

National Energy
Board



Office national
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5 June 2012

To: All Parties to the OH-005-2011 Proceeding

**Enbridge Pipelines Inc. (Enbridge) Line 9 Reversal Phase I Project (Project)
Application under section 58 of the *National Energy Board Act* (NEB Act)
Hearing Order OH-005-2011
Draft Environmental Screening Report (ESR)**

On 5 December 2011, the National Energy Board (Board) issued Hearing Order OH-005-2011, convening a public hearing to assess Enbridge's proposed Project. As part of its responsibilities under the *Canadian Environmental Assessment Act* (CEA Act), the Board initiated an environmental assessment of the Project. Pursuant to paragraph 15 of Procedural Update No. 2, issued 27 February 2012, the Board has prepared the attached draft ESR for public review and comment.

Comments on the draft ESR must be filed with the Board and served on Enbridge no later than **noon, Calgary time, on 19 June 2012**. Comments may be filed with the Board either electronically or by facsimile at 403-292-5503 (toll-free 1-877-288-8803). Comments can be served on Enbridge either electronically via the Board's website or by facsimiles sent to Enbridge at 403-767-3863.

Enbridge may file comments with the Board and serve a copy on any Parties who have filed comments no later than **noon, Calgary time, on 22 June 2012**.

The Board will consider submissions on the draft ESR in completing its final ESR and in reaching its determination under the CEA Act.

The draft ESR is also available on the Board's website at www.neb-one.gc.ca. Click on *View* under *Regulatory Documents* and then on *Quick Links*. Click on *Enbridge Pipelines Inc. – Application for Line 9 Phase I Project (OH-005-2011)* and then on the folder called *Environmental Screening Report*.

If you have any questions about the above information, please contact Jessica Lim, Legal Counsel, at 403-299-3170, or through the Board's toll-free number at 1-800-899-1265.

Yours truly,

For
Sheri Young
Secretary of the Board

Attachment: Draft ESR

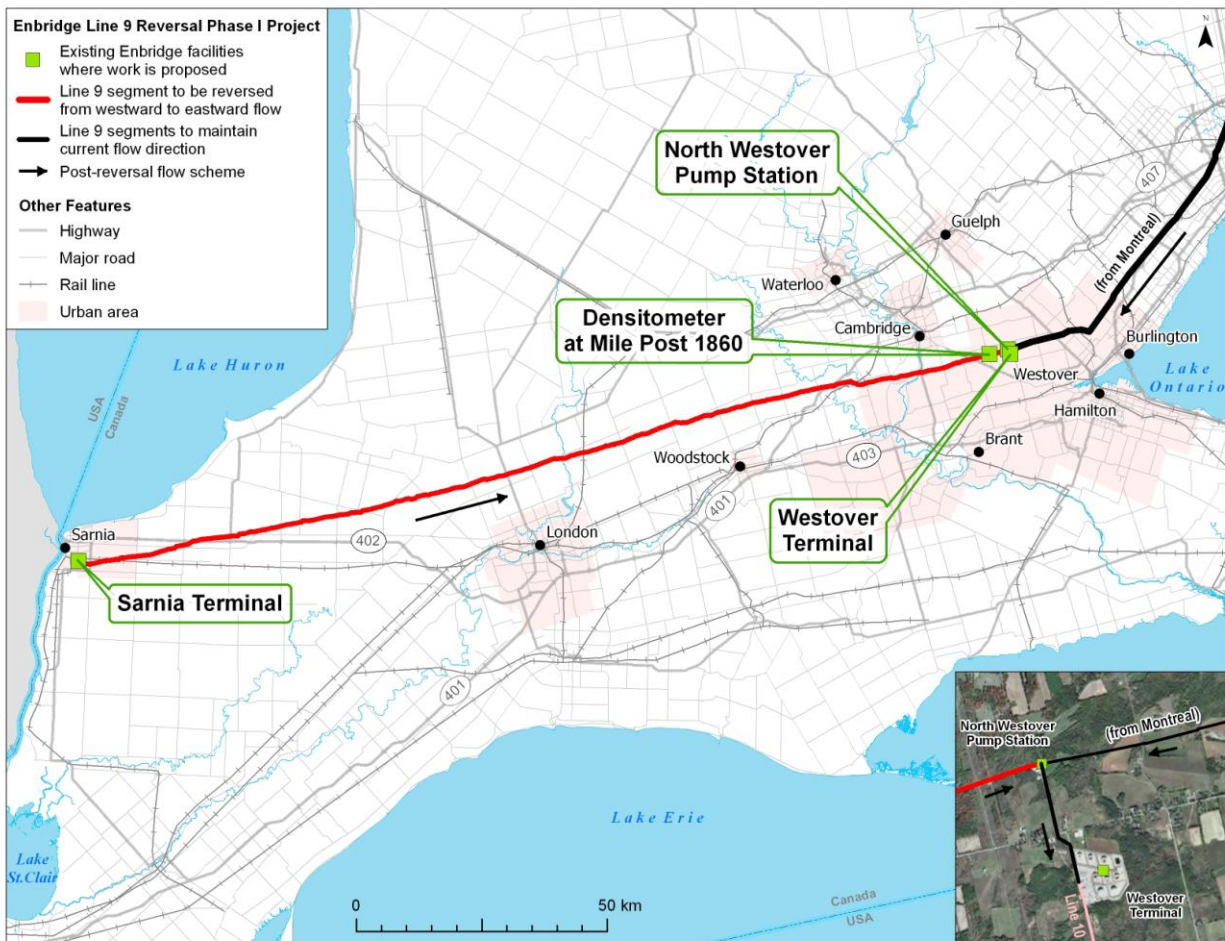


DRAFT ENVIRONMENTAL SCREENING REPORT

Pursuant to the *Canadian Environmental Assessment Act* (CEA Act)

Line 9 Reversal Phase I Project

Applicant Name:	Enbridge Pipelines Inc. (Enbridge)	CEA Act Registration Date:	19 August 2011
Application Date:	8 August 2011	Canadian Environmental Assessment Registry Number:	11-01-63658
National Energy Board File Number:	OF-Fac-Oil-E101-2011-01 01	CEA Act Determination Date:	To be determined
CEA Act Law List Trigger(s):	Subsection 58(1), <i>National Energy Board Act</i>		



SUMMARY

This report is a draft Environmental Screening Report (ESR) under the *Canadian Environmental Assessment Act* (CEA Act) for the Line 9 Reversal Phase I Project (the Project), as applied for by Enbridge Pipelines Inc. (Enbridge) on 8 August 2011. Once complete, the Project would enable crude oil to flow eastward within Enbridge's existing Line 9 between its Sarnia Terminal (SA) and North Westover Pump Station (NW), for delivery to Westover Terminal (WT). Currently, this segment of Line 9 flows westward.

The Project includes the infrastructure additions and modifications (related to pumps, piping, valves, densitometers, a pig trap) at four existing fenced and graveled sites along Line 9 (SA, NW, WT and at a densitometer site 4.12 kilometres west of NW). A new electrical building would also be installed at WT. All construction work would be completed on existing Enbridge facilities and surface leases with no planned ground disturbances along the Line 9 right-of-way itself.

The National Energy Board (Board or NEB) is the Federal Environmental Assessment Coordinator for this Project. In this role, the NEB coordinated the involvement of federal departments with an interest in the Project. No other Responsible Authorities were identified. Environment Canada declared itself a Federal Authority in possession of specialist or expert information or knowledge.

This draft ESR was prepared as part of the NEB's responsibilities under the CEA Act and incorporates information provided by Enbridge, government authorities, Aboriginal groups and the general public. The analysis in this draft ESR is based on the evidence on the record for the public hearing process held for the proposed Project, the full documentation of which can be found at the following hyperlink:

<https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=706437&objAction=browse&sort=-name>

As detailed in this draft ESR, various potential adverse environmental effects of the Project were assessed, the most notable being those related to accidents and malfunctions. The NEB is of the view that, if the Project is approved and, taking in account the implementation of Enbridge's proposed environmental protection procedures and mitigation measures, and through its compliance with the Board's regulatory requirements and the recommendations included in this draft ESR, the Project is not likely to cause significant adverse environmental effects.

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LIST OF ACRONYMS AND ABBREVIATIONS

Board or NEB	National Energy Board
CEA Act	<i>Canadian Environmental Assessment Act</i>
CP	cathodic protection
CPM	Computational Pipeline Monitoring
EA	environmental assessment
Enbridge	Enbridge Pipelines Inc.
EPR Program	Emergency Preparedness and Response Program
ESA	Environmentally Significant Area
ESEIA	Environmental and Socio-Economic Impact Assessment
ESR	Environmental Screening Report
Federal Coordination Regulations	<i>Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements</i>
GHG	greenhouse gas
ILI	in-line inspection
IMP	Integrity Management Program
km	kilometre(s)
kPa	kilopascal(s)
LDS	Leak Detection System
Line 9	Enbridge Pipelines Inc.'s existing 762 millimetre (30-inch) outside diameter crude oil pipeline between Sarnia, Ontario and Montreal, Québec
LTO	Leave to Open
MOP	maximum operating pressure
MP 1860	densitometer site 4.12 kilometres west of North Westover Pump Station, at mile post 1860
NEB Act	<i>National Energy Board Act</i>
NW	North Westover Pump Station
ON	Ontario
OPR-99	<i>Onshore Pipeline Regulations, 1999</i>
PE	polyethylene
Project	Enbridge Pipelines Inc.'s proposed Line 9 Reversal Phase I Project
Project Sites	collectively, the four existing fenced and graveled sites where construction work is proposed: Sarnia Terminal, North Westover Pump Station, Westover Terminal and a site 4.12 kilometres west of North Westover Pump Station
psi	pounds per square inch
QC	Québec
RoW	right-of-way
SA	Sarnia Terminal
SCC	stress corrosion cracking
WT	Westover Terminal

1.0 INTRODUCTION

1.1 Background

Enbridge Pipelines Inc. (Enbridge) currently owns and operates Line 9, an approximately 830 kilometre (km) long, 762 millimetre (30-inch) outside diameter crude oil pipeline located between Sarnia, Ontario (ON) and Montreal, Québec (QC). The Board authorized its construction and operation with the issuance of Certificate of Public Convenience and Necessity OC-30. Line 9 was placed in service in 1976 with eastward flow. In 1997, the National Energy Board (NEB or Board) authorized a reversal to its current westward flow following proceeding OH-2-97.

1.2 Project Overview

On 8 August 2011, Enbridge applied to the NEB for authorization to construct and operate its Line 9 Reversal Phase I Project (the Project) between Sarnia and Westover in southwestern ON.

The Project includes the infrastructure additions and modifications required to allow the reversal of crude oil flow within the approximately 194 km long segment of Line 9 between Sarnia Terminal (SA) and North Westover Pump Station (NW). All construction activities would occur within the confines of four existing fenced and graveled sites: SA, NW, Westover Terminal (WT) and at a densitometer site 4.12 km west of NW, at mile post 1860 (MP 1860). These sites are collectively referred to as “the Project Sites”. Work is related to pumps, piping, valves, a pig trap and densitometers. A new electrical building would be built at WT.

Line 9 currently transports crude oil in a westward direction, with deliveries from Montreal Terminal flowing through NW and onward to either SA or WT. In the proposed reversed direction (eastward), Line 9 would deliver crude oil to WT from SA. East of NW, Line 9 would maintain its current westward flow.

Upon reversal, the anticipated average daily crude oil volume that would be shipped is 50,000 barrels per day. The maximum average daily volume that could be shipped is 152,000 barrels per day.

Section 4.0 provides a detailed description of the work associated with the Project.

1.3 Rationale for the Project

Enbridge has proposed the Project in order to meet shipper business demands. On this Line 9 segment, oil currently imported from offshore would be replaced by oil sourced from western Canada or the United States. Enbridge submits that the Project would eliminate the current reliance of ON refiners on crude oil from areas of declining or potentially unreliable supply.

1.4 Baseline Information and Sources

The analysis for this draft Environmental Screening Report (ESR) is based on information from the following sources:

- Enbridge's Project application package, including its Environmental and Socio-Economic Impact Assessment (ESEIA) and Engineering Assessment;
- Enbridge's supplementary filings to its Project application;
- Enbridge's responses to information requests;
- submissions from interested parties (e.g., general public, Aboriginal groups, government authorities, non-government organizations, industry);
- views expressed by those during the final argument portion of the public hearing; and
- various manuals referenced in the Project application (e.g., Enbridge's *Environmental Guidelines for Construction*).

All filed information is available online within the NEB's Regulatory Document Index at the following hyperlink:

<https://www.neb-one.gc.ca/l1-eng/livelink.exe?func=l1&objId=706437&objAction=browse&sort=-name>

For more details on how to obtain documents, please contact the Secretary of the NEB at the address specified in Section 10.0 of this report.

2.0 ENVIRONMENTAL ASSESSMENT (EA) PROCESS

Enbridge's 8 August 2011 Project application under section 58 of the *National Energy Board Act* (NEB Act) triggered the *Canadian Environmental Assessment Act* (CEA Act) EA process. The Board was required to undertake a screening level of assessment for the Project.

2.1 EA Coordination Process

The NEB is the Federal Environment Assessment Coordinator for the Project. On 24 August 2011, pursuant to section 5 of the CEA Act *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements*, the NEB issued a Federal Coordination Notification letter to identify the potential involvement of federal departments in the EA process.

No other Responsible Authorities were identified; however, Environment Canada identified itself as a Federal Authority in possession of specialist or expert information or knowledge.

The NEB's letter was also sent to the Ontario Ministry of Environment, which, in turn, did not identify a responsibility or interest in the EA of the Project.

2.2 Opportunities for Public Input into the EA

2.2.1 Public Hearing Process

With the issuance of Hearing Order OH-005-2011 on 5 December 2011, the Board announced that it would convene a public hearing to assess the Project. It also issued Procedural Updates on 1 and 27 February and on 11 May 2012. These documents described the process and

requirements for the public hearing, and the various ways in which any member of the general public, Aboriginal groups, government authorities, non-government organizations and industry could participate and contribute.

The Board received several submissions related to environmental matters. Those dealing with topics relevant to the CEA Act EA are summarized in Section 6.0.

The oral final argument portion of the public hearing was held on 23-24 May 2012 in London, ON.

2.2.2 Draft Scope of the EA

At the time of release of the Hearing Order, the NEB sought comments from the public on the draft Scope of the EA. The draft scope and a request for public input on it were posted on the Canadian Environmental Assessment Registry Internet Site on 6 December 2011. The public (including government departments) was given the opportunity to suggest amendments or additions to the draft by filing comments with the Board by 12 January 2012.

During the public comment period, the NEB received two letters of comment: one from the Ontario Ministry of Energy and a joint letter from Équiterre and Environmental Defence.

The Ontario Ministry of Energy considered the draft Scope of the EA to be appropriate for the evaluation of the Project. Équiterre and Environmental Defence indicated that, provided the draft Scope of the EA is broadly interpreted, they had no specific amendments to suggest. No additions or changes to the document were made as a result of these letters.

2.2.3 Draft ESR

This section will be completed following the public comment period on this draft ESR. The Board will consider the comments received when preparing the final ESR.

3.0 SCOPE OF THE EA

Following the public comment period described in Subsection 2.2.2, the Board issued its Scope of the EA on 1 February 2012, which is comprised of three parts:

1. Scope of the Project (elaborated upon in Section 4.0 of this draft ESR);
2. Factors to be Considered; and
3. Scope of the Factors to be Considered.

The Scope of the EA is also included as Appendix 1 to this draft ESR. The Board notes that it has made various minor wording changes to improve clarity, consistency and readability.

During the oral portion of the hearing, Aamjiwnaang First Nation submitted that the Board was not considering the reversed operation of Line 9 (between SA and NW) in its EA of the Project. The Board confirms that, from the outset, it had always contemplated assessing the applied-for operation of this Line 9 segment in reversed flow and it has considered that operation in its EA of the Project. The previously-circulated Scope of the EA, for example, explicitly included mention of flow reversal, operation and consideration of the environmental effects of accidents

or malfunctions. The List of Issues for the OH-005-2011 proceeding, likewise, includes issues related to line operation, such as pipeline integrity under reversed flow and contingency planning for accidents and malfunctions during operations.

4.0 DESCRIPTION OF THE PROJECT

4.1 Construction Phase

The following table outlines the work to be completed at each of the four Project Sites.

	SA	MP 1860	NW	WT
Pump and piping modifications	•		•	•
New valves and piping	•		•	•
Replace existing densitometer		•	•	
New electrical building				•
Replace pig trap	•			

Physical activities during Project construction include, but are not limited to: surveying, conducting geotechnical investigations, excavating, trench dewatering, backfilling, foundation construction, clean-up and reclamation. No clearing, in-water works or new access are required.

All construction would occur on existing Enbridge facilities and surface leases with no planned ground disturbances along the right-of-way (RoW) itself. No new lands are required. Work on at MP 1860 would be contained within an existing building and no excavation is planned.

4.2 Operations Phase

During operations, the segment of Line 9 between SA and NW would continue to transport crude oil, but in the reversed eastward direction. From NW, oil would head south to WT, as it does currently.

Proposed crude oil types to be shipped post-reversal are all light blends and are similar to those currently being transported in this Line 9 segment. Commodities of similar physical properties have been transported in the past in this segment. However, Enbridge would be able to transport any crude oil type that meets its imposed quality specifications.

Enbridge would continue to implement its existing integrity management practices along this segment of Line 9 and at its facilities. This includes maintenance and repair work along the pipeline, as well as line patrols, including by air. More details on integrity-related operational activities are included in Subsection 8.2.2.2.

No sources of continuous operational air emissions are proposed. Pumping at SA would be electrically-driven. Trace amounts of fugitive greenhouse gas (GHG) emissions can be expected to escape from valves and fittings along the pipeline; however, these would likely see a decrease compared to past pipeline operations due to the replacement of old valves with newer ones. The occasional use of equipment and vehicles (including aerial) would also result in periodic emissions releases during operations.

4.3 Abandonment Phase

Pursuant to the NEB Act, any plans for abandonment would require an application to the Board, at which time the NEB would assess the potential environmental effects.

5.0 DESCRIPTION OF THE ENVIRONMENT

This section focuses on describing the environmental and socio-economic setting at and in the vicinity of the four existing fenced and graveled Project Sites (SA, NW, MP 1860 and WT). All Project Sites currently have above-ground infrastructure in place.

As Line 9 already exists as a buried pipeline, its potential impacts on bio-physical and socio-economic elements are limited to those resulting from operational activities (e.g., investigative digs) or accidents and malfunctions, the locations of which, if any, cannot be meaningfully predicted. Therefore, a complete description of the setting along the remainder of Line 9 between SA and WT is not provided. However, some high-level information has been included to provide context. For more details on accidents and malfunctions, see Subsection 8.2.2.

Geographical Information, Human Occupancy and Resource Use

- The Project Sites are within the County of Lambton and the Regional Municipality of Hamilton-Wentworth, in southwestern ON.
- With the exception of SA, the Project Sites are within the City of Hamilton (WT and NW are within 1 km of each other). SA is within the City of Sarnia.
- With the exception of SA, the land use adjacent to the Project Sites is primarily agricultural. SA is located in a primarily industrial area (petrochemical- and petroleum-related). Generally-speaking, a high degree of agricultural activity occurs along the RoW between SA and NW.
- WT: a baseball diamond/recreational park area is within 200 metres of the fence line; four residential structures are within 500 m; numerous man-made linear features and corridors are in the vicinity.
- NW: one farm structure is within 500 m; numerous man-made linear features and corridors are in the vicinity.
- MP 1860: four residential structures and one residential/farm structure are within 500 m.

Traditional Land and Resource Use

- The Project Sites do not traverse Indian Reserve lands.
- The Aamjiwnaang First Nation reserve is within 1.3 km of SA.
- The Line 9 segment to be reversed is within the traditional territory claimed by the Aamjiwnaang First Nation, Oneida Nation of the Thames, Bkejwanong (Walpole Island) First Nation, Métis Nation of Ontario, the Southern First Nations Secretariat and Chippewa of the Thames First Nation.

- The current land use at the Project Sites is incompatible with any traditional use. The lands are not currently being used for the purposes of exercising traditional rights and the sites have not been used in that respect for many generations.

Terrain and Soils

- The Projects Sites are graveled.
- Soil permeability at WT and NW is high, low at SA and variable at MP 1860.
- There are no known areas of geotechnical instability along the Line 9 RoW from SA to NW.

Vegetation

- The Project Sites have been disturbed to the point that no natural sensitive environmental features are present.
- The dominant land cover in the general Project area is cropped land with limited areas of mixed and deciduous forests. Woodlots or wooded areas are found near all Project Sites.
- Two Environmentally Significant Areas (ESAs) – the Westover Lowland Forest and the Westover Southwest Complex – occur near the Project Sites (excluding SA).
- Bordering NW, the Westover Lowland Forest ESA is a natural area that crosses several watercourses including Barlow Creek, Spencer Creek and two unnamed tributaries of Spencer Creek. It consists of a variety of vegetation types and is hydrologically and physically connected to a larger network of natural areas and provides ecologically important linkages along riparian corridors and watersheds.
- The Westover Southwest Complex ESA occupies most of the wooded lands surrounding WT. It consists of a mix of previously-disturbed terrestrial communities and wetland areas. This ESA extends across the divide between the Grand River and Spencer Creek watersheds, providing a continuous corridor linking other natural areas.

Water

- The Cole Drain is adjacent to SA. This drain flows northwest, connects to other drains and eventually discharges into Talfourd Creek.
- Drainage at MP 1860 runs toward Fairchild Creek, located 460 m to the southwest. This creek runs through many small wetlands before discharging into the Grand River near Brantford, ON.
- Spencer Creek is located in the vicinity of WT and NW. Drainage from these sites is generally toward this creek. WT is almost completely surrounded by the floodplain of Spencer Creek and its tributaries.
- Groundwater supply near the Project Sites is of good quality with a high chloride and bicarbonate chemistry due to the underlying bedrock.
- The following numbers of wells are located within 1 km of the Project Sites: SA (24), NW (44), WT (34), MP 1860 (31).
- Groundwater at several of the Project Sites is at such a depth that it may be encountered during excavations.

- Between SA and NW, Line 9 crosses numerous watercourses, including Black Creek and the Thames, Nith and Grand Rivers.

Fish and Fish Habitat

- Various cold, cool and warm water fish species may occur in the watercourses potentially-affected by Project construction and operations. These include, but aren't limited to: central mudminnow, creek chub, fathead minnow, northern redbelly dace, common shiner, white sucker, brook stickleback, Johnny darter, brook trout, brown trout, rainbow trout, chinook salmon, largemouth bass, smallmouth bass, black crappie, finescale dace and golden shiner.

Wetlands

- SA is not within 200 m of any wetlands. Generally-speaking, the remaining Project Sites are located in areas interspersed with wetlands and swamps.
- NW, MP 1860 and WT are bordered to the south and east by the Sheffield-Rockton Wetland Complex, designated as a Provincially-Significant Wetland and protected by the Province. This complex occupies much of the low-lying wooded lands surrounding NW and WT.

Wildlife and Wildlife Habitat

- Characteristic wildlife species in the general Project area include white-tailed deer, grey squirrel, red squirrel and eastern chipmunk. Bird species include northern cardinal, wood thrush, eastern Screech-owl, mourning dove, green heron, pileated woodpecker, red-bellied woodpecker and wild turkey.
- The fenced and graveled Project Sites do not represent optimal wildlife habitat.

Species at Risk or of Special Status

- The applicable migratory bird restricted activity period is from 1 May to 31 July.
- The following species listed on Schedule 1 of the *Species at Risk Act* are known to occur within 2 km of the Project Sites. Many of these species are also protected provincially under the Ontario *Endangered Species Act, 2007*:

Plants: American columbo, small white lady's slipper, American chestnut (all Endangered); colicroot, dense blazing star, willowleaf aster (all Threatened); Riddell's goldenrod, swamp rose-mallow (both Special Concern).

Reptile: common five-lined skink (Endangered); Massasauga rattlesnake, Blanding's turtle (both Threatened); eastern ribbonsnake and milksnake (both Special Concern).

Birds: Acadian flycatcher, Henslow's sparrow (both Endangered).

- Several other plant, reptile, bird or fish species of various conservation statuses (as listed in the Natural Heritage Information Centre database) are known to occur in the vicinity of the Project Sites.
- The fenced and graveled Project Sites do not provide preferred habitat for listed species, although lands adjacent to the sites could support the preferred habitat of four species (common five-line skink, Blanding's turtle, eastern ribbonsnake, Massasauga rattlesnake).

6.0 PROJECT-RELATED ISSUES/COMMENTS RAISED TO THE NEB

The Board received submissions related to environmental and socio-economic matters from several interested parties (e.g., public, landowner associations, government authorities, non-government organizations, Aboriginal groups).

Several submissions described issues and concerns that were not relevant to the Board's overall assessment of the applied-for Project or to this CEA Act EA, as scoped.

However, many comments and concerns were relevant to the CEA Act EA. Common concerns generally related to accidents and malfunctions during the operation of this Line 9 segment in reversed flow. Specifically, concerns dealt with the potential for an increased risk of a leak occurring due to the effects of changing operating conditions (e.g., pressures, flow direction, crude types) on pipeline integrity. Comments also focused on the potential effects of a release on various elements, including water resources, wildlife habitat and land use (including for traditional purposes), as well as Enbridge's emergency response measures. The Board's analysis of accidents and malfunctions is found in Subsection 8.2.2 of this report.

Other specific comments and concerns relevant to the CEA Act EA were related to:

- Impacts of the Project on air and water quality in ON (see Subsections 8.1, 8.2 and 8.2.1); and
- Migratory bird and species at risk mitigation (see Subsections 8.2 and 8.2.1).

7.0 THE NEB'S EA METHODOLOGY

In assessing the environmental effects of the Project, the NEB used an issue-based approach. In Subsection 8.1, the NEB identified interactions expected to occur between the proposed Project activities and the surrounding bio-physical and socio-economic elements. The NEB also considered the potential accidents and malfunctions that may occur due to the Project and any change to the Project that may be caused by the environment. If there were no expected element/Project interactions, then no further examination was deemed necessary.

Subsection 8.2 provides analyses for the identified potential adverse environmental effects of the Project and is divided into two streams:

1. Subsection 8.2.1 serves to discuss those potential adverse environmental effects that can be addressed through standard or routine design and practices.
2. Subsection 8.2.2 serves to provide a more detailed analysis of individual potential adverse environmental effects that are of public concern, involve the use of non-standard mitigation measures or design, or have a relative importance in the context of the Project application.

Subsection 8.3 addresses cumulative effects, Subsection 8.4 addresses follow-up programs under the CEA Act and Subsection 8.5 lists all recommendations for any potential regulatory approval of the Project.

8.0 ENVIRONMENTAL EFFECTS ANALYSIS

8.1 Project – Environment Interactions

	Environmental Element	Description of Interaction (How, When, Where) or Reason for No Interaction	Type of Potential Effect Pos/Ntl/Adv	Potential Environmental Effect	Discussed in Subsection
Bio-Physical	Soil and Soil Productivity	<ul style="list-style-type: none"> Excavation and backfilling activities. Discovery of historical contamination during excavations. 	Adv	<ul style="list-style-type: none"> Reduced soil productivity due to admixing of soil layers, rutting and compaction. Spread of historical contamination to unaffected areas. 	8.2.1
	Vegetation	<ul style="list-style-type: none"> Runoff of sediment-laden water (e.g., from dewatering, spoil pile erosion). 	Adv	<ul style="list-style-type: none"> Health effects on nearby plants. 	8.2.1
	Water Quality and Quantity	<ul style="list-style-type: none"> Runoff of sediment-laden water (e.g., from dewatering, spoil pile erosion). Excavation in areas with high water table. Discovery of historical contamination during excavations. 	Adv	<ul style="list-style-type: none"> Reduced water quality of nearby water sources and groundwater. Increased water quantity in nearby water bodies or watercourses. Spread of historical contamination to unaffected water sources and groundwater. 	8.2.1
	Fish and Fish Habitat	<ul style="list-style-type: none"> Runoff of sediment-laden water (e.g., from dewatering, erosion of spoil piles) into nearby water sources. 	Adv	<ul style="list-style-type: none"> Health effects on fish (stress, injury, mortality). 	8.2.1
	Wetlands	<ul style="list-style-type: none"> Runoff of sediment-laden water (e.g., from dewatering, erosion of spoil piles). Excavation in areas with high water table. Dewatering activities. 	Adv	<ul style="list-style-type: none"> Alteration of wetland hydrology. 	8.2.1
	Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Noise from vehicle and equipment use during construction and operations. Vehicle collisions with wildlife. 	Adv	<ul style="list-style-type: none"> Temporary and localized sensory disturbance to wildlife. Wildlife injury or mortality. 	8.2.1
	Species at Risk or of Special Status	<ul style="list-style-type: none"> See the “Wildlife and Wildlife Habitat” and “Vegetation” elements above. 	Adv	<ul style="list-style-type: none"> Effects noted in the “Wildlife and Wildlife Habitat” and “Vegetation” elements, as they relate to species at risk or of special status. 	8.2.1
	Air Emissions	<ul style="list-style-type: none"> Dust from vehicle and equipment use during construction and operations. Emissions (including GHGs) from vehicle and equipment use during construction and operations. Fugitive emissions from valves and fittings during operation of the pipeline. 	Adv	<ul style="list-style-type: none"> Temporary and localized decrease in air quality. Temporary or occasional increases in GHG emissions to the atmosphere. Trace GHG emissions to the atmosphere during pipeline operations. 	8.2.1

	Environmental Element	Description of Interaction (How, When, Where) or Reason for No Interaction	Type of Potential Effect Pos/Ntl/Adv	Potential Environmental Effect	Discussed in Subsection
Socio-Economic	Acoustic Environment	<ul style="list-style-type: none"> Noise from vehicle and equipment use during construction and operations. 	Adv	<ul style="list-style-type: none"> Temporary or occasional increase in noise levels. 	8.2.1
	Human Occupancy and Resource Use	<ul style="list-style-type: none"> No interaction: Construction activities would occur on previously-disturbed, existing industrial sites. 			
	Heritage Resources	<ul style="list-style-type: none"> Excavation activities. 	Adv	<ul style="list-style-type: none"> Disturbance and/or destruction of previously-undisturbed heritage resources. 	8.2.1
	Traditional Land and Resource Use	<ul style="list-style-type: none"> No interaction: Construction activities would occur on previously-disturbed, existing industrial sites. 			
	Social and Cultural Well-Being	<ul style="list-style-type: none"> No interaction: Construction activities would occur on previously-disturbed, existing industrial sites. 			
	Human Health and Aesthetics	<ul style="list-style-type: none"> No interaction: Construction activities would occur on previously-disturbed, existing industrial sites. 			
Other	Accidents and Malfunctions	<ul style="list-style-type: none"> Pipeline rupture or facility failure during operations. Hazardous material spills during construction. 	Adv	<ul style="list-style-type: none"> Contamination of soil, surface water and/or groundwater and associated effects on: <ul style="list-style-type: none"> soil and soil productivity; vegetation; fish and fish habitat; wetlands; wildlife and wildlife habitat; species at risk or of special status; human health; and resource use (including traditional). 	8.2.2
	Effects of the Environment on the Project	<ul style="list-style-type: none"> Severe weather and climatic events (e.g., precipitation, extreme temperatures). 	Adv	<ul style="list-style-type: none"> Damage to infrastructure. Delays to Project schedule. 	8.2.1

Legend: Pos = Positive; Ntl = Neutral; Adv = Adverse

8.2 Analysis of Potential Adverse Environmental Effects

Enbridge has proposed several mitigation strategies to avoid or minimize the potential effects of the Project including: scheduling of construction activities to avoid sensitive periods, developing mitigation measures to address site-specific and general issues, and confining construction to existing industrial sites. Enbridge's proposed strategies and measures, together with its responses to information requests and submissions from Intervenor, have provided the Board with a sufficient basis to assess the potential adverse environmental effects and evaluate whether those effects can be effectively mitigated.

As noted in Section 7.0 of this draft ESR, the analysis of potential adverse effects has been categorized into two streams: Subsection 8.2.1 (dealing with potential adverse environmental effects that can be mitigated using standard measures) and Subsection 8.2.2 (dealing with a more detailed analysis of individual potential adverse environmental effects). The Table in Subsection 8.1 identifies which stream each identified potential effect is considered within.

8.2.1 Analysis of Potential Adverse Environmental Effects to be Mitigated Using Standard Measures

A standard mitigative measure is a specification or practice that has been developed by industry, or prescribed by a government agency, that has been previously employed successfully, and meets the expectations of the NEB.

Enbridge has proposed a variety of standard mitigation measures to address the majority of the potential adverse environmental and socio-economic effects of the Project. This includes all of the potential effects attributable to the construction phase. These measures are presented in Enbridge's Project application package (including its ESEIA), its *Environmental Guidelines for Construction* and its subsequent submissions (e.g., responses to information requests).

The majority of identified potential effects are minor in nature due to construction activities occurring exclusively within previously-disturbed, fenced and graveled sites of relatively small dimensions. No previously-undisturbed lands would be impacted. Further, the majority of the identified potential effects are temporary (confined to the construction period) and much of the proposed work would be above-ground.

Beyond the change in flow direction and operating pressures, Project operation would effectively remain unchanged from what Line 9 is currently authorized for. No new continuous operational air emissions sources are proposed. Any required pumping at SA would be electrically-driven. Although trace amounts of fugitive GHG emissions can be expected to escape from valves and fittings during pipeline operation, their amounts could potentially decrease compared to past pipeline operations as a result of replacing older valves with newer ones.

The Board notes the potential for Enbridge to encounter historical contamination while excavating during construction at the Project Sites or during operational activities along the RoW. Enbridge committed to suspend work if contamination is suspected and summarized how it would store suspect material, obtain laboratory analyses and treat or dispose of affected material. Enbridge also committed to following the Board's established *Remediation Process Guide* (2011).

Enbridge committed to develop, in collaboration with its construction contractor, an Emergency Plan to address accidental hazardous material spills during construction. This plan would provide guidance to field staff regarding actions to implement to minimize and mitigate the duration and severity of any potential adverse effects of such an event. Enbridge advised that it would submit this to the Board prior to construction. In order to ensure that this occurs, the Board recommends that, in any Order that it may grant, a condition be included requiring Enbridge to make this submission. See **Recommendation 1** in Subsection 8.5 for more detailed wording of this condition.

The NEB is of the view that, if the Project is approved and, taking into account Enbridge's implementation of its proposed environmental protection procedures and mitigation measures, and through its compliance with the Board's regulatory requirements and the recommendation described above, the potential adverse environmental effects considered in this subsection are not likely to be significant.

8.2.2 Detailed Analysis of Potential Adverse Environmental Effects – Accidents and Malfunctions during Operations

As noted in Section 7.0, this subsection is intended to provide a more detailed analysis of effects that are of public concern, involve the use of non-standard design or mitigation measures or which the Board has identified as having a relative importance in the context of the Project application. In this case, the Board has identified the potential adverse effects of operational accidents and malfunctions (e.g., leaks, ruptures) as a key issue for detailed discussion.

8.2.2.1 Issue Background

There has been a great deal of public concern that crude oil flow reversal in this segment of Line 9 may lead to a greater risk of a leak or rupture occurring. Reasons cited include the pipeline's current integrity status and impacts that changes in commodity composition/corrosivity, operating pressures and flow direction may have on pipeline integrity. The public has also expressed concern that, depending on the commodity being carried, the environmental consequences of a leak or rupture could be more detrimental. The Board also heard concerns about the vulnerability of local aquifers and the potential for leaked oil to be transported between them.

In the following subsections, the Board provides information and its views on three broad aspects of mitigating the potential effects of a crude oil release: release prevention (including pipeline integrity), release detection and emergency response. These topics will be addressed in more detail within the Board's overall Reasons for Decision on the Project.

It is important to note that the Board's assessment of accidents and malfunctions does not focus on the effects on individual receptors or specific areas. Such an assessment would be hypothetical since the location(s) of any release point(s) cannot be predicted with confidence. Other important factors that would influence the magnitude and extent of potential effects are also unknown at this time (e.g., weather; time of year; event duration; type and volume of the release; nature and characteristics of site-specific soils, geology, surface water and groundwater).

Rather, this assessment focuses on Enbridge's overall approaches to minimizing the likelihood of a release and, in the event of a release, its response plans. The Board considers any release to be undesirable and that an incident in a particularly sensitive area (e.g., a river crossing, farmland) would have greater negative consequences than in a less sensitive area (e.g., within a facility site). Enbridge's preparedness and operational practices are overarching and applicable to the entire Line 9 segment subject to this application. It is on this basis that the Board has performed its assessment of accidents and malfunctions.

8.2.2.2 Release Prevention

Integrity Management

Release prevention centers around the goal of ensuring that a pipeline's integrity and operating conditions are such that it can be used safely while minimizing the risk of a release occurring. This typically involves conducting monitoring, inspections, maintenance and ongoing pipeline protection measures.

Enbridge indicated that it builds and maintains its pipeline system as a long life asset and that it implements a comprehensive Integrity Management Program (IMP). Enbridge submits that a large part of its daily operations is devoted to the prevention of any accidents, malfunctions and unplanned events. It has stated that its Pipeline Integrity Department supports the company's goal of maintaining a safe and reliable pipeline system with a focus on preventing leaks or ruptures caused by service-related deterioration such as corrosion, cracks, mechanical damage and strain. The following outlines various integrity management activities that Enbridge conducts during the operation of its pipelines:

- Supervisory Control and Data Acquisition – Monitoring 24 hours/day, 365 days/year from Enbridge's Control Centre in Edmonton, Alberta.
- Routine in-line inspection (ILI) tool runs – To monitor pipeline integrity for issues such as cracks, dents and corrosion.
- Integrity excavations – Regular pipeline exposure to validate ILI data, assess pipeline integrity and conduct repairs, where necessary. Various forms of monitoring aid in determining the schedule and priority of digs. During these digs, Enbridge collects data regarding soil conditions, land use, topography and drainage patterns in order to guide a more proactive approach for preventing potential problems.
- External corrosion control – A polyethylene (PE) tape coating is intended to provide a physical barrier between the pipe and soil, preventing corrosion. Continuous cathodic protection (CP) is used to provide protection against external corrosion where the coating has been compromised. Annual pipe to soil surveys are undertaken to evaluate CP protection levels. Routine CP rectifier inspections and/or monitoring are also conducted to assess CP performance and adequacy.
- Internal corrosion inhibition – Intended to protect pipelines from internal corrosion (e.g., limiting the water/sediment content of transported oil, line cleaning, oil batch testing, chemical treatment).
- Crack Management Program – An established program aimed at managing the threat associated with crack-related defects on Enbridge's entire pipeline system.

- Third-party damage prevention – A monitoring and stakeholder awareness program aimed at preventing third parties from accessing and damaging pipelines. This includes public awareness, maintaining signage, RoW patrols and follow-up on unauthorized activities.
- Depth of cover surveys and remediation at problem areas. Underwater surveys of water body crossings are also conducted, typically at five- and ten-year intervals for major and minor crossings, respectively.
- Mechanical Damage Management Plan – A plan intended to address the threat of damage in the form of dents and gouges due to a variety of causes, including strikes from excavating equipment and pipe settlement onto rock. This primarily involves running ILI tools and performing excavations.

Integrity Status

Enbridge's Line 9 has been in an operational state since 1976, with the exception of a two-year period (July 1991 to July 1993) when the pipeline sat in an approved deactivated state. Initially, from 1976 to 1999, Line 9 flowed eastward. In 1999, the current westward flow along the entire length of Line 9 began. The Project essentially represents a re-reversal of the Line 9 segment from SA to NW to its original eastward flow direction.

Enbridge noted one historical leak along the segment of Line 9 to be reversed, which occurred in 1976 due to a dent caused by an in-trench rock. Enbridge submitted that affected soils and groundwater were remediated to applicable ON standards. There have been seven leaks at two terminals along this segment, all of which were under one barrel in volume.

Pipeline integrity can be influenced by a wide variety of factors. Enbridge has provided a significant amount of information related to this topic in its Engineering Assessment for the Project, as well as through its responses to information requests. Overall, Enbridge is of the view that the Engineering Assessment demonstrates that this segment of Line 9 can be reversed and be safely and reliably operated.

The following summarizes various conclusions that Enbridge has drawn with respect to certain hazards to the integrity of Line 9 between SA and NW:

Metal Loss – Internal and External Corrosion
<ul style="list-style-type: none"> ▪ Recent data found corrosion near long seam welds on approximately 70 joints. Two were excavated in 2009/2010. The remaining had features well below Enbridge's excavation criteria. ▪ There are no metal loss features that require repair before reversal or prior to the next magnetic flux leakage inspection in 2013. ▪ Flow reversal would have no effect on external corrosion and only a minor potential effect on internal corrosion. Overall, the metal loss threat is being adequately addressed and should not prohibit flow reversal. ▪ There is a low external and internal corrosion feature density per km, demonstrating that the PE tape coating has performed well and the internal metal loss threat is being managed to acceptable levels. ▪ The pipe is coated with single-layer PE tape. Historically, PE tape-coated pipelines have exhibited moderate to high susceptibility to stress corrosion cracking (SCC). Enbridge considers this segment to have that potential. ▪ Since 2003, ten SCC colonies were detected at four locations, none of which met the definition of "significant SCC". The observed shallow SCC does not present an immediate threat to integrity on this segment. ▪ Since 1999, approximately 40 joints were noted with coating reported as "fair" or "poor". SCC was reported on only three. 2009-2010 CP survey results suggested that adequate CP was being demonstrated at these locations.

- The SCC growth assessment showed that this segment can operate safely beyond the planned 2013 ILI tool run.
- No internal corrosion has been noted at watercourse crossings and observed external corrosion is very shallow.
- There is no increase to the internal pipe corrosion threat based on product shipped. Products to be shipped are all classified as light crude oils. Similar blends are currently being shipped in this pipe segment and commodities of similar physical properties have been transported in the past.
- The increase in flow rate would slightly raise the internal pipe corrosion threat, but would be insignificant and addressed through a regular cleaning program (e.g., using brushing tools to mobilize water and other accumulating potentially corrosive material).
- Enbridge's historical experience and the low level of existing internal corrosion damage provides it with a high level of confidence that any newly formed corrosion that may result from reversed operation would be effectively managed through subsequent ILI and integrity programs.

Cracking

- No features reported by the 2008 crack detection inspection are predicted to fail in the next three years under pre- or post- flow conditions. 98% (349) of the 357 crack-like features were below 1 mm in depth. Enbridge plans to re-inspect this segment of Line 9 in two years time.
- The lowest predicted burst pressure of the reported features on Line 9 between SA and NW was 5,612 kilopascals (kPa) [814 pounds per square inch (psi)], which equates to 165% of the proposed normal operating discharge pressure post-reversal (3,393 kPa or 492 psi).
- Pre- and post- reversal cracking risk profiles are essentially identical. The post-reversal profile is higher along the first 8 km downstream of SA, where pumping would be initiated. Despite this change, this 8 km long segment is not immediately threatened by cracking-related mechanisms. The lowest predicted burst pressure of any observed crack-like feature is 209% of the current maximum allowable operating pressure. The shortest remaining life of any one feature is 53 years.
- Based on the results of a fatigue analysis, the crack threat would not be aggravated by flow reversal.

Dents and Mechanical Damage

- No dents, buckles or gouges require excavation prior to reversal, based on regulatory requirements or standard industry practices. The risk associated with existing features is not expected to increase due to flow reversal.
- Four deformation features are located on the bottom of the pipe at watercourse crossings, none of which exhibit stress concentrators or meet Enbridge's excavation criteria.
- Currently, the top of pipe is at or below the depth of cover required by CSA Z662-2011 *Oil and Gas Pipeline Systems*.
- Features identified as having metal loss coincident with a dent or other geometry anomaly have been addressed as per Enbridge standards and in compliance with CSA Z662-11.
- The vast majority of existing mechanical damage features are likely related to pipe settlement, have been present for most of the pipeline's life, including during eastward flow conditions prior to 1999.

Enbridge stated that it performs an annual system-wide analysis of the internal pipe corrosion threat, which is based on product(s) shipped, corrosion status of the line (as per ILI readings) and flow conditions.

Views of the Board

The Board notes that both the segment of Line 9 to be reversed and the segment between NW and WT have various features which require, or may require, further investigation, repairs and/or mitigation. The Board notes Enbridge's completed and proposed work to document, categorize and assess these features of concern. The Board is of the view that the presence of such features is not uncommon and can reasonably be expected for any given pipeline. Of importance is how operating companies deal with these issues. Enbridge's existing IMP and the pipeline's integrity status are described in this draft ESR and more fully in Enbridge's filings.

Various parties raised concerns about the effects of changing product types on internal corrosion. The Board notes Enbridge's indication that, post-reversal, it intends on shipping light crude oils similar to those currently being transported on this segment of Line 9. With respect to the concerns raised, Enbridge indicated that it imposes quality specifications aimed at preventing product-related impacts on pipeline integrity and that it "simply will not transport oil that cannot be transported safely". The Board notes Enbridge's submission that its annual internal pipeline corrosion threat analysis would take into account any changes in product shipped. The Board is of the view that Enbridge's existing IMP is adaptive and capable of recognizing and addressing possible internal corrosion issues related to transporting different grades of crude oil, should Enbridge identify this need in the future.

As part of its Project application, Enbridge sought an exemption from having to apply for Leave to Open (LTO) the pipeline in the reversed direction, under section 47 of the NEB Act. The Board recommends that, if the Project is approved, a LTO application should be required.

The Board also recommends that, in any Order that it may grant, various conditions be included related to investigating, understanding and managing integrity features, both in the short- and long-term. These recommended conditions are summarized below, with more detailed wording found in Subsection 8.5. These conditions would also require the filing of updated information regarding the pipe's fitness-for-service. The Board notes that a number of these conditions would require information filings prior to operating in reversed flow or within a specific time period after flow is reversed.

Recommendation 2: Impose a condition requiring Enbridge to file, prior to applying for LTO, an updated Engineering Assessment demonstrating that the pipeline segments subject to the Project application are fit-for-service at a maximum operating pressure of 5,281 kPa (766 psi). The intent of this condition is to have Enbridge demonstrate safe operation at this pressure, since 3,393 kPa (492 psi) was the highest value used in performing its cracking fatigue analysis.

Recommendation 3: Impose a condition requiring Enbridge to, prior to applying for LTO, repair all integrity features meeting CSA Z662-11 repair criteria and the defects that triggered current pressure restrictions. The intent of this condition is to have Enbridge repair all features that could have a reasonable impact on the safe operation of this segment under eastward flow.

Recommendation 4: Impose a condition requiring Enbridge to submit, prior to applying for LTO, a plan to manage cracking features between NW and WT, including the timeline associated with the assessment methodology. The intent of this condition is to document Enbridge's commitments with respect to managing cracking in this segment.

Recommendation 5: Impose a condition requiring Enbridge to run various ILI tools between SA and NW within one year of LTO approval. These tools must be capable of detecting, characterizing and sizing cracking, metal loss and geometry features. Enbridge would be required to repair or mitigate all features meeting CSA Z662-11 repair criteria. Enbridge would also be required to perform field validations for tool performance assessments, and to review the integrity status of cased crossings. The intent of this condition is to have Enbridge identify, and repair or mitigate, any integrity features that have grown since the last ILI tool runs, as well as to establish baseline data for the reversed flow direction.

Recommendation 6: Impose a condition requiring Enbridge to file a long-term integrity improvement plan to mitigate and monitor ILI-reported internal and external corrosion, geometry and cracking features between SA and WT. The intent of this condition is to identify and understand Enbridge's long-term integrity management plans.

As part of the LTO application process, the Board would assess Enbridge's compliance with all relevant conditions in determining whether or not to allow Enbridge to begin operating the pipeline in eastward flow.

The Board is of the view that, with the implementation of Enbridge's existing integrity management practices and through compliance with the conditions summarized above, Enbridge is capable of addressing current and potential integrity issues facing these segments of Line 9.

8.2.2.3 Release Detection, Minimization and Containment

Integral to minimizing potential impacts from crude oil leaks or ruptures is the ability of a company to identify that such an event has occurred. Generally, the earlier a release can be detected and response measures implemented, the less the potential impact. To further minimize such impacts, companies often have in place pipeline and facility design measures that are aimed at limiting the amount of product released or confining it to a particular area.

Enbridge uses a variety of approaches for leak detection on its oil pipelines. Generally-speaking, Enbridge's Edmonton Control Centre manages or monitors many aspects of the company's leak detection activities. Enbridge's four primary methods of monitoring for possible leaks are:

- 1. Computational Pipeline Monitoring (CPM)** – This is a standard industry computer-based tool that uses continuous measurements of pipeline conditions for dedicated leak detection. CPM is Enbridge's primary real-time system for detecting leaks on all of its oil pipelines. Enbridge submits that this system also exceeds regulatory requirements. Enbridge noted that the CPM's targeted minimum detectable leak size for Line 9 (at the current nominal flow rate) is 60 cubic metres over two hours. The other means described below are intended to detect leaks below this threshold.
- 2. Visual surveillance and reports** – Involves RoW patrols (aerial and ground) and responding to third-party reports of oil or odours. Aerial patrols occur approximately every two weeks and as needed in response to pipeline integrity concerns. The helicopter used is equipped with an infra-red camera to aid in identifying leaks. Station piping is inspected weekly. Third-party reports are handled through an emergency telephone line.
- 3. Scheduled line balance calculations** – Calculations of oil inventory completed at a fixed time. These are intended to identify unexpected losses of inventory that may indicate a leak.
- 4. Controller monitoring** – Continuous monitoring of pipeline conditions by the Pipeline Controller. This monitoring is focused on identifying unexpected operational changes (e.g., pressure drops) that may indicate a leak.

Enbridge explained that these approaches provide overlapping capabilities such that an alarm caused by one method can be further analyzed using a separate method. It also submitted that the various methods used also allow for detection of leaks of varying magnitudes.

Enbridge advised that it is actively investigating and testing a number of new leak detection technologies to complement its current system, including those aimed at detecting smaller leaks. This includes methods for external-based detection and alternative CPM approaches like statistical and extended real-time transient models.

Currently, mainline sectionalizing valves are located along Line 9. Should a release occur, valve closures would isolate the affected pipe segment(s) in an attempt to minimize the volume of oil that could be released to the environment. Remotely-operated valves are intended to further decrease this potential by allowing activation without personnel needing to travel to the site. Enbridge performed an Intelligent Valve Placement analysis for the segment of Line 9 between SA and NW to examine the potential for new remote-controlled valve placements in areas of higher consequence. This analysis identified that one new valve cut-in and two conversions of existing valves could provide increased protection. The two valve cut-ins are aimed at providing this protection at Black Creek and the Nith River. The exact locations of this valve work are still to be determined. As it would proceed regardless of whether or not the Project is approved (flow reversal was just one factor considered in the analysis), Enbridge advised that it would perform the activities under the Board's *Operations and Maintenance Activities on Pipelines Regulated Under the National Board Act: Requirements and Guidance Notes*.

At its facility sites, Enbridge indicated that it implements several design aspects aimed at containing potential releases within site boundaries. This includes appropriate attention to equipment and piping selection, infrastructure maintenance, building and site containment areas, site grading and water management. As noted earlier, seven leaks at two terminals have occurred along this Line 9 segment. In none of these instances did the estimated leak volume exceed one barrel or affect lands outside of station properties.

Views of the Board

The Board notes Enbridge's multi-faceted approach to leak detection. The Board is of the view that Enbridge currently employs the latest industry-standard leak detection practices along Line 9. The Board notes that Enbridge indicated that it is exploring new detection technologies aimed at detecting smaller leaks. The Board encourages Enbridge to continue this research and work towards potential implementation.

Annex E of CSA Z662-11 consists of recommended leak detection practices for oil pipelines. Although companies are not required to adhere to the recommendations, the Board considers that doing so is responsible industry practice. In light of the public concerns raised related to accidents and malfunctions and the Board's desire to ensure that companies are appropriately prepared to identify leaks along their pipeline systems, the Board recommends that, in any Order that it may grant, a condition be included requiring Enbridge to file, prior to operating in reversed flow, and in the spirit of Annex E of CSA Z662-11, a comprehensive Leak Detection System manual. See **Recommendation 7** in Subsection 8.5 for more detailed wording of this condition.

8.2.2.4 Emergency Preparedness and Response (EPR)

The NEB has set, through its *Onshore Pipeline Regulations, 1999* (OPR-99), several requirements for companies to develop programs, procedures and protocols related to various aspects of emergency preparedness and response. In April 2002, the Board issued a letter to all

regulated companies which clarified the requirement for companies to develop and maintain EPR Programs in order to minimize the effects of incidents and emergencies that have the potential to impact the health and safety of the public, company employees, property and the environment. The Board described its expectations regarding the following eight elements¹:

- EPR Program Development (Hazard Assessment);
- Emergency Procedures Manual;
- Liaison Program (First Responders);
- Continuing Education Program (Public);
- Emergency Response Training;
- Emergency Response Exercises;
- Incident and Response Evaluation; and
- Emergency Response Equipment.

In its application filings, Enbridge stated that it has an established EPR Program on file with the Board. It elaborated on its compliance with the OPR-99 requirements and the Board's EPR Program expectations. It noted that the various elements of its EPR Program are contained and fully laid out within its Operations & Maintenance Procedures (Books 1, 2 and 7). Although Enbridge had previously filed its EPR Program documentation confidentially with the Board, it was directed by the Board to provide this information, redacted as necessary, for the benefit of those participating in the hearing process who had concerns in this area. Enbridge did not anticipate any required changes to the EPR Program documentation as a result of the Project.

Enbridge generally described its tiered response to emergencies along its pipelines. It explained that such an approach promotes rapid and streamlined expansion of response operations by first involving onsite or nearby personnel and equipment, then local and regional resources as necessary, up to and including available resources at the national and international levels. For this segment of Line 9, Enbridge indicated that it has response equipment and trained personnel in Sarnia and Westover (the segment's endpoints). These personnel would provide a Tier I response. Based on Enbridge's history and experience with exercises, it anticipates that this would begin within three hours of initial leak notification. Personnel from Belleville, ON, and Montreal, QC, would provide a Tier II response. Tier III would include pre-identified resources from outside ON, including from the United States.

Enbridge provided details about its Public Awareness Program that it implements to continually educate the public residing adjacent to the pipeline RoW, as well as first responders (police and fire departments) and other agencies and organizations, about the pipeline location and procedures to follow in the case of emergency. Enbridge submits that this Program is also aimed at informing stakeholders about products being shipped. The Program includes face-to-face meetings for information sharing, regular contact with landowners, annual mail-outs, engagement with Aboriginal communities, as well as response drills and exercises involving

¹ See the Board's letter for a full description of these expectations:
<http://www.neb-one.gc.ca/clf-nsi/rpblctn/ctsndrgltn/rrgnmgpnb/prcssngplnt/mrgncprprdnssrspns200204-eng.pdf>

local responders. Enbridge also stated that it performs scheduled reviews of its Public Awareness Program and distributes contact information for those who may have comments or questions.

Views of the Board

The Board regularly reviews regulated companies' EPR Program documentation since these programs are critical in guiding companies through adequate, effective and responsible emergency response, should a release occur. As Enbridge noted, the Board issued a letter to Enbridge on 29 March 2012, advising that the NEB had completed an Emergency Procedures Manual Critical Information Check. The Board highlighted the need for two revisions related to NEB contact information and the roles and responsibilities of the NEB and Transportation Safety Board during incidents. Enbridge committed to making these revisions.

The Board notes that Enbridge's EPR Program is currently in place and applicable to Line 9 in its current flow scheme. The Board is of the view that Enbridge's EPR Program documentation is appropriate and entirely applicable to any release, of any product, from the segment of Line 9, should it be reversed.

Under section 35 of the OPR-99, Enbridge is required to develop continuing education programs for police, fire departments, medical facilities, other appropriate organizations/agencies and the public residing adjacent to their pipelines about pipeline locations, potential emergency situations and the safety procedures to be followed. The Board notes Enbridge's description of its established Public Awareness Program, which serves to inform and educate the groups noted above, as per the OPR-99 requirements. The Board also notes that Enbridge provides contact information for anyone who may have questions or comments regarding emergency response procedures. The Board perceives this to be a potential avenue for continuous improvement and adaptation of Enbridge's EPR Program.

Public concern was raised regarding liability for property damage caused by a leak or rupture. Although the issue of liability is not typically discussed in the context of the Board's CEA Act EAs, the Board does note that Enbridge maintains insurance coverage for property damage occurring during operations, including for cleaning up and remediating damages caused by accidental pollutant releases.

8.2.2.5 Views of the Board on Significance

The Board notes Enbridge's significant and demonstrated experience in safely operating its extensive Canadian pipeline system, as well as the fact that it has designed the Project in accordance with CSA Z662-11.

Although one cannot guarantee that a leak or rupture would never occur on any pipeline, the Board is of the view that Enbridge has an appropriate set of systems, procedures and protocols in place to manage the risks associated with the integrity of Line 9 between SA and WT and to minimize the likelihood of a release occurring. It also has acceptable systems in place, and in development, for leak detection and spill minimization. Should a release occur, Enbridge's established EPR Program would be implemented.

The geographical extent of any potential release is impossible to determine at this time, but could range from being localized to more regional. Any release would likely have a short duration;

however, the potential effects of any release could endure until a full clean-up is completed. Depending on the affected bio-physical or socio-economic element, the potential effect could range from being completely reversible to irreversible. Even with regard to such uncertainties, the Board is of the view that, although a release could result in potential adverse environmental effects of high magnitude, the likelihood of a release occurring is low.

The NEB is of the view that, if the Project is approved and, taking into account Enbridge's implementation of its proposed environmental protection procedures and mitigation measures, and through its compliance with the Board's regulatory requirements and the recommendations included in Subsection 8.5, the potential adverse environmental effects of accidents and malfunctions are not likely to be significant.

8.3 Cumulative Effects Assessment

Cumulative effects assessment differs from conventional project-specific effect assessment by considering larger geographic study areas, longer time frames and interactions with other past, present and future projects or activities. The key difference between determining the significance of project-specific effects and cumulative effects is the added influence of those other projects and activities.

The Board considers cumulative effects by:

- First considering the environmental effects of a proposed project and whether, after the applicant implements mitigation, residual effects will remain.
- If no residual effects are predicted, further analysis of cumulative effects is not required.
- If residual effects are predicted, the Board considers the potential for those effects to interact with the residual effects of other projects and activities.
- If there are interactions, the combined effects are considered along with proposed mitigation, and a determination on the significance of the cumulative effect is made.

Construction Phase

For this Project, all construction activities would be confined to four existing fenced and graveled industrial sites. The Project involves modifications to, and additions and replacements of, various pieces of infrastructure within confined areas that are already heavily disturbed. No new disturbance outside of these sites is required and; therefore, the Project would not result in an increased industrial footprint.

The most likely residual effects related to Project construction are associated with unavoidable temporary and localized increases in air emissions (including GHGs) and noise levels due to the use of vehicles and equipment.

The associated effects of construction-related air emission and noise level increases are temporary (in the order of a few months) and relatively very minor in nature. Levels in both cases would return to the current baseline following construction completion. Any interactions of these effects with air emissions and noise levels from other projects and activities in the vicinity would also be temporary. Such unavoidable, temporary and relatively minor construction-related emissions (noise and air) would not meaningfully contribute to cumulative effects. The Board

does note that, with the exception of SA, all of the Project Sites are located in areas under rural/agricultural use where concentrated air emissions and noise levels from other activities are not expected. SA is surrounded by lands under industrial use where air emission and noise levels may be elevated on an ongoing basis such that the Project's temporary contribution would be very minor.

Operations Phase

Beyond the change in flow direction and operating pressures, Project operation would effectively remain unchanged from what Line 9 is currently authorized for. Operational noise levels are expected to remain unchanged, with the exception of those occurring during maintenance activities or line patrols. Limited operational air emissions would also be associated with these occasional activities. In the Board's view, although residual effects from these occasional emissions increases are likely, they would be relatively very minor and of short duration, and would not meaningfully contribute to cumulative effects.

Trace GHG emissions would likely escape from valves and fittings during pipeline operation; however, an improvement in these emissions could be realized following the replacement of older valves with newer ones. The Board does not consider that these trace GHG emissions would meaningfully contribute to cumulative effects.

Abandonment Phase

As noted in Subsection 4.3 of this draft ESR, the environmental effects of any abandonment plans would be assessed by the Board at such time when an application is filed. A cumulative effects assessment would be undertaken at that time, as appropriate.

Upstream / Downstream Activities

In response to comments from Équiterre and Environmental Defence, the Board explained in its Procedural Update No. 1 (dated 1 February 2012) that it would only consider upstream Alberta oil sands production in its cumulative effects assessment to the extent that these activities may interact with the potential residual effects of the Project. The Board finds that the Project and oil sands production are sufficiently geographically separated such that there would be no interactions between the residual environmental effects of the two.

Aamjiwnaang First Nation raised concerns about cumulative effects associated with air emissions in the Sarnia area, and specifically with regards to crude oil storage at SA as a result of the Project. The Board does not consider oil storage to be within the Scope of the EA. Storage currently occurs at SA and would continue to occur, should flow be reversed. Considering this, the Board's assessment of cumulative effects in this regard would be limited to the identified residual effects of the Project acting in combination with those from oil storage practices at Sarnia. The Board notes that pumping at SA would be electrically-driven. The most likely residual effects of the Project that would act in combination with oil storage are limited to those air emissions associated with construction activities and maintenance. The Board re-iterates its previously-expressed view that these temporary or occasional emissions would not meaningfully contribute to cumulative effects, given that they would be relatively very minor and of short duration.

The Board also re-iterates its decision within Procedural Update No. 1 that it is not considering the downstream consumption of oil transported by this segment of Line 9 within the cumulative effects assessment for the Project. Refining destinations are not likely to change as a result of the Project and the downstream use of refined oil would be not be any more identifiable than it is today. The potential for effects of downstream use to act cumulatively with any potential effects of the Project is too speculative to merit consideration.

Views of the Board on Significance

The Board finds that any adverse environmental effects that are likely to result from this Project in combination with other projects or activities that have been or will be carried out would be temporary, localized and/or minor in nature. Therefore, it is unlikely that there would be any significant cumulative environmental effects resulting from this Project.

8.4 CEA Act Follow-Up Program

The Project and its associated activities, including mitigation, are routine in nature and the identified potential adverse environmental effects are expected to be similar to those of past projects of a similar nature in a similar environment. For these reasons, the NEB is of the view that a follow-up program under the CEA Act would not be appropriate for this Project.

8.5 Recommendations

The Board proposes that, in any Order that it may grant, a condition be included requiring Enbridge to carry out all of the environmental protection and mitigation measures outlined in its application and subsequent submissions.

In addition, the Board also recommends that the following conditions form part of any NEB Order that may be granted for the construction and operation of the Project.

In these recommended conditions, the following terms are used:

“the Project” refers to Enbridge’s Line 9 Reversal Phase I Project, as described in Subsection 2.1 of the Scope of the EA (attached to this draft ESR as Appendix 1).

“commencing construction” includes groundbreaking and other forms of site preparation for the Project that may have an impact on the environment.

“applying for Leave to Open” means: making an application under section 47 of the NEB Act. The Board must then grant Leave to Open before Enbridge is allowed to flow product eastward.

“MOP” means: the maximum operating pressures as set out in Enbridge’s revised response to NEB IR 3.7b) i).

1. Enbridge must file with the Board, at least 15 days prior to commencing construction, the Project-specific Emergency Plan that would be implemented during the construction phase, and which includes complete spill contingency measures that Enbridge would employ in response to accidental spills attributable to construction activities.
2. Enbridge must file with the Board, at least 30 days prior to applying for Leave to Open the pipeline in the reversed direction, an updated Engineering Assessment, which includes a remaining life analysis for cracks, demonstrating that the pipeline between North Westover Pump Station and Sarnia Terminal is fit-for-service in the reversed flow direction at 5,281 kPa (766 psi). If Enbridge chooses to apply a different operating pressure for this analysis, please provide justification.
3. Based on the maximum operating pressure (MOP) and integrity status information used in the updated Engineering Assessment ([A2Q7D7](#)), prior to applying for Leave to Open the pipeline in the reversed direction, Enbridge must:
 - a) repair all the features that meet CSA Z662-11 repair criteria (depth and safety factor based on the MOP including the criterion for cracking depth equal to or greater than 40% nominal wall thickness) in the pipeline sections between Sarnia Terminal and Westover Terminal as identified by additional assessments and/or re-assessments committed to in the Project application;
 - b) repair the defects which triggered the current pressure restrictions specified in Enbridge's response to NEB Information Request 3.7 b), regardless of the existing operating pressure; and
 - c) file a report that includes, but is not limited to, a list of features repaired, feature sizes, safety factors prior to repair, and repair date.
4. Enbridge must submit to the Board, prior to applying for Leave to Open the pipeline in the reversed direction, a plan to manage cracking features in the pipeline section between North Westover Pump Station and Westover Terminal. This plan must include the timeline associated with the assessment methodology, and the rationale for selecting the timeline.
5. Enbridge must, within 365 days following the receipt of Board approval for Leave to Open the pipeline in the reversed direction, for the segment of pipeline between Sarnia Terminal and North Westover Pump Station:
 - a) run ILI tools capable of detecting, characterizing, and sizing cracking, metal loss, and geometry features using ultrasonic, high resolution Magnetic Flux Leakage and mechanical finger technologies, respectively;
 - b) repair or mitigate, through measures such as excavations and pressure restrictions, all features, identified by these latest ILI runs, that meet CSA Z662-11 repair criteria (depth and safety factor based on the approved MOP including the criterion for cracking depth no greater than 40% nominal wall thickness);
 - c) conduct a statistically representative field validation and investigative dig program

- to assess the detection, characterization and sizing performance of these latest ILIs;
- d) using the new ILI data, review the integrity status of cased crossings, specifically the ones not monitored by the Cathodic Protection program; and
 - e) file with the Board, a report of Enbridge's findings resulting from a), b), c) and d), which demonstrates the pipeline segment's continued fitness-for-service. This should include, but is not limited to, the identified remaining features, their locations (mile post and km post), and their safety factors.
6. Enbridge must file with the Board, within 365 days following the receipt of Board approval for Leave to Open the pipeline in the reversed direction, a proposed long-term integrity improvement plan to mitigate and monitor remaining ILI-reported corrosion (internal and external), geometry and cracking features in the pipeline sections between Sarnia Terminal and Westover Terminal indicating, but not limited to, their timelines, the rationale for selecting those features, and the planned re-inspection interval.
7. Enbridge must file with the Board, at least 60 days prior to applying for Leave to Open the pipeline in the reversed direction, the LDS manual for the Project. The LDS manual must include, but not be limited to, the following:
- a) senior management policy and commitment to leak detection;
 - b) the roles, responsibilities, and authorities of personnel in the event of a suspected leak;
 - c) the theory and rationale for each LDS design and application;
 - d) the methodology and instrument requirements;
 - e) performance indicators such as the accuracy, reliability, and sensitivity of the LDS;
 - f) leak alarms and diagnostic messaging as well as related procedures;
 - g) any information to be provided by the LDS to assist in operating the LDS and responding to any potential leak;
 - h) the estimated maximum amount of product released before a leak is detected;
 - i) the process to be followed with respect to the continuous improvement, non conformity, audits and corrective protocols;
 - j) the procedures for LDS record keeping, training, and performance evaluation; and
 - k) the plan for maintenance, testing methods (i.e., simulated signal, fluid withdrawal, etc.), and frequency of testing.

9.0 THE NEB'S CONCLUSION

Pursuant to the CEA Act, the NEB has determined that, if the Project is approved and, taking in account Enbridge's implementation of its proposed environmental protection procedures and mitigation measures, and through its compliance with the Board's regulatory requirements and the recommendations included in this draft ESR, the Project is not likely to cause significant adverse environmental effects.

10.0 NEB CONTACT

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APPENDIX 1: Scope of the EA

**Enbridge Pipelines Inc. (Enbridge)
Line 9 Reversal Phase I Project (Project)
Scope of the Environmental Assessment (EA)
Pursuant to the *Canadian Environmental Assessment Act* (CEA Act)**

1.0 INTRODUCTION

Enbridge is proposing to construct and operate the Project, which would require an Order pursuant to section 58 of the *National Energy Board Act* (NEB Act). The Project would also be subject to a screening level of EA under the CEA Act.

On 8 August 2011, Enbridge filed its Project application with the National Energy Board (NEB).

On 24 August 2011, the NEB sent out notification pursuant to section 5 of the *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements* (Federal Coordination Regulations). In response, Environment Canada identified itself as a Federal Authority in possession of specialist or expert information or knowledge in respect of the EA of the Project. No other Responsible Authorities were identified.

The Province of Ontario was also notified of the Project.

The scope of this EA was established by the NEB, after consulting with the Federal Authority, in accordance with the CEA Act and the Federal Coordination Regulations.

2.0 SCOPE OF THE ASSESSMENT

2.1 Scope of the Project

The scope of the Project for the purposes of the EA includes the various components of the Project as described by Enbridge in its 8 August 2011 Project application, as submitted to the NEB. The physical activities include construction, operation, maintenance and foreseeable changes, and reclamation, including physical works described in greater detail in the application. [Section A.2.3](#) of the NEB's Filing Manual provides additional information on how the NEB determines the scope of the Project.

The Project is defined as the additions and modifications required to allow the reversal of crude oil flow within the segment of the existing 762 millimetre (30-inch) outside diameter Line 9 between Sarnia Terminal and North Westover Station, in southwestern Ontario. These additions and modifications are related to pumps, piping, valves, a pig trap, and densitometers at Sarnia Terminal, North Westover Station, Westover Terminal and at a location 4.12 km west of North Westover Station. A new electrical building would also be built at Westover Terminal.

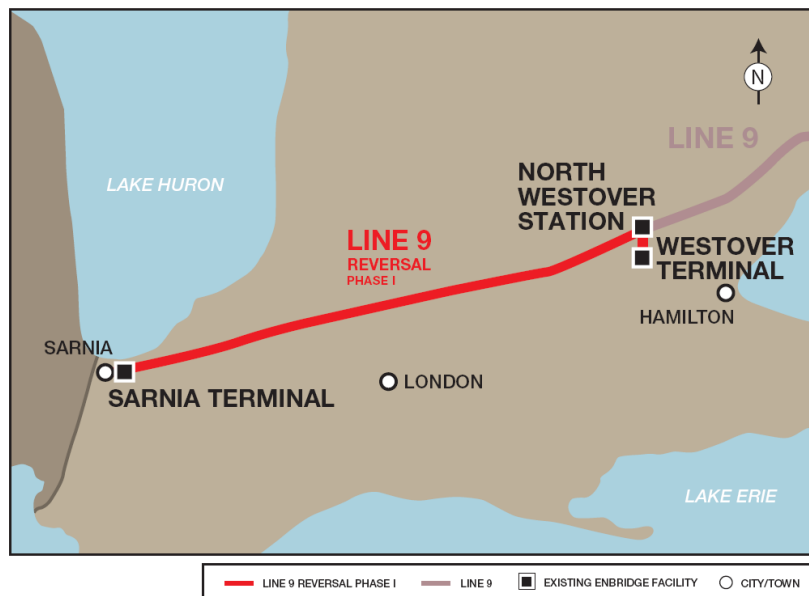
Line 9 currently transports crude oil in a westward direction, with deliveries from Montreal Terminal flowing through North Westover Station and onward to either Sarnia Terminal or Westover Terminal. In the reversed direction (eastward), crude oil would be delivered to

Westover Terminal from Sarnia Terminal. The bi-directional capability for Line 9 to flow westward in the future would be maintained by ensuring that necessary piping and instrumentation is in place.

All proposed work would take place on existing Enbridge facilities and surface leases, with no planned ground disturbance along the pipeline right-of-way itself.

See Figure 1 below for a map of the proposed Project, as provided by Enbridge in its Project application.

Figure 1 – Project Map



Any works and activities associated with decommissioning or abandonment would be subject to future examination under the NEB Act and the CEA Act.

2.2 Factors to be Considered

The EA will include a consideration of the following factors listed in paragraphs 16(1)(a) to (d) of the CEA Act:

- (a) the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects¹ that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- (b) the significance of the effects referred to in paragraph (a);

¹ [Section A.2.7](#) of the NEB's Filing Manual provides additional information on how the NEB considers cumulative effects.

- (c) comments from the public that are received during the EA process; and
- (d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project.

For further clarity, subsection 2(1) of the CEA Act defines ‘environmental effect’ as, in respect of a project:

- (a) any change that the project may cause in the environment, including any change that the project may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of the *Species at Risk Act*;
 - (b) any effect of any change referred to in paragraph (a) on
 - i. health and socio economic conditions,
 - ii. physical and cultural heritage,
 - iii. the current use of lands and resources for traditional purposes by aboriginal persons, or
 - iv. any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance, or
 - (c) any change to the project that may be caused by the environment,
- whether any such change or effect occurs within or outside Canada.

2.3 Scope of the Factors to be Considered

The EA will consider the potential effects of the proposed Project within spatial and temporal boundaries within which the Project may potentially interact with, and have an effect on components of the environment. These boundaries will vary with the issues and factors considered, and will include but not be limited to:

- construction, operation and site reclamation, as well as any other undertakings proposed by Enbridge or that are likely to be carried out in relation to the physical works proposed by Enbridge, including mitigation and habitat replacement measures;
- seasonal or other natural variations of a population or ecological component;
- any sensitive life cycle phases of species (e.g., wildlife, vegetation) in relation to the timing of Project activities;
- the time required for an effect to become evident;
- the area within which a population or ecological component functions; and
- the area affected by the Project.

As indicated above, the EA will consider cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out.