out of kind; in place or out of place; in advance or not in advance; or located in an area with greater than or less than 80 percent of its pre-settlement wetland acreage remaining. At this time, proposed project wetland mitigation may include:

- restoring effectively drained wetland;
- rehabilitating the functions of existing, degrading wetland;
- creating new wetland;
- enhancing existing wetland functions by planting native trees or shrubs; and/or
- purchasing wetland mitigation credits from an approved wetland bank.

Enbridge would develop a specific wetland mitigation plan based on consultation with the St. Paul District and other state and federal resource agencies, including EPA. This mitigation plan would be submitted to the St Paul District for review and approval prior to commencement of project construction. The St. Paul District and Enbridge would develop cooperatively hydrology and vegetation success criteria for restored, rehabilitated, created or enhanced wetland mitigation sites that would be set forth as special conditions in the permit authorization. Wetland mitigation monitoring would be required consistent with applicable regulations and policies.

Operation

After the pipeline is constructed, additional permanent right-of-way up to 50 feet would be maintained relatively free of larger-diameter trees primarily adjacent to the existing right-of-way. This additional maintained right-of-way would result in the permanent conversion of approximately 0.65 acres of forested wetland to emergent or scrub-shrub wetland. Impacts associated with conversion of forested wetlands to emergent or shrub-scrub wetlands would be mitigated through coordination with the COE as described above.

3.5 TERRESTRIAL VEGETATION

3.5.1 Vegetative Communities

Vegetative communities crossed by the proposed LSr Project pipeline were identified using regional vegetation classification and mapping systems, including the Land Use and Land Cover (LULC) and National Gap Analysis Program (GAP) databases. The LULC database consists of historical land use and land cover classification data that is based on interpretation of 1970s and 1980s aerial photography and land use maps and surveys. There are 21 possible categories of cover type identified under LULC. These categories are broad and include urban area identifiers as well as many vegetation plant community types.

Approximately 91.6 percent of the permanent pipeline right-of-way would cross predominantly agricultural land. This land consists of pastures and row crops such as sunflowers, sugar beets, canola, corn and soybeans. Potatoes are also a common crop in some of the counties in the project area. Approximately 3.8 percent of the pipeline route would cross forest land consisting of upland forests and forested wetlands. The pipeline route would also cross wetlands (approximately 4.1 percent of the pipeline route length) and open land (less than 1 percent of the pipeline route length). The wetlands are primarily composed of emergent marshes and scrub-shrub wetlands, and the open lands consist of maintained rights-of-way and fallow fields.

3.5.1.1 Ecological Classifications

The MDNR has developed an Ecological Classification System. The proposed LSr Project is located in the Prairie Parkland, Tallgrass Aspen Parklands, and Eastern Broadleaf Forest Provinces as defined by this classification system (MDNR website http://www.dnr.state.mn.us/ecs/index.html). North Dakota has no similar classification system.

Prairie Parkland Province

The pipeline route would cross the Red River Prairie subsection of the Prairie Parkland Province between approximate MPs 801.8 and 833.9. The majority of this subsection is a glacial lake plain with silty, sandy, and clayey lacustrine depositions. It is level, uniform, and relatively featureless, broken only by wetlands, meandering waterways, and old beach ridges. Much of this area has been converted to agriculture and is intensively ditched.

Tallgrass Aspen Parklands Province

The pipeline route would cross the Aspen Parklands subsection of the Tallgrass Aspen Parklands Province between approximate MPs 833.9 and 896.2. Well over 60 percent of this subsection is in agricultural production, mostly in the southern half. In the northern half, extensive areas have recently been cleared for farming. Some remnants of large contiguous patches of native plant communities, including wetlands, remain. Wild rice cultivation occurs in the eastern edge of this area.

Eastern Broadleaf Forest Province

The pipeline route would cross the Hardwood Hills subsection within the Eastern Broadleaf Forest Province between approximate MPs 896.2 and 909.5. Much of this area has been converted to agricultural production. Natural communities along the pipeline generally are limited to wetlands and small woodlots. Vegetation communities include aspen, mixed hardwood forests, emergent marshes, and scrub-shrub swamps.

3.5.1.2 Typical Vegetative Communities

As indicated by the descriptions of the ecological units crossed by the project, aspen-birch forest is the most common upland forest type in the project area. Northern mixed hardwood forests and pine forests also are present along the pipeline route in addition to some forested wetlands. The majority of the wetlands are emergent marshes and scrub-shrub swamps. The more common vegetative communities along the pipeline route are described below.

Aspen-Birch Forest

Aspen-birch forests dominate forested upland portions of the project. Quaking aspen and paper birch are primary components. A tall shrub layer may be present consisting of beaked hazel, mountain maple, and saplings of other tree species. Small shrubs such as bush honeysuckle, gooseberry, and raspberry may be present. The herbaceous layer is diverse and dominated by large-leaved aster, bunchberry, Canada mayflower, wild sarsaparilla, and lady fern.

Northern Hardwood Forest

Northern hardwood forests contain sugar maple, basswood, and birch as primary species. These forests often contain a conifer component and may also include red oak on drier sites. A shrub layer may be present depending on the amount of available sunlight. The species present in the shrub layer are typically fly-honeysuckle, beaked hazel, leatherwood, and mountain maple. Club mosses are frequent in the herbaceous layer.

Forested Wetlands

There are four types of forested wetlands in the vicinity of the project: black spruce swamps and bogs, tamarack swamps, cedar swamps, and hardwood swamps. Hardwood swamps are most frequent over the length of the project and are often intermixed with scrub-shrub swamps. Hardwood swamps in this region contain black ash as the primary component with green ash, paper birch, maple, balsam fir, and white cedar as secondary components. Conifer lowlands in the vicinity of the project may contain black spruce, tamarack, and white cedar. Sedges, grasses, and sphagnum moss are common in the understory of the conifer lowlands.

Scrub-shrub Swamps

Scrub-shrub swamps dominate lowland vegetation communities within wetlands found in the project corridor. In the northern region of Minnesota, scrub-shrub swamps contain speckled alder as the primary component. Shrubs such as willow and alder, and trees such as white cedars, tamaracks, black ash, and paper birch may also be present. Northern marsh fern, jewel-weed, and sedges are common in the herb layer.

3.5.1.3 Sensitive Plant Species

Information on sensitive plant species communities potentially found along the proposed right-of-way was obtained from the FWS, NDGFD, and MDNR Natural Heritage Program (NHP); see Appendix A. No occurrences of federal or state listed threatened or endangered plant species were identified along the LSr Project route through the course of consulting with these agencies. However, these agencies provided information on special status species. Data on species of special concern were provided by the various state wildlife departments. The MDNR NHP provided information on the status of various

wildlife populations. The majority of these species are found primarily in wetland or native prairie habitats.

Mesic Prairie Remnant

A review of the MDNR NHP database indicated a Mesic prairie remnant within the right-of-way of the Burlington Northern & Santa Fe Railroad near MP 817. A Mesic and wet prairie remnant was also identified within the Canadian Pacific Railway near MPs 886 and 890. This grassland community occurs on rich, moist, well-drained sites. The dominant plant is the tall grass, big bluestem (*Andropogon gerardii*). The grasses little bluestem (*Andropogon scoparius*), Indian grass (*Sorghastrum nutans*), porcupine grass (*Stipa spartea*), prairie dropseed (*Sporobolus heterolepis*), and tall switchgrass (*Panicum virgatum*) are also frequent. The forb layer is diverse in the number, size, and physiognomy of the species. Common taxa include the prairie docks (*Silphium spp.*), lead plant (*Amorpha canescens*), heath and smooth asters (*Aster ericoides* and *A. laevis*), sand coreopsis (*Coreopsis palmata*), prairie sunflower (*Helianthus laetiflorus*), rattlesnake-master (*Eryngium yuccifolium*), flowering spurge (*Euphorbia corollata*), beebalm (*Monarda fistulosa*), prairie coneflower (*Ratibida pinnata*), and spiderwort (*Tradescantia ohioensis*).

Mixed Cattail Marsh

A review of the MDNR NHP database indicated a mixed cattail marsh near MPs 853 and 854. The mixed cattail marsh community is typically dominated by cattails present on floating mats along shorelines in lakes, ponds, and river backwaters or rooted in mineral soil in shallow wetland basins. Vegetation is often composed of dense stands of cattails interspersed with pools of open water. Associated species are highly variable. Floating leaved and submergence aquatic plant cover is sparse, with species such as duckweed (*Lemna* spp.) and greater duckweed (*Spirodela polyrhiza*) frequent and common bladderwort (*Utricularia vulgaris*) and common coontail (*Ceratophyllum demersum*) occasionally present. Forb cover is strongly dominated by cattails (*Typha* spp.), usually with greater than 50 percent cover. Shrubs are absent or very sparse.

3.5.1.4 Noxious and Invasive Species

After disturbances of the soil, vegetation communities may be susceptible to infestations of noxious species including reed canary grass in aquatic resources. These species are most prevalent in areas of prior surface disturbance, such as agricultural areas, roadsides, existing utility corridors, and wildlife concentration areas. The prevention of the introduction or spread of noxious and invasive weeds is a high priority for nearby communities. In addition to federally listed noxious weeds, each state crossed by the proposed pipeline route maintains a list of regulated and prohibited noxious and invasive weed species.

3.5.2 Potential Impacts and Mitigation

- Removal of vegetation from the right-of-way during construction (and associated reduction in wildlife habitat and forage productivity and an increased risk of soil erosion and weed invasion).
- Modification of existing vegetative communities as a result of right-of-way maintenance.
- Loss of sensitive plant individuals and habitat as a result of construction clearing and grading.

- Potential spread of invasive species and noxious weed populations along the pipeline right-of-way as a result of construction.

Construction

Clearing of herbaceous vegetation during construction is anticipated to be a short-term impact. Active revegetation measures and rapid colonization by annual and perennial herbaceous species in the disturbed areas would restore most vegetative cover within the first growing season. Clearing of woody shrubs and trees would be the primary long-term impact on vegetation associated with the project. Woody shrubs and trees would be allowed to recolonize the temporary construction right-of-way and extra workspaces. However, recolonization of disturbed areas by woody shrubs and trees would be slower than recolonization by herbaceous species. As natural succession is allowed to proceed in these areas, the early successional or forested communities present before construction would eventually be reestablished.

The clearing of trees in the construction right-of-way could affect forest vegetation growing along the edges of the cleared areas. By exposing some edge trees to elevated levels of sunlight and wind, evaporation rates and the probability of tree knockdown could increase. Due to the increased light levels penetrating the previously shaded interior, shade intolerant species would be able to grow and the species composition of the newly created forest edge may change. Clearing could also temporarily reduce local competition for available soil moisture and light and may allow some early successional species to become established and persist on the edge of the uncleared areas adjacent to the site. However, the proposed project is on or adjacent to Enbridge's existing, maintained right-of-way, therefore these impacts are incremental and not a significant change in existing cover type.

In North Dakota, four parcels crossed by the LSr Project have easements that were acquired by the NRCS subsequent to the installation of the original Enbridge pipeline system. Two of the parcels are managed by NRCS as WRP lands. The other two other parcels are set aside as Emergency Watershed Protection (EWP) program easements. Although Enbridge's existing blanket easements pre-date the establishment of these set-aside parcels, and therefore represent a superior property interest, Enbridge has agreed to re-establish vegetation on these parcels based on recommendations from the NRCS. These recommendations include replanting cleared trees and shrubs in the vicinity of the project at a 2:1 ratio.

In the mesic prairie remnants between MPs 816 and 866, these features are associated with railroad corridors. Enbridge would construct underneath these corridors and associated prairie remnants using a horizontal bore technique. This technique does not disturb surface vegetation. Enbridge would implement measures to divert runoff away from remnants and replant remnants with native species, although as stated, no surface disturbance is anticipated in the associated remnants.

Regarding the rare plant community near MPs 853.1 and 853.4 (Mixed Cattail Marsh), surveys conducted in July and September 2007 support the MDNR's classification of the wetland as a Northern Wet Prairie (WPn53) community primarily on the eastern end of the complex. The western (and larger portion) of the wetland complex would be classified as a Wet Meadow/Carr community (WMn82) with occasional upland mounds supporting aspen stands. During Enbridge's field work, *Cypripedium candidum* (a Minnesota Special Concern species) was found on the western end of the wetland complex. Most of the wetland complex extends to the south of the existing pipeline corridor. Enbridge has prepared a report of survey findings and has submitted the completed report to MDNR in February 2008. As with the nearby calcareous fen, employing the MDNR's suggestion to cross this area using the HDD technique may present additional risks to the resource and may not be feasible for the reasons stated in section 3.4.3.2, namely, that subsurface conditions may not support this type of construction technique. Enbridge, COE and MDNR continue to examine specific resource concerns in this area. Based on these

discussions, modifications of construction techniques (e.g., use of timber matting to alleviate soil compaction, limiting travel lane width to limit vegetation disturbance) would be implemented to address these resource impact concerns.

Impacts on vegetation adjacent to the project area would be minimized by the erosion control measures outlined in Enbridge's EMP and CECP and by restricting clearing activities to approved workspaces. To minimize potential damage to adjacent trees, clearing crews would be directed to fell trees toward the cleared right-of-way.

The proposed pipeline route would cross five areas of sensitive species or plant communities as identified in table 3.6.3-1. Enbridge would implement best management practices as detailed in the EMP and CECP and continue consultation with the MDNR to minimize impacts from construction on these sensitive species and habitats. Construction near the mesic prairie remnant near MP 817 would involve boring beneath the remnant associated with the crossing of the associated railroad right-of-way.

Enbridge has consulted with local NRCS and FSA offices for information regarding invasive species and noxious weeds and for recommendations on controlling these nuisance plants. As a result, Enbridge has developed methods to address the control and spread of noxious and invasive species in its CECP (see Appendix J). These measures include identifying and marking areas containing noxious and invasive species during preconstruction inspections, allowing only clean equipment onto construction work areas, cleaning equipment after working in areas of known noxious and invasive species, using mulch and seed that are free of noxious and invasive species seeds, and conducting final seeding operations within 24 hours of final grading, pending weather and soil conditions, to prevent the establishment of noxious and invasive weed seeds that may be present in the existing seed bed.

Upon completion of construction, Enbridge would revegetate disturbed areas in accordance with revegetation plans to be developed in consultation with appropriate public agencies unless otherwise directed by landowners or land managing agencies. Timely restoration of the construction right-of-way and reseeding with an appropriate seed mix would minimize the duration of vegetative disturbance. Enbridge has consulted with local NRCS and FSA offices and with the COE for information regarding appropriate seed mixes and for recommendations on seeding times and restoration procedures. These recommendations would be incorporated as construction mitigation measures and would be employed as appropriate. In conjunction with the NDPSC order, Enbridge has agreed to replant trees and shrubs at a 2:1 ratio as mitigation for any tree removal in North Dakota. In aquatic resources, the COE authorization shall indicate the appropriate revegetation/seed mix recommendations.

Operation

Pipeline operation and maintenance would have minimal impact on revegetated areas. Maintenance impacts would be limited to infrequent vehicular traffic along the pipeline right-of-way. Routine vegetation clearing generally would be conducted as necessary to maintain access to the right-of-way for maintenance and enable patrol of the pipeline. Collocating the proposed pipeline on or adjacent to the existing maintained Enbridge right-of-way effectively minimizes change in cover type resulting from operation of the proposed pipeline.

3.6 WILDLIFE AND FISHERIES

3.6.1 Terrestrial Wildlife

3.6.1.1 Wildlife Resources

The LSr Project would be constructed in multiple biomes, including the deciduous and conifer-hardwood forest zones and the prairie zone. Wildlife habitats within these areas are diverse and include open areas, wetlands, and forested areas. Because the pipeline route would cross predominantly agricultural lands within these zones, wildlife habitat is more limited and confined primarily to the undeveloped areas. Existing wildlife resources in these areas are described below.

The pipeline route would cross land that has been altered for agricultural production, including row crops, small grains, hayfields, and pastures. Approximately 91.6 percent of the permanent pipeline right-of-way would cross agricultural land currently in row crops or small grains. These agricultural fields provide limited wildlife habitat. A few common wildlife species, including white-tailed deer, pheasant, and raccoon, use these areas for feeding and occasional cover. A few bird species such as starlings, crows, eastern meadowlark, and sparrows are occasionally found in the agricultural fields.

Approximately 3.8 percent of the pipeline route would cross forested areas. These areas are primarily found along the eastern portion of the proposed pipeline route. Some of the common mammalian species in deciduous forests include white-tailed deer, bear, eastern cottontail rabbit, woodchucks, raccoons, skunks, gray and fox squirrels, gray and red fox, and several species of bats. The structural diversity of the forest provides a variety of habitats that can support a large number of avian species, including songbirds, hawks, and owls (Tester, 1995).

Another 4.1 percent of the pipeline route would cross wetlands, and pipeline construction would temporarily affect about 55.3 acres of wetland habitats. The wetlands primarily consist of emergent, scrub-shrub, and forested wetlands. The emergent wetlands provide habitat for a variety of aquatic wildlife, including muskrat, beaver, mink, waterfowl, wading birds, and numerous species of reptiles and amphibians. The scrub-shrub wetlands and forested wetlands provide additional habitat for terrestrial wildlife, such as the white-tailed deer, moose, gray wolf, fox, bear, porcupine, and a variety of small mammals and songbirds.

Less than 1 percent of the pipeline route would cross non-agricultural open land including grasslands. Most of these open areas are fallow fields or maintained rights-of-way. The open, grassy pastures support several species of birds, numerous small rodents, and several species of snakes. Predatory species such as coyote, fox and variety of raptors hunt the grasslands for the abundant small rodents, birds, and reptiles. Other common wildlife species that occasionally may use the open areas include white-tailed deer, raccoon, squirrel, striped skunk, eastern cottontail rabbit, and white-tailed jackrabbit.

3.6.1.2 Potential Impacts and Mitigation

- Habitat loss or alteration and incremental habitat fragmentation.
- Displacement of wildlife from project construction.
- Direct and/or indirect mortalities from project construction and operation.

Construction

Temporary effects would occur during construction due to clearing of vegetation and movement of construction equipment along the right-of-way. Long-term impacts would be limited to the incremental loss of forest habitat adjacent to the existing right-of-way due to clearing of the temporary construction right-of-way and extra workspaces in forested areas.

Clearing the construction right-of-way would remove vegetative cover and would result in temporary displacement of species along the pipeline route. The construction right-of-way and extra workspaces would remain relatively clear of vegetation until restoration is completed. Most wildlife, including the larger and more mobile animals, would disperse from the project area as construction activities approach. Displaced species may recolonize in adjacent, undisturbed areas, or reestablish in their previously occupied habitats after construction has been completed and suitable habitat is re-established. Some smaller, less mobile wildlife such as amphibians, reptiles, and small mammals may experience direct mortality during clearing and grading activities. The FWS recommends that construction occur in late summer or early fall so as not to disrupt waterfowl or other wildlife during nesting season (see Appendix A). The current construction schedule calls for primary construction to occur in summer and early fall.

Through discussions with MDNR, COE and MPCA, Enbridge has been provided further guidance regarding effective mitigative strategies to limit impacts on all forested lands to the greatest extent feasible. Subsequently, Enbridge has developed mitigative measures such as shallow rooted woody vegetation plantings in riparian forest areas and establishing wildlife travel lanes (vegetative plantings) in upland forest crossings in sensitive travel areas as indicated by the MDNR and with landowner approval (see the CECP, Appendix J). All reasonable attempts would be made to not site extra workspaces within forested areas (upland or wetland). Enbridge has prepared environmental plan sheets indicating the location of all extra workspaces and will use these plans for ongoing discussions with these agencies. In the event it is not feasible to avoid a sensitive area when extra workspace is needed, the sites would be identified on the map, and site-specific mitigation plans would be developed in consultation with the agencies.

Clearing of herbaceous and shrub communities on the existing right-of-way and adjacent open areas would be required for pipeline construction. This clearing would cause a short-term impact due to the relatively quick recolonization of plant species that comprise these communities. Herbaceous cover would be seeded on disturbed upland areas following the completion of construction and it is expected that pre-existing herbaceous and shrub habitats would quickly re-establish themselves. Consequently, it is expected that the wildlife species that use these habitats would also return within one growing season of construction completion.

Temporary right-of-way and extra workspaces would be seeded with native herbaceous species and grasses and allowed to revegetate naturally with tree and shrub species common to the area. Direct and long-term impacts on wildlife that use forests include the temporary conversion of forest edge habitat to herbaceous-dominated habitat on the temporary construction right-of-way. It is expected that wildlife displaced from the cleared areas would relocate to nearby forest. Over time, natural growth and succession would restore the temporary portion of the construction right-of-way and extra workspaces to a forested community and wildlife typically inhabiting forest habitats would return.

A potential long-term impact on wildlife is associated with the clearing of forest vegetation. For this project, impacts on wildlife species would be limited because the pipeline is proposed to be collocated with the existing Enbridge pipeline right-of-way. The project would involve the permanent removal of approximately 37.2 acres of forested habitat for the maintained right-of-way. These areas

would be converted to non-forest habitat for the life of the pipeline. It is anticipated that the incremental loss of this forested habitat along the existing cleared right-of-way would not have a significant effect on wildlife species. In North Dakota, the FWS and NDGFD recommend replacing unavoidable wetland losses of wetland habitat with functionally equivalent wetlands and trees/shrubs at a ratio of two planted for each one removed (see Appendix A).

Overall, construction and operation of the project is not anticipated to significantly alter the character or composition of the vegetative communities along the pipeline route. No impacts on overall species diversity or genetic diversity would occur due to the temporary nature of disturbance associated with construction of the proposed project.

Operation

Normal pipeline operations would have minimal effects on terrestrial wildlife resources. Direct impacts on wildlife species populations and habitats from maintenance activities such as pipe inspections would be similar to those discussed for construction; however, these activities are typically infrequent and localized. Disturbed areas would be restored to re-establish vegetative cover following maintenance activities.

To minimize the electrocution hazard to birds, FWS recommends that new overhead power lines be constructed with current guidelines for preventing raptor electrocutions. Additionally, the FWS recommends power lines that cross or run adjacent to rivers or large wetlands be modified to increase visibility and reduce bird fatalities resulting from collisions with power lines (see Appendix A). The LSr Project would not involve the installation of any new power lines.

3.6.2 Aquatic Resources

3.6.2.1 Fisheries

In North Dakota, the project would cross 3 perennial waterbodies, 18 intermittent waterbodies, and 2 canal/ditches. Most of these waterbodies contain warmwater fisheries. No coldwater fisheries would be affected by the LSr Project in North Dakota. Common fish species within the project area include catfish, walleye, perch, white bass and white sucker. Additional species occurring in the Red River of the North include muskellunge, sauger, Northern pike, bullhead, and lake sturgeon. Less commonly occurring fish species in the project area include the common and large stone rollers, blacknose shiner, and rosy-faced shiner.

The NDGFD identified the Pembina and Tongue Rivers as Class III fisheries and the Red River as a Class I fishery. The NDGFD recommended crossing these rivers using a directional boring method if feasible or if not feasible, construction should not occur using other methods between April 15 and June 1. In addition, the FWS recommended avoiding construction in streams during fish migration and spawning periods between April 15 and June 1.

In Minnesota, the project would cross 15 perennial waterbodies, 33 intermittent waterbodies, and 18 canal/ditches. Most of these waterbodies contain warmwater fisheries. The proposed pipeline route does not cross any cool water or cold water fisheries or designated trout streams in Minnesota. Table 3.6.2-1 provides the list of representative fish species identified by the MDNR for the warmwater waterbodies in the project area. Common game fish found in some of the larger rivers crossed by the project include channel catfish, walleye, northern pike, white bass, and sauger (Renard et al., 1983; Renard et al., 1986).

TABLE 3.6.2-1

Representative Fish Species in the LSr Project Area

Game Fish	Other Fish
Walleye	Carp
Sauger	Bullhead
Northern pike	Suckers
Muskellunge	Sculpin
Sunfish	Burbot
Crappie	Redhorse
Perch	Minnows and other forage fish
Channel catfish	White bass
Bluegill	Largemouth bass
Smallmouth bass	

3.6.2.2 Potential Impacts and Mitigation

- Short-term physical disturbance to stream channels.
- Short-term increases in suspended sediments from in-stream activities and erosion from adjacent disturbed lands.
- Increases in downstream sedimentation, during construction, from in-stream activities and erosion from adjacent disturbed lands.
- Potential fuel spills from equipment and refueling operations during construction.
- Potential accidental petroleum release.
- Short-term reductions in habitat and potential loss of individual specimens from water appropriations for hydrostatic testing.

Construction

Movement of fish upstream and downstream of the crossing site may be temporarily affected during installation of the pipeline across waterbodies due to disturbances associated with construction. The physical disturbance of the streambed may temporarily displace adult fish and may dislodge other aquatic organisms, including invertebrates. Some limited mortality of less mobile organisms such as small fish and invertebrates may occur within the immediate area of the crossing. Aquatic plants, woody debris, and boulders that provide in-stream fish habitat would also be removed during trenching. Noise upstream and downstream of the site would deter fish that may otherwise inhabit the area. These disturbances are temporary and are not expected to significantly affect fisheries resources. Studies have shown that natural re-colonization of the disturbed areas would begin soon after restoration of the streambed and would be completely re-colonized within one year after construction (Schubert et al., 1985; Anderson et al., 1997).

Sediment loads would be temporarily increased downstream during open-cut stream crossings. These increased loads may temporarily affect the more sensitive fish eggs, fish fry, and invertebrates inhabiting the downstream area. However, sediment levels would quickly attenuate both over time and distance and would not adversely affect resident fish populations or permanently alter existing habitat

(McKinnon and Hnytka, 1988). The crossing would be completed as quickly as possible and the suspended sediment levels would return to preconstruction levels after instream work is completed.

Some riparian vegetation would temporarily be removed during construction. After construction, the permanent right-of-way would be maintained in an herbaceous state, and trees and shrubs on adjacent temporary rights-of-way would be allowed to reestablish. Additionally, Enbridge proposes to plant woody vegetation along forested riparian corridors to mitigate impacts associated with erosion and sedimentation (see section 3.4.1). Changes in the light and temperature characteristics of some waterbodies may affect the behavioral patterns of fish, including spawning and feeding activities, at the pipeline crossing location. This incremental increase in maintained right-of-way is not anticipated to have a significant impact on stream temperature and light conditions due to the highly localized nature of this effect. Shrubby vegetation would be allowed to reestablish on stream banks further diminishing potential impacts on water temperature.

To minimize the potential for adverse impacts on the fisheries at the river and stream crossings, erosion and sediment control measures specified in the CECP (see Appendix J) would be implemented including limiting the duration of construction in these waterbodies, and complying with timing restrictions and other requirements identified in stream crossing permits issued by appropriate regulatory agencies. In North Dakota, the NDGFD and FWS recommended avoiding open cut construction across river channels during fish migration and spawning periods from April 15 to June 1 (see Appendix A). If permitted, Enbridge would begin construction in North Dakota no sooner than June 2, 2008. The MDNR recommends employing dry crossing techniques, if feasible, in streams that support sensitive mussel species. Similarly, the MDNR recommends employing the HDD crossing method at sensitive rivers. Only two rivers that would be crossed by the project, the Red Lake River and Lost River, support significant communities of mussel species, including several Minnesota special concern species. No threatened or endangered species were identified during mussel surveys. The HDD method is proposed for the crossing of the Red Lake River and therefore no impacts are expected to aquatic species in this waterbody. The dam and pump method, which is a dry crossing method, is proposed for the crossing of the Lost River. Enbridge proposes to relocate the special concern mussel species that was identified in this area prior to attempting the crossing of the Lost River. Enbridge is continuing to discuss the findings of the mussel survey reports with the MDNR.

The accidental release of petroleum from the pipeline could affect terrestrial wildlife in the area of the spill. Enbridge would follow procedures outlined in the SPCC Plan (see Appendix G) to minimize the potential for spills, and to respond in a timely and appropriate manner if a spill occurs.

Operation

Following construction, the permanent right-of-way would be revegetated and maintained in an herbaceous state and monitored. Areas of poor revegetation would be reseeded to ensure that the right-of-way is stabilized and does not erode into adjacent waterbodies and wetlands. As a result, operations activities are not anticipated to affect aquatic resources or their habitat.

Adherence to the Enbridge emergency response procedures (see Appendix F) would minimize potential impacts on aquatic wildlife from potential spills during the operation of the pipeline.

3.6.3 Sensitive Terrestrial and Aquatic Wildlife Species

3.6.3.1 Agency Identified Sensitive Species

For North Dakota, the FWS and the NDGFD identified known occurrences of state and federally listed threatened or endangered species, and critical habitat located within 1 mile of the proposed pipeline route. Documentation of these consultations is included in Appendix A. Based on these consultations, no threatened or endangered plant or animal species are likely to be affected by the proposed project.

For Minnesota, the FWS and MDNR, Natural Heritage and Non-game Research Program identified sensitive species and habitats in the vicinity of the LSr Project. Documentation of these consultations is included in Appendix A. The MDNR provided information on sensitive species and habitats, and identified eight locations of sensitive habitat as listed in table 3.6.3-1.

TABLE 3.6.3-1

Natural Heritage Information in the Vicinity of the LSr Project[a]

County, State	Milepost(s)	Feature	Species/Issue
Kittson, Minnesota	816 to 817	Pipeline crossing of railroad.	Mesic Prairie Remnants within Burlington Northern & Santa Fe Railroad right-of-way
Marshall, Minnesota	844	Pipeline runs adjacent to wet brush-native prairie community and prairie wetland complex.	Northern Singlespike Sedge (*Carex scirpoidea*)
Marshall, Minnesota	844	Pipeline runs through wet brush-native prairie community.	Northern Singlespike Sedge (*Carex scirpoidea*)
Pennington, Minnesota	853 to 854	Pipeline runs through "Site of Outstanding Biodiversity Significance."	Mixed cattail marsh native plant community; Nelson's sharp-tailed Sparrow (*Ammodramus nelsoni)*
Pennington, Minnesota	853 to 854	Pipeline is adjacent to Mesic brush prairie and Mesic oak woodland.	Nelson's sharp-tailed Sparrow (*Ammodramus nelsoni).* Sterile Sedge (*Carex sterilis)*
Pennington, Minnesota	864 to 865	Pipeline crossing of the Red Lake River.	Freshwater mussels: Creek Heelsplitter (*Lasmigona compressa*); Black Sandshell (*Ligumia recta*); Fluted Shell (*Lasmigona costata*)
Red Lake/Polk, Minnesota	886 to 890	Pipeline shares railroad right-of-way.	Mesic and wet prairie remnants within the right-of-way of the Canadian Pacific Railway
Red Lake/Polk, Minnesota	885 to 886	Pipeline crossing of Lost River.	Creek Heelsplitter mussels

[a] Source: Minnesota Department of Natural Resources, Minnesota Natural Heritage Database, 2006.

Migratory birds are protected by the Migratory Bird Treaty Act (MBTA) (16 U.S.C 703-712: Ch. 128 as amended) which prohibits the taking, killing, possession, transportation and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the FWS. In consultation with the COE and with the MDNR, Enbridge refined its best management practices to address concerns regarding impacts on protected resources along the LSr Project route. Some of the BMPs that Enbridge will use to minimize the proposed project's impacts on migratory birds include:

- for non-HDD waterbody crossings, Enbridge proposes to maintain a 20-foot uncleared riparian buffer (rather than the 10-foot buffer stated in the EMP) until 24 hours before the crossing is to be performed;

- for HDD waterbody crossings (six proposed), Enbridge proposes no clearing above the crossing zone between the workspace areas at the entry and exit points;

- Enbridge will neck down from the typical upland construction right-of-way width of 100 feet to a 75-foot construction right-of-way width in all wetlands and at all forested waterbody crossings;

- Enbridge proposes to replant shallow-rooted woody vegetation in woody riparian corridors adjacent to waterbodies and between all of the pipelines (new and existing) where the pipes are buried sufficiently deep to allow growth of such vegetation (see attached figure). Enbridge will consult with the MDNR regarding specific details of replantings in these areas (e.g., appropriate species, densities of plantings, extent of plantings);

- almost 99 percent of the pipeline length is collocated with existing pipeline right-of-way;

- approximately 90 percent of the project would cross active agricultural land.

Among the responses Enbridge received from the FWS, the North Dakota Field Office provided recommendations to minimize disturbance to wildlife resources in the project area. In a letter dated November 2, 2006 (see Appendix A), the FWS recommended that the timing of construction be deferred until late summer (after July 15) or fall to avoid disrupting waterfowl or other wildlife during the nesting season. In response, Enbridge conducted an aerial survey for nesting structures (stick nest survey) on March 5th, 2008, and did not identify any active nests (including raptors) within the proposed construction corridor.

3.6.3.2 Potential Impacts and Mitigation

- Habitat loss or alteration and incremental habitat fragmentation.

- Displacement of wildlife from project construction.

- Direct and/or indirect mortalities from project construction and operation.

- Short-term physical disturbance to stream channels.

- Short-term increases in suspended sediments from in-stream activities and erosion from adjacent disturbed lands.

- Increases in downstream sedimentation, during construction, from in-stream activities and erosion from adjacent disturbed lands.

- Potential fuel spills from equipment and refueling operations during construction.

- Potential accidental petroleum release.

- Short-term reductions in habitat and potential loss of individual specimens from water appropriations for hydrostatic testing.

- Loss of tree and shrub habitat for nesting migratory birds.

Construction

Although no known occurrences of bald eagles were identified by agencies consulted for the LSr Project including the MDNR, FWS, and NDGFD and no nests were observed during field surveys conducted by Enbridge in the proximity of the project route, Enbridge would conduct surveys for active bald eagle nests prior to construction. If active nests are found, Enbridge would avoid construction activities between February 15 and August 15 within 0.5 mile of any active nest, unless otherwise directed by the appropriate state and federal agencies.

The MDNR has identified three waterbodies (Clearwater, Lost, and Red Lake Rivers) crossed by the LSr Project that potentially harbor populations of protected mussels (see table 3.6.3-1). Surveys of these waterbodies indicated the presence of special concern mussel species in two of the three waterbodies (Lost River and Red Lake River). The Lost River is proposed to be crossed using the dam and pump method, and the Red Lake River is proposed to be crossed using the HDD technique. Enbridge proposes to transplant specimens found prior to construction at the Lost River crossing, subject to concurrence from the MDNR. The accidental release of petroleum from the pipeline could affect sensitive aquatic species in the area of the spill. Enbridge would follow procedures outlined in the SPCC Plan (see Appendix G) to minimize the potential for spills, and to respond in a timely and appropriate manner if a spill occurs.

The MDNR recommends that environmentally sensitive construction techniques, such as HDD or boring/drilling be considered at mesic prairie remnants associated with railroad rights-of-way near MP 816 and MP 886 (see Appendix A). Additional measures would include diverting runoff away from the prairie remnants, planting disturbed areas with prairie species native to Minnesota, or some other non-invasive cover to decrease the opportunity for the spread/invasion of exotic species. MDNR also recommended employing methods that would limit disturbance as much as possible in the mixed cattail marsh near MP 853 and several mesic and wet prairie remnants in the same vicinity (see Appendix A). These measures include: operating within already-disturbed areas to the extent possible; minimizing vehicular disturbance; inspecting and cleaning all equipment prior to entering the site; keeping parked vehicles and stored equipment out of the area; constructing in autumn (if possible); reducing runoff by completing work as rapidly as possible and using erosion control measures such as straw bales or silt fencing; revegetating disturbed soils with native species as soon as possible after construction; and using only invasive free mulches, topsoils, and seed mixes.

Prior to construction, Enbridge would consult with the FWS to implement measures to comply with the MBTA.

Operation

Adherence to the Enbridge ERP (see Appendix F) would minimize potential impacts on aquatic resources from potential spills during the operation of the pipeline.

3.7 LAND USE

Land use along the pipeline route was classified using the U.S.GS LULC Classification System. This system uses satellite imagery from the early 1990s to classify land use into 21 categories. For the LSr Project, these U.S.GS land use categories were combined into five general categories: agricultural land, developed land, forest land, open land, and wetland/open water based on prevalent land use and vegetation cover types. All land along the pipeline route was classified by milepost into one of these five land use categories. The land use categories used in this final EA are defined as follows:

- Agricultural Land: Agricultural Land consists of areas used primarily for the growing of crops or livestock and include, but are not limited to, orchards or vineyards, row crops, small grains, fallow, and pasture.

- Developed Land: Developed Land consists of areas classified as low intensity residential, high intensity residential, commercial, industrial, and transportation corridors such as roads, highways, and railroads.

- Forest Land: Forest Land consists of areas classified as deciduous forest, evergreen forest, and mixed forest.

- Open Land: Open Land consists of areas classified as bare rock, sand, or clay; quarries, strip mines or gravel pits; transitional; shrubland; grasslands or herbaceous areas; and urban or recreational grasses.

- Wetland/Open Water: Wetland/Open Water consists of areas classified as woody wetlands, emergent herbaceous wetlands, scrub/shrub wetlands, and open water.

3.7.1 Land Ownership and Use

Table 3.7.1-1 lists the land ownership crossed by the proposed pipeline route. The LSr Project pipeline route predominantly would cross private lands located outside of municipal areas (132.2 miles, or approximately 97 percent of the pipeline route). No federal, state, or Tribal lands would be crossed by the proposed pipeline. The pipeline route would cross about 0.3 mile of county lands and 3.5 miles of incorporated areas.

TABLE 3.7.1-1

Ownership of Lands Crossed by the LSr Project Pipeline Route

Ownership	Crossing Length (miles)	Percentage of Route
Federal lands	0.0	0
State Lands	0.0	0
County Lands	0.3	<1
Incorporated Areas:		
Plummer	2.0	1
Oklee	0.7	<1
Trail	0.8	<1
Private Land Outside Incorporated Areas	132.2	97
Total	136.0	100

Sources: Minnesota Department of Natural Resources (MDNR), 1998; MDNR, MIS Bureau, 2003; MDNR, 2005a.

Tables 3.7.1-2 and 3.7.1-3 provide acreages affected by construction and operation of the proposed pipeline route categorized by land use. The majority of the land in the project area is agricultural land (92.7 percent).

TABLE 3.7.1-2

Land Uses Impacted by Construction of the LSr Project [a, b]

	Agricultural		Developed		Forested		Open		Water/Wetland	
County, State	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Pembina, North Dakota	335.90	20.03	0.18	0.01	0.56	0.03	0.00	0.00	9.96	0.59
Kittson, Minnesota	189.37	11.29	0.36	0.02	0.81	0.05	0.11	0.01	0.63	0.04
Marshall, Minnesota	424.20	25.30	0.37	0.02	7.81	0.47	0.10	0.01	3.51	0.21
Pennington, Minnesota	209.01	12.46	1.03	0.06	21.98	1.31	0.09	0.01	5.03	0.30
Red Lake, Minnesota	185.78	11.08	2.60	0.15	5.49	0.33	0.36	0.02	3.46	0.21
Polk, Minnesota	120.17	7.17	0.31	0.02	16.39	0.98	0.32	0.02	24.02	1.43
Clearwater, Minnesota	89.32	5.33	1.11	0.07	5.71	0.34	2.09	0.12	8.65	0.52
Total	1553.75	92.66	5.96	0.36	58.75	3.50	3.07	0.18	55.26	3.30

[a] Data was derived from U.S. Geological Survey National Land Cover Dataset, 1992.

[b] Acreages were calculated using the construction right-of-way footprint plus extra workspace areas and reflect variable dimensions according to the land use crossed and other constructability factors.

TABLE 3.7.1-3

Land Uses Impacted by Operation of the LSr Project [a, b]

	Agricultural		Developed		Forested		Open		Water/Wetland	
County, State	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Pembina, North Dakota	113.35	19.74	0.22	0.04	0.60	0.10	0.00	0.00	4.49	0.78
Kittson, Minnesota	63.86	11.12	0.31	0.05	0.61	0.11	0.00	0.00	0.28	0.05
Marshall, Minnesota	144.26	25.12	0.13	0.02	2.60	0.45	0.07	0.01	1.10	0.19
Pennington, Minnesota	70.88	12.34	0.36	0.06	8.34	1.45	<0.01	0.01	2.14	0.37
Red Lake, Minnesota	61.74	10.75	0.80	0.14	2.03	0.35	0.11	0.02	1.51	0.26
Polk, Minnesota	41.43	7.22	0.11	0.02	5.43	0.94	0.13	0.02	10.21	1.78
Clearwater, Minnesota	30.30	5.28	0.18	0.03	1.98	0.34	0.81	0.14	3.82	0.67
Total	525.82	91.57	2.11	0.37	21.59	3.76	1.13	0.20	23.55	4.10

[a] Data was derived from U.S. Geological Survey National Land Cover Dataset, 1992.

[b] Acreages were calculated using the permanent right-of-way footprint and reflect variable dimensions as necessary to accommodate a 25-foot buffer on each side of the LSr pipeline.

3.7.1.1 Agriculture

Agricultural production is the predominant land use of the project area. Principal crops include wheat, barley, potatoes, dry beans, sunflowers, soybeans, sugar beets, grain corn, canola, and alfalfa.

Approximately 1,554 acres (92.7 percent) of the proposed pipeline's construction impacts would occur on agricultural lands. Proposed aboveground facilities would be located within existing industrial sites, and not on agricultural lands. Some of the agricultural land may include terraces and/or have subsurface drainage systems installed.

3.7.1.2 Developed Areas

Approximately 6 acres of developed land (0.36 percent of construction impacts) would be crossed during construction of the proposed project. Based on examination of aerial photographs, there are approximately 74 residences within 500 feet, of which three residences are within 50 feet of the proposed construction work area. Many of these residences and most of the residential land are located along the eastern portions of the pipeline route. Proposed construction related noise and dust control discussed below in 3.7.6 would mitigate some of these impacts.

The only industrial areas crossed by the pipeline route are the five existing pumping stations, which are owned and operated by Enbridge.

3.7.2 Contaminated Waste Sites

As part of a review of land use along the pipeline corridor, Enbridge identified known contaminated sites along the proposed pipeline route (see table 3.7.2-1). The database search included state and federal governmental databases for properties up to 1 mile from the pipeline corridor.

TABLE 3.7.2-1

Contaminated Sites within 0.5 Mile of the LSr Project Pipeline Route

County, State	Milepost	Distance from centerline (miles)	Entity Name	City	Listing Type
Pennington, Minnesota	854.7	<0.1	Unnamed Dump	Norden Township	Unpermitted Dump
Red Lake, Minnesota	885.6	<0.1	Red Lake County Demo Landfill	Oklee	Solid Waste Permit
Polk, Minnesota	897.7	0.2	Gully Dump	Gully	Unpermitted Dump
Clearwater, Minnesota	902.9	0.2	Gonvick Dump	Gonvick	Unpermitted Dump

3.7.3 Transportation Corridors

The LSr Project pipeline would cross 198 federal, state, county, city/township, and private/commercial roads, and six railroads. Road crossings are summarized in table 3.7.3-1 and railroad crossings are summarized in table 3.7.3-2.

TABLE 3.7.3-1

Number of Roads Crossed by LSr Project Pipeline Route

County, State	State or Federal	Local
Pembina, North Dakota	2	33
Kittson, Minnesota	2	22
Marshall, Minnesota	0	57
Pennington, Minnesota	2	38
Red Lake, Minnesota	1	16
Polk, Minnesota	1	15
Clearwater, Minnesota	1	8
Total	9	189

TABLE 3.7.3-2

Railroads Crossed by the LSr Project Pipeline Route

County, Minnesota	Milepost	Description	Township	Range	Section
Pembina, North Dakota	795.2	Burlington Northern Railway	161	51	15
Kittson, Minnesota	817.0	Burlington Northern Santa Fe Railway	159	48	31
Marshall, Minnesota	846.5	Northern Plains Railroad	155	45	20
Pennington, Minnesota	863.7	Minnesota Northern Railroad, Inc.	153	43	29
Red Lake, Minnesota	875.7	Canadian Pacific Railway	151	42	9
Polk, Minnesota	896.0	Canadian Pacific Railway	150	39	28

3.7.4 Recreation and Special Interest Areas

The NRI is a listing of more than 3,400 free-flowing river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. Under a 1979 Presidential directive, and related Council on Environmental Quality procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments. The NRI was compiled by the National Park Service (NPS) in partial fulfillment of section 5(d) of the National Wild and Scenic Rivers Act (16 U.S.C 1271-1287). The NPS has confirmed that three rivers that are currently listed on the NRI would be crossed by the proposed project. Those rivers are the Pembina River in North Dakota, from the Red River to the Canadian border, and the Middle and Red Lake Rivers in Minnesota. To minimize impacts on these rivers, they would be crossed using the HDD crossing method.

No other recreation or special interest areas are crossed by or known to be in close proximity to the LSr Project.

3.7.5 Noise

In 1974, the EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin on Safety.* This publication evaluated the effects of environmental noise with respect to health and safety. The EPA has determined that noise levels should not exceed a day-night noise level (L_{dn}) of 55 decibels (dBA), which is the level that protects the public from indoor and outdoor activity interference. This noise level has been useful for state and federal

agencies to establish noise limitations for various noise sources. A 55 dBA L_{dn} noise level equates to a daytime and nighttime equivalent sound level (L_{eq}) of 48.6 dBA (i.e., a facility that does not exceed a continuous noise impact of 48.6 dBA would not exceed a 55 dBA L_{dn}).

The State of North Dakota and Pembina County do not have any quantitative noise regulations. The State of Minnesota has noise regulations at Minnesota Rules Chapter 7030. Noise mitigation measures are discussed below under Developed Land and in Appendix A.

3.7.6 Potential Impacts and Mitigation

- Loss of agricultural productivity or use due to agricultural drain tile and irrigation system damage during construction.
- Temporary loss of agricultural productivity during the construction period.
- Increased noise and dust to nearby residential and commercial areas from pipeline construction.
- Impacts on visually sensitive areas.

Construction

Agricultural Land

The proposed pipeline route would affect approximately 1,553.75 acres of agricultural land (92.7 percent of all construction impacts) that would be temporarily disturbed during construction. Construction activities may also interfere with planting or harvesting, depending on the timing of construction. Following construction, all agricultural activities would be allowed to resume within the pipeline corridor.

During construction, access would be maintained to fields, storage areas, structures, and other agricultural facilities and irrigation and drainage systems that cross the right-of-way to the extent practicable. Drainage systems located during construction would be flagged and repaired if damaged to the landowner's satisfaction following pipeline construction and in accordance with Enbridge's AMP (see Appendix B). Agricultural land in the construction right-of-way would generally be taken out of production for one growing season and would be restored to its previous condition following construction. Landowners would be fairly compensated for crop loss and other damages caused by construction activities.

Consultations were conducted with the FSA and NRCS to determine the existence of USDA easements or other program lands along the proposed route. The responses from these agencies are included in Appendix A.

The Minnesota state office of the NRCS provided GIS data regarding existing WRP easements in Minnesota. (NRCS Letter, August 21, 2007, and NRCS E-Mail, August 22, 2007). It was determined that the proposed project would not cross WRP lands in Minnesota. The NRCS in Pembina County, North Dakota, provided information regarding two WRP easements and two EWP easements crossed by the LSr Project in North Dakota (see section 3.5.2). Enbridge has determined that it has blanket easements on each of the four parcels that pre-date the NRCS easements and are therefore superior. Nevertheless, Enbridge has committed to restore the WRP and EWP easement lands in accordance with NRCS recommendations, thereby allowing the easements to continue in place after pipeline construction.

In August and September, 2007, letters were sent to each local FSA office along the proposed route asking for information regarding the existence and location of CRP and CREP contract parcels in the proposed project area. In October of 2007, Freedom of Information Act requests were made to the North Dakota and Minnesota state FSA offices again requesting this information. On November 15, 2007, the Minnesota state office of the FSA provided GIS information that enabled Enbridge to identify the locations of all CRP lands in the vicinity of the proposed project. This analysis showed that 58 CRP contract parcels would be crossed by the proposed pipeline route. As a condition of participation in the CRP program, a landowner who is a CRP participant must seek permission from a local FSA office when a new use is made of the land. This is called a request for permissive use. Enbridge will restore all CRP contract parcels to pre-construction condition in an effort to maintain each parcel's status in the CRP program.

On March 10, 2008, the North Dakota state office of the FSA contacted Enbridge regarding the request for CRP parcel locations. The FSA requested a GIS shapefile of the proposed route to assist in identifying CRP parcels. Because GIS shapefiles of proposed pipeline routes are considered to be Critical Energy Infrastructure Information (CEII) by the DoS and the Department of Homeland Security, the North Dakota FSA Office would be asked to sign a Non-Disclosure Agreement before any CEII may be provided. As of the date of this FEA, no CRP parcels in North Dakota have been identified.

Measures to avoid, minimize or mitigate potential impacts on soil productivity would be employed as outlined in the AMP and EMP (see Appendices B and D, respectively). These measures include topsoil segregation, drain tile repair, stone removal (greater than 4 inches in diameter), restoration of contours and drainage patterns, and measures to minimize and alleviate soil compaction.

Based on a review of aerial photography of the proposed route, there are no known dairy farms that would be crossed or impacted by the project. In addition, Enbridge has determined through publicly available data sources that no organic farms would be crossed by the proposed route. The proposed pipeline route does not cross any known center-pivot irrigation systems.

Private roads and farm lanes damaged during construction would be repaired. Appropriate measures would be taken to protect livestock during construction, including minimizing the length of time that the trench is open and coordinating with landowners to accommodate on-going livestock operations. Where appropriate, temporary access would be maintained across the trench to allow the passage of livestock, and Enbridge would erect temporary fences (including gates) as necessary to contain and protect livestock from construction related hazards. After completing construction, fences and gates would be rebuilt to their former condition or better.

Forest Land

Approximately 58.9 acres of forest land would be cleared during construction of the proposed project. Approximately 21.6 acres of forest would be permanently converted to shrub and herbaceous cover types as the result of routine maintenance practices of the permanent right-of-way. The 37.2 acres of trees temporarily cleared from the temporary construction right-of-way and extra workspaces would be allowed to revert to pre-existing cover types.

Localized short- and long-term effects would result from the construction of the proposed pipeline route through forested areas. Trees and brush would be removed from the construction right-of-way and temporary workspaces. Overlapping the construction right-of-way with Enbridge's existing maintained right-of-way to the greatest extent possible effectively minimizes impacts on forest land. This existing permanent right-of-way is maintained in an herbaceous state to facilitate pipeline access and to enable aerial patrols of the pipeline right-of-way.

Following construction, the permanent right-of-way would be seeded to promote herbaceous cover types and would be maintained in an herbaceous state. Forested areas within the temporary right-of-way and extra workspaces would be allowed to revert to forest cover. The rate of forest reestablishment would depend upon the type of vegetation cleared, as well as the natural fertility of the areas affected. It is anticipated that early successional species would begin to colonize the right-of-way within a few years after construction, followed by establishment of later successional species. In North Dakota, Enbridge will replant trees in the project area at a ratio of two trees for every tree removed in accordance with the North Dakota Route Permit. Impacts would not be significant or would be mitigated to less than significant.

Wetland/Open Water

Approximately 55.3 acres of open water and wetlands would be temporarily affected by construction of the proposed project. Open water impacts would occur at crossings of rivers, streams, and agricultural ditches (the proposed pipeline does not cross any lakes). Saturated wetlands would be allowed to revegetate naturally. Unsaturated wetlands would be temporarily revegetated with annual rye during restoration unless standing water is prevalent or unless permanent plantings or seeding with native wetland vegetation is required. Construction impacts associated with these crossings are discussed in section 3.4.3.2.

Open Land

Approximately 3.1 acres of open land would be temporarily disturbed during construction of the proposed project. Open land would be temporarily disturbed during grading, trenching, backfilling, and restoration. After final construction cleanup, open land in upland areas would be reseeded and mulched and generally allowed to return to preconstruction conditions.

Developed Land

During construction, residences in close proximity to construction activities may be exposed to short-term increases in construction-related noise and dust. Construction-related dust emissions would generally be of short duration and dependent on soil type, weather conditions, and the extent of ground disturbance. Minor dust emissions are inevitable with any construction project; however, Enbridge would implement dust control measures as needed on the construction right-of-way and access roads near residential areas. During periods of high winds, work may be temporarily suspended if control measures are ineffective and dust is excessive for the area. After construction is completed, the right-of-way would be stabilized and revegetated to prevent ongoing dust emissions.

The heavy construction equipment needed to construct the pipeline would generate unavoidable short-term increases in ambient noise levels. Typical bulldozers, backhoes, and sideboom tractors used to install large-diameter pipelines typically generate 80 to 90 decibels within 50 feet of the equipment. Increases in ambient noise levels due to heavy equipment operation would be limited to the period of construction. Construction activities would generally be limited to daylight hours and construction equipment would be equipped with mufflers in good working order, as recommended by the NDDH (see Appendix A). No noise would be generated along the pipeline right-of-way during normal operations.

Contaminated Waste Sites

Appropriate regulatory agencies would be consulted prior to construction to determine whether construction activities may encounter known contaminants. If contamination is encountered, measures described in the emergency response plan (see Appendix F) would be implemented to avoid or minimize

contact with the known sites, while avoiding adverse impacts on the environment. Measures include proper notification of company and agency personnel as well as steps to ensure the safety of personnel in the vicinity of contaminated sites.

Transportation Corridors

Construction methods would vary among roadway types crossed by the pipeline. Most paved roads and railroads would be bored allowing them to remain open during construction. Open-cut construction is typically proposed for unpaved roads, which would require temporary closure and detours. If no reasonable detour is available, at least one traffic lane would be maintained, except for brief periods essential to pipeline construction. Construction disturbance at each open-cut road crossing would typically be limited to one day, which is not expected to have a significant impact on local traffic patterns. Detour, warning, traffic control, and safety signs would be posted as prescribed by federal, state, and local (county) Departments of Transportation. Attempts would be made to avoid road closures during peak-traffic time periods.

Visually Sensitive Areas

The Pembina River in North Dakota and the Red Lake and Middle Rivers in Minnesota are listed on the NRI. Enbridge proposes to employ the HDD crossing method for these waterbodies, which would prevent disturbance to the banks and channels of these waterbodies during construction. In a letter from the NPS dated November 20, 2007, the director of the Midwest Region recommended the use of the HDD method at these waterbody crossings.

Operation

Following construction the right-of-way would typically be allowed to revert to previous land uses. Right-of-way easements restrict certain development activities, such as the construction of permanent structures within the easement. Landowners are compensated for loss of these uses when the permanent easement is established. Collocation of the proposed pipeline on or adjacent to the existing Enbridge right-of-way minimizes alteration of existing land use patterns and avoids new severances of parcels or encumbrances on parcels. Also, roads and railroads would be restored after construction. Therefore, long-term impacts on land use are not anticipated.

No appreciable increases in ambient noise levels would be attributable to the operation of the LSr Project facilities. Existing pumping facilities would be refitted to accommodate the LSr Project.

3.8 CULTURAL RESOURCES

Cultural resources are protected by federal laws enacted to protect these resources from damage or loss due to federally funded or permitted activities. These laws include the Antiquities Act of 1906, Historic Sites Act of 1935, EO 13007, the NHPA of 1966, as amended, the Archaeological and Historic Preservation Act of 1974, the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), and the Archaeological Resources Protection Act of 1979 (ARPA). EO 11593 also provides necessary guidance on protection and enhancement of cultural resources. Since the LSr Project does not cross any federal or tribal lands, the Antiquities Act, EO 13007, NAGPRA and ARPA do not apply.

3.8.1 Previous Studies

Existing site file data maintained by the North Dakota SHPO and Minnesota Historical Society was reviewed to determine if any portion of the proposed pipeline route was previously surveyed for

cultural resources. A total of six previous archaeological studies have been completed that directly relate to the proposed pipeline route. The entire Neche, North Dakota to Clearbrook, Minnesota portion of the corridor was first surveyed as part of Enbridge's 1994 Capacity Expansion project (Minnesota SHPO No. 94-2227; North Dakota SHPO Reference 94-0200). In 1998, portions of the previous survey corridor were included in a project named Terrace I or Terrace Expansion (Minnesota SHPO No. 98-2466). The Terrace I project did not extend beyond the survey corridor for the 1994 Capacity Expansion and, therefore, no additional archaeological investigations were required for Terrace I. The reports of these previous surveys are as follows:

- Breakey, Kim C., and Clark Dobbs. 1993. *Files Search and Literature Review of Lakehead Pipeline Between Clearbrook, Minnesota and Neche, North Dakota*.
- Dobbs, Clark A., Kim Breakey and Howard Mooers. 1994. *A Model of Archaeological Sensitivity for Landforms Along the Lakehead Pipe Line Company Corridor from Neche, North Dakota to Clearbrook, Minnesota*.
- Breakey, Kim, Clark Dobbs and Matthew Murray. 1994a. *Phase I Archaeological Investigations of Selected Areas of the Lakehead Pipe Line Company Corridor between Neche, North Dakota and Clearbrook, Minnesota.*
- Breakey, Kim, Clark Dobbs and Matthew Murray. 1994b. *Evaluation of the Archaeological Sites on the Lakehead Pipe Line Company Corridor between Neche, North Dakota and Clearbrook, Minnesota.*
- Breakey, Kim, Clark Dobbs and Matthew Murray. 1994c. *Evaluation of the archaeological Sites on the Lakehead Pipe Line Company Corridor between Neche, North Dakota and Clearbrook, Minnesota: 32PB153 and the Angle Road, Tongue River, Pembina County, North Dakota.*
- Foth & Van Dyke and Associates Inc. 1998. *Archaeological Monitoring at the Pembina River Crossing, North Dakota, Lakehead Pipe Line Company Terrace Expansion Project.*

3.8.2 Environmental Setting

Between October 2006 and September 2007, Phase I cultural resources surveys were conducted for the proposed LSr and Alberta Clipper Projects within portions of North Dakota and Minnesota located between the North Dakota/Canada border and Clearbrook, Minnesota. The surveys were conducted simultaneously for both projects in order to minimize inconvenience for landowners. The survey corridor was designed to encompass all areas that could potentially be disturbed by construction of both the LSr and Alberta Clipper Projects so as to minimize the need for multiple access to properties. Enbridge contracted The 106 Group to conduct cultural resource surveys for the LSr and Alberta Clipper Projects. Prior to cultural resources investigation undertaken for the proposed projects, a previous investigations overview and survey implementation plan for the proposed corridor was prepared (Ketz et al. 2006). The report defined a scope of work for cultural resources investigations based on the level of survey for all previous investigations that have occurred within the current project area. A summary of the results of these cultural resources surveys are presented by state below.

3.8.2.1 North Dakota

The North Dakota portion of the LSr pipeline between the Canada/North Dakota border and the North Dakota/Minnesota border consists of the construction of a crude-oil pipeline, approximately 28.1

miles in length, passing through portions of Pembina County. As a result of the previous investigations and survey implementation plan, a total of 500.5 acres of the project route was determined to have been previously surveyed for archaeology according to current federal and state standards and generally extended beyond the current LSr pipeline corridor; no survey was conducted in these areas. The remaining 250.7 acres of the corridor was determined to require Phase I archaeological survey of the proposed LSr pipeline corridor from the Canada/North Dakota border and the North Dakota/Minnesota border. The previous investigations overview and survey implementation plan also determined that no systematic architectural history survey has been completed to date within the LSr pipeline corridor. Therefore, an architectural history survey was required for a total of 751.2 acres of the proposed LSr and Alberta Clipper Projects corridor from the Canada/North Dakota border and the North Dakota/Minnesota border.

The corridor examined for cultural resources was wider than, and encompassed, the area of potential effect (APE) to allow for flexibility in construction. Adjacent to the existing pipelines, the survey corridor measured 215 feet (66 meters) in width from the centerline of the closet existing pipeline. In all areas, the survey corridor encompassed additional temporary workspace needs at road, railroad, utility, and waterbody crossings. Pedestrian survey was completed for 230 acres, and pedestrian survey and shovel testing was completed for 20.7 acres, totaling 250.7 acres.

The APE for architectural history accounted for any physical, auditory, or visual impacts on historic properties. Because most of the project entails the installation of an underground pipeline, the APE was limited to the construction area and is the same as the archaeology APE. For aboveground facilities such as pump stations, the APE encompassed a larger area to account for potential visual impacts. The architectural history investigation consisted of a review of documents of previously inventoried properties and of surveys previously conducted within the project area, as well as a Phase I field survey to identify and document properties that are 45 years of age or older within the APE.

The Phase I cultural resources inventory within North Dakota resulted in the identification of three new archaeological sites (32PBX161, 32PB205, and 32PBX165). Site 32PBX161 consisted of a prehistoric isolated find, while site 32PB205 consisted of an isolated find of an undetermined cultural affiliation. Site 32PBX165 contained a scatter of historic period artifacts. All three of these sites are not considered to be eligible for the NRHP and no additional testing of the sites is recommended. A portion of a previously recorded site (The Angle Road [Site 32PB0153]) was also identified during cultural resources survey. After consultation with the State Historical Society of North Dakota, it was recommended that this portion of the Angle Road receive its own state site number separate from Site 32PB0153. Site 32PB206 represented a newly noted section of The Angle Road (Site 32PB0153). A portion of the site to the north of the current project corridor was previously surveyed in 1994 by the Institute for Minnesota Archaeology (IMA) as part of the Lakehead Pipeline Project. IMA recommended that the site be avoided using standard road-boring techniques to install the pipeline under the road. The North Dakota SHPO concurred with this recommendation and the site was avoided during construction. As The Angle Road is considered to be eligible for the NRHP, it is recommended that a similar approach be utilized to avoiding impact on site 32PB206 during the current project.

In addition to Site 32PB0153, a total of 17 previously recorded sites (32PB0099, 32PB0152, 32PB0155, 32PB0158, 32PB0159, 32PB0160, 32PB0161, 32PB0166, 32PB0212, 32PB0213, 32PB0214, 32PB0215, 32PB0216, 32PB0217, 32PB0219, 32PB0220, and 32PB0222) were identified as being positioned within the LSr and Alberta Clipper Projects corridor. Ten of these sites (32PB0099, 32PB0152, 32PB0155, 32PB0159, 32PB0160, 32PB0215, 32PB0216, 32PB0217, 32PB0220, and 32PB0222) were not relocated as they were within a portion of the corridor that was previously surveyed in 1994 by IMA as part of the Lakehead Pipeline Project. Intensive survey within the recorded site locations of the remaining seven sites (32PB0158, 32PB0161, 32PB0166, 32PB0212, 32PB0213,

32PB0214, and 32PB219) located within the project survey area; however, the sites were not relocated. Of the portions of these 17 sites positioned with the current project corridor, all but one (32PB0161), were previously assessed as not eligible for the NRHP and no further work was recommended.

Site 32PB0161 was previously determined to be potentially eligible for listing on the NRHP. The site was previously surveyed in 1994 by IMA as part of the Lakehead Pipeline Project. Additional intensive survey was conducted within the site area and additional archaeological materials were recorded, extending the site to the northwest of its previous boundary. Because of its close proximity to the Red River, IMA recommended that the site be avoided using standard boring techniques to install the pipeline under the river. The North Dakota SHPO concurred with this recommendation and the site was avoided during construction. It is recommended that a similar approach to avoiding impact on the site during the current project.

A single architectural history property was identified within the North Dakota portion of the project APE. The property (32PB173) consisted of a segment of railroad line. The property was recommended as eligible for listing on the NRHP. Although the level of investigation for the eligible railroads was undertaken at the Phase I level, it was recommended that no further study is necessary for this investigation. Since boring or the HDD method are the default method of construction at railroads, it was recommended that the proposed project would have no effect to the historic railroad features, based on the minimal level of impact that would be made to the property as a result of the proposed project construction plans.

The North Dakota SHPO reviewed the cultural resource survey reports. The DoS provided formal Determinations of Eligibility regarding the findings discussed in the survey reports and on February 28, 2008, the North Dakota SHPO concurred with the listed sites and management recommendations.

3.8.2.2 Minnesota

The Minnesota portion of the LSr Project between the North Dakota/Minnesota border and Clearbrook, Minnesota, consists of the construction of a crude-oil pipeline, approximately 107.8 miles in length, passing through portions of six counties in Minnesota, which are (from northwest to southeast): Clearwater, Polk, Red Lake, Pennington, Marshall, and Kittson. As a result of the previous investigations and survey implementation plan, a total of 2,229.6 acres of the project route was determined to have been previously surveyed for archaeology according to current federal and state standards and generally extended beyond the current LSr pipeline corridor; no survey was conducted in these areas. The remaining 656.8 acres of the corridor was determined to require Phase I archaeological survey of the proposed LSr pipeline corridor from Clearbrook, Minnesota, to the North Dakota/Minnesota border. The previous investigations overview and survey implementation plan also determined that no systematic architectural history survey has been completed to date within the LSr pipeline corridor. Therefore, an architectural history survey was required for a total of 3,445.9 acres of the proposed LSr pipeline corridor from Clearbrook, Minnesota, to the North Dakota/Minnesota border and within the appropriate APE for 10 proposed pipe yards.

The survey corridor was wider than, and encompassed, the APE to allow for flexibility in construction. Adjacent to the existing pipelines, the survey corridor measured 215 feet (66 meters) in width from the centerline of the closest existing pipeline. In all areas, the survey corridor encompassed additional temporary workspace needs at road, railroad, utility, and waterbody crossings. In addition to the pipelines corridor, ten pipe yard storage areas of varying dimensions were surveyed, totaling 559.5 acres.

Pedestrian survey was completed for 619.7 acres, and pedestrian survey and shovel testing was completed for 37.1 acres, totaling 656.8 acres within the project corridor. The architectural history survey area included approximately 107.8 miles, totaling 3,445.9 acres.

A total of two new archaeological sites (52-1 and 68-1) were identified during the cultural resources inventory within Minnesota. Both sites were described as post contact artifact scatters and both were recommended as not eligible for listing on the NRHP. No additional testing of either site was recommended. In addition, nine previously recorded and reported sites (21KT0024, 21MAk, 21MA0038, 21MA0039, 21MA0040, 21PEh, 21PL0023, 21CE0043, and 21CE0044) were identified within the LSr pipeline corridor. A total of seven of these sites (21KT0024, 21MAk, 21MA0038, 21MA0039, 21PEh, 21CE0043, and 21CE0044) were not relocated as they were within a portion of the corridor that was previously surveyed in 1994 by the IMA as part of the Lakehead Pipeline Project. Intensive survey was conducted within the recorded site areas of the two remaining previously recorded sites (21MA0040 and 21PL0023) located within the project survey area; however, the sites were not relocated. The portions of these nine sites (with the exception of site 21MA0039) located with the current APE were described as not significant and no further work was recommended prior to construction.

Although Site 21MA0039 was not resurveyed as part of the current project, the site was previously determined to be eligible for listing on the NRHP by IMA in 1994. The Minnesota SHPO concurred with this recommendation and the site was avoided during construction. It is recommended that a similar approach to avoiding impact on the site be utilized during the current project.

A total of nine architectural history properties were identified within the APE during the current survey. Of these properties, five were described as segments of railroad lines (both active and inactive) while the four remaining properties were comprised of rural farmsteads or remnants of farmsteads. The five railroad segments (KT-DAV-001, MA-VKT-003, RL-PVC-016, PE-ROC-001, and PL-GLT-004) have been determined eligible for listing on the NRHP. Although the level of investigation for the eligible railroads was undertaken at the Phase I level, it was recommended that no further study is necessary for this investigation. Since boring or the HDD method are the default construction method at railroad crossings, it was recommended that the proposed project would have no effect to the historic railroad features, based on the minimal level of impact that would be made to these properties as a result of the proposed project construction plans. Initially, one farmstead (MA-VKT-002) was thought to be eligible for listing on the NRHP and additional evaluation at the Phase II level in order to further assess the need for avoidance or mitigation was recommend; however, upon further review it was determined that the farmstead did not meet the requirements for listing on the NRHP. No additional recordation of MA-VKT-002 is recommended. The remaining properties (PL-CHS-003, RL-OKC-001, and MA-WAG-002), all farmsteads, were recommended as not eligible for listing on the NRHP and no additional recordation is recommended. Survey of ten potential off right-of-way use yards resulted in the identification of approximately 39 architectural history properties. These properties are undergoing further research and consultation with Minnesota SHPO concerning eligibility and/or an appropriate avoidance/treatment plan.

The DoS reviewed the cultural resource survey reports prepared for work completed along the project route in Minnesota. DoS concurred with the survey findings and recommendations and requested Minnesota SHPO's concurrence on February 21, 2008. The SHPO's concurrence is still pending. However, under 36 C.F.R. §800.4(d)(1)(i) "if SHPO/THPO does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under section 106 are fulfilled."

3.8.3 Potential Impacts and Mitigation

- Could potentially affect NRHP-eligible historic properties such as prehistoric or historic archaeological sites, districts, buildings, structures, and objects.

Construction

Measures to minimize cultural resources identified within the project APE would be implemented during construction based on consultations between the DoS and SHPOs. These measures may include routing the pipeline around identified sites, installing the pipeline beneath the sites using conventional bore or HDD technology, fencing sites or portions of sites to ensure that they are not disturbed during construction, monitoring of construction activities by an archaeologist; or archaeological data recovery at the sites. Therefore, impacts on cultural resources would not be significant or would be mitigated to less than significant.

If unanticipated cultural resources are encountered during construction, procedures would be implemented as outlined in the unanticipated discoveries plan developed for each state crossed by the LSr Project pipeline (see Appendices H and I). These plans describe measures to be followed in the event that a previously undocumented cultural resource site is discovered during construction activities. These measures include: documenting and evaluating the site; consulting with the DoS and the appropriate SHPO; notifying appropriate law enforcement authorities when human remains are discovered; and implementing measures to avoid, minimize, or mitigate adverse impacts on the site if the site is eligible for listing on the NRHP.

Operation

No impacts are anticipated during the operational phase of the project.

3.9 NATIVE AMERICAN CONSULTATION

The lead federal agency is responsible for consulting with federally recognized Indian tribes as part of the section 106 NHPA process. For the LSr Project, the DoS directed consultations with tribal organizations with the assistance of the COE. Letters were sent to the tribal organizations on May 25, 2007 inviting the tribes to participate in consultation regarding the potential effects to properties of concern resulting from the LSr Project. In November 2007, follow up phone consultations were made by the COE to determine if tribes who had not responded to the initial invitation to participate in consultation remained interested in further participation. Those tribes that requested to be consulted on the project received a copy of the applicant's application to the DoS, a copy of the Draft EA, and a copy of the Preliminary Final for review. While no specific mitigative measures were identified during these consultations, some tribes requested results of the cultural resource surveys. Table 3.9-1 lists tribes consulted for the LSr Project and indicates those that requested consultation involvement and received copies of the cultural resource survey reports. No tribes have provided any further comments on the cultural resource survey reports.

Neither the construction nor operation of the proposed project would cross any Native American reservations. Any Traditional Cultural Properties that may be affected by the LSr Project would be treated in accordance with the NHPA and its implementing regulations, as well as other applicable federal statutes.

TABLE 3.9-1

Native American Organizations Consulted for the LSr Project

*Flandreau Santee Sioux Tribe of South Dakota	Prairie Island Indian Community
*Fond du Lac Band of Lake Superior Chippewa	Sac and Fox of the Mississippi in Iowa
*Forest County Potawatomi	Shakopee Mdewakanton Sioux Community
*Ho-Chunk Nation	Sokagon Chippewa Community
*Leech Lake Band of Ojibwe	St. Croix Band of Lake Superior Chippewa
*Lower Sioux Indian Community	White Earth Band of Ojibwe
*Mille Lacs Band of Ojibwe	Sac and Fox Nation of Missouri and Nebraska
*Boise Forte Band of Chippewa	Santee Sioux Nation, Nebraska
*Upper Sioux Community	*Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
*Red Cliff Band of Lake Superior Chippewa	Sisseton-Wahpeton Sioux
*Spirit Lake Nation	Yankton Sioux
Red Lake Band of Chippewa	Turtle Mountain Band of Chippewa
Sac and Fox Nation of Oklahoma	Standing Rock Sioux Tribe
Stockbridge-Munsee Community	Spirit Lake Sioux Tribe
Bad River Band of Lake Superior Chippewa	Rosebud Sioux Tribe
Grand Portage Band of Lake Superior Chippewa	Oglala Sioux Tribe
Keweenaw Bay Indian Community	Lower Brule Sioux Tribe
Lac Courte Oreilles Band of Lake Superior Chippewa	Fort Belknap Indian Community
Lac du Flambeau Band of Lake Superior Chippewa	Crow Nation
Lac Vieux Desert Band of Lake Superior Chippewa	Crow Creek Sioux Tribe
Menominee Indian Tribe of Wisconsin	Cheyenne River Sioux Tribe
Oneida Nation of Wisconsin	Blackfeet Tribe

* Indicates tribal organizations that requested consultation and received cultural resource survey reports prepared for work completed along the project route. No comments have been received of DoS by any of the consulted tribal organizations.

3.10 SOCIAL AND ECONOMIC CONDITIONS

Construction and operation of the LSr Project would result in both temporary and long-term socioeconomic impacts in the counties crossed by the project. During construction, there would be temporary increases in local population, demand for short-term housing, use of transportation systems, and expenditures in local economies for goods and services. Construction would also result in temporary impacts on agricultural production. Long-term impacts associated with the project include payment of local property and/or ad valorem taxes and the creation of both permanent and temporary jobs for pipeline operation and maintenance activities.

Table 3.10-1 lists the communities that are within 1 mile of the proposed project that may be affected by the proposed project and their respective year 2005 population statistics.

TABLE 3.10-1

Municipalities within 1.0 Mile of the LSr Project

County, State/Municipalities	Approximate Milepost	Population Estimate (2005) [a]
Kittson, Minnesota		
Donaldson	815	38
Marshall, Minnesota		
Viking	849	92
Pennington, Minnesota		
Saint Hilaire	866	273
Red Lake, Minnesota		
Plummer [b]	876	271
Oklee [b]	886	382
Polk, Minnesota		
Trail [b]	895	63
Gully	898	106
Clearwater, Minnesota		
Gonvick	903	297
Clearbrook	909	536

[a] U.S. Census Bureau, www.quickfacts.census.gov.
[b] City or Township would be crossed by the proposed pipeline route.

3.10.1 Population, Employment, and Income

The 2005 U.S. Census Bureau, 2004 Northwest Area Foundation Indicator Website, and 2005 Minnesota Department of Employment and Economic Development Local Area Unemployment Statistics data were reviewed to gather information on existing socioeconomic conditions in the counties affected by the project. Table 3.10.1-1 summarizes the population, unemployment rate, and income trends in the counties crossed by the proposed pipeline route. Population densities (an indicator of the extent of economic development) in the counties affected by the project average 10.9 people per square mile. This is slightly higher than the North Dakota state average of 9 people per square mile and less than the Minnesota state average of 62 people per square mile, and reflects the generally rural character of much of the proposed pipeline route.

County population levels within the project area range from a low of 4,317 persons in Red Lake County, Minnesota to a high of 31,133 persons in Polk County, Minnesota. In general, populations in affected counties in North Dakota and Minnesota have declined from 1990 to 2000, with Kittson County in Minnesota experiencing the greatest overall loss, while slight population increases were seen in Pennington (0.2 percent), Red Lake (0.4 percent), and Clearwater (0.6 percent) Counties, Minnesota.

The September (Minnesota) and November (North Dakota) 2006 unemployment rate in the project area varied from 3.3 percent in Polk County, Minnesota to 11.3 percent in Clearwater County, Minnesota (compared to a statewide average of 4.2 percent for Minnesota and 3.3 percent for North Dakota).

Per capita income in 2004 ranged from a low of $22,715 in Red Lake County, Minnesota to a high of $32,284 in Pennington County, Minnesota. In general, per capita income is lowest in rural counties with low population densities and high unemployment rates, and highest in urban counties with high population densities and low unemployment rates.

TABLE 3.10.1-1

Existing Socioeconomic Conditions in LSr Project Area

State/ County	Population Estimate [a]	Population Density (people per sq. mile) [a]	Per Capita Income [b]	Civilian Labor Force [c]	Unemploy-ment Rate (percent) [c]	2000 Major Employment Industries [a]
NORTH DAKOTA	636,677	9	$30,494	368,208	3.3	Educational, health and social services; Retail trade; Agriculture, forestry, fishing and hunting, and mining
Pembina	8,038	8	$28,220	4,255	4.9	Educational, health and social services; Agriculture, forestry, fishing and hunting, and mining; Manufacturing
MINNESOTA	5,132,799	62	$37,411	2,974,779	4.2	Educational, health, and social services; Manufacturing; Retail Trade
Kittson	4,792	5	$28,671	2,582	5.4	Educational, health, and social services; Manufacturing; Agriculture, forestry, fishing and hunting, and mining
Marshall	9,965	6	$26,901	5,453	7.3	Educational, health, and social services; Manufacturing; Agriculture, forestry, fishing and hunting, and mining
Pennington	13,608	22	$32,284	8,283	5.9	Educational, health, and social services; Manufacturing; Retail Trade
Red Lake	4,317	10	$22,715	2,301	6.8	Educational, health, and social services; Manufacturing; Retail Trade
Polk	31,133	16	$27,260	18,188	4.6	Educational, health, and social services; Retail Trade; Manufacturing
Clearwater	8,476	9	$22,734	4,002	11.3	Educational, health, and social services; Retail Trade; Construction

[a] U.S. Census Bureau, http://quickfacts.census.gov, 2005 (population) and 2000 (population density).
[b] Northwest Area Foundation Indicator Website, www.indicators.nwaf.org, 2004.
[c] Minnesota Department of Employment and Economic Development, LAU.S. Data, www.deed.state.mn.us; North Dakota Job Service, http://www.jobsnd.com/data/warehouse_unemployment.html.

Employment in the project area is concentrated in the agricultural production, manufacturing, accommodation and food services, healthcare and social services, and retail trade industries. Manufacturing, healthcare, and social assistance are the top employment industries in these counties.

In general, the pipeline route avoids population centers and residential areas. Nine municipalities are located within approximately 1 mile of the pipeline route and three communities would be crossed by the pipeline route (see table 3.10-1). The majority of these communities have populations less than 500. The largest community is the City of Clearbrook, Minnesota with a population of 536.

Construction of the project is scheduled to occur over a 6-month period, beginning in 2008, with an in-service date of late 2008. It is anticipated that the total workforce over this period would be about 450 workers. The number of workers would be determined when construction contractors have been retained prior to construction. Workers generally would be dispersed along the length of the construction corridor rather than concentrated at a single location. Local workers would commute from their residences to project work sites on a daily basis. Non-local workers would reside in the vicinity of the

project for short periods and would not typically be accompanied by family members. As a result, incremental demand from non-local workers for public services would be small.

3.10.2 Infrastructure

3.10.2.1 Housing

Enbridge does not expect that construction crews would encounter difficulties finding temporary housing in the project area. Local workers would commute from their residences. Non-local workers would use hotels, motels, and apartments or bring their own mobile housing units (such as travel trailers) and stay at local campgrounds. Because workers generally would be dispersed along the length of the pipeline route, demands for temporary housing within local communities would be minimal.

3.10.2.2 Public Services and Facilities

In general, the public services available within the proposed project area are functions of the size and population of the county and the number of larger communities. There are multiple law enforcement providers including the respective state patrols, county sheriffs, and local police departments. A network of fire departments and districts provide fire protection and suppression services across the region. Many of the fire districts across the region are staffed by volunteers and are housed in stations located in the larger communities.

3.10.3 Fiscal Relationships

Long-term economic benefits associated with operation of the pipeline would include increased tax revenues at the state and county level in the form of property and/or ad valorem taxes. It is estimated that the LSr Project would generate an estimated $4.0 million in annual local tax revenues for the counties, depending on the number of pipeline miles within the county and the placement of pipeline-related facilities such as pump stations.

3.10.4 Environmental Justice

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629) requires that impacts on minority or low-income populations be taken into account when preparing environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by federal agencies. The Environmental Justice Guidance under NEPA prepared by the Council on Environmental Quality ("CEQ," 1997) is commonly used in implementing EO 12898 for NEPA review. The purpose of the order is to avoid the disproportionate placement of any adverse environmental, economic, social, or health impacts from federal actions and policies on minority populations, low-income populations, and Indian tribes, and to allow all portions of the population an opportunity to participate in the development of, compliance with, and enforcement of federal laws, regulations, and policies affecting human health or the environment regardless of race, color, national origin, or income.

In accordance with the CEQ Guidance, minority populations should be identified where either (1) the minority population in the affected area exceeds 50 percent, or (2) the minority population of the affected area is meaningfully greater than the minority population in the general population of the surrounding area. For the purposes of this analysis, the "affected area" is defined as local counties, the "general population" is defined as the state within which the counties are located and "meaningfully greater" refers to a population that is at least 1.5 times greater than the corresponding measure for the general population.

A description of the population types (i.e., races) residing with the seven counties affected by the proposed project based on U.S. Census Bureau data from 2005 is presented in table 3.10.4-1. These data show that minority populations do not exceed 50 percent of the population in any county. Pennington, Red Lake, Polk, and Clearwater Counties have a higher proportion of American Indians than the state of Minnesota's average percent of the total population, with Clearwater County having a "meaningfully greater" proportion than the rest of the state. However, even at a higher level, American Indians would only comprise less than 10 percent of the entire county population; therefore, are well under the EO 12898 threshold of 50 percent. The remaining counties have a smaller proportion of American Indian populations than the respective state levels.

TABLE 3.10.4-1

Race and Poverty Conditions in the LSr Project Area

State/ County Specific	Race as a Percentage of Total Population [a]							Persons of Hispanic or Latino Origin, percent (2005) [a]	Persons Below Poverty, percent (2003) [b]
	White	Black or African American	Asian	American Indian and Alaska Native	Native Hawaiian and Other Pacific Islander	Persons Reporting Other Race/2 or More Races	Total		
NORTH DAKOTA	92.3	0.8	0.7	5.3	0.0	1.0	100	1.6	10.5
Pembina	96.2	0.5	0.3	1.8	0.0	1.2	100	3.5	8.0
MINNESOTA	89.6	4.3	3.4	1.2	0.1	1.4	100	3.6	8.0
Kittson	98.7	0.2	0.4	0.4	0.1	0.3	100	1.5	8.5
Marshall	98.9	0.1	0.3	0.4	0.0	0.3	100	3.8	8.5
Pennington	96.7	0.4	0.8	1.4	0.0	0.7	100	1.9	9.5
Red Lake	98.1	0.2	0.1	1.5	0.0	0.2	100	0.9	9.0
Polk	96.5	0.6	0.5	1.3	0.0	1.0	100	4.6	10.7
Clearwater	89.3	0.3	0.3	8.9	0.0	1.1	100	0.9	12.9

Note: (1) This table is based on U.S. Census Bureau figures that, due to rounding, may total slightly more or less than 100 percent. (2) People who identify their origin as Hispanic or Latino may be of any race. Thus, the percent Hispanic or Latino should not be added to the race as percentage of population categories.

[a] Source: U.S. Department of Commerce, Bureau of the Census: State and County Quick Facts; http://quickfacts.census.gov.

[b] Source: U.S. Department of Commerce, Bureau of the Census, Census 2005: State and County Quick Facts; http://quickfacts.census.gov.

In all six counties affected in Minnesota, the poverty levels exceed the overall state poverty level. However, Pembina County in North Dakota does not exceed the overall state poverty level.

3.10.5 Potential Impacts and Mitigation

- Construction workforce demands on local infrastructure.
- Fiscal benefits from goods and services purchased locally and associated tax revenue generated.
- Tax revenues generated by the pipeline.

Construction

Enbridge, through its construction contractors and subcontractors would attempt to hire local workers where the local workforce possesses the required skills. Construction personnel hired from outside the project area would augment the local workforce and consist of supervisors, environmental inspectors, and highly skilled mechanical, electrical, and instrumentation/control tradesmen.

Local communities would benefit from monies paid to construction workers, both local and non-local, throughout the construction period. Workers would spend a portion of their earnings locally, thereby providing significant revenues to local communities. Both local and non-local workers would use hospitality services such as restaurants, grocery stores, and gasoline stations. Non-local workers would require temporary housing in addition to hospitality services. Construction contractors and subcontractors would also purchase certain materials from local vendors and lease land and equipment for temporary field offices and material storage areas.

Although several of the counties affected by the LSr Project have minority populations higher than the state averages, in each effected county the minority populations are significantly less than 50 percent of the general population of the affected area and for all but one county, Clearwater County, Minnesota, the minority population is not "meaningfully greater" than the general population. In addition, although several affected counties have a higher percentage of low-income population than the state average, all counties' low-income populations are less than 50 percent of the general population and are not "meaningfully greater" than the general population. The impact of the pipeline route in Clearwater County is the same as impacts in the other affected counties and there is no disproportionate impact on Clearwater County.

The scale of construction activities that are planned for the LSr Project are very similar in scope to the Lakehead Capacity Expansion Project that was constructed in the same area in 1994 and the Lakehead Terrace I Project in 1998. In addition, another pipeline project (the MinnCan Project) is currently under construction between the Clearbrook Terminal and Flint Hills Resources' Pine Bend Refinery south of the Twin Cities. During each of these projects, no material problems or shortages occurred with regard to housing, law enforcement, or other social or economic issues. Pipeline construction crews are largely a transient workforce and are accustomed to finding or providing their own lodging. In addition, because the project would be constructed by multiple crews moving in tandem, not all of the associated construction workers would be located in the same area at the same time, but rather would be spread out along the extent of the project route. Enbridge would brief local law enforcement and/or county economic development or similar departments with regard to project schedule and activities and anticipated numbers of workers in the area.

Operation

Operation of the proposed pipeline would require Enbridge to hire up to four additional full-time employees. The new employees would be based locally at existing Enbridge facilities in Clearbrook, Thief River Falls, Bemidji, Minnesota or Superior, Wisconsin. The new permanent jobs would contribute to local economies through payroll taxes and by the use of services such as hospitality services, retail vendors, and other businesses.

Local communities also would benefit from periodic employment created by pipeline operation and maintenance activities. Workers for these activities may be local or non-local. Communities would benefit from the monies spent by temporary workers on local hospitality services and temporary housing. Additionally, construction contractors or Enbridge employees may purchase materials from local vendors.

3.11 PUBLIC HEALTH AND SAFETY

Pipeline systems afford some level of risk to the public and the environment in the event of an accidental release. This section discusses the causes of accidents and preventative measures employed on pipeline systems as well as comparative risks associated with other crude oil transportation systems. Safety standards, industry and Enbridge operating history, and mitigative measures are also addressed.

3.11.1 Baseline Transportation Accident Rates

The major causes of pipeline leaks in the United States are corrosion (both internal and external), excavation damage, pipe or weld failure, incorrect operations or natural causes (e.g., floods or outside force). Releases from interstate liquid petroleum pipelines are reportable to PHMSA as required by 49 C.F.R. Part 195 Subpart B. Currently, the federal regulations require reporting of all releases greater than 5 gallons (and/or if other threshold reporting criteria are met), which becomes public record. In North Dakota and Minnesota, state rules require pipeline operators to report releases to the NDDH and MPCA.

It is illustrative to compare pipeline safety to other modes of transportation. Pipelines operate more safely than any other mode of oil transportation. In table 3.11.1-1, the numbers show how much more likely a transportation mode is to have an accident of a particular type compared to an oil pipeline. For example, truck accidents result in deaths at least 87 times more often than pipeline accidents. Likewise, truck accidents result in fires and/or explosions about 35 times more frequently per barrel of oil transported per mile. (These figures include only accidents involving petroleum shipments, not all accidents for a given transportation mode).

TABLE 3.11.1-1

Accident Rates of Petroleum Transportation Methods [a]

Method	Death	Fire/Explosion	Injury
Truck	87.3	34.7	2.3
Rail	2.7	8.6	0.1
Barge	0.2	4.0	3.6
Tank Ship	4.0	1.2	3.1

[a] Values less/more than 1.0 indicate risk of accident is lower/greater than pipeline transportation. Comparisons based on calculated rates per ton-mile.

Source: Allegro Energy Group as posted on the Association of Oil Pipelines website: http://www.aopl.org

3.11.2 Crude Oil Pipeline Accident Rates

An analysis of the historical record shows that the liquid petroleum pipeline industry's safety performance has improved significantly over the last 30 years. These improvements correlate with advancements in technology as well as increased environmental awareness. The annual number of spills has decreased by nearly 40 percent. Over the last 30 years, the number of spills has also dropped from an average of 318 in the first 6 years (1969 to 1974) to the most recent six year running average of 197 spills nationwide. The median size of a spill has greatly decreased. The annual volume of oil spilled from pipeline systems has fallen by about 60 percent, based on six year running averages (PHMSA website and Association of Oil Pipelines website).

3.11.2.1 Enbridge Pipeline Incidents and Public Safety

According to available records, there have been no deaths or major injuries of landowners or members of the public as a direct result of a pipeline leak on the Enbridge Lakehead System since the system began operations in the U.S. in 1950 (previously named Lakehead Pipe Line Company, Inc. and Lakehead Pipeline, Limited Partnership).

On November 28, 2007, an accident occurred south of Clearbrook, Minnesota during maintenance activities associated with an existing pipeline, not related to new pipeline construction. Two Enbridge employees were killed as a result of the accident. As of early March 2008, the accident investigation underway by the two jurisdicational agencies – the Occupational Safety and Health Administration (OSHA) and PHMSA – was not completed. The results of the agency investigation would be made public upon completion expected during by the spring of 2008.

3.11.2.2 Enbridge Ten Year Pipeline Accident Record

Enbridge Energy, Limited Partnership's 10-year pipeline accident record on the mainline pipe system is presented in table 3.11.2-1 below. Data excludes pipeline or facility leaks within Enbridge station or terminal properties.

TABLE 3.11.2-1

Mainline Pipeline Incidents - Ten Year History (Lakehead System) [a]

Date	County	State	Product Spilled [b]	Volume Spilled (barrels)	Primary Cause
9/16/98	Red Lake	MN	Crude	5,700	Outside Force Damage
10/19/98	Red Lake	MN	NGL	950	Outside Force Damage
1/16/99	Douglas	WI	NGL	130	Corrosion
2/22/99	Pennington	MN	Crude	400	Leak from Bolted Flange
11/2/99	Iron	MI	NGL	5,300	Outside Force Damage
11/15/99	Taylor	WI	Crude	15	Failure Caused in Initial Construction
2/7/00	Clearwater	MN	Crude	25	Failed Weld
2/23/00	Cass	MN	Crude	10	Pinhole Leak in Weld
5/9/00	Clearwater	MN	Crude	25	Failed Weld
7/22/00	Clearwater	MN	Crude	50	Failed Weld
1/25/01	Clearwater	MN	Crude	25	Failed Over-sleeve
3/4/01	Cass	MN	Crude	25	Failed Weld
7/4/02	Itasca	MN	Crude	6,000	Material / Weld Failure
4/14/03	Polk	MN	Crude	125	Pinhole Leak in Girth Weld
2/19/04	Itasca	MN	Crude	1,003	Natural Forces (Earth Movement)
7/13/04	Itasca	MN	Crude	1	Weeping Flange on Mainline
4/1/05	McHenry	IL	Crude	5	Material / Weld Failure
12/22/05	Wood	WI	Crude	0.1	Material/Weld Failure
10/20/06	Beltrami	MN	Crude	5	Failed Weld
1/1/07	Clark	WI	Crude	1,500	Material / Weld Failure
2/2/07	Rusk	WI	Crude	3,000	Operator Excavation Damage
11/13/07	Clearwater	MN	Crude	2	Pinhole Leak in Weld
11/28/07	Clearwater	MN	Crude	325	Under Investigation

[a] Pipeline system leaks reportable to U.S. DOT, PHMSA 1998-2008. Reporting criteria for leaks changed in 2002 from 50 barrels to 5 gallons.

[b] NGL = Natural gas liquids.

3.11.3 Potential Impacts and Mitigation

- The release of contaminants to the environment during construction which may affect water, soils, and sensitive ecosystems.
- Health and safety risks for construction personnel.
- The risk of petroleum releases during pipeline operations and the potential effects on humans and other sensitive resources such as populated areas, drinking water sources, and ecologically sensitive areas.

Construction

The introduction of contaminants to the environment due to accidental spills of construction related chemicals, fuels, or hydraulic fluid could have an adverse effect on groundwater and surface water quality, sensitive ecosystems, and soils. Spill-related impacts from pipeline construction are primarily associated with fuel storage, equipment refueling, and equipment maintenance. The SPCC Plan (see Appendix G) outlines measures that would be implemented to prevent accidental releases of fuels and other hazardous substances. These measures include response, containment, and cleanup procedures. Spills from refueling operations, fuel storage, or equipment failure in or near a waterbody could affect aquatic resources and contaminate the waterbody downstream of the release point. Enbridge would minimize the potential impact of spills of hazardous materials by adhering to the relevant provisions in its SPCC Plan.

Enbridge has developed a Petroleum-Contaminated Soil Management Plan (PCSMP, see Appendix L) that describes the procedures to be followed upon encountering contaminated soil during pipeline construction. The PCSMP outlines procedures to identify, contain, document, report and dispose of petroleum-contaminated soils encountered during construction.

To prevent pipeline failures resulting in inadvertent releases, Enbridge would construct and maintain the LSr Project pipeline to meet or exceed industry and governmental requirements and standards. Specifically the steel pipe would meet PHMSA specifications under 49 C.F.R. Part 195, follow standards issued by the American Society of Mechanical Engineers, National Association for Corrosion Engineers and American Petroleum Institute (API). As a safety factor, the proposed LSr Project pipeline would be designed to withstand pressures over and above its normal operating pressures. All pipe would be inspected and integrity-tested at the factory and transported per the highest technical standards. All of the pipe would be manufactured with fusion-bonded epoxy coating to protect against corrosion. The actual installation of the pipeline and all construction and testing records would be subject to regulatory inspection, including by PHMSA inspectors. PHMSA also conducts regularly scheduled field inspections of the pipeline facilities to ensure compliance with federal regulatory requirements, including the integrity testing of the pipeline through the use of internal inspection devices.

Once installed, the pipeline would be subjected to testing to verify its integrity and compliance with specifications. Such testing would include checking coating integrity, examining by X-ray 100 percent of field welds (over and above the 10 percent required by regulations), internally inspecting the entire length of each line by using an in-line inspection tool known as a caliper pig, and hydrostatically testing the line to qualify the maximum allowable operating pressure. The pipeline would be placed into service only after inspection to verify compliance with all construction standards and requirements are met.

Worker safety is a critical component of every aspect of construction. Construction personnel would be properly trained and information made available to all personnel regarding the exposure hazards and risks associated with pipeline construction. Prior to each day's work in the field, contractors and Enbridge employees would conduct a hazard assessment to identify any potential health and safety effects of the actual work and any environmental stressors. Enbridge would issue a safe work permits which identify such hazards and measures to be implemented to ensure a safe work environment.

Operation

Accidental leaks from the pipeline system during operations can also potentially affect the natural and human environments. Enbridge uses computerized inspection tools that travel through the inside of the pipeline to check pipe integrity. Enbridge also performs regular aerial flyovers to inspect the pipeline right-of-way. As required by federal law, Enbridge maintains an ERP (see Appendix F) which has been reviewed and approved by the DOT, OPS to address pre-planning, equipment staging, notifications, and release containment procedures to be implemented in the event of an inadvertent pipeline release. A summary of Enbridge's ERP is presented below.

Prompt and effective response during an emergency is accomplished by being prepared for any type of incident. Enbridge staff regularly plan, and train, for reasonably foreseeable (including worst-case) emergency situations in accordance with the processes and procedures identified in the attached ERP. In addition, pre-emergency preparedness includes the consideration and maintenance of local area worst-case discharge volume calculations, High Consequence Area (HCA) and control point maps, and cooperative and mutual aid relationships.

- ◊ **Emergency Response Management-** The Enbridge emergency management process, and actions taken through that process are:
    - Pre-Emergency Preparedness
    - Emergency Notification
    - First Responder Activity
    - Incident Command System
    - Safety Precautions
    - Site Security and Control
    - Public Relations
    - Wildlife Management
    - Waste Management
    - Incident Records
    - Post-Emergency Reviews
    - Decontamination
- ◊ **Emergency Response Standards and Tactics-** Detailed response standards and tactics are described for various types of emergencies, include:
    - Product Containment, Recovery and Cleanup
        - On land
        - In Wetlands
        - In Rivers and Lakes
        - In Sensitive Areas

- Security Threats
- Small Hazardous Materials Spills (HAZMAT)
- Medical Emergencies
- Natural Disasters
- Fires and Explosions

The DOT, PHMSA requires regulated pipeline operators to prepare and maintain a documented Integrity Management Program (IMP) for pipeline system components which could affect HCAs in the event of a pipeline release. The requirements of the IMP are provided in 49 C.F.R. §195.452 which is commonly referred to as the HCA Rule. The LSr Project pipeline would be incorporated into Enbridge's existing IMP and associated HCA Management Plan. The HCA Management Plan fulfills the requirements set forth in the HCA Rule for planning and performing ongoing assessments of pipeline integrity, data collection, data integration and analysis, repairing and remediating the pipeline, implementing preventive and mitigative measures, and improving the overall IMP. Section 5 of the HCA Management Plan specifically addresses risk management activities that could assist in the protection of HCAs from a pipeline rupture or facility incident. The mainline risk assessment in this section comprehensively evaluates a range of threats (corrosion, cracking, denting, third-party damage, ground movement and system operations) and potential consequences (impact on population, environment, and customers). The model has been customized to include likelihood and consequence conditions applicable to Enbridge liquid pipelines and has been applied to the mainline as a whole.

This new pipeline, as well as the existing pipelines in this same right-of-way, are maintained and inspected according to PHMSA regulations, industry codes and prudent pipeline operating techniques. All of Enbridge's mainline liquids pipelines are externally coated to resist corrosion, internally inspected at regular intervals using in-line inspection technology, and equipped with a cathodic-protection system to prevent external corrosion. Enbridge's cathodic protection system and internal inspection program were implemented prior to these techniques becoming a regulatory standard.

Enbridge Lakehead System's rights-of-way are patrolled and inspected by air at least every three weeks but not less than 26 times per year to watch for abnormal conditions or dangerous activities (e.g., unauthorized excavation along the pipelines). Enbridge also conducts extensive public education and outreach programs that exceed industry (API Recommended Practice 1162) and federal (49 C.F.R. §195.440) requirements concerning public awareness of pipelines and pipeline-safety matters. All Enbridge lines are marked with signage and warnings, per federal regulations, at road and highway crossings, railroad crossings, navigable rivers, and other locations to alert the public to the presence of underground lines and to provide information, contact numbers, and emergency data. Such measures would be implemented for the LSr Project pipeline.

Pipeline workers and contractors performing critical tasks are qualified under OSHA safety standards and PHMSA "operator qualification" rules and are subjected to federal drug and alcohol testing requirements. Enbridge meets, and often exceeds, these requirements so that human error in construction and operation is avoided.

3.12 CONNECTED ACTIONS

One commenter on the draft EA, the MCEA, alleges that other projects, including the planned Alberta Clipper and Keystone pipelines, and development of the Alberta, Canada oil sand fields, are connected actions.

The CEQ regulations define "connected actions" as actions which "(i) automatically trigger other actions which may require environmental impact statements; (ii) cannot or would not proceed unless other actions are taken previously or simultaneously; (iii) are interdependent parts of a larger action and depend on the larger action for their justification." 40 C.F.R. § 1508.25(a)(1) (2007). None of the other projects or developments identified by MCEA fit these criteria for connected actions.

The LSr Project including its pumping stations, valves and other operational appurtenances to the pipeline has utility apart from the other projects listed by MCEA. As explained in Section 1.2, the purpose of the LSr Project is to transport light and medium sour crude petroleum originating in the northern Williston Basin of Saskatchewan received at the Enbridge terminal in Cromer, Manitoba to meet the demand of refinery markets in the United States. The LSr pipeline will eliminate a bottleneck in the Enbridge pipeline system at Cromer, Manitoba and allow Enbridge to meet U.S. demand for petroleum with stable Canadian supplies in replacement of declining oil production from certain domestic on-shore sources. The LSr Project is not dependent for its utility on the other pipeline projects identified by MCEA, and discussed in this EA. The LSr Project will function and serve its purpose even if none of those other projects were to be constructed. These other projects are therefore not connected actions under NEPA. *See Coalition for a Liveable Westside v. United States HUD*, 1997 U.S. Dist. LEXIS 8860 (S.D.N.Y. 1997) (court held that connected actions are those that are interdependent).

The other significant proposed Enbridge U.S.-Canada pipeline project, Alberta Clipper Project, is the subject of a separate Presidential Permit application filed by Enbridge Energy, Limited Partnership and is undergoing simultaneous environmental review by the DoS, which is preparing an EIS. That project embraces the construction of approximately326 miles of new 36-inch diameter pipeline from the U.S.-Canada border near Neche, North Dakota to an Enbridge terminal in Superior, Wisconsin for the transportation of heavy crude petroleum originating in the oil sands of Alberta. The Alberta Clipper Project environmental review will also consider the construction, in the same footprint as the Alberta Clipper pipeline, of a new 191 mile, 20-inch-diameter pipeline between Superior, Wisconsin and Clearbrook, Minnesota. This pipeline will be used for the northbound transportation of diluent to the Alberta oil sands region for use in facilitating the pipeline transportation of heavy crude originating in the oil sands region. Neither of these projects is connected to the LSr pipeline, which will transport a different type of liquid (light and medium sour crude) originating in a different region of Canada (the Williston Basin in Saskatchewan) and serving a different purpose and need. The LSr Project therefore has an independent purpose and utility relative to these other projects and they are therefore not connected actions warranting environmental review in this EA.[6]

The Canadian oil sands project is also not a connected action relative to the LSr Project. As noted above, the LSr pipeline will transport oil pumped from traditional production wells in the northern Williston Basin of Saskatchewan, not heavy crude from the Alberta oil sands. The LSr pipeline will accordingly have no impact on the size or scope of the Alberta oil sands project or on greenhouse gas or other emissions from the production of heavy synthetic crude in Alberta. In addition, the Alberta oil sands have been and presumably will continue to be developed regardless of the LSr pipeline and independent of any U.S. federal agency approval since the oil sands region is located in Canada. For these reasons, the oil sands is not a connected action to the LSr Project for purposes of environmental review. *See Citizens' Comm. To Save Our Canyons v. U.S. Forest Serv.*, 297 F.3d 1012, 1023-24 (10th Cir. 2002) (court held that federal land exchange and a master development plan were not connected actions because the development plan would proceed whether or not the exchange occurred); *Coalition*

[6] Enbridge also plans to reverse from southbound to northbound service the use of an existing 18-inch-diameter, 135-mile-long pipeline between Clearbrook, Minnesota and the U.S.-Canada border near Neche, North Dakota for use in transporting diluent northbound in connection with the proposed new 20-inch pipeline. Enbridge has already been advised that it may do so without the need for a new Presidential Permit for this cross border pipeline. That project is not connected to the LSr pipeline for environmental review or other purposes.

for a Liveable Westside v. U.S. HUD, 1997 U.S. Dist. LEXIS 8860 (S.D.N.Y. 1997) (court held that because developer would proceed with project regardless of whether the other federally-funded projects went forward, those projects were not connected actions).

3.13 INDIRECT EFFECTS AND CUMULATIVE IMPACTS

3.13.1 Introduction

Definitions and Approach

Indirect effects which are defined as effects "[c]aused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 C.F.R. § 1508.8).

Cumulative impacts are "… [t]he impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 C.F.R. § 1508.7). Cumulative impacts consider not only the localized effect of the construction and operation of the proposed LSr pipeline but also past actions and reasonably foreseeable future actions that affect the resources potentially impacted by that project.

In response to MCEA's comments, this Final EA presents in section 3.13.1.1 an analysis of the indirect effects on LSr on air quality as well as the potential broad-based cumulative air quality impacts, including greenhouse gas impacts resulting from the transportation of the crude oil through the LSr pipeline into the United States.

This final EA also considers in section 3.13.1.2 current and reasonably foreseeable environmental effects and impacts through the use of watershed and Minnesota Ecological Classification System (ECS) subsections (Cleland et al., 1997) as management units. This approach enables reviewing agencies to evaluate the potential environmental effects of previous, proposed, and reasonably foreseeable future actions in an environmentally-based context in order to identify potential impacts and appropriate mitigation measures (Carlson et al., 1997).

3.13.1.1 Indirect and Cumulative Air Quality Impacts

Historically, light, medium and heavy crude oil from conventional oilfields in Canada has been transported by pipeline to refineries in the United States for refining into a variety of products. The light and medium sour crude transported from Canada through the proposed LSr pipeline is intended to replace similar conventional crude import capacity from other foreign sources, and from declining on-shore domestic sources. Table 3.13.1-1 indicates the net capacity changes for crude oil transportation related to the LSr pipeline over the reasonably foreseeable time span.

TABLE 3.13.1-1

Lakehead System Capacities – U.S. Border to Superior, Wisconsin (bpd)[a]

Enbridge Line Number	Pre-LSr Project Crude Capacity	Initial Capacity Replacement Potential 2009 and Q1 and Q2 of 2010	Total Crude Capacity through Q2 2010	Final Capacity Replacement Potential Post Q2 2010	Total Crude Capacity after Q2 2010
1	237000	0	237000	0	237000
2	409,000	33,000	442,000	33,000	442,000
3	503,000	0	503,000	0	503,000
4	793,000	0	793,000	0	793,000
13	172,000	0	172,000	-172,000	0 [a]
LSr Project	0	186,000	186,000	186,000	186,000
Total	2,114,000	219,000	2,333,000	47,000	186,000

[a] Line 13 removed from crude oil service.

During the pipeline installation phase, modifications to existing Enbridge Pipeline No. 2 would result in 33,000 bpd increased capacity and the new LSr pipeline would result in additional conventional crude capacity of 186,000 bpd for a total capacity replacement potential of 219,000 bpd. In the third quarter of 2010 Enbridge Pipeline No. 13 would be reversed to deliver diluent to Canada and the total incremental crude capacity replacement potential would drop from 219,000 bpd to 47,000 bpd of light and medium sour crude.

The Upper Midwest states that would be directly served by the LSr pipeline are part of PADD 2, which consists of 15 states, including Minnesota, North Dakota and Wisconsin. The cumulative air quality impacts analysis presented here assumes that all of the conventional light and medium sour crude transported on the LSr pipeline would be refined in PADD 2, although there is no assurance that this would in fact be the case. The pipeline would be operated for common carrier traffic and therefore Enbridge has no way of ascertaining the ultimate destination of the transported crude. Nonetheless, assuming that all the light and medium sour crude would be refined in PADD 2 is not unreasonable for purposes of an indirect and cumulative impacts analysis. The analysis also assumes that consumer demand and inventory drives refining activity, and price and availability of crude drives the source of the crude that is refined by refineries.

Consumer demand is a significant factor in the amount of crude oil refined. The EIA short term energy outlook shows that from January to February of 2008, U.S. demand for (consumption of) petroleum products fell. Demand is expected to be comparatively flat for February and April 2008. Table 3.13.1-2 indicates EIA short-term consumption projections.

TABLE 3.13.1-2

U.S. Petroleum Consumption [a]

Consumption by Type (million barrels per day)	12/ 07	1/08	2/08	3/08	4/08	5/08	6/08	12/08	6/09	12/09
Pentanes Plus	0.14	0.11	0.12	*0.11*	*0.11*	*0.1*	*0.12*	*0.12*	*0.12*	*0.11*
Liquefied Petroleum Gas	2.28	2.51	2.44	*2.18*	*1.98*	*1.85*	*1.86*	*2.38*	*1.87*	*2.38*
Unfinished Oils	0.04	0.02	0.01	*0.03*	*0.04*	*0.03*	*0.02*	*0.02*	*0.02*	*0.02*
Finished Petroleum Products										
Motor Gasoline	9.25	9.01	9.07	*9.18*	*9.24*	*9.43*	*9.52*	*9.36*	*9.62*	*9.44*
Jet Fuel	1.6	1.55	1.56	*1.61*	*1.63*	*1.64*	*1.68*	*1.64*	*1.69*	*1.65*
Distillate Fuel Oil	4.35	4.27	4.4	*4.41*	*4.25*	*4.12*	*4.13*	*4.44*	*4.14*	*4.48*
Residual Fuel Oil	0.66	0.75	0.62	*0.79*	*0.72*	*0.71*	*0.68*	*0.63*	*0.66*	*0.65*
Other Oils	2.55	2.34	2.3	*2.39*	*2.57*	*2.75*	*2.83*	*2.47*	*2.86*	*2.49*
Total	20.87	20.56	20.52	*20.72*	*20.54*	*20.63*	*20.83*	*21.06*	*20.97*	*21.22*

Projection numbers are shown in italics.
[a] http://www.eia.doe.gov/oiaf/forecasting.html)

If this flattening consumption trend is projected through the second quarter of 2010, it would be reasonable to assume for purposes of assessing air quality impacts that the 219,000 bpd brought into PADD 2 by the LSr pipeline would replace existing crude inputs and therefore, would not make any contribution to increased emissions of greenhouse gases ("GHG", carbon dioxide or equivalents) or criteria pollutants: SO_2, NO_x, CO, PM_{10}, and volatile organic carbon (VOC) compounds. If this trend is projected through the indefinite future, one could assume that demand does not increase significantly. The 47,000 bpd brought into PADD 2 by the LSr Project after the second quarter of 2010 likewise would only replace existing crude inputs and would not make any contribution to increased emissions of GHG or criteria pollutants.

It is unlikely that the LSr Project would contribute to a significant overall increase of conventional crude oil imports and refining activity given the current state of the economy, the flattening of demand (consumption), various programs to increase use of biofuels and other alternative, non-petroleum liquid fuels and a projected drop-off in domestic crude production. A summary of the refining capacity of PADD 2 is shown in table 3.13.1-3. It is significant to note that the refineries in PADD 2 have been operating near full capacity as indicated by the utilization rate, calculated by dividing the amount of crude refined by the refining capacity, of 92.4 percent in 2006 (EIA, 2008). These refineries would have the capacity and are configured to process the crude transported by the LSr pipeline because the crude would be displacing similar crude historically transported into PADD 2 from other foreign and domestic sources.

TABLE 3.13.1-3

PADD 2 Current Refining Capacity [a]

Criteria	All Crude [b]
Refining Capacity (bpd)	3,583,000
Crude Refined in 2006 (bpd)	3,309,000
Utilization Rate (percent)	92.4

[a] Energy Information Administration, "Midwest (PADD 2) Refinery Utilization and Capacity," http://tonto.eia.doe.gov/dnav/pet/pet_pnp_unc_dcu_r20_a.htm (last visited March 12, 2008).

[b] "Benchmarking of Refinery Emissions Performance", Prepared for Canadian Council of Ministers of the Environment by Levelton Engineering Ltd. and Purvin & Gertz Inc., July 2003.

Since it is anticipated that the crude oil transported by the LSr pipeline would displace crude oil transported from other sources, any net change in GHG and criteria pollutant emissions from PADD 2 refining activities associated with oil transported through the LSr pipeline would be deminimus. Emissions from refining are dependent upon the type of crude refined (Levelton Engineering Ltd. and Purvin & Gertz, Inc., 2003). Refineries cannot easily switch from one type of crude to another (i.e., light sweet to medium sour) without undergoing process modifications. As a result, criteria pollutant and GHG emissions from refining in PADD 2 are not expected to change as a result of the LSr pipeline. Any announced plans of certain refineries to expand or modify their capacity to refine heavy crude oil from the Alberta oil sands are unrelated to the LSr Project as it will carry light and medium sour crude oil, and no refinery expansion plans have been announced based on the LSr pipeline.

The EIA has also attempted to predict refining capacity and utilization out into the future. Table 3.13.1-4 indicates slight increases in capacity in 2010 and a corresponding drop in utilization rate. It appears as though it is not until 2015 that utilization surpasses 2008 utilization.

TABLE 3.13.1-4

National Refining (Distillation) Capacity and Utilization

Consumption (million barrels per day)	2008	2010	2015	2020	2025
Domestic Refinery Distillation Capacity	17.5	18.3	18.3	18.3	18.3
Capacity Utilization Rate (percent)	89.0	86.8	89.6	89.3	90.1

Source: Report #: DOE/EIA-0383 (2008) Released Date: March 2008 (Revised to include the impact of H.R.6, Energy Independence and Security Act of 2007 enacted in December 2007).

According to EIA information 1,514,000 bpd of crude oil were imported into PADD 2 from the Persian Gulf, Organization of Petroleum Exporting Countries (OPEC) countries and non-OPEC countries in 2006. Of that total, 1,150,000 bpd (76 percent) was imported into PADD 2 from Canada. It is likely that the 219,000 bpd of LSr pipeline capacity would replace some of the 364,000 bpd of non-Canadian imports from more distant countries. According to EIA information, non-Canadian imports of crude oil to PADD 2 are delivered via pipeline from stockpiles in PADD 1 and PADD 3. These two PADD regions import significant portions of their crude from OPEC and Persian Gulf sources via tanker. Almost no crude is currently transported directly into PADD 2 via tanker or barge.

Replacing crude imports into PADD 2 from PADD 1 and 3 with additional crude oil from Canada via the proposed LSr pipeline is unlikely to change the GHG and criteria pollutant emissions profile

resulting from the mode of transport since all imports into PADD 2 are via pipeline. However, if significant imports to PADD 1 and 3 arrive via tanker, the GHG and criteria pollutant emission profile would likely be positively impacted (lower emissions), if there is a reduction in the number of tankers and ground supporting equipment and their corresponding emissions.

The majority of GHG and criteria pollutants are emitted through the end use or combustion of petroleum products and fuels. The LSr pipeline would transport similar crude to that currently imported into PADD 2 and would be refined into a similar mix of petroleum fuels and products. As the crude would replace existing imports into PADD 2 from non-Canadian sources, there would not likely be an increase or decrease of GHG or criteria pollutants.

Section 2.2 of this final EA describes System Alternatives to include: expanding existing Enbridge facilities, other new pipeline systems (Keystone), and trucking crude from Cromer, Manitoba to Clearbrook, Minnesota. The first two system alternatives would have very similar emissions profiles if the capacity is kept constant. However, the trucking alternative has somewhat different emissions profile than the pipeline/transport mode. Trucking crude oil supplies as an alternative to the proposed LSr Project is estimated to require 310 trucks with 150 barrel capacity operating at four round trips per day. This truck traffic is expected to require 124,917,600 additional miles of truck traffic each year. This trucking would be expected to contribute significantly higher GHG and criteria pollutant emissions than the LSr Project as proposed.

Section 2.2 of the EA also identified the following route alternatives: direct route and three minor route variations. If the crude volume remains constant, refining and end use emissions constant, the largest change would be related to pipeline length. The direct route alternative is shown to be less than 2 percent shorter than the proposed LSr Project route. It is unlikely that emissions would be significantly less by taking a direct route and would likely be greater because additional pumps would be needed with the associated additional indirect GHG emissions. The other minor route variations would result in a longer pipeline and an incremental increase in emissions.

Energy prices, a desire to reduce GHG emissions and other factors will influence consumer demand for fossil fuel. Nevertheless, a reliable supply of crude oil will be needed to allow time for a national program to reduce GHG to be instituted and implemented. The proposed project and other potential crude oil delivery projects would not create the market demand for the crude oil; they would, however, assist in meeting the demand that is currently projected. The cumulative impacts of the LSr Project and other identified potential projects on GHG is difficult to quantify. However, DoS noted in the FEIS for Keystone that the construction and operation of that project would incrementally increase the cumulative impact of GHG (Keystone FEIS at 3.14-10) and it is likely that other proposed projects would also incrementally contribute to GHG. However, the construction and operations of these projects would offset potential emissions associated with other means for meeting the demand for imported crude oil, such as delivery of crude via tanker from more distant international sources.

As noted above the primary impact of the proposed LSr Project to regional and local criteria pollutants would occur during construction and would include soil disruption and combustion emissions from construction equipment. These impacts would be localized, intermittent and short term in duration. To the extent that other proposed projects have construction activities occurring simultaneously in a nearby locality, cumulative impacts on air quality may occur. However, any potential impacts would be short term and temporary. Moreover, the mitigation measures discussed in Section 3.1.4 regarding construction emissions would limit criteria pollutants from these construction activities. Air emissions from operations would occur primarily at the Clearbrook terminal and are limited in nature. No additional permitting will be required and the emissions are not expected to have any impact on cumulative emissions. No operational emissions would be generated by the stationary sources at the

pump station facilities because they are a closed system and electric powered. Electrical energy would be provided by the regional electrical grid and the specific source of the energy and the related emissions cannot be identified.

3.13.1.2 Cumulative Impacts on Land Use

Data exist that can be used to evaluate long-term changes in land use in response to various impacts. However, problems interpreting data acquired at varying map scales and comparing data summarized using different geopolitical boundaries limit the analysis to an abbreviated but useful semi-quantitative assessment. Several of the watersheds considered in this analysis are large and lie within ecological zones that differ in land use and environmental setting. The LSr pipeline route frequently crosses only one of the ecological zones, rendering a discussion of the characteristics of all ecological zones within the watershed unnecessary. Similarly historic, current, and future impacts would differ depending upon the nature of the ecological system impacted. While this cumulative impact analysis ("Analysis") applies to various resources, impacts on wetland and water resources would be emphasized.

The cumulative impacts of particularly sensitive resources identified during agency consultations and Enbridge's review of alignment characteristics would be addressed at smaller scales appropriate to the magnitude and type of potential impact that may occur during pipeline construction.

Baseline Conditions and the Effect of Federal Regulation and Conservation Support Programs on Estimating Current Conditions

Federal and state regulations promulgated during the 1970s to regulate and control impacts on wetlands and other natural resources were generally implemented by the 1980s, thus the 1980s serves as a convenient baseline from which cumulative impacts can be assessed. Examples of existing federal and state regulatory programs include NEPA (1969), the establishment of the EPA in 1970, the CAA (1970), the Coastal Zone Management Act (1972), the CWA (1972), and the ESA (1973), among others. Previous regulations did not address resource protection or actively fostered conversion of undisturbed natural resources to "more productive" agricultural, mining, and transportation/infrastructure uses (Votteler and Muir, 1996).

National resource inventories surveys during the 1980s indicated that agricultural activities had been responsible for approximately 80 percent of the wetland loss in preceding decades. Congress responded by creating programs in farm legislation starting in 1985 that use disincentives and incentives to encourage landowners to protect and restore wetlands, grasslands, highly erodible lands, and lands important for flood reduction (in aggregate referred to a conservation programs). Resource preservation and restoration that began under the 1985 Food Security Act (Farm Bill) have continued under subsequent Farm Bills and have recently resulted in a change from a overall trend of wetland and resource loss prior to 1997 (Dahl, 2000) to one of overall wetland and resource gains through restoration of marginal agricultural land to natural ecosystems (Dahl, 2006).

This Analysis considers the effect of human interaction and development on resources and habitats from the late 1800s to the early 1980s (considered baseline conditions) to current day. Estimated impacts occurring from 1980s baseline conditions to current day are evaluated by assessing government records that evaluate losses/gains in wetland and related resources as a result of current federal and state wetland regulations and conservation programs and surveys of appropriate local, state, and federal agencies. For the purposes of this Analysis, NRCS and related agency data would be used to evaluate changes from baseline conditions to current conditions (Zinn and Copeland, 2003).

National and NRI data provide further indications that federal regulations combined with disincentives and incentives associated with various conservation programs are resulting in a dramatic reversal of wetland losses. Dahl (2006) indicated that overall wetland resources increased nationally by 32,000 acres from 1998 to 2004, and that much of this increase in acreage was due to agricultural conservation programs. Approximately 70,800 acres of targeted restored wetlands and 4,000,000 acres for other wetland incorporated into "other" conservation programs in uplands were registered as wetland gains. The largest loss involved conversion as a result of urbanization.

Representative conservation programs administered by the NRCS the FSA and BWSR include the following:

- The CRP and CREP programs are voluntary for agricultural landowners. Through CRP and CERP, the landowner can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland. Participants enroll in CRP contracts for 10 to 15 years.

- The WRP provides payments and cost sharing to farmers in exchange for placing restoring farmed wetlands into permanent or 30-year contract periods.

- Minnesota's Reinvest in Minnesota (RIM) program pays landowners to retire marginal lands and drained wetlands from agricultural production through the purchase of permanent easements.

- Minnesota's WCA requires that anyone wishing to drain or fill a non-exempt wetland must, in sequence, document the unsuitability of avoidance alternatives, minimize impacts, and mitigate for all unavoidable impacts. All of the Minnesota counties along the LSr route require 2:1 mitigation under the WCA. The act includes a number of options for landowners to receive compensation for protecting wetlands.

Considered against the 1980s baseline, federal and state conservation programs must be evaluated as a positive current and reasonably foreseeable action for a cumulative impact analysis (Zinn, 2003; Zinn and Copeland, 2003).

3.13.2 Cumulative Land Use Impacts Methodology

Watershed Based Analysis

Cumulative impacts would generally be placed in a watershed context. General project impacts would be described for the HUC 8-digit sub-basins that are the primary management unit for state and federal agencies. Cumulative impacts on sensitive resources that have been identified along the route would be discussed at the HUC 8-digit sub-basin and ECS subsection levels as management units, as appropriate (see Appendix M).

Pre-settlement, Baseline, Current, and Reasonably Foreseeable Future Impacts

Available historic data on pre-settlement vegetation and cover type were contrasted with 1980s data, ECS and NWI data using GIS analysis and published land use resource summaries to infer changes over time resulting from human activity in each watershed affected by the project (see Appendix M). Resulting GIS figures illustrating pre-settlement compared to baseline conditions are presented on figures 3.13.2-1 and 3.13.3-2, respectively.

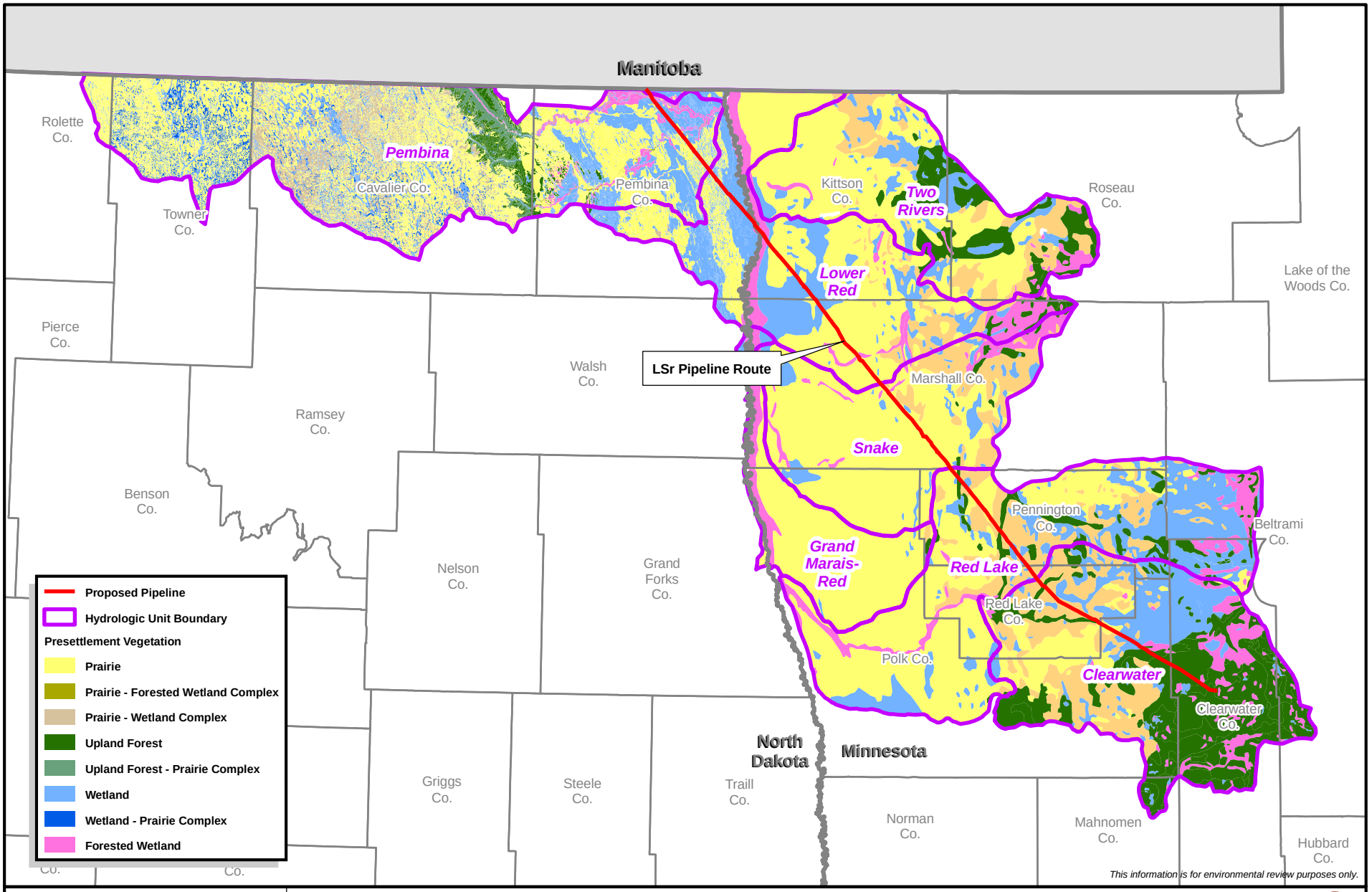

Figure 3.13.2-1

Southern Lights 20-Inch Crude Line

Pre-Settlement Vegetation Cover

Enbridge Pipelines (Southern Lights) L.L.C.

ENBRIDGE

NATURAL RESOURCE GROUP

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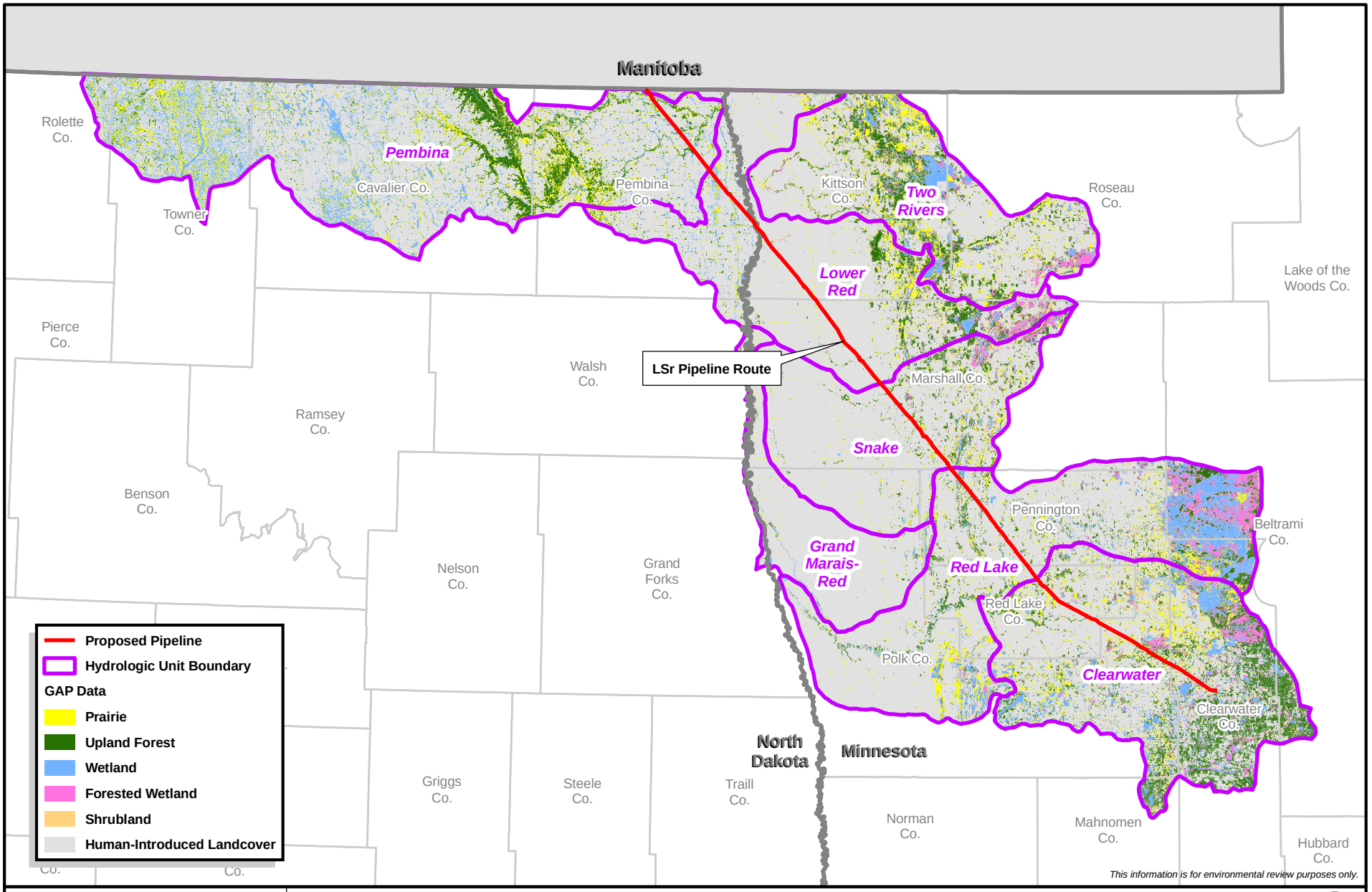

Figure 3.13.2-2

Southern Lights 20-Inch Crude Line

GAP Analysis Program Landcover

Enbridge Pipelines (Southern Lights) L.L.C.

ENBRIDGE

NATURAL RESOURCE GROUP

M:\Clients\D-F\EEL\SLP_ArcGIS\2007\10\Landuse_EEL_SLP_LU_GAP_New.mxd	1:1,400,000	DATE: 03/20/08	REVISED: 03/26/08	DRAWN BY: KJANDERSON

Project-specific changes in vegetation and cover type are evaluated in the context of the watershed and ECS subsections to contrast project effects with previous land-use changes and identify incremental effects of the proposed LSr Project by management unit. Finally, a qualitative evaluation of reasonably foreseeable future actions that may impact each watershed was conducted to factor possible future development into this Analysis.

Current and reasonably foreseeable potential impacts include planned multi-state linear right-of-way projects, county and state road projects, other potential large projects identified by contacting county, state, and federal agencies responsible for planning permitting such projects, and identifying trends in conservation program enrollments by county.

3.13.3 Environmental and Geopolitical Context for the LSr Project and Projects with Known Locations

Treatment of the Collocated Enbridge LSr, Alberta Clipper, and Line 13 Reversal Projects

Enbridge is currently planning to convert its existing 18-inch-diameter liquid petroleum pipeline, designated as Line 13, by reversing the flow along 135 miles between Clearbrook, Minnesota, and the Canadian border near Neche, North Dakota. This pipeline would remain in liquid petroleum service but would be converted to export service with light petroleum hydrocarbons into Canada. No environmental impact would result from the reversal of pump units, which would take place within existing fenced station facilities.

Additionally, Enbridge is planning to construct, own, and operate a new 325-mile-long, 36-inch-diameter crude oil pipeline, commercially known as the Alberta Clipper Pipeline Project (Alberta Clipper). The pipeline would originate in Alberta and terminate at Enbridge's existing terminal located in Superior, Wisconsin. Alberta Clipper would be constructed generally within or immediately adjacent to the existing Enbridge pipeline right-of-way. Enbridge has applied to the DoS for a Presidential permit for this facility, which has a proposed in-service date of December 2009.

The planned Alberta Clipper pipeline would be constructed adjacent to the proposed LSr Project pipeline for the entire distance from the international border to Clearbrook, Minnesota. In addition, Alberta Clipper would primarily be located within or immediately adjacent to the existing Enbridge right-of-way from Clearbrook to Superior, Wisconsin. Construction of the LSr Project must be complete prior to the Line 13 reversal, and is anticipated to be completed prior to construction of Alberta Clipper. The combined projects could result in up to a 75-foot expansion of Enbridge's existing 125-foot permanent easement, up to 200 feet in width.

Expected cumulative impacts resulting from Alberta Clipper impacts along the collocated LSr and Alberta Clipper pipelines have been included in the LSr Project impact discussion and associated tables. The Line 13 Reversal, the Alberta Clipper, and the LSr Project would be referred to in this Analysis in aggregate as the LSr Project or Project.

Large Projects with Known Locations

In addition to the three Enbridge projects discussed above, two large, planned projects with known locations that would be discussed in this analysis are the TransCanada Keystone Pipeline Project in the Pembina Watershed, and the MinnCan Project in the Clearwater River Watershed in Minnesota.

These projects are located relative to the LSr Project on figure 3.13.3-1.

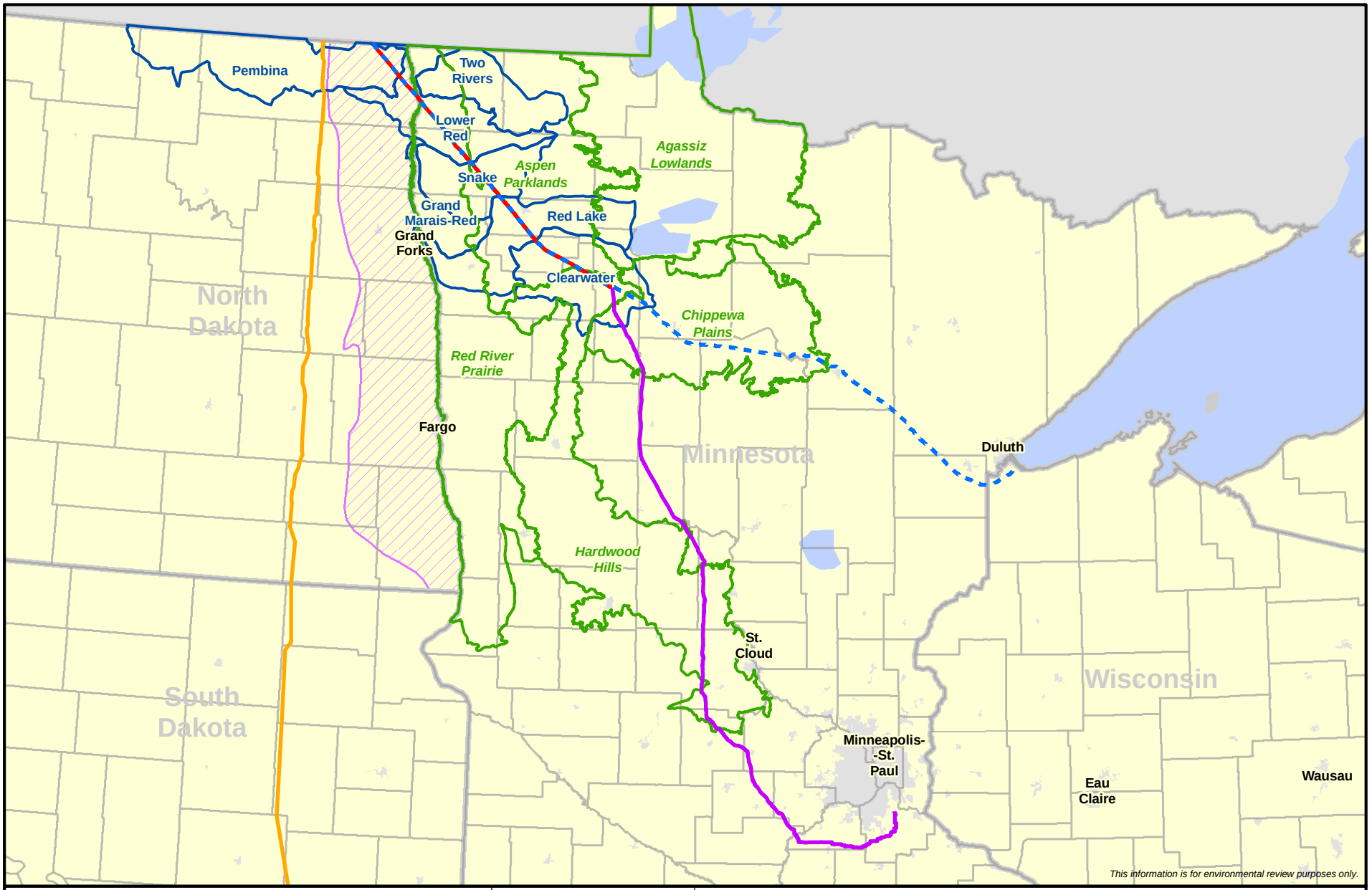

Figure 3.13.3-1

Southern Lights 20-Inch Crude Line

Planned Projects in the Vicinity of the LSr Project

Enbridge Pipelines (Southern Lights) L.L.C.

M:\Clients\D-F\EEL\SLP_ArcGIS\2008\03\Nearby_Projects\EEL_SLP_LSr_Nearby.mxd | DATE: 03/18/08 | REVISED: 03/26/08 | DRAWN BY: RSMcGREGOR

Environmental and Geopolitical Context for the Proposed Enbridge LSr Project

Pertinent hydrologic, ecologic, and political boundaries are compared to the proposed right-of-way in table 3.13.3-1 to place the proposed project alignment in a management unit context (watershed and ecology based) to discuss historic, current, and projected wetland and natural resource impacts. The existing Enbridge right-of-way (identified by milepost increment in table 3.13.3-1) crosses portions of six watershed basins, three distinctly different ecological zones, and seven counties between Neche, North Dakota and Clearbrook, Minnesota. Figure 3.13.3-2 provides the general location of the proposed project relative to watersheds, counties, and ecological systems.

Historic, current, and reasonably foreseeable potential impacts would be discussed from north to south along the proposed right-of-way, starting with the Pembina and Lower Red River Watersheds in Pembina County, North Dakota, continuing through the Lower Red River, Snake River, Red Lake River, and the Clearwater River Watersheds in Minnesota.

3.13.4 Pembina River Watershed (North Dakota)

3.13.4.1 Environmental Character, Pre-settlement, and Baseline Conditions

Physiography

The Pembina River Watershed is large (1,886 square miles), trends west-to-east, and spans portions of four counties (see table 3.13.3-1, figure 3.13.3-1). The Pembina River traverses several physiographic provinces in North Dakota and drains into the Red River in Pembina County at the Minnesota border. The entire LSr Project in the Pembina River Watershed is: 1) contained within Pembina County; 2) located far downstream in the watershed; and 3) traverses only the Red River Prairie ECS (see figure 3.13.3-1). The Analysis presents summary data for all counties; however, the discussion of cumulative impacts for the Pembina River Watershed would stress the Red River ECS portion in Pembina County (see figure 3.13.3-1).

The proposed LSr pipeline route crosses the Pembina River Watershed in North Dakota for approximately 15.4 miles in Pembina County (table 3.13.3-1). In the absence of pre-settlement land cover estimates for the Pembina River Watershed, NRCS Soil Survey Geographic (SSURGO2) native vegetation cover was compared to current GAP land-use data. This comparison is summarized in table 3.13.4-1.

The Pembina River Watershed in Pembina County was historically a combination of mainly prairie and wetland features. Approximately 47.3 percent of the watershed was upland prairie, and 39.0 percent was wetlands. The remaining approximately 13.7 percent of the watershed was upland forest (3.8 percent) and forested wetlands (9.9 percent). The upland forests mainly consisted of deciduous woodlands, and the forested wetlands were mainly wooded floodplains.

TABLE 3.13.3-1

Watersheds and Geopolitical Boundaries Crossed by LSr Project Pipeline Route [a]

Watershed Name	MNDNR ECS	County	Area in Watershed (thousands of acres)	Percent of Watershed Area	Milepost Increment	Crossing Length(miles) (percent of route)
Lower Red River	-	Pembina	189.47	94.1	773.8-774.7 790.1-801.8	0.9 11.7
	-	Walsh	11.86	5.9	-	-
Subtotal			201.34	100		12.6
Pembina River	-	Pembina	330.04	27.2	774.7-790.1	15.4
	-	Cavalier	620.41	51.2	-	-
	-	Towner	237.39	19.6	-	-
	-	Rollette	23.74	2.0	-	-
Subtotal			1211.5	100.0		15.4
Total North Dakota			1430.55			28.0
Lower Red River	Red River Prairie	Kittson	230.23	39.6	801.8 – 817.0	15.3 (11.3)
		Marshall	131.09	22.5	817.0 – 834.0	16.8 (12.4)
	Subtotal		361.32	62.1	801.8-834.0	32.2 (23.8)
	Aspen Parklands	Marshall	135.06	23.2	-	-
		Kittson	79.39	13.6	-	-
		Roseau	5.95	1.1	-	-
	Subtotal		220.40	37.9		-
Subtotal			581.72	100.0	801.8-834.0	32.2 (23.8)
Snake River	Aspen Parklands	Marshall	283.30	47.5	834.0 – 851.6	17.6 (13.0)
		Pennington	12.27	2.1	-	-
		Polk	37.29	6.3	-	-
	Subtotal		332.85	55.8		17.6 (13.0)
	Red River Prairie	Marshall	190.27	31.9	-	-
		Polk	73.36	12.3	-	-
	Subtotal		263.64	44.2	-	-
Subtotal			596.49	100.0		17.6 (13.0)
Red Lake	Aspen Parklands	Pennington	327.90	36.3	851.7 – 871.4	19.6 (14.5)
		Red lake	97.54	10.8	871.4 – 873.9	2.6 (1.9)
		Marshall	14.61	1.6	851.6 – 851.7	0.1 (0.1)
		Polk	111.75	12.4	-	-
		Beltrami	6.90	<0.1	-	-
		Clearwater	1.40	<0.1	-	-
	Subtotal		560.10	62.1		22.3 (16.5)
	Red River Prairie	Polk	179.81	19.9	-	-
	Agassiz Lowlands	Beltrami	104.77	11.6	-	-
		Clearwater	54.32	6.0	-	-
		Pennington	2.71	<0.1	-	-
		Marshall	0.10	<0.1	-	-
	Subtotal		161.91	17.9	-	-
	Hardwood Hills	Polk	0.56	<0.1	-	-
Subtotal			902.38	100.0		22.3 (16.5)

TABLE 3.13.3-1 (cont'd)

Watersheds and Geopolitical Boundaries Crossed by LSr Project Pipeline Route [a]

Watershed Name	MNDNR ECS	County	Area in Watershed (thousands of acres)	Percent of Watershed Area	Milepost Increment	Crossing Length(miles) (percent of route)
Clearwater River	Aspen Parklands	Red Lake	179.13	20.4	873.9 – 886.9	13.0 (9.6)
		Polk	114.60	13.1	886.9 – 896.2	9.2 (6.8)
		Clearwater	51.06	5.8	-	-
		Pennington	31.62	3.6	-	-
	Subtotal		376.41	42.9		22.2 (16.4)
	Hardwood Hills	Polk	186.37	21.3	896.2 – 900.5	4.3 (3.2)
		Clearwater	109.84	12.5	900.5 – 909.4	9.0 (6.6)
		Mahnomen	15.58	1.8	-	-
		Beltrami	2.83	0.3	-	-
	Subtotal		314.62	35.9		13.2 (9.8)
	Chippewa Plains	Polk	0.48	0.1	-	-
		Clearwater	101.59	11.6	-	-
		Beltrami	28.96	3.3	-	-
		Mahnomen	0.35	<0.1	-	-
	Subtotal		131.37	15.0	-	-
	Agassiz Lowlands	Clearwater	53.82	6.1	-	-
		Pennington	0.01	<0.05	-	-
	Subtotal		53.83	6.1	-	-
	Red River Prairie	Polk	0.75	0.1	-	-
Subtotal			876.98	100.0		35.5 (26.2)
Total Minnesota			3852.36			107.6 (79.4)
Grand Total			5282.91			

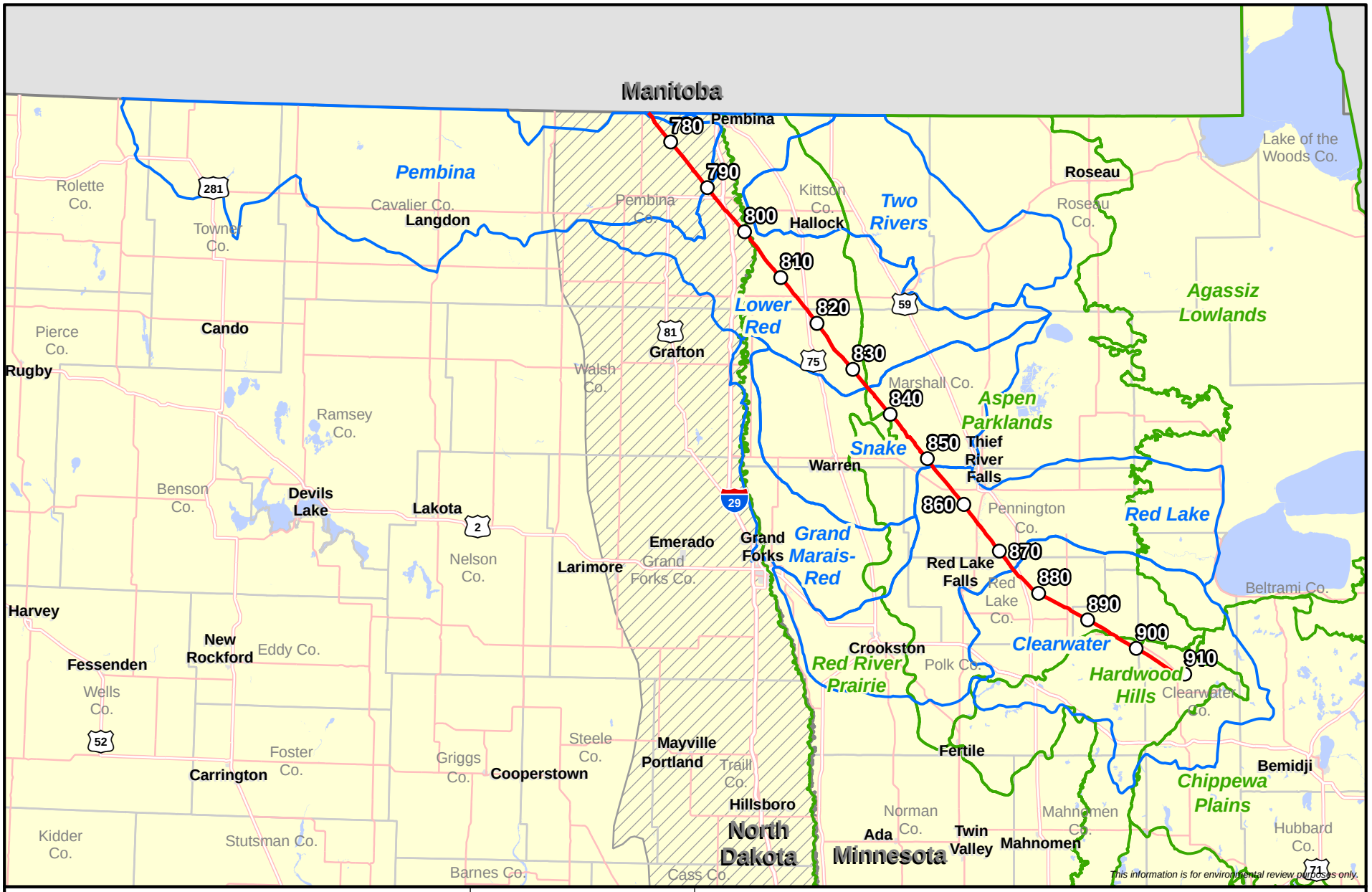

Figure 3.13.3-2

Watersheds and Ecosystems in the LSr Project Vicinity

Southern Lights 20-Inch Crude Line

Enbridge Pipelines (Southern Lights) L.L.C.

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TABLE 3.13.4-1

Comparison of Pre-Settlement [a] versus Baseline [b] Environmental Conditions
Pembina River Watershed – Pembina County, North Dakota

	Pre-Settlement		Baseline		
County/Land Use	Pre-Settlement Acreage (thousands)	Relative Percentage for County	GAP Land Use or NWI Acreage (thousands)	Relative Percentage for Watershed	Percentage Change
Pembina County					
Forest	12.51	3.80	23.60	7.17	+3.37
Shrubland	0.00	0.00	0.66	0.20	0.20
Prairie/Grassland	155.68	47.28	19.08	5.79	-41.49
Wetland	128.46	39.02	5.44	1.65	-37.37
Forested Wetland	32.59	9.90	1.99	0.60	-9.29
Agricultural	0.00	0.00	275.60	83.68	83.68
Developed	0.00	0.00	2.96	0.90	0.90
Subtotal	329.24	100.0	**329.33**	**100.0**	
GAP Wetland			*9.23*[d]		
GAP Forested Wetland			*13.62*[e]		

[a] Pre-settlement land cover distribution determined by estimating the potential native vegetation associated with individual soil series and then determining the distribution using SSURGO2 (Soil Survey Geographic database, Version 2, U.S. Department of Agriculture NRCS) GIS.

[b] Land Use determined using GAP Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute NWI acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

[d] GAP photography late 1980s may incorporate some additional CRP wetlands.

[e] GAP forested wetlands is elevated as all riparian forests (floodplain forests) were considered wetlands in the analysis.

The Red River Prairie ECS

The Red River Prairie ECS contains the full length of the LSr route through the Pembina River Watershed and is entirely contained within Pembina County. The major landform is the large, level lake plain of Glacial Lake Agassiz. Minor landforms include beach ridges, sand dunes, outwash, and water-reworked till on the far western portion of Pembina County. Poorly, somewhat poorly, and moderately well-drained lacustrine clays, silts, and sands characterize the flat lake plain. Dry, sandy and gravelly soils are characteristic of the beach ridges. Rivers and streams (e.g., the Red River of the North, the Pembina River, and the Tongue River) meander extensively across the lacustrine plain. Flooding is common in early spring and can cause major problems due to level topography. Tallgrass prairie and wet prairie were the dominant vegetation before settlement. Narrow, forested floodplains were common along larger streams and rivers. The most important current land use is agriculture. The lake plain has been intensively ditched for agriculture. Native flora persists in fragments (in some of moderate size) on beach ridges and in the inter-beach zone.

The largest difference between the Red River Prairie ECS subsection and the Drift Prairie to the west is the much higher amount of pre-settlement wetland acreage, the almost complete drainage of pre-settlement wetlands (currently only 1.7 percent remain), and the dominance of agriculture (83.7 percent).

Current land-use data shows that approximately 90 percent of the historic prairie and approximately 93 percent of the historic wetlands and open water in the Red River Prairie ECS have been converted to other land uses (see figures 3.13.2-1 and 3.13.2-2). These data also show a 3.4 percent gain in historic upland forest resources and a 9.3 percent loss of historic forested wetlands. Gains in forested resources in Pembina County likely reflect the increase in forested shelterbelts and additional tree plantings in the prairie environment.

Demographics

Pembina County is a sparsely populated, strongly rural county in North Dakota with a total population of 8,038 people, 1,500 of which live in the county seat of Cavalier (2005 data). This was a decrease of 7.9 percent in population when compared to the 2000 census. Interstate Highway 29 traverses the county north to south on the county's far eastern edge; however, no regional population or service centers are located along Interstate 29 in Pembina County. The Pembina River flows west to east along the northern portion of the County. Portions of both the Pembina and Red Rivers flood regularly, resulting in considerable flood damage and a historic interest in flood control projects in the Red River Prairie ECS especially. The dominant industry is agriculture. No dramatic increases in industrial or residential expansion are expected in the portion of the Pembina River Watershed that lies within the Red River Prairie ECS that would significantly impact existing resources.

3.13.4.2 Current and Reasonably Foreseeable Actions

Proposed LSr Project Impacts

The LSr Project would cross the Pembina River Watershed from MP 774.4 to MP 790.1 for a total of 15.4 miles. The majority of LSr Project right-of-way in the Pembina River Watershed would be located in existing agricultural land. Table 3.13.4-2 summarizes existing land-use and cover-types for the Red River Prairie ECS component of the Pembina River Watershed and contrasts those features to the incremental effect of the proposed Enbridge pipelines.

No wetlands would be filled during or after construction of the Project. However, temporary impacts would occur to wetland resources during construction and additional temporary impacts would result from clearing of trees from forested upland during construction. No forested wetlands would be converted to emergent wetlands within the maintained portion of the permanent easement. One small area of forested wetland associated with the Pembina River crossing would be avoided by HDD. Forested conditions are expected to return to cleared areas within the temporary workspace as the temporarily affected portions of the corridor naturally re-vegetate. Approximately 5.9 acres of historic upland forest would be converted to grass and shrubland due to right-of-way maintenance. However, Enbridge has negotiated tree-take mitigation at a 2:1 ratio with the State of North Dakota. Enbridge would tally trees cut during the project and would plant twice this amount of trees at appropriate, negotiated locations. There would be a positive net effect on the resource (indicated parenthetically in table 3.13.4-2).

The removal of trees from the right-of-way could increase fragmentation of selected habitats as the width of the cleared right-of-way would increase from 125 to 200 feet. However, the LSr Project follows existing right-of-way which would limit upland forest habitat fragmentation to the periphery of the Enbridge easement. Most of the upland forest impacts are associated with riparian habitat adjacent to the Tongue River. Negotiated tree plantings at appropriate locations within the right-of-way could minimize the effects of fragmentation (see section 3.4.1.1). Strips of trees within the right-of-way would reduce the width of cleared strips.

TABLE 3.13.4-2

Cumulative Effect of Enbridge Expansion
Pembina River Watershed, Pembina County, Red River Prairie (RRP) ECS

Land Cover	Current Land Use [a] (acres)	Baseline Land Use Existing Enbridge ROW [b]	Land Use in Added ROW [c] (acres)	Add'n. LSr Perm. ROW [d] (acres)	Add'n. Alberta Clipper Perm. ROW [d] (acres)	Cum Acres Perm. ROW [e] (acres)	Post Resto-ration (acres)[f]	Change in Land Use [g] (acres)	Change in existing land Cover (percent)[h]
Forest	23,600	2.15	1.44	1.47	0.87	5.93	0.00	-5.93 (+5.93)	-0.03 (+0.03)
Shrubland	660	0.00	0.00	0.00	0.00	0.00	1.67	+2.97	+0.45
Prairie	30,705	2.12	1.48	0.98	0.66	5.24	3.69	+2.97	<+0.01
Wetland	10,257	0.69	0.46	0.90	0.41	2.46	2.46	+0.28	0.00
Forested Wetland	1,990	0.05	0.03	0.13	0.07	0.28	0.28	0.0	0.00
Agriculture	259,158	135.5	90.3	89.82	44.67	360.3	360.3	0.00	0.00
Developed	2,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	329,330	140.5	93.7	93.3	46.7	374.2	374.3	0.00	

[a] Pembina County data from table 3.13.4-1 was adjusted to include an estimated 16,442 acres of CRP (2007 Farm Services Agency Land Use Summary, North Dakota) that was converted from cropland to wetland (29.3 percent, 4817 acres) and prairie/grassland (11,625 acres). CRP acres were removed from the agriculture category. Estimates determined by multiplying the acreage CRP in Pembina County by the percentage of the county in the Pembina Watershed. This reduced acreage was then multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see table 3.13.4-1, see also table 3.13.4-3), with the remainder placed in the Prairie/Grassland category.

[b] Existing Enbridge right-of-way is 125 feet in width and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge Corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the permanent easement from 75 to 125 feet in width. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge Corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easement (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easement.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreages increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland. Approximately 2.16 acres of forested wetland would be avoided by HDD methods.

[g] Changes in acres of land on the existing ROW from pre construction to post restoration conditions. Values in parentheses for forest and forested wetland indicate the actual increase in forested resources resulting from the mitigation of trees at 2:1 ratio, offsetting the reduction in forest resources along the right-of-way and increasing the total resource by the amount taken.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

All wetland impacts would be mitigated under COE and state permits. Considered after mitigation, no permanent impacts on forested or emergent wetland resources would result from the project. Similarly, sensitive resources (e.g., native prairie habitats) have been identified along the route and appropriate construction, erosion control, and revegetation procedures have been identified. Similar permit conditions placed on other linear projects occurring subsequent to and concurrent with the LSr Project would ensure that no permanent, cumulative impacts on wetland and other sensitive resources would result from pipeline construction.

State and County Highway Development

Pembina County staff were contacted to determine if any road construction projects were on-going or planned in the county that could impact existing natural resources within the Lower Red River Watershed (see Appendix M). A highway department representative indicated that there was no proposed road-construction or road-widening projects being planned in the Pembina County (Troy Kittleson, Superintendent Pembina County Highway Department). Projects that would occur in the future would not involve extensive widening and would not be expected to have associated wetland impacts.

Flood Control Projects

The largest planned flood control project in the watershed was proposed in 1986 by the COE for the town of Neche on the Pembina River. The proposed plan consists of an earthen levee with associated interior drainage facilities, a road raise, and modification of a constructed cutoff channel. The project is currently on hold because of limited funds. If the project were to proceed, any wetland impacts would be mitigated through COE permits.

Most waterways in Pembina County that are crossed by the LSr Project consist of intermittent drainage ways and agricultural ditches that flood regularly (see Appendix K). The NRCS has an active flood control program assisting landowners with the design of flood control structures and obtaining riparian easements to assist with flood control. Between 1997 and 2001, 184 projects have resulted in the acquisition of 21,090 acres of riparian, flood control easements in Pembina and Walsh counties, respectively. Easements are planted to native vegetation and are managed for recreation and wildlife use. In general NRCS flood control programs promulgated after the 1980s baseline conditions would result in restoration and preservation of riparian wetlands and wet prairie resulting in an increase in these resources. A substantial though unknown acreage of flood control easements along the Tongue River is evident on project alignment sheets. It is assumed that the conservation acreage placed in reserve for flood control is included in the CRP acreage referenced in table 3.13.4-2.

Planned TransCanada Keystone Pipeline Project

TransCanada Keystone Pipeline, LLC (Keystone) is proposing the construction of a new crude oil pipeline system from Hardisty, Alberta, Canada to Patoka, Illinois and Cushing, Oklahoma (Cushing Extension) (TransCanada, 2006). The Keystone project would traverse approximately 31 miles of the Pembina River Watershed through the western portion of Pembina County on the fringe of the Red River ECS. The environmental setting of the area is distinctly different from the LSr Project route, consisting of coarse textured sands on outwash, inter-beach, and delta areas. Prairie, grasslands, and native environments are more numerous along the Keystone route.

Keystone is planning to construct the proposed 30-inch-diameter pipeline using a 110-foot-wide construction right-of-way, which would include 60 feet of temporary construction right-of-way and 50 feet of permanent right-of-way. Keystone has received a Presidential Permit and has identified a proposed construction season of 2008-2009.

While the Keystone and LSr Project facilities are not in close proximity to each other, they could result in incremental increases in sedimentation to the Pembina and Tongue River channels that they both cross. However, both projects are proposing to implement effective erosion and sedimentation control measures during construction and would monitor the effectiveness of these measures throughout construction. It is also likely that the Pembina River would be constructed using HDD methods that would avoid impacts on the river and riparian areas. Both projects are proposing to stabilize and

revegetate the respective rights-of-way following construction. Therefore, any cumulative impacts of these projects are anticipated to be negligible.

Potential Wind Power Development

As of January 16, 2008 no wind farms were located in any of the counties within the Pembina River Watershed. However, all of the counties are located in areas where wind power is feasible and share characteristics where successful wind power projects have been built (American Wind Energy Association).

Conversations with various county staff have indicated that there is interest in wind power in the area; however, no wind power projects have been planned within the Pembina River Watershed as of this writing. If wind power projects were to occur, few wetland resources would be filled as a result of construction of the wind towers themselves. However, temporary construction impacts would be associated with wind tower construction, associated roads, and installation of electrical transmission lines. Bird strike issues are also associated with wind power facilities. Permanent land-use impacts could be associated with restrictions associated with new transmission line easements, especially in forested areas where tree and shrub growth are removed for safety reasons.

Because of the potential to affect wetland, wildlife, and cultural resources, a large wind power project would generally require a NEPA review and would be subject to similar regulations and mitigation as electrical power lines and crude oil pipelines.

Government Conservation Programs

Most conservation reserve programs were not established at the time of baseline conditions. However, extensive acreages of land in counties within the Pembina River Watershed have been enrolled in these programs (table 3.13.4-3). In Pembina County alone, 16,442 acres within the Pembina County Watershed have been enrolled in CRP land planted to native vegetation with included wetlands left undisturbed.

TABLE 3.13.4-3

Land in Conservation Programs: Pembina River Watershed Counties - 2007[a]

County	Total County Acres	Watershed Acres in County [b]	CRP/CREP/RIM County [c]	WRP etc. County [d]	CRP/CREP/RIM Watershed [e]	WRP etc. Watershed [e]
	acres					
Pembina	719,300	330,040	35,835	0.0	16,442	0
Cavalier	969499	620,410	52,325	22.30	33,484	14.27
Towner	669516	237,390	66,073	1,439	23,427	510.23
Rolette	604,404	23,740	74,464	22.20	2,924	0.87
Total	2,962,719	1,211,580	228,697	1,484	76,279	525

[a] North Dakota farm Services Agency. September 4, 2007. 2007 Reported Acreage Summary North Dakota. North Dakota farm Services Agency Staff. 1025 28th St. South, Fargo ND 58103.

[b] County Acres within the Pembina River watershed determined by GIS query.

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years.

[d] Wetland Reserve Program restores historically farmed/drained wetlands.

[e] Watershed acres estimated by dividing the acres in the watershed by total county acres, then multiplying by the total county acres in conservation easements.

The net result of these programs is to return substantial acreages of farmland to natural environments. The acreage associated with conservation programs would not be included under 1980s baseline conditions and would represent a reasonably foreseeable action with substantial positive impact on area resources that would result in an increase of thousands of acres of restored wetland and grassland prairie

Impacts of the SWANCC Decision and Agricultural Conversion

Recent Supreme Court decisions have restricted CWA jurisdiction over certain types of wetlands considered isolated from Waters of the United States. Several states (e.g., Minnesota and Wisconsin, among others) have passed state laws that regulate activities in these "Non-Federal" wetlands. North Dakota does not regulate such wetlands. It has been estimated that over 50 percent of North Dakota's wetland are isolated and not subject to Federal Regulation under section 404 of the CWA (Tiner et al., 2002; Kusler and Christie, June 26, 2006). However, isolated wetlands in agriculture would still be subject to indirect regulation under the Swampbuster provisions of the 2002 Farm Bill. While Swampbuster does not directly prevent drainage and filling of wetlands, farm operations that engage in unapproved drainage and fill activities could be subject to loss of farm subsidy payments. At this time, the implications of SWANCC on increased drainage and fill of wetlands in agricultural settings is unknown (van der Valk and Pederson, 2003).

3.13.4.3 Cumulative Impacts

Agriculture has resulted in the most significant impact on both upland prairie and wetland resources comparing the pre-settlement and baseline conditions in the Pembina River Watershed. However, conservation programs involving voluntary protection to both upland and wetland resources have resulted in the greatest positive impact on watershed land resources when comparing baseline conditions to current conditions. Extensive acreages are currently enrolled in CRP, and additional riparian and wetland resources have been placed in flood-control easements. CRP contracts are generally provided for a period of 15 years, with reenrollment at the landowner's discretion.

If enrollment options are not exercised, the landowner can convert CRP to active cropping, potentially affecting thousands of acres in the watershed. Uncertainty regarding the future of the swamp- and sodbuster provisions of future Farm Bills may have significant future impacts as land enrolled in conservation programs (including wetlands) become subject to conversion to agriculture and drainage. Likewise, if commodity prices remain high, there would be increased economic pressure to return CRP land to active agriculture.

The cumulative impacts of the current and potentially foreseeable actions discussed above (including the LSr Project) are relatively minor as they are subject to current environmental regulations that require a detailed inventory of sensitive resources, an assessment of alternatives that would avoid impacts on the resources (avoidance), minimization of unavoidable impacts, and mitigation of unavoidable impacts.

From a cumulative impacts perspective, the majority of the impacts on wetland and natural habitat resources in the Pembina River Watershed are neutral-to-positive due to:

- Demographics and land use. The watershed is rural with limited expectations for growth and development that would require conversion of land from natural/rural/agricultural to industrial and residential use. While considerable conversion of prairie and wetland habitats has occurred historically, additional conversion of such habitats to agriculture is

not expected to be significant due to the Swampbuster and Sodbuster provisions in the current Farm Bill.

- The dominantly agricultural nature of the county and the availability of conservation programs have resulted in increased wetland restoration/enhancement and preservation.

- Proposed large projects (including the Enbridge LSr Project and the TransCanada Keystone Project) result in few permanent impacts on natural resources. Negotiated mitigation of project impacts would result in a net increase in upland forest and forested wetland when considered on a watershed basis.

3.13.4.4 Cumulative Impacts on Identified Sensitive Resources

The majority (360.3 acres) of the LSr Project in Pembina County is in agricultural land. Of the remaining land uses, 5.9, 5.2, and 2.5 acres are in forest, grassland, and wetland, respectively (see table 3.13.4-2). The following sensitive resources within the Pembina River Watershed in Pembina County currently in native vegetation have been identified by Enbridge in consultation with various state and federal agencies: Pembina River crossing (MP 775.5); and the Tongue River crossing (MP 786.2).

Pembina River Crossing

The Pembina River crossing (MP 775.5) would be installed by HDD methods that would avoid impacts on riparian upland and 0.3 acre of forested wetland. Enbridge has developed approved construction mitigation plans consistent with state and federal regulations to avoid, minimize, and mitigate impacts on resources as a result of construction-related erosion, sedimentation, and the inadvertent release of drilling mud used in horizontal directional drilling (see Appendices E, G, and J). No cumulative impacts on the Pembina River are expected to occur as a result of construction of the LSr Project.

Similarly, the Keystone Pipeline project would cross the Pembina River just west of the town of Walhalla well upstream of the LSr Project crossing. The Keystone project has undergone environmental review and proposes to use horizontal direction drilling methods for the Pembina River that would avoid adverse impacts.

Phone interviews with county, state, and federal staff involved with project permitting did not identify any additional planned or reasonably foreseeable projects within Pembina County that have the potential for substantial adverse cumulative impacts on the Pembina River (see Appendix M).

Tongue River Crossing

The Tongue River Crossing (MP 786.2) is proposed to be crossed by open-cut methods for both the LSr Project and the Keystone Project. Open cut waterbody crossing procedures are provided in section 2.1.3.3. Procedures to avoid, minimize, and mitigate impacts on resources resulting from construction using open-cut methods have been developed and are provided for the LSr Project in the CECP (see Appendix J).

The Keystone Project would cross the Tongue River well upstream of the LSr Project crossing, and proposes to use similar open-cut procedures. While minor increases in sediment may result during construction, the impacts of adjacent agriculture on the stream are such that small amounts of additional sediment result in minimal impact on downstream aquatic resources.

The existing Enbridge easement is bounded on the north by a small approximately 0.2 acre strip of upland riparian forest that would be cleared during construction of the LSr Project. Enbridge has agreed with the State of North Dakota to: 1) count trees that would be cleared within the right-of-way; and 2) mitigate tree takes at a 2:1 ratio through appropriate, negotiated plantings in appropriate areas. Enbridge has committed to discuss the mitigation of tree takes within the affected portions of the right-of-way with the applicable landowner. In situations where the landowners agrees, appropriate tree plantings in cleared areas that were historically riparian forest would mitigate for fragmentation resulting from an incremental increase in cleared right-of-way width.

3.13.5 Cumulative Impacts Analysis: Lower Red River Watershed (North Dakota)

3.13.5.1 Environmental Character, Pre-settlement, and Baseline Conditions

Physiography

While the North Dakota Portion of the Lower Red River Watershed lies in portions of Pembina and Walsh counties, 94 percent (189,470 acres) is in Pembina County and is separated from the Walsh County portion (6 percent, 11,840 acres) by the Pembina River Watershed (see table 3.13.3-1). The analysis of cumulative impacts for the Lower Red River Watershed in North Dakota stresses the portion of the watershed in Pembina County that contains the LSr Project and is completely isolated from the Walsh County portion.

The North Dakota portion of the watershed covers approximately 313.8 square miles. The proposed LSr Project would cross the Lower Red River Watershed in North Dakota for approximately 0.9 miles at the point the route crosses the Canada – United States international border and then re-enters this watershed at MP 790.1 in Pembina County, for a total of 12.6 miles. The proposed pipeline route exits the North Dakota portion of the Lower Red River Watershed at MP 801.8, where it enters the Minnesota portion of the Lower Red River Watershed (see table 3.13.3-1).

The portion of the Lower Red River Watershed lies entirely within the northern portion of the Lake Agassiz Plain that has been characterized in Minnesota as the Lake Agassiz Prairie ECS subsection described above in section 3.13.4.1. In the absence of pre-settlement land cover estimates for the Pembina River Watershed, SSURGO2 native vegetation cover was compared to current GAP land use data. This comparison is summarized in table 3.13.5-1.

The Red River Prairie ECS

The Lower Red River Watershed in Pembina and Walsh Counties (approximately 200,840 acres) lies entirely within the broad, flat Lake Agassiz plain within the Red River Prairie ECS sub section that was described in section 3.13.4.1. Prior to European settlement the Lower Red River Watershed was a mosaic of wet-meadow wetlands (98,630 acres) interspersed with areas of somewhat poorly drained wet-prairie uplands (81,520 acres). Forested uplands (660 acres) were essentially absent from the area, however, floodplain forests (8,180 acres) existed as narrow bands next to the Red River.

Artificial drainage has been extensive. As of the 1980s agriculture has become the dominant use and has resulted in dramatic conversion of upland prairie and wetland to agriculture. Over 90 percent of the watershed is in active cropland. Existing farms are large, with the dominant crops being sunflowers and sugar beets, with minor amounts of wheat.

TABLE 3.13.5-1

Comparison of Pre-Settlement [a] versus Baseline [b] Environmental Conditions
Lower Red River Watershed – Pembina County, North Dakota

	Pre-Settlement		Baseline		
County/Land Use	Pre-settlement Acreage (thousands)	Relative Percentage for County	GAP Land Use or NWI Data (thousands)	Relative Percentage for Watershed	Percentage Change Pre-Settlement to Baseline
Pembina County					
Forest	0.66	0.35	2.19	1.16	+0.81
Shrubland	0.00	0.00	<0.01	0.00	0.00
Prairie/Grassland	81.52	43.13	6.49	3.43	-39.7
Wetland	98.63	52.19	5.05	2.67	-49.52
Forested Wetland	8.18	4.33	0.80	0.42	-3.91
Agricultural	0.00	0.00	172.98	91.49	+91.49
Developed	0.00	0.00	1.57	0.83	+0.83
Subtotal	188.99	100.0	189.08	100.0	
GAP Emergent Wetland			*7.22*[d]		
GAP Forested Wetland			*2.12*[e]		

[a] Pre-settlement land cover distribution determined by estimating the potential native vegetation associated with individual soil series and then determining the distribution using SSURGO2 (Soil Survey Geographic database, Version 2, U.S. Department of Agriculture NRCS) GIS.

[b] Land Use determined using GAP Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute NWI acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

[d] GAP photography late 1980s may incorporate some additional CRP wetlands.

[e] GAP forested wetlands is elevated as all riparian forests (floodplain forests) were considered wetlands in the analysis.

GAP and NWI digital data suggest that wetlands, forested wetlands, and native prairie/grassland under baseline conditions account for only 2.7, 0.4, and 3.4 percent of the total watershed areas, respectively. NWI data suggest that the GAP analysis overestimates both forested and emergent wetlands see table 3.13.5-1).

Demographics

Demographic characteristics of Pembina County were discussed in section 3.13.4.1. The dominant industry is agriculture. No dramatic increases in industrial or residential expansion are expected in the portion of the Pembina River Watershed that lies within the Red River Prairie ECS that would significantly impact existing resources.

3.13.5.2 Current and Reasonably Foreseeable Actions

LSr Project Impacts

The LSr Project would cross the Lower Red River Watershed from MP 774.4 to MP 790.1 for a total of 15.4 miles. The majority of LSr pipeline right-of-way in the Lower Red River Watershed would be located in existing agricultural land. Table 3.13.5-2 summarizes existing land use and cover-types for

the Red River Prairie ECS component of the Pembina River Watershed and contrasts those features to the incremental effect of the proposed Enbridge pipelines.

TABLE 3.13.5-2

Cumulative Effect of Enbridge Expansion
Lower Red River Watershed, Pembina County, Red River Prairie (RRP) ECS

Land Cover	Current Land Use [a] (acres)	Baseline Land Use Existing Enbridge ROW [b]	Land Use in Added ROW [c] (acres)	Add'n. LSr Perm. ROW [d] (acres)	Add'n. Alberta Clipper Perm. ROW [d] (acres)	Cum Acres Perm. ROW [e] (acres)	Post Restor. (acres)[f]	Change in Land Use [g] (acres)	Change in existing land Cover (Percent)[h]
Forest	2,190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shrubland	<10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prairie Grassland	11,676	6.07	4.04	1.24	0.33	11.68	11.68	0.00	0.00
Wetland	9,014	9.44	6.29	11.53	5.66	32.89	32.89	0.00	0.00
Forested Wetland	800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agriculture	163,541	98.07	65.38	62.18	31.50	257.1	257.1	0.00	0.00
Developed	1,570	0.6	0.4	1.10	0.54	2.64	2.64	0.00	0.00
Total	189,080	114.2	76.1	76.1	38.0	304.3	304.3	0.00	

[a] Pembina County data from table 3.13.5-1 was adjusted to include an estimated 9,439 acres of CRP (2007 Farm Services Agency Land Use Summary, North Dakota) that was converted from cropland to wetland (39 percent, 3,694 acres) and prairie (61 percent, 5,186 acres). Estimates determined by multiplying the acreage CRP in Pembina County by the percentage of the county in the Lower Red River Watershed. This reduced acreage was then multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see table 3.13.5-1, see also table 3.13.5-3), with the remainder placed in the Prairie/Grassland category.

[b] Existing Enbridge right-of-way (ROW) is 125 feet in width and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge Corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the permanent easement from 75 to 125 feet in width. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge Corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easement (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easement.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural, prairie, and emergent wetland land would revert to pre-construction uses. No forested upland, wetland, or shrubland would be impacted.

[g] Changes in acres of land on the existing ROW from pre-construction to post-restoration conditions. No changes in land use or wetland status are expected.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

There would be no permanent impact on existing natural resources resulting from construction of the LSr Project in the Lower Red River Watershed. The two segments of the Lower Red River Watershed crossed by the Project (MP segments 773.8-774.7 and 790.1-801.8, respectively) total 12.6 miles and traverse primarily farmland, CRP prairie and wetland, and a few small wet drainage ways. Upland forest and wetland forest are completely absent from the two segments. Riparian forest associated with the Red River of the North is only present on the Minnesota side of the river, and impacts on this small wooded riparian zone would be avoided through the use of HDD methods. Lands in agriculture and conservation programs would be returned to their pre-construction status and configuration during the restoration phase of the project.

State and County Highway Development

The Pembina County Highway Department indicated that there were no proposed road-construction or road-widening projects being planned in Pembina County that would be expected to have associated impacts on wetland or other natural resources.

Flood Control Projects

No large flood control projects are planned for the Lower Red River Watershed in Pembina County. NRCS flood control activities in Pembina County are discussed in section 3.13.4.2. No unmitigated, adverse impacts due to flood control activities are expected in the watershed. Existing flood control and proposed flood control actions would likely result in the acquisition of additional conservation easements and a resulting positive impact on associated riparian zones and wetlands adjacent to drainage ways.

Potential Wind Power Development

Wind power potential in Pembina County was discussed in section 3.13.4.2. The Lower Red River Watershed portion of Pembina County is entirely located in areas considered marginal for wind power development, thus the development of wind power is not considered to be a reasonably foreseeable action.

Government Conservation Programs

The impact of conservation programs on natural resources in Pembina County is discussed in section 3.13.4.2 and is presented for the portion of Pembina County in the Lower Red River Watershed in table 3.13.5-3. The acreage associated with Conservation Programs would not be included under 1980s baseline conditions and would represent a substantial positive impact on area resources that would result in an increase of thousands of acres of restored wetland and grassland prairie. A large area of CRP/WRP enrolled land exists between MP 790.6 and MP 793 and is discussed as a sensitive resource.

TABLE 3.13.5-3

Land in Conservation Programs: Lower Red River Watershed, Pembina County, North Dakota - 2007[a]

County	Total County Acres	Watershed Acres in County [b]	CRP/CREP/RIM County [c]	WRP etc. County [d]	CRP/CREP/RIM Watershed [e]	WRP etc. Watershed [e]
	acres					
Pembina	719,300	189,470	35,835	0.0	9,439	0

[a] North Dakota farm Services Agency. September 4, 2007. 2007 Reported Acreage Summary North Dakota. North Dakota farm Services Agency Staff. 1025 28th St. South, Fargo ND 58103.

[b] County Acres within the Lower Red River Watershed determined by GIS query.

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years.

[d] Wetland Reserve Program restores historically farmed/drained wetlands.

[e] Watershed acres estimated by dividing the acres in the watershed by total county acres, then multiplying by the total county acres in conservation easements.

Impacts of the SWANCC Decision and Agricultural Conversion

Potential adverse impacts of the SWANCC Decision and Agricultural Conversion on wetland and upland natural resources are discussed in section 3.13.4.2.

3.13.5.3 Cumulative Impacts

The cumulative impacts on wetland and other natural resources in the North Dakota portion of the Lower Red River Watershed are similar to those discussed above for the Pembina River Watershed. However, the route through the Lower Red River Watershed is virtually all agricultural but for: 1) a segment of CRP/WRP land; 2) the crossing of Interstate 29 (as developed land); and 3) a few cropped drainage ways (see Appendix K). Drainage ways in cropped fields would be crossed using open-cut methods according to construction mitigation plans developed to minimize erosion, sedimentation, and bank disruption in the waterway. The North Dakota side of the Red River is cropped to the bank in the area proposed for the crossing. Enbridge would employ HDD methods would avoid impacts on the aquatic resources of the river itself.

Compared to the potential impacts on upland and wetland resources involving land set-asides in conservation programs, the cumulative impacts of current and reasonably foreseeable actions (including the combined LSr Project) are minor as they are subject to current environmental regulations that require a detailed inventory of sensitive resources, an assessment of alternatives that would avoid impacts on the resources (avoidance), minimization of unavoidable impacts, and mitigation of unavoidable impacts.

- The 1) potential and planned highway impacts and residential and commercial development impacts; and 2) impacts of potential flood control projects, are essentially the same as described for the Pembina County portion of the Pembina River Watershed in section 3.13.4.4. No adverse impacts are currently or reasonably foreseeable in the watershed.

- While the development of potential wind power resources is not a reasonably foreseeable action within the Lower Red River Watershed because suitability for wind power is marginal, future wind power development could result in the siting of transmission lines through the area. The siting of transmission lines would involve extensive environmental review and mitigation for unavoidable adverse impacts on natural resources.

- LSr Project impacts in the Lower Red Watershed in North Dakota would be similar or less than those described in section 3.13.4.3. The area is more agricultural, no forested resources would be crossed, and the only waterbody crossing is the Red River of the North. With the exception of the crossing of CRP lands described below, smaller amounts of lands in native vegetation are crossed.

The majority of the impacts of current and reasonably foreseeable actions to wetland and natural habitat resources in the Lower Red River Watershed in Pembina County are neutral-to-positive due to: 1) demographics and land use; 2) the dominantly agricultural nature of the county and the availability of conservation programs; and 3) the relative lack of sensitive natural resources and forested lands.

3.13.5.4 Cumulative Impacts on Identified Sensitive Resources

The majority (257.1 acres) of the LSr Project in the Lower Red River Watershed in Pembina County traverses agricultural land. Of the remaining land uses, 11.7, 32.9, and 2.6 acres are in grassland, wetland, and developed land, respectively (see table 3.13.5-2). The following sensitive resources within

the Lower Red River Watershed in Pembina County currently in native vegetation have been identified by Enbridge in consultation with various state and federal agencies: Extensive CRP/WRP Enrolled Land (MP 790.6 to MP 793); and the Red River of the North crossing (MP 801.7).

CRP/WRP Land

Approximately 2.4 miles of existing Enbridge easement between MP 790.6 and MP 793.0 have been enrolled in CRP/WRP and are being actively managed for upland grassland/shrubland and emergent wetland resources. This area is the only substantial, extensive natural system crossed by the LSr Project in the North Dakota portion of the Lower Red River Watershed. The NRCS has been contacted regarding the crossing of these lands and has provided site-specific reseeding mixtures and procedures to ensure that these lands return to their pre-construction state. No permanent impacts or additional cumulative impacts are expected as the land: 1) would be returned to its pre-construction state; 2) would not lose its existing CRP/WRP status; and 3) would have tree/shrub impacts mitigated at 2:1 ratio.

Red River of the North Crossing

The Red River of the North crossing (MP 801.7) would be by HDD methods that would avoid impacts on riparian upland and wetland forests. Enbridge has developed approved construction mitigation plans referenced in section 3.13.4.4 and described in section 2.0. No permanent impacts or additional cumulative impacts are expected.

3.13.6 Cumulative Impacts Analysis: Lower Red River Watershed (Minnesota)

3.13.6.1 Environmental Character, Pre-settlement, and Baseline Conditions

Physiography

The Minnesota portion of the Lower Red River Watershed is located in the northwestern portion of the state in Kittson and Marshall Counties, with a very small portion in Roseau County. The watershed covers approximately 909.7 square miles and is similar in character to the North Dakota portion of the Lower Red River Watershed described in section 3.13.5.1. The LSr pipeline would cross the Minnesota portion of the Lower Red River Watershed for approximately 32.2 miles and is entirely contained within the Red River Prairie ECS subsection that has been described above for the Pembina River and Lower Red River Watersheds in North Dakota (see sections 3.13.4.1 and 3.13.5.1, table 3.13.3-1, figure 3.13.1-1, Appendix M). The upstream, eastern portions of the Lower Red River Watershed are in the Aspen Parklands ECS subsection that has its western boundary near the LSr Project route where the route exits the Lower Red River Watershed (see figure 3.13.1-1). The Aspen Parkland ECS subsection is not crossed by the LSr Project in the Lower Red River Watershed.

The Red River Prairie ECS in Minnesota

All portions of the Red River Prairie ECS included in the Pembina and Lower Red River Watersheds in North Dakota and Minnesota have the same physiography and characteristics resulting from uniformity of landform, soils, climate, and historic vegetation. The Red River Prairie ECS subsection has been extensively characterized by the MDNR (see Appendix M). MDNR data confirm the evaluation of pre-settlement versus baseline conditions determined in the present analysis for the portions of constituent watersheds within the ECS.

Based upon these data, the Minnesota portion of the Lower Red River Watershed within the Red River Prairie ECS was historically a combination of prairie (64 percent) and wetland (25 percent) features

on a flat lacustrine lake plain. Approximately 11 percent of the ECS was riparian forest associated primarily with the Red River of the North (see table 3.13.6-1).

TABLE 3.13.6-1

Comparison of Pre-Settlement [a] versus Baseline [b] Environmental Conditions
Lower Red River Watershed – Marshall and Kittson Counties, Red River Prairie ECS

	Pre-Settlement		Baseline		
ECS Subsection/ Land Use	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for ECS	Percentage Change Pre-Settlement to Baseline
Red River Prairie					
Forest	0.00	0.00	2.18	0.60	0.60
Shrubland	0.89	0.25	0.38	0.10	-0.15
Prairie/Grassland	225.09	63.60	4.97	1.38	-62.22
Wetland	87.47	24.72	2.51	0.69	-24.03
Forested Wetland	40.44	11.43	0.93	0.26	-11.17
Agricultural	0.00	0.00	349.57	96.76	96.76
Developed	0.00	0.00	0.74	0.20	0.20
Subtotal	353.89	100.0	361.28	100.0	
GAP Emergent Wetland			*1.61*[d]		
GAP Forested Wetland			*0.60*[d]		

[a] Pre-settlement land cover distribution determined using the Marschner Native Vegetation Map.

[b] Land Use determined using GAP Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute NWI acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

[d] GAP estimates are conservative and are less than NWI wetland estimates.

The most significant land-use impact in the Red River Prairie ECS portion of the Lower Red River Watershed has been the conversion of prairie and wetland features to agricultural land. Current land use data shows prairie, wetland, and forested wetland comprise only 1.4, 0.7, and 0.3 percent of the area, respectively. The subsection is now 97 percent agricultural land.

Demographics

The LSr route through the Lower Red River Watershed in Minnesota traverses southwestern Kittson County and northwestern Marshall County (see figure 3.13.3-1). Kittson County is a sparsely populated, strongly rural county with a total population of 4,792 people. However, between 1990 and 2006 the county has lost over a thousand people, a population decline of approximately 18 percent (U.S. Census Bureau). Lancaster, Hallock, and Karlstad are the largest towns in the county. No regional retail/commercial centers exist in the county. The closest town to the LSr Project route is Donaldson.

Marshall County is similar with a total estimated 2005 populations of 9,965 and a 1990 population of 10,993 people, a population decline of nearly 10 percent (U.S. Census Bureau). Warren, Argyle, and Grygla are the largest towns. No regional retail/commercial centers exist in the county. There are no towns within 5 miles of the LSr Project pipeline route in Marshall County.

The dominant industry for both counties is agriculture. No regional or interregional road corridors are present that would require significant upgrades. The lack of regional retail or industrial centers limits expected road projects to small maintenance projects that are not expected to have substantial impacts on natural resources (Minnesota Department of Transportation (MDOT) Statewide Transportation Plan, August 2003). No dramatic increases in industrial or residential expansion are expected in the portion of the Lower Red River Watershed that lies within the Red River Prairie ECS that would significantly impact existing resources.

3.13.6.2 Current and Reasonably Foreseeable Actions

The LSr Project would cross the Lower Red River Watershed from MP 801.8 to MP 834.0 for a total of 32.2 miles. The majority of LSr Project right-of-way in the Lower Red River Watershed would be located in existing agricultural land. Table 3.13.6-2 summarizes existing land-use estimates and cover-types for the Red River Prairie ECS component of the Red River Watershed and contrasts those features to the incremental effect of the proposed Enbridge pipelines.

TABLE 3.13.6-2

Cumulative Effect of Enbridge Expansion
Lower Red River Watershed, Marshall and Kittson Counties, Red River Prairie (RRP) ECS

Land Cover	Current Land Use [a] (acres)	Baseline Land Use Existing Enbridge ROW [b]	Land Use in Added ROW [c] (acres)	Add'n. LSr Perm. ROW [d] (acres)	Add'n. Alberta Clipper Perm. ROW [d] (acres)	Cum Acres Perm. ROW [e] (acres)	Post Restor. (acres)[f]	Change in Land Use [g] (acres)	Change in existing land Cover (Percent)[h]
Forest	2,180	0.00	0.00	0.05	0.06	0.11	0.00	-0.11	<-0.01
Shrubland	380	0.00	0.00	0.00	0.00	0.00	0.05	+0.05	0.01
Prairie/ Grassland	52,073	4.26	2.84	2.89	1.47	11.46	11.52	+0.06	<0.01
Wetland	14,057	2.42	1.61	2.54	1.18	7.75	9.56	1.81	0.00
Forested Wetland	930	0.69	0.46	0.47	0.19	1.81	1.81	0.00	0.00
Agriculture	290,920	287.7	191.8	190.77	95.46	765.76	765.76	0.00	0.00
Developed	740	0.14	0.10	0.00	0.00	0.24	0.24	0.00	0.00
Total	361,280	295.2	196.8	196.7	98.36	787.1	787.1	0.00	0.00

[a] Red River Prairie ECS data from table 3.13.6-1 was adjusted to include an estimated 57,812 acres of CRP (2008 Conservation Lands Summary, Minnesota Board of Soil and Water resources) that was converted from cropland to wetland (18.5 percent, 10,709 acres) and prairie/grassland (81.5 percent, 47,103 acres). An additional 838 acres enrolled in WRP was added to the wetland acreage. Estimates determined by multiplying the acreage CRP in Kittson and Marshall Counties by the percentage of each county in the Red River Prairie ECS, Lower Red River Watershed. This reduced acreage was then multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see table 3.13.6-1, see also table 3.13.6-3), with the remainder placed in the Prairie/Grassland category.

[b] Existing Enbridge right-of-way (ROW) is 125 feet in width and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge Corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the permanent easement from 75 to 125 feet in width. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge Corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easement (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easement.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreages increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland. Approximately 1.81 acres of forested wetland would be avoided by HDD methods.

[g] Changes in acres of land on the existing ROW from pre construction to post restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

No wetlands would be filled during or after construction of the project. However, temporary impacts would occur to wetland resources during construction. No forested wetlands would be converted to emergent wetlands within the maintained portion of the permanent easement, and very minor, temporary impacts would result from clearing of trees from forested upland during construction. Forested conditions are expected to return to cleared areas within the temporary workspace over time as the temporarily affected portions of the corridor naturally revegetate. Approximately 0.11 acre of historic upland forest resources currently in shelterbelts associated with agriculture would be converted to grass and shrubland after construction.

Because of the small acreage of forest resources impacted (0.11 acre) the removal of trees from the right-of-way is not expected to impact forested habitats as the width of the cleared right-of increases from 125 to 200 feet. The only substantial waterbody crossings are the Red River of the North at MP 801.7 and the Tamarac River at MP 828.8. Impacts on sensitive resources associated with the crossing of these rivers would be avoided by the use of HDD techniques.

Wetland impacts would be mitigated under COE and state permits, no permanent impacts on forested or emergent wetland resources would result from the project. Similarly, sensitive resources (e.g., native prairie habitats) have been identified along the route and appropriate construction, erosion control, and revegetation procedures have been identified. Similar permit conditions placed on other linear projects occurring subsequent to and concurrent with the LSr Project would ensure that no permanent, cumulative impacts on wetland and other sensitive resources would result from pipeline construction.

State and County Highway Development

The MDOT and Kittson and Marshall County staff were contacted to determine if any road construction projects were on-going or planned that could impact existing natural resources within the Lower Red River Watershed. Detailed information was collected and is provided in Appendix M. No substantial proposed road-construction or road-widening projects are being planned in the Lower Red River Watershed. Projects that would occur in the future would not involve extensive widening and would not be expected to have significant associated wetland impacts. The minor wetland impacts that would occur are mitigated for using a wetlands mitigation bank developed specifically for road projects jointly by BSWR and MDOT.

Flood Control Projects

No large flood control projects are planned for the Lower Red River Watershed in Kittson and Marshall Counties. NRCS flood control activities are discussed in section 3.13.4.2. No unmitigated adverse impacts due to flood control activities are expected in the watershed. Existing flood control and proposed flood control actions would likely result in the acquisition of additional conservation easements and a resulting positive impact on associated riparian zones and wetlands adjacent to drainage ways. A substantial though unknown acreage of flood control easements along a tributary to the Red River at MP 805.4 is evident in project alignment sheets. It is assumed that the conservation acreage placed in reserve for flood control is included in the CRP acreage referenced in table 3.13.6-2.

Potential Wind Power Development

As of January 16, 2008 no wind farms were located in the Lower Red River Watershed (American Wind Energy Association). The Lower Red River Watershed in Minnesota is entirely located in areas considered marginal for wind power development, thus the development of wind power is not considered to be a reasonably foreseeable action.

Government Conservation Programs

The impact of conservation programs on natural resources is discussed in section 3.13.4.2. The net result of these programs is to return substantial acreages of farmland to natural environments (see table 3.13.6-3). In total, it is estimated that 57,812 acres have been enrolled in CRP land planted to native vegetation with included wetlands left undisturbed. An additional 838 acres of farmed wetlands have been restored under the WRP and related state wetland preservation programs.

TABLE 3.13.6-3

Land in Conservation Programs: Lower Red River Watershed Counties in the Red River Prairie ECS [a]

County	Total County Acres	Watershed Acres in ECS [b]	CRP/CREP/RIM County [c]	WRP etc. County [d]	CRP/CREP/RIM Watershed [e]	WRP etc. Watershed [e]
	acres					
Kittson	706,727	230,230	109,046	177	35,524	58
Marshall	1,161,204	131,090	197437	6,097	22,288	780
Total	1,867,931	361,320	306,483	6,274	57,812	838

[a] Conservation Lands Summary Prepared 01/29/08, Minnesota Board of Soils and Water Resources.
[b] County Acres within the Lower red river Watershed determined by GIS query.
[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years.
[d] Wetland Reserve Program restores historically farmed/drained wetlands.
[e] Watershed acres estimated by dividing the acres in the watershed by total county acres, then multiplying by the total county acres in conservation easements.

The acreage associated with Conservation Programs would not be included under 1980s baseline conditions and represents a substantial positive impact on area resources that results in an increase of thousands of acres of restored wetland and grassland prairie to areas that were formerly cropland.

Impacts of the SWANCC Decision and Agricultural Conversion

The impact of the SWANCC decision and agricultural conversion are discussed in section 3.13.4.2 above. In addition to protection under the Swampbuster provisions of the current Farm Bill, Minnesota wetlands are protected under WCA. The BWSR administers WCA and tracks wetland impacts regulated and mitigated under the statute. For the period beginning 1999 and extending through 2003 neither Kittson nor Marshall County listed any wetland impacts under the Wetlands Conservation Act (BWSR, October 2001; BWSR, August 2005).

3.13.6.3 Cumulative Impacts

The cumulative impacts on wetland and other natural resources in the Minnesota portion of the Lower Red River Watershed are similar to those discussed above for the North Dakota portion of the Lower Red River Watershed. The route through the Lower Red River Watershed is virtually all agricultural but for: 1) the crossing of the Red River of the North (MP 801.7); 2) the crossing of the Tamarac River (MP 828.8); and 3) the crossing of several drainage ways in cropped fields (see Appendix K). Minor acreage of CRP land is apparent on alignment sheets near MP 833.8. Enbridge would employ HDD methods for the Red River of the North and the Tamarac River crossings that would avoid impacts on the aquatic resources of these rivers.

Compared to the potential impacts on upland resources involving agriculture, the cumulative impacts of current and reasonably foreseeable actions (including the LSr Project) are relatively minor as they are subject to current environmental regulations that require a detailed inventory of sensitive resources, an assessment of alternatives that would avoid impacts on the resources (avoidance), minimization of unavoidable impacts, and mitigation of unavoidable impacts. Reasonably foreseeable actions include:

- Potential adverse impacts due to: 1) planned highway maintenance and expansion; 2) potential flood control projects; and 3) development of wind power, and (4) additional residential and industrial development are not expected in the Lower Red River Watershed due to the nature of any projects that would occur, demographics, and the marginal nature of wind resources.

- LSr Project impacts would be similar to those described in section 3.13.5.3 for the Lower Red Watershed in North Dakota. The major perennial rivers would be crossed by horizontal direction drill techniques, avoiding adverse impacts on these resources. Remaining resources are agricultural, and no native upland or wetland forests would be impacted.

The majority of the impacts of current and reasonably foreseeable actions to wetland and natural habitat resources in the Lower Red River Watershed in Minnesota are neutral-to-positive due to: 1) demographics and land use; 2) the dominantly agricultural nature of the county and the availability of conservation programs; and 3) the relative lack of sensitive natural resources and forested lands.

3.13.6.4 Cumulative Impacts on Identified Sensitive Resources Potentially Affected by the LSr Project

The majority (787.0 acres) of the LSr Project in the Lower Red River Watershed in Kittson and Marshall Counties in is agricultural land. Of the remaining land uses, 0.1, 11.5, 7.8, and 0.2 acres are in forest, prairie grassland (CRP), wetland, and developed land, respectively. The following sensitive resources within the Lower Red River Watershed in Kittson and Marshall Counties currently in native vegetation have been identified by Enbridge in consultation with various state and federal agencies: crossing of the Red River of the North (MP 801.7) and crossing of the Tamarac River (MP 828.8).

Red River of the North Crossing

The Minnesota side of the Red River of the North (MP 801.7) crossing using HDD methods that avoid adverse impacts was discussed in section 3.13.5.4. While some forested riparian wetland exists in the Minnesota side of the river, no cumulative impacts on the Red River of the North are expected to occur as a result of construction of the LSr Project.

Tamarac River Crossing, MP 828.8

Most Enbridge pipelines crossed the Tamarac River along a northwest to southeast trending diagonal, resulting in a long, linear swath of cleared riparian forest and requiring crossing the river at three places. The current route proposed by Enbridge crosses the Tamarac perpendicular to the flow at a single location using HDD methods. The crossing location contains no trees and the use of HDD methods would result in not impact on aquatic resources in the Tamarac River.

The existing Enbridge easement contains substantial cleared areas that could be restored to tree and shrub habitat without affecting maintenance and aerial survey of the pipeline itself. The presence of

this area presents an opportunity to mitigate for unavoidable impacts on forested upland and forested wetland occurring elsewhere in the watershed.

3.13.7 Cumulative Impacts Analysis: Snake River Watershed (Minnesota)

3.13.7.1 Environmental Character, Pre-settlement, and Baseline Conditions

Physiography

The Snake River Watershed is located in the northwestern portion of the state in Marshall, Pennington, and Polk Counties. The watershed covers approximately 932.0 square miles, most of which (740 square miles) is within Marshall County. The proposed pipeline would cross the Snake River Watershed for approximately 17.6 miles and is entirely contained within the Aspen Parkland ECS subsection (see table 3.13.3-1, figure 3.13.1-1, Appendix M). The entire LSr Project within the Snake River Watershed is contained within Marshall County, Minnesota. The downstream, western portions of the Snake River Watershed are in the Red River Prairie ECS subsection that has its eastern boundary west of the LSr route (see figure 3.13.1-1). The Red River Prairie ECS subsection is not crossed by the LSr Project in the Snake River Watershed.

The Aspen Parkland ECS in Minnesota

The general nature of the Snake River portion of the Aspen Parkland ECS is discussed in Appendix M. The majority of the LSr route through the Snake River Watershed traverses the periphery of the relatively flat lake plain dominated by agriculture from MP 834.0 to MP 837. The Middle River is crossed at MP 835.9. From MP 837 to where the route exits the Snake River Watershed at MP 851.6, the route would traverse a complex area dominated by wave-washed till, lacustrine deposits, and sandy beach areas that trend north-to-south and are oriented with the glacial lake shoreline. Aspen groves that have been squared off to accommodate agriculture are interspersed throughout the area. Shelterbelts are common and agriculture is the dominant land use. Substantial acreages have apparently been placed into various conservation programs resulting in conversion of land from agricultural to grassland and wetland. Much conservation acreage is associated with the beach areas of glacial Lake Agassiz consisting of sandy ridges interspersed with wetland. The Snake River is crossed by the project at MP 843.1.

The Aspen Parkland ECS subsection is not as intensively agricultural as the Red River Prairie ECS. Analysis of pre-settlement and baseline conditions indicates that the portion of the Snake River Watershed within the Aspen Parkland ECS was historically a combination of prairie (56 percent) shrubland (26 percent) and emergent and forested wetland (8 and 7 percent, respectively (see table 3.13.7-1)). However, only 8, 2, 5, 3, and 3 percent of the baseline condition acreage was in forest, shrubland, prairie, wetland, and forested wetland, respectively (see table 3.13.7-1). The baseline condition estimates that area at 77 percent agricultural land converted primarily from pre-settlement prairie, shrubland, and wetland.

Marschner Map historic land cover data was compared to GAP land use data for each ECS subsection and the whole watershed in table 3.13.7-1.

TABLE 3.13.7-1

Comparison of Pre-Settlement [a] versus Baseline [b] Environmental Conditions
Snake River Watershed – Minnesota

	Pre-Settlement		Baseline		
ECS Subsection/ Land Use	Pre-settlement Acreage (thousands)	Relative Percentage for ECS	GAP Land Use or NWI Acreage [c] (thousands)	Relative Percentage for Watershed	Percentage Change Pre-Settlement to Baseline
Red River Prairie					
Forest	8.62	2.59	28.58	8.59	6.00
Shrubland	87.94	26.42	5.12	1.54	-24.88
Prairie/Grassland	185.86	55.84	17.68	5.31	-50.53
Wetland	27.44	8.24	18.70	5.62	-2.62
Forested Wetland	23.00	6.91	11.66	3.53	-3.38
Agricultural	0.00	0.0	250.73	75.33	75.33
Developed	0.00	0.0	0.35	0.11	0.35
Subtotal	332.85	100.0	332.82	100	
GAP Emergent Wetland			*12.43*[d]		
GAP Forested Wetland			*12.51*[e]		

[a] Pre-settlement land cover distribution determined using the Marschner Native Vegetation Map..

[b] Land Use determined using GAP Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute NWI acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie/agriculture and upland forest for emergent and forested wetlands, respectively.

[d] GAP photography late 1980s underestimates wetlands when compared to NWI estimates.

[e] GAP photography late 1980s overestimates forested wetlands when compared to NWI estimates. GAP forested wetlands may be elevated as all riparian forests (floodplain forests) were considered wetlands in the analysis.

Demographics

The LSr route through the Snake River Watershed in Minnesota traverses Marshall County (see table 3.13.1-1) as described in section 3.13.6.1. Marshall County is rural, dominated by agriculture, and does not have regional retail centers or regional transportation corridors. No dramatic increases in industrial or residential expansion due to increasing population or transportation pressures are expected in the portion of the Snake River Watershed that lies within the Aspen Parklands ECS that would significantly impact existing resources.

3.13.7.2 Current and Reasonably Foreseeable Projects

The LSr Project would cross the Snake River Watershed from MP 834.0 to MP 851.6 for a total of 17.6 miles. The majority of LSr pipeline right-of-way in the Snake River Watershed would be located in existing agricultural land. Table 3.13.7-2 summarizes existing land use estimates and cover-types for the Aspen Parkland ECS component of the Snake River Watershed and contrasts those features to the incremental effect of the proposed Enbridge pipelines.

TABLE 3.13.7-2

Cumulative Effect of Enbridge Expansion
Snake River Watershed, Marshall County, Aspen Parkland (AP) ECS

Land Cover	Current Land Use [a] (acres)	Baseline Land Use Existing Enbridge ROW [b]	Land Use in Added ROW [c] (acres)	Add'n. LSr Perm. ROW [d] (acres)	Add'n. Alberta Clipper Perm. ROW [d] (acres)	Cum Acres Perm. ROW [e] (acres)	Post Restor. (acres)[f]	Change in Land Use [g] (acres)	Change in existing land Cover (Percent)[h]
Forest	28,580	4.02	2.68	2.62	1.80	11.12	-11.12	-11.12	-0.04
Shrubland	5,120	0.69	0.46	0.54	0.33	2.02	7.58	+5.56	+0.11
Prairie/ Grassland	62,851	5.51	3.68	2.03	0.78	12.00	17.56	+5.56	+0.01
Wetland	23,162	6.32	4.21	10.07	4.49	25.09	25.47	+0.38	<0.01
Forested Wetland	11,660	<0.01	<0.01	0.27	0.10	0.38	-0.38	-0.38	<0.01
Agriculture	201,097	145.88	97.19	92.71	46.50	382.28	382.28	0.00	0.00
Developed	350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	332,820	162.42	108.22	108.24	54.00	432.88	433.01	0.00	0.00

[a] Aspen Parkland ECS data from table 3.13.7-1 was adjusted to include an estimated 48,146 acres of CRP (2008 Conservation Lands Summary, Minnesota Board of Soil and Water resources) that was converted from cropland to wetland (6.18 percent, 2,975 acres) and prairie/grassland (45,171 acres). An additional 1,487 acres enrolled in WRP was added to the wetland acreage. Estimates determined by multiplying the acreage CRP Marshall County by the percentage of the county in the Aspen Parkland ECS, Snake River Watershed. This reduced acreage was then multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see table 3.13.7-1, see also table 3.13.7-3), with the remainder placed in the Prairie/Grassland category.

[b] Existing Enbridge right-of-way (ROW) is 125 feet in width and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge Corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the permanent easement from 75 to 125 feet in width. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge Corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easement (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easement.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and Shrubland acreages increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land on the existing ROW from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

No wetlands would be filled during or after construction of the project. However, temporary impacts would occur to wetland and upland resources (including agriculture) during construction. Approximately 0.82 acres of forested wetlands are expected to be temporarily converted to emergent wetlands within the maintained portion of the permanent easement. Forested conditions are expected to return to cleared areas within the temporary workspace over time as the temporarily affected portions of the corridor naturally re-vegetate. Aspens are known to propagate vegetatively and by seed and are expected to rapidly revegetate cleared upland areas. Approximately 10.67 acres of historic upland forest resources currently in shelterbelts associated with agriculture and aspen groves would be temporarily converted to grass and shrubland during construction. A small portion of this acreage is expected to be permanently converted to grass and/or shrubland due to right-of-way maintenance.

Substantial waterbody crossings include the Middle River crossing at MP 835.9 and that of the Snake River at MP 843.1. Impacts on sensitive resources associated with the crossing of the Middle

River would be avoided by the use of HDD techniques. The proposed crossing of the Snake River will be by the use of open cut techniques. All other proposed crossings of waterbodies consisting of various channelized and constructed drainage ways would be by open-cut methods as well.

Several wetlands are crossed or are adjacent to the LSr route through the Snake River Watershed. The Viking Fen is a Calcareous Fen recognized and regulated by the MPCA as an Outstanding Resource Water associated with the beach ridge zone of the Aspen Parkland. The Viking Fen has been avoided by alignment reroute in the past.

Wetland impacts would be mitigated under COE and state permits, no permanent impacts on forested or emergent wetland resources would result from the project. Wetland type conversions resulting from permanent forest clearing would be mitigated as a permit condition attached to the Federal 404 CWA permit.

Similarly, sensitive resources (e.g., native prairie habitats, lands in CRP) have been identified along the route and appropriate construction, erosion control, and revegetation procedures have been identified. Similar permit conditions placed on other linear projects occurring subsequent to and concurrent with the LSr Project would ensure that no permanent, cumulative impacts on wetland and other sensitive resources would result from pipeline construction.

State and County Highway Development

The MDOT and Marshall, Pennington, and Polk County staff were contacted to determine if any road construction projects were on-going or planned that could impact existing natural resources within the Snake River Watershed. Detailed information was collected and is provided in Appendix M. No substantial proposed road-construction or road-widening projects are being planned in the Snake River Watershed. Projects that would occur in the future would not involve extensive widening and would not be expected to have significant associated wetland impacts. The minor wetland impacts that would occur are mitigated for using a wetlands mitigation bank developed specifically for road projects jointly by BWSR and MDOT.

Flood Control Projects

Several flood control projects are planned for the Snake River Watershed in Marshall and Polk Counties (see Appendix M). Two proposed by the Middle Tamarac Watershed District are large impoundments and floodways on the Snake River that would have wetland impacts mitigated on-site. NRCS flood control activities are discussed in section 3.13.4.2. No unmitigated adverse impacts due to flood control activities are expected in the watershed. Existing flood control and proposed flood control actions would likely result in the acquisition of additional conservation easements and a resulting positive impact on associated riparian zones and wetlands adjacent to drainage ways. A substantial though unknown acreage of flood control easements within the Snake River Watershed is visible on alignment sheets at MP 844. It is assumed that the conservation acreage placed in reserve for flood control is included in the CRP acreage referenced in table 3.13.7-2.

Aggregate Mining

The Aspen Parklands include the beach ridges of Glacial Lake Agassiz that have been historically used for aggregate. Several active and inactive sand and gravel mines exist near the proposed LSr Project route (e.g., between MP 845 and MP 847). Sand and gravel mining converts the pre-existing land use and has been known to affect local groundwater flows that may be important to sustain groundwater fed wetlands in the area.

Based on available information, no additional sand and gravel mining operation are proposed in the immediate area of the LSr Project. However, if additional projects become reasonably foreseeable actions, such projects are subject to several federal, state, and local regulations that ensure the protection of natural resources, including:

- local Permits (Conditional Use Permits);
- various state permits administered by MPCA, MDNR, and BSWR including water appropriation permits, protected waters permits, burning permits, floodplain permits, WCA wetland permits, and water quality permits;
- federal permits administered by the COE when mining activities could impact wetland resources; and
- environmental review by the Minnesota Environment Quality Board for larger mining activities (Minnesota Department of Natural Resources, January 2001).

Potential Wind Power Development

As of January 16, 2008 no wind farms were located in the Snake River Watershed (American Wind Energy Association). The Snake River Watershed is entirely located in areas considered marginal for wind power development, thus the development of wind power is not considered to be a reasonably foreseeable action.

Government Conservation Programs

Extensive acreages of land in Marshall County within the Snake River Watershed have been enrolled in conservation programs (see table 3.13.7-3). In total, it is estimated that 48,146 acres have been enrolled in CRP land planted to native vegetation with included wetlands left undisturbed. An additional 6,097 acres of farmed wetlands have been restored under the WRP and related state wetland preservation programs.

TABLE 3.13.7-3

Land in Conservation Easements: Snake River Watershed in the Aspen Parklands ECS [a]

County	Total County Acres	Watershed Ac. in ECS [b]	CRP/CREP/RIM County [c]	WRP etc. County [d]	CRP/CREP/RIM Watershed [e]	WRP etc. Watershed [f]
	acres					
Marshall	1,161,204	283,300	197437	6,097	48,146	1487

[a] Conservation Lands Summary Prepared 01/29/08, Minnesota Board of Soils and Water Resources.
[b] County Acres within the Snake River Watershed determined by GIS query.
[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years.
[d] Wetland Reserve Program restores historically farmed/drained wetlands.
[e] Watershed acres estimated by dividing the acres in the watershed by total county acres, then multiplying by the total county acres in conservation easements.

3.13.7.3 Cumulative Impacts

The cumulative impacts on wetland and other natural resources in the Snake River Watershed are similar to those discussed above for the Lower Red River Watershed. The route through the Snake River Watershed is virtually all agricultural but for: 1) the crossing of the Middle River (MP 835.9); 2) the crossing of the Snake River (MP 843.1); 3) the crossing of a several drainage ways in cropped fields (see Appendix K); and 4) the crossing of isolated pockets of aspen embedded within agricultural fields. Substantial acreage of CRP land is apparent on alignment sheets. Enbridge would employ HDD methods for the Middle River that would avoid impacts aquatic resources. Open cut methods are being proposed for the Snake River crossing.

Compared to the potential impacts on upland resources involving agriculture, the cumulative impacts of current and reasonably foreseeable actions (including the LSr Project) are relatively minor as they are subject to current environmental regulations that require a detailed inventory of sensitive resources, an assessment of alternatives that would avoid impacts on the resources (avoidance), minimization of unavoidable impacts, and mitigation of unavoidable impacts. Reasonably foreseeable actions include:

- Potential adverse impacts due to: 1) planned highway maintenance and expansion; 2) potential flood control projects; 3) development of wind power; and 4) additional residential and industrial development are not expected in the Snake River Watershed due to regulation and mitigation for any flood control and related project impacts that would occur (see Appendix M), demographics, and the marginal nature of wind resources.

- LSr Project impacts would be similar to those described in section 3.13.6.3 for the Lower Red Watershed in North Dakota. The Middle River would be crossed by horizontal direction drill techniques, avoiding adverse impacts on these resources. Some forested wetland and upland would be impacted during the crossing of the Snake River. Remaining resources are agricultural, and no native upland or wetland forests would be impacted.

The majority of the impacts of current and reasonably foreseeable actions to wetland and natural habitat resources in the Snake River Watershed in Minnesota are neutral-to-positive due to: 1) demographics and land use; 2) the dominantly agricultural nature of the county and the availability of conservation programs; and 3) the relative lack of sensitive natural resources and forested lands.

3.13.7.4 Cumulative Impacts on Identified Sensitive Resources Potentially Affected by the LSr Project

The majority (382.3 acres) of the LSr Project in the Snake River Watershed in Marshall County is in agricultural land. Of the remaining land uses, 11.2, 2.0, 12.0, and 25.1 acres are in forest, shrubland, prairie, and wetland, respectively (see table 3.13.7-2). The following sensitive resources within the Snake River Watershed in Marshall County that are currently in native vegetation have been identified by Enbridge in consultation with various state and federal agencies: crossing of the Middle River (MP 835.9); crossing of the Snake River (MP 843.1); rerouting near the Viking Calcareous Fen (MP 844.1 to 845); and upland and riparian forest impacts.

<u>Middle River Crossing</u>

The Middle River crossing is characterized by the presence of a narrow belt of riparian wetland, a portion of which is forested and one outlier of aspen trees. The Middle River crossing at MP 801.7 would

be crossed by the HDD method that would avoid impacts on existing riparian upland and forested wetland and upland as discussed in section 3.13.4.4. The immediate area of the crossing is rural/agricultural, and no future development impacts are expected. No cumulative impacts on the Middle River are expected to occur as a result of construction of the LSr Project.

Snake River Crossing, MP 843.1

Previous Enbridge pipelines crossed the Snake River along a northwest to southeast trending diagonal, resulting in a long, linear swath of cleared riparian forest and requiring open cut river crossings at three locations. The current route proposed by Enbridge follows a recent reroute that crosses the Snake perpendicular to the flow at a single location using open cut methods. The reroute would involve crossing the Snake River at a location that is characterized by a high cut bank (south side) and low emergent and riparian wetland on the south, with a narrow band of riparian forested upland to the north of the wetland. The open cut through the high bank would result in additional excavation to accommodate the pipe bend. Enbridge would employ full erosion and sedimentation procedures according to EMP to limit impacts on the waterbody and would restore the original contour and character. Less than one acre of forested upland and wetland would be cleared during the crossing.

The existing Enbridge easement at the Snake River crossing contains substantial cleared areas that could be restored to tree and shrub habitat without affecting maintenance and aerial survey of the pipeline itself. The presence of this area presents an opportunity to mitigate for unavoidable impacts on forested upland and forested wetland.

Enbridge has evaluated the costs associated with open cut and HDD procedures combined with the environmental characteristics of the Snake River at the crossing location. Enbridge believes that employing open-cut procedures is the least environmentally damaging, practicable alternative when considering associated costs, the environmental character of the location crossed, and proposed and potential mitigation for the permanent and temporary loss of forested resources.

Rerouting Near the Viking Calcareous Fen, MP 844.1 to 844.5

The Viking Calcareous Fen Complex has been identified as an Outstanding Resource Water regulated by the MPCA under Minnesota Statute. The LSr Project route follows a previous reroute that was located down-gradient and designed to avoid impacts on the Viking Fen. No impacts on the Viking Calcareous fen are expected to result from the proposed route.

The Viking Fen reroute joins the main existing Enbridge easement at MP 845.1 where it enters a large area of apparent CRP (historically agricultural) that extends from MP 845.1 to MP 845.7. Several wetlands are crossed in this area. Utilizing the existing corridor represents the least environmentally damaging practicable alternative as the route follows an area where sediments have been disturbed by previous pipeline construction without apparent impact on calcareous fen resources in the area.

Upland Forest Impacts

The existing LSr Project route would traverse six aspen groves in the Snake River Watershed that have been bisected by previous pipeline construction. All of these non-riparian forested uplands exist as discrete, isolated patches of aspen within an agricultural matrix. All have been squared off and modified by clearing for agricultural purposes. It is expected that the construction of the LSr Project would increase the width of cleared right-of-way that would be converted to shrub and open grassland within the permanent easement by 75 feet (from 125 to 200 feet in width). Given the small size of the forested areas and their presence as features embedded within an agricultural matrix, the effects of increasing the width

of the cleared area by a minor amount of fragmentation within the forested area is expected to be negligible.

3.13.8 Cumulative Impacts Analysis: Red Lake River Watershed (Minnesota)

3.13.8.1 Environmental Character, Pre-settlement, and Baseline Conditions

Physiography

The Red Lake River Watershed is located in the northwestern portion of the state in Marshall, Pennington, Red Lake, Polk, Beltrami, and Clearwater Counties. The watershed covers approximately 1,410 square miles. The proposed pipeline would cross the Red Lake River Watershed for approximately 22.3 miles, and is entirely contained within the Aspen Parkland ECS subsection in Pennington, Red Lake, and Marshall Counties, though the majority of the pipeline route is within Pennington County (19.6 miles) (see table 3.13.3-1, figure 3.13.1-1, Appendix M). The upstream, eastern portions of the Red Lake River Watershed are in the Lake Agassiz Lowland ECS subsection that has its western boundary well east of the LSr Project route. The downstream, western portions of the Red Lake River Watershed are in the Red River Prairie ECS that has its eastern boundary well west of the LSr/Alberta clipper route (see figure 3.13.1-1).

Given: 1) the large size of the Red Lake Watershed; 2) the presence of the route solely within the Aspen Parkland ECS; and 3) the large distance separating the proposed LSr Project route from the Red River Prairie and Lake Agassiz Lowland ECS subsections, the following discussion would address cumulative impacts within the Aspen Parkland ECS subsection that contains the proposed LSr/Clipper project. Marschner Map historic land cover data was compared to GAP land use data for each ECS subsection and the whole watershed in table 3.13.8-1.

The Aspen Parkland ECS in Minnesota

The general nature of the Red Lake River portion of the Aspen Parkland ECS is similar to that discussed in section 3.13.7.1 for the Aspen Parkland portion of the Snake River Watershed (see also Appendix M). The majority of the LSr route through the Red Lake Watershed traverses the eastern portion of the Lake Agassiz beach ridges from MP 851.7 to MP 855 where it enters areas composed of glacial till, outwash, and minor lacustrine lake plains that extend to the eastern boundary of the watershed at MP 873.9.

The route can be separated into two discrete segments. The first segment consists of beach ridges, till, and outwash from MP 853.0 to MP 860.2 is characterized by extensive emergent/scrub shrub, and forested wetlands interspersed with drained agricultural land, much of which has been enrolled into CRP and related conservation programs. The route is primarily agricultural from MP 860.2 to the eastern boundary of the watershed at MP 873.9. The Red Lake River is crossed at MP 864.3.

TABLE 3.13.8-1

Comparison of Pre-Settlement [a] versus Baseline [b] Environmental Conditions
Aspen Parklands ECS, Red Lake River Watershed – Minnesota

	Pre-Settlement		Baseline		
ECS Subsection/ Land Use	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for ECS	Percentage Change Pre-Settlement to Baseline
Aspen Parklands					
Forest	41.91	7.48	25.91	4.63	-2.85
Shrubland	125.67	22.44	3.06	0.55	-21.89
Prairie/Grassland	284.73	50.84	37.47	6.69	-44.15
Wetland	98.85	17.65	37.08	6.62	-11.03
Forested Wetland	8.93	1.59	16.20	2.89	+1.3
Agricultural	0.00	0.00	436.27	77.89	+77.89
Developed	0.00	0.00	4.07	0.73	+0.73
Subtotal	560.09	100.0	560.06	100.0	
GAP Emergent Wetland			*29.04*[d]		
GAP Forested Wetland			*10.69*[d]		

[a] Pre-settlement land cover distribution determined using the Marschner Native Vegetation Map.

[b] Land Use determined using GAP Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute NWI acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie/agriculture and upland forest for emergent and forested wetlands, respectively.

[d] GAP photography late 1980s underestimates both emergent and forested wetlands when compared to NWI estimates.

Analysis of pre-settlement and baseline conditions indicates that the portion of the Red Lake River Watershed within the Aspen Parkland ECS was historically a combination of prairie (51 percent) shrubland (22 percent), forest (7 percent) and emergent and forested wetland (18 and 2 percent, respectively (see table 3.13.8-1). However, only 5.0, 0.6, 7.0, 6.0, and 3.0 percent of the baseline condition acreage was in forest, shrubland, prairie, wetland, and forested wetland, respectively (see table 3.13.6-1). The baseline condition estimates that the Aspen Parkland had been converted to 78 percent agricultural land.

Demographics

The 22.3 miles of LSr route through the Red Lake River Watershed in Minnesota traverses Pennington, Red Lake, and Marshall Counties, with the majority (19.6 miles) in Pennington County (see table 3.13.1-1). Pennington County is generally rural with a total estimated 2005 population of 13,608 and a 2000 population of 13,584 people indicating a stable, slightly increasing population (U.S. Census Bureau). St. Hillaire, Goodridge, and Thief River Falls are the major towns and cities. Thief River Falls is at the junction of two regional corridors (Minnesota 32 and U.S. 52), and is a shopping regional retail/commercial center for northwestern Minnesota. Thief River Falls is expected to have continued future growth potentially resulting in increased residential and commercial development pressure on nearby natural resources. Minnesota 32 and U.S. 52 are regional corridors that require periodic upgrades to accommodate increased regional traffic (MDOT Statewide Transportation Plan, August 2003). Thief River Falls is approximately five miles east of the closest approach of the proposed LSr pipeline route.

The dominant industry for the county is agriculture. Continued increases in industrial and residential expansion are expected in the area of Thief River Falls that could significantly impact existing resources.

3.13.8.2 Current and Reasonably Foreseeable Projects

The LSr Project would cross the Red Lake River Watershed from MP 851.6 to MP 873.9 for a total of 22.3 miles. The majority of LSr pipeline right-of-way in the Red Lake River Watershed would be located in existing agricultural land; however, areas of wetland, forested wetland, and CRP land would be crossed as well. Table 3.13.8-2 summarizes existing land use estimates and cover-types for the Aspen Parkland ECS component of the Red Lake River Watershed and contrasts those features to the incremental effect of the proposed Enbridge pipelines.

No wetlands would be filled during or after construction of the project. However, temporary impacts would occur to wetland and upland resources (including agriculture) during construction. Approximately 3.9 acres of forested wetlands would be converted to emergent wetlands as a result of construction. Aspens are known to propagate vegetatively and by seed and are expected to rapidly revegetate cleared upland areas. Approximately 31.6 acres of historic upland forest resources would be converted to grassland/shrubland as a result of construction. Forested conditions are expected to return to cleared areas within the temporary workspace over time as the temporarily affected portions of the corridor naturally re-vegetate. Conversion of forested to prairie/grassland is reflected in increases in the prairie/grassland cover category in table 3.13.8-2.

Substantial waterbody crossings include the Red Lake River at MP 864.3. Impacts on sensitive resources associated with the crossing of the Red Lake River would be avoided by the use of HDD techniques. However, planned residential development near the crossing location is likely to have a more significant impact on native upland and wetland resources. All other waterbodies consisting of various channelized and constructed drainage ways would be by open cut methods as well (see Appendix K).

Numerous wetlands are crossed by the LSr route through the Red Lake River Watershed. Several of these wetlands have been identified by MDNR as areas of high biological diversity are associated with the beach ridge zone of the Aspen Parkland. During an inventory for rare and sensitive species, Enbridge located an unlisted calcareous fen just south of MP 853.5. In consultation with MDNR, Enbridge developed a mutually accepted reroute that is expected to avoid all impacts on this sensitive resource. Unavoidable crossings of other sensitive wetlands would follow existing procedures that can be modified to minimize impacts.

All wetland impacts involving wetland conversion from forested to emergent would be mitigated under COE and Minnesota State permits, thus no permanent impacts on forested or emergent wetland resources would result from the project. Wetland type conversions resulting from permanent forest clearing would be mitigated as a permit condition attached to the federal section 404 CWA permit.

Similarly, sensitive resources (e.g., native prairie habitats) have been identified along the route and appropriate construction, erosion control, and revegetation procedures have been identified. Similar permit conditions placed on other linear projects occurring subsequent to and concurrent with the LSr Project would ensure that no permanent, cumulative impacts on wetland and other sensitive resources would result from pipeline construction.

TABLE 3.13.8-2

Cumulative Effect of Enbridge Expansion
Red Lake River Watershed, Pennington, Red Lake, and Marshall Counties, Aspen Parkland (AP) ECS

Land Cover	Current Land Use [a] (acres)	Baseline Land Use Existing Enbridge ROW [b]	Land Use in Added ROW [c] (acres)	Add'n. LSr Perm. ROW [d] (acres)	Add'n. Alberta Clipper Perm. ROW [d] (acres)	Cum Acres Perm. ROW [e] (acres)	Post Restor. (acres)[f]	Change in Land Use [g] (acres)	Change in existing land Cover (Percent)[h]
Forest	25,910	12.04	7.43	8.69	3.40	31.56	-31.56	-31.56	-0.12
Shrubland	3,060	0.47	0.18	0.24	0.15	1.04	16.82	+15.78	+0.52
Prairie/ Grassland	119,971	9.48	6.32	5.61	2.59	24.00	56.60	+15.78	+0.01
Wetland	51,590	15.26	10.17	13.34	5.57	44.34	48.21	+3.87	>0.01
Forested Wetland	16,200	0.0	0.0	1.72	2.15	3.87	-3.87	-3.87	-0.02
Agriculture	339,259	166.43	110.93	105.66	53.79	436.81	436.81	0.00	0.00
Developed	4,070	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	560,060	203.68	135.03	135.26	67.65	541.62	541.62	0.00	

[a] Aspen Parkland ECS data from table 3.13.8-1 was adjusted to include an estimated 95,080 acres of CRP (2008 Conservation Lands Summary, Minnesota Board of Soil and Water resources) that was converted from cropland to wetland (13.23 percent, 12,579 acres) and prairie/grassland (82,501 acres). An additional 1931 acres enrolled in WRP was added to the wetland acreage. Estimates determined by multiplying the acreage CRP in Pennington, Red Lake, and Polk Counties by the percentage of each county in the Aspen Parklands ECS, Red Lake River Watershed. This reduced acreage was then multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (table 3.13.8-1, see also table 3.13.8-3), with the remainder placed in the Prairie/Grassland category.

[b] Existing Enbridge right-of-way (ROW) is 125 feet in width and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge Corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the permanent easement from 75 to 125 feet in width. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge Corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easement (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easement.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreages increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land on the existing ROW from pre construction to post restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

State and County Highway Development

The MDOT and Pennington, Marshall, and Polk County staff were contacted to determine if any road construction projects were on-going or planned that could impact existing natural resources within the Red Lake River Watershed (see Appendix M). As expected, several road projects proposed for the regional corridors may have limited wetland impacts. However, projects that would occur in the future should not involve extensive widening and would not be expected to have significant associated wetland impacts unless substantial future upgrades are required for regional corridors Minnesota 31 and U.S. 59. Both roads have considerable traffic loads and are not divided highways. Wetland impacts would occur if one or both regional corridors were to be widened and converted to divided highways. Minor and major wetland impacts that would occur as a result of maintenance or high-capacity road upgrades are mitigated for using a wetlands mitigation bank developed specifically for road projects jointly by BSWR and MDOT (see Appendix M).

Residential and Commercial Development Projects

Thief River Falls is the Pennington County seat, is a regional shopping center, is at the junction of two regional transportation corridors, and is 5 miles removed from the LSr pipeline route near MP 864 where the route crosses the Red Lake River. Demographic characteristics indicate that several current and foreseeable future impacts would result from increased development in the area. For example, land immediately adjacent to the Red Lake River by the LSr pipeline crossing near MP 864.5 has been subdivided for large lot residential development. An access road has been constructed but houses have not yet been built. This subdivision, others like it, and associated commercial development in the area of Thief River Falls would likely affect considerable upland resources.

Wetland impacts are also likely to occur; however, wetland impacts for residential development would be subject to regulation under WCA and would be mitigated for at a ratio of 2:1 in Pennington County (2:1 mitigation is a requirement in Minnesota counties where less than 50 percent of their pre-contact wetlands remain).

According to BWSR records, 4.90 acres of wetland fill impacts were replaced by 9.80 acres of mitigation wetlands in 1999 for Pennington County. No wetland impacts were recorded for 2000 through 2003. However, several contacts made with the Local Government Unit by developers were recorded that resulted in avoidance of wetland impacts. It is likely that minor wetland impacts would continue in the immediate area of Thief River Falls, and that a small but unknown acreage of unprotected uplands would continue to be converted to residential and commercial use.

Flood Control Projects

Several flood control projects are planned for the Red Lake River Watershed in Pennington, Polk, and Red Lake Counties by the Red Lake Watershed District (see Appendix M). The Louisville/Parnell impoundment restored approximately 39 acres of wetland for a wetland bank in 1996. NRCS flood control activities are discussed in section 3.13.4.2. No unmitigated adverse impacts due to flood control activities are expected in the watershed. Existing flood control and proposed flood control actions would likely result in the acquisition of additional conservation easements and a resulting positive impact on associated riparian zones and wetlands adjacent to drainage ways. A substantial though unknown acreage of flood control easements within the Red Lake River Watershed is visible on alignment sheets at MP 856. It is assumed that the conservation acreage placed in reserve for flood control is included in the CRP acreage referenced in table 3.13.8-2.

Aggregate Mining

Aggregate mining in the Red Lake River Watershed is evident near milepost 853. Based on available information, no additional sand and gravel mining operations are proposed in the immediate area of the LSr Project. However, if additional projects become reasonably foreseeable actions, such projects are subject to several federal, state, and local regulations that ensure the protection of natural resources (discussed in section 3.13.7.3).

Government Conservation Programs

Extensive acreages of land in Pennington, Red Lake, and Marshall Counties within the Red Lake River Watershed have been enrolled in these programs (see table 3.13.8-3). In total, it is estimated that 95,088 acres have been enrolled in CRP land planted to native vegetation with included wetlands left undisturbed. An additional 1,931 acres of farmed wetlands have been restored under the WRP and related

state wetland preservation programs in the Aspen Parkland ECS subsection within the Red Lake River Watershed.

TABLE 3.13.8-3

Land in Conservation Easements: Red Lake River Watershed Counties in the Aspen Parkland ECS [a]

County	Total County	Watershed in ECS [b]	CRP/CREP/RIM County [c]	WRP etc. County [d]	CRP/CREP/RIM Watershed [e]	WRP etc. Watershed [e]
	acres					
Pennington	395,841	327,900	75,687	38	62,696	31.5
Red Lake	276,802	97,540	47,072	5.0	16,587	1.76
Polk	1,279,475	111,750	151,495	20,871	13,231	1,822
Marshall	1,161,204	14,610	197437	6,097	2,484	76.7
Total					95,088	1931

[a] Conservation Lands Summary Prepared 01/29/08, Minnesota Board of Soil and Water Resources.
[b] County Acres within the Red Lake River Watershed determined by GIS query. Beltrami and Clearwater Counties not included as these counties are a minor percentage of the watershed.
[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years.
[d] Wetland Reserve Program restores historically farmed/drained wetlands.
[e] Watershed acres estimated by dividing the acres in the watershed by total county acres, then multiplying by the total county acres in conservation easements.

The acreage associated with conservation programs would not be included under 1980s baseline conditions and represents a substantial positive impact on area resources that results in an increase of thousands of acres of restored wetland and grassland prairie to areas that were formerly cropland.

3.13.8.3 Cumulative Impacts

The cumulative impacts on wetland and other natural resources in the Red Lake River Watershed are similar to those discussed above. The route through the Red Lake River Watershed is virtually all agricultural but for: 1) the crossing of the Red Lake River at MP 864.3; 2) the crossing of a several drainage ways in cropped fields; and 3) the crossing of isolated pockets of aspen, emergent wetlands, and lands in CRP. Substantial acreage of CRP land is apparent on alignment sheets. Enbridge would employ HDD methods for the Red Lake River that would avoid impacts aquatic resources.

Compared to the potential impacts on upland resources involving agriculture, the cumulative impacts of current and reasonably foreseeable actions (including the LSr Project) are relatively minor as they are subject to current environmental regulations that require a detailed inventory of sensitive resources, an assessment of alternatives that would avoid impacts on the resources (avoidance), minimization of unavoidable impacts, and mitigation of unavoidable impacts. Reasonably foreseeable actions include:

- Potential adverse impacts due to: 1) planned highway maintenance and expansion; 2) potential flood control projects; 3) development of wind power; and 4) additional residential and industrial development are not expected in the Red Lake River Watershed due to regulation and mitigation for any flood control and road projects that would occur (see Appendix M), demographics, and the marginal nature of wind resources. However, extensive development of regional retail centers that could result in impacts on resources through increases in residential and commercial development are expected in the area of

Thief River Falls. Extensive upgrades to the regional corridors Minnesota 32 and U.S. 59 are not expected or planned, but could reasonably happen in the future. Mitigation for road maintenance, regional corridor upgrades, and other state highway maintenance would be mitigated for under WCA.

- LSr Project impacts would be similar to those described in section 3.13.7.3 for the Snake River Watershed. The Red Lake River would be crossed by horizontal direction drill techniques, avoiding adverse impacts on these resources. Some forested wetland and upland would be impacted during wetland crossings. Remaining resources are agricultural, and no native upland or wetland forests would be impacted.

The majority of the impacts of current and reasonably foreseeable actions to wetland and natural habitat resources in the Red Lake River Watershed in Minnesota are neutral-to-positive due to: 1) demographics and land use; 2) the dominantly agricultural nature of the county and the availability of conservation programs; and 3) the relative lack of sensitive natural resources and forested lands.

Because few impacts on forested riparian resources are expected, and mitigation for these impacts would be mitigated as a permit condition, fragmentation of riparian forest resources would be minimal. In addition, Enbridge is proposing to provide forested and shrub plantings at appropriate locations within the riparian areas of the right-of-way that would further mitigate fragmentation of riparian forests.

3.13.8.4 Cumulative Impacts on Identified Sensitive Resources Potentially Affected by the LSr Project

The majority (436.81 acres) of the LSr Project in the Red Lake River Watershed in Pennington, Red Lake, and Marshall Counties traverses agricultural land. Of the remaining land uses, 31.6, 1.0, 24.0, 44.3, and 3.9 acres are in forest, shrubland, prairie/grassland, wetland, and forested wetland, respectively. The following sensitive resources within the Red Lake River Watershed in Pennington County that are currently in native vegetation have been identified by Enbridge in consultation with various state and federal agencies: Crossing of the Red Lake River (MP 864.3); construction near a calcareous fen (MP 853.5); construction within a wetland identified as having high biological diversity from MP 853.0 to MP 853.3; and upland and riparian forest impacts.

Red Lake River Crossing

The Red Lake River crossing (MP 864.3) is characterized by the presence of Minnesota State Highway 32 to the west, a belt of riparian wetland forested on both sides of the river, and the presence of a planned residential development on the east bank. The Red Lake River crossing would be by HDD methods discussed elsewhere that would avoid impacts on existing riparian upland and forested wetland and upland.

The immediate area of the crossing is highly developed and impacted by the presence of a regional road corridor and a planned subdivision. Cumulative impacts on the riparian environment near the crossing are expected to occur in the future primarily as a result of residential development and potential road corridor upgrades as opposed to the construction of the LSr pipeline.

Construction Near a Calcareous Fen, MP 853.5

During a due diligence review of the proposed construction right-of-way for wetland resources, sensitive plant communities and rare plant species, Enbridge located a wetland that would meet current Minnesota State criteria for Calcareous Fens that are protected under state statute. During consultations

with the MDNR, Enbridge developed a mutually acceptable reroute that is expected to avoid all impacts on this new, protected fen listing.

Construction within a Wetland with High Biological Diversity from MP 853.0 to MP 853.3

MDNR has identified a wetland located between MP 853.0 and MP 853.3 as having high biological diversity that must be considered during pipeline construction. Avoidance of this area is not indicated as it would potentially create additional disturbance to subsurface sediments that may be delivering groundwater to the wetland in question or other nearby wetland features.

The LSr pipeline would cross the northern portion of the subject wetland that is characterized as a shrub carr with high biological diversity. Enbridge would collaborate with MDNR to develop a mutually acceptable crossing plan that represents the least environmentally damaging practicable alterative for this particular resource. Alternatives could include but not be limited to employing special mats to minimize soil disruption and timing of construction.

Upland Forest Impacts

The presence of small aspen groves embedded in a prairie matrix originally characterized the Aspen Parkland ECS. The existing Enbridge route would traverse several aspen groves in the Red Lake River Watershed that have been bisected by previous pipeline construction. All of these non-riparian forested uplands exist as discrete, isolated patches of aspen within an agricultural matrix that have been squared off and modified by clearing for agricultural purposes. It is expected that the construction of the LSr Project would increase the width of cleared right-of-way by 75 feet (from 125 to 200 feet in width). Given the small size of the forested areas and their presence as features embedded within an agricultural matrix, the effects of increasing the width of the cleared area by a minor amount is expected to be negligible.

3.13.9 Cumulative Impacts Analysis: Clearwater River Watershed (Minnesota)

3.13.9.1 Environmental Character, Pre-settlement, and Baseline Conditions

Physiography

The Clearwater River Watershed is located in the northwestern portion of the state in Red Lake, Polk, Clearwater, Pennington, Mahnomen, and Beltrami Counties though the majority of the watershed is contained within Red Lake, Polk, and Clearwater Counties. The watershed covers approximately 1,370 square miles. The proposed pipeline would cross the Clearwater River Watershed for approximately 35.5 miles, and is contained within the Aspen Parkland ECS subsection in Red Lake and Polk Counties (22.2 miles), and the Hardwood Hill ECS subsection in Polk and Clearwater Counties (13.2 miles) (see table 3.13.3-1, figure 3.13.1-1, Appendix M). The watershed is extremely diverse ecologically, and also contains portions of the Chippewa Plains and Agassiz Lowlands ECS subsections (see figure 3.13.1-1).

Given: 1) the large size of the Clearwater River Watershed; 2) the presence of the route solely within the Aspen Parkland and Hardwood Hills ECS subsections; and 3) the large distance separating the proposed LSr Project route from the Lake Agassiz Lowland and Chippewa ECS subsections, the following discussion would address cumulative impacts within the Aspen Parkland and Hardwood Hills ECS subsections that contain the proposed LSr Project. Marschner Map historic land cover data was compared to GAP land use data for each ECS subsection and the whole watershed in table 3.13.9-1.

The Aspen Parkland ECS in Minnesota

The general nature of the Aspen Parkland ECS portion of the Clearwater River Watershed is similar to that discussed in section 3.13.8.1 for the Snake River Watershed (see also Appendix M). The majority (22.2 miles) of the LSr route through the Clearwater River Watershed traverses the eastern portion of the Aspen Parklands consisting of a rolling till plan with isolated areas of outwash and lacustrine plains. The project route crosses the Clearwater River and the Lost River at MP 875.5 and MP 885.9, respectively.

Analysis of pre-settlement and baseline conditions indicates that the portion of the Clearwater River Watershed within the Aspen Parkland ECS was historically a combination of prairie (20 percent), shrubland (33 percent), forest (12 percent), and emergent and forested wetland (31 and 4 percent, respectively) (see table 3.13.9-1). However, only 6.2, 0.9, 10.1, 9.9, and 3.3 percent of the baseline condition acreage was in forest, shrubland, prairie, wetland, and forested wetland, respectively (see table 3.13.9-1). The Aspen Parklands ECS within the Clearwater River Watershed had been converted to 69 percent agricultural land by the 1980s.

The Hardwood Hills ECS

The Hardwood Hills ECS subsection contains the last 13.2 miles of LSr route and is entirely contained within Polk and Clearwater Counties (see table 3.13.3-1). Steep slopes, high hills, and lakes formed in glacial end-moraines characterize this subsection. Pre-settlement vegetation consisted of maple-basswood forests interspersed with isolated pockets of oak savanna and tallgrass prairie. The most important current land use is agriculture and tourism near areas with high numbers of lakes.

The largest difference between the Aspen Parkland ECS subsection and the Hardwood Hills is the dominance of agriculture (69 vs. 58 percent) and the dominance of pre-settlement forest and shrubland in the Hardwood Hills (66 and 22 percent, respectively). Prairie was a minor (2.6 percent) component of the Hardwood Hills ECS. Though a considerable acreage has been converted to agriculture, the Hardwood Hills has retained more than three times the forest acreage when compared to the Aspen Parkland (see table 3.13.9-1).

Current land-use data shows that approximately 75 percent of the historic forest and 92 percent of shrubland has been converted to agriculture (see figures 3.13.2-1 and 3.13.2-2, table 3.13.9-1). The data indicate an increase in wetland percentage, likely due to the poor resolution of the Marschner data set at capturing small wetlands in forested areas. GAP data and NWI data compare favorably; however, the NWI indicates more wetland than the GAP estimates.

Demographics

The 35.5 miles of LSr route through the Clearwater River Watershed in Minnesota traverses Red Lake (13.0 miles), Polk (13.5 miles), and Clearwater (9.0 miles) Counties, with the majority in Red Lake and Polk Counties (see table 3.13.1-1). Red Lake County is rural with a total estimated 2005 populations of 4,317 and a 2000 population of 4,299 people indicating a relatively stable, slightly increasing population (U.S. Census Bureau). Cities and towns include Brooks, Oklee, Plummer, and Red Lake Falls. U.S. 2 and U.S. 59 are regional corridors that require periodic upgrades to accommodate increased regional traffic (MDOT Statewide Transportation Plan, August 2003). Red Lake County does not have any regional trade centers.

TABLE 3.13.9-1

**Comparison of Pre-Settlement [a] versus Baseline [b] Environmental Conditions
Clearwater River Watershed – Minnesota**

	Pre-Settlement		Baseline		
ECS Subsection /Land Use	Pre-Settlement Acreage (thousands)	Relative Percentage for Watershed	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for ECS	Percentage Change Pre-Settlement to Baseline
Aspen Parklands					
Forest	47.20	12.54	23.37	6.21	-6.33
Shrubland	123.24	32.74	3.53	0.94	-31.8
Prairie	74.62	19.82	37.88	10.06	-9.76
Wetland	116.68	31.00	37.33	9.91	-21.09
Forested Wetland	14.67	3.90	12.38	3.29	-0.61
Agricultural	0.00	0.00	258.94	68.79	+68.79
Developed	0.00	0.00	2.97	0.79	0.79
Subtotal	376.41	100	376.41	100	
GAP Emergent Wetland			*22.23*[d]		
GAP Forested Wetland			*10.26*[d]		
Hardwood Hills					
Forest	207.21	65.86	50.69	16.11	-49.75
Shrubland	69.67	22.15	5.68	1.81	-20.34
Prairie	8.30	2.64	15.67	4.98	2.34
Wetland	14.38	4.57	36.35	11.55	+6.98
Forested Wetland	15.03	4.78	17.20	5,47	+0.69
Agricultural	0.00	0.00	185.02	58.82	58.82
Developed	0.00	0.00	3.97	1.26	1.26
Subtotal	314.62	35.88	314.57	100	
GAP Emergent Wetland			*33.93*[d]		
GAP Forested Wetland			*10.46*[d]		

[a] Pre-settlement land cover distribution determined using the Marschner Native Vegetation Map.

[b] Land Use determined using GAP Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute NWI acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie/agriculture and upland forest for emergent and forested wetlands, respectively.

[d] GAP photography late 1980s slightly underestimates both emergent and forested wetlands when compared to NWI estimates.

Polk County is dominantly rural with an estimated 2005 population of 31,133, a decrease of 1 percent when compared to the 2000 population of 31,369. Crookston, East Grand Forks, Fosston, and Fertile are the major population centers. Grand Forks/East Grand Forks and Crookston are regional trade centers. The county has a medium priority, interregional corridor (U.S. 2) and two regional corridors (U.S. 59 and Minnesota 32) that require periodic upgrades to accommodate increased regional traffic (MDOT Statewide Transportation Plan, August 2003). The county is extremely large (1,998 square miles). The majority of the population is found on the western portion of the county; however, the LSr Project traverses the sparsely populated northeastern portion of the county. The closest large town is Fosston (population 1,575).

Clearwater County is dominantly rural with an estimated 2005 and 2000 population estimates of 8,476 and 8,423, respectively indicating a relatively stable population. Dominant industries are agriculture and tourism associated with the area's forests and lakes. No regional trade centers are located in Clearwater County. Bagley and Clearbrook are the major towns. The county has one major medium priority interregional corridor (U.S. 2) (MDOT Statewide Transportation Plan, August 2003).

3.13.9.2 Current and Reasonably Foreseeable Projects

The LSr Project would cross the Clearwater River Watershed from MP 851.6 to MP 873.9 for a total of 35.5 miles. The majority of LSr pipeline right-of-way in the Clearwater River Watershed would be located in existing agricultural land; however, extensive areas of wetland, forested wetland, and CRP land would be crossed as well. Table 3.13.9-2 summarizes existing land use estimates and cover-types for the Aspen Parklands and Hardwood Hills ECS component of the Clearwater River Watershed and contrasts those features to the incremental effect of the proposed Enbridge pipelines.

No wetlands would be filled during or after construction of the project. However, temporary impacts would occur to wetland and upland resources (including agriculture) during construction. The Aspen Parkland portion of the route would cross relatively more agricultural and forested wetland compared to the Hardwood Hills portion. Approximately 1.6 and 1.2 acres of forested wetlands would be converted to emergent wetlands as a result of LSr Project construction in the Aspen Parklands and Hardwood Hills ECS subsections, respectively. Similarly, 45.2 and 17.6 acres of upland forest (62.8 acres total) would be converted to upland and shrubland by construction in the Aspen Parklands and Hardwood Hills ECS subsections, respectively. Aspens are known to propagate vegetatively and by seed and are expected to rapidly revegetate cleared upland areas that are not maintained. Forested conditions are expected to return to cleared areas within the temporary workspace over time as the temporarily affected portions of the corridor naturally re-vegetate. Conversion of forested to prairie (50 percent assumed) and shrubland (50 percent assumed) is reflected in increases in these cover categories in table 3.13.9-2.

Substantial waterbody crossings include the Clearwater River and Lost River at approximate MP 874.5 and MP 885.9. Silver Creek meanders through a large wetland complex between mileposts 906.0 and 906.7 and is crossed four times between MP 907.1 and 907.7. Crossing at the Clearwater River, Lost River, and Silver Creek would be accomplished by the dam-and-pump method. All other waterbodies consisting of various channelized and constructed drainage ways would be by open cut method (see Appendix K).

All wetland impacts would be mitigated under COE and Minnesota State permits, no permanent impacts on forested or emergent wetland resources would result from the project. Unavoidable crossings of other sensitive wetlands would follow existing procedures that can be modified to minimize impacts. Wetland type conversions resulting from permanent forest clearing would be mitigated as a permit condition attached to the federal section 404 CWA permit.

Similarly, sensitive resources (e.g., native prairie habitats) have been identified along the route and appropriate construction, erosion control, and revegetation procedures have been identified. Similar permit conditions placed on other linear projects occurring subsequent to and concurrent with the LSr Project would ensure that no permanent, cumulative impacts on wetland and other sensitive resources would result from pipeline construction.

TABLE 3.13.9-2

Cumulative Effect of Enbridge Expansion
Clearwater River Watershed, Red Lake, Polk, and Clearwater Counties, Aspen Parkland (AP) and Hardwood Hills ECS

Land Cover	Current Land Use [a] (acres)	Baseline Land Use Existing Enbridge ROW [b]	Land Use in Added ROW [c] (acres)	Add'n. LSr Perm. ROW [d] (acres)	Add'n. Alberta Clipper Perm. ROW [d] (acres)	Cum Acres Perm. ROW [e] (acres)	Post Restor. (acres)[f]	Change in Land Use [g] (acres)	Change in existing land Cover (Percent)[h]
Aspen Parklands									
Forest	23,370	15.60	10.41	12.60	6.59	45.20	-45.20	-45.20	-0.19
Shrubland	3,530	1.05	0.70	0.85	0.58	3.18	25.78	+22.60	+0.64
Prairie/ Grassland	72,369	17.14	11.42	10.75	5.21	44.52	67.12	+22.60	+0.03
Wetland	49,649	35.51	23.68	22.40	10.21	91.80	93.40	+1.60	+0.01
Forested Wetland	12,380	0.23	0.15	0.82	0.40	1.60	-1.60	-1.60	-0.01
Agriculture	212,142	132.06	88.05	86.46	44.05	350.62	350.65	0.00	0.00
Developed	2,970	1.43	0.96	0.71	0.35	3.45	3.44	0.00	0.00
Subtotal	376,410	203.02	135.37	134.59	67.39	540.4	540.4	0.00	
Hardwood Hills									
Forest	50,690	7.35	4.89	3.41	1.96	17.60	-17.60	-17.60	-0.03
Shrubland	5,680	4.50	3.00	3.06	1.42	11.98	20.78	+8.8	+0.15
Prairie/ Grassland	38,854	5.58	3.72	4.36	2.51	16.17	24.97	+8.8	+0.02
Wetland	40,213	14.38	9.59	9.79	4.98	38.73	39.94	+1.21	<0.01
Forested Wetland	17,200	<0.01	<0.01	0.61	0.59	1.21	-1.21	-1.21	-0.01
Agriculture	157,963	83.76	55.85	54.84	26.53	220.9	220.9	0.00	0.00
Developed	3,970	5.16	3.44	4.61	2.37	15.59	15.59	0.00	0.00
Subtotal	314,570	120.74	80.49	80.68	40.36	322.2	322.2	0.00	
Total	691,030	323.80	215.87	215.20	107.74	862.6	862.6		

[a] Aspen Parkland and Hardwood Hills ECS data from table 3.13.9-1 was adjusted to include an estimated acres of CRP (2008 Conservation Lands Summary, Minnesota Board of Soil and Water resources) that was converted from cropland to wetland (23.2 percent, 10,447 acres; 3.38 percent, 823 acres) and grassland (34,489; 23,184 acres) for the Aspen Parklands and Hardwood Hills ECS, respectively. Additional acres enrolled in WRP were added to the wetland acreage (see table 3.13.9-3). Estimates determined by multiplying the acreage CRP in Red lake, Polk, and Clearwater Counties by the percentage of each county in the Aspen Parklands and Hardwood Hills ECS, Clearwater River Watershed. This reduced acreage was then multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see table 3.13.9-1, see also table 3.13.9-3), with the remainder placed in the Prairie/Grassland category.

[b] Existing Enbridge right-of-way (ROW) is 125 feet in width and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge Corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the permanent easement from 75 to 125 feet in width. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge Corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easement (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easement.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and Shrubland acreage increases where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land on the existing ROW from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

MinnCan Crude Oil Pipeline Project

Minnesota Pipeline Company is currently constructing a new, underground crude oil pipeline between an existing Flint Hills tank farm located at Clearbrook, Minnesota and an existing Flint Hills refinery located in Rosemount, Minnesota (south of St. Paul). The project entails approximately 300 miles of pipeline, of which the northern 119 miles would parallel existing Minnesota Pipeline Company rights-of-way. The remaining 181 miles of pipeline route would be constructed on new rights-of-way. A map illustrating the proposed route of the MinnCan Pipeline is provided on figure 3.13.3-2. Construction of the MinnCan pipeline is scheduled to occur in 2007 with an estimated in-service date of 2008.

The proposed MinnCan pipeline route does not intersect the Enbridge pipeline system or the LSr Project area, except that the point of origin for the proposed MinnCan pipeline is located in close proximity to the Enbridge pipeline system and Enbridge's existing Clearbrook Terminal. Although the northernmost portion of the MinnCan project would be constructed near the proposed LSr Project route, the pipelines would not be constructed concurrently. MinnCan is scheduled to be constructed in 2007 while the LSr Project is planned to be constructed in 2008, after the MinnCan right-of-way has been restored. Both projects are proposing to implement effective soil erosion and sediment control Best Management Practices and to stabilize and revegetate the respective rights-of-way following construction. Both projects would be mitigating forested wetland impacts as a permit condition negotiated with the St. Paul District COE. However, there would be potential impacts on upland forested areas that are converted to grassland/shrubland.

State and County Highway Development

The MDOT and Red Lake, Polk, and Clearwater County staff were contacted to determine if any road construction projects were on-going or planned that could impact existing natural resources within the Clearwater River Watershed. Detailed information was collected and is provided in Appendix M. As expected, several road projects proposed for the regional corridors may have limited wetland impacts. Projects that would occur in the future should not involve extensive widening and would not be expected to have significant associated wetland impacts unless substantial future upgrades are required for regional corridors U.S. 2. U.S. 2 is a divided highway and is not expected to be widened further. Minor and major wetland impacts that would occur as a result of maintenance or major capacity road upgrades are mitigated for using a wetlands mitigation bank developed specifically for road projects jointly by BWSR and MDOT (see Appendix M).

Residential and Commercial Development Projects

The Aspen Parkland and especially the Hardwood Hills ECS subsections within the Clearwater River Watershed contain valuable recreational lands that could be developed into recreational residences. Wetland impacts for residential development would be subject to regulation under the Minnesota Wetland Conservation Act and would be mitigated for at a ratio of 2:1 in Polk and Red Lake Counties and 1:1 in Clearwater County (2:1 and 1:1 mitigation are requirements in Minnesota counties where less than 50 percent and greater than 80 percent of their pre-contact wetlands remain, respectively).

According to BWSR records, 0.5, 11.5, 0.6, and 0.96 acres of wetland fill impacts were replaced at a mitigation ratio of 1:1 in 2000, 2001, 2002, and 2003, respectively, for Clearwater County. Similarly, 0.18 acres were replaced in Polk County at a mitigation ratio of 1.2:1 in 2003. No wetland impacts were recorded for 1999 through 2003 for Red Lake County. The higher mitigated drain/fill activity in Clearwater County is likely due to vacation home and residential developments. It is likely that minor wetland impacts would continue in Clearwater County and that a small but unknown acreage of unprotected uplands would continue to be converted to residential and commercial use.

One industrial project was identified in the Clearwater River Watershed (see Appendix M). This project involves the construction of an ethanol production facility on 269 acres near Erskine approximately 10 miles southwest of the proposed LSr Project route. No wetland impacts are projected, and the facility proponents have prepared an Environmental Assessment with the MPCA and the Polk County Planning and Zoning Office.

Flood Control Projects

Flood control projects are few in the Clearwater River Watershed due to less acreage in intensive agricultural use and the rolling nature of the landscape (see Appendix M). Two dam projects have been constructed for flood control, both in 1981 (see Appendix M). No unmitigated adverse impacts due to flood control activities are expected in the watershed. Existing flood control and proposed flood control actions would typically be associated with local NRCS activities and would likely result in the acquisition of additional conservation easements and a resulting positive impact on associated riparian zones and wetlands adjacent to drainage ways. It is assumed that any conservation acreage placed in reserve for flood control is included in the CRP acreage referenced in table 3.13.9-2.

Government Conservation Programs

Extensive acreages of land in Red Lake, Polk, and Clearwater Counties within the Clearwater River Watershed have been enrolled in conservation programs (see table 3.13.9-3). Polk County has been the most active county in the watershed regarding conservation program enrollments, with Clearwater County having the least amount of acres enrolled, likely due to the lower amount of agricultural acreage and the nature of the farming practices.

TABLE 3.13.9-3

Land in Conservation Easements: Clearwater River Watershed Counties in the Aspen Parkland and Hardwood Hills ECS [a]

County/ECS	Total County Acres	Watershed Ac. in ECS [b]	CRP/CREP/RIM County [c]	WRP etc. County [d]	CRP/CREP/RIM Watershed [e]	WRP etc. Watershed [e]
	acres					
Aspen Parkland						
Red Lake	276,802	179,130	47,072	5.0	30,462	3.2
Polk	1,279,475	114,600	151,495	20,871	13,569	1,869
Clearwater	659,048	51,060	11,684	0.0	905	0.0
Total					44,936	1872
Hardwood Hills						
Polk	1,279,475	186,370	151,495	20,871	22,060	3,040
Clearwater	659,048	109,840	11,684	0.0	1,947	0.0
Total					24,007	3,040

[a] Conservation Lands Summary Prepared 01/29/08, Minnesota Board of Soil and Water Resources.

[b] County Acres within the Clearwater River Watershed determined by GIS query. Pennington, Mahnomen, and Beltrami Counties not included as these counties are a minor percentage of the watershed (table 3.13.3-1).

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years.

[d] Wetland Reserve Program restores historically farmed/drained wetlands.

[e] Watershed acres estimated by dividing the acres in the watershed by total county acres, then multiplying by the total county acres in conservation easements.

In total, it is estimated that 68,943 acres have been enrolled in CRP land planted to native vegetation with included wetlands left undisturbed. An additional 4,912 acres of farmed wetlands have been restored under the WRP and related state wetland preservation programs.

The acreage associated with Conservation Programs would not be included under 1980s baseline conditions and represents a substantial positive impact on area resources that results in an increase of thousands of acres of restored wetland and grassland prairie to areas that were formerly cropland.

3.13.9.3 Cumulative Impacts

The cumulative impacts on wetland and other natural resources in the Clearwater River Watershed are somewhat different compared to the other watersheds as a result of a higher percentage of the land in forest, less agricultural land and less intensive agriculture, generally greater acreage of wetlands, and increasing recreational development. Drainage of wetlands has been less of a factor in the Clearwater River Watershed than in the other watersheds discussed in this Analysis. According to BWSR, Clearwater County has greater than 80 percent of its pre-settlement wetlands remaining. While substantial acreage of CRP land is apparent on alignment sheets in the Aspen Parkland especially associated with Polk County, less is evident in Clearwater County.

The proposed LSr Project would have no fill impacts, but would convert forested upland and wetland to shrub and grassland, and emergent wetland, respectively. Several waterbodies are proposed to be crossed using dam and pump and open-cut wet trench methods that would have some potential to temporarily increase erosion and sedimentation in the crossed waterbodies. However, the project would employ full erosion controls as indicated in the EMP and CECP (see Appendices D and J) to minimize any impacts on the crossed waterbodies.

Compared to the potential impacts on upland resources involving agriculture, the cumulative impacts of current and reasonably foreseeable actions (including the LSr Project) are relatively minor as they are subject to current environmental regulations that require a detailed inventory of sensitive resources, an assessment of alternatives that would avoid impacts on the resources (avoidance), minimization of unavoidable impacts, and mitigation of unavoidable impacts. Reasonably foreseeable actions include:

- Potential adverse impacts due to: 1) planned highway maintenance and expansion; 2) potential flood control projects; 3) and additional residential and industrial development are not expected in the Clearwater River Watershed due to regulation and mitigation for any wetland impacts that would occur (see Appendix M). Extensive upgrades to U.S. 2 are not expected or planned. Mitigation for road maintenance, regional corridor upgrades, and other state highway maintenance is would be mitigated for under WCA.

- LSr Project impacts are discussed in section 3.13.9.1. All waterbody crossings would be by dam and pump and open-cut wet trench methods. Some forested wetland and upland would be impacted during these wetland crossings.

3.13.9.4 Cumulative Impacts on Identified Sensitive Resources Potentially Affected by the LSr Project

Even though less agricultural land is contained within the Clearwater Watershed, the majority of the LSr Project in the Clearwater River Watershed in Red Lake, Polk, and Clearwater Counties traverses agricultural land. In the Aspen Parkland, 350.6 of the total 540.4 acres within the LSr Project right of way are in agriculture. Of the remaining land uses, 45.2, 3.8, 44.5, 91.8, and 1.6 acres are in forest,

shrubland, prairie, wetland, and forested wetland, respectively. In the Hardwood Hills, 221 of 322 total acres within the LSr Project right-of-way are in agriculture. Of the remaining land uses, 17.6, 12.0, 16.2, 38.7, and 1.2 acres are in forest, shrubland, prairie, wetland, and forested wetland, respectively.

The following sensitive resources within the Clearwater River Watershed in Red Lake, Polk, and Clearwater Counties that are currently in native vegetation have been identified by Enbridge in consultation with various state and federal agencies: Crossings of the Clearwater and Lost Rivers, and Silver Creek, and upland and wetland forest impacts.

River Crossings

The Clearwater and Lost Rivers, and Silver Creek crossings are proposed for dam and pump construction that can: 1) temporarily degrade water quality during construction; 2) impact channel and banks stability during construction; and 3) impact adjacent riparian forested areas (see section 3.4.1.1).

For the Clearwater and Lost Rivers and Silver Creek, Enbridge has proposed the dam and pump methods as appropriate given the small size of the waterbody crossings, the nature of the adjacent land, and the lack of sensitive adjacent resources. Additional mitigation measures are discussed in section 3.4.1.

Upland and Riparian Forest Impacts

The presence of small aspen groves embedded in a prairie matrix originally characterized the Aspen Parkland ECS. The existing Enbridge LSr route would traverse several aspen groves in the Clearwater River Watershed that have been bisected by previous pipeline construction. All of these non-riparian forested uplands exist as discrete, isolated patches of aspen within an agricultural matrix that have been squared off and modified by clearing for agricultural purposes.

Similarly, riparian forested areas adjacent to the existing right-of-way would be cleared during construction and maintained in an emergent condition. Enbridge has proposed several mitigation measures discussed in section 3.4.3.2 that include minimizing impacts during construction, appropriately restoring contours and wetland function to pre-construction levels. In the case where permanent conversion of forested to emergent conditions is unavoidable, Enbridge has proposed a suite of mitigation measures to be evaluated and selected in consultation with the St. Paul District of the COE at a mutually agreed upon mitigation ratio. Such mitigation measures could include wetland restoration, rehabilitation, creation, enhancement, and wetland mitigation bank purchase.

3.13.10 Conclusions

Cumulative impacts resulting from the proposed LSr Project and other current and reasonably foreseeable actions would have a negligible impact on wetland and upland resources.

General Characteristics

1. The area of potential impact (i.e., the watersheds and constituent ECS subsections) is dominantly rural with stable or declining populations. With the exception of the Thief river Falls area in the Red Lake River Watershed, significant increases in residential or industrial development are unlikely and those projects with the potential to introduce substantial impacts would generally be subject to sequencing and mitigation under WCA (Minnesota), the Swampbuster provisions of the current Farm Bill, the wetland regulation provisions of section 401 and 404 of the CWA, and NEPA review.

2. Current regulations generally conform to a sequencing procedure that involves an analysis of sensitive natural features, avoidance of impacts on the degree practicable, minimization of unavoidable impacts, and mitigation for unavoidable impacts in order for a project to be permitted.

3. When compared to baseline conditions, conservation programs have successfully resulted in a very substantial increase in the acreage of upland and wetland that has been restored to native habitats.

4. The most important reasonably foreseeable action with the potential to adversely affect natural environments in the area of potential impact would be a decline in the enrollment in conservation programs that have resulted in dramatic increases in restored lands.

Project-Specific Characteristics

1. Pipeline construction results in temporary impacts on agricultural, wetland and upland natural resources during construction.

2. Pipeline construction does not upgrade existing infrastructure that would result in additional residential and industrial development pressures in the area of construction.

3. Lands impacted by pipeline construction are subject to mitigative procedures during construction that are designed in consultation with applicable state and federal agencies to avoid and minimize construction-related impacts.

4. These procedures include but are not limited to outright avoidance, appropriate erosion control, turbidity controls in waterbodies crossed by open cut methods, the use of horizontal directional drilling methods to avoid impacts on sensitive waterbodies, right-of-way width and construction-traffic limitations in wetlands, and the use of mats to minimize disturbance in wetlands.

5. Post-construction restoration includes procedures to return the affected land to its pre-construction character.

6. Post-construction restoration procedures include topsoil segregation in wetlands and agricultural uplands, returning the land to its original contour, decompaction in agricultural land, planting of appropriate cover crops that minimize erosion, and specific planting of NRCS-approved native cover in CRP and other conservation lands.

7. Permanent impacts result from the requirement for brushing maintenance to clear the area immediately above the pipeline. A small amount of forested upland may be converted to agricultural land or grassland. The amount that may be converted is less than 4 percent of the total amount of land affected by the pipeline. Impacts on forested wetlands are mitigated as a permit condition.

8. In certain settings, fragmentation resulting from clearing of forested land may occur. In consultation with agencies, Enbridge is developing procedures to mitigate and minimize.

4.0 CONCLUSIONS

This EA is based on information provided by Enbridge and includes the results of literature reviews, field surveys, agency consultations, and public scoping. Mitigative measures include those provided by consulted agencies, widely accepted industry standards, public input, and Enbridge's construction, operation, mitigation and restoration methods and environmental protection measures. These measures would be implemented on all lands (public and private) unless specific exceptions are stated. Individual landowners may include other specific construction and restoration requirements in right-of-way agreements with Enbridge.

Enbridge would acquire necessary federal, state, and local permits, approvals, and authorizations necessary to construct and operate the Enbridge system, regardless of whether these permits and approvals are listed. Based on these assumptions, the proposed LSr Project would result in limited adverse environmental impacts during both construction and operation and would be an environmentally acceptable action.

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