Transport Canada Transports Canada

A new **bridge** for the St. Lawrence

Environmental Assessment

Screening Report

August 2013

Canada

Transport Canada

New Bridge for the St. Lawrence Environmental Assessment

Screening Report

August 2013

TC Ref.: T8080-110362
Dessau Ref.: 068-P-0000810-0-00-110-01-EN-R-0007-00

EXECUTIVE SUMMARY

This Screening Report is a consolidation of the *Environmental Assessment Summary Report, Project Description and Description of the Environment – March 2013* and the *Environmental Assessment Summary Report, Assessment of Effects and Mitigation Measures – August 2013*.

Given the conclusions of expert reports regarding the current state of deterioration of the bridge and the increasing estimated cost of maintenance to maintain required safety levels, Transport Canada has decided to build a new bridge (hereafter referred to as the "New Bridge for the St. Lawrence") to replace the components of the existing Champlain Bridge.

At its launch, the project for the New Bridge for the St. Lawrence was subject to the former *Canadian Environmental Assessment Act,* S.C. 1992, c. 37 (CEAA). Although the former CEAA was replaced in 2012, a transitional provision means that this environmental assessment (EA) will continue under the former CEAA. Transport Canada, Fisheries and Oceans Canada and Environment Canada are the responsible authorities for this EA.

The project being assessed in this EA comprises the following components: construction of the New Bridge for the St. Lawrence and the Nuns' Island Bridge, reconstruction and expansion of Highway 15, road work on Nuns' Island, alignment with Highway 10 on the South Shore and deconstruction of the existing Champlain and Nuns' Island Bridges. Pre-construction and post-construction work as well as project operations have also been considered in the EA.

With respect to the description of the physical environment, the presence of soil and groundwater termed "contaminated" has been noted in certain areas of the project. Regarding surface water, water quality in the St. Lawrence River has been monitored since the 1980s. There is no sampling station in the study area: however, stations are located upstream and downstream. According to analyses, none of the measured parameters exceeded the water quality criteria for the protection of aquatic life. With respect to air quality, despite the direct and indirect effects of transport-related pollution on quality of life and human health, current conditions for both criteria air pollutants (CAP) and greenhouse gases leave reason to believe that air quality is not a significant issue for this project.

With respect to the description of the biological environment, although they have not all been observed in the study area, there are five special status fish species that could potentially be found in that area. The American eel, the chain pickerel, the lake sturgeon and the rosyface shiner are all likely to be designated threatened or vulnerable at the provincial level while the American shad is designated as vulnerable at the provincial level. The presence of the brown snake is the sole noteworthy element with regard to reptiles. The brown snake is likely to be designated threatened or vulnerable in Quebec. One bird species is worth mentioning, the peregrine falcon was observed during inventories and nests on the existing bridge. This species is designated vulnerable by Quebec and has the status of a species of special concern under the *Species at Risk Act*. The

study area is characterized by the presence of a migratory bird sanctuary, protected under federal jurisdiction, called "Couvée Island". However, the colony of ring-billed gulls that was known to frequent this island has been in steady decline in recent decades. The study area also includes a waterfowl concentration area, La Prairie Basin, Nuns' Island. Finally, regarding flora, the floristic inventories identified two species of horehound likely to be designated threatened or vulnerable, the St. Lawrence waterhorehound and the rough waterhorehound.

With respect to the description of the human environment, the Kahnawake Aboriginal community is located about 10 kilometres southwest of the New Bridge for the St. Lawrence right-of-way. There is no commercial fishing in the study area; however, sportfishing is permitted over the entire body of water. Within the study area, the St. Lawrence River with the exception of the Seaway, is not suitable for navigation. The study area includes at least 15 bike paths. There is also a residential development on Nuns' Island very near the right-of-way proposed for the new bridge. Lastly, there are two sites of archaeological interest on Nuns' Island, one of which is within the right-of-way proposed for the new bridge.

To identify the potential effects of the project, the relationships between the various project phases and the environmental components were established. For each effect, the significance of the effect was assessed according to three parameters, intensity, duration and scope. Mitigation measures were identified to reduce the significance of the effects and ensure that the residual effects are not significant within the meaning of the CEAA.

Because the project design is at the preliminary phase, a number of environmental effects will be considered during the upcoming design phases in order to reduce the impacts during the work. Additional studies are also planned during the process to refine the analysis of certain effects.

In terms of the physical environment, the main effects have to do with soil, groundwater and surface water quality. Because of soil and groundwater contamination, measures must be implemented to avoid the spread of contaminants into the environment. As a large proportion of the construction work will take place in or near the water, a number of mitigation measures must be put in place to limit dispersal of suspended solids and contaminants in the water. Water quality will be monitored throughout the work to ensure that requirements are met. In short, the effects on the physical environment are considered non-significant once the proposed mitigation measures are taken into account. As for air quality and greenhouse gases, measures will be taken to mitigate the effects during the construction phase. For the operations phase, the changes in atmospheric emissions can be established at the subsequent design stages, once the supply and configuration of mass transit options are known.

During construction of the structures, there is a danger that wetlands along the riverbank will be disrupted. Measures must be taken to limit such losses and a compensation project for the ecological functions must be developed. Effects on the fish habitat, migratory birds and endangered species are expected during the construction and deconstruction phases. The project

may result in the disruption, deterioration and loss of fish habitats that are deemed sensitive. A compensation program will be required to mitigate those effects, where applicable. Nesting of migratory birds may be disturbed during the work. Restriction periods will be in effect in order to minimize the disruptions. Species at risk (peregrine falcon and American eel) may also be impacted by the project. The peregrine falcon nesting site will have to be relocated, however the river currents near the work are not expected to prevent eel migration. Species with provincial status are also found in the area. Specific measures will have to be taken to mitigate the effects on the brown snake, lake sturgeon, American shad, chain pickerel and rosyface shiner. Once the mitigation measures and compensation projects are taken into account, the effects on the biological environment are considered non-significant.

In terms of the human environment, the main effects will be on the sound environment and archeology. The surrounding sound environment will be affected both by the construction work and by operation of the infrastructure. Considering the sensitive areas, noise mitigation measures are planned for both phases. A noise management program must be in place from the outset of the work in order to comply with requirements. Because there is a recognized archeological site at the foot of the bridge, measures will have to be taken to preserve the integrity of the remains. The environmental effects on the human environment are considered non-significant once the mitigation measures are taken into account.

An analysis of the cumulative effects and the effects of the environment on the project has also shown that the project does not have significant residual effects. An emergency response plan will also have to be implemented to limit the effects of accidents and malfunctions.

To ensure that environmental requirements are met, Transport Canada and the private partner will have to put in place an environmental management system, whereby monitoring and supervision of mitigation measures and the performance objectives set during the environmental assessment will be ensured, providing accountability, where necessary.

Based on the information contained in this report, the responsible authorities are in a position to make a decision pursuant to subsection 20(1) of the CEAA.

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Ownership and Confidentiality

LIST OF ACRONYMS

AADT	Average annual daily traffic
AARQ	Atlas des amphibiens et des reptiles du Québec (Atlas of Amphibians and Reptiles of Quebec)
ACOA	Aire de concentration des oiseaux aquatiques (Waterfowl concentration area)
ADM	Aéroports de Montréal (Montreal Airports Authority)
AMQ	Association maritime du Québec (Quebec Marine Association)
AMT	Agence métropolitaine de transport (Montreal's Transportation Agency)
ASDT	Average summer daily traffic
BAnQ	Bibliothèque et Archives nationales du Québec (Quebec National Library and Archives)
BRT	Bus rapid transit
CAP	Criteria air pollutants
CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers of the Environment
CD	Chart datum
CDPNQ	Centre de données sur le patrimoine naturel du Québec (Quebec Natural Heritage Data Centre)
CEAA	Canadian Environmental Assessment Agency
CEAA	*Canadian Environmental Assessment Act, S.C. 1992, c. 37*
CEAA (2012)	*Canadian Environmental Assessment Act, S.C. 2012, c. 19, s*. 52
CFE	Concentration of frequent effects
CIS	Canadian Ice Service
CMM	Communauté métropolitaine de Montréal (Montreal Metropolitan Community)
CN	Canadian National
COE	Concentration of occasional effects
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Ct	Total concentration
CWS	Environment Canada's Canadian Wildlife Service
DBH	Diameter at breast height

DFO	Department of Fisheries and Oceans
DRTL	Dedicated rapid transit lane
EA	Environmental assessment
EC	Environment Canada
ÉPOQ	Étude des populations d'oiseaux du Québec (Study of Bird Populations in Quebec)
FHWA	Federal Highway Administration (United States of America)
GHG	Greenhouse gases
GPS	Global positioning system
GTR	Grand Trunk Railway System
ISAQ	Inventaire des sites archéologiques du Québec (Inventory of Archeological Sites in Quebec)
ISDM	Integrated science data management
ITS	Intelligent transportation system
JCCBI	Jacques Cartier and Champlain Bridges Incorporated
LAC	Library and Archives Canada
LQE	*Loi sur la qualité de l'environnement* (Quebec *Environment Quality Act*)
LRT	Light rail transit
MAMROT	Ministère des Affaires municipales, des Régions et de l'Occupation du territoire (Quebec Ministry of Municipal Affairs, Regions and Land Occupancy)
MBS	Migratory bird sanctuary
MCCCF	Ministère de la Culture, des Communications et de la Condition féminine du Québec (Quebec Ministry of Culture, Communications and the Status of Women)
MDDEFP	Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs (Quebec Ministry of Sustainable Development, Environment, Wildlife and Parks)
MDDEP	Ministère du Développement durable, de l'Environnement et des Parcs (Quebec Ministry of Sustainable Development, Environment and Parks)
MEL	Minimal effect level
MRN	Ministère des Ressources naturelles (Quebec Ministry of Natural Resources)
MRNF	Ministère des Ressources naturelles et de la Faune (Quebec Ministry of Natural Resources and Wildlife)

MSL	Mean sea level
MTQ	Ministère des Transports du Québec (Quebec Ministry of Transport)
OME	Ontario Ministry of the Environment
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyl
PET-A	Pierre Elliott Trudeau Airport
PH	Petroleum hydrocarbons
RESIE	Rejet dans les eaux de surface et infiltration à l'égout (surface water outfall and sewer)
RPCQ	Répertoire du patrimoine culturel du Québec (Cultural Heritage Inventory for Quebec)
SLSMC	St. Lawrence Seaway Management Corporation
SS	Suspended solids
TC	Transport Canada
TDG	Transportation of dangerous goods
TOC	Total organic carbon
VEC	Valued ecosystem/environmental component
VSP	Segments on piers
ZIP	Zone d'intervention prioritaire (priority intervention zone)

GLOSSARY

Abscissa:	Coordinate used to express the position of a point on the x-axis of a Cartesian coordinate system.
Abutment:	Support structure located at the end of a bridge which also links the structure to the land.
Air draught:	Vertical distance between the waterline and the highest point of a ship structure: the masthead.
Alluvial meadow:	Piece of land primarily comprised of sedimentary particles transported and deposited by running water (alluvium).
Anaerobic environment:	Environment totally devoid of oxygen.
Anthropic:	Relating to human activity.
Anuran:	Amphibian destitute of a tail in the adult form (e.g.: frogs).
Aquatic plant community:	Sea or riverbed with vegetation.
Aquifer:	Geological formation that stores water temporarily or permanently.
Ash stand:	Area planted with ash trees.
Avian fauna:	See avifauna.
Avifauna:	All species of birds in a given region.
Basal area:	The basal area of a stand of trees is the surface area of all cross-sections of the trunks of the trees over a hectare of forest, measured at 1.30 metres high. It is expressed in m^2/ha for tree stands and is calculated using a factor 2 forest prism.
Bathymetric chart:	A hydrographic map showing the contours of submerged areas of the sea floor or lake beds and sometimes riverbeds.
Bathymetry:	Measurement of water depths to determine the topography of sea or riverbeds.
Berm:	Bank developed at the bottom of a cut or fill slope to ensure its stability and potentially used for signage.
Biodiversity:	All living organisms in a given region considered in terms of variety of species, variability within each species and variability of ecosystems.
Bordering:	Located at the border of a country or region.
Buffer zone:	Controlled outlying area of an ecological reserve that serves as a transition between the reserve (partially or fully restricted) and the occupied space.
Calcicole:	Plant that grows well in calcium-rich or calcareous soil.

Cantilever:	Bridge whose main beams extend beyond and overhang and in turn support a shorter beam.
Catostomidae:	Family of freshwater fish closely related to minnows.
Centrarchidae:	Family of fish including types of sunfish.
Chloride:	Combination of chlorine and another non-oxygen element.
Chlorophyll a:	Green pigment in plants, principal element in photosynthesis.
Civil engineering structures:	Bridges and crossing structures.
Climate change:	Changes in climate that are directly or indirectly attributed to a human activity that alters the composition of the Earth's atmosphere and exacerbates the natural variability of the climate observed over comparable periods of time.
Coffer-dam:	Temporary dam used to allow work to be done below water level.
Conductivity:	Opposite of resistivity, measurement of which makes it possible to determine overall mineralization of water.
Cutaneous:	Relating to the skin.
Cyprinidae:	Family of freshwater fish including carp, barbel and chub.
Deck:	Horizontal part of the frame of a bridge located beneath the roadway.
Diameter at breast height:	The diameter at breast height (DBH) of a tree trunk is measured at 1.30 metres above the ground.
Downstream:	Occurring after the bridge, in the direction from which water is moving.
Draught:	Quantity or volume of water displaced by a ship.
Ecotoxicity:	Nature of a substance that is toxic to living organisms and their environment.
Expansion joint:	Joint between various parts of a structure to allow differential horizontal and vertical movements.
Factor 2 prism:	A factor 2 forest prism is a precise optical instrument designed especially to measure the basal area of a stand of trees. This measurement instrument is made of angled optical glass that bends light and produces an offset image. The number of trees offset is multiplied by a factor of two to obtain the basal area.
Fecal coliforms:	Bacteria of fecal origin.
Federal land:	Land that is the sole property of the State.
Fish fauna:	See Ichthyofauna.
Fish guild:	Group of fish species having the same need for a given activity, such as spawning or nurseries.

Flat:	Piece of land that is relatively level, without a defined water flow network, forming a transition between a relief and a valley bottom or body of water.
Food chain:	Sequence of organisms in which each becomes food for an organism higher in the same sequence.
Forest litter:	Any organic plant matter, including litter and unincorporated humus, covering the mineral soil under forest vegetation.
Fyke net:	A net held in a tube by a few hoops that get smaller by degrees allowing the animal to reach the end, where it is held by cones that keep it from passing through.
Geomatics:	Discipline involving managing and using sciences and technologies to acquire, store, process and distribute geographic data.
Glacial till:	Deposit left by an unsolidified glacier.
Granulometric:	Expression of the distribution of a fragmented material into the various granulometric classes comprising it.
Hard water:	Water containing a greal deal of calcium in bicarbonate form.
Heavy lift derrick:	Assembly of two or three poles whose lower ends are spread out and which are fastened at the upper ends to support a hoist for lifting heavy loads.
Herbaceous field:	Field dominated by natural herbaceous vegetation, may be used extensively or uncultivated.
Herpetofauna:	All reptiles and amphibians found in an area.
Heterogeneous:	Made up of elements differing in nature and form.
Hibernaculum:	Winter habitat of certain small animals and insects.
Hoist:	Lifting device that is usually suspended and serves to move loads vertically from a fixed or mobile position.
Hydraulic regime:	All variations in the state and characteristics of an aquatic formation that repeat regularly in time and space and go through cyclical (e.g.: seasonal) variations.
Hydraulicity:	Relationship between the annual average flow (module) for one year and the module calculated over a longer period, designed to characterize the abundance of flow of running water for that particular year.
Hydrodynamic regime:	All of the sedimentary parameters, e.g.: erosion, transportation of solid matter and sedimentation, that change according to the season, flow, tides, wind and ice.
Hydrogeological:	Related to hydrogeology, the circulation of water in the subsoil.
Hydrographic chart:	A chart primarily designed to show the topography of a submerged area of land, but also generally showing above-water elements.
Hydrometric station:	A facility for measuring elevation and a section for measuring flow of a channel.

Ice control structure:	The Champlain Bridge ice control structure is a structure located upstream of and parallel to the bridge which controls the formation of ice jams in the La Prairie Basin and thus facilitates shipping.
Ice jam:	Obstruction of a watercourse by an accumulation of ice.
Ichthyofauna:	All species of fish forming a population.
Iconographical:	Relating to the study of artistic representations of a subject, sometimes using various media (painting, sculpture, etc.).
Invertebrate:	Animals that do not have a spinal column, such as insects and mollusks.
Jetty:	Construction forming a roadbed extending into the water in order to provide access to a work site or the other riverbank.
Juvenile:	Animal below reproductive age, distinguished from adults by its external features.
Lacustrine:	Of or relating to lakes.
Laminar:	Characterizing a flow that is not turbulent.
Launching equipment:	Temporary steel structures used to guide a civil engineering structure during launching.
Lentic:	Characterizing freshwater in which the water circulates slowly or not at all (lakes, ponds, canals, etc.).
Leq_T:	Equivalent continuous noise level. This parameter corresponds to the level of continuous noise with the same sound energy as discontinuous noise during a time interval (T). It therefore makes it possible to take into account dynamic fluctuations in noise level. The parameter is largely used in environmental noise, because noise sources are often variable, such as the noise generated by vehicles travelling over highway infrastructures.
$L_{X\%}$:	Statistical noise parameters. Statistical analysis makes it possible to measure variations in noise levels for an analysis period. The statistical values are usually indicated as a percentage of the measurement period. The values commonly used are: L1%, L10%, L50%, L90%, L95% and L99%. For instance, L1% is the noise level reached or exceeded during 1% of the analysis period, i.e. for 1% of the time, the noise level was above this value and for 99% of the time, the noise level was below that value.
Lithic:	Containing debris from rocks (generally crystalline) recognizable as rocks.
Lithopelagic species:	Species that spawn on a substrate of coarse sand, gravel or rock, whose eggs or larvae become pelagic as they develop.
Lithophil:	Describes chemical elements that have a great affinity for oxygen and halogens that are preferably found in the lithosphere.
Lithophilous species:	Species that spawn on a coarse substrate (gravel, rock, blocks) or in fast-flowing water.

Low-water period:	Period when the minimum level of a watercourse is observed.
Macrophyte:	Large aquatic plant.
Median:	In a series of data in order of size, the figure in the middle of the series, dividing the two series in equal halves.
Multi-use path:	Lane intended for use by cyclists, pedestrians, roller-bladers and others using non-motorized forms of transportation on a dedicated site or separated from motor traffic by a physical barrier.
Navigation clearance:	Maximum space provided by a navigable waterway for passage of vessels.
Nitrate:	Common name for sodium nitrate.
Nitrite:	Salt of nitrous acid.
Noise barrier:	Screen of varying compositions that make it possible to reduce noise levels perceived.
Nursery area:	Habitat in which fish larvae (fry) absorb their yolk sac and move into another development stage.
Organochlorine:	A chlorine derivative product.
Ornithological:	Relating to the study of birds.
Orthophosphate:	Phosphorus compound (acid or salt) characterized by the following radicals: $H_2PO_4^{1-}$, HPO_4^{2-} or PO_4^{3-}.
Palustrine:	Relating to marshes or marsh-like environments.
Pelagic species:	Species that spawn in the water column.
Percidae:	Member of a family of bony fish such as perch.
Photo-interpretation:	Thematic study of an aerial or space-based image, photographic or non-photographic, carried out based on a previous analysis of information obtained by photo-identification.
Physicochemical:	Relating to physicochemistry, the science of the physical and chemical properties of matter.
Phytolithophilous species:	Species that spawn on varied material beds, organic or not, with vegetation present.
Pier:	Intermediate supports of a bridge's deck.
Piezometric contour:	Contour line joining points in which the groundwater table is the same altitude.
Plankton community:	Community of all microscopic organisms suspended in sea or freshwater.
Poplar stand:	Area planted with poplar trees.
Portal cap beam:	Horizontal piece at the top of one or more posts and serving to support the deck of a bridge.

Prestressed concrete:	Concrete cast around tensioned steel cables placed under permanent stress in the opposite direction of that of the loads that will be applied to it.
Private partner:	Company that takes responsibility for completing and operating the New Bridge for the St. Lawrence. The private partner will be supported by contractors during the construction period.
River sand:	Sand carried by a watercourse, characterized by specific forms related to transportation capacity, erosion and sedimentation of the watercourse.
Roundabout:	Intersection in which traffic flows in a continuous circle in one direction around a central island.
Sapropel:	Fine sediment containing organic matter that is transformed by the action of anaerobic bacteria in the reducing environment formed by calm water depths, which produces methane and hydrogen sulfide in particular.
Scrubland:	Vegetation dominated by shrubs greater than 10 cm in height.
Sedimentation hydrodynamics:	Movement of sedimentary particles caused by a waterway (saltation, sedimentation, traction, etc.).
Segment:	Part of a prestressed concrete structure built using balanced cantilevers.
Seismic analysis:	Analysis relating to earthquakes.
Sheet pile:	Wood, steel or concrete piece in thin sections with grooves enabling them to be interlaced.
Silicate:	Silica in combination with various metallic oxide minerals.
Silt:	Very fine moving detrital sediment or mineral of organic/mineral origin with grains less than 0.06 mm in diameter.
Silt:	General term designating any fine deposit (grains equal to or smaller than 64 µm), that is engorged with water and sinks easily.
Snake cover board:	Cover made of shingles and used to inventory reptiles and amphibians.
Spawning area:	Area of an aquatic environment where spawning and fertilization of the eggs of an animal species takes place.
Spawning ground:	An aquatic area where a species of fish lays and fertilizes its eggs.
Standard deviation	Measure of the dispersion of a set of data in relation to the mean.
Stratigraphic:	Relating to stratigraphy, the study of layers of the Earth's crust.
Substrate:	Layer that serves or onced served as a support.
Survey:	In the archeological sense, a local exploration technique used in an area to detect the presence of relevant and useable elements from an historical standpoint.

Terrestrial herbaceous graminoid:	Land-based plant of the grass family.
Topography:	Configuration of the land surface.
Toponymy:	Relating to the study of the origin and form of place names.
Transect:	Narrow line or strip that crosses a given environment, along which are located observation, measurement or sampling stations that make it possible to analyze, profile or map the environment.
Tributary:	Watercourse that empties into a larger watercourse or lake.
Turbidity:	Characteristic of water with reduced transparency due to the presence of fine suspended particles of natural origin or due to pollutants.
Typology:	Systematic classification of individuals according to certain physical or behavioural characteristics.
Underwashing:	Process of erosion of the soil forming the bed of a watercourse, which intensifies during high-water periods, particularly beneath bridge piers.
Unwatered:	Removed from or above water (a place previously inundated).
Upstream:	Occurring before the bridge, in the direction from which water is moving.
Water table:	Surface level of groundwater with or without flow from the outside.
Wind erosion:	Change in the landform caused by the wind.

1 INTRODUCTION

The following reports[1] have been prepared for the purposes of this environmental assessment:

- *Environmental Assessment, Part I, Sections 1 to 4, Project Description and Description of the Environment, Final Version – March 2013* (referred to hereafter as Part I of the Environmental Assessment, Full Report);
- *Environmental Assessment, Summary Report, Project Description and Description of the Environment – March 2013* (a synthesis of Part I of the Environmental Assessment, Full Report, and referred to hereafter as Part I of the Environmental Assessment, Summary Report);
- *Environmental Assessment, Part II,Sections 5 to 13, Assessment of Effects and Mitigation Measures, Preliminary Version – August 2013* (referred to hereafter as Part II of the Environmental Assessment, Full Report);
- *Environmental Assessment, Summary Report, Assessment of Effects and Mitigation Measures – August 2013* (a synthesis of Part II of the Environmental Assessment, Full Report, and referred to hereafter as Part II of the Environmental Assessment, Summary Report);
- *Environmental Assessment, Screening Report – August 2013* (this report, a consolidation of Part I of the Environmental Assessment, Summary Report and Part II of the Environmental Assessment, Summary Report, and referred to hereafter as the Screening Report).

The decisions made by the responsible authorities (Transport Canada, Fisheries and Oceans Canada and Environment Canada) pursuant to subsection 20(1) of the *Canadian Environmental Assessment Act* (CEAA) are based on Part I of the environmental assessment, Full Report and Part II of the environmental assessment, Full Report.

Part I of the environmental assessment, Full Report and Part II of the environmental assessment, Full Report take precedence over all other reports, including this Screening Report, that have been published as part of this environmental assessment.

The Screening Report is designed to support decision making pursuant to subsection 20(1) of the CEAA. Appendix 1 provides an overview of the various reports produced for this environmental assessment, which served in preparing this Screening Report.

Details concerning elements associated with the project components presented in this report are for information purposes only. This project description does not constitute the proponent's final decision. These elements may be modified based on the results of this environmental assessment and on the evolution of the concept for the New Bridge for the St. Lawrence.

Blank pages have been inserted intentionally to facilitate printing and reading of the report.

[1] **All of the documentation is available on the Web site of the Canadian Environmental Assessment Agency at the following link: http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=65574&type=5**

1.1 PROJECT BACKGROUND AND LOCATION

The Champlain Bridge has been in operation since 1962 and is one of the busiest bridges in Canada. It provides a link between the Island of Montreal and the South Shore, the eastern United States and western North America. It is also an important route for transporting freight and a strategic link in the Port of Montreal transportation network, which has an area of influence extending as far as the American Midwest (Transport Canada, 2012a).

Given the conclusions of expert reports regarding the current state of deterioration of the bridge and the increasing estimated costs of maintenance to maintain required safety levels, Transport Canada has decided to build a new bridge (hereafter referred to as the "New Bridge for the St. Lawrence") to replace the components of the existing Champlain Bridge.

As such, the Champlain Bridge will be kept in operation for another 10 years while the New Bridge for the St. Lawrence is built. It will then be dismantled in sections.

The Nuns' Island Bridge, built in 1960, sits alongside Champlain Bridge and connects the Island of Montreal and Nuns' Island. The Nuns' Island Bridge has also reached the end of its useful life. Replacement of Nuns' Island Bridge is also therefore unavoidable. It will be deconstructed and a new bridge built in the same location. The corridor of the New Bridge for the St. Lawrence also includes the federal portion of Highway 15 and the Highway 10 bridge approach on the South Shore.

The new bridge for the St. Lawrence will be built approximately 10 metres downstream (to the north) of the Champlain Bridge in order to minimize the impact of the new route on Nuns' Island, facilitate temporary installation work during construction, facilitate the connection to the existing transportation network and protect the temporary structures from ice. The study area identified for the project covers an area around the existing and planned bridges that is sufficiently broad to take into the potential direct and indirect effects that the project may cause. The corridor for the New Bridge for the St. Lawrence project is shown in Figure 1.

1.2 LEGAL FRAMEWORK FOR THE ENVIRONMENTAL ASSESSMENT

1.2.1 CEAA (2012)

The new *Canadian Environmental Assessment Act* (2012), S.C. 2012, c. 19, s. 52 (CEAA (2012) was enacted on June 29, 2012 and came into effect on July 6, 2012. The CEAA (2012) offers an updated, modern approach that responds to Canada's current economic and environmental context. It implements central elements of the Government's plan for Responsible Resource Development to modernize the regulatory system and allow for natural resources to be developed in a responsible and timely way for the benefit of all Canadians (CEAA, 2012.). It focuses on federal areas of jurisdiction and consequently on the potential adverse environmental effects that

are within federal jurisdiction. Projects falling under CEAA (2012) for the purposes of environmental assessment are generally those that are "designated" by the Act.

On July 6, 2012, the Minister for the Environment designated the New Bridge for the St. Lawrence project, on which the environmental assessment process had begun under the former CEAA, pursuant to subsections 14(2) and 124(2) of CEAA (2012). The environmental assessment was therefore carried out under the CEAA.

1.2.2 CEAA

In light of the Minister of the Environment's decision to continue the environmental assessment of the New Bridge for the St. Lawrence under CEAA, this section explains why screening was selected as the method of environmental assessment for the project.

The primary purpose of CEAA is to ensure that projects are considered in a careful and precautionary manner before federal authorities take action in connection with them, in order to ensure that such projects do not cause significant adverse environmental effects. CEAA is intended to encourage responsible authorities to take actions that promote sustainable development and thereby achieve or maintain a healthy environment and a healthy economy, to promote cooperation between federal and provincial governments and to eliminate unnecessary duplication in the environmental assessment process.

CEAA applies to projects involving undertaking (including construction, operation, modification, decommissioning or abandonment) a physical work or physical activity not relating to a physical work that is prescribed or is within a class of physical activities that is prescribed pursuant to regulations made under paragraph 59*(b)* of the Act.

The New Bridge for the St. Lawrence project involves the undertaking and decommissioning of physical works, i.e. construction of the new bridge and deconstruction of the Champlain Bridge, the reconstruction of the Nuns' Island Bridge, reconstruction and expansion of Highway 15, modification of Highway 10 and the on- and off-ramps for Nuns' Island, as well as realignment of the Highway approach to the Bridge from the South Shore. The project meets the definition of "project' within the meaning of subsection 2(1) of CEAA 2003, and is not an excluded project as provided for in section 7 of CEAA and the 2007 *Exclusion List Regulations*.

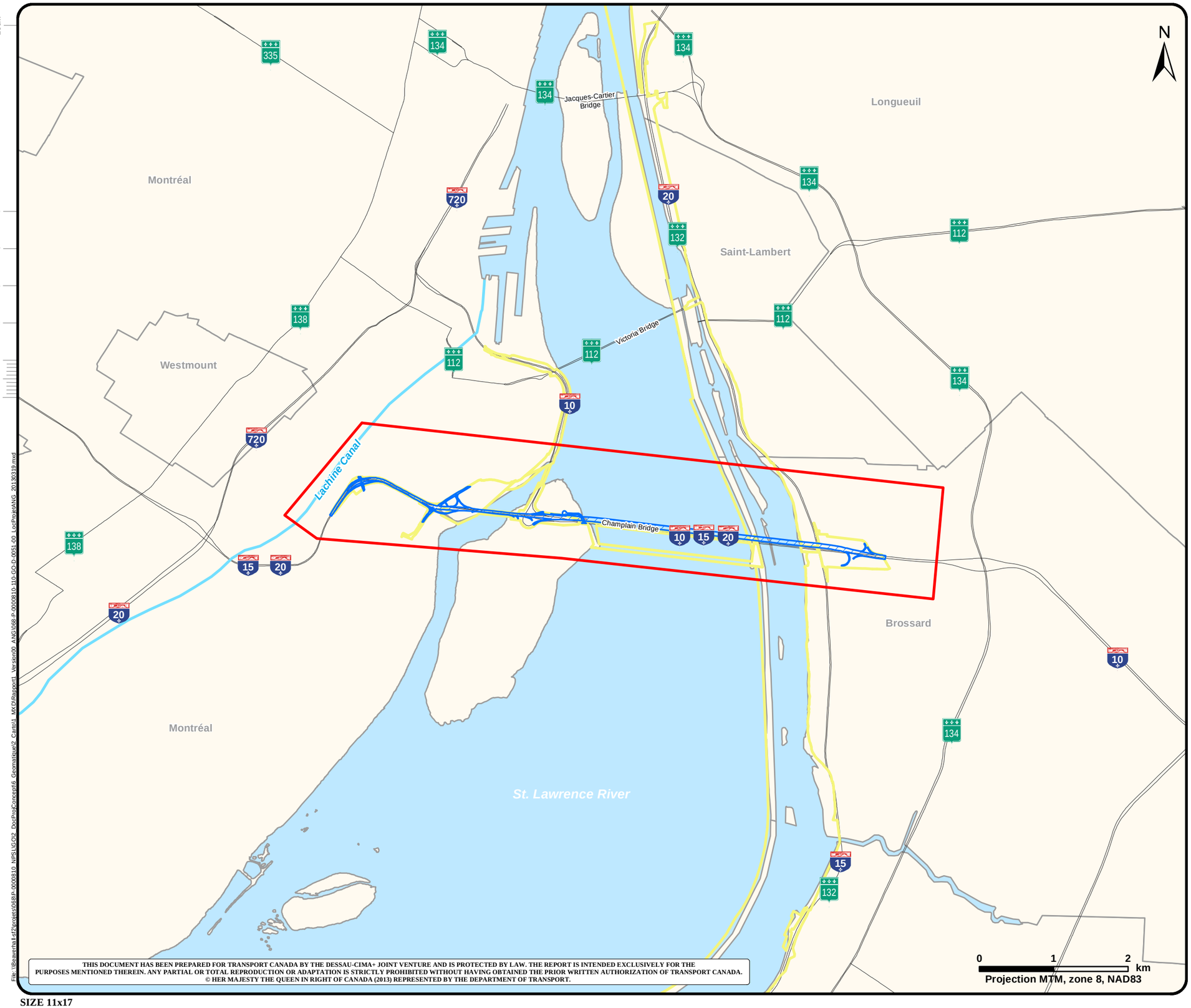
Further, in order for the federal environmental assessment process to apply, there must, in addition to a project, be a trigger within the meaning of paragraph 5(1) of CEAA. In this case, a number of triggers are present: the project has federal funding, the project proponent is federal and a number of regulatory provisions apply requiring permits to be obtained from the various agencies that are responsible authorities, namely:

- Transport Canada, pursuant to:
  - paragraph 5(1)*(a)* of the CEAA: is the project proponent; and

- paragraph 5(1)*(d)* of the CEAA: project approvals under section 5 of the *Navigable Waters Protection Act*, which is named in the *Law List Regulations*, are required.

- Department of Fisheries and Oceans, pursuant to:
  - paragraph 5(1)*(d)* of the CEAA: authorizations for changes to fish habitat caused by the project under subsection 35(2) of the *Fisheries Act*, which is named in the *Law List Regulations*, are required.
- Environment Canada, pursuant to:
  - paragraph 5(1)*(d)* of the CEAA: project permits and licences under subsection 9(1) of the *Migratory Bird Sanctuary Regulations*, which is named in the *Law List Regulations*, are required.

Lastly, because the project to build a new bridge for the St. Lawrence is not described in the *Comprehensive Study List Regulations*, the environmental assessment must be performed using the screening method and must meet the requirements set forth in Section 18 of CEAA.



Federal Government property limit
Study area
Proposed infrastructure right-of-way
Municipal limit

SOURCE :
- Property and right-of-way limit : Transports Canada, 2012

Client
Transport Canada / Transports Canada

Project
New Bridge for the St. Lawrence
Environmental Assessment

Title
Figure 1
Project Location for the New Bridge for the St. Lawrence

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Checked	Ghyslain Pothier	Date	2013-03-19
Project manager	Sylvie Côté	Sequence No.	01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0051	00

SIZE 11x17

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Since the prefeasibility study completed in 2011 showed how diverse the options are for construction of the New Bridge for the St. Lawrence, Transport Canada decided to opt for an objective-based approach for the environmental assessment. This approach was chosen because it is well-suited to projects with as yet undefined details or with details that will be known at a later date. Mitigation measures are expressed as objectives to be attained rather that specific parameters to be met. In the end, the result is the same: protecting environmentally sensitive components with the environment being considered ahead of the later stages of the project.

2 PROJECT DESCRIPTION

In 2012, Transport Canada accorded the joint venture led by PricewaterhouseCoopers a three-year mandate to complete, among other tasks, the project's preliminary design and costing. The following sections present, for information purposes only, details on elements associated with the project components. This project description does not constitute the proponent's final decision. These elements may be modified based on the results of this environmental assessment and on the evolution of the concept for the New Bridge for the St. Lawrence.

Therefore, the environmental assessment for the New Bridge for the St. Lawrence construction project was based on the engineering and technical information in the reports of the pre-feasibility studies conducted in 2010 and 2011 for Jacques Cartier and Champlain Bridges Inc. and the Quebec Ministry of Transport (MTQ). The information concerns the construction of the New Bridge for the St. Lawrence and the Nuns' Island Bridge, reconstruction and expansion of Highway 15, road work on Nuns' Island, alignment with Highway 10 on the South Shore and deconstruction of the existing Champlain and Nuns' Island Bridges (see Figure 2). Please consult the pre-feasibility study available on the Transport Canada website[2] for more details on the project description.

2.1 PROPOSED COMPONENTS AND ALTERNATIVES

2.1.1 Reconstruction and expansion of Highway 15 (Component A)

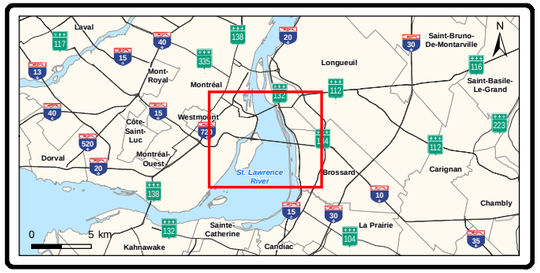
The federal segment of Highway 15, that part between the Nuns' Island Bridge and the Atwater Avenue off and on ramps, will be rebuilt due to structural conditions.

This work would involve widening the existing highway in order to increase the number of traffic lanes and redesigning the Atwater Avenue/Wellington Street – Highway-10 East/Downtown interchanges. Depending on the route chosen, weave lanes should also be built for the public transit system. The decision on the public transit route will be made by the provincial government. The options share the advantage of having been designed with the possibility of integrating light rail transit and bus rapid transit.

[2] Accessible at http://www.tc.gc.ca/eng/programs/bridges-new-bridge-for-the-st.lawrence-2775.htm

Project Components
Municipal limit
Borough limit

SOURCES :
-Components : Un nouveau pont pour le Saint-Laurent, Lignes directrices finales pour l'évaluation environnementale (incluant la portée de l'évaluation environnementale) page 11, Transport Canada, 2012
- Orthophotographs : © Montreal Metropolitan Community, 2005-2011
- Satellite images : (c) 2010 Microsoft Corporation and its data suppliers



Client: Transport Canada / Transports Canada

Project: New Bridge for the St. Lawrence Environmental Assessment

Title: Figure 2
Project Components for the New Bridge for the St. Lawrence

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Project manager	Sylvie Côté	Sequence No.	01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
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SIZE 11x17

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2.1.2 New Nuns' Island Bridge (Component B)

Five road geometry scenarios were developed for the replacement of the Nuns' Island Bridge in the pre-feasibility study prepared for Jacques Cartier and Champlain Bridges Inc. No scenario has yet been adopted. The solution chosen for the new bridge could very well differ from the scenarios developed in the pre-feasibility study.

The work involves building a temporary causeway to maintain traffic flow during deconstruction of the existing bridge and construction of the new bridge(s). Work related to the construction of the temporary causeway-bridge is under the responsibility of Jacques Cartier and Champlain Bridges Inc. and is subject to a separate environmental assessment.

The preferred solution for each direction would include:

- Three lanes for automobile traffic;
- One reserved lane for public transit;
- One multi-use path.

2.1.3 Work on Nuns' Island (Component C)

Based on the pre-feasibility studies, there are two construction options for the Nuns' island sector, depending on the scenario finally chosen for public transit service. In principle, the cross-section of the highway on Nuns' Island would be similar to the cross-section for the Nuns' Island Bridge and for the New Bridge for the St. Lawrence. There would be three traffic lanes.

With regard to the space required for public transit, the route could either follow the Nuns' Island Bridge or leave the centre of the highway on Nuns' Island, run beneath the highway going west, cross the river via an independent bridge and join the route proposed in the Metropolitan Transport Agency (AMT) February 2007 preliminary study for the light rail transit system in the Highway 10 corridor between the South Shore and downtown Montreal.

As the New Bridge for the St. Lawrence is planned to be downstream from the current bridge and the Nuns' Island Bridge is to be built along the same route as the existing bridge, the proposal would retain most of the existing infrastructure apart from the partial relocation of René Lévesque Boulevard.

2.1.4 The New Bridge for the St. Lawrence (Component D)

To date, no solution, either in terms of location (route and profile) or structural solution (bridge type) has been officially chosen. Therefore, all options described below are still possible, and since more detailed studies are or will be undertaken, other solutions may be proposed.

The location proposed for the New Bridge for the St. Lawrence in the pre-feasibility study is approximately 10 m downstream (north side) from the existing Champlain Bridge. It would be about 3.5 km long and divided into three segments:

- Section 1: crossing the St. Lawrence River between Nuns' Island and the Seaway, approximately 2,300 m;
- Section 2: crossing the Seaway, approximately 400 m;
- Section 3: crossing the Lesser La Prairie Basin, approximately 800 m.

The bridge proposed in the pre-feasibility study would consist of two identical decks each supporting three automobile traffic lanes and one public transit lane. To promote active transportation, the proposed bridge will also include a bike path and sidewalks, which will be integrated into the existing networks at both ends of the proposed bridge.

Although the number of lanes will rise from six to eight, including the public transit lanes, peak direction capacity in the morning and afternoon will not increase. In fact, vehicles will always have three lanes available in the peak direction. The extra lane will ensure better flow in the opposite direction. Moreover, dedicated public transit lanes will make it unnecessary to have buses travelling against traffic and will improve road safety.

2.1.4.1 Components D1a and D1b: Crossing the St. Lawrence River between Nuns' Island and the Seaway and the Lesser La Prairie Basin

The span lengths proposed in the pre-feasibility study for crossing the river and the Lesser La Prairie Basin are 80 m. This was determined based on:

- The reduction in the number of piers compared to the current number (elimination of one pier out of three);
- Economic length for the type of structure considered.

2.1.4.2 Component D2: Crossing the Seaway

Based on the data in the pre-feasibility study, the Seaway crossing would require a span of at least 200 m in order to meet the navigation clearance given the angle between the structure and the canal.

2.1.5 Alignment with Highway 10 (Component E)

For this last segment of the corridor under study, providing a connection to the existing Highway 10 on the South Shore, the planned solution would provide for three lanes in each direction and two dedicated public transit lanes (light rail transit or rapid bus transit services), as on the new bridge. Highway 10 would be brought closer to the residential area north of the existing bridge in order to align with the New Bridge for the St. Lawrence.

2.1.6 Demolition of existing Champlain Bridge and Nuns' Island Bridge (Components F and G)

For both bridges, the proposed deconstruction method could be based on the principle of sawing the concrete spans and piers using diamond-encrusted wire cables and dismantling the entire steel spans, and then deconstructing various other elements singly. These pieces would be transported by barge or truck.

The deconstruction of the Champlain Bridge will produce approximately 165,000 tonnes of concrete and 13,300 tonnes of steel (6,500 in the structure and 6,800 in the deck). Reclamation would always be the preferred option.

Deconstruction of the Nuns' Island Bridge would occur following construction of the temporary causeway downstream from the existing bridge. There are approximately 16,500 tonnes of concrete decking to be demolished, approximately 18,000 tonnes of concrete in the piers and 16,200 tonnes of concrete in the bases.

2.1.7 Pre-construction work: Set-up of jobsites

Regardless of the solution that is ultimately chosen, a project of the scope of the New Bridge for the St. Lawrence will require the establishment of a very large jobsite, which must be carefully planned out in advance. Figures 3 to 6 show specific areas identified by the Dessau-Cima Consortium. A portion of the jobsite may be supplied via the river. The contractor may consider constructing a new wharf near the jobsite. Approvals will be required for all temporary work, and the locations of these sites will need to be submitted for approval, as will their detailed plans.

Figure 3 Jobsite location – Nuns' Island

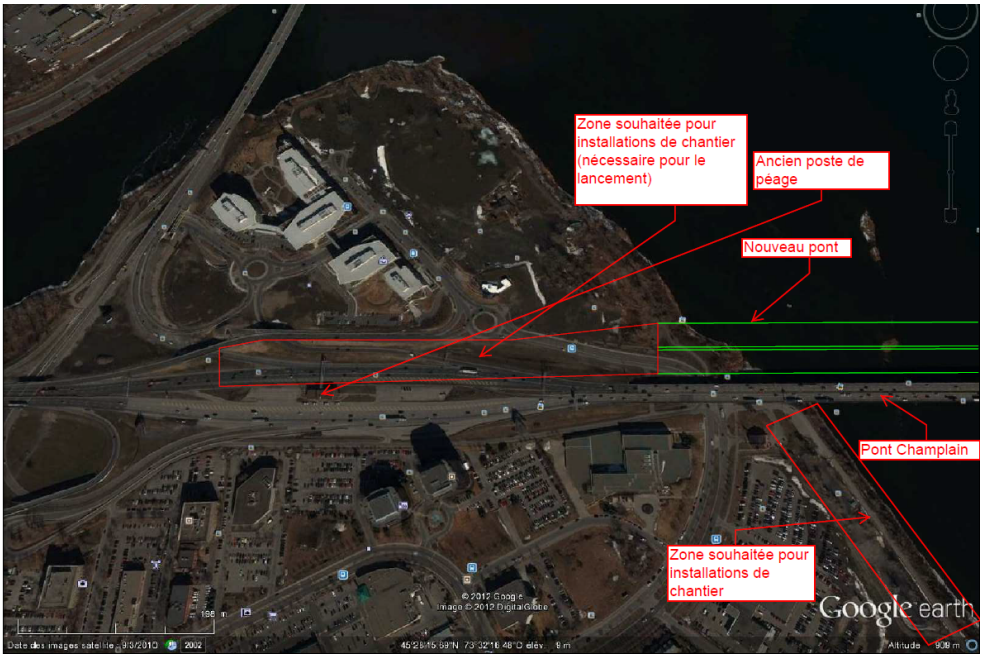


Figure 4 Jobsite location – Dike

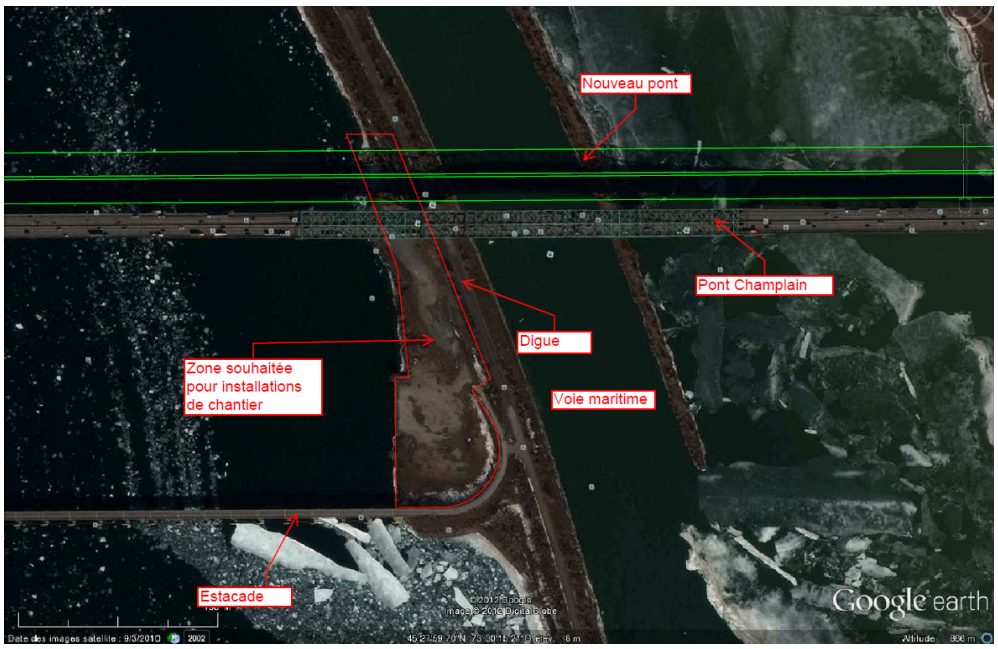


Figure 5 Jobsite location – South Shore

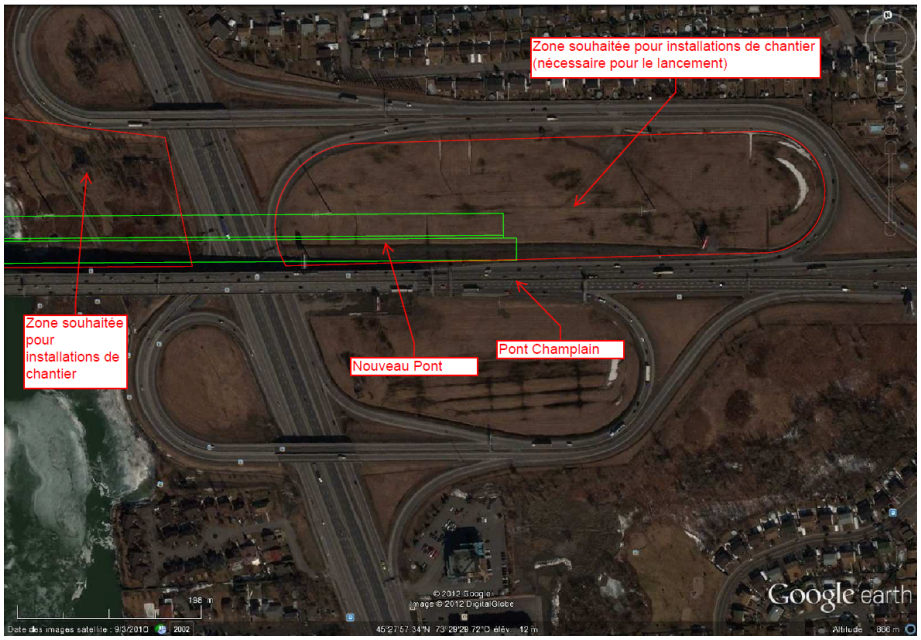
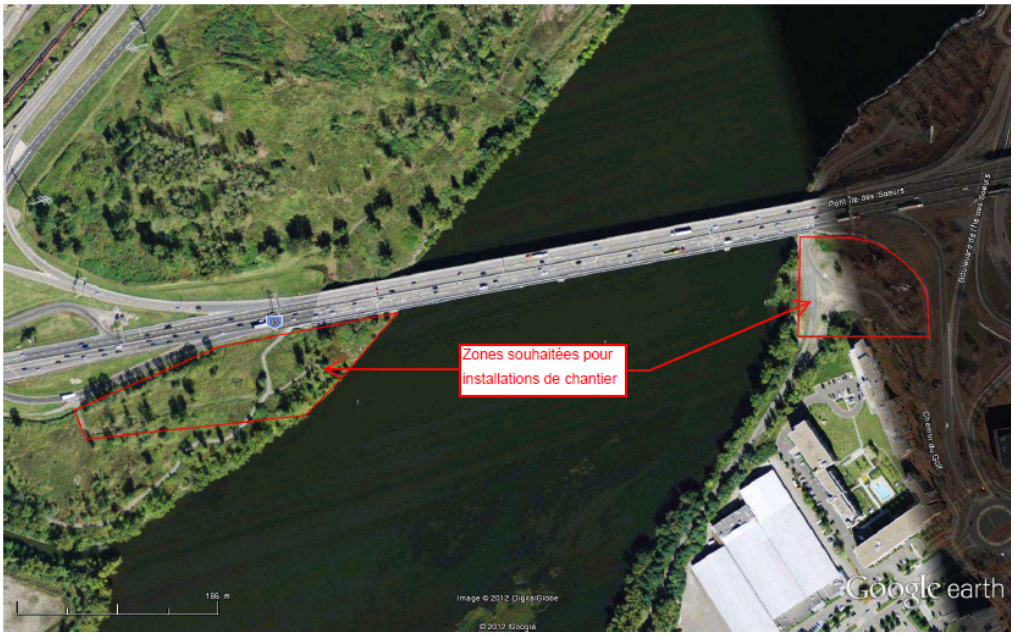


Figure 6 Jobsite location – Montreal and Nuns' Island



2.1.8 Post-construction work

Once construction has been completed (in full or a major section), the jobsite facilities will be dismantled. Areas used by the contractor for the jobsite (pre-fabrication area, launch area, etc.) will need to be returned to their original or equivalent condition, based on requirements set out by the property owners or contained in performance specifications.

2.1.9 Operation of new infrastructure

Inspections will be required at regular pre-defined intervals specified by the authorities in charge of operations. As a general rule, there are two inspection levels: general inspections and detailed inspections. General inspections are carried out annually, while detailed inspections are done every four (4) to five (5) years. These inspections make it possible to monitor any changes in the structure and to plan maintenance.

To ensure longevity, the structures will require routine maintenance.

Routine maintenance encompasses the routine activities that are carried out at regular intervals on structures, for example:

- Replacement of bearings;
- Replacement of expansion joints;
- Painting.

Heavy maintenance includes repairs, the scope of which require more in-depth investigation and are more difficult to perform:

- Replacement of the slab;
- Replacement of the stay cables;
- Repairs to the concrete.

It is important to note here that a structural design that includes, from the outset, studies on the problems associated with maintenance could greatly simplify future operations, or at least reduce their frequency and the impact on users.

Numerous maintenance operations, such as replacement of the joints or the asphalt, will require traffic on the structures to be interrupted.

2.2 SCHEDULE

The total estimated time required to produce plans and specifications and build the New Bridge for the St. Lawrence is 5 years. Deconstruction of the existing bridge is estimated to take 3 years. figure 7 presents the schedule of project stages.

Figure 7 Preliminary schedule

MAIN PHASES	2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024	
Environmental assessment																										
Preliminary design and feasibility study																										
Preliminary engineering and preparation of specifications																										
Tender calls and award of contract to the bridge builder																										
Final plans and specifications and construction (by the bridge builder)																										
Deconstruction of the existing bridge (by the bridge builder)																										

* This preliminary schedule will be refined over the coming months.

2.3 TRAFFIC MANAGEMENT

The Champlain Bridge corridor is one of the busiest in the country with over 57 million crossings per year. It is essential to maintain traffic throughout the entire construction period. During construction of each project component, traffic maintenance measures will be implemented, including:

- Partial closing of ramps and lanes while maintaining at least two lanes open in either direction;
- Complete closing at night with detours publicized;
- Temporary lane changes;
- Uninterrupted service on the Champlain Bridge during construction;
- Phasing of construction work that could disrupt traffic;
- Development of temporary configurations.

3 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

3.1 SCOPE OF THE PROJECT

Since the prefeasibility study completed in 2011 showed how diverse the options are for construction of the New Bridge for the St. Lawrence, TC decided to opt for an objective-based approach for the environmental assessment.

Under this approach, the current impact study presents a series of potential construction activities. This is the case in this project as only one concept in the pre-feasibility phase is currently available. The project description in the previous section presents, for information purposes only, details on the elements associated to project components.

This approach leads to the establishment of mitigation measures that will become environmental objectives to be achieved in subsequent concept development stages of the New Bridge for the St. Lawrence. Such an approach makes it possible to integrate environmental concerns ahead of the final design of the project thereby improving integration with the site's environmental components.

As defined in Transport Canada's Final Environmental Assessment Guidelines for the New Bridge for the St. Lawrence (2012a), the final plans and specifications for the New Bridge for the St. Lawrence will be prepared after the contract is awarded. The environmental assessment has therefore assessed the project in its most advanced concept stage. Thus the project environmental assessment will be based on the concept plans from the pre-feasibility studies ordered by the JCCBI and presented in the previous section.

Note that the mitigation measures identified in the EA process will be incorporated into the final plans and specifications.

3.1.1 Preconstruction phase

The preconstruction phase includes all preparatory activities required before the construction work itself is initiated. These activities include the following, without necessarily being limited thereto:

- Establish temporary access roads;
- Prepare work areas and material storage sites;
- Establish proper signage to protect workers and users of the Champlain Bridge and the associated highway network;
- Marshall work crews, equipment and material;
- Construct the temporary structures required to facilitate the work;
- Move or protect public utility and other infrastructure that may be affected by the work.

3.1.2 Project execution phase

The New Bridge for the St. Lawrence construction project is divided into seven major components as illustrated in Figure 2 at the beginning of Section 2. The following sections briefly present these components, which were introduced in more detail in Section 2.0.

3.1.2.1 Component A: Reconstruction and widening of Highway 15

The federal section of Highway 15 (i.e. the section between Nuns' Island Bridge and the Atwater Avenue off-ramps) will be rebuilt and widened. There are plans to add a third lane in each direction, so that there will be three continuous lanes between the Turcot Interchange and the New Bridge for the St. Lawrence. There will also have to be work carried out on several on-ramps in the Atwater Avenue and Nuns' Island areas.

3.1.2.2 Component B: New Nuns' Island Bridge

After a temporary causeway is installed and the existing bridge is deconstructed, the bridge connecting Nuns' Island to the Island of Montreal will be replaced.

3.1.2.3 Component C: Work on Nuns' Island

On Nuns' Island, the work will consist of doing alterations to Highway 10, the on-ramps to the New Bridge for the St. Lawrence and to the Nuns' Island Bridge, as well as to certain local roads. The on-ramps located at the entry and exit points to Nuns' Island will also have to be realigned with the new bridge. Additional work could be required to facilitate the movement of public transit.

3.1.2.4 Component D: New Bridge for the St. Lawrence

The new bridge will span the St. Lawrence downstream from the Champlain Bridge. This bridge, which will be built over the St. Lawrence River and the St. Lawrence Seaway, will be built starting from Nuns' Island in the borough of Verdun in Montreal, and extending over to the City of Brossard on the South Shore. According to the Pre-feasibility Study Concerning the Replacement of the Existing Champlain Bridge (JCCBI, 2011), the best configuration would comprise three lanes in each direction, plus a fourth lane in each direction reserved for public transit. The bridge includes three components:

- Component D1a: spans the St. Lawrence River between Nuns' Island and the Seaway;
- Component D2: spans the Seaway; and
- Component D1b: spans the Lesser La Prairie Basin between the Seaway and the Brossard shore.

3.1.2.5 Component E: Alignment with Highway 10

Highway 10 will have to be realigned so that it connects to the new bridge. The access ramps to the South Shore will also have to be slightly reconfigured to connect with Highway 10.

3.1.2.6 Component F: Demolition of existing Champlain Bridge

The deconstruction of the Champlain Bridge will take place after the construction of the New Bridge for the St. Lawrence.

3.1.2.7 Component G: Deconstruction of the Nuns' Island Bridge.

After a temporary causeway is installed, the existing Nuns' Island Bridge will be deconstructed and rebuilt in the same area.

3.1.3 Post-construction phase

The post-construction phase includes various activities associated with demobilizing crews and material. These activities include the following, without necessarily being limited thereto:

- The deconstruction of the existing bridge;
- The dismantling of temporary facilities (access roads, storage areas, maintenance and supply areas, trailers, etc.);
- Site restoration (leveling, replanting, removal of final debris, etc.).

3.1.4 Operations phase

Anticipated activities in the operations phase are associated with traffic control and maintenance operations. These activities include the following, without necessarily being limited thereto:

- Monitoring the flow of traffic to ensure the safety of users;
- Maintaining the structure, traffic lanes and operations buildings;
- Snow and ice removal.

3.1.5 Decommissioning phase

Although the infrastructure will be designed to last at least 125 years, at some point it will need to be replaced. Decommissioning activities are identical to, though not limited to, post-construction activities.

3.2 FACTORS TO BE CONSIDERED

Subsection 16(1) of the CEAA specifies the factors that must be considered in a "screening-type" environmental assessment:

16(1) Every screening […] shall include a consideration of the following factors:

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 effects 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 effect referred to in paragraph *(a)*;

c) comments from the public that are received in accordance with this Act and the regulations;

d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project;

e) and e) any other matter relevant to the screening […] that the responsible authority […] may require to be considered.

In addition, certain project alternatives will be discussed.

It should be noted that the terms “environment” and “environmental effect” are defined in subsection 2(1) of the CEAA:

“Environment”:

Means components of the Earth, and includes:

a) land, water and air, including all layers of the atmosphere;

b) all organic and inorganic matter and living organisms;

c) the interacting natural system that include components referred to in paragraphs *(a)* and *(b).*

“Environmental effect” (adapted from the full text of the Act):

In respect of a project, “environmental effect” means any change that the project may cause in the environment, including any change it 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*; any effect of any change referred to health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes by Aboriginal persons, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, or any change to the project that may be caused by the environment.

Lastly, appropriate directives under Quebec’s *Environment Quality Act* have also been taken into account in this environmental assessment, that is those:

- For carrying out an environmental impact study for a highway project (September 2010), and;
- For carrying out an environmental impact study for a project involving dredging, digging or fill in a hydrous environment (November 2011).

3.3 SCOPE OF FACTORS TO BE CONSIDERED

3.3.1 Valued environmental components

Delivering the project will have an impact on environmental components. The environmental assessment demonstrates what impact the project will have on these components.

Special attention has been focused on components called “valued environmental components” (VECs), which are selected on the basis of their legal, scientific, cultural, social, economic or aesthetic value. The list of the valued environmental components selected for this project is shown in Table 1.

Table 1 List of valued environmental components selected for this project

ENVIRONMENT	Valued environmental components
Physical environment	Water quality/hydrology; and Soil and sediment quality.
Biological environment	Fish and fish habitat; Migratory birds and their habitats (protected areas); Precarious plant, wildlife and aquatic species; and Herpetofauna.
Human environment	Navigation; Physical and cultural heritage resources; Quality of life; Aesthetic and visual aspects; Sound environment; and Air quality.

Note that the component “Quality of life” has been approached through other valued environmental components relating to biodiversity and to elements that support it, such as “Water quality” or “Fish and fish habitat”, as well as to human activities such as “Navigation” or nuisance factors that may be associated with the sound environment, for example.

Figure 8 presents the inventory of biological and human environments in the study area.

3.3.2 Effect of the environment on the project

The assessment has taken into account how the environment could adversely affect the project: for example, from seismic events or severe weather, including occurrences of extreme ice jam and high water level events. The assessment also considered any potential effect of climate change[3] on the project, such as an assessment of whether the project is designed to endure changes in climate conditions during its life span.

This part of the assessment has been step by step, rather like the assessment of project effects. The possible major interactions between potential natural hazards and the project have been first identified, followed by an assessment of the effects of those interactions, mitigation measures, if required, and the significance of any remaining likely adverse environmental effects.

The emphasis in this section is on environmental conditions that are reasonably plausible, but is not limited to events that occur on a regular basis.

3.3.3 Assessment of accidents and malfunctions

The environmental assessment has examined the malfunctions and accidents that might occur, so that relevant environmental effects are taken into account in the assessment. The information provided includes a description of:

- specific malfunctions and accidents that have a reasonable probability of occurring during the various phases of the project, including an explanation of how these occurrences were identified for purposes of this environmental assessment;
- the source, quantity, mechanism, flow, form and characteristics of contaminants and other materials (physical and chemical) that risk being released into the surrounding environment should any malfunctions or accidents occur; and
- all emergency plans or cleaning or restoration activities in the surrounding environment that could be required in the case of malfunctions or accidents, or immediately after them.

Special attention has been paid to vulnerable components of the environment that could be affected by an accident or a malfunction and could have more serious consequences (for example, proximity to communities, natural sites of special value).

3.3.4 Temporal boundaries

The temporal boundaries of this assessment establish the period of time during which the negative environmental effects of the project have been taken into consideration.

The temporal boundaries of the project components include the construction, operation and maintenance of the New Bridge for the Saint Lawrence and the new Nuns' Island Bridge, and the

[3] **For example, will road drainage structures be able to safely handle a slight increase in the frequency and intensity of precipitation extremes, and the resulting floods, which will occur in the future (according to climate change predictions) given current design standards for drainage?**

decommissioning of the existing Champlain Bridge and the Nuns' Island Bridge as well as site restoration.

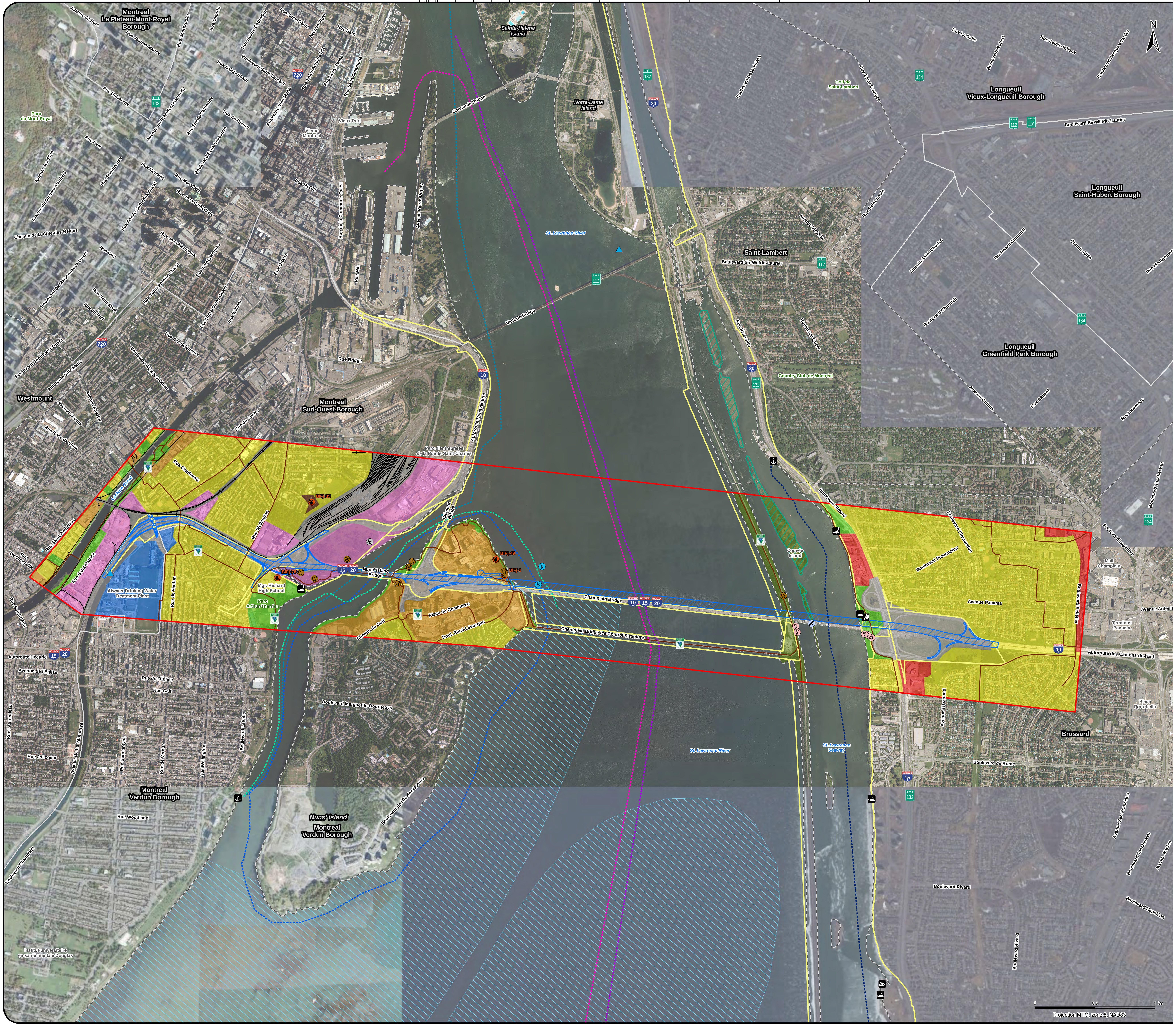
3.3.5 Spatial boundaries

The spatial boundaries that will be established for the environmental assessment include geographical areas where it would be reasonable to foresee that the project would have an impact on the environment, or that might be relevant to assessing cumulative environmental effects. These directions resulted in defining a study area with specific boundaries described in Section 1.3 and illustrated in Figure 2, and confirmed that the intervention zone (the space where the work itself will be carried out) corresponds basically to the footprint of the existing Champlain and Nuns' Island Bridges combined with that intended for the New Bridge for the St. Lawrence.

3.3.6 Study of likely cumulative effects

Cumulative effects are residual effects of the project on the environment (i.e. which persist even after mitigation measures have been put in place) combined with the cumulative effects of past, present and future projects or activities. They may also result from a combination of various effects of the project on the same environmental component. Therefore, the following have been considered: both the impact of the project and that of other projects and activities that have already been completed or will be, and whose effect will be added to the impact of the project (at the same time and the same location).

All reasonably foreseeable projects have been considered, especially those that contribute to the cumulative effects on the valued ecosystem components, particularly water quality, vegetation, wildlife habitat, air quality and sound environment, because these are the environmental factors that are most often subject to the impact of multiple projects or cumulative effects.



Human environment

Uses

- Residential
- Commercial and services
- Industrial
- Mixed area (commercial/residential)
- Large green space or river park
- Conservation
- Large transport right-of-way
- Public infrastructure
- Convent, monastery or place of worship

Public and private components

- Archaeological site
- Windsurfing area
- Fishing area
- Boat launching ramp
- Marina
- Route Bleue-La Prairie Lower Basin path
- Route Bleue-Nuns' Island Tour path
- Known kayakers' path
- Point de Mire Youth Centre path
- Hovercraft path
- Saute Moutons path
- Bike path
- Bike path - Route Verte
- Railway (CN)
- Water Intake Approximate Location

Limits

- Federal government property limits
- Study area
- Planned infrastructure right-of-way
- Municipal limits
- Borough limits

Natural environment

Special status flora and fauna

- Rough bugleweed
- Laurentian Bugleweed
- Brown snake
- Peregrine falcon
- Chimney swift

Areas of special interest for wildlife

- Migratory bird sanctuary
- Waterfowl concentration area

SOURCES :
- Project components: Transport Canada, 2012
- Flora and fauna: Site surveys, CIMA, 2012
- Uses:
  Sud-Ouest Borough, City of Montreal Master Plan, May 2012
  Verdun Borough, City of Montreal Master Plan, June 2005
  City of Brossard, City Plan, October 2001
- Railway: NTDB © Natural Resources Canada
- Orthophotographs: © Montreal Metropolitan Community, 2005-2011
- Satellite images : © 2010 Microsoft Corporation and its data suppliers

REV.	Y - M - D DATE	DESCRIPTION	Prepared By	Checked By
00	13-03-19	Final Issue	GL	YM
0C	12-11-09	Issue for comments	GL	GP
0B	12-10-16	Issue for comments	GL	GP
0A	12-10-11	Issue for comments	GL	GP

ISSUES - REVISIONS

ALL DIMENSIONS MUST BE TAKEN AND CHECKED BEFORE BEGINNING THE WORKS

Seal

Client

Transport Canada | Transports Canada

Client's references: T8080-110362

Project

New Bridge for the St. Lawrence

Environmental Assessement

Title

Figure 8
Inventory Map of Natural and Human Environments

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Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0100	00

SIZE A1

4 DESCRIPTION OF ENVIRONMENT AND VALUED ENVIRONMENTAL COMPONENTS

4.1 GENERAL DESCRIPTION OF THE PHYSICAL ENVIRONMENT

The Champlain Bridge corridor is located between the Island of Montreal and Nuns' Island on one side and the City of Brossard on the other. It crosses, from west to east, the Greater La Prairie Basin, the main body of the St. Lawrence River, the Seaway and the Lesser La Prairie Basin. The surface of the land adjacent to the bridge is relatively flat. The average elevation above sea level is approximately 16 m on Montreal Island, 14 m on Nuns' Island and 15 m on the South Shore.

The geology of the basement rock in the area is identified as Utica black shale dating from the middle Ordovician epoch. The soil is either composed of solely glacial till, including on Nuns' Island; zones of till covered by sea clay, including along the natural shoreline of the St. Lawrence on Montreal Island; and zones of limited extent covered by river sand to a depth ranging between 6 m and 12 m. On the South Shore, natural unconsolidated deposits of argillaceous sediments topped by a thin sand horizon cover the bedrock to a depth of approximately 8 m.

Climatic conditions are representative of the Montreal region. The annual average daily temperature, calculated from the monthly averages recorded at the Montreal-McGill station, is 7.4°C, with an annual average daily maximum of 11.1°C and an annual average daily minimum of 3.6°C. Annual precipitation was just over 1,000 mm. Prevailing winds are from the south-west. Although relatively consistent on an annual average, they are stronger in winter from November to March. Prevailing winds average between 11.5 km/h and 15.6 km/h depending on the meteorological station. Prevailing winds are generally west-south-west, west and north-east depending on the time of year. On average, wind speed of 83 km/h is exceeded every 10 years and that of 69 km/h is exceeded once per year. Visibility is generally good; visibility under 1 km occurs less than 1% of the time.

4.1.1 Soil and sediment quality

4.1.1.1 Shores of the Island of Montreal and Nuns' Island

Of all the areas included in the right-of-way of the New Bridge for the St. Lawrence, the soils near the St. Lawrence shore of Montreal Island to the west of the Parc d'entreprises de la Pointe-Saint-Charles (known as "Technoparc") potentially represent the most complex environmental conditions by far. These soils contain earth fill and waste materials up to 12 m thick that were placed in the course of the operation of various riverside dumps spanning a period of 100 years (1864-1965).

A number of soil sampling campaigns were conducted in certain areas of the Island of Montreal and Nuns' Island. In general, most samples (Figure 9) indicate contamination levels higher than the BC category defined in the *Politique de protection des sols et de réhabilitation des terrains*

contaminés (Policy on Soil Protection and Rehabilitation of Contaminated Land – the Policy), issued by the ministère du Développement durable, de l'Environnement, de la Faune et des Parcs (MDDEFP) (Quebec Ministry of Sustainable Development, Environment, Wildlife and Parks). This contamination is mainly due to the presence of petroleum hydrocarbons, polycyclic aromatic hydrocarbons and metals.

Furthermore, anaerobic degradation of organic waste matter in the shoreline sector of the Island of Montreal releases significant concentrations of methane gas (CH4).

Several environmental issues were also identified in connection with the lands adjacent to the right-of-way of Highway 15, to the west of Wellington Street. One example is the presence of industries in these areas, some dating from the early 20th century (Consumers Glass, Montreal Light, Heat & Power, petroleum product storage depots and metalworks alongside the Lachine Canal, etc.). No information on these sites is currently available.

Assessment and management of contaminated soils will be determined during subsequent development stages of the new bridge.

4.1.1.2 Banks of the south shore of the river

On the South Shore, aerial photos from as early as 1957 indicate that before the highways leading to the bridge were built, the properties under and adjacent to the present-day roads were farmland. Similarly, few environmental concerns are associated with the historical uses on the eastern part of Nuns' Island.

Irrespective of any historical or neighbouring activities, the mere presence of the bridge, on- and off-ramps and the freeways connected to it represent in and of themselves an environmental issue. Residues of metals and hydrocarbons produced by vehicles and the degradation of the bridge structures and coatings are likely to have affected the environmental quality of the surface soils within the right-of-way since it was built about 50 years ago.

4.1.1.3 Sediments

A coarse substrate made up of pebbles and blocks is scattered over the main sector of the Greater Basin. At Nuns' Island, there is a flat of sedimentary rocks downstream from the Champlain Bridge, continuing to a small formation of islets. The section along the other side of these islets is made up of pebbles and blocks and becomes coarser (blocks and sedimentary rocks) the farther you get from the islets. On the left bank of Nuns' Island, between the two bridges, is found a mixture of pebbles and blocks with lenses of coarse sand and small gravel. The substrate downstream from Clément Bridge gets coarser, ranging from stones and pebbles near Clément Bridge to pebbles and blocks near the point of Nuns' Island, while blocks and sedimentary rock are characteristic of the extreme east of the island. On the South Shore of the Greater Basin, the substrate is composed of stones, gravel and pebbles (Figure 10).

SIZE 11x17

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Maximum concentration range[1](all depth intervals and analysis parameter mixed together)

- Not analyzed
- <A
- AB
- BC
- >C
- Municipal limit
- Borough limit

[1] Range of contamination for the soil protection and contaminated land rehabilitation policy, Quebec Ministry of Sustainable Development, Environment and Parks (MDDEP) 1998, revised criteria from the MDDEP e-portal

SOURCES :
- Boreholes : Dessau, 2008; Inspec-Sol, 1993 et 1996; Technorem, 2007 et 2011; Tecsult, 2005
- Orthophotographs : © Montreal Metropolitan Community, 2005-2011

Client: Transport Canada / Transports Canada

Project: New Bridge for the St. Lawrence Environmentale Assessment

Title: Figure 9 Environmental Soil Quality

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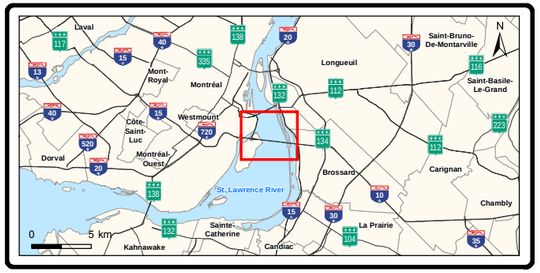
068	P-0000810	110	GO	D	0096	00

Surface substrate

- Organic - Sand
- Pebbles - Gravel
- Cobble – Boulder
- Cobble – Boulder - Sand intrusion
- Pebbles - Cobble
- Boulder - Sedimentary rock
- Sedimentary rock

- Bathymetry study area and surface substrate
- Municipal limit
- Borough limit

SOURCES :
- Surface substrate : Environnement Illimité inc., 2012
- Orthophotographs: © Montreal Metropolitan Community, 2005-2011



Client: Transport Canada / Transports Canada

Project: **New Bridge for the St. Lawrence Environmental Assessment**

Title: **Figure 10**
Composition of the Surface Substrate

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Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0098	00

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SIZE 11x17

Results of the sediment characterization campaigns tend to suggest a significant level of historic contamination on the north shore of the basin. Concentrations of heavy metals over the lowest effect level (LEL) were found in samples in 1975 near the study area. In 2012, during the sampling campaign for the New Bridge for the St. Lawrence project, only one sediment sample could be collected under the Champlain Bridge. Sediments are scarce in that area because of the rocky substrate near the Nuns' Island Bridge. The sample showed heavy metal contamination (chromium, copper, nickel, lead and zinc), along with PAH and PCB. These contaminants come from the Parc d'entreprises de la Pointe-Saint-Charles developed in the early 1990s on contaminated fill (Bibeault et al., 1997) and leaks of waste oil.

Unlike the Greater Basin, the Lesser La Prairie Basin is composed of a thick, relatively uniform, layer of fine sediments built up since construction of the Seaway watertight dike between 1955 and 1959. A major proportion of these sediments come from the Châteauguay River. Its waters flow along the right bank of the river from the time they enter Lake Saint-Louis (St. Lawrence Centre, 1993). Studies (Hardy et al. (1991) and St. Lawrence Centre (1996)) show that this sector is characterized by lacustrine conditions and heavy sedimentation of fine particles. A silty substrate is scattered throughout the Lesser Basin, and there are shell fragments from the decomposition of zebra mussels. The substrate in the navigation channel is coarser, with a lot of mussels and mussel fragments.

Based on the data from 1976, 1987 and 2012, the portrait of contamination in the Lesser La Prairie Basin indicates the existence of moderate contamination distributed throughout the Lesser Basin with higher individual sources in some places. The main contaminants are heavy metals and polychlorinated biphenyls (see Table 2).

Table 2 Comparison of metal concentrations in sediment samples from the Lesser La Prairie Basin in 1976, 1987 and 2012 with current MDDEP data

Parameter	Sérodes, 1978		Hardy et al., 1991		Study for the New Champlain Bridge, 2012		*OME Criterion (mg/kg)	**MDDEP and EnvCan Criterion (mg/kg)				
	Median (mg/kg)	Effective (n)	Median (mg/kg)	Effective (n)	Median (mg/kg)	Effective (n)		≤ CEO	CEO[2]	> COE and ≤ CFE	CEF[3]	> CEF
Mercury (Hg)	0.46	17	0.34	18	0.21	12	0.3	Class 1	0.25	Class 2	0.87	Class 3
Arsenic (As)	-	-	9.82	18	5.00	12	8		7.6		23	
Cadmium (Cd)	9	17	1	18	1.15	12	0.1		1.7		12	
Chromium (Cr)	73	17	105	18	49.00	12	25		57		120	
Copper (Cu)	55.3	17	62.9	18	57.50	12	25		63		700	
Nickel (Ni)	48.4	17	41.1	18	41.00	12	25		47		-	
Lead (PB)	48	17	137	18	98.50	12	50		52		150	
Zinc (Zn)	315	17	392	18	270.00	12	100		170		770	
PCB (total)	-	-	0.651	18	0.19	12	-		0.079		0.78	

*Criteria from the Ontario Ministry of the Environment, 1979 (used in the report by Hardy et al., 1991).
** Criteria from Environment Canada and the Quebec Ministry of Sustainable Development, the Environment and Parks (MDDEP), 2007.
Class 1- [Substance] ≤ COE: sediments may be released in open water;
Class 2- COE < [Substance] ≤ CFE: release in open water may be considered, but toxicity tests are required;
Class 3- [Substance] > CFE: release of sediments in open water is prohibited.
PCB: Polychrlorinated biphenyls

4.1.2 Surface and groundwater characteristics

Water quality in the St. Lawrence River has been monitored since the 1980s. There is no sampling station in the study area: however, stations are located upstream and downstream. According to analyses, none of the measured parameters exceeded the water quality criteria for the protection of aquatic life. (MDDEP, 2012; CCME, 1999a).

The La Prairie Basin is divided into two sections, the Greater La Prairie Basin, which includes the main part of the river, and the Lesser La Prairie Basin, including the shipping channel of the St. Lawrence Seaway.

4.1.2.1 Surface water

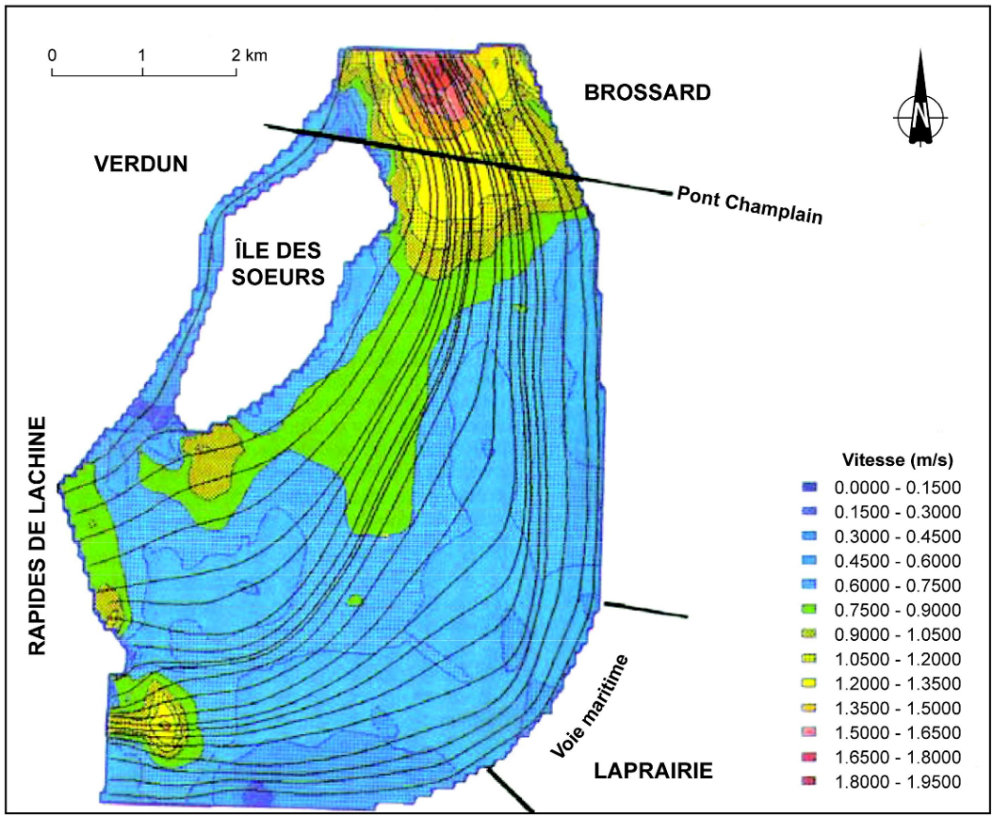
4.1.2.1.1 Greater La Prairie Basin

Flow in Greater La Prairie Basin is influenced by water yields from the St. Lawrence River and the Ottawa River. Streamflow is controlled by several dams in their upper reaches. Average streamflow in the St. Lawrence is 7,060 m^3/s (Bouchard et al., 2000), and it can vary from 6,000 to 9,000 m^3/s. As for the Ottawa River, streamflow averages 2,000 m^3/s, and can vary from a low of 800 m^3/s and a peak of 6,500 m^3/s, depending on the season. These water masses tend not to mix. One observes therefore a mass of blended water (Ottawa and St. Lawrence) along the north shore, while the centre and the south shore are characterized by water typical of the Great Lakes

At Champlain Bridge, current speed in the channel ranges from 1.2 to 1.35 m/s (Leclerc et al., 1987). Outside the channel, the current ranges from 0.9 to 1.2 m/s (Leclerc et al., 1987). Below the bridge lies a zone where speeds range from 1.8 to 1.9 m/s in the channel (Leclerc et al., 1987). In the left arm at Nuns' Island, current speed ranges from 0.3 to 0.45 m/s (Leclerc et al., 1987). figure 11 presents flow and trajectories.

In this section of the St. Lawrence, current speeds in the centre (flow channels) are over 0.3 m/s and therefore not conducive to the sedimentation of fine particles. As a consequence, fine suspended particles are not deposited at the foot of the rapids, where only coarser materials come to rest: gravel, pebbles or cobblestone. Fine particles are deposited in grass beds or close to the banks, where the current speed is under 0.1 m/s. At these current speeds, particles can form sedimentary deposits, but often only temporarily, as the current gains speed during the spring runoff.

Figure 11 Velocity fields and flow trajectories (Leclerc et al. 1987)

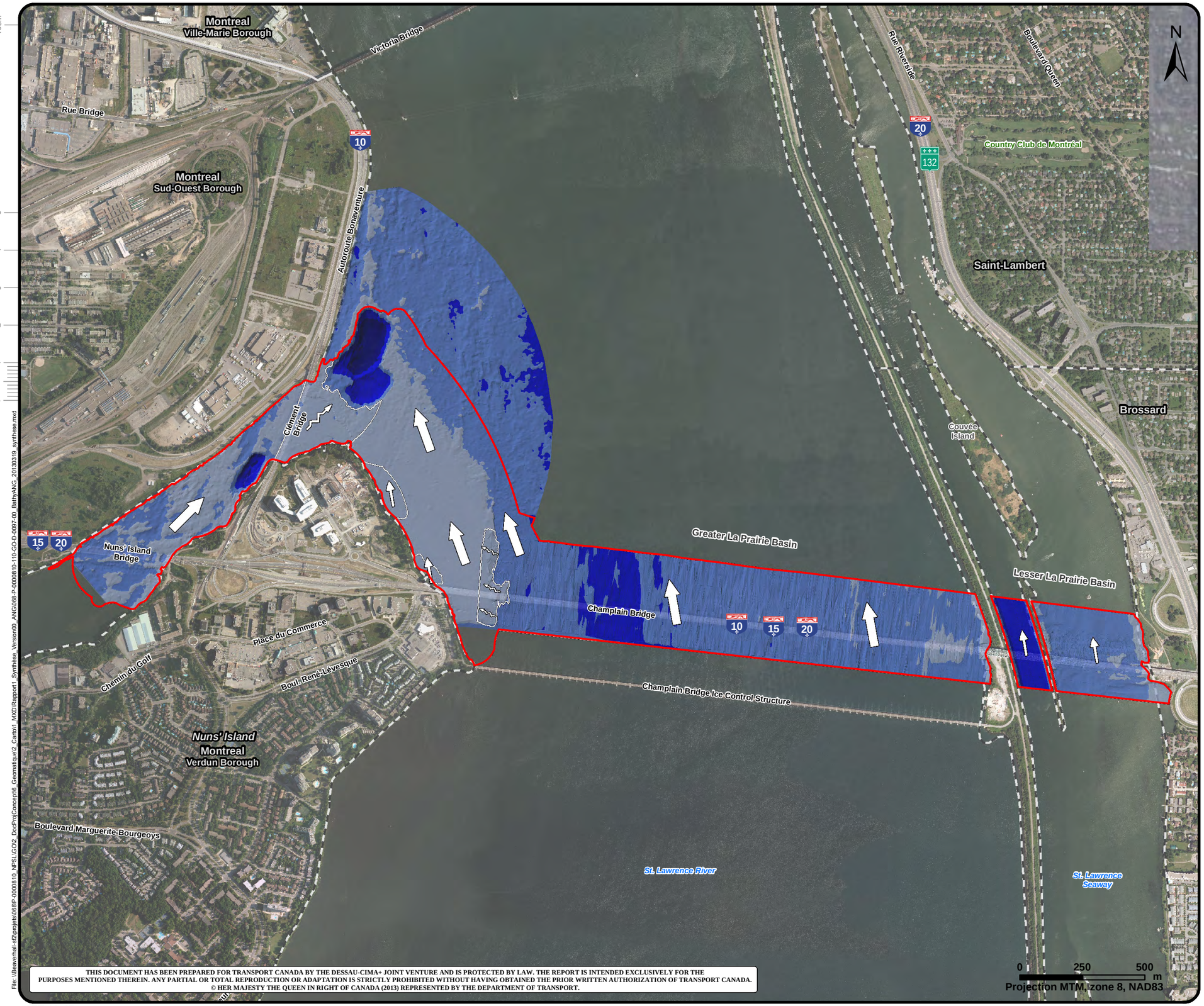


Under Champlain Bridge, at the time of the surveys, the water depth varied from 3 to 6 m on average, from the centre to the left bank, with one main channel varying from 7 to 9 m deep. Along the right bank of the basin, depths varied from 1 to 3 m. The left bank at Nuns' Island shows more variation. Upstream of the island, depths varied from 0 to 2 m, precluding navigation during low-

water periods. Under the bridge (left arm), depths varied from 1 to 3 m, in general, allowing careful navigation, as some rocky islets or sills were almost exposed in this area (see Figure 12).

Ice conditions in the Greater La Prairie Basin differ from those found in the Lesser La Prairie Basin. Ice concentration is lower in the Greater La Prairie Basin for these reasons:

- In the Seaway, currents are very weak, especially in winter when the locks remain closed;
- In the Greater Basin, the water flows all winter and moves the ice.



Flow facies

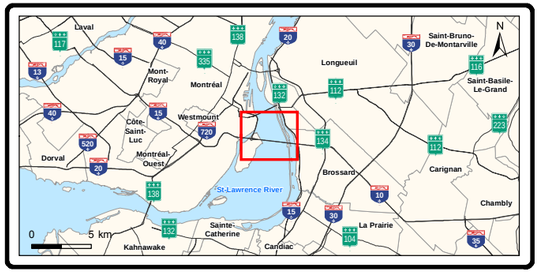
- Lotic – Whitewater
- Laminar lotic
- Lentic
- Flow facie limit

Depth (m)

- 0 -2
- 2- 5
- 5 - 15
- Over 15

- Bathymetric study area and surface substrate
- Municipal limit
- Borough limit

SOURCES :
- Bathymetry :
  St. Lawrence Seaway, 2010
  The Jacques Cartier and Champlain Bridges inc., 2007, 2010 et 2011
  Environnement Illimité inc., 2012
- Flow facies : Environnement Illimité inc., 2012
- Orthophotographs : © Montreal Metropolitan Community, 2005-2011



Client: Transport Canada / Transports Canada

Project: New Bridge for the St. Lawrence Environmental Assessment

Title: Figure 12 Bathymetry and flow facies

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Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0097	00

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4.1.2.1.2 Lesser La Prairie Basin

The Lesser La Prairie Basin is separated from the Greater La Prairie Basin by a dike between Kahnawake and Longueuil and is fed primarily by the Great Lakes. The average streamflow at the inlet of the Lesser Basin is evaluated at 149 m^3/s (St. Lawrence Centre, 1991). Inflow from three tributaries in the Lesser Basin is minimal, at 7 m^3/s, or less than 7% of the river streamflow (Robitaille, J., 1997). Average current speed is 0.1 m/s (St. Lawrence Centre, 1991).

This is a lentic flow zone. The low current speeds in this area are conducive to the sedimentation of fine particles on the riverbed, forming a layer of silt. The Lesser Basin acts as a sort of sediment trap (St. Lawrence Centre, 1996).

A navigation channel with a depth of 8.6 m on average was dredged along the dike that separates the two basins, near the right bank, and the dredged material was used to create islets, thereby separating the shipping channel from the rest of the Lesser Basin (St. Lawrence Centre, 1996). The channel is maintained at a depth of about 8.6 m by the Seaway Management Corporation so that vessels can navigate. The depth of the Lesser Basin at the time of the surveys averaged 2.5 m, with depths ranging from 1 to 3 m (see Figure 12).

4.1.2.2 Groundwater

The flow of groundwater on the lands along the shore of the Champlain Bridge is directly influenced by the St. Lawrence River, into which this water migrates. As a result, the groundwater flow in the part of Montreal Island concerned here is generally toward the southeast, while the flow on the South Shore is presumed to be toward the west. According to piezometric data, the average depth of the groundwater is on the order of 6.5 m below grade, which places it generally within the fill materials that characterize the river shore.

The previous characterization studies provide a substantial quantity of relevant hydrogeological information about the lands adjacent to Champlain Bridge on the Montreal side. Thus, all groundwater samples collected from the area of fill on the Montreal shore exceed the levels prescribed by the Montreal Metropolitan Community for at least one parameter. In most cases, exceedence was noted for metals, manganese and/or barium or PAHs. There are no similar data for the South Shore.

4.1.3 Air quality

The New Bridge for the St. Lawrence project is not subject to provincial and municipal regulation, but in the absence of federal regulation these documents may serve as a reference framework (see Table 3).

Present air quality in Montreal is generally acceptable. According to the 2011 Air Quality Report for Montreal, there were 69 days with poor air quality in Montreal in 2011. Fine particles are the main

cause of days with poor air quality (68 of the 69 days declared). This is relatively similar to previous years, with 68 days with poor air quality in 2008, 69 days as well in 2009 and 65 days in 2010.

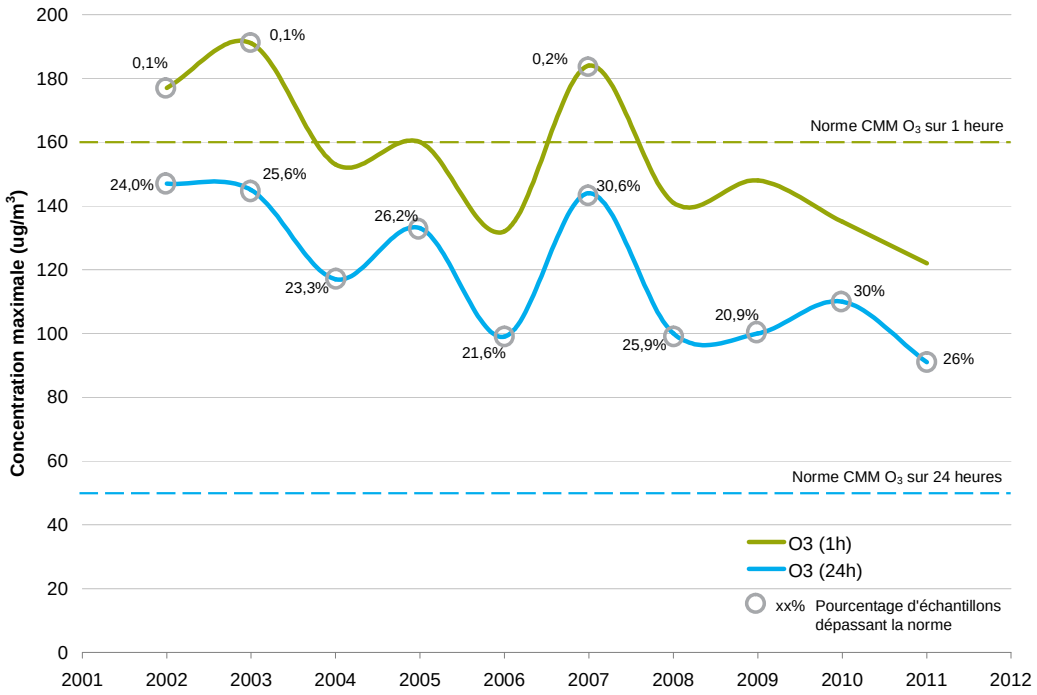
Table 3 Air quality standards in Quebec and in the CMM for the principal contaminants associated with highway transportation

POLLUTANT	PERIOD	CLEAN AIR REGULATION	CMM REGULATION 2001-10
Total particles in suspension	24 hr	120 µg/m³	150 µg/m³
	1 yr	None	70 µg/m³
Particles in suspension under 2.5 microns (PM2,5)	24 hr	30 µg/m³	None [4]
Nitrogen dioxide (NO_2)	1 hr	414 µg/m³	400 µg/m³
	8 hr	None	253 µg/m³
	24 hr	207 µg/m³	200 µg/m³
	1 yr	103 µg/m³	100 µg/m³
Carbon monoxide (CO)	1 hr	34,000 µg/m³	35,000 µg/m³
	8 hr	12,700 µg/m³	15,000 µg/m³
Sulphur dioxide (SO_2)	15 min	None	860 µg/m³
	1 hr	None	1,300 µg/m³
	8 hr	None	490 µg/m³
	24 hr	288 µg/m³	260 µg/m³
	1 yr	52 µg/m³	52 µg/m³
Ozone (O_3) (See figure 13)	15 min	None	265 µg/m³
	1 hr	160 µg/m³	160 µg/m³
	8 hr	120 µg/m³	75 µg/m³
	24 hr	None	50 µg/m³
	1 yr	None	30 µg/m³

Sources: *Clean Air Regulation* (Q-2, r.4.1)
CMM regulation 2001-10 (http://www.cmm.qc.ca/fileadmin/user_upload/reglements/09_1.pdf)

[4] **However, this pollutant is sampled by the City of Montreal's air quality monitoring network and the proposed limit value for a mobile average of three hours is 35 µg/m³.**

Figure 13 Changes in the concentration of ozone (O_3) at station 68-Verdun on an hourly average and a 24-hour average



4.1.4 Key issues of the physical environment

Although the effects and mitigation measures are dealt with elsewhere, this section provides an overview of the highlights of current environmental components and the factors to be considered in the upcoming stages of the project.

4.1.4.1 Soil and sediment quality

Construction of the new infrastructure does not require decontamination of the land it crosses, particularly the Parc d'entreprises de la Pointe-Saint-Charles. However, the soil and other excavation material that will result from the construction work will need to be managed based on their environmental quality and in compliance with prevailing regulations.

Among the factors to be considered in the design of new infrastructure and during subsequent stages are:

- Identification of excavation/fill zones for the entire construction site is required during the preliminary design phase in order to determine which zones need characterization to ensure adequate environmental management of excavated material;
- The possible presence of methane in the soil must be taken into account in the structural design of the new infrastructure. Situations likely to cause gas to accumulate in an area or in an

enclosed space where there is also an ignition source or in a space or premises even occasionally occupied by a worker or any other person must be avoided;

- Construction of the new infrastructure must be preceded by interventions designed to mitigate the problem of contamination in the Parc d'entreprises de la Pointe-Saint-Charles and the migration of contaminants to the river. However, if this sequence is not followed, the design and execution of work for the new infrastructure must not constitute an obstacle to future action to deal with this problem.

Work in the water of the Greater La Prairie Basin is not an issue with respect to dispersion of contaminated sediment, but careful attention must be paid to the work that will take place in the Lesser La Prairie Basin. Measures to control the resuspension of sediments are required, though this should not be difficult given the low flow conditions.

4.1.4.2 Surface and groundwater quality

The main issue with regard to surface water quality relates to variations in turbidity and suspended solids. One year prior to the start of work, when the concept for the new bridge and the construction techniques are more clearly defined, separate sampling on either side of the river as well as a central station should be planned in order to determine the influence of the two bodies of water in the area (the influence of the St. Lawrence River on the left bank and the Ottawa River on the right bank). Following periods of heavy rainfall data on suspended solids should also be gathered in order to learn the high values of the range for suspended solids and for turbidity under natural conditions.

The only factor regarding groundwater to be taken into account in the design for the new infrastructure and in subsequent stages is:

- Any groundwater pumped during construction work in the Montreal shore sector must be treated prior to discharge.

4.1.4.3 Air Quality

Despite the direct and indirect effects of transport-related pollution on quality of life and human health, current conditions for both criteria air pollutants and greenhouse gases leave reason to believe that, although air quality is a significant issue for this project, no major impact on this environmental component is expected.

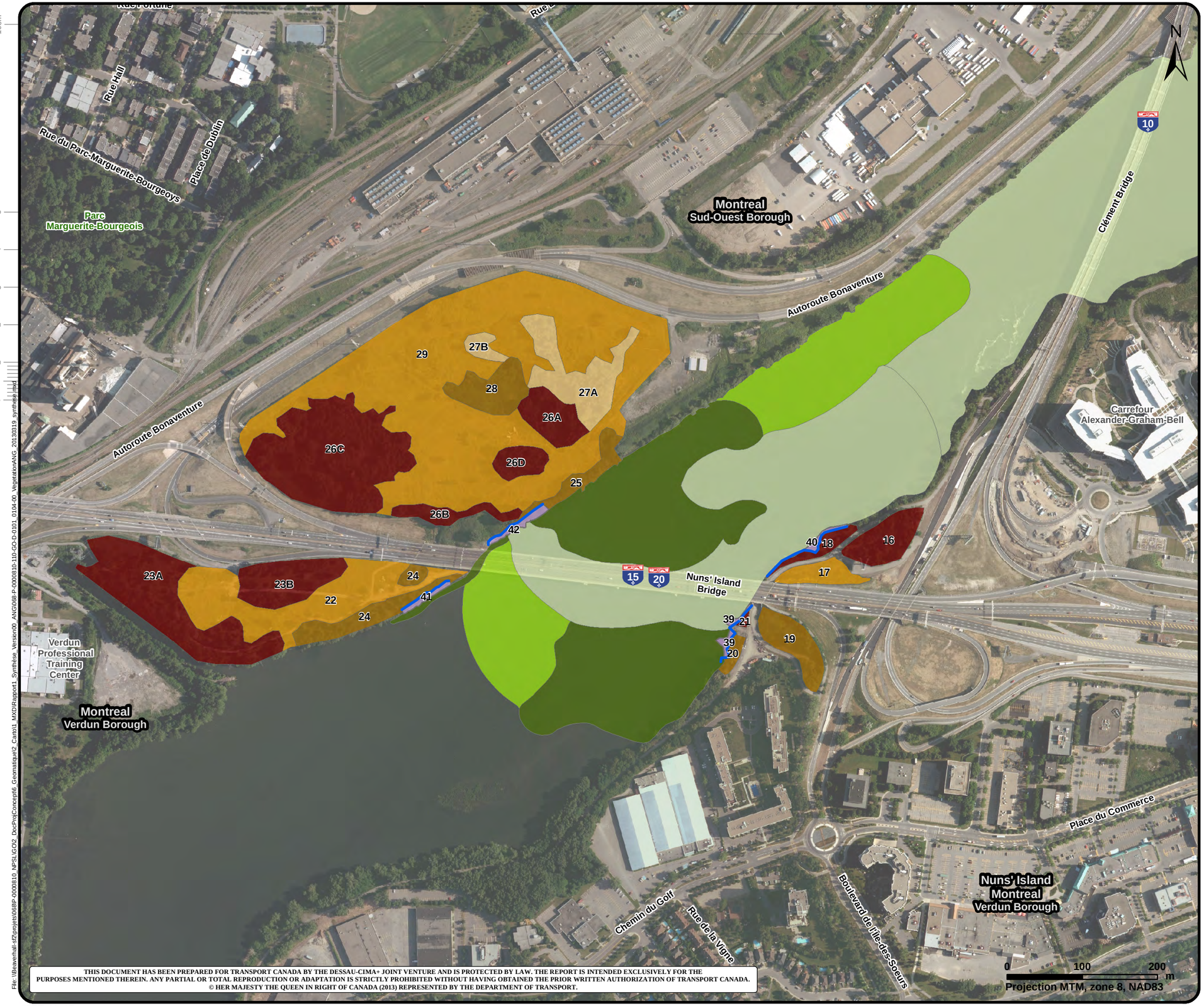
Once the final geometry of the infrastructure is known, a dispersion simulation for criteria air pollutants should be conducted in order to validate whether the project's impact is marginal on pre-defined sensitive areas (schools, seniors' residences, daycares, hospitals), mainly under prevailing winds.

4.2 GENERAL DESCRIPTION OF THE BIOLOGICAL ENVIRONMENT

The area around the Champlain Bridge site consists mainly of herbaceous fields and eastern cottonwood stands covering, respectively, 46.3% and 21.3% of the vegetated area. Table 4 and figures 14a to 14d present the different plant populations found near the site. Wetlands are found mainly along the river and next to the Highway 10 ramps on the South Shore.

Table 4 Description of plant populations in the study area

ENVIRONMENT TYPE	SURFACE AREA (m^2)	% AREA OF COVERAGE
Terrestrial environment		
Eastern cottonwood poplar stands	72,450 m^2	21.3%
Black locust stands	33,233 m^2	9.8%
Red ash stands	52,724 m^2	15.5%
Staghorn sumac fields	23,592 m^2	6.95%
Herbaceous fields	157,296 m^2	46.3%
Wetlands		
Aquatic plant communities	414,041 m^2	
Pond	1,555 m^2	
Tree swamp	15,458 m^2	
Emerging riverside marshes	7,609 m^2	



High water line

Wetland

- Pond
- Emergent shoreline marsh
- Common reed marsh
- Treed swamp

Terrestrial environment

- Staghorn sumac shrublands
- Herbaceous fields
- Red ash stands
- Black locust stands
- Eastern cottonwood poplar stands

Aquatic vegetation cover (in %)

- 0-25
- 25-50
- 50-75
- 75-100

SOURCES :
- Vegetation units and High-water line : field inventory, CIMA 2012
- Aquatic vegetation : Environnement Illimité inc., 2012
- Orthophotographs : © Montreal Metropolitan Community, 2005-2011

Client: Transport Canada / Transports Canada

Project: New Bridge for the St. Lawrence Environmental Assessment

Title: Figure 14a
Floristic Composition of the
Wetlands and Terrestrial Environments

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Checked	Ghyslain Pothier	Date	2013-03-19
Project manager	Sylvie Côté	Sequence No.	01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0101	00

SIZE 11x17

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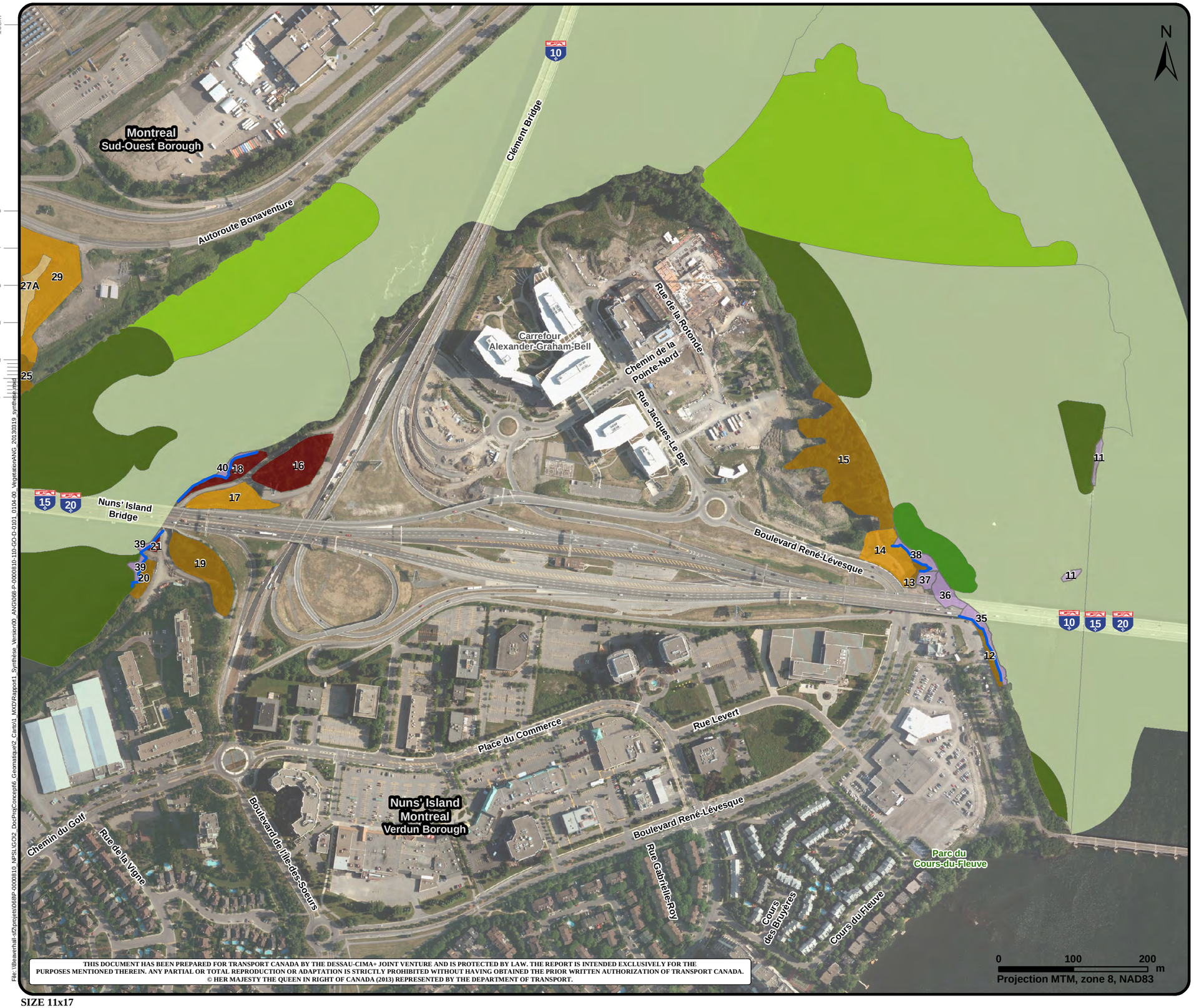

High water line

Wetland

- Pond
- Emergent shoreline marsh
- Common reed marsh
- Treed swamp

Terrestrial environment

- Staghorn sumac shrublands
- Herbaceous fields
- Red ash stands
- Black locust stands
- Eastern cottonwood poplar stands

Aquatic vegetation cover (in %)

- 0-25
- 25-50
- 50-75
- 75-100

SOURCES :
- Vegetation units and High-water line : field inventory, CIMA 2012
- Aquatic vegetation : Environnement Illimité inc., 2012
- Orthophotographs : © Montreal Metropolitan Community, 2005-2011

Client: Transport Canada / Transports Canada

Project: New Bridge for the St. Lawrence Environmental Assessment

Title: Figure 14b
Floristic Composition of the
Wetlands and Terrestrial Environments

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Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0102	00

SIZE 11x17

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High water line

Wetland

- Pond
- Emergent shoreline marsh
- Common reed marsh
- Treed swamp

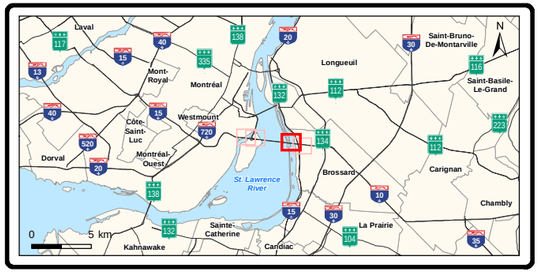
Terrestrial environment

- Staghorn sumac shrublands
- Herbaceous fields
- Red ash stands
- Black locust stands
- Eastern cottonwood poplar stands

Aquatic vegetation cover (in %)

- 0-25
- 25-50
- 50-75
- 75-100

SOURCES :
- Vegetation units and High-water line : field inventory, CIMA 2012
- Aquatic vegetation : Environnement Illimité inc., 2012
- Orthophotographs : © Montreal Metropolitan Community, 2005-2011



Client: Transport Canada / Transports Canada

Project: New Bridge for the St. Lawrence Environmental Assessment

Title: Figure 14c
Floristic Composition of the
Wetlands and Terrestrial Environments

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Project manager	Sylvie Côté	Sequence No.	01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0103	00

File: \\Beaverhall-sf2\projets\068\P-0000810_NPSLGO\2_DocProjConcept\6_Geomatique\2_Carto\1_MXD\Rapport1_Synthèse_Version00_ANG\068-P-0000810-110-GO-D-0103_0104-00_VegetationANG_20130319_synthese.mxd

SIZE 11x17

High water line

Wetland

- Pond
- Emergent shoreline marsh
- Common reed marsh
- Treed swamp

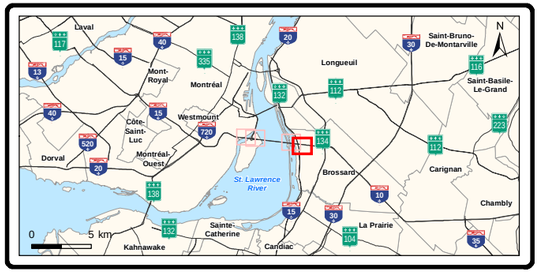
Terrestrial environment

- Staghorn sumac shrublands
- Herbaceous fields
- Red ash stands
- Black locust stands
- Eastern cottonwood poplar stands

Aquatic vegetation cover (in %)

- 0-25
- 25-50
- 50-75
- 75-100

SOURCES :
- Vegetation units and High-water line : field inventory, CIMA 2012
- Aquatic vegetation : Environnement Illimité inc., 2012
- Orthophotographs : © Montreal Metropolitan Community, 2005-2011



Client: Transport Canada / Transports Canada

Project: New Bridge for the St. Lawrence Environmental Assessment

Title: Figure 14d
Floristic Composition of the
Wetlands and Terrestrial Environments

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Checked	Ghyslain Pothier	Date	2013-03-19
Project manager	Sylvie Côté	Sequence No.	01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0104	00

SIZE 11x17

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4.2.1 Fish and fish habitat

The waters of the Greater and the Lesser La Prairie Basins host a wide variety of fish species. Studies carried out in this area identified 44 fish species (Table 5) out of a hundred found in the extended area stretching 15 km upstream and downstream from the Champlain Bridge corridor.

Table 5 Fish species found or likely to be found in the study area

FISH SPECIES FOUND OR LIKELY TO BE FOUND IN THE STUDY AREA									
SPECIES	FAMILY	SPECIAL STATUS		STUDY AREA (VILLE-MARIE ZIP)				UPSTREAM (HAUT-RICHELIEU ZIP)	DOWNSTREAM (JACQUES-CARTIER ZIP)
		PROVINCIAL	FEDERAL	ALL	GREATER LA PRAIRIE BASIN	LESSER LA PRAIRIE BASIN	LACHINE RAPIDS		
Largemouth bass	CENTRARCHIDAE			x	x	x	x	x	x
Smallmouth bass	CENTRARCHIDAE			x	x	x	x	x	x
Gizzard shad	CLUPEIDAE			x				x	
American shad	CLUPEIDAE	Vulnerable		x			x	x	x
American eel	ANGUILLIDAE	LDTV	Special concern	x	x	x	x	x	x
White bass	PERCICHTHYIDAE							x	
Striped bass	PERCICHTHYIDAE								x
Brown bullhead	ICTALURIDAE			x	x	x	x	x	x
Stonecat	ICTALURIDAE			x				x	x
Channel catfish	ICTALURIDAE			x		x		x	x
White perch	PERCICHTHYIDAE			x	x	x	x	x	
Harelip	CYPRINIDAE			x			x	x	x
Redfin pickerel	ESOCIDAE								x
Chain pickerel	ESOCIDAE	LDTV		x					x
Grass pickerel	ESOCIDAE	LDTV	Special concern					x	x
Crucian carp	CYPRINIDAE								x
Carp	CYPRINIDAE			x	x	x	x	x	x
Mottled sculpin	COTTIDAE			x	x		x	x	x
Slimy sculpin	COTTIDAE			x					x
Tadpole madtom	ICTALURIDAE					x		x	x
Golden shiner	CYPRINIDAE			x					
Silver redhorse	CATOSTOMIDAE								x

Table 5 (cont'd.) Fish species found or likely to be found in the study area

FISH SPECIES FOUND OR LIKELY TO BE FOUND IN THE STUDY AREA									
SPECIES	FAMILY	SPECIAL STATUS		STUDY AREA (VILLE-MARIE ZIP)				UPSTREAM (HAUT-RICHELIEU ZIP)	DOWNSTREAM (JACQUES-CARTIER ZIP)
		PROVINCIAL	FEDERAL	ALL	GREATER LA PRAIRIE BASIN	LESSER LA PRAIRIE BASIN	LACHINE RAPIDS		
Copper redhorse	CATOSTOMIDAE	Threatened	Endangered						x
River redhorse	CATOSTOMIDAE	Vulnerable	Special concern						x
Greater redhorse	CATOSTOMIDAE								x
Shorthead redhorse	CATOSTOMIDAE								x
Quillback	CATOSTOMIDAE			x				x	x
Longear sunfish	CENTRARCHIDAE	LDTV							x
Bluegill	CENTRARCHIDAE								x
Rock bass	CENTRARCHIDAE			x	x	x	x	x	x
Pumpkinseed	CENTRARCHIDAE			x	x	x	x	x	x
Brook silverside	ATHERINIDAE			x				x	x
Iowa darter	PERCIDAE				x			x	x
Rainbow darter	PERCIDAE	LDTV						x	x
Fantail darter	PERCIDAE			x			x	x	x
Eastern sand darter	PERCIDAE	Threatened	Threatened						x
Walleye	PERCIDAE			x	x	x	x	x	x
Sauger	PERCIDAE			x	x	x	x	x	x
American smelt	OSMERIDAE			x		x	x	x	x
Brook stickleback	GASTEROSTEIDAE			x			x	x	x
Threespine stickleback	GASTEROSTEIDAE								x
Lake sturgeon	ACIPENSERIDAE	LDTV		x	x			x	x
Atlantic sturgeon	ACIPENSERIDAE	LDTV							x
Banded killifish	CYPRINODONTIDAE			x	x	x	x	x	x
Channel darter	PERCIDAE	Vulnerable	Threatened					x	x
Logperch	PERCIDAE			x	x	x	x		x

Table 5 (cont'd.) Fish species found or likely to be found in the study area

FISH SPECIES FOUND OR LIKELY TO BE FOUND IN THE STUDY AREA									
SPECIES	FAMILY	SPECIAL STATUS		STUDY AREA (VILLE-MARIE ZIP)				UPSTREAM (HAUT-RICHELIEU ZIP)	DOWNSTREAM (JACQUES-CARTIER ZIP)
		PROVINCIAL	FEDERAL	ALL	GREATER LA PRAIRIE BASIN	LESSER LA PRAIRIE BASIN	LACHINE RAPIDS		
Alewife	CLUPEIDAE			x		x		x	x
Northern pike	ESOCIDAE			x	x	x	x	x	x
Lake whitefish	SALMONIDAE								x
Silver lamprey	PETROMYZONTIDAE			x	x			x	x
Lamprey	PETROMYZONTIDAE							x	x
Mooneye	HIODONTIDAE			x					x
Longnose gar	LEPISOSTEIDAE			x				x	x
Burbot	GADIDAE			x				x	x
Freshwater drum	SCIAENIDAE							x	x
Black crappie	CENTRARCHIDAE			x	x	x		x	x
Muskellunge	ESOCIDAE			x	x	x	x	x	x
Common shiner	CYPRINIDAE			x	x	x	x	x	x
Spotfin shiner	CYPRINIDAE			x				x	x
Silver minnow	CYPRINIDAE			x		x		x	x
Bridle shiner	CYPRINIDAE	Vulnerable	Special concern					x	x
Emerald shiner	CYPRINIDAE			x		x	x	x	x
Golden shiner	CYPRINIDAE					x	x	x	x
Sand shiner	CYPRINIDAE			x				x	x
Mimic shiner	CYPRINIDAE			x		x	x	x	x
Blackchin shiner	CYPRINIDAE			x			x	x	x
White sucker	CATOSTOMIDAE			x	x	x	x	x	x
Northern sucker	CATOSTOMIDAE			x	x		x	x	x
Creek chub	CYPRINIDAE			x			x	x	x
Pearl dace	CYPRINIDAE					x			x
Blacknose shiner	CYPRINIDAE							x	x
Longnose dace	CYPRINIDAE			x	x		x	x	x
Blacknose dace	CYPRINIDAE							x	x

Table 5 (cont'd.) Fish species found or likely to be found in the study area

FISH SPECIES FOUND OR LIKELY TO BE FOUND IN THE STUDY AREA									
SPECIES	FAMILY	SPECIAL STATUS		STUDY AREA (VILLE-MARIE ZIP)				UPSTREAM (HAUT-RICHELIEU ZIP)	DOWNSTREAM (JACQUES-CARTIER ZIP)
		PROVINCIAL	FEDERAL	ALL	GREATER LA PRAIRIE BASIN	LESSER LA PRAIRIE BASIN	LACHINE RAPIDS		
Brook trout	SALMONIDAE			x			x	x	x
Arctic grayling	SALMONIDAE								x
Trout-perch	PERCOPSIDAE			x				x	x
Fallfish	CYPRINIDAE			x			x	x	x
Yellow perch	PERCIDAE			x	x	x	x	x	x
Bowfin	AMIIDAE			x	x			x	x
Spottail shiner	CYPRINIDAE			x	x	x	x	x	x
Tesselated darter	PERCIDAE			x				x	x
Johnny darter	PERCIDAE			x	x	x	x	x	x
Atlantic salmon	SALMONIDAE								x
Coho salmon	SALMONIDAE			x			x	x	x
Chinook salmon	SALMONIDAE								x
River redhorse	CATOSTOMIDAE			x				x	x
Silver redhorse	CATOSTOMIDAE			x	x	x	x	x	x
Copper redhorse	CATOSTOMIDAE							x	x
Greater redhorse	CATOSTOMIDAE			x				x	x
Shorthead redhorse	CATOSTOMIDAE			x	x	x	x	x	x
Rosyface shiner	CYPRINIDAE	LDTV		x		x		x	x
Fathead minnow	CYPRINIDAE			x		x		x	x
Lake trout	SALMONIDAE							x	x
Rainbow trout	SALMONIDAE			x	x	x	x	x	x
Sea trout	SALMONIDAE			x	x	x	x	x	x
Cutthroat trout	SALMONIDAE			x			x		x
Central mudminnow	UMBRIDAE			x	x			x	x
Northern redbelly dace	CYPRINIDAE							x	x
Bluntnose minnow	CYPRINIDAE			x	x	x	x	x	x

Source: Armellin et al. (1994, 1995, 1997), Dumont et al. 2005, Ministère des ressources naturelles et de la faune – MRNF (Ministry of Naural Resources and Wildlife) (2011), Government of Canada 2012

4.2.1.1 General description of fish habitat

Fish habitats were characterized based on criteria established by Lavoie and Talbot (1984), as set forth in Armellin and Mousseau (1998), for six groups of fish that spawn in similar habitats (guilds), namely: fast-flowing water lithophil, still water lithophil, still water phytolithophil, phytophil, lithopelagophil and pelagophil. The last two guilds (lithopelagophil and pelagophil) are not represented in the study area and therefore are not presented here. The biophysical characteristics of the watercourse considered when determining spawning potential are: flow velocity, average depth, substrate particle-size classes and aquatic and semi-aquatic vegetation density (environment type). The table presented in Appendix 2, which presents this information, has been adjusted to include all the species present in the study area and to incorporate the latest data from the literature. One or more of the 24 habitat types were then assigned to a type of spawning ground (see Appendix 2).

4.2.1.2 Habitats in the Lesser La Prairie Basin

When characterization was carried in August 2012, the water level in the Lesser La Prairie Basin was nearly 2 m higher than in the Greater La Prairie Basin. There are 36 species from 12 families in the Lesser La Prairie Basin (Armellin et al. 1997; see Table 5) and among these families cyprinidae, percidae and centrarchidae dominate.

As stated above, flow in the Lesser La Prairie Basin is lentic and the basin comprises three habitat types (see figure 18). The substrate is fine-textured, there is little vegetation and the depth ranges from 2 to 5 m in over 63% (122,180 m²) of the area of this sector (see Figure 15). In the shallow areas, there are large aquatic plant communities (16,570 m²) such as the one along the south shore of the basin. This habitat is a favourable breeding zone for many phytolithophil species such as bass, perch and even some members of the carp family. The Seaway canal covers 25% of this sector. The canal is deeper at 8.6 m, and is colonized, for the most part, by zebra mussels on a gravel substrate. Many fish were observed during characterization in the Seaway canal. Among these species are the American eel and the rosyface shiner, both likely to be designated threatened or vulnerable at the provincial level. It is possible that the passage of commercial vessels stirs up particles that attract certain invertebrates, including zebra mussels, which in turn attract fish in search of food.

4.2.1.3 Habitats of the Greater La Prairie Basin

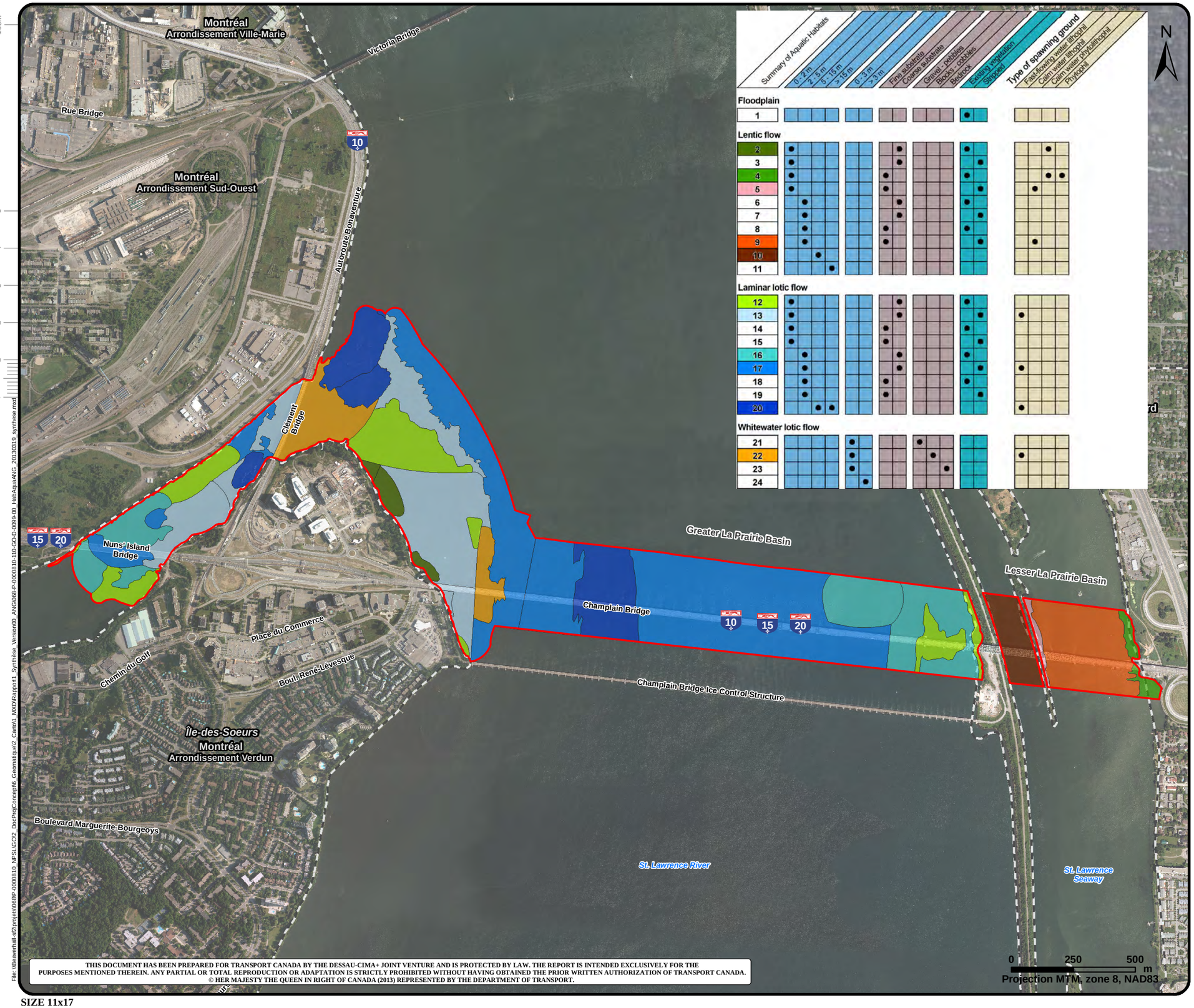
The Greater La Prairie Basin, including the channel between Nuns' Island and Montreal Island, hosts 33 species among 15 families (Armellin et al. 1997; see Table 5). The largest families are the percidae, followed by cyprinidae and centrarchidae. Among the species observed in the study area are the lake sturgeon and the American eel, both likely to be designated threatened or vulnerable at the provincial level (see Table 5).

Approximately 50% of the Greater La Prairie Basin is composed of coarse substrate and is bare of vegetation, as is the central section extending below the Champlain Bridge (see figure 18). Depths in this sector, which presents a laminar water flow pattern, range between 2 m and 15 m. Two areas around Nuns' Island downstream from the Champlain Bridge and downstream from the Clément Bridge are worthy of note. The combination of coarse substrate, a depth of less than 3 m

and the fast-flowing cross current has created two zones with favourable spawning conditions for several fast-flowing water lithophil species such as walleye and catostomidae. There are also several areas of aquatic plant communities in the Greater La Prairie Basin including the South Shore, with a plant bed of approximately 178,360 m². The channel between Nuns' Island and Montreal contains a variety of intermingled habitats, of varying depths (0 to 5 m) and vegetation density. This diversity has created a favourable feeding area for many fish species. Other areas of plant beds, where the current is slower, are found along Nuns' Island, and serve as refuges, feeding areas and even spawning grounds for some phytolithophil species. Two especially deep sectors were also observed, one along Montreal Island and the other, smaller one, along the north shore of Nuns' Island. These depressions were probably created artificially during backfilling work.

4.2.1.4 Special status species

Although they have not all been observed in the study area, there are five special status species that could potentially be found in that area. The American eel, the chain pickerel, the lake sturgeon and the rosyface shiner are all likely to be designated threatened or vulnerable at the provincial level while the American shad is designated as vulnerable at the provincial level.



- Bathymetric study area and surface substrate
- Municipal limit
- Borough limit

SOURCES :
- Aquatic habitats : Environnement Illimité inc., 2012
- Orthophotographs: © Montreal Metropolitan Community, 2005-2011

Client: Transport Canada / Transports Canada

Project: New Bridge for the St. Lawrence Environmental Assessment

Title: Figure 15
Summary of Aquatic Habitats

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Checked	Ghyslain Pothier	Date	2013-03-19
Project manager	Sylvie Côté	Sequence No.	01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0099	00

SIZE 11x17

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4.2.2 Terrestrial wildlife

There are 15 to 20 species of mammals found in the study area; these species are mainly associated with urban and peri-urban environments. No special status species has been listed or inventoried. During the surveys conducted in 2012, the presence of 13 species was confirmed (Table 6). These are common species and are for the most part well-adapted to urban, fairly open, environments.

Table 6 Mammals observed during study area surveys

FRENCH NAME	ENGLISH NAME	LATIN NAME	CONFIRMED PRESENCE			
			SOUTH SHORE	COUVEE ISLANDS AND DIKE	NUNS' ISLANDS	MONTREAL
Léporidé sp.	Hare or Rabbit	*Leporidae sp.*	-	-	-	Feces
Marmotte commune	Woodchuck	*Marmota monax*	-	Burrow	Burrow	Burrow
Tamia rayé	Eastern Chipmunk	*Tamis striatus*	-	-	-	Individual
Écureuil gris	Gray Squirrel	*Sciurus carolinensis*	Individual	Individual	Individual	Individual
Écureuil roux	Red Squirrel	*Tamiasciurus hudsonicus*	-	-	Individual	-
Castor du Canada	American Beaver	*Castor canadensis*	-	Browse	-	-
Souris sylvestre	Deer Mouse	*Peromyscus maniculatus*	Nest (6 young)	–	–	Nest (5 young)
Campagnol des champs	Meadow Vole	*Microtus pennsylvanicus*	-	-	-	Individual
Rat musqué	Muskrat	*Ondatra zibethicus*	-	-	Individual	-
Renard roux	Red Fox	*Vulpes vulpes*	-	-	Individual	-
Raton laveur	Racoon	*Procyon lotor*	Tracks	-	Individual	Tracks
Vison d'Amérique	American Mink	*Mustela vison*	-	-	Individual	-
Moufette rayée	Skunk	*Mephitis mephitis*	Tracks	-	-	Tracks

According to the Atlas of Amphibians and Reptiles of Quebec (AARQ, 2011), 20 species of amphibians and 18 species of reptiles have been identified within a 5 km radius encompassing the study area. However, the species inventoried in the study area are less numerous. In fact, only the

leopard frog (*Lithobates pipiens*), the mudpuppy (*Necturus maculosus*), the common garter snake (*Thamnophis sirtalis*), the painted turtle (*Chrysemys picta*) and the brown snake (*Storeria dekayi*) were identified. Field inventories were conducted in the study area. table 7 summarizes the inventory results and habitat potential.

In general, habitats suitable for amphibians are not common in the study area. Furthermore, data obtained from the Atlas of Amphibians and Reptiles of Quebec support this conclusion and confirm that there are few amphibian species in the study area.

Table 7 Summary of amphibian and reptile species inventoried and observed on the site

ORDER	TYPICAL SPECIES	PRESENCE OF INDIVIDUALS DURING INVENTORY	POTENTIAL HABITAT
Anuran	Frogs, toads and tree frogs	No species	Uncommon outside of wetlands near the bridge.
Urodela	Salamanders	No species	Very rare
Testudines	Turtles	No species	Not suitable due to rocky shores
Squamates	Snakes	Common Garter Snake (*Thamnophis sirtalis*) Redbelly Snake (*Storeria o. occipitomaculata*) Brown Snake (*Storeria d. dekayi)*	Suitable habitat including fields, on the edge of woodlands and on the rocky banks of the St. Lawrence River, mainly on the Island of Montreal and Nuns' Island.

4.2.3 Migratory birds and their habitats

Previous studies found up to 254 bird species in the area of the Champlain Bridge corridor. During inventories conducted for the project, 41 bird species were identified. They are, for the most part, species common to Quebec and characteristic of open, urban environments (see table 8). Wild bird habitats are usually shrublands and fallow fields. Deciduous groves are also suitable, mainly poplars, which comprise the strip along the shore of the St. Lawrence River, in addition to the water itself, which is used primarily by aquatic fauna.

During inventories carried out in 2012, the greatest number of individuals was found in the Nuns' Island sector (east and west), whereas the greatest number of breeding pairs was found on the Seaway canal dyke and in the western sector of Nuns' Island. Lastly, the Brossard shore held the lowest number of individuals and breeding pairs.

4.2.3.1 Migratory bird sanctuary and other protected habitats

The study area is characterized by the presence of a migratory bird sanctuary (MBS), protected under federal jurisdiction, called "Couvée Island" (IBA 2012). The Couvée Islands are located within the South Shore Canal along the south bank of the St. Lawrence River, between the Champlain and Victoria bridges. The islands were created from sediment dredged from the canal.

From 1970 to 1990, the largest island sheltered a significant colony of ring-billed gulls, with approximately 30,000 pairs, as well as a small number of herring gulls and common terns. Since then, the colony has been in continuous decline due in part to the presence of a family of red foxes (IBA 2012).

The study area also includes a waterfowl concentration area, the Nuns' Island La Prairie Basin (habitat number: 02-06-0167). The main species using this area, inventoried in the fall and spring, are dabblers, such as the American wigeon, northern pintail, mallard and American black duck; there are also diving ducks such as bluebills and the common goldeneye, and there is the ring-billed gull.

Table 8 Avifauna inventory result per observed species

ENGLISH NAME	LATIN NAME	NUMBER OF INDIVIDUALS			NUMBER OF BREEDING PAIRS			BREEDING PAIRS / HECTARE
		June 5	June 20	Best result	June 5	June 20	Best result	
Canada goose	*Branta canadensis*	7	40	40	3.5	0	3.5	0.08
Black-crowned night-heron	*Nycticorax nycticorax*	1	3	3	0	0	0	0.00
Song sparrow	*Melospiza melodia*	45	37	45	42	34	42	0.93
Swamp sparrow	*Melospiza georgiana*	1	0	1	1	0	1	0.02
Gadwall	*Anas strepera*	2	1	2	1	0,5	1	0.02
Mallard	*Anas platyrhynchos*	12	59	59	6	0	6	0.13
Northern cardinal	*Cardinalis cardinalis*	0	1	1	0	1	1	0.02
Red-winged blackbird	*Agelaius phoeniceus*	149	118	149	129.5	102	129.5	2.88
American goldfinch	*Spinus tristis*	2	13	13	2	12	12	0.27
Spotted sandpiper	*Actitis macularius*	0	1	1	0	0.5	0.5	0.01
Double-crested cormorant	*Phalacrocorax auritus*	1	1	1	0	0	0	0.00
American crow	*Corvus brachyrhynchos*	11	2	11	5.5	0	5.5	0.12
European starling	*Sturnus vulgaris*	29	159	159	10.5	4.5	10.5	0.23
Peregrine falcon[1]	*Falco peregrinus anatum*	1	3	1	1	0	1	0.02
Ring-billed gull	*Larus delawarensis*	98	69	98	2.5	5.5	5.5	0.12
Herring gull	*Larus argentatus*	9	0	9	0.5	0	0.5	0.01
Great black-backed gull	*Larus marinus*	2	1	2	0	0	0	0.00
Great blue heron	*Ardea herodias*	4	2	4	1.5	0	1.5	0.03
Great egret	*Ardea alba*	1	1	1	0	0	0	0.00
Cliff swallow	*Petrochelidon pyrrhonota*	77	39	77	3.5	16.5	16.5	0.37
Tree swallow	*Tachycineta bicolor*	8	13	13	5	2.5	5	0.11
Cedar waxwing	*Bombycilla cedrorum*	74	12	74	50	11	50	1.11
Chimney swift[1]	*Chaetura pelagica*	2	0	2	1	0	1	0.02

Table 8 (cont'd) Avifauna inventory result per observed species

ENGLISH NAME	LATIN NAME	NUMBER OF INDIVIDUALS			NUMBER OF BREEDING PAIRS			BREEDING PAIRS / HECTARE
		June 5	June 20	Best result	June 5	June 20	Best result	
American robin	*Turdus migratorius*	10	7	10	4	5.5	5.5	0.12
Gray catbird	*Dumetella carolinensis*	0	2	2	0	2	2	0.04
Baltimore oriole	*Icterus galbula*	3	5	5	2.5	3	3	0.07
Black-throated blue warbler	*Dendroica caerulescens*	3	0	3	2.5	0	2.5	0.06
American redstart	*Setophaga ruticilla*	0	1	1	0	1	1	0.02
Yellow warbler	*Dendroica petechia*	87	54	87	86	53.5	86	1.91
Common yellowthroat	*Geothlypis trichas*	1	1	1	1	1	1	0.02
Downy woodpecker	*Picoides pubescens*	1	2	2	0.5	2	2	0.04
Rock dove	*Columba livia*	7	3	7	3.5	1.5	3.5	0.08
Killdeer	*Charadrius vociferus*	1	0	1	1.5	0	1.5	0.03
Common grackle	*Quiscalus quiscula*	2	3	3	2	1.5	2	0.04
House finch	*Carpodacus mexicanus*	0	1	1	0	0.5	0.5	0.01
Common tern	*Sterna hirundo*	10	16	16	0	0	0	0.00
Mourning dove	*Zenaida macroura*	2	0	2	1.5	0	1.5	0.03
Eastern kingbird	*Tyrannus tyrannus*	4	3	4	2.5	1.5	2.5	0.06
Brown-headed cowbird	*Molothrus ater*	2	0	2	2	0	2	0.04
Red-eyed vireo	*Vireo olivaceus*	2	2	2	2	2	2	0.04
Warbling vireo	*Vireo gilvus*	10	15	15	10	14.5	14.5	0.32
Total		**681**	**690**	**930**	**387.5**	**279.5**	**426.5**	**9.48**

1: Species at risk

4.2.4 Special status flora and fauna species

Certain special status flora and fauna species were observed in the study area. The following tables identify the species that have been either listed or inventoried and indicate their legal status in Quebec and Canada.

Table 9 List of occurrences of special status plant species in the CDPNQ and in the 2012 inventories and possible use of study area based on habitat availability

VERNACULAR NAME *(LATIN NAME)*	OCCURRENCE	STATUS IN CANADA*	STATUS IN QUEBEC**	HABITAT	HABITAT AVAILABLE IN STUDY AREA
Green dragon (Arisaema dracontium)	1(CDPNQ)	SC	T	Floodplains, natural high-water mark, silver maple stands and red ash, reed phalaris alluvial meadows	YES
American water-willow (Justicia americana)	1(CDPNQ)	T	T	Stream and pond banks on gravel, sand or organc matter substrate. Prefers hard water, i.e., rich in dissolved carbonates and bicarbonates, soil rich in organic matter and swift currents	YES
Downy wildry (Elymus villosus)	1(CDPNQ)	-	LDTV	Open, rocky woodlands, shores	YES
Common hackberry (Celtis occidentalis)	1(CDPNQ)	-	LDTV	Tolerant deciduous forest in rich, cool limestone soil, gravel or rocky riparian gradients, steep banks; Calcicole	YES
Switchgrass (Panicum virgatum)	1(CDPNQ)	-	LDTV	Dry shores and alluvial deposits	YES
St. Lawrence waterhorehound (Lycopus americanus var. laurentianus)	2 (2012 inventory)		LDTV	Rocky or gravel shores	YES
Rough water-horehound (Lycopus asper)	7(2012 inventory)		LDTV	Shorelines	YES

* Status in Canada: SC: Special Concern, T: Threatened, E: Endangered

** Status in Quebec: V: Vulnerable, LDTV: Likely to be Designated Threatened or Vulnerable, T: Threatened

Table 10 List of special status species listed by the CDPNQ and identified in the inventories

	ENGLISH NAME	LATIN NAME	STATUS		OBSERVATIONS	
			PROVINCIAL	FEDERAL	CDPNQ[1]	2012[2]
Amphibians and reptiles	Chorus frog	*Pseudacris triseriata*	V	T	X	
	Pickerel frog	*Lithobates palustris*	LDTV	NT	X	
	Spiny softshell	*Apalone spinifera*	T	T	X	
	Map turtle	*Graptemys geographica*	V	SC	X	
	Ringneck snake	*Diadophis punctatus*	LDTV	NE	X	
	Milk snake	*Lampropeltis triangulum*	LDTV	SC	X	
	Brown snake	*Storeria dekayi*	LDTV	NT	X	
	Smooth green snake	*Opheodrys vernalis*	LDTV	NE	X	
Birds	Least bittern	*Ixobrychus exilis*	V	T	X	
	Bald eagle	*Haliaeetus leucocephalus*	V	NT	X	
	Tundra peregrine falcon	*Falco peregrinus anatum*	V	SC	X	X
	Yellow rail	*Coturnicops noveboracensis*	V	SC	X	
	Red-headed woodpecker	*Melanerpes erythrocephalus*	T	T	X	
	Grasshopper sparrow	*Ammodramus savannarum*	LDTV	NE	X	
	Martinet ramoneur	*Chaetura pelagica*	LDTV	T		X
Fish	Bridle shiner	*Notropis bifrenatus*	V	SC	X	
	Lake sturgeon	*Acipenser fluvescens*	LDTV	None	X	
	Atlantic sturgeon	*Acipenser oxyrinchus*	LDTV	None	X	
	River redhorse	*Maxostoma carinatum*	V	SC	X	
	Copper redhorse	*Maxostoma hubbsi*	T	E	X	
	Longear sunfish	*Lepomis megalotisi*	LDTV	NT	X	
	American shad	*Alosa sapidissima*	V	NE	X	
	American eel	*Anguilla rostrata*	LDTV	None	X	
	Stonecat	*Noturus flavus*	LDTV	NE	X	
	Channel darter	*Percina copelandi*	V	T	X	
	Chain pickerel	*Esox niger*	LDTV	NT	X	
	Grass pickerel	*Esox americanus vermiculatus*	LDTV	SC	X	
	Rainbow darter	*Etheostoma caeruleum*	LDTV	NE	X	
	Rosyface shiner	*Notropis rubellus*	LDTV	NT	X	
Mollusks	Spike	*Elliptio dilatata*	LDTV	NE	X	
	Elephantear	*Elliptio crassidens*	LDTV	NE	X	

* Status in Canada: SC: Special Concern, T: Threatened, E: Endangered, NT: Not threatened according to COSEWIC, NE: Not evaluated

** Status in Quebec: V: Vulnerable, LDTV: Likely to be Designated Threatened or Vulnerable, T: Threatened

1 CDPNQ observations were inventoried within an 8 km radius around the study area.

2 Observations based on inventories taken in the study area.

4.2.5 Key issues of the biological environment

This section provides an overview of the highlights of the existing components of the biological environment and the factors that have been considered in the analysis of the environmental effects.

4.2.5.1 Flora

During the planning phase for construction work, the location of the St. Lawrence waterhorehound and the rough water-horehound should be taken into account. As far as possible, these specimens should be protected from impact. If this is unavoidable, that impact should be minimized by, for example, transplanting the specimens outside the construction zone. These species are perennials.

Consideration should also be given to renaturalizing the natural environments disturbed by the work carried out on the shore and at the shoreline. Indigenous plant species must be available for renaturalization work to move ahead quickly with seeding and planting in order to prevent invasive species form colonizing the area.

4.2.5.2 Fish and their habitat

The study area possesses a range of habitats used by as many as 67 fish species, including 5 special status species. The spawning grounds in the fast-flowing water near Nuns' Island and the aquatic plant communities in the study area are the habitats with the greatest potential. The spawning grounds are used in April and May while the plant beds are used year round for spawning, nurseries and feeding. Limiting work in water, and respecting the crucial spring spawning periods are two measures planned to mitigate the impact of the work. In the event of permanent encroachment, compensatory measures will be proposed.

4.2.5.3 Amphibians, reptiles and their habitats

The presence of the brown snake (*Storeria dekayi*) is the sole noteworthy element with regard to reptiles. This species, whose home range is limited, was surveyed at the stations on Nuns' Island, Montreal Island and on the Seaway dyke. Suitable habitats are plentiful (abandoned fields and woodland borders). No hibernation site was confirmed in the area inventoried, but there are rock piles that could be used for hibernation. The brown snake is likely to be designated threatened or vulnerable in Quebec under the *Act respecting threatened or vulnerable species* (R.S.Q, c. E-12.01). However, based on the COSEWIC assessment, it is not considered endangered in Canada. If necessary, capture and relocation of individuals in suitable habitats unaffected by the work in the study area may be considered as has been done in other projects.

4.2.5.4 Birds and their habitats

The peregrine falcon was observed during inventories and nests on the existing bridge. This species is designated vulnerable in Quebec and has the status of a species of special concern in

Canada (Appendix 1 of the *Species at Risk Act*). The peregrine falcon may nest as early as the beginning of April and egg incubation and rearing of the young in the nest takes approximately 75 days. Nesting monitoring, setting a restricted radius of 250 m around the nest and relocation of the artificial nesting box are among the measures being considered to mitigate the impact of the project.

Cliff swallows nest on the existing bridge regularly and common terns may also be present on islets near Nuns' Island, which are close to the work. The presence of these two species during the nesting period will be confirmed before the work begins and appropriate measures will be taken to avoid disturbing nests.

Lastly, for work carried out within the migratory bird sanctuary on Couvée Island, a permit from the federal environmental authorities will have to be obtained beforehand in accordance with the *Migratory Birds Convention Act*, 1994 and the *Regulations Respecting the Protection of Migratory Birds,* C.R.C., c. 1036).

4.3 GENERAL DESCRIPTION OF THE HUMAN ENVIRONMENT

The study area is located in the city of Montreal's boroughs of Sud-Ouest and Verdun — the borough of Verdun, it should be noted, includes Nuns' Island — and in the city of Brossard. Both cities are part of the Montreal Metropolitan Community. Demographic data on the three territories are presented in table 11, along with those of the Montreal urban area and the Montérégie region.

Table 11 Overview of main features of human environments in the study area

		SUD-OUEST BOROUGH	VERDUN BOROUGH	MONTREAL	CITY OF BROSSARD	MONTÉRÉGIE
Population (2011)		71,546	66,158	481	79,273	1,456,743
Density (inhab./km^2)		4,562	6,809	3,779	1,753	129
Age group	0-19	18.8	18.0	20.7	21.6	23.5
	20-39	35.3	32.2	30.3	26.6	23.9
	40-59	27.7	28.9	27.8	28.6	30.7
	60-79	17.4	16.9	16.3	19.7	18.1
	80 +	3.5	4.2	4.8	3.2	3.5
Average number of persons per household		2.1	2.0	2.2	2.7	2.4
Educational level (at least one diploma)		71%	80%	79%	83%	76%
Average personal income ($)		26,151	36,407	32,970	26,326	26,967
Employment rate (%)		54	57	58	61	64

The residential area designation covers the largest portion of the study area, but other land use categories can also be found. The biophysical and human environments distribution map (see Figure 8) presents the various land uses and the infrastructure found in the study area.

Housing stock the Sud-Ouest and Verdun boroughs mainly consists of apartments whereas in Brossard the housing stock is composed for the most part of detached and semi-detached houses.

A number of bike paths cross the study area. The bike paths affected by the project are part of the #1 and #5 Route verte (green route), and the network of city of Montreal and South Shore bike paths. A total of seven bike paths will be directly affected by the work.

The water intake for the City of Montreal in the Aqueduc Canal is located within the study area while the water intake on the St. Lawrence River for the Le Royer plant for the Longueuil urban area is located 2 km downstream from the project.

4.3.1 Aboriginal communities

There is one Aboriginal community in the study area: Kahnawake, which is located about 10 kilometres southwest of the New Bridge for the St. Lawrence right-of-way. Specifically, it is located on the south shore of Lake St-Louis, west of the Honoré Mercier bridge, north-east of the city of Châteauguay. The reserve covers an area of approximately 55 square kilometres.

4.3.2 Navigation

4.3.2.1 The Seaway

The Great Lakes St. Lawrence Seaway System is a deep-draught waterway extending 3,700 km from the Atlantic Ocean to the head of the Great Lakes. The St. Lawrence Seaway portion of the System extends from Saint-Lambert (upstream of Montreal) to Lake Erie. The Seaway includes 13 Canadian and 2 U.S. locks.

Annual commerce on the Seaway exceeds 50 million metric tonnes. Almost 25% of the Seaway's traffic travels to and from overseas ports, primarily in Europe, the Middle East and Africa.

The ships transiting the St. Lawrence Seaway are required to adhere to certain requirements, as set out in Table 12.

Table 12 Requirements for ships transiting the Seaway

MAXIMUM BEAM	MAXIMUM LENGTH	MINIMUM LENGTH	MAXIMUM DRAUGHT	MINIMUM WEIGHT	MAXIMUM HEIGHT
23.2 m	222.5 m	6 m	79.2 dm	900 kg	35.5 m above water level

Source: Joint practices and procedures respecting the transit of ships on the St. Lawrence Seaway (2012)[5]

[5] http://www.media-seaway.com/seaway_handbook/seaway-handbook-fr/reglements.pdf

Each year, the St. Lawrence Seaway records over 4,000 vessel movements, the majority carrying mining products (Tables 13 and 14). Pleasure craft also transit the Seaway. These craft must also meet transit requirements (Table 12).

Table 13 Commercial vessel and pleasure craft traffic

YEAR	COMMERCIAL VESSELS	PLEASURE CRAFT
2011	2,889	2,306
2010	2,631	2,201
2009	2,273	2,349
2008	2,664	2,129
2007	2,824	2,369
Average	2,656	2,271

Table 14 Commercial traffic on the Montreal-Lake Ontario section

TYPE OF VESSEL		VESSEL TRANSITS	CARGO TONNES		
			Mining commodities	Agricultural commodities	Processed commodities
Ocean	Cargo	511	13,497,350 (47%)	8,303,839 (28.9%)	6,920,355 (24.1%)
	Barge	2			
	Tanker	226			
Laker	Cargo	1,135			
	Barge	327			
	Tanker	276			
Non-cargo		470			
Passenger		53			
TOTAL		3,000	28,721,544 tonnes (100%)		

Source: The St. Lawrence Seaway 2011 Traffic Report (SLSMC, 2011)

According to information obtained from the St. Lawrence Seaway Management Corporation, over the last eight years, there has been only one incident in the section between the Côte Sainte-Catherine and Saint-Lambert locks. A vessel struck bottom owing to excessive speed (St. Lawrence Seaway Management Corporation, September 24, 2012).

4.3.2.2 Greater and Lesser La Prairie Basins

Given the shallow water and strength of the current, the La Prairie Basins are not open to navigation and both basins are marked. However, Canadian Coast Guard hovercraft, Saute-

Moutons Inc. jet boats and dozens of motor launches operate in this sector of the river. Canadian Coast Guard and Saute-Moutons vessels navigate under the Champlain Bridge and under the ice control structure, approximately at the middle of these structures because the three central piers of the ice control structure are spaced further apart than the other piers. Other vessels that navigate under the Champlain Bridge in these sectors do so by drawing primarily on local navigation knowledge. As for the Lesser La Prairie Basin, recreational boating mainly uses the Seaway channel to cross the study area.

4.3.2.3 Fishing and nautical activities

In addition to pleasure craft, water activities such as kayaking, canoeing, rabascaw, windsurfing, water skiing and sport fishing were identified in the study area. The Champlain Bridge Park in Brossard has been identified as an excellent location for windsurfing. Figure 8 presents the main sectors for boating and sport fishing.

4.3.3 Sound environment

A number of sensitive areas were identified within the three following areas:

- **City of Montreal (three areas**);
  - Area 1 is located between Atwater Avenue and Mullin Street (Argenson Park and residential use);
  - Area 2 is located north of the highway axis, between Reading Street on the west and Wellington Street on the east (residential use);
  - Area 3 is located between Lasalle Boulevard and extends as far as the Nuns' Island Bridge (Mgr. Richard High School and residential use);
- **Nuns' Island (one area**);
  - Zone 4a: located south of the infrastructure on the island (residential and commercial use);
  - Area 4b: located north of the infrastructure on the island (residential and commercial use).
- **City of Brossard (three areas**);
  - Area 5 is located on the south side of the axis for highways 10/15/20, between the river and the axis for Highway 15/Route 132 (residential use);
  - Area 6 is located south of the axis for highways 10/15/20, on Tisserand Avenue, Turgeon Crescent and Tchad Place (residential use);
  - Area 7 is located north of Highways 10-15-20, between Highway 20 on the west and Pinard Street on the east (residential use).

4.3.4 Heritage resources

The study area contains sites of prehistoric and historic archaeological interest (see Table 15). Only the sector on the eastern edge of Nuns' Island contains known prehistoric sites, i.e. BiFj-1 and

BiFj-49[6] (see Figure 8). Site BjFj-49 is of particular importance to the Mohawk community of Kahnawake. 21 currently known prehistoric archaeological sites are in the immediate vicinity of the study area, which indicate more intensive occupation over the past three to four thousand years.

Three historic archaeological sites are within the study area. The Nuns' Island area directly affected by the future work holds one historical archaeological site (BiFj-1: Le Ber site; see Table 15) that is extremely important due to its uniqueness in the Montreal area. The two other sites, located in the Verdun (BiFj-78) and Sud-Ouest (BiFj-35) boroughs will not be appreciably affected by the project.

The South Shore contains no known site.

Table 15 Known archaeological sites in the study area

BORDEN CODE	LOCATION	DISTANCE FROM PROJECT (KM)	CULTURAL AFFILIATION
BjFj-1	Le Ber site, Nuns' Island	0	Prehistoric (Middle and Late Woodland); Euro-Quebec, 17th and 18th centuries
BiFj-35	Maison Saint-Gabriel	0.5	Euro-Quebec (1608-1950)
BiFj-49	Le Ber site, northern tip of Nuns' Island	0	Prehistoric (Archaic, Middle and Late Woodland); Euro-Quebec, 17th and 18th centuries
BiFj-78	Verdun Dyke	0.1	Euro-Quebec (1800-1950)

In light of past disturbance and the nature of the soil, the archaeological potential is considered low for the affected sectors of Montreal. On Nuns' Island, known sites indicate archaeological potential along the new route of René-Lévesque Boulevard. The same is true near site BiFj-78 and near the Aqueduct Canal in the Borough of Verdun.

The current area of Brossard where the right of way for the new bridge and the access roads is located holds historical archaeological potential associated solely with an agricultural occupation dating back to the 19th century.

4.3.5 Aesthetic and visual aspects

The Champlain Bridge has been an icon of the Montreal landscape. For users, it provides an eloquent gateway that introduces the city's morphology, with the business centre and Mount Royal as the backdrop.

[6] Canadian archaeological sites are identified by the alphanumeric Borden code, used to identify the discovery location.

The study area has four (4) landscape units whose boundaries are broadly determined by the presence of the St. Lawrence River:

Landscape unit 1, gateway to the city of Brossard. This unit has two sub-units: the suburb and the shore. The suburb sub-unit is an essentially homogenous bedroom community on both sides of the bridge and Highway 10. The "shore" sub-unit is heterogeneous urban environment that is in a state of transformation; it fronts the Lesser La Prairie Basin.






Landscape unit 2, the river is a landscape sequence emblematic of the nature of the Island of Montreal. The presence of the bridge and its route reflect this specificity.



Landscape unit 3, Nuns' Island is divided into two sub-units because of the diverse uses to each side of the bridge. The southern part is dominated by a homogeneous low-density residential area, while the northern part is currently developing, with mixed uses and imposing large-scale and high-density bungalow developments.





Landscaping unit 4, gateway to the city of Montreal, includes three (3) landscape sub-units, distinguished by their uses and the historical nature of the built environment. Overall, the unit is divided into three strips:

- The first, riverfront strip includes industrial, commercial and recreational uses.


- The second, middle strip is defined by an urban residential heritage area, the residential neighbourhood.



- The final, westernmost strip includes mixed uses around the Lachine Canal, an area dominated by industrial uses and a residential redevelopment in the vicinity of the Atwater Market.



4.3.6 Key issues of the human environment

This section provides an overview of highlights of existing components of the human environment and the factors have been considered in the analysis of the environmental effects.

4.3.6.1 Navigation

The elements to be considered for the Seaway are essentially obtaining the authorization by the St. Lawrence Seaway Management Corporation for work above the Seaway during the navigation season and the positioning of the new infrastructure's piers on each side of the Seaway.

For construction purposes, a technical response protocol should be developed so that an agreement on work during the navigation season can be established with the St. Lawrence Seaway Management Corporation. Concerning the location of the piers, it will be important to ensure that their installation does not affect the water-tightness of the dike and that it does not reduce the width of the current template.

With regard to river navigation, some elements to be considered include the limited knowledge of hydraulic conditions to the right of the bridge; these conditions could be altered by the presence of new piers and the removal of existing piers. The new arrangement of piers (existing and future) could also impact the sedimentary regime (erosion / sedimentation), the position and depth of the channels, and the ice regime. These elements should be given particular attention during the next steps in the project.

Recreational boating could be maintained while work is being carried out but will require an information campaign targeting organizations and users and conducted in co-operation with the relevant authorities, as well as the application of strict navigation measures and the co-operation of monitoring and enforcement agencies to ensure the safety of boaters and workers.

4.3.6.2 Recreational/tourist activities

Like recreational boating, sport fishing could be maintained during construction but will require an information campaign targeting fishers, conducted in co-operation with the relevant authorities, as well as strict navigation measures and the co-operation of monitoring and enforcement agencies to ensure the safety of boaters and workers.

The project could result in the closure of some bike paths for fairly long periods of time, and the temporary or permanent relocation of some paths. Particular attention will have to be paid to keeping bike paths open during construction.

4.3.6.3 Sound environment

Ambient noise has been measured for different periods within the various sensitive areas. Survey results, combined with traffic counts for the same periods, have served to model noise levels in sensitive areas. Based on this model, it will be possible to locate places where noise-abatement measures may need to be implemented.

4.3.6.4 Heritage resources

Four archeological sites have been inventoried in the project right-of-way and areas of archeological potential have been defined in a preliminary fashion at this stage of the project. The identification of the areas of potential makes a pre-construction archaeological inventory necessary during the next stages of the project. This will allow archeologists to verify the presence of soil that is undisturbed by land use and the construction of the Champlain Bridge and to search for any archeological indicators.

4.3.6.5 Aesthetic and visual aspects

The river shapes the landscape, allowing sweeping, open perspectives of the structures from the city and, conversely, of the city from the highway. With this in mind, two fundamental objectives should be considered, which are:

- The need to maintain the views of Montreal from the bridge;
- A concern for developing an infrastructure design process that ensures that infrastructure contributes in a positive way to the quality of the landscape composition of Montreal and its surrounding area.

Further, the environments and landscapes already exist in a compromise with the proximity of the transportation route that crosses them. It is likely that local residents have become used to the

situation over the past two generations. The Champlain Bridge is a landmark feature of the landscape. However, replacing the bridge provides an opportunity to strengthen the urban integration by developing the approaches adequately and introducing civil engineering structures that ensure greater connectedness with the residential areas. Lastly, a number of strategic viewpoints should be taken into consideration in the project, including those from the bike path (the ice control structures, for example) and from the parks in Brossard and Montreal. The contexts of Montreal and Nuns' Island suggest that particular attention should be paid to integrating the infrastructure (site design and civil engineering structures) in order to enhance living environments that are very different but highly valued.

5 ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

5.1 APPROACH

The methodological approach used to assess environmental effects includes two main phases, namely, identification and assessment of potential effects.

Identification of potential effects consists in identifying the components of the physical, biological and human environments that are likely to be impacted by the project's activities.

The **assessment of potential effects** consists of defining the scope of the effects associated with project execution. The significance of an effect on a component of the environment is based on three parameters, intensity, duration and scope.

The identification of potential effects takes into account the following elements:

- The project's technical characteristics and proposed working methods as determined at this stage of the process;
- Knowledge of the environment;
- Lessons learned from similar projects;
- Environmental concerns associated with the project.

Finally, the significance of the residual effects is assessed, taking into account the application of mitigation measures. Following the application of mitigation measures, significant or non-significant residual effects may remain:

Non-significant: signifies a residual effect that is temporary and/or low-return, short-lived and/or limited in scope, and has little or no impact on the environmental component;

Significant: signifies, that despite mitigation measures, the residual effect has a permanent impact on the environmental component.

5.2 IDENTIFICATION OF THE POTENTIAL EFFECTS OF THE PROJECT

Potential effects were identified using the grid shown in Table 16. The environmental components that have been described (see Section 4 for the description of environmental components) are shown on the y-axis of the grid and the sources of impact associated with the various phases of the project on the x-axis. Table 17 sets out the impact sources and the interaction between them and the components of the project using the following identification scheme:

- A: Reconstruction and expansion of Highway 15;
- B: New Nuns' Island bridge;

- C: Work on Nuns' Island;
- D1a: Crossing the Greater La Prairie Basin;
- D2: Crossing the Seaway;
- D1b: Crossing the Lesser La Prairie Basin;
- E: Alignment with Highway 10;
- F: Demolition of existing Champlain Bridge and Nuns' Island Bridge.

The project components are described in Part 2 of this Environmental Assessment Report.

Table 16 Grid displaying the interaction between environmental components and the project

ENVIRONMENTAL COMPONENT		PRE-CONSTRUCTION			CONSTRUCTION						POST-CONSTRUCTION					OPERATIONS		DEM.
		Site mobilization and construction of temporary facilities	Maintenance of traffic and shipping and installation of signage	Relocation and protection of public utility infrastructures	Soil stripping and land clearing	Excavation, earthwork	Construction of infrastructure	Work in aquatic environments	Management of waste and hazardous materials	Transportation, operation and maintenance of machinery	Deconstruction of structures	Demobilization of worksite and dismantling of temporary facilities	Work in aquatic environments	Management of waste and hazardous materials	Transportation, operation and maintenance of machinery	Presence and use of infrastructure	Infrastructure maintenance and repair	Deconstruction of infrastructure
Physical environment																		
Soil and sediment quality		x		x	x	x		x	x	x		x	x	x	x			x
Surface water quality		x			x	x		x	x	x	x	x	x	x	x		x	x
Hydrology and hydraulics								x					x					
Groundwater quality		x		x		x		x	x	x		x	x	x	x		x	x
Air quality and GHG		x	x			x				x	x			x	x	x	x	x
Biological environment																		
Vegetation	Terrestrial	x			x													
	Aquatic							x					x					x
	Wetlands			x	x	x												
Ichthyofauna and habitats					x	x		x	x	x	x		x			x	x	x
Herpetofauna and habitats		x			x			x			x		x			x		
Avifauna and habitats		x			x			x			x		x			x		x
Mammals					x													
Species at risk and with provincial status		x			x			x			x		x			x		x
Human environment																		
Land and buildings		x	x	x		x												
Infrastructure			x	x		x	x			x	x						x	x
Commercial ship traffic			x			x	x	x			x		x				x	x
Recreational / tourist activities and recreational boating		x	x	x	x		x				x		x		x	x	x	x
Sound environment		x	x							x					x	x		x
Heritage and archeology					x	x	x									x		x
Aesthetic and visual aspects											x					x		
Traditional use of land and resources																		

Table 17 Relationship between project components and activities identified in the effect identification grid

ACTIVITIES	DESCRIPTION	COMPONENT[7]							
		A	B	C	D1A	D2	D1B	E	F
Pre-construction phase									
Site mobilization and construction of temporary facilities	▸ Installation of construction trailers, sanitary services and hook-ups ▸ Installation of work areas and areas for storage of materials, waste disposal and prefabricated components ▸ Installation of temporary production areas as required (concrete plant, etc.) ▸ Development of launch and assembly areas ▸ Construction of temporary access roads, parking areas and, as required, jetties, a pile-supported bridge, floating bridge and/or temporary pier	x	x	x	x	x	x	x	x
Traffic and navigation maintenance, installation of signage	▸ Rerouting and closure of traffic and bicycle lanes ▸ Rerouting and closure of recreational boating lanes ▸ Installation of signage	x	x	x	x	x	x	x	x
Relocation and protection of public utility infrastructures	▸ Electrical power lines (high and low voltage) ▸ Transmission lines (telephone, cable, fibre optic) ▸ Underground pipes (all types)	x	x	x	x	x	x	x	X

[7] **Components refer to Figure 2**

Table 17 (cont'd.) Relationship between project components and activities identified in the effect identification grid

ACTIVITIES	DESCRIPTION	COMPONENTS							
		A	B	C	D1A	D2	D1B	E	F
Construction phase									
Soil stripping and land clearing	► Land preparation activities ► Land clearing ► Surface stripping ► Topsoil storage	x	x	x	x	x	x	x	
Excavation, earthwork	► Excavation and excavated material ► Contaminated soil and sediment management ► Water and wastewater segregation ► Fill and earthwork ► Maintenance of the seaway dike's water-tightness	x	x	x	x	x	x	x	
Construction of infrastructure	► Road construction ► Construction of overpasses ► Bridge construction (excluding in-water work) ► Construction of abutments and bridge decks	x	x	x	x	x	x	x	
Work in aquatic environments	► Construction of temporary structures (cofferdams, jetty, etc.) ► Pile-driving ► Installation of foundations, bridge footings and piles ► Interventions in the Aqueduct Canal	x	x		x	x	x		
Management of waste and hazardous materials	► Management of unused excavated material ► Waste management ► Hazardous waste management	x	x	x	x	x	x	x	
Transportation, operation and maintenance of machinery	► Movement of machinery, vehicles and barges ► Maintenance of vehicles and machinery ► Transportation of materials by road and river ► Lighting during the work	x	x	x	x	x	x	x	

Table 17 (cont'd.) Relationship between project components and activities identified in the effect identification grid

ACTIVITIES	DESCRIPTION	COMPONENTS							
		A	B	C	D1A	D2	D1B	E	F
Post-construction phase									
Deconstruction of structures	▸ Dismantling of steel structures ▸ Dismantling of concrete structures ▸ Deconstruction of administrative centre/plaza ▸ Crushing of debris								x
Demobilization of work site and dismantling of temporary facilities	▸ Dismantling of temporary facilities ▸ Restoration of storage areas ▸ Site restoration	x	x	x	x	x	x	x	x
Work in aquatic environments	▸ Removal or cutting of piles from existing bridges ▸ Management of sawing mud ▸ Dismantling of temporary structures in aquatic environments								x
Management of waste and hazardous materials	▸ Management and disposal of residual materials and debris ▸ Hazardous waste management (lead, asbestos)								x
Transportation, operation and maintenance of machinery	▸ Circulation of machinery and vehicles ▸ Maintenance of machinery and vehicles ▸ Transportation of debris by land and water ▸ Lighting during construction work	x	x	x	x	x	x	x	x

Table 17 (cont'd.) Relationship between project components and activities identified in the effect identification grid

ACTIVITIES	DESCRIPTION	COMPONENTS							
		A	B	C	D1A	D2	D1B	E	F
Operations phase									
Presence and use of infrastructure	▸ Traffic supervision and management ▸ Vehicular traffic ▸ Presence of mass transit corridor ▸ Active transportation ▸ Street furniture (lighting of structures)	x	x	x	x	x	x	x	
Infrastructure maintenance and repair	▸ Repair of engineering structures ▸ Use of de-icing salt (traffic and active transportation) ▸ Snow removal and loading	x	x	x	x	x	x	x	
Decommissioning phase									
Deconstruction of structures at the end of their useful life	▸ Mobilization of job site ▸ Dismantling of structures ▸ Traffic management ▸ Debris management	x	x	x	x	x	x	x	

5.3 ANALYSIS OF ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

This section presents a summary of effects for each component. The sensitive areas are identified for each component (see Figure 16 for their location), and the effects and mitigation measures are described. The complete analysis of environmental effects is presented in Appendix 3.

5.3.1 Soil, sediment and groundwater

Sensitive areas

The following areas are deemed sensitive for soil, sediment and groundwater:

- Sud-Ouest Business Park (contaminated soil, sediment and groundwater);
- Lesser La Prairie Basin (contaminated sediment);
- Brossard wetlands (soil).

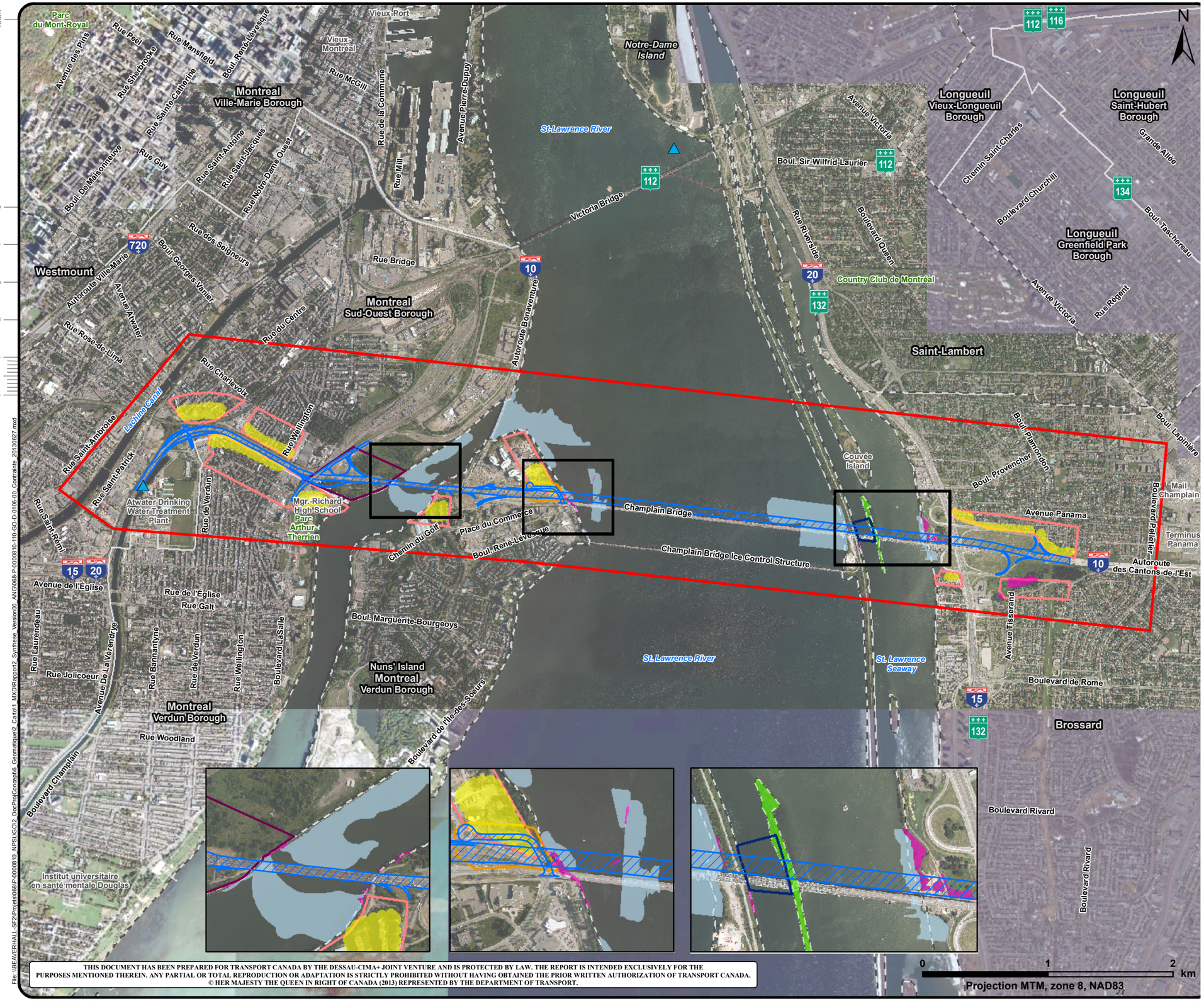
Description of effects and background

Soil, sediment and groundwater will be affected by the presence of contamination, potential erosion and risks of spills during the construction and operations phases of the project.

In the pre-construction, construction, post-construction and operations phases, soil, sediment and groundwater will be affected by the following activities:

- Site mobilization and construction of temporary facilities;
- Relocation and protection of public utility infrastructures;
- Soil stripping and land clearing;
- Excavation, earthwork;
- Work in aquatic environments (construction and post-construction);
- Management of waste and hazardous materials (all phases);
- Transportation, operation and maintenance of machinery(all phases);
- Infrastructure maintenance and repair.

The inventory of the environment identified areas in which soil and groundwater are contaminated, mainly in the Sud-Ouest Business Park. Work in these areas has the potential to remobilize contaminants and affect uncontaminated soil and groundwater, and create a health hazard. The exposure of surfaces and berms will increase erosion caused by wind and rain. Accidental oil leaks from equipment could also contaminate soil and groundwater, as can the presence of lead or other contaminants during deconstruction.



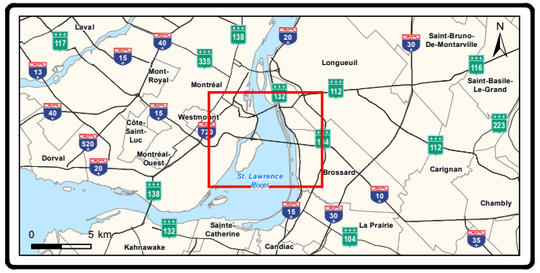
FORMAT 11x17

- Study area
- Projected infrastructure right-of-way
- Municipal limits
- Borough limits

Sensitive areas

- Contaminated soil
- Wetlands
- Air quality sensitive area
- Sensitive fish habitat
- Protected avifauna habitat
- Seaway channel
- Drinking water intake
- Noise-sensitive area
- Archaeological site (Le Ber site)

SOURCES :
- Archeology : Arkéos, 2013
- Aquatic vegetation : Environnemnet Illimité inc., 2012
- Vegetation units : Field inventory, CIMA 2012
- Property and right-of-way limit : Transport Canada, 2012
- Orthophotographs : © Montreal Metropolitan Community, 2005-2011
- Satellite images : (c) 2010 Microsoft Corporation and its data suppliers



Client: Transport Canada / Transports Canada

Project: New Bridge for the St. Lawrence Environmental Assessment

Titre: Figure 16 Sensitive Areas

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Prepared	Ghyslain Pothier	Discipline	Geomatic
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Contaminants in sediment could be remobilized during work in water, mainly around the Sud-Ouest Business Park and in the Lesser La Prairie Basin.

Finally, the use of road salt during the operations phase could result in chloride contamination of soil near infrastructure.

Mitigation measures

Before the work

Because the exact quality of the soil is not known at this stage, the level of soil contamination must be characterized once the areas to be excavated are defined. A program for managing contaminated soil and excavated material must be developed at the preliminary engineering and specification preparation stage to ensure that the contaminated soil is treated or disposed of in accordance with current regulations.

Materials must also be characterized when the deconstruction plans and specifications are being developed, to identify and quantify the sectors containing asbestos and lead, and additional measures may then have to be defined.

During the work

Mitigation measures will be implemented when work begins to limit the dispersion of contaminated soil and reduce erosion, including the following:

- Isolate and preserve the organic soil layer so that it may be reused in places where the topsoil has been stripped;
- Minimize the footprint occupied by the work;
- Dispose of excavated material at a site designated for that purpose;
- Stabilize exposed areas susceptible to erosion (using a geotextile membrane, straw or seeding);
- Construct piers in confined and dewatered environments (e.g., using cofferdams);
- Immediately remove excavated sediment whose contaminant concentration is known to an approved site;
- Excavated sediment that cannot be removed must be immediately placed for temporary storage on a waterproof surface and covered for protection from the elements (e.g., sediment from uncharacterized piers);
- Keep the site free of waste at all times including empty containers of any kind unless they are stored in a sealed repository designed for this purpose;
- When contamination levels exceed criterion B of the Quebec Soil Protection and Contaminated Sites Rehabilitation Policy, all trucks leaving the worksite must pass through a vehicle wheel-washing facility;

- Store and dispose of contaminated soil and sediment at authorized sites and comply with the related federal and provincial requirements;
- Maintain transportation vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants;
- Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log;
- The private partner must plan construction on the Island of Montreal in collaboration with the operator of the containment system for the Western sector of the Sud-Ouest Business Park;
- An emergency kit for hydrocarbon spills must be available on the equipment at all times;
- In the event of a spill on land, the emergency response plan will be implemented:
  - Prompt notification of Environment Canada (1-866-283-2333) and MDDEP (1-866-694-5454) early warning networks as well as St. Lawrence Seaway Management Corporation's emergency response and shipping management teams;
  - Elimination of the source of the spill;
  - Implementation of environmental protection measures (absorbent material);
  - Clean-up of the affected area;
  - Disposal of contaminated soil.

During the operations phase

Some design criteria may be considered at the preliminary engineering phase to mitigate the effects of road salt used during the project:

- Meltwater will not be discharged directly into sensitive areas such as wetlands (see Figure 16) and a method for treating meltwater will be studied;
- The geometry of the structures must limit the accumulation of snow and ice on the infrastructure.

A road salt management plan must be developed to mitigate the environmental effects of road salt while maintaining road safety. The plan will be based on the Code of Practice for the Environmental Management of Road Salts (EC, 2004). There are no Canadian recommendations on chloride content in soil.

5.3.2 Surface water quality and hydrology

Sensitive areas

The following areas are deemed sensitive with respect to surface water quality and hydrology:

- St. Lawrence River (suspended solids and other contaminants);
- Aqueduct Canal (drinking water source).

Description of effects and background

During the work and operations phases of the project, water quality will be affected by the introduction of suspended solids (potentially including contaminants), petroleum hydrocarbons and de-icing salts into the receiving environment.

During the pre-construction, construction, post-construction and operations phases, water quality will be affected by the following activities:

- Site mobilization and construction of temporary facilities;
- Soil stripping and land clearing;
- Excavation, earthwork;
- Work in aquatic environments (construction and post-construction);
- Management of waste and hazardous materials (all phases);
- Transportation, operation and maintenance of machinery(all phases);
- Deconstruction of existing structures;
- Infrastructure maintenance and repair.

Work carried out in water, including the construction of temporary facilities and bridge piers, could result in resuspension of sediment in the river. Work on the riverbank, owing to its nature, could produce soil particles in surface water through runoff or excavation de-watering. Accidental petroleum hydrocarbon spills could also contaminate surface water. Resuspension of contaminants is possible, given that some sectors where work will be done are currently contaminated.

Finally, the use of road salt during the operations phase could result in negligible chloride contamination in the river.

The risk of drinking water intake contamination was considered. The Aqueduct Canal is the City of Montreal's primary source of drinking water and must be protected from any contamination during work. Protective measures are required. The water intake for the Le Royer plant is located in the main channel of the river upstream from Notre Dame Island over 2 km from the study area. Because of the implementation of mitigation measures, the river's ability to purify itself, the flow of the channel and the low concentration of contaminated sediments in the sector (Greater La Prairie Basin), no effect on the intake is expected.

Mitigation measures

Before the work

Flow and ice regime modelling must be conducted following preliminary engineering to predict potential effects of the project on these elements. Additional measurements may then be required.

During the work

Mitigation measures will be implemented when work begins to prevent the introduction of suspended solids and contaminants to surface water, including the following:

- Take all necessary precautions to prevent the migration of fine particulate matter to the aquatic environment above the immediate work area, using proven work methods (block or sheet pile cofferdams);
- Encourage the use of turbidity curtains to prevent sediment transport in the water;
- Stabilize exposed areas susceptible to erosion (using a geotextile membrane, straw or seeding);
- Divert drainage ditches towards stable vegetated areas, located more than 20 m from the natural high water mark. If it is impossible to divert the ditch, potential sediment loading from the structures must be controlled by means of a suitable and effective system to prevent leaching;
- Install settling and runoff capture ponds along work areas to prevent erosion and migration of fine sediment to the river or Aqueduct Canal (for work on Highway 15);
- Pump water out of excavations and discharge it in compliance with applicable federal, provincial and municipal regulations or call a specialized firm for pumping and final disposal;
- Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log;
- Use vegetable oil in machinery that will be used for long periods on or near water;
- Keep equipment at least 60 m from the river when not in use or when the site is closed;
- Maintain transportation vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants;
- Prohibit access to the site to any mobile equipment that leaks oil;
- An emergency kit for hydrocarbon spills must be available on the equipment at all times. Kits must be available on the site at all times to deal with larger spills in aquatic environments;
- To prevent any risk of contaminant leaching, bituminous concrete (asphalt) must not be used as fill material in an aquatic environment because it is a potential source of hydrocarbons;
- In the event of a spill in an aquatic environment, the emergency response plan will be implemented:
  - This plan includes: - Prompt notification of Environment Canada (1-866-283-2333) and MDDEP (1-866-694-5454) early warning networks, SLSMC’s emergency response and shipping management teams as well as the Mohawk community of Kahnawake;
  - Elimination of the source of the spill;
  - Implementation of environmental protection measures (absorbent berms);
  - Clean-up of the affected area.
- Additional measures are required for work near the Aqueduct Canal:

- Isolate water affected by work in the littoral sector of the Aqueduct Canal from raw water needed to supply the filtration plant by a method that minimizes sediment suspension from the canal bed;
- Ensure that no contamination reaches the property of the Aqueduct Canal whether via storm sewers, contaminated soil, leachate from contaminated soil, or any other form of contamination;
- If work is required near the Aqueduct Canal, this work must be performed within a contained enclosure in order to prevent suspended solids from spreading into the air and water;
- Access to the banks of the Aqueduct Canal is prohibited;
- If barges are used on the Aqueduct Canal, the following measures are required:
    - No combustion engine may be used in the waters of the canal;
    - Launching ramps are prohibited. Barges must be raised by crane.
- All work on or near the Aqueduct Canal must be approved by the City of Montreal. Additional measures may be identified at a later date;
- Debris is to be recovered by means of a tarpaulin stretched under the work area and removed as soon as possible.

- Where possible, restore demobilized areas to their natural state using native species and a natural slope. Where it is not possible to restore an area to its natural state, the demobilized area must be restored to a state equivalent to its state before the work began.

During the operations phase

Some design criteria may be considered at the preliminary engineering phase to mitigate the effects of road salt used during the project:

- Meltwater will not be discharged directly into sensitive areas such as wetlands, sensitive fish habitats or migratory bird sanctuaries (see Figure 16) and a method for treating meltwater will be studied.
- The geometry of the structures must limit the accumulation of snow and ice on the infrastructure.

A road salt management plan must be developed to mitigate the environmental effects of road salt while maintaining road safety. The plan will be based on the Code of Practice for the Environmental Management of Road Salts (EC, 2004). It should be noted that road salt that will be used on the new infrastructure and which will be discharged into the river will make only a negligible contribution (in the order of 0.002%) to the concentration currently found in the river (22 mg/L). The Canadian recommendation for chlorine in fresh water is a maximum concentration of 120 mg/L (Canadian Council of Ministers of the Environment, 1999a).

5.3.3 Air quality (local scale)

Sensitive areas

The following areas[8] are considered air quality-sensitive based on the direction of prevailing winds:

- Areas 1, 2 and 3 in Sud-Ouest Montreal;
- Areas 4a and 4b on Nuns' Island;
- Areas 5, 6 and 7 in Brossard.

Description of effects and background

For this project, air quality will be affected both while the work is under way and during operation. Dispersed dusts, both fine (less than 2.5 microns) suspended particles and total, and atmospheric contaminants will affect air quality near the work areas and sensitive residential areas (less than 500 m from these work areas).

An air quality sampling station will be established on Nuns' Island at least 12 months before work begins in order to determine the baseline level of atmospheric contaminants in the sector. Data from nearby stations will also be used to establish the baseline. This data, combined with the project technical specifications (geometry, location, work methods), will allow accurate modeling of the dispersion of atmospheric contaminants and establishment of the areas of prime concern. At the same time, the data recorded will be used to prepare a regional picture of how particles and atmospheric contaminants are dispersed during the operations phase.

Air quality will be affected during the pre-construction, construction, post-construction and operations phases by the following activities:

- Site mobilization and construction of temporary facilities;
- Traffic and navigation maintenance, installation of signage;
- Excavation, earthwork;
- Management of waste and hazardous materials (all phases);
- Transportation, operation and maintenance of machinery(all phases);
- Deconstruction of existing structures;
- Infrastructure maintenance and repair.

Mitigation measures

During these activities, mitigation measures such as the following will be in effect:

[8] The air quality-sensitive areas and noise-sensitive areas are identical.

- When working in urban areas, remove loose material and other debris on a daily basis from streets used by vehicles and machinery;;
- Apply a dust suppressant (water or a dust suppressant approved by the Bureau de normalisation du Québec) on gravel traffic lanes when the quantity of dust raised when a vehicle passes exceeds 40 mg/m^3;
- Stabilize reworked sectors to limit wind erosion by seeding them or by covering them with straw or geotextile, depending on how advanced the work is;
- Cover piles of material with geotextile if they are not in use for more than 24 hr.;
- Use adequate signage and impose appropriate maximum speeds to reduce dust emissions on access roads and work surfaces;
- Establish a truck route that avoids residential sectors;
- Activities that create dust will be located so as to minimize their effect on the public;
- Ensure that the pollution abatement systems on vehicles and equipment are operational and meet the regulatory requirements for air quality;
- Fires and waste burning on or near the construction site are prohibited at all times.

5.3.4 Air quality and greenhouse gases (GHG)

It is difficult at this stage of the project to establish the traffic parameters on the new structure, and thus to know what traffic flows will be. Traffic studies are under way. Volume will depend in part on the provision of public transit and the kind of transport provided. Simulations of variations in greenhouse gas emissions show that there may be, despite increased traffic flows at rush hour, a reduction in greenhouse gas emissions if these increases in flow are accompanied by better fluidity or higher speeds than were the situation in 2012.

Discussions under way between Transport Canada and the Agence métropolitaine des Transports will lead to a concerted approach to efficient public transportation on the new bridge.

After the preliminary engineering stage, it will be possible to adjust speed and traffic flow parameters for the future scenario and thus define changes in greenhouse gas emissions compared to the situation in 2012.

On a larger scale, GHG emitted during the work by machinery will be offset to make the worksite “carbon neutral”. During the construction phase, annual emissions will be calculated based on the number of kilometres travelled by the machinery and transportation of materials and excavations. Compensation may take the form of buying carbon credits or of carrying out independent projects (such as planting trees).

5.3.5 Vegetation and wetlands

Sensitive areas

The following areas are considered to be sensitive for vegetation and wetlands:

- Emergent nearshore marshes;
- The common reed swamp along the shore at Brossard.

Description of effects and background

Vegetation and wetlands will be affected during the pre-construction, construction, post-construction and operations phases by the following activities:

- Site mobilization and construction of temporary facilities;
- Relocation and protection of public utility infrastructures;
- Soil stripping and land clearing;
- Excavation and earthwork;
- Work in aquatic environments;
- Deconstruction of existing structures;
- Presence of infrastructure.

Construction work will cause a loss of vegetation mainly from uncultivated shrubland and grassland (9,100 m^2) and from poplar stands (3,425 m^2). Potential wetland losses are estimated at 4,300 m^2 for the common reed swamp. Losses of emergent nearshore marshes (2,000 m^2) are calculated in with the losses of fish habitat because they are below the high-water mark.

Mitigation measures

The Federal Policy on Wetland Conservation (EC, 1991) recommends a three-pronged approach: Avoid, minimize and compensate losses of wetlands. Residual losses of wetland functions that cannot be avoided will be compensated for at a 3:1 ratio, as specified in the compensation proposals report.

Before the work

To meet the Policy, project design must avoid or minimize, as much as possible, encroachments onto wetlands by the piers and abutments of the new structures.

During the work

Mitigation measures will be implemented from the start to mitigate effects on vegetation, in particular:

- Specimens of rough water-horehound and Laurentian water horehound will be transplanted when possible to similar habitats;
- All necessary measures will be taken to protect those trees and shrubs that are to be maintained from any damage or mutilation (i.e., installation of a protective perimeter);
- The footprint of the worksite will be minimized;

At the end of the project, the work areas will be seeded with native species (shrubs, plants and trees, consistent with safety requirements). Particular attention will be paid to naturalizing the banks to recreate suitable habitats, including those for wildlife. In areas that cannot be restored to their natural state, a minimum set-back of 15 metres will be maintained between structures and the water so as to not compromise future shore restoration projects.

5.3.6 Fish and habitats

Sensitive areas

The following areas[9] are considered to be sensitive for fish habitat:

- Type 2, 13 and 22 habitats along the eastern shore of Nuns' Island (moving water and banks with good potential for spawning, nurseries and feeding);
- Type 4 habitats along the shore at Brossard (quality seagrass beds with potential for spawning and nurseries);
- Type 12 and 16 habitats near the Seaway dike (quality aquatic plant communities with potential for nurseries and feeding);
- Type 13 habitats along the western shore of Nuns' Island (moving water with potential for spawning and feeding).

Description of effects and background

The project will result in deterioration, disruption and destruction of the fish habitat. The impacts will be caused in particular by permanent and temporary encroachments on fish habitats considered to be sensitive, as well as by potential modifications to the hydraulic regime during the work and the operations phase. These modifications will be specified when the plans and specifications have been prepared and the simulations executed.

Fish habitat will be affected during the construction, post-construction and operations phases by the following activities:

- Soil stripping and land clearing;
- Excavation and earthwork;

[9] **Habitat locations are presented in Figure 15.**

- Work in aquatic environments (construction and post-construction);
- Transportation, operation and maintenance of machinery(all phases);
- Deconstruction of existing structures;
- Infrastructure maintenance and repair;
- Presence and use of infrastructure.

According to the worst-case scenario, all the work on this project (construction and operation of the new bridge and deconstruction of the existing bridge) will destroy 5,865 m^2, degrade 12,050 m^2 and disturb 34,200 m^2 of fish habitat (see Table 18 for details). Permanent and temporary losses in the sensitive areas represent 2% of the sensitive areas found in the study area. Resuspension of sediments in the river water could return particles to the water and disturb habitat quality. The presence of temporary structures and piers is likely to modify flow speeds and affect the migration of fish in the study area. Vibrations associated with the use of explosives could cause mortality among certain fish.

Table 18 Summary of fish habitat losses (rounded)

HABITAT TYPE	SUMMARY		
	Alteration (m^2)	Disruption (m^2)	Loss/Gain (m^2)
2	650	-	-250
4	650	-	-250
5	-	755	-210
9	-	5,665	-475
10	-	1,300	-500
12	3,315	-	-225
13	-	3,360	-210
16	5,640	-	-1,330
17	-	19,415	-1,530
20	-	3,705	-575
22	1,795	-	-310
TOTAL	12,050	34,200	5,865

One species of concern under the *Species at Risk Act*, the American eel, and four species with provincial status (American shad, chain pickerel, lake sturgeon and rosyface shiner) occurring in the study area could be affected in the same way as the other species.

Mitigation measures

Before the work

Once the structures have been designed and before construction begins, the ice regime and flows will be modeled in order to predict the effects of the temporary structures and new piers. Modifications to flow conditions should not have any effect on flow patterns and speeds in the main fish migratory routes (Greater La Prairie Basin and Nuns' Island channel). Additional measures may be required.

The report of net losses will have to be reviewed once the plans and specifications are completed.

During the work

Mitigation measures will be implemented as soon as the work begins to prevent suspended material and contaminants from entering surface water. These are listed in the section on surface water. As well, measures specific to fish habitat are planned, principally the following:

- Perform work in the water outside of sensitive periods (see Appendix 4) for fish species present in the waterways. Periods of restriction will be identified for fish habitats felt to be sensitive (Figure 16) and will take into account the species of fish that are found in them and their use (reproduction, nurseries, migration, etc.). Ranges of protection will be adapted to the species and the fragility of the environment;
- Maintain constant free circulation of water and sufficient inflow of water to preserve the functions of the fish habitat (feeding, nursery, spawning) downstream from the work area. Take the measures needed to prevent impacts (i.e., flooding, dewatering, material in suspension, erosion, etc.) upstream and downstream from the work area;
- Restore the banks and beds of the watercourses affected by the work to their original state (granulometry, bed profile, etc.) after dismantling of the temporary structures throughout the disturbed areas;
- Limit the use of riprap on the banks of the watercourses up to the natural high water mark (two-year return period), and replant the band along the river at the edge of the riprap using recognized vegetation engineering techniques that encourage overhanging shrub and grass. Revegetation must be undertaken as swiftly as possible after the earthwork is finished, using mainly native species;
- Recover all fish captured in the cofferdams and immediately return them to the aquatic environment to prevent any fish mortality;
- Install a structure (e.g., screen) at the opening of the pumping hose to prevent intake of fish;
- Do not release any debris, concrete residues or damp mortar into the aquatic environment. All debris accidentally introduced into the aquatic environment must be removed as quickly as possible;

- Comply with DFO (1998) standards for the use of explosives near or in aquatic environments. If it is not possible to comply with DFO's requirements regarding explosives, an application to destroy fish by means other than fishing must be submitted to DFO.

5.3.7 Terrestrial wildlife

Sensitive areas

The following areas are considered to be sensitive for terrestrial wildlife:

- The Seaway dike;
- The spaces on either side of the Nuns' Island bridge, where brown snakes are found.

Description of effects and background

With respect to the project, terrestrial wildlife will be affected by the work itself and by habitat loss.

The wildlife will be affected during the pre-construction, construction, post-construction and operations phases by the following activities:

- Site mobilization and construction of temporary facilities;
- Soil stripping and land clearing;
- Deconstruction of existing structures;
- Presence of infrastructure.

The construction will cause a loss of terrestrial habitats for mammals and herpetofauna (13,000 m^2 of terrestrial vegetation and 6,300 m^2 of wetlands). The mammals will be bothered by the work and will have to move to get some peace and quiet. The habitat of the brown snake, a species liable to be designated as threatened or vulnerable in Quebec, in the project right-of-way will be disturbed and there are risks of mortality for this species and for other species of herpetofauna.

Mitigation measures

Before the work

To reduce risks of mortality, the brown snake population will be moved to a similar habitat nearby before the work starts. The perimeter of the work areas will be fenced to keep them from coming back. The fences will also be effective for certain mammals and the other species of herpetofauna.

During the work

The measures implemented before the work will prevent most effects on terrestrial wildlife. During the work, the fences must be kept in place.

After the project, the work areas will be restored to their natural state, and this process will create new habitats suitable for terrestrial wildlife, including hibernacula.

5.3.8 Avifauna

Sensitive areas

The following areas are considered to be sensitive for avifauna:

- Couvée Islands Migratory Bird Sanctuary (*Migratory Bird Sanctuary Regulations* (C.R.C., c. 1036), Environment Canada);
- Nuns' Island waterfowl gathering area (*Act Respecting the Conservation and Development of Wildlife* (c C-61.1, ss 128.1, 128.6 and 128.18), MDDEFP);
- Peregrine falcon nesting site on the Champlain Bridge;
- Swallow nesting sites on the Champlain Bridge;
- Rocky islets near Nuns' Island.

Description of effects and background

With respect to the project, avifauna will be affected by the work itself and by habitat loss.

Avifauna will be affected during the pre-construction, construction, post-construction and operations phases by the following activities:

- Site mobilization and construction of temporary facilities;
- Soil stripping and land clearing;
- Work in aquatic environments (construction and post-construction);
- Deconstruction of existing structures;
- Presence of infrastructure.

The construction work will cause a temporary or permanent loss of terrestrial and aquatic habitats for avifauna (13,000 m^2 of terrestrial vegetation, 6,300 m^2 of wetlands and 37,000 m^2 of grasslands) including certain protected habitats (migratory bird sanctuary and waterfowl gathering area). Birds using the sector could also be disturbed during the nesting period (mid-April to mid-August). It should be noted that species nesting regularly on the Champlain Bridge include the peregrine falcon and swallows. Certain rocky islets near Nuns' Island that may be used by common terns could also be disturbed during the work. As for the black-throated blue warbler, it was found at Brossard in an area lying outside the footprint of the worksite and in an area where the habitat is already fragmented.

While the chimney swift is a threatened species, there are no suitable nesting habitats for it in the work area and therefore no impact is anticipated.

The type of structure planned for the New Bridge for the St. Lawrence could also affect the rate of avian mortality. The presence of guy cables and architectural lighting increase the risks of avian mortality, especially during periods of nocturnal migration.

Mitigation measures

Before the work

The preliminary engineering will have to consider effects on birds, especially in the choice of the type of structure. For example, the following should be considered:

- Low intensity, short wavelength lights should be preferred over red and yellow lights. Light standards should be directed downwards;
- If obstruction lighting is required, flashing lights should be used;
- The existing bridge and the rocky islets near Nuns' Island must also be checked for nesting birds before starting work in order to avoid disturbance and bycatch.

During the work

Mitigation measures will be implemented as soon as work begins to prevent the destruction or disturbance of nests, eggs or birds:

- Avoid carrying out potentially destructive or disruptive activities during *sensitive periods* (normally ranges from mid-April to mid-August) and at *sensitive locations* in order to reduce the risk of impacting birds, their nests and their eggs;
- Develop and implement appropriate prevention and mitigation measures to minimize the risk of bycatches and help maintain sustainable migratory bird populations;
- Perform work on and in the vicinity of the Couvée Islands migratory bird sanctuary in accordance with EC requirements;
- Special attention will be paid to protecting common tern breeding sites (small rocky islets near Nuns' Island);
- Manage, relocate and if necessary add falcon nesting boxes depending on the sectors of activity. Retain the services of an expert on birds of prey to advise the private partner and encourage coexistence between workers and this species whenever possible;
- Obtain a permit from MDDEFP for work involving the peregrine falcon if necessary and comply with its conditions, if applicable;
- Check for peregrine falcon nesting on the bridge before the start of work. If there are nesting birds, organize a 250-metre exclusion zone around the nest until the end of the nesting period, or approx. 75 days after egg-laying;
- Work with Environment Canada's Peregrine Falcon Recovery Team on an appropriate way to install nesting boxes. As early as possible before demolition of the bridge, move the existing

nesting boxes and install new artificial ones for peregrine falcons at a suitable nearby site in order to limit potential conflicts between maintenance and repair work and falcon nesting.

5.3.9 Infrastructure and buildings

Sensitive areas

The following area is considered to be sensitive for infrastructure, land and buildings:

- Access to Nuns' Island.

Description of effects and background

Infrastructure, land and buildings will be affected during the pre-construction, construction and post-construction phases by the following activities:

- Site mobilization and construction of temporary facilities;
- Traffic and navigation maintenance, installation of signage;
- Relocation and protection of public utility infrastructures;
- Excavation and earthwork;
- Construction of infrastructure;
- Deconstruction of existing structures;
- Transportation, operation and maintenance of machinery (all phases).

The work areas and detours may encroach on private land along the right-of-way. Vibrations associated with construction work such as soil compaction and driving pilings and sheet-pilings may damage buildings and infrastructure. Trucking may have an effect on road structure. Finally, the road network in the sector may have problems with dirty lanes and with congestion associated with closing certain stretches. Considering that Nuns' Island is indeed an island, access while work is underway may be limited both for local traffic and for emergency vehicles. This access problem does not exist for Montreal and Brossard because they have several access routes.

No expropriations are planned at this stage of project development, but one piece of private land may be acquired.

Mitigation measures

Mitigation measures will be implemented during the project, including:

- Minimize encroachment of detours on private land. The private partner will have to come to an agreement with property owners with respect to encroachment on private land;
- The public will be informed of the work and the detours provided. Alternate routes will be proposed;

- At least one access to Nuns' Island, and preferably two, will be maintained at all times on the local road and highway systems. Lane dimensions will be maintained;
- Use the right-of-way corridor as the principal access to the construction zones and, as far as possible, limit the movement of machinery to the work areas located within this corridor;
- Transport Canada and the private partner will work together to develop a plan to manage the flow of trucks used in the areas near the project during the construction phase;
- Transport Canada and the private partner will work together to develop a plan to manage transportation in order to optimize traffic flow through the road network adjacent to the project;
- The bus lane will be kept operational during the work;
- The private partner must ensure that underground infrastructure is clearly identified in the plans and in the field;
- Perform an inspection before any work likely to cause damage and adjust work methods in consequence;
- The private partner must establish an alternate transportation system and organize parking near the worksite restricting access to the local network;
- When working in urban areas, remove loose material and other debris on a daily basis from streets used by vehicles and machinery;
- When the work is done, the private partner will rehabilitate the land and infrastructure.

5.3.10 Commercial navigation

Sensitive areas

The following area is considered to be sensitive for commercial navigation:

- The Seaway channel.

Description of effects and background

With respect to the project, work could encroach on the Seaway channel and affect commercial navigation.

Commercial navigation could be affected during the pre-construction, construction, post-construction and operations phases by the following activities:

- Navigation maintenance and installation of signage;
- Excavation and earthwork;
- Construction of infrastructure;
- Work in aquatic environments (construction);
- Deconstruction of existing structures;
- Infrastructure maintenance and repair.

Obstructions due to construction could reduce clearance in the Seaway. Work on and near the dike could compromise its watertightness.

Mitigation measures

Before the work

Transport Canada and the St. Lawrence Seaway Management Corporation have to negotiate a memorandum of understanding to set the conditions regarding work on the dike and above the Seaway while maintaining safe commercial navigation. A lease will also be needed to establish work areas on the dike. Discussions are under way between Transport Canada and the Corporation.

During the work

The conditions agreed upon must be met for the duration of the work, including maintaining navigation clearance.

5.3.11 Recreational / tourist activities and recreational boating

Sensitive areas

The following areas are considered to be sensitive for tourist / recreational activities and recreational boating:

- Lesser La Prairie Basin (recreational boating and tourist / recreational activities);
- The Route Bleue around Nuns' Island (recreational boating).

Description of effects and background

Tourist / recreational activities and recreational boating will be affected during the pre-construction, construction and post-construction phases by the following activities:

- Site mobilization and construction of temporary facilities;
- Traffic and navigation maintenance, installation of signage;
- Relocation and protection of public utility infrastructures;
- Soil stripping and land clearing;
- Construction of infrastructure;
- Work in aquatic environments (post-construction);
- Deconstruction of existing structures;
- Transportation, operation and maintenance of machinery (post-construction).

The work areas may encroach on the bike paths that cross the project right-of-way on Nuns' Island and in Montreal and Brossard. Traffic on the path along the Seaway and the Estacade (Route

Verte #1) may also be hindered during the work. Work in the water will limit recreational boating, fishing and windsurfing in these sectors. Itineraries on the Route Bleue (Lesser La Prairie Basin and Nuns' Island) will be affected. Passing under the structures will be prohibited during construction periods and this could detract from land- and water-based recreational activities.

It is also quite probable that there will be heavy traffic on the river during the work to move materials, workers and barges. A navigation management plan will be needed.

Mitigation measures

During the work

Mitigation measures will be implemented during the project, in particular:

- Barring exceptional circumstances, keep a cycling link open at all times between the South Shore and Montreal, including Nuns' Island, during the official opening period. Cycling links on both sides of Highway 15 will be re-opened when the project is completed;
- Surfacing of multi-use paths will be selected to suit active forms of transportation;
- When possible, inform users of cycling links of safe detours and closure periods. As for recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through the Canadian Coast Guard's Marine Communications and Traffic Services;
- Issue notices to boaters regarding temporary and permanent obstructions;
- Remove the piers of the present bridge so as not to cause any obstacles to recreational boating.

5.3.12 Sound environment

Sensitive areas

The following areas are considered to be noise-sensitive:

- Areas 1, 2 and 3 in Sud-Ouest Montreal;
- Areas 4a and 4b on Nuns' Island;
- Areas 5 and 7 in Brossard.

Description of effects and background

The sound environment will be affected during the work and operations phases of the project. The noise from the work and traffic will have an effect on the sound environment near the work areas and in sensitive residential areas (less than 300 m from the right-of-way).

Noise sampling and modelling have shown that the sound environment in a number of sectors (Figure 16) will deteriorate if no anti-noise measures are taken. Machinery, driving pilings and other

construction activities will increase noise from time to time during the work. Highway traffic on the new infrastructure could modify the present sound environment and affect human health.

The sound environment will be affected during all phases by the following activities:

- Site mobilization and construction of temporary facilities;
- Traffic and navigation maintenance, installation of signage;
- Transportation, operation and maintenance of machinery(all phases);
- Presence and use of infrastructure.

Mitigation measures

Before the work

When the geometry of the structures is sufficiently advanced, the noise climate will be modelled again to allow effective noise barriers to be designed and located. The noise barriers will be designed based on the following:

- The noise mitigation measures must wherever possible bring residual LAeq 24-hr. noise levels (Leq24h) at dwellings and other sensitive areas as close as possible to the noise level considered acceptable, i.e. 60 dBA;
- The mitigation measures (noise barriers) should be installed wherever possible within the boundaries of the Transport Canada right-of-way;
- The presence of railway tracks along Highway 15 will be factored into the design;
- Noise barriers will be designed to fit into the existing built environment and to minimize obstruction of residents' sightlines;
- The problem of graffiti will be taken into account in designing noise barriers. Plantings will be used as noise barriers where possible;
- Where possible, permanent noise barriers will be installed prior to the start of construction to keep noise at acceptable levels.

During the work

Mitigation measures such as the following will be in place to reduce noise:

- Install temporary noise barriers when machinery exceeds the standards in effect (percussion drills, compressors);
- Locate worksite facilities to block sound dispersion (worksite trailer between sensitive areas and the worksite);
- Install mufflers on noisy equipment (percussion drill covered with an insulating tarp);
- Avoid locating noisy activities (breaking concrete, heavy truck traffic, etc.) near noise-sensitive areas;

- Barring unusual circumstances, work between 7:00 a.m. and 7:00 p.m. from Monday to Sunday shall not exceed 75 dBA or the ambient noise level without the work plus 5 dBA, and work between 7:01 p.m. and 6:59 a.m. shall not exceed the ambient noise level without the work plus 5 dBA. Also, barring exceptional situations, very noisy work should be done during the day to avoid disturbing residents close to the work site whenever possible.

5.3.13 Heritage and archeology

Sensitive areas

The following areas are considered to be sensitive for archeology and heritage:

- The Le Ber archeological site (BiFj-01);
- Area S-1 in Brossard;
- The site of a prehistoric First Nations burial ground (BiFj-49).

Description of effects and background

Infrastructure construction could destroy archeological remains in sensitive areas. Following an assessment of the potential effects of the project, it was determined that no effects are expected on the site where the First Nations burial ground (BiFj-49) was discovered, given how far it is from the work areas.

Archeology and heritage will be affected during the construction and operations phases by the following activities:

- Soil stripping and land clearing;
- Excavation and earthwork;
- Construction of infrastructure;
- Presence of infrastructure.

Mitigation measures

Before the work

As the project is near an archeological site, design criteria will have to be considered during the preliminary engineering stage. Thus, project design will have to minimize the encroachment of the abutment and redevelopment of René-Lévesque Boulevard on the Le Ber archeological site (BiFj-01). Transport Canada will need to discuss promotion of the site's historical character with the Government of Quebec and the City of Montreal.

An archeological inventory survey will have to be conducted in the S-1 area of archeological potential. Should archeological remains be discovered, a site assessment will be made and a recommendation will be issued on the measures to be taken to either protect the site or conduct a dig (see Figure 16).

During the work

Mitigation measures will be implemented when the work begins in identified areas of archeological potential to limit potential loss or disturbance of remains, in particular:

- The prehistoric archeological site BiFj-49 (area C), where a First Nations burial ground was discovered, must sit outside the job site boundaries and be fenced off from the job site;
- If soil is excavated to construct the infrastructure base, backfill should be mechanically stripped down to the level of the ancient soil, and then a checkerboard dig of the areas affected should be conducted. Ancient soils are found at a depth of approximately 1 m in this sector. Exploratory stripping should be carried out under archeological supervision;
- If soil is not excavated for the construction of the new infrastructure, a protective layer could be spread over the existing soil to seal the site;
- Any discovery of archeological remains must immediately be communicated to the MCCQ. The Mohawk community of Kahnawake will also be advised of any discoveries of prehistoric or Aboriginal archeological remains. Work at the discovery site should stop until a Ministry archeologist has completed a qualitative and quantitative assessment.

5.3.14 Project integration with its environment

Sensitive areas

The following area is considered to be sensitive for project integration with its environment:

- The landscape of the Montreal region.

Description of effects and background

The presence of the infrastructure will have an effect on the Montreal landscape both locally and regionally.

Mitigation measures

Before the work

Project design needs to integrate the project with its urban environment in order to conserve existing strengths and to improve on the weaknesses of the site of this major infrastructure. The following measures are recommended:

- The New Bridge for the St. Lawrence will have to be emblematic of its major role in the Montreal landscape and as a visual landmark for the region by means of an appropriate aesthetic;
- Views of the river and the city from the bridge must be maintained (i.e., by using see-through cable barriers);
- The project should enhance and strengthen the existing bicycle path network and the scenic views it affords;

- Residual spaces should be landscaped so that they contribute to an entranceway to the city;
- Study improving connectivity between Sud-Ouest and Verdun;
- Include a link below the bridge structure to connect the bike and walking trails on the banks.

All these measures would contribute to optimal integration of the new bridge project into a contemporary urban environment that provides quality living environments, values the riverbanks and affords iconic views of downtown Montreal.

5.4 OTHER EFFECTS OF THE PROJECT

5.4.1 Deficiencies and accidental spills

Accidents that must be covered by an emergency response plan include spills of oil and other hazardous materials, the failure of anti-erosion and anti-sedimentation measures as well as collisions and fire on or below the structures.

All necessary precautions will be taken to avoid deficiencies and accidents during every phase of the project and to minimize the possible effects on the environment when accidents do happen. Accidents with the greatest potential to affect the environment include the following:

- Spills of hydrocarbons or other hazardous materials;
- Deficiencies in the erosion and sedimentation control measures;
- Collisions and fire on and beneath the structures.

It is difficult to accurately anticipate the nature and severity of such events. However, the probability of serious accidents or events causing significant negative environmental effects is low as a result of the emergency response and management plans that will be put in place.

5.4.1.1 Accidental spills

The presence and operation of machinery and means of transportation can affect quality of water and soil as a result of spillage of petroleum products or other hazardous materials. When work is going on, the measures that must be taken in order to minimize the risk of accidental spills include, but are not limited to, the following:

- Prepare secure hazardous material storage areas that comply with current regulations;
- Prohibit from the work site any moving equipment (e.g.: cranes, elevator, trucks, etc.) that leaks hydrocarbons (gas, engine oil or hydraulic oil);
- Plan for one or more machinery fueling areas, which must be located more than 30 metres from any ditch, grate or sewer line and more than 60 metres from any watercourse;
- Supervise the refuelling of machines on site;
- Have on site emergency response materials and personnel required in the event of accidental spills;

- Develop, distribute and apply the actions and procedures to be implemented in the event of accidental spills.

If an accidental spill occurs, the leakage must be confined and the spilled product recovered and disposed of at an MDDEFP authorized site. To do this, the work site must at all times have sufficient petroleum product recovery materials available, including absorbent rolls that can be used on the entire width of the watercourse or that can confine petroleum products within the desired perimeter. During the critical phases of work in water, emergency environmental response teams will be pre-deployed for high-risk operations. Lastly, the sites must be restored. Further, in the event of a leak or spill, the federal and provincial environmental emergency departments, the SLSMC, and the Mohawk community of Kahnawake must be informed. Accordingly, their telephone numbers must be displayed in the site trailer.

5.4.1.2 Deficiency of anti-erosion and sedimentation measures

Deficiencies in the structures to prevent erosion and sedimentation may lead to discharge of a large quantity of effluent with heavy sediment loads into the receiving watercourse and have potentially harmful effects on fish and the fish habitat. Measures to counter erosion and sedimentation must be put in place to protect water quality. The measures must be supervised by an environmental inspector, particularly after heavy rains or during snowfalls that cause observable surface runoff. Weekly monitoring will also be conducted to ensure that these measures are effective. Preventive action must be taken whenever needed including replacing barriers and draining sedimentation basins.

5.4.1.3 Collisions and fire

A risk analysis is required to deal adequately with the effects of a collision or fire on or beneath the structures. The analysis would be based, among other things, on the type of vehicles and vessels travelling over the bridge and on the Seaway, as well as the type and quantity of products transported and frequency of transportation. Upon completion of the analysis, the steps to be taken can be planned and load calculations deduced depending on the risk deemed acceptable by Transport Canada and the private partner. The structures will be designed to meet these criteria.

Collisions

A collision can have a number of causes: human error, mechanical fault, weather conditions, mechanical and hydraulic conditions, and traffic and geometric conditions of the shipping channel.

For commercial shipping, the main effect of a ship collision under or on the bridge would be the impediment to shipping. Routine Seaway activities would be affected or even brought to a halt if a vessel collided with a bridge pier or if a serious traffic accident took place on the bridge. In the first case, the vessel involved in the collision could prevent other vessels from passing for an indeterminate amount of time. In the latter case, the debris falling from the bridge could endanger safety of vessels travelling beneath the bridge.

Furthermore, the main effect of a vessel striking a bridge pier would be deterioration of the bridge structure. Piers and foundations will be designed to address the criteria identified in the risk analysis. Deterioration of the structure will depend on the specific conditions of the structure, the geometry of the channel, the mass and clearance of the vessel, its collision speed and angle (head-on or sideways).

To reduce the risk and effects of a collision, a number of measures can be planned:

- Training of vessel operators;
- Use of navigational tools;
- Regulation of shipping;
- Installation of structural protection systems.

Numerous structural protection systems are possible and their design and application must meet SLSMC standards and requirements. Such systems include pier protection systems and guardrails on the bridge.

Fire

Fires can start whenever spillage of petroleum products or chemicals occurs on or beneath the bridge.

For commercial shipping, the main impact of a fire on or beneath the bridge would be the impediment to navigation. Vessel traffic in the Seaway would have to be interrupted if a fire started either beneath or on the bridge so that rescue operations could take place and to guarantee user safety.

The main effect of a fire on the bridge structure would be alteration through effect of heat. In particular, a fire can cause deformation of the bridge deck. However, alteration of the structure would depend on the construction materials and the temperature of the fire. Installation of structural protection systems (i.e. surface materials) may delay the effects of a fire, though effectiveness of such systems would depend on the intensity of the fire.

To reduce the negative impact of a fire, a number of measures can be planned:

- Regulation of maritime and road traffic (speed limits, control of goods transported, etc.);
- Installation of structural protection systems (i.e. surface materials);
- Design of access routes for rescue operations.

5.4.1.4 Environmental emergency response plan

An environmental emergency response plan must be developed by the private partner in order to adequately manage any situation that presents a risk to the environment. The plan must be submitted for approval prior to the start of work and must take into account the methods,

requirements and constraints of all the stakeholders (TC, DFO, EC, CCG, JCCBI, SLSMC, MDDEFP, cities of Montreal and Brossard).

The environmental emergency response plan must include the following:

- Appointment of a site supervisor / manager;
- A list of people, companies, organizations or any other authority to be contacted in the event of an emergency or spill, as well as a description of their respective roles and responsibilities;
- An organizational chart for communications;
- A list of situations presenting a risk to the environment and related preventive measures;
- The various actions and procedures to take place in the event of an emergency or spill;
- Training to be provided to stakeholders;
- Holding exercises if deemed necessary;
- Incident reports and corrective measures put in place.

As members of the public are concerned about transportation during the project, the emergency response plan will also include procedures for managing access to Nuns' Island in the event of an accident requiring that the bridges be completely closed.

The environmental emergency response plan will be incorporated into the project environmental management plan.

5.4.2 Current use of lands and resources for traditional purposes by Aboriginal persons

To determine the effects on the current use of lands and resources for traditional purposes by Aboriginal persons, Transport Canada has requested comments from the Mohawks Council of Kahnawake. Comments were sent to Transport Canada on the second part of the environmental assessment report. Following the analysis of these comments, changes were made to the environmental assessment. For example, measures have been integrated concerning the Nuns' Island prehistoric archaeological site.

5.4.3 Effect of the environment on the project

The effects of the environment on the project are described as any negative effects that the environment could have on the project, such as weather conditions, seismicity and the potential effects of climate change. In particular, it was necessary to determine whether climate change has the potential to affect the project during its lifetime.

The environmental factors that may have an influence on the project are as follows:

- Extreme weather conditions (severe thunderstorms, violent winds, snowstorms, extreme cold, etc.);
- Changes in water levels in the river, both low and high;

- Earthquakes;
- The first two factors are conditions also associated with climate change.

Thus, if extreme weather conditions (severe thunderstorms, violent winds, snowstorms, extreme cold, etc.) or potentially dangerous natural phenomena are observed or anticipated, operations will be suspended temporarily and protective measures taken to ensure worker and user safety and prevent equipment and materials from falling into the river. The site office will need to maintain a monitoring system based on EC weather watches and warnings to follow these events.

The water levels near the New Bridge for the St. Lawrence are controlled by a number of dams upstream on the river itself and the Ottawa River. If exceptionally high water levels were anticipated, protective measures would also be taken to ensure the safety of people and the structures. The ice booms or other work structures will be designed to withstand five-year flood levels.

The new earthquake resistance standards will be incorporated into the design of the New Bridge for the St. Lawrence project.

Moreover, the above-mentioned factors and related standards will be taken into consideration when the plans and specifications for the structures of the New Bridge for the St. Lawrence are designed.

In short, the environment is unlikely to have any significant negative effects on the project if the planned mitigation measures are implemented.

5.4.4 Impacts on navigation

The St. Lawrence Seaway is the only waterway for the transportation of goods between the St. Lawrence River and the Great Lakes. Commercial shipping in the Seaway therefore cannot be disrupted during construction of the New Bridge for the St. Lawrence or during deconstruction of the Champlain Bridge without an agreement between TC, SLSMC and the private partner, where applicable.

The SLSMC is the organization responsible for the safe and effective passage of maritime cargo between facilities on the Canadian seaway. As a result, it prohibits work within the boundaries of the St. Lawrence Seaway during the shipping season, which runs from March to December each year, unless it receives and approves a technical protocol for the work in advance. Discussions are underway between Transport Canada and SLSMC with respect to this technical protocol.

The technical protocol must outline the planned work methods and the measures that will be taken to ensure that commercial shipping remains uninterrupted and safe. The SLSMC reserves the right to approve or amend the protocol based on its criteria and objectives. For example, a technical protocol was put in place that allowed construction on the Beauharnois Bridge over the Seaway during the shipping season.

The ban on construction covers all bridge construction and demolition activities that take place within the jurisdiction of SLSMC and covers foundations, footings and piers, deck construction or removal and maintenance activities.

Furthermore, in order to set up a work area within the boundaries of the St. Lawrence Seaway and to build and maintain structures, Transport Canada will continue discussions with SLSMC to negotiate and sign a lease agreement. This applies to the embankment as well, as it falls within SLSMC jurisdiction and any activity or structure on the embankment must also be validated by the organization.

Two options are being considered for levelling the piers of the Champlain and Nuns' Island bridges: Complete removal of the piers to 30 cm below the river bed or cutting the piers to 2 m under the low water level. The environmental effects of these two options were briefly evaluated. The results are presented in the following table. These factors must be considered in the preliminary engineering for deconstruction of the current bridges.

Table 19 Comparison of environmental effects of options for removal of Champlain Bridge piers

COMPONENT	ENVIRONMENTAL EFFECTS	
	Levelling of piers	Cut 2 m below water level
Fish habitat	Potential gain of 5,200 m^2	Some gain may be obtained on submerged surfaces.
Water quality	Limited disturbance in water quality. The measures identified above will be implemented.	Limited disturbance in water quality. The measures identified above will be implemented.
Navigation	No effect on navigation. Free passage is assured.	Obstacles possible in the event of a drop in the water level of the river. Nautical charts will need to be modified to signal these obstacles.
Ice regime	No effect on ice regime.	Depending on the thickness of the ice, there is a risk of ice jams, particularly in the Lesser La Prairie Basin. Modelling of the ice regime under these conditions will need to be done.

TC will need to issue approvals under the *Navigable Waters Protection Act* with respect to the plans for the structures to be built and the working methods that will be submitted. For the duration of the project's construction and deconstruction phases, special conditions will be issued to whoever will be building, installing or maintaining any structure whatsoever in, on, over, below or across these navigable waters. The public right to navigation and the safety of boaters will be maintained through temporary mitigation measures provided in these same approvals. Following

completion of the work, the configuration of the new bridge will result in no additional disruption to navigation in the La Prairie Basin and the St. Lawrence Seaway.

Furthermore, under the *Navigable Waters Works Regulations* regarding equipment and debris, the Regulations state:

> No person shall permit any tools, equipment, vehicles, temporary structures or parts thereof used or maintained for the purpose of building or placing a work in a navigable water to remain in such water after the completion of the project;
>
> Where a work or a portion of a work that is being constructed or maintained in a navigable water causes debris or other material to accumulate on the bed or on the surface of such water, the owner of that work or portion of that work shall cause the debris or other material to be removed to the satisfaction of the Minister.

5.4.5 Summary of residual effects

Residual effects are the anticipated environmental impacts that are likely to persist following application of the mitigation measures outlined in the previous sections.

The analysis of the project's potential environmental impacts presented in Part II of the environmental assessment (Appendix 1) shows that the New Bridge for the St. Lawrence project will have only minor residual effects. The main expected impacts during the construction and post-construction phases relate to, in particular, soil and sediment quality, air quality, surface water quality, aquatic fauna, wetlands and the sound environment. Standard and specific mitigation measures will alleviate them. When the bridge is in operation, the project's main impacts will be on air quality and the sound environment.

6 CUMULATIVE EFFECTS

The approach used was adapted from the approach presented in the Canadian Environmental Assessment Agency's *Cumulative Effects Assessment Practitioners' Guide* (Hegmann et al., 1999). The steps are as follows:

1. Identification of regional issues (Table 20) ;

- Identify valued environmental components (VECs) and their reference state;
- Establish spatial and temporal boundaries;
- Identify past, present and future projects;

2. Analysis of cumulative effects;

- Identify interrelationships between the project, other projects and the VECs;
- Identify mitigation, monitoring and follow-up measures;
- Assess the significance of the cumulative residual effects.

Table 20 Identification of regional issues

ISSUE	VEC	INDICATOR	SCOPE
Water	Water quality Sediment and soils Navigation	SS, metals, hydrocarbons and PAH loads	St. Lawrence River, from the La Prairie Basin to the Boucherville Islands
			2008-2030
Quality of life	Infrastructure and urban integration: • Physical and cultural heritage • Aesthetic dimension	Network congestion	Local and regional road networks (Montreal and Montérégie)
			2008-2026
	Sound environment	Noise level	Local study area 2008-2030
	Air quality	Suspended solids	Local study area
			2008-2030
Fish, habitat and special status species	Fish Migratory birds Special status species Herpetofauna	Habitat losses (brown snake, peregrine falcon)	Habitat of species
			2008-2030

The analysis of cumulative effects was carried out for three major elements: water, quality of life and fish, habitat and special status species. The main points in the analysis are presented below.

6.1 WATER

All measures will be taken to maintain a sediment load within allowable limits during the work. Accordingly, the expected cumulative effect on the water quality component is considered non-significant once all mitigation measures are taken into account. Follow-up of water quality will however be necessary to confirm the effectiveness of the measures.

Moreover, considering the mitigation measures, the expected cumulative effects on sediments, soils and navigation are considered non-significant.

6.2 QUALITY OF LIFE

The opening of Highways 30 and 50 will alleviate pressure on the Montreal transportation network, particularly regional transportation. Maintaining mass transit capacity will also make it possible to alleviate some of the congestion. Coordination of the various job sites and stakeholders will ensure that traffic flow is maintained and that the work is appropriately staggered. TC will participate in the Mobility Montreal committee in order to discuss about mobility elements related to the project.

Accordingly, the expected cumulative effect on the infrastructure, sound environment and water quality components is considered non-significant once mitigation measures are considered.

Moreover, considering the mitigation measures, the expected cumulative effects on urban integration are considered non-significant.

6.3 FISH, HABITAT AND SPECIAL STATUS SPECIES

“Special status species” are species that are protected under the *Species at Risk Act* (federal) or the *Act respecting threatened or vulnerable species* (provincial).

The brown snake is at the northern boundary of its North American range. The North American population is considered sizeable, although population groups are isolated and highly localized. COSEWIC does not consider the species to be at risk in Canada. Measures will be taken during the main road projects to ensure that the species is protected. Accordingly, the cumulative effects are considered non-significant once mitigation measures are taken into account.

The various works could disrupt nesting for the peregrine falcon; however, the species is known to return to nesting sites annually even when nesting is disrupted. The Quebec population is growing, rising from 58 nesting pairs in 2005 to 98 in 2010. During the work, the peregrine falcon will be able to nest on structures nearby (Jacques Cartier Bridge, St. Joseph’s Oratory, Université de Montréal). Accordingly, the cumulative effects are considered non-significant once mitigation measures are taken into account.

Moreover, considering the mitigation measures, the expected cumulative effects on fish, migratory birds and herpetofauna are considered non-significant.

7 COMPENSATION

Compensation plans have been developed for fish habitat and wetlands. The general guidelines are presented in the following sections. Since the projects have not yet been selected by the responsible authorities, the project locations are not revealed. All projects are, however, in the Montreal area. Information on the projects, developed in collaboration with DFO and EC, is provided below on a provisional basis only, and the responsible authorities reserve the right to analyze other projects as the project moves forward. Project selection will be finalized in collaboration with DFO and EC so as to compensate for all losses of fish habitat and wetlands identified in the authorization phase. In the end, it is possible that the losses to be compensated will be smaller and that only some parts of the projects will be implemented.

7.1 FISH HABITAT

Based on the scenario of greatest encroachment described in the Pre-feasibility Study Concerning the Replacement of the Existing Champlain Bridge, the project for the New Bridge for the St. Lawrence (construction of new bridges and deconstruction of old bridges) will result in permanent habitat losses of approximately 5,865 m^2 of, habitat disruption of approximately 34,200 m^2 and harmful alteration approximately 12,050 m^2. The following table presents a summary of harmful alteration, disruption and destruction of fish habitat.

Table 21 Summary of fish habitat losses (rounded)

HABITAT TYPE	SUMMARY		
	Alteration (m^2)	Disruption (m^2)	Loss/Gain (m^2)
2	650	-	-250
4	650	-	-250
5	-	755	-210
9	-	5,665	-475
10	-	1,300	-500
12	3,315	-	-225
13	-	3,360	-210
16	5,640	-	-1,330
17	-	19,415	-1,530
20	-	3,705	-575
22	1,795	-	-310
TOTAL	12,050	34,200	5,865

The calculation assumptions used for this summary are based on a scenario of greatest encroachment:

- Losses represent total losses for each habitat type due to construction of piers for the New Bridge for the St. Lawrence and for the Nuns' Island Bridge;
- A factor of 2.6 was chosen for the estimate of temporary losses during construction and during removal of existing bridge piers (as an indicator);
- For the temporary structure in the Lesser La Prairie Basin, it was decided to limit encroachment by installing a bridge on piles rather than a jetty.

Habitat types 2, 4, 12, 13, 16 and 22 are considered sensitive. The likelihood of permanent encroachment in types 2 and 4 is considered low as these are shoreline habitats. As for types 12, 13 and 16, losses will need to be offset and the habitats protected so that nearby higher value habitats are not harmed. These habitats could be compensated by smaller, higher value habitats. Type 22 habitats must be protected or compensated. Depending on the configuration of the piers, it is possible to limit the number of piers in this habitat to two rather than four.

The compensation method calls for two types of arrangements. Arrangements in still water will include a wetland portion to compensate both for wetland and riverbank losses and for still water losses. These arrangements can be used by both fish in flooded areas and birds and herpetofauna. Secondly, flowing water arrangements will compensate for losses of habitat of this type affected by the work. Two still water sites and two flowing water sites were selected, as described below.

Still water

- Project #1: Removing fill and creating an open water section and a floodplain section. Breeding habitats for ichthyofauna will be created or restored;
- Project #2: Restoring the hydric link and creating a wetland accessible to fish. Breeding habitats for ichthyofauna will be created or restored.

Flowing water

- Project #3: Restoring spawning grounds in flowing water used by walleye, small-mouth bass and possibly lake sturgeon;
- Project #4: Expanding a spawning ground of significant importance for St. Lawrence ichthyofauna by creating new habitats around the existing spawning ground.

This summary of fish habitat losses will need to be recalculated following the preliminary engineering stage, and the plans and specifications for the compensation projects will be finalized in collaboration with DFO stakeholders. The program will take habitat losses into account and will meet the requirements of the *Fisheries Act.* Finally, it should be noted that the compensation options mainly relate to the same species as those that are liable to be affected by the work.

7.2 WETLANDS

Based on a scenario of greatest encroachment, construction work for the New Bridge for the St. Lawrence is likely to lead to a loss of 6,300 m^2 of wetlands, mainly emergent nearshore marshes

and one common water reed marsh. The exact size of the area will be known once preliminary engineering is complete and will take into account the surface area of zones restored to their natural state when existing structures are demolished. The purpose of compensation program will be to compensate for losses of functions of the wetlands (see Table 22).

Table 22 Summary of functions in wetlands affected by the project

COMPONENTS	EMERGING RIVERSIDE MARSHES	COMMON REED MARSH
Description		
Location (Appendix 6, Part I)	Zones 11, 33, 34, 36, 37, 38 and 42. Below the high water mark.	Zone 30. Below the high water mark.
Surface area of the study area (m^2)	7,600	5,880
Potential losses (m^2)	2,000	4,300
Principal composition	Perfoliated eupatorium (11) Spotted jewelweed (33) Common reed (34, 37, 38) Reed phalaris (38, 42) Narrow-leaved cattail (36)	Common reed It is well known that areas invaded by invasive species, such as the common reed, are often dense and impenetrable. An area thus transformed results in a degradation of ecological processes and functions, in addition to being less attractive to flora and fauna.
Functions		
Hydrological functions	The environments are along the St. Lawrence. They are not a factor in basin hydrology. They reduce bank erosion. Level: minor Loss potential: minor	The environment is not a factor in hydrology, as the water level is controlled by the Seaway. Level: minor Loss potential: minor
Biogeochemical functions	Emerging riverside marshes filter runoff from nearby structures. Level: average **Loss potential: average**	Common reed marshes filter runoff from roads. Level: average **Loss potential: average**
Fauna habitat functions - Avifauna	Birds could nest and feed in these marshes. Near an MBS and a WCA. Level: average-high **Loss potential: high**	Birds could nest and feed in these marshes. Near an MBS and a WCA. Level: average **Loss potential: average**
Fauna habitat functions - Terrestrial wildlife	Fox, raccoon, skunk and mink would frequent riverside zones to feed. Muskrat are present on Nuns' Island and would frequent these zones to feed. Level: low-average Loss potential: low-average	The presence of common reeds makes it less attractive for terrestrial wildlife. Adjacent to an anthropogenic zone. Raccoon and skunk would frequent this sector. Level: low Loss potential: low

Table 22 (cont'd.) Summary of functions in wetlands affected by the project

COMPONENT	EMERGING RIVERSIDE MARSHES	COMMON REED MARSH
Fauna habitat functions – Herpetofauna	Brown snake and garter snake have been identified near the wetlands and could frequent these areas. Level: low-average Loss potential: low-average	The inventory does not include anurans but the environment could support them. Level: low-average Loss potential: low-average
Aquatic habitat functions	Discussed in the fish habitat analysis. Potential for spawning in still water. Level: average-high **Loss potential: average-high**	Discussed in the fish habitat analysis. Potential for spawning in still water. Level: average-high **Loss potential: average**
Ecological functions	These environments were disturbed in the past by fill. Plants act as sediment barriers. Level: low-average Loss potential: low-average	The reed marsh was disturbed in the past by road work. It forms part of the unwatered shore of the Seaway channel. Level: low-average Loss potential: low-average
Sociocultural and economic functions	Presence of an archeological site nearby (37, 38). No commercial exploitation of terrestrial wildlife. Riverside fishing. Level: low-average Loss potential: minor	Environment enclosed by highway on- and off-ramps. No wildlife exploitation. Riverside fishing. Level: low Loss potential: minor
Recreational and aesthetic functions	Environments are bordered by recreational pathways. Level: minor Loss potential: minor	Recreational pathway runs through the environment. Windsurfing nearby. Level: minor Loss potential: minor
Protection strategy		
Avoid	The bridge corridor cannot be moved.	
Minimize	Encroachment on these environments by the bridge abutments and work activities will be minimized.	
Compensate	The exact estimate of losses will be confirmed when structural design is further advanced. All lost functions will be compensated for at a minimum 3:1 ratio.	

Wetland compensation has been merged with still water fish habitat compensation. Two potential projects have been identified to compensate for losses of wetland function:

- Project #1: Removing fill and creating an open-water section, a floodplain and wetlands. Restoring the wetlands in this area will improve biogeochemical, avifauna habitat, and fish and

terrestrial wildlife habitat functions, while enhancing recreational and tourism functions and limiting invasive species;

- Project #2: Restoring a hydric link and creating a wetland. Restoring these wetlands will improve biogeochemical, avifauna habitat, and fish and terrestrial wildlife habitat functions.

The summary of wetland functions will need to be recalculated following the preliminary engineering stage, and the plans and specifications for compensation projects will be finalized in collaboration with SCF stakeholders. Fauna and flora inventories will have to be taken to determine the real gain before the work begins.

7.3 COMPENSATION FOR MIGRATORY BIRD SANCTUARY

Compensation for this MBS will be developed at a later date, once engineering is complete. The compensation proposals outlined above do not include those related to the Couvée Islands MBS. The compensation work related to the MBS will be carried out in accordance with the terms and conditions of the permit issued under the *Migratory Bird Sanctuary Regulations* by EC. The scale of the compensation measures required will be determined when details are known regarding encroachment on the MBS. TC undertakes to compensate for the losses.

8 PUBLIC AND FIRST NATIONS PARTICIPATION

As part of the New Bridge for the St. Lawrence project screening process, the responsible authorities determined that public participation was desirable pursuant to subsection 18(3) of the CEAA.

An initial consultation was held from March 15 to April 4, 2012 to collect comments from the public regarding the draft environmental assessment guidelines for the project.

The public was consulted again in December 2012 at six "open house" information sessions held in Brossard, Verdun and Nuns' Island. The sessions, hosted by TC, were designed to inform and consult the public, specifically the residents immediately affected, regarding the project description and the physical, biological and human environments. At the same time, TC collected concerns from the public via the Canadian Environmental Assessment Registry until January 15, 2013.

A second series of open houses was held in the same areas in April 2013 to present the environmental impact analysis and the mitigation measures. TC accepted comments from the public until May 19, 2013.

Residents were informed of the two series of open house sessions by various means:

- direct mail;
- advertisements in daily and weekly newspapers;
- press releases;
- press conference held by the Minister of Transport.

Furthermore, since the beginning of the environmental assessment, discussions have taken place between Transport Canada and the Mohawks Council of Kahnawake. They have sent comments on the second part of the environmental assessment report. Following the analysis of these comments, changes were made to the environmental assessment. Discussions between Transport Canada and the Mohawks Council of Kahnawake will continue throughout the project's development. For more information concerning the current use of lands and resources for traditional purposes by Aboriginal persons, please refer to Section 5.4.2.

8.1 CONCERNS RAISED

Because the responsible authorities felt that public participation in the screening process was required under subsection 18(3) of the CEAA, they are required to take public comments into consideration before making a decision under subsection 20(1) of the Act. The following sections provide a summary of the concerns raised during the consultation periods. All of the concerns

raised during the consultations and the position of the responsible authorities in relation to the concerns are found in Appendix 1 of Part II of the Environmental Assessment Report.

8.1.1 Environmental assessment guidelines

During the consultations, the public raised some concerns about the draft environmental assessment guidelines. The concerns centred on five themes:

- Human health;
- Automobile traffic and related consequences;
- Modal shift;
- Contaminated soil and sediment;
- Other options for new bridge construction.

These concerns were taken into account in developing the final version of the guidelines.

8.1.2 Primary concerns regarding the environmental assessment

Noise, air quality and traffic are the three leading concerns.

People residing in the vicinity of the New Bridge for the St. Lawrence are concerned about the impact of noise during both construction and operation of the bridge. During construction, residents are concerned about the constant noise of heavy machinery as well as potential failure to comply with current standards. During bridge operations, they are worried that the new bridge will see an increase in traffic and that there will therefore be an increase in noise from automobile and heavy truck traffic.

Local and regional degradation of air quality, particularly related to increases in dust and greenhouse gases (GHG), are also of concern to the public.

Finally, traffic problems related to congestion on local routes and access to Nuns' Island were raised during the open houses and in briefs.

8.1.3 Aspects outside the scope of the environmental assessment

A number of topics of interest unrelated to the scope of the environmental assessment but directly related to construction of the New Bridge for the St. Lawrence were raised. These are:

Mass transit

Mass transit is a priority for everyone. The participants wanted to have more information about the proposals being considered or studied.

Method of construction

Some people are worried that construction of a new bridge would be more bothersome than refurbishing the existing bridge, particularly due to the noise from pile driving over long periods.

Architecture

A number of people indicated that the bridge should make an architectural statement so that it forms a local landmark and an international reference point.

Tolls

Tolls are an issue for people who use the Champlain Bridge every day. They worry about the price of crossing and the method of payment. Older individuals recall when the tollbooths slowed traffic. The public, particularly residents of the South Shore, are strongly opposed to charging a toll.

Method of management

People wondered what type of management method Transport Canada would adopt for the bridge construction and management. There was fear that a public-private partnership (PPP) would lead to excessive, unjustified costs designed to line the pockets of private interests.

Route verte

Some people expressed a desire to see the existing bridge kept and converted into a bicycle path.

9 ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan is designed to describe the minimum requirements that must be met by the private partner in order to minimize the effects that the structural design and construction activities may have on the environment. The plan includes the environmental monitoring program, the environmental follow-up program and the emergency response plan.

The private partner is required to develop an environmental management system (EMS), which will be based on the latest version of ISO 14001:2004 standard requirements (Canadian Standards Association, 2009).

EMS implementation has the following objectives:

- Project activities will be carried out in accordance with the environmental and sustainable development policy that has been established for the project, in compliance with Transport Canada's specific requirements;
- Project activities will comply with environmental legislation, third-party agreements, Transport Canada requirements and any other applicable requirements;
- Project activities will meet the performance criteria and targets set out in the preceding stages of the process including the environmental assessment;
- All programs, plans, procedures and documentation required for projection execution will be provided;
- All planned procedures and mitigation measures (in particular those identified in this environment assessment) will be followed and their implementation controlled in order to report on their effectiveness;
- Any non-compliance issues will be identified and corrected and the required corrective and preventive action taken;
- A report on the effectiveness of the EMS will be provided to ensure continuous improvement through the commitment of the private partner's senior management to providing the resources necessary to achieve this.

The conditions for EMS implementation and ISO 14001 certification could be incorporated into the tenders and form an integral part of contracts. Further, it is strongly recommended that the EMS be integrated with the project's quality management and health and safety management systems. A verification and audit system will be established to ensure that the EMS meets these objectives.

10 ADDITIONAL ENVIRONMENTAL STUDIES

The environmental assessment identified environmental effects and the resulting mitigation measures. In some cases, the effects cannot be quantified with precision owing to a lack of data and the stage of the project. Once project design has reached a more advanced stage, additional studies will make it possible to pinpoint the effects and proposed mitigation measures. The following additional environmental studies were identified in this environmental assessment, and must be done before work begins:

- Establishment of the benchmark in the study area to provide a final and accurate portrait of the following components before work begins:
  - Surface water;
  - Groundwater;
  - Air (sampling over a 12-month period at a minimum);
  - Soil characterization.
- Modelling, taking the project's configuration into account, to provide an accurate assessment of the effects on the following components:
  - Dispersion of contaminants and GHG emissions. The methodology selected for modelling atmospheric pollutants will be implemented at strategic points that accurately reflect air quality around the proposed structure, and the findings will be compared against current standards;
  - Noise;
  - Flow and ice regime near temporary works and piers.
- Bird mortality study if a cable-stayed structure is used.

Throughout the course of project development and preliminary engineering, other studies may be required and may be added to the list.

11 MONITORING

Environmental monitoring is a series of measures designed to provide supervision of the implementation of mitigation measures identified during the screening process as well as the contractual mitigation measures and those identified by the private partner. Under subsection 20(2) of the CEAA, the responsible authorities (TC, Fisheries and Oceans Canada and Environment Canada in this instance) are responsible for supervising implementation of mitigation measures. Environmental monitoring is also part of the emergency management system (EMS).

The environmental monitoring program will be submitted to EC for approval before the work begins.

During the work, a site supervisor will be responsible for ensuring that all environmental measures are followed. The site supervisor will have administrative documents, including all applicable authorizations and permits, available for that purpose. The supervisor must also ensure that the measures are effective and, where warranted, inform Transport Canada and ensure that alternate protection measures are proposed.

The site supervisor is required to complete a monitoring report to ensure that mitigation measures are respected as the work progresses. The site supervisor is also required to submit a monthly monitoring report to the responsible authorities. The report will enable the site supervisor to ensure that mitigation measures are applied, take note of any issues or problems and see to their correction. Photographs must be taken by the supervisor to document observations on the ground.

Certain mitigation measures have been formulated as performance criteria. In these cases, the private partner will be responsible for implementing the appropriate measures to ensure compliance. Specific monitoring of these elements is therefore required. Table 23 provides a brief description of the requirements for performance criteria monitoring identified in the effects analysis. The main monitoring criteria are presented in the next section. They may be adjusted once project details have been confirmed.

Table 23 Prescribed approach for monitoring performance criteria

COMPONENT	INDICATOR	THRESHOLD	SECTORS AT RISK	METHODOLOGY	FREQUENCY	PROCEDURE TO ADDRESS NON-COMPLIANCE
Air	Fine particles P2.5 Total particulate matter	30 µg/m^3 24-hr. average 150 µg/m^3 24 hours;	Residential areas fewer than 50 m from the work	Method: 8.06/1.3/M (EC, 2009a) Sampling on each side of the work	Every two weeks during the work between April and October. Reduce frequency if indicator is below threshold for four consecutive samples.	Additional mitigation measures and reduction at source. Examples: Cover piles of materials Use of dust control products Restriction during high winds
Water quality	SS	25 mg/l or 25 mg/l above upstream value	St. Lawrence River (Nuns' Island channel, Greater and Lesser La Prairie basins) upstream and downstream of work site	Continuous sampling station for turbidity and correlation of SS and turbidity.	Continuously during work in the water.	Additional mitigation measures and reduction at source. Example: Turbidity curtain
	Contaminants	Criteria for release into natural environment	Sectors in which contaminated soils are found (Island of Montreal)	CEAEQ surface water sampling method Basin water sampling	When purging settling ponds	The contaminated water must be treated or disposed of at an authorized site.
Sound environment	L_{10}	Daytime: 75 dBA or ambient noise during non-work Evening and nighttime: ambient noise during non-work plus 5 dBA	Sensitive areas identified on figures 80, 81 and 82 of Part I (in Appendix 4)	Method: FHWA-PD-96-046	Daily for work estimated at greater than 70 dBA near sensitive areas.	Additional mitigation measures and reduction at source. Examples: Sound suppressor or enclosures Electrical air supply compressors Soundproof hydraulic drills Soundproof concrete saw blades Temporary noise barriers (portable or fixed)
Hydraulic	Flow velocity (m/s)	Values measured before work in sensitive areas	Lesser La Prairie Basin Nuns' Island channel	Measurement of flow velocity using a current-meter	Once before installation of infrastructure that may change flow velocity. Once after installation of infrastructure	Modification of infrastructure to maintain target velocities, such as adding a culvert to a jetty.

11.1 SOIL AND SEDIMENT

Monitoring of the quality of soil and sediment will be required to comply with contaminated soil and sediment management requirements. Excavated soil will be characterized and classified based on level of contamination before it is taken off the project right-of-way. Depending on the level of contamination, the soil may be:

- Reused on the site as fill material;
- Sent to a landfill site as fill;
- Treated and/or disposed of at an authorized site.

Groundwater must also be monitored to ensure that it is not contaminated as a result of the project. Sampling upstream and downstream of the work sites on the Island of Montreal will be carried out on a regular basis.

11.2 WATER QUALITY

The water quality performance objective will be monitored and measured via a network of sampling stations located upstream and downstream of the sites to determine the degree to which the site is impacting the river's natural concentration of suspended solids (see Table 20). The number of stations in the network, the distance between the stations, their exact location and the frequency of readings will be determined based on the work site's parameters, such as river flow and environmental sensitivity. During the work, water quality will be measured several times a day using an in situ method calibrated by laboratory measurements. Monitoring will be done on an ongoing basis in the areas where work is to be done and in open water (sampling will not be done when ice is present). The final monitoring protocol will be developed during preparation of the final plans and specifications.

Where the threshold is exceeded, an alarm system will be triggered so that the appropriate corrective action can be taken quickly, such as:

- Modify work methods and eliminate the source of the contaminant;
- Clean the settling ponds and other protective equipment.

Although monitoring targets suspended solids, the samples taken will also enable monitoring for other contaminants, particularly in work sectors where contaminated soil is located nearby (Island of Montreal) or contaminated sediment is located in the vicinity (Lesser La Prairie Basin and Nuns' Island).

Monitoring data and corrective measures implemented will be available to the public via a website.

11.3 AIR QUALITY

Air quality will be monitored and measured by sampling stations around the worksites to identify the contribution of the effects of the worksite on the dispersion of dust. The stations will be installed based on the wind direction, the type of work and the presence of sensitive areas. The most dust is raised during excavation, earthwork and deconstruction of structures. Monitoring will be conducted every two weeks from April to October in the areas where the work has taken place. The Nuns' Island sampling station will also be used to monitor overall air quality in the area.

Where the threshold is not met, corrective mitigation measures such as these will be implemented:

- Modify work methods by using equipment with dust capture systems;
- Install protective tarps when the work generates dust;
- Encourage the use of wet sprays to limit dust;
- Redesign work areas to reduce the amount of dust raised (move piles of material, etc.).

Monitoring data and corrective measures implemented will be available to the public via a website.

11.4 HYDRAULICS

The hydraulic performance objective will be monitored and measured using current meters (at least two) installed upstream and downstream from the jetty. Measurements will be taken after construction of the jetty to validate the model. The final monitoring protocol will be developed during preparation of the final plans and specifications.

If the objective is not met, appropriate corrective measures will have to be implemented such as:

- Adding another culvert to the jetty;
- Modifying the flow pattern.

11.5 COMMERCIAL NAVIGATION

The St. Lawrence Seaway Management Corporation will enforce the private partner's compliance with the conditions of the memorandum of understanding.

11.6 RECREATIONAL / TOURIST ACTIVITIES AND RECREATIONAL BOATING

A website and a telephone line will be available to provide information and record complaints from users. Any adjustments implemented will be published there as well.

With respect to navigation, TC's Navigable Waters Protection Program will enforce conditions attached to authorizations under the *Navigable Waters Protection Act*. Worksite visits will be carried out to ensure compliance with temporary mitigation measures and, if necessary, the needed adjustments will be demanded to ensure the safety of recreational boating and commercial navigation.

During deconstruction of the piers of the existing bridge, bathymetric surveys will be required to ensure that the remains of the piers do not cause any obstacle to navigation

11.7 SOUND ENVIRONMENT

Performance objectives during the work will be monitored and measured by noise sampling stations located 5 m from sensitive areas over 24-hour periods using calibrated sound level meters. These latter will be moved as the work progresses.

In situations where the thresholds would be exceeded, corrective measures such as these will be implemented:

- Modify work methods by using equipment with mufflers;
- Modify work schedules;
- Install temporary noise barriers.

Monitoring data and corrective measures implemented will be available to the public via a website.

11.8 HERITAGE AND ARCHEOLOGY

It is recommended that an archeologist be on site during excavation work in areas of archeological potential. The work must stop if artifacts are found, the site must be assessed and a recommendation issued with respect to the measures needed to either protect them or conduct a dig.

12 FOLLOW-UP PROGRAM

The environmental follow-up program provides an approach for monitoring the development of certain components affected by the project and determine the accuracy of the forecasts and the environmental issues identified. It also makes it possible to verify effectiveness of the mitigation measures identified in the environmental assessment for which uncertainty may remain over the short, medium and long terms. The components that will be followed up on under the CEAA are presented in the following sections.

12.1 SOUND ENVIRONMENT DURING THE OPERATIONS PHASE

The private partner will develop a proposed program for sound environment follow-up during operations, which will be designed to verify results identified in the noise impact study. The noise monitoring program will also make it possible to verify effectiveness of mitigation measures, where applicable.

The program will be implemented before construction begins (baseline case) and one, five and 10 years after the project goes into operation and will include the following:

- A noise survey for 24 consecutive hours will be taken at the first dwelling for every sensitive area. The noise survey may be completed simultaneously with the one-hour noise surveys for areas deemed to be too large. The one-hour noise surveys will be taken between 9:00 a.m. and 3:00 p.m.;
- Traffic counts will be taken for periods of six consecutive hours (9:00 a.m. to 3:00 p.m.) or for 24 hours. Counts must include the following categories of vehicles, at a minimum: cars, two-axle trucks, trucks with three axles or more. The purpose of the counts is to validate the sound environment computer prediction models and to assess average summer daily traffic (ASDT) on the road infrastructure if the information is not otherwise available;
- The effectiveness of the noise mitigation measures will be assessed on the ground and residual noise levels will also be confirmed using noise surveys.

For the follow-up to take place 10 years following the start of operations, mitigation measures will be proposed in the event that the expected sound environment estimates are violated in order to rectify the situation.

12.2 AIR QUALITY DURING THE OPERATIONS PHASE

The private partner will implement an air quality follow-up program during the operations phase. The purpose of the program will be to monitor fine and total particulate matter (P2.5 and Ptot) and other atmospheric pollutants.

The program will be carried out one, five and 10 years after project operations begin. The installation of a complete sampling station on Nuns' Island combined with measurements taken using mobile stations will provide a portrait of the air quality situation.

The results will be consolidated to monitor changes against Canadian ambient air quality recommendations and CMM criteria.

12.3 COMPENSATION PROGRAM FOR FISH HABITAT AND WETLANDS

Fish habitat and wetlands compensation is generally monitored over a five-year period. The purpose of the follow-up program will be to determine the degree to which the compensation plan objectives have been achieved (e.g., development of spawning grounds, survival of wetlands). Field measurements and visual inspections are required for monitoring.

The terms for following up on fish habitat compensation will be detailed in the compensation program. Monitoring criteria and their duration and scope depend on the type of project, chance of success, risk associated with the stability of the developments and the scope of the development project or projects. All of this information will be specified once DFO finalizes the compensation program, which will be included in the authorizations to be issued by DFO pursuant to the *Fisheries Act*.

12.4 RELOCATION OF THE BROWN SNAKE

Brown snake relocation will be monitored twice-yearly over a four-year period to confirm that the snakes have adapted to their new habitat.

12.5 PEREGRINE FALCON NESTING

Peregrine falcon nesting on the New Bridge for the St. Lawrence structure will be monitored. The use of artificial nesting boxes or any other bridge structure will be studied for a period of five years once work is completed (i.e., after deconstruction of the existing Champlain Bridge).

12.6 VEGETATION RECOVERY

Vegetation planted once work has been completed will be monitored in the spring after planting and 24 months later to ensure that the plants have survived. The plant survival rate will be assessed via visual inspection, and new plants must be planted if the survival rate falls below 90%.

13 RESPONSIBLE AUTHORITIES DECISION

Pursuant to subsection 20(1) of the CEAA, the responsible authorities (Transport Canada, Fisheries and Oceans Canada and Environment Canada), upon reading Part I of the Environmental Assessment, Full Report and Part II of the Environmental Assessment, Full Report and taking note of observations made by the general public, have determined that the New Bridge for the St. Lawrence project is not likely to cause significant adverse environmental effects, in light of the application of the mitigation measures identified in Part II of the Environmental Assessment, Full Report.

TRANSPORT CANADA

Recommended by:

Name, title	Date

Approved by:

Name, title	Date

FISHERIES AND OCEANS CANADA (signature on next page)

Recommended by:

Name, title	Date

Approved by:

Name, title	Date

ENVIRONMENT CANADA (signature on next page)

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Name, title	Date

ENVIRONMENT CANADA

Recommended by:

Name, title	Date

Approved by:

Name, title	Date

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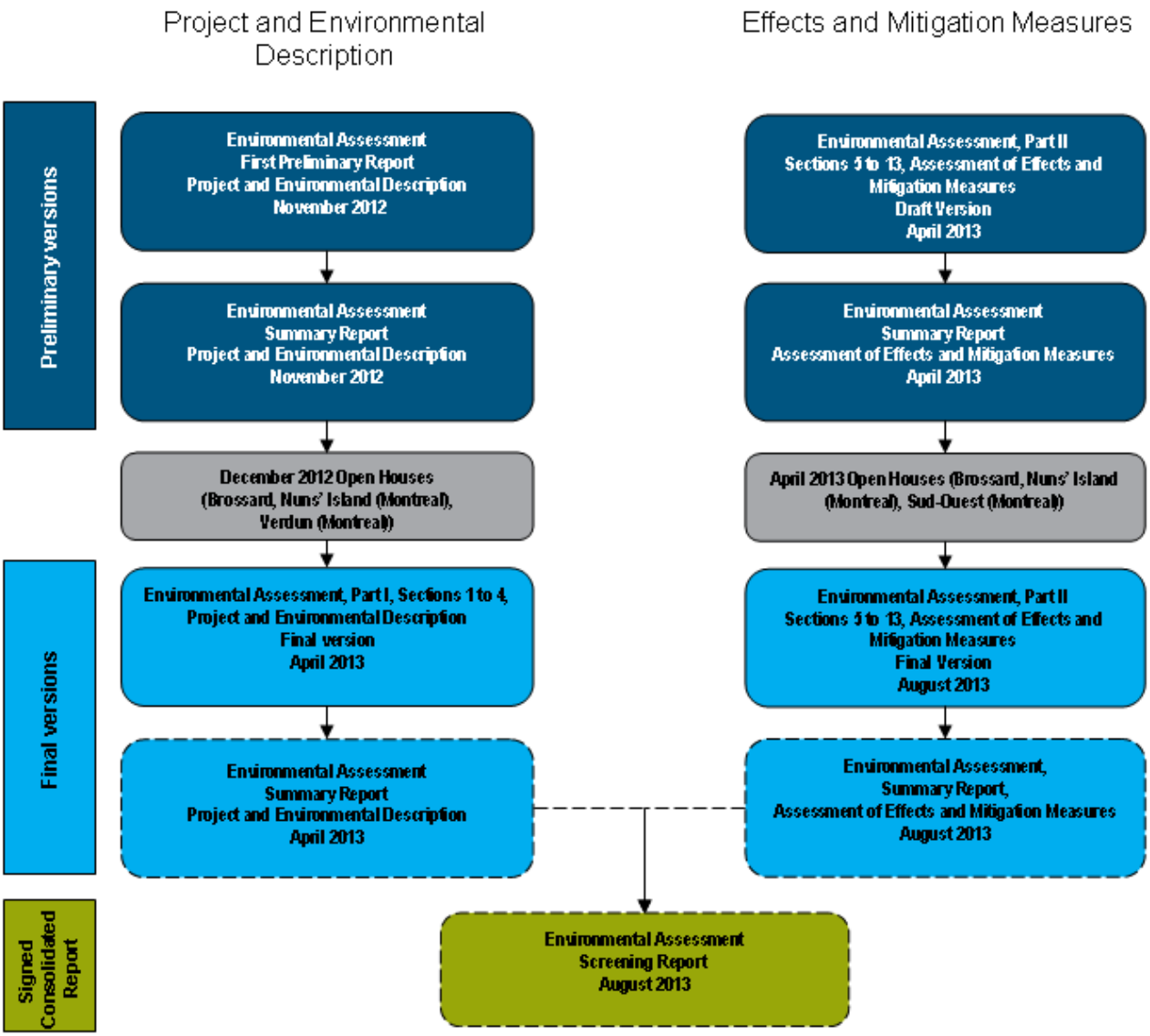
Appendix 1 Flowcharts of reports published in the context of the environmental assessment



Reports published in the context of the New Bridge for the St. Lawrence project environmental assessment

Appendix 2 Biophysical characteristics of spawning grounds used by ichthyofauna in the La Prairie basins

Table 32 is from the *Environmental Assessment, Part I, Sections 1 to 4, Project Description and Description of the Environment, Final Version – March 2013*.

Table 32 Biophysical characteristics of spawning grounds used by ichthyofauna in the La Prairie basins

TYPE OF SPAWNING GROUND	STUDY AREA SPECIES (UPSTREAM AND DOWNSTREAM)	BIOPHYSICAL CHARACTERISTICS							ENVIRONMENT TYPE
		Current (cm/s)	Depth (m)	Substrate	Season	Vegetation	Turbidity	Oxygen content (ppm)	
Fast-flowing water lithophil	Lake sturgeon, white sucker, northern sucker, silver redhorse, shorthead redhorse, smallmouth bass, channel catfish, tadpole madtom, walleye, sauger, silver lamprey, rosyface shiner, rainbow trout, sea trout	30 to 215	0.2 to 7.0	Coarse sand, gravel, rock, blocks	Sp-S-F	Rare	Clear to turbid	≥8	13-15-17-19-20-21-22-23-24
Still water lithophil	Mottled sculpin, American smelt, white perch, logperch, johnny darter, silver lamprey	<30	≥0.1	Coarse sand, gravel, rock	Sp-S-F	Rare	Clear to turbid	≥8	3-5-7-9-
Still water phytolithophil	Bowfin, largemouth bass, smallmouth bass, rock bass, pumpkinseed, black crappie, carp, common shiner, silver minnow, emerald shiner, golden shiner, mimic shiner, pearl dace, longnose dace, spottail shiner, rosyface shiner, fathead minnow, bluntnose minnow, banded killifish, brown bullhead, white perch, Iowa darter, logperch, yellow perch, central mudminnow	≤30	≤4	Silt, gravel, rock, organic matter	Sp-S	Medium density: aquatic and semi-aquatic	Low trubidity	6 to 8	2-4-6-8
Phytophil	Northern pike, muskellunge	≤30	≤1.2	Organic matter (vegetation)	Sp-S-F	Medium density: aquatic and semi-aquatic and terrestrial herbaceous graminoids	General low turbidity	?	1-4

Source: Adapted from Armellin et al., 1997, (adapted from Lavoie and Talbot, 1984), Bernatchez and Giroux 2000

Appendix 3 Analysis of environmental effects

ASSESSMENT OF POTENTIAL PROJECT EFFECTS

The analysis of environmental impacts addresses the points listed in subsection 16(1) of the CEAA, which are described in section 3.

The following table provides a summary of the impact analysis and shows the recommended mitigation measures.

The mitigation measures identified in the table have been divided into four categories:

1. Design criteria, which will be considered and incorporated when the plans and specifications for the structures are developed, identified by “CC” in Table 71;
2. Performance criteria, for which the objectives are defined, identified by “PC” in Table 71. The general guidelines for the monitoring program are presented in Section 9;
3. Standard mitigation measures, taken from industry standards and government guidelines. Three sources of standard mitigation measures were used for this environmental assessment:
   - The standard mitigation measures proposed by the Department of Fisheries and Oceans for projects involving work in water, identified by “MPO” in Table 71;
   - MTQ General Specifications and Standards (2012), identified by “CCDG” in Table 71;
   - MTQ Standards for Road Work (Tome II, 2011), identified by “NC” in Table 71;
4. Specific mitigation measures, identified with an “S” in Table 71.

Table 71 is from the *Environmental Assessment, Part II, Sections 5 to 13, Assessment of Effects and Mitigation Measures, Preliminary Version – August 2013.*

Table 71 Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES[2]	SIGNIFICANCE OF RESIDUAL EFFECTS
1.	Pre-construction	Site mobilization and construction of temporary facilities	Recreational / tourist activities and recreational boating	Bike path corridors and some riverfront areas used for recreational / tourist activities (wading, windsurfing, hunting, etc.) used for some pre-construction activities.	High	Temporary	Local	Major	S-1 Unless exceptional circumstances arise, maintain a cycling link between the South Shore and Montreal, including Nuns' Island, during the official opening periods. Cycling links will be re-established on both sides of Highway 15 when the work is finished. S-2 When possible, inform users of cycling links of safe detours and closure periods. As for recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services.	Non-significant
2.	Pre-construction	Site mobilization and construction of temporary facilities	Avifauna and habitats	Disturbance of avifauna habitat during construction of temporary facilities.	Average	Temporary	Local	Medium	S-3B Avoid carrying out potentially destructive or disruptive activities during sensitive periods and in sensitive locations in order to reduce the risk of affecting birds, their nests or eggs. If activities cannot be avoided, develop and implement appropriate preventive and mitigation measures to minimize the risk of bycatches and help maintain sustainable migratory bird populations. Bird nesting periods normally range from mid-April to mid-August in the study area.	Non-significant
3.	Pre-construction	Site mobilization and construction of temporary facilities	Sound environment	Site mobilization activities may increase noise levels in sensitive areas identified in figures 80, 81 and 82 in Part I of the Environmental Assessment Report (see summary in figure 84).	Average	Temporary	Local	Medium	PC-1 Noise levels associated with site mobilization activities must not exceed the following thresholds: $L_{10\%}$ = 75 dbA during daytime; ambient noise +5 dbA during evening and night (measured at 5 m from sensitive areas). Where these thresholds cannot be met, mitigation measures must be implemented, such as: - NC 9.9.3.1 - NC 9.9.3.2 - NC 9.9.3.3. S-4 Where feasible, permanent noise barriers will be built before the start of work.	Non-significant
4.	Pre-construction	Site mobilization and construction of temporary facilities	Special status wildlife and plant species	Potential mortality of individuals and disturbance of brown snake habitat on Montreal Island, Nuns' Island and the Seaway dike.	High	Temporary	Limited	Major	S-5 In the spring, install a fence along the construction perimeter (exclosure) and maintain it for the duration of the work. The fence will be designed for the required functions and will be removed as soon as it is no longer needed. Regular inspections will be made along the fence. S-6 At the end of summer and before the start of work, capture brown snakes found on the exclosure and relocate them in suitable habitats outside the site. Relocation should be discussed with the appropriate authorities (MDDEFP).	Non-significant
5.	Pre-construction	Site mobilization and construction of temporary facilities	Herpetofauna and habitats	Potential mortality of individuals and disturbance of herpetofauna habitat during construction of temporary facilities in the Nuns' Island and seaway dike bridge sectors.	Average	Temporary	Limited	Medium	NC 9.5.3 S-5 In the spring, install a fence along the construction perimeter (exclosure) and maintain it for the duration of the work. The fence will be designed for the required functions and will be removed as soon as it is no longer needed. Regular inspections will be made along the fence. S-7 As far as possible, avoid work in wetlands suitable for herpetofauna (Nuns' Island Bridge and Seaway Dike) or minimize work in these environments.	Non-significant

[2] CC-n: Design Criteria; PC-n: Performance Criteria; MPO-n: DFO Standard Measures; CCDG-n: MTQ General Specifications and Standards (2012a); NC-n: MTQ Roadwork Standards (2013b); S-n: Specific Measures

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
6.	Pre-construction	Site mobilization and construction of temporary facilities	Mammals	Mammal disturbance in the construction footprint.	Low	Temporary	Local	Minor	No special measures with respect to the species on the site; individual animals disturbed by the work should be able to move out of the affected areas.	Non-significant
7.	Pre-construction	Site mobilization and construction of temporary facilities	Air quality	Construction of temporary facilities may produce a short-term degradation of air quality due to fugitive dust, some of which may contain contaminants.	Average	Temporary	Local	Medium	PC-2 Do not exceed a threshold of 30 µg/m^3 for fine airborne particulate matter less than 2.5 microns in diameter over a 24 hr. average (PM 2.5 24 hr. average) and an average concentration of total particulate matter over 24 hr. of 120 µg/m3 at 50 m from the footprint. Where these thresholds cannot be met, mitigation measures must be implemented, for example: - Use equipment fitted with dust collection systems. - Install tarpaulins around work that generates dust. - Cover piled materials with geotextile. CCDG 12.4 S-8 When working in urban areas, remove loose material and other debris on a daily basis from streets used by vehicles and machinery. S-100 Activities that generate dust will be located so as to minimize their effect on the public.	Non-significant
8.	Pre-construction	Site mobilization and construction of temporary facilities	Surface water quality	Potential increase in SS concentrations in surface water due to sediment disturbance in the Lesser La Prairie Basin. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Average	Temporary	Regional	Major	PC-3 The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations. If these concentrations are exceeded, additional mitigation measures must be implemented, such as: - Install a turbidity curtain; - Adjust working methods; - Identify and control sources of SS emissions. MPO-4 to MPO-8.	Non-significant
9.	Pre-construction	Site mobilization and construction of temporary facilities	Surface water quality	Potential contamination of the waters of the St. Lawrence River due to soil runoff from disturbed areas. Potential increase in suspended solid (SS) concentrations in surface water. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Average	Temporary	Local	Medium	PC-3 The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations. If these concentrations are exceeded, additional mitigation measures must be implemented, such as: - Install a turbidity curtain; - Adjust working methods; - Identify and control sources of SS emissions. MPO-4 to MPO-8, MPO-11, MPO-13 CCDG 10.4.3.1, 10.4.3.2.1, 10.4.3.2.2 et 10.4.3.2.3 NC 9.4.3.1	Non-significant
10.	Pre-construction	Site mobilization and construction of temporary facilities	Groundwater quality	Accidental oil or fuel spills when transporting construction materials or during site mobilization could affect groundwater quality.	Average	Temporary	Limited	Medium	S-9 Maintain transportation vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous emissions and noise. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log.	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
11.	Pre-construction	Site mobilization and construction of temporary facilities	Soil and sediment quality	Oil or fuel spills during site mobilization could affect soil and sediment quality.	Low	Temporary	Limited	Medium	S-9 Maintain transportation vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous emissions and noise. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-11 Ensure that catalytic converters on all vehicles are in proper working order throughout the construction period. S-12 Ensure that contractors and sub-contractors are made aware of environmental concerns including air quality.	Non-significant
12.	Pre-construction	Site mobilization and construction of temporary facilities	Soil and sediment quality	Excavation, fill and grading activities carried out in aquatic environments (wharf/jetty/other) during site mobilization could result in dispersion of contaminated sediments.	High	Temporary	Limited	Major	MPO-4 and MPO-5	Non-significant
13.	Pre-construction	Site mobilization and construction of temporary facilities	Soil and sediment quality	Site mobilization and construction of temporary facilities may lead to soil exposure and increased erosion.	Low	Temporary	Limited	Medium	MPO-6, MPO-8 CCDG 10.4.3.2.2 and 10.4.3.5 NC 9.4.3.1, 9.4.3.2 and 9.4.3.3 S-13 Isolate and preserve the organic soil layer so that it may be reused in places where the topsoil has been stripped.	Non-significant
14.	Pre-construction	Site mobilization and construction of temporary facilities	Land and buildings	Possible encroachment on private land for construction of materials storage areas.	Average	Temporary	Limited	Medium	CCDG 7.11 S-14 Minimize encroachment of detours on private land. The private partner must come to an agreement with property owners with respect to encroachment on private land.	Non-significant
15.	Pre-construction	Site mobilization and construction of temporary facilities	Terrestrial vegetation	Possible loss of terrestrial and riparian vegetation due to organization of materials storage areas and access roads. The surface area will vary depending on the private partner's working methods.	Average	Temporary	Limited	Medium	CCDG 11.2.5, 11.2.6 and 11.2.7.1	Non-significant
16.	Pre-construction	Traffic and navigation management, installation of signage	Recreational/tourist activities and recreational boating	Detours, closures and temporary changes to boat lanes and bike paths.	Average	Temporary	Local	Medium	S-15 Install the materials required to mark boat lanes and bike paths in order to ensure safe passage of cyclists and recreational boaters.	Non-significant
17.	Pre-construction	Traffic management, installation of signage	Sound environment	Detours may result in changes to noise levels in residential neighbourhoods near the route in the boroughs of Verdun and Sud-Ouest.	High	Temporary	Local	Major	PC-1 Noise levels associated with site mobilization activities must not exceed the following thresholds: $L_{10\%}$ = 75 dbA during daytime; ambient noise +5 dbA during evening and night (measured at 5 m from sensitive areas). Where these thresholds cannot be met, mitigation measures must be implemented, such as: - NC 9.9.3.1 - NC 9.9.3.2 - NC 9.9.3.3.	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
18.	Pre-construction	Traffic management, installation of signage	Infrastructure	Temporary lane changes (A-10, Highway 15, Route 132 and municipal network) and partial closures of some accesses.	High	Temporary	Regional	Major	CCDG 10.3.1 and 10.3.4.3 S-16 The public will be informed of the work and the detours provided. Alternate routes will be proposed. S-17 At least one, preferably two, accesses to Nuns' Island local network will be maintained at all times on the local road and highway network. S-101 Transport Canada and the private partner will work together to develop a transportation management plan in order to maintain a smooth traffic flow on the project's adjacent road network. S-102 Transport Canada and the private partner will work together to prepare a transportation management plan for trucking during the construction phase and around the project site. S-103 Keep the buses-only lane operational during the project.	Non-significant
19.	Pre-construction	Traffic and navigation management, installation of signage	Commercial ship traffic	Impact on commercial ship traffic on the St. Lawrence Seaway.	High	Temporary	Regional	Major	S-18 Work is prohibited during periods when the seaway is open without a memorandum of understanding between TC, SLSMC and the private partner.	Non-significant
20.	Pre-construction	Traffic management, installation of signage	Air quality	Traffic lane diversions (Highway 15 and municipal network) may result in a local change in air quality in residential neighbourhoods near the route in the boroughs of Verdun and Sud-Ouest.	Average	Temporary	Local	Medium	S-19 Set up a system to monitor atmospheric contaminants in nearby residential areas (Verdun, Sud-Ouest, Nuns' Island and Brossard) during construction work.	Non-significant
21.	Pre-construction	Traffic management, installation of signage	Land and buildings	Possible encroachment on private land for bypass roads.	Low	Temporary	Limited	Minor	CCDG 7.11 S-14 Minimize encroachment of detours on private land. The private partner must come to an agreement with property owners with respect to encroachment on private land.	Non-significant
22.	Pre-construction	Relocation and protection of public utility infrastructures	Recreational/tourist activities and recreational boating	Disruption of access to Champlain Bridge Park for recreational activities (fishing, windsurfing, cycling, hunting, etc.).	Average	Temporary	Local	Medium	S-2 When possible, inform users of cycling links of safe detours and closure periods. As for recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services.	Non-significant
23.	Pre-construction	Relocation and protection of public utility infrastructures	Infrastructure	Relocation of the power line will require temporary closures or traffic lane diversions (Route 132 and ramps).	Low	Temporary	Regional	Medium	CCDG 10.3.1 and 10.3.4.3 S-16 The public will be informed of the work and the detours provided. Alternate routes will be proposed.	Non-significant
24.	Pre-construction	Relocation and protection of public utility infrastructures	Wetlands	Potential destruction of part of wetland due to installation of a tower for the high voltage line in Brossard (between 100 m^2 and 250 m^2 of common water reed marsh).	High	Permanent	Limited	Major	CC-1 Design engineering structures to comply with the Federal Policy on Wetland Conservation by favouring, in order of importance, impact avoidance, impact minimization and loss compensation. If necessary, prepare a compensation plan including the creation of a wetland of equivalent ecological function. When work is performed in wetlands, implement the following measures: - MPO-3, MPO-4, MPO-11 and MPO-16 - CCDG 10.4.3.2.1, 10.4.3.2.2 and 10.4.3.2.3	Non-significant

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NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
25.	Pre-construction	Relocation and protection of public utility infrastructures	Groundwater quality	Excavation of contaminated soil or sediment beneath the water table may result in groundwater contamination.	Average	Temporary	Limited	Medium	S-20 When dewatering excavations or confined areas, pump out water and discharge it in compliance with applicable federal, provincial and municipal regulations or call a specialized firm for pumping and final disposal.	Non-significant
26.	Pre-construction	Relocation and protection of public utility infrastructures	Soil and sediment quality	Excavating and piling contaminated soil could cause contamination of soils and sediment under or near excavation zones and piles.	Average	Permanent	Limited	Medium	NC 9.3.3.4	Non-significant
27.	Construction	Soil stripping and land clearing	Recreational/tourist activities and recreational boating	Bike path corridors and some riverfront areas used for recreational / tourist activities (wading, windsurfing, hunting, etc.) used for some construction activities.	Low	Temporary	Local	Minor	S-1 Unless exceptional circumstances arise, maintain a cycling link between the South Shore and Montreal, including Nuns' Island, during the official opening periods. Cycling links will be re-established on both sides of Highway 15 when the work is finished. S-2 When possible, inform users of cycling links of safe detours and closure periods. As for recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services.	Non-significant
28.	Construction	Soil stripping and land clearing	Avifauna and habitats	Disturbance of potential avifauna habitat and possible accidental destruction of nests, eggs or birds.	High	Temporary	Local	Major	CCDG 11.2.7.1 S-3A Conduct out work outside nesting times for birds whose nesting schedule normally ranges from mid-April to mid-August in the study area. S-21 Work on and in the vicinity of the Couvée Islands migratory bird sanctuary must be performed in accordance with EC requirements.	Non-significant
29.	Construction	Soil stripping and land clearing	Special status wildlife and plant species	Potential mortality of individuals and potential loss of habitat for rough water-horehound on the South Shore and for the brown snake on Montreal Island, Nuns' Island and the Seaway dike.	High	Permanent	Limited	Major	S-5 In the spring, install a fence along the construction perimeter (exclosure) and maintain it for the duration of the work. The fence will be designed for the required functions and will be removed as soon as it is no longer needed. Regular inspections will be made along the fence. S-6 At the end of summer and before start of work, capture brown snakes found on the exclosure and relocate them in suitable habitats outside the site. Relocation should be discussed with the appropriate authorities (MDDEFP). S-22 Signpost areas where special status plant species are present and prohibit access during construction work. S-23 Prior to the start of work, transplant species that could be affected by the work to an area that will remain undisturbed.	Non-significant
30.	Construction	Soil stripping and land clearing	Herpetofauna and habitats	Potential mortality of individuals and disturbance of herpetofauna habitat during construction of temporary facilities in the Nuns' Island and seaway dike bridge sectors.	Average	Permanent	Limited	Medium	NC 9.5.3 S-5 In the spring, install a fence along the construction perimeter (exclosure) and maintain it for the duration of the work. The fence will be designed for the required functions and will be removed as soon as it is no longer needed. Regular inspections will be made along the fence. S-7 As far as possible, avoid work in wetlands suitable for herpetofauna (Nuns' Island Bridge and Seaway Dike) or minimize work in these environments.	Non-significant

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NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
31.	Construction	Soil stripping and land clearing	Ichthyofauna and habitats	Sediment runoff from work on the riverbank could disturb fish habitats downstream from the work especially in lentic flow zones (Types 2 and 4 in figure 73 in Part I of the Environmental Assessment Report).	High	Temporary	Local	Major	MPO-4, MPO-7 and MPO-8 NC 9.4.2	Non-significant
32.	Construction	Soil stripping and land clearing	Ichthyofauna and habitats	Leaching of contaminants from contaminated riverbank sites could affect fish health.	High	Temporary	Regional	Major	MPO-8 NC 9.4.2 S-24 Initiate contaminant monitoring in aquatic environments during construction work (see section 9.8.2 for details).	Non-significant
33.	Construction	Soil stripping and land clearing	Mammals	Temporary habitat loss.	Low	Temporary	Limited	Minor	No action at this stage.	Non-significant
34.	Construction	Soil stripping and land clearing	Wetlands	Loss of wetlands due to soil stripping and land clearing in the new corridor in the following proportions: 4,300 m^2 of a common water reed marsh.	High	Permanent	Limited	Major	CC-1 Design engineering structures to comply with the Federal Policy on Wetland Conservation by favouring, in order of importance, impact avoidance, impact minimization and loss compensation. If necessary, prepare a compensation plan including the creation of a wetland of equivalent ecological function. When work is performed in wetlands, implement the following measures: - MPO-3, MPO-4, MPO-11 and MPO-16 - CCDG 10.4.3.2.1, 10.4.3.2.2 and 10.4.3.2.3	Non-significant
35.	Construction	Soil stripping and land clearing	Heritage and archeology	Soil stripping could disturb archeological remains, particularly at the Le-Ber site (BiFj-1).	High	Permanent	Local	Major	S-25 Conduct archeological surveys in the sectors affected by the work (see Appendix 3). S-26 Any discovery of archeological remains must immediately be communicated to MCCQ. The Mohawk community of Kahnawake will also be advised of any discovery of prehistoric or Aboriginal archeological remains. Work at the discovery site should stop until a Ministry archeologist has completed a qualitative and quantitative assessment. S-113 Area C of the prehistoric archeological Site BiFj-49 where were found Aboriginal remains should be fenced outside the work areas.	Non-significant
36.	Construction	Soil stripping and land clearing	Surface water quality	Potential contamination of surface water due to soil runoff from the disturbed areas. Potential increase in SS concentrations in surface water. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species. Note: The *Migratory Birds Regulations* (MBR) prohibits the introduction of toxic substances into migratory bird habitats.	Average	Temporary	Local	Medium	PC-3 The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations. If these concentrations are exceeded, additional mitigation measures must be implemented, such as: - Install a turbidity curtain; - Adjust working methods; - Identify and control sources of SS emissions. MPO-4 to MPO-8, MPO-11, MPO-13 CCDG 10.4.3.1, 10.4.3.2.1, 10.4.3.2.2 and 10.4.3.2.3 NC 9.4.2 and 9.4.3.1 S-24 Initiate contaminant monitoring in aquatic environments during construction work (see section 9.8.2 for details).	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
37.	Construction	Soil stripping and land clearing	Soil and sediment quality	Soil stripping and land clearing will leave soil exposed and cause increased erosion.	Average	Permanent	Limited	Medium	MPO-6, MPO-8 CCDG 10.4.3.2.2 and 10.4.3.5 NC 9.4.3.1, 9.4.3.2 and 9.4.3.3 S-13 Isolate and preserve the organic soil layer so that it may be reused in places where the topsoil has been stripped. S-106 Minimize the footprint occupied by the work. S-109 Install geotextile at the base of the fences at the time of installation.	Non-significant
38.	Construction	Soil stripping and land clearing	Soil and sediment quality	Piling contaminated soil could cause soil and sediment contamination under or near the piles.	Average	Permanent	Limited	Medium	NC 9.3.3.4	Non-significant
39.	Construction	Soil stripping and land clearing	Terrestrial vegetation	Loss of terrestrial and riparian vegetation due to soil stripping and land clearing in the new corridor.	Average	Permanent	Limited	Medium	CCDG 11.2.5, 11.2.6 and 11.2.7.1 NC 9.4.2 S-106 Minimize the footprint occupied by the work. S-107 Replant the footprint with native species of trees when safety permits.	Non-significant
40.	Construction	Excavation, earthwork	Ichthyofauna and habitats	Sediment runoff from work on the riverbank could disturb fish habitats downstream from the work especially in lentic flow zones (Types 2 and 4 in figure 73).	High	Temporary	Local	Major	MPO-4 to MPO-8, CCDG 10.4.3.1, 10.4.3.2.1, 10.4.3.2.2 and 10.4.3.2.3 NC 9.4.3.1	Non-significant
41.	Construction	Excavation, earthwork	Ichthyofauna and habitats	Excavation of contaminated backfill could cause contaminants to leach from and/or wash off contaminated riverbank sites. These could affect fish health.	High	Temporary	Regional	Major	CC-2 Abutments will be sited in compliance with MDDEFP's policy on the protection of riverbanks, coastlines and floodplains. Among other things, this will limit work in the contaminated sector of Montreal Island near the river. MPO-4 to MPO-8 NC 9.4.3 S-24 Initiate contaminant monitoring in aquatic environments during construction work (see section 9.8.2 for details).	Non-significant
42.	Construction	Excavation, earthwork	Infrastructure	The work may damage infrastructure, the road network in particular, used by the local and regional population.	Low	Temporary	Limited	Minor	CCDG 7.11 S-27 Use the corridor footprint as the principal access to the construction zones and limit, as far as possible, the movement of machinery to the work areas located within this corridor. S-28 The private partner must ensure that underground infrastructure is clearly identified in the plans and protected at the site.	Non-significant
43.	Construction	Excavation, earthwork	Wetlands	Excavation and earthwork will change the drainage pattern near wetlands and may result in a reduction of quality and possible losses.	Average	Permanent	Limited	Medium	MPO-8 CCDG 10.4.3.2.1, 10.4.3.2.2 and 10.4.3.2.3 Note: A compensation plan will be needed if the ecological functions of affected environments are modified.	Non-significant
44.	Construction	Excavation, earthwork	Commercial ship traffic	Possible loss of water-tightness in the seaway dike or in the pipe located beneath the dike.	High	Temporary	Regional	Major	S-18 Work is prohibited during periods when the seaway is open without a memorandum of understanding between TC, SLSMC and the private partner.	Non-significant

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NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
45.	Construction	Excavation, earthwork	Heritage and archeology	Excavation work may disturb archeological remains, particularly at the Le-Ber site (BiFj-1).	High	Permanent	Local	Major	In areas identified as being of potential archeological and historical interest: S-29 In the sensitive area of the Le Ber site, if soil is excavated to construct the infrastructure base, backfill should be mechanically stripped down to the level of the ancient soil, and then a checkerboard dig of the areas affected should be conducted. Ancient soils are found at a depth of approximately 1 m in this sector. Exploratory stripping should be carried out under archeological supervision. If soil is not excavated for the construction of the new infrastructure, a protective layer could be spread over the existing soil to seal the site. S-30 An archeological inventory survey will have to be conducted in the S-1 area of archeological potential. Should archeological remains be discovered, a site assessment will be made and a recommendation will be issued on the measures to be taken to either protect the site or conduct a dig. S-31 It is recommended that an archeologist be present at the site during excavation work in areas of archeological potential (see Appendix 3). S-113 Area C of the prehistoric archeological Site BiFj-49 where were found Aboriginal remains should be fenced outside the work areas.	Non-significant
46.	Construction	Excavation, earthwork	Air quality	During excavation work, exposed surfaces and piles of granular material could lead to airborne dust and affect air quality particularly in dry weather.	Low	Temporary	Limited	Minor	MPO-11 NC 9.4.3.1, 9.4.3.2 and 9.4.3.3 S-32 Excavated materials must be kept wet or covered with geotextile.	Non-significant
47.	Construction	Excavation, earthwork	Surface water quality	Water pumped from excavations could contaminate watercourses.	Low	Short-lived	Limited	Minor	PC-4 Pumped water must meet the criteria for discharge in natural environments for all contaminants. Monitoring must be increased in contaminated sectors (Island of Montreal). If these criteria are exceeded, pumped water must be treated and disposed of in an authorized location. MPO-16	Non-significant
48.	Construction	Excavation, earthwork	Surface water quality	Excavation work and earthwork will change the drainage pattern and may result in increased runoff and transfer of SS to watercourses. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species. Note: The *Migratory Birds Regulations* (MBR) prohibits the introduction of toxic substances into migratory bird habitats.	Low	Temporary	Limited	Minor	PC-3 The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations. If these concentrations are exceeded, additional mitigation measures must be implemented, such as: - Install a turbidity curtain; - Adjust working methods; - Identify and control sources of SS emissions. MPO-4 CCDG 10.4.3.2.1, 10.4.3.2.2 and 10.4.3.2.3 NC 9.4.3	Non-significant

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49.	Construction	Excavation, earthwork	Groundwater quality	Excavation of contaminated soil or sediment beneath the water table may result in groundwater contamination.	Average	Temporary	Limited	Medium	S-20 When dewatering excavations or confined areas, pump out water and discharge it in compliance with applicable federal, provincial and municipal regulations or call a specialized firm for pumping and final disposal. S-33 During excavation work, special attention must be paid to the presence of waste in the northern section of the Nuns' Island Bridge (Montreal) and, if necessary, such waste must be removed for disposal (e.g., empty barrels) to prevent it becoming a source of contamination. S-34 Groundwater must be monitored for signs of work-related contamination. Periodic sampling will be conducted both upstream and downstream from construction zones on the Island of Montreal.	Non-significant
50.	Construction	Excavation, earthwork	Soil and sediment quality	Excavation work could leave waste exposed, particularly for the north abutment of Nuns' Island Bridge and Highway 15.	Average	Temporary	Limited	Medium	S-33 During excavation work, special attention must be paid to the presence of waste in the northern section of the Nuns' Island Bridge (Montreal) and, if necessary, such waste must be removed for disposal (e.g., empty barrels) to prevent it becoming a source of contamination.	Non-significant
51.	Construction	Excavation, earthwork	Soil and sediment quality	Excavating and piling contaminated soil could cause contamination of soils and sediment under or near excavation zones and piles.	Average	Permanent	Limited	Medium	CC-3 The project's preliminary design must identify excavation locations so that these areas can be characterized and an environmental management plan for excavated materials can be developed. NC 9.3.3.4 S-35 Establish a contaminated soil management plan and ensure that contaminated soil is treated or disposed of in accordance with prevailing regulations. S-36 Contaminated soil must be piled on a waterproof surface and should be no higher than 2.5 m. The volume of each pile must not exceed100 m^3 and piles must be covered with a waterproof membrane.	Non-significant
52.	Construction	Excavation, earthwork	Air quality	Embankments on the Montreal shore may contain methane in concentrations that could be dangerous or explosive.	Average	Temporary	Limited	Medium	S-37 The potential presence of methane in the soil must be taken into consideration in the design of the future project structures (temporary and permanent). Situations likely to cause methane to accumulate in an area (including beneath ground-level infrastructure) or in an enclosed space where there is also an ignition source or in a space or premises even occasionally occupied by a worker or any other person must be avoided.	Non-significant
53.	Construction	Excavation, earthwork	Land and buildings	Possibility of damage to land neighbouring the construction footprint.	Low	Temporary	Limited	Minor	CCDG 7.11 S-38 Conduct an inspection before the start of construction of critical work likely to cause damage and adjust the working method accordingly.	Non-significant
54.	Construction	Construction of infrastructure	Recreational/tourist activities and recreational boating	Installation of decks and construction of bridge abutments could lead to partial or complete closure of bike paths under the new bridges and of accesses to some riverfront areas used for recreational / tourist activities (wading, windsurfing, hunting, etc.).	High	Temporary	Local	Major	S-1 Unless exceptional circumstances arise, maintain a cycling link between the South Shore and Montreal, including Nuns' Island, during the official opening periods. Cycling links will be re-established on both sides of Highway 15 when the work is finished. S-2 When possible, inform users of cycling links of safe detours and closure periods. As for recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services.	Non-significant

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55.	Construction	Construction of infrastructure	Special status wildlife and plant species	Peregrine falcon nesting on the Champlain Bridge could be disrupted during construction work.	High	Temporary	Local	Major	S-39 Manage, relocate and if necessary add falcon nesting boxes depending on the sectors of activity. Retain the services of an expert on birds of prey to advise the private partner and encourage coexistence between workers and this species.	Non-significant
56.	Construction	Construction of infrastructure	Recreational/tourist activities and recreational boating	Access to riverfront areas near the new bridge will be restricted, which will limit recreational / tourist activities when bridge structures are assembled.	Low	Temporary	Limited	Minor	S-1 Unless exceptional circumstances arise, maintain a cycling link between the South Shore and Montreal, including Nuns' Island, during the official opening periods. Cycling links will be re-established on both sides of Highway 15 when the work is finished. S-2 When possible, inform users of cycling links of safe detours and closure periods. As for recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services.	Non-significant
57.	Construction	Construction of infrastructure	Infrastructure	Soil compaction work producing vibrations could damage infrastructure (buildings and pipes).	Average	Temporary	Local	Medium	CCDG 11.4.4	Non-significant
58.	Construction	Construction of infrastructure	Commercial ship traffic	Installation of the bridge deck above the seaway could affect commercial navigation.	High	Temporary	Regional	Major	S-18 Work is prohibited during periods when the seaway is open without a memorandum of understanding between TC, SLSMC and the private partner.	Non-significant
59.	Construction	Construction of infrastructure	Heritage and archeology	Construction of the abutment on Nuns' Island and redevelopment of René-Lévesque Boulevard could encroach on the Le Ber archeological site (BiFj-1). Construction is not expected to have any impact on site BiFj-49 (prehistoric burial ground) as the project does not affect this sector.	High	Permanent	Local	Major	CC-4 Bridge design (components D1a and C) must minimize encroachment of permanent (abutment and boulevard) and temporary (detours) structures on the Le Ber archeological site (BiFj-1). S-26 Any discovery of archeological remains must immediately be communicated to MCCQ. The Mohawk community of Kahnawake will also be advised of any discovery of prehistoric or Aboriginal archeological remains. Work at the discovery site should stop until an archeologist from the Ministry has completed a qualitative and quantitative assessment. S-40 Archeological remains found on the site during construction must be sent to MCCQ. The Mohawk community of Kahnawake will be informed. S-41 If work is required to temporarily divert the boulevard; a protective layer could be spread over the existing soil to seal the site. S-113 Area C of the prehistoric archeological Site BiFj-49 where were found Aboriginal remains should be fenced outside the work areas.	Non-significant
60.	Construction	Work in aquatic environments	Avifauna and habitats	Work in water could disturb waterfowl which frequent the study area, particularly in the migratory bird sanctuary on Couvée Islands.	Average	Temporary	Local	Medium	S-3B Avoid carrying out potentially destructive or disruptive activities during sensitive periods and in sensitive locations in order to reduce the risk of affecting birds, their nests or eggs. If activities cannot be avoided, develop and implement appropriate preventive and mitigation measures to minimize the risk of bycatches and help maintain sustainable migratory bird populations. Bird nesting periods normally range from mid-April to mid-August in the study area. S-21 Work on and in the vicinity of the Couvée Islands migratory bird sanctuary must be performed in accordance with EC requirements. S-108 Special attention will be paid to protecting common tern breeding sites (small rocky islets near Nuns' Island) by establishing a buffer exclusion zone.	Non-significant

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61.	Construction	Work in aquatic environments	Special status wildlife and plant species	Installation of temporary structures, such as cofferdams and jetties, for the construction of piers could affect potential habitats of special status fish (see Table 72 for details) and aquatic plant communities used as habitats, feeding grounds and shelter for certain special status migratory birds.	Average	Temporary	Local	Medium	CC-5 Pier design should seek to avoid type 22 zones near the shores of Nuns' Island. MPO-1 to MPO-5, MPO-10, and MPO-14 to MPO-21 S-3B Avoid carrying out potentially destructive or disruptive activities during sensitive periods and in sensitive locations in order to reduce the risk of affecting birds, their nests or eggs. If activities cannot be avoided, develop and implement appropriate preventive and mitigation measures to minimize the risk of bycatches and help maintain sustainable migratory bird populations. Bird nesting periods normally range from mid-April to mid-August in the study area.	Non-significant
62.	Construction	Work in aquatic environments	Special status wildlife and plant species	Construction of piers could affect the habitat of the Laurentian water-horehound on the Nuns' Island side.	High	Permanent	Limited	Major	S-22 Signpost areas where special status plant species are present and prohibit access during construction work. S-23 Prior to the start of work, transplant species that could be affected by the work to an area that will remain undisturbed.	Non-significant
63.	Construction	Work in aquatic environments	Hydrology and hydraulics	Construction of piers will change hydraulic conditions, mainly in the Greater La Prairie Basin.	Low	Permanent	Local	Medium	CC-6 Following or during the structural design stage (but before start of construction work), conduct flow and ice regime modeling in order to predict potential effects. Additional measures may be required. Changes to flow conditions should not significantly affect flow patterns and velocities in the principal fish migration routes (Greater La Prairie Basin and the Nuns' Island channel). S-110 Temporary project structures must not modify the ice regime in such a way as to cause flooding.	Non-significant
64.	Construction	Work in aquatic environments	Ichthyofauna and habitats	Sediment resuspension could disturb fish habitats downstream from the work, particularly in the Lesser La Prairie Basin and Nuns' Island channel.	High	Temporary	Regional	Major	MPO-1 to MPO-5, MPO-10 and MPO-16	Non-significant
65.	Construction	Work in aquatic environments	Ichthyofauna and habitats	The construction of the piers and wharf will alter the fish habitat by changing flow velocities.	Average	Temporary	Local	Medium	CC-6 Following or during the structural design stage (but before start of construction work), conduct flow and ice regime modeling in order to predict potential effects. Additional measures may be required. Changes to flow conditions should not significantly affect flow patterns and velocities in the principal fish migration routes (Greater La Prairie Basin and the Nuns' Island channel). MPO-1 to MPO-3 and MPO-10	Non-significant
66.	Construction	Work in aquatic environments	Ichthyofauna and habitats	Work in water could disturb the tranquility of the fish habitat during spawning and migration periods.	Average	Temporary	Regional	Major	MPO-1 to MPO-3 and MPO-10	Non-significant
67.	Construction	Work in aquatic environments	Ichthyofauna and habitats	Work causing vibrations in water could disturb fish and possibly result in deaths due to blasting.	Average	Temporary	Local	Medium	MPO-1 to MPO-3 S-42 Comply with DFO standards (1998) for the use of explosives near or in aquatic environments. S-43 If it is not possible to comply with DFO requirements regarding explosives, authorization to destroy fish by means other than fishing must be obtained from DFO. (At present, no information is available on the explosives and charges required).	Non-significant

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68.	Construction	Work in aquatic environments	Ichthyofauna and habitats	Construction of piers and a possible wharf could lead to a temporary deterioration or disturbance of fish habitat (estimate based on the scenario with the greatest encroachment: 12,050 m^2 and 34,200m^2).	Average	Temporary	Local	Medium	MPO-1 to MPO-3, MPO-10 and MPO-13	Non-significant
69.	Construction	Work in aquatic environments	Commercial ship traffic	Construction of footings, foundations and piers on the seaway dike could affect commercial shipping.	High	Temporary	Regional	Major	S-18 Work is prohibited during periods when the seaway is open without a memorandum of understanding between TC, SLSMC and the private partner. S-44 Negotiate and sign a lease with SLSMC to occupy the space required for the work.	Non-significant
70.	Construction	Work in aquatic environments	Surface water quality	Potential increase in SS concentrations in surface water caused by sediment disturbance in the La Prairie basins. Potential increase concentrations of organic and inorganic contaminants in surface water caused by sediment disturbance in the Lesser and Greater La Prairie Basins. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Average	Temporary	Local	Medium	PC-3 The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations. If these concentrations are exceeded, additional mitigation measures must be implemented, such as: - Install a turbidity curtain; - Adjust working methods; - Identify and control sources of SS emissions. MPO-4 to MPO-8 S-20 When dewatering excavations or confined areas, pump out water and discharge it in compliance with applicable federal, provincial and municipal regulations or call a specialized firm for pumping and final disposal.	Non-significant
71.	Construction	Work in aquatic environments	Surface water quality	Work on Highway 15 could degrade water quality in the Aqueduct Canal.	High	Temporary	Regional	Major	S-45 Isolate water affected by work in the littoral sector of the Aqueduct Canal from raw water needed to supply the filtration plant by a method that minimizes sediment suspension from the canal bed. S-46 The private partner must ensure that no contamination reaches the property of the Aqueduct Canal whether via storm sewers, contaminated soil, leachate from contaminated soil or any other form of contamination. S-47 If work is required near the Aqueduct Canal; this work must be performed within a contained enclosure in order to prevent suspended solids from spreading into the air and water. S-48 Access to the banks of the Aqueduct Canal will be prohibited. S-49 If barges are used on the Aqueduct Canal, the following measures are required: - No combustion engine may be used in the waters of the canal - Launching ramps are prohibited. Barges must be raised by crane. S-50 All work on or near the Aqueduct Canal must be approved by the City of Montreal. Additional measures may be identified at a later date. S-51 Debris is to be recovered by means of a tarpaulin stretched under the work area and removed as soon as possible.	
72.	Construction	Work in aquatic environments	Surface water quality	Residue and waste could be discarded in surface water and affect water quality.	Average	Short	Local	Minor	MPO-5, MPO-25 S-51 Debris is to be recovered by means of a tarpaulin stretched under the work area and removed as soon as possible.	Non-significant

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NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
73.	Construction	Work in aquatic environments	Soil and sediment quality	Work in water for pier construction for the seaway crossing (D2) and the new Nuns' Island bridge (B) could lead to remobilization of contaminated sediments.	High	Temporary	Local	Major	MPO-3, MPO-10 and MPO-11 S-20 When dewatering excavations or confined areas, pump out water and discharge it in compliance with applicable federal, provincial and municipal regulations or call a specialized firm for pumping and final disposal. S-53 Establish a working method that limits resuspension of contaminated sediment (e.g., excavation performed within a coffer-dam or protective curtain). S-54 Immediately remove to an approved site excavated sediment with a contaminant concentration in excess of established criteria. S-55 Excavated sediment that cannot be removed must be immediately placed for temporary storage on a waterproof surface and covered for protection from the elements (e.g., sediment from uncharacterized piers). S-56 Temporary structures in watercourses must be stabilized for protection against erosion with, for example, a geotextile membrane or riprap. Furthermore, these structures must be designed to withstand flooding (and ice loading) which may occur during construction.	Non-significant
74.	Construction	Work in aquatic environments	Aquatic vegetation	Pier construction could destroy aquatic vegetation, including aquatic plant communities serving as fish and bird habitats.	Average	Permanent	Limited	Medium	MPO-1 S-3B Avoid carrying out potentially destructive or disruptive activities during sensitive periods and in sensitive locations in order to reduce the risk of affecting birds, their nests or eggs. If activities cannot be avoided, develop and implement appropriate preventive and mitigation measures to minimize the risk of bycatches and help maintain sustainable migratory bird populations. Bird nesting periods normally range from mid-April to mid-August in the study area.	Non-significant
75.	Construction	Management of waste and hazardous materials	Air quality	Poor management of volatile waste could lead to the release of contaminants into the atmosphere.	Average	Temporary	Limited	Minor	S-57 Fires and waste burning on or near the construction site are prohibited at all times. CCDG 11.4.7.2.1 and 11.4.7.3.1	Non-significant
76.	Construction	Management of waste and hazardous materials	Surface water quality	Accidental release of oil, other hazardous materials or waste into the St. Lawrence River could affect surface water quality. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Average	Short	Limited	Minor	CCDG 7.11 and 10.4.3.1 S-9 Maintain transportation vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous emissions and noise. S-58 No isolated machinery or gas-powered equipment is to remain on a coffer-dam, a jetty or in the 60-metre riparian strip along watercourses and lakes during the closing hours of the site. If it is not possible to meet this requirement, adapted environmental measures must be applied (monitoring, etc.). S-59 Do not accumulate construction site waste within 30 m of a body of water or within 60 m if the waste contains or could contain contaminants.	Non-significant
77.	Construction	Management of waste and hazardous materials	Groundwater quality	Temporary storage and disposal at unauthorized sites could adversely affect groundwater quality.	Average	Temporary	Limited	Medium	CCDG 7.11, 10.4.3.2.2 and 11.4.7.2.1 NC 9.3.3.1 to 9.3.3.4 S-59 Do not accumulate construction site waste within 30 m of a body of water or within 60 m if the waste contains or could contain contaminants. S-60 The operations site must be free of waste at all times including empty containers of any kind unless they are stored in a sealed repository designed for this purpose.	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
78.	Construction	Management of waste and hazardous materials	Soil and sediment quality	Temporary storage and disposal at unauthorized sites could adversely affect soil quality in that location.	Average	Permanent	Limited	Medium	CCDG 7.11 and 11.4.7.2.1 NC 9.3.3.1 to 9.3.3.4 S-60 The operations site must be free of waste at all times including empty containers of any kind unless they are stored in a sealed repository designed for this purpose. S-59 Do not accumulate construction site waste within 30 m of a body of water or within 60 m if the waste contains or could contain contaminants.	Non-significant
79.	Construction	Transportation, operation and maintenance of machinery	Sound environment	Movement of vehicles and machinery will increase noise levels near the worksite.	High	Temporary	Limited	Major	PC-1 Noise levels associated with site mobilization activities must not exceed the following thresholds: $L_{10\%}$ = 75 dbA during daytime; ambient noise +5 dbA during evening and night (measured at 5 m from sensitive areas). Where these thresholds cannot be met, mitigation measures must be implemented, such as: - NC 9.9.3.1 - NC 9.9.3.2 - NC 9.9.3.3. S-4 Where feasible, permanent noise barriers will be built before the start of work. S-98 If possible, the noisiest activities (concrete crushing, heavy truck traffic, etc.) will not be located near noise-sensitive areas. S-99 Barring unusual circumstances, work between 7:00 a.m. and 7:00 p.m. from Monday to Sunday shall not exceed 75 dBA or the ambient noise level without the work plus 5 dBA, and work between 7:01 p.m. and 6:59 a.m. shall not exceed the ambient noise level without the work plus 5 dBA. Also, unless exceptional reasons occur, particularly noisy work will be scheduled during the day in order to avoid, as much as possible, disturbing those residing near the worksite.	Non-significant
80.	Construction	Transportation, operation and maintenance of machinery	Ichthyofauna and habitats	Accidental spills of oil or other products could harm fish and fish habitats.	Average	Short	Local	Medium	CCDG 10.4.2 NC 9.3.2 S-61 In the event of a spill in an aquatic environment, the emergency response plan will be implemented. This plan includes: - Prompt notification of Environment Canada (1-866-283-2333) and MDDEP (1-866-694-5454) early warning networks, SLSMC's emergency response and shipping management teams as well as the Mohawk community of Kahnawake; - Notification of municipalities downstream with water intakes that could be affected by the spill; - Elimination of the source of the spill; - Implementation of environmental protection measures (absorbent berms); - Clean-up of the affected area. S-9 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log.	Non-significant
81.	Construction	Transportation, operation and maintenance of machinery	Infrastructure	Traffic associated with work on Nuns' Island will increase traffic congestion on the local network.	Average	Temporary	Local	Medium	S-62 The private partner must establish an alternate transportation system and organize parking near the worksite restricting access to the local network. S-102 Transport Canada and the private partner will work together to prepare a plan for trucking routes.	Non-significant

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NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
82.	Construction	Transportation, operation and maintenance of machinery	Infrastructure	Transportation could damage and dirty surrounding roads during construction.	Low	Temporary	Limited	Minor	S-27 Use the corridor footprint as the principal access to the construction zones and limit, as far as possible, the movement of machinery to the work areas located within this corridor. S-8 When working in urban areas, remove loose material and other debris on a daily basis from streets used by vehicles and machinery. CCDG 7.11	Non-significant
83.	Construction	Transportation, operation and maintenance of machinery	Air quality	Movement of vehicles and machinery on temporary roads could generate dust on and near the worksite.	Average	Temporary	Local	Medium	CCDG 12.4 S-63 Use adequate signage and impose appropriate maximum speeds to reduce dust emissions on access roads and work surfaces. S-8 When working in urban areas, remove loose material and other debris from streets used by vehicles and machinery. S-64 Place tarpaulins on trucks. S-65 Avoid transporting materials through residential neighbourhoods.	Non-significant
84.	Construction	Transportation, operation and maintenance of machinery	Air quality	Movement of vehicles and machinery on temporary roads will produce particulate emissions and airborne contaminants.	Average	Temporary	Local	Medium	S-9 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-64 Place tarpaulins on trucks. S-65 Avoid transporting materials through residential neighbourhoods S-66 GHG emissions generated by machinery during the work will be offset to make this site condition "carbon neutral". During the construction phase, annual emissions will be calculated based on the number of kilometres travelled by the machinery and transportation of materials and excavations. Compensation may take the form of buying carbon credits or of carrying out independent projects. S-11 Ensure that catalytic converters on all vehicles are in proper working order throughout the construction period. S-104 Ensure that the pollution abatement systems on vehicles and equipment are operational and meet the regulatory requirements for air quality.	Non-significant
85.	Construction	Transportation, operation and maintenance of machinery	Air quality	Lighting needed for the work will cause light pollution along the worksites	Average	Temporary	Local	Medium	S-111 Site lighting will be aimed at the work areas and avoid intrusive light outside the worksite.	

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86.	Construction	Transportation, operation and maintenance of machinery	Surface water quality	Leaks from machinery used near or on water could contaminate surface water. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Average	Temporary	Local	Medium	CCDG 10.4.2 S-9 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-61 In the event of a spill in an aquatic environment, the emergency response plan will be implemented. This plan includes: - Prompt notification of Environment Canada (1-866-283-2333) and MDDEP (1-866-694-5454) early warning networks, SLSMC's emergency response and shipping management teams as well as the Mohawk community of Kahnawake; - Notification of municipalities downstream with water intakes that could be affected by the spill; - Elimination of the source of the spill; - Implementation of environmental protection measures (absorbent berms); - Clean-up of the affected area. S-67 Before the start of work, develop and implement spill response procedures. S-68 Use vegetable oil in machinery that will be used for long periods on or near water.	Non-significant
87.	Construction	Transportation, operation and maintenance of machinery	Groundwater quality	During transportation of construction materials, accidental oil or fuel spills could affect groundwater quality.	Average	Temporary	Limited	Medium	CCDG 10.4.2 S-9 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-61 In the event of a spill in an aquatic environment, the emergency response plan will be implemented. This plan includes: - Prompt notification of Environment Canada (1-866-283-2333) and MDDEP (1-866-694-5454) early warning networks, SLSMC's emergency response and shipping management teams as well as the Mohawk community of Kahnawake; - Notification of municipalities downstream with water intakes that could be affected by the spill; - Elimination of the source of the spill; - Implementation of environmental protection measures (absorbent berms); - Clean-up of the affected area. S-67 Before the start of work, develop and implement spill response procedures.	Non-significant
88.	Construction	Transportation, operation and maintenance of machinery	Soil and sediment quality	Truck traffic from contaminated areas could lead to contamination of soil adjacent to the worksite. Accidental spills could occur during on-site machinery maintenance.	Average	Permanent	Local	Major	NC 9.3.2 S-69 When contamination levels exceed criterion B of the *Quebec Soil Protection and Contaminated Sites Rehabilitation Policy*, all trucks leaving the worksite must pass through a vehicle wheel-washing facility. These areas will be determined at a later stage (Environmental Site Assessment phases II and III).	Non-significant

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89.	Construction	Transportation, operation and maintenance of machinery	Soil and sediment quality	During transportation (by land or water) of construction material, accidental oil or fuel spills could affect soil quality at the worksite and sediment in the river.	Low	Permanent	Limited	Medium	CCDG 10.4.2 S-9 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-67 Before the start of work, develop and implement spill response procedures.	Non-significant
90.	Post-construction	Demobilization of worksite and dismantling of temporary facilities	Surface water quality	Site remediation could result in resuspension of sediment and affect water quality. The areas most at risk are located along the St. Lawrence River. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Low	Temporary	Local	Minor	PC-3 The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations. If these concentrations are exceeded, additional mitigation measures must be implemented, such as: - Install a turbidity curtain; - Adjust working methods; - Identify and control sources of SS emissions. MPO-9 to MPO-13 CCDG 10.4.3.3, 10.4.3.2.1, and 10.4.3.2.2 NC 9.4.3.3 S-105 Where possible, restore demobilized areas to their natural state using native species and a natural slope. Where it is not possible to restore an area to its natural state, the demobilized area must be restored to a state equivalent to its state before the work began.	Non-significant
91.	Post-construction	Demobilization of worksite and dismantling of temporary facilities	Groundwater quality	Soil from contaminated sites could affect groundwater quality.	Low	Temporary	Limited	Medium	CCDG 7.11 NC 9.3.3.4 S-70 In the event of a spill on land, the emergency response plan will be implemented. This plan includes: - Prompt notification of Environment Canada (1-866-283-2333) MDDEP (1-866-694-5454) early warning networks as well as SLSMC's emergency response team; - Elimination of the source of the spill; - Implementation of environmental protection measures (absorbent material); - Clean-up of the affected area. - Disposal of contaminated soil.	Non-significant
92.	Post-construction	Demobilization of worksite and dismantling of temporary facilities	Soil and sediment quality	Contaminants on the site could degrade soil quality.	Low	Permanent	Limited	Medium	CCDG 7.11 S-70 In the event of a spill on land, the emergency response plan will be implemented. This plan includes: - Prompt notification of Environment Canada (1-866-283-2333) MDDEP (1-866-694-5454) early warning networks as well as SLSMC's emergency response team; - Elimination of the source of the spill; - Implementation of environmental protection measures (absorbent material); - Clean-up of the affected area. - Disposal of contaminated soil.	Non-significant

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93.	Post-construction	Deconstruction of structures	Recreational/tourist activities and recreational boating	Bike path corridors and some riverfront areas used for recreational / tourist activities (wading, windsurfing, hunting, etc.) used for some deconstruction activities.	High	Temporary	Local	Major	S-2 When possible, inform users of cycling links of safe detours and closure periods. As for recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services.	Non-significant
94.	Post-construction	Deconstruction of structures	Aesthetic and visual aspects	The view towards Champlain Bridge and its structure will change.	Average	Permanent	Regional	Major	The view of the New Bridge for the St. Lawrence will remain substantially unchanged.	Non-significant
95.	Post-construction	Deconstruction of structures	Avifauna and habitats	Bird habitats, especially cliff swallow habitats, on the bridge structure will be disrupted and destroyed during deconstruction work.	High	Permanent	Limited	Major	S-3B Avoid carrying out potentially destructive or disruptive activities during sensitive periods and in sensitive locations in order to reduce the risk of affecting birds, their nests or eggs. If activities cannot be avoided, develop and implement appropriate preventive and mitigation measures to minimize the risk of bycatches and help maintain sustainable migratory bird populations. Bird nesting periods normally range from mid-April to mid-August in the study area.	Non-significant
96.	Post-construction	Deconstruction of structures	Special status wildlife and plant species	Deconstruction of Champlain Bridge will affect peregrine falcon nesting boxes and could affect the rough water-horehound habitat on the banks of the South Shore and the brown snake habitat on Montreal Island, Nuns' Island and the seaway dike.	High	Permanent	Limited	Major	S-6 At the end of summer and before the start of work, capture brown snakes on the exclosure and relocate them in suitable habitats outside the site. Relocation should be discussed with the appropriate authorities (MDDEFP). S-23 Prior to the start of work, transplant species that could be affected by the work to an area that will remain undisturbed (rough water-horehound). S-71 Check for peregrine falcon nesting on the bridge before the start of work. If there are nesting birds, organize a 250-metre exclusion zone around the nest until the end of the nesting period, or approx. 75 days after egg-laying. S-72 Work with Environment Canada's peregrine falcon restoration team to develop a suitable approach for installing nesting boxes. As early as possible before demolition of the bridge, move the existing nesting boxes and install new artificial ones for peregrine falcons at a suitable nearby site in order to limit potential conflicts between maintenance and repair work and falcon nesting.	Non-significant
97.	Post-construction	Deconstruction of structures	Herpetofauna and habitats	Herpetofauna habitats beneath the bridges will be disturbed and destroyed during deconstruction work.	Average	Permanent	Limited	Medium	CCDG 7.11 S-7 As far as possible, avoid work in wetlands suitable for herpetofauna (Nuns' Island Bridge and Seaway Dike) or minimize work in these environments. S-52 Restoration will include the creation of hibernacula for herpetofauna.	Non-significant
98.	Post-construction	Deconstruction of structures	Ichthyofauna and habitats	Deconstruction of the Champlain and Nuns' Island bridges may generate waste that could affect the fish habitat.	Average	Permanent	Local	Major	MPO 1, MPO-25	Non-significant
99.	Post-construction	Deconstruction of structures	Infrastructure	The deconstruction of the bridges will require temporary lane closures or detours (René-Lévesque Boul., Route 132 and ramps).	Low	Temporary	Regional	Medium	CCDG 10.3.1 and 10.3.4.3 S-16 The public will be informed of the work and the detours provided. Alternate routes will be proposed. S-17 At least one, preferably two, accesses to Nuns' Island local network will be maintained at all times on the local road and highway network.	Non-significant
100.	Post-construction	Deconstruction of structures	Commercial ship traffic	Removal of the bridge deck over the seaway could affect commercial navigation at this location.	High	Temporary	Local	Major	S-18 Work is prohibited during periods when the seaway is open without a memorandum of understanding between TC, SLSMC and the private partner. S-73 Observe the current provisions of SLSMC's land use lease.	Non-significant

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101.	Post-construction	Deconstruction of structures	Air quality	Deconstruction work may produce a short-term degradation of air quality due to fugitive dust, some of which may contain contaminants.	Average	Temporary	Local	Medium	PC-2 Do not exceed a threshold of 30 µg/m³ for fine airborne particulate matter less than 2.5 microns in diameter over a 24 hr. average (PM 2.5 24 hr. average) and an average concentration of total particulate matter over 24 hr. of 120 µg/m3 at 50 m from the footprint. Where these thresholds cannot be met, mitigation measures must be implemented, for example: - Use equipment fitted with dust collection systems, when available. - Install tarpaulins around work that generates dust. - Cover piled materials with geotextile - Encourage the use of wet-spray dust control equipment.	Non-significant
102.	Post-construction	Deconstruction of structures	Surface water quality	Debris and cutting slurry from dismantling the deck may be end up in the river and affect surface water quality in this area. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Average	Temporary	Local	Medium	PC-3 The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations. If these concentrations are exceeded, additional mitigation measures must be implemented, such as: - Install a turbidity curtain; - Adjust working methods; - Identify and control sources of SS emissions. MPO-4 to MPO-5, MPO-14 to MPO-18, MPO-25	Non-significant
103.	Post-construction	Deconstruction of structures	Surface water quality	The presence of lead in the structure could contaminate surface water.	Average	Temporary	Local	Medium	MPO-25	Non-significant
104.	Post-construction	Work in aquatic environments	Recreational/tourist activities and recreational boating	Remnants of the Champlain Bridge piers could pose a risk for recreational boating.	Average	Permanent	Limited	Medium	S-74 Keep boaters informed through notices to shipping, and once the work of removing existing bridge piers is completed carry out a bathymetric survey of these locations. S-75 Restore the bed of the watercourse to its original condition. In exceptional cases, piers must be reduced to at least 2 m below the low-water level; reference zero on the nautical chart (ZC).	Non-significant
105.	Post-construction	Work in aquatic environments	Recreational/tourist activities and recreational boating	Temporary disturbance of recreational boating lanes during work in water.	Average	Temporary	Local	Medium	S-2 When possible, inform users of cycling links of safe detours and closure periods. As for recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services.	Non-significant
106.	Post-construction	Work in aquatic environments	Avifauna and habitats	Work in water could disturb waterfowl which frequent the study area, particularly in the migratory bird sanctuary on Couvée Islands.	Average	Temporary	Local	Medium	In the Couvée Islands sector: S-3B Avoid carrying out potentially destructive or disruptive activities during sensitive periods and in sensitive locations in order to reduce the risk of affecting birds, their nests or eggs. If activities cannot be avoided, develop and implement appropriate preventive and mitigation measures to minimize the risk of bycatches and help maintain sustainable migratory bird populations. Bird nesting periods normally range from mid-April to mid-August in the study area. S-21 Work on and in the vicinity of the Couvée Islands migratory bird sanctuary must be performed in accordance with EC requirements.	Non-significant

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107.	Post-construction	Work in aquatic environments	Special status wildlife and plant species	Installation of temporary structures, such as cofferdams and jetties, for the deconstruction of piers could affect potential habitats of special status fish (see Table 72 for details) and aquatic plant communities used as habitats, feeding grounds and shelter for certain special status migratory birds.	Average	Permanent	Limited	Medium	MPO-1 to MPO-5 and MPO-10 S-3B Avoid carrying out potentially destructive or disruptive activities during sensitive periods and in sensitive locations in order to reduce the risk of affecting birds, their nests or eggs. If activities cannot be avoided, develop and implement appropriate preventive and mitigation measures to minimize the risk of bycatches and help maintain sustainable migratory bird populations. Bird nesting periods normally range from mid-April to mid-August in the study area.	Non-significant
108.	Post-construction	Work in aquatic environments	Ichthyofauna and habitats	Work causing vibrations in water could disturb fish and possibly result in deaths due to blasting.	Average	Temporary	Local	Medium	MPO-1 to MPO-5 and MPO-10 S-42 Comply with DFO standards (1998) for the use of explosives near or in aquatic environments. S-43 If it is not possible to comply with MPO requirements regarding explosives, authorization to destroy fish by means other than fishing must be obtained from the MPO.	Non-significant
109.	Post-construction	Work in aquatic environments	Ichthyofauna and habitats	Work in water could disturb fish, especially during spawning and migration periods.	Average	Temporary	Regional	Major	MPO-1, MPO-10 and MPO-25	Non-significant
110.	Post-construction	Work in aquatic environments	Surface water quality	Dismantling the existing bridge piers and removing temporary structures may cause sediment resuspension and the release of debris into the river affecting water quality.	Average	Temporary	Local	Medium	PC-3 The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations. If these concentrations are exceeded, additional mitigation measures must be implemented, such as: - Install a turbidity curtain; - Adjust working methods; - Identify and control sources of SS emissions. MPO-4 to MPO-5, MPO-14 to MPO-18	Non-significant
111.	Post-construction	Work in aquatic environments	Surface water quality	Underwater cutting of existing bridge piers could produce cutting slurry that would end up in the river and affect water quality. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Average	Short	Local	Medium	PC-3 The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations. If these concentrations are exceeded, additional mitigation measures must be implemented, such as: - Install a turbidity curtain; - Adjust working methods; - Identify and control sources of SS emissions. MPO-4 to MPO-5, MPO-14 to MPO-18	Non-significant
112.	Post-construction	Work in aquatic environments	Groundwater quality	If excavations must be performed to remove footings and foundations on floodplains and on the dike, excavation of contaminated soil or sediment below the water level could contaminate groundwater.	Average	Temporary	Limited	Medium	S-20 When dewatering excavations or confined areas, pump out water and discharge it in compliance with applicable federal, provincial and municipal regulations or call a specialized firm for pumping and final disposal.	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
113.	Post-construction	Work in aquatic environments	Soil and sediment quality	Work in water could involve excavation of contaminated sediment, which the private partner will need to manage.	Average	Short	Local	Medium	MPO-3, MPO-10 and MPO-11 S-20 When dewatering excavations or confined areas, pump out water and discharge it in compliance with applicable federal, provincial and municipal regulations or call a specialized firm for pumping and final disposal. S-53 Establish a working method that limits resuspension of contaminated sediment (e.g., excavation performed within a coffer-dam or protective curtain). S-54 Immediately remove to an approved site excavated sediment with a contaminant concentration in excess of established criteria. S-55 Excavated sediment that cannot be removed must be immediately placed for temporary storage on a waterproof surface and covered for protection from the elements (e.g., sediment from uncharacterized piers)). S-56 Temporary structures in watercourses must be stabilized for protection against erosion with, for example, a geotextile membrane or riprap. Furthermore, these structures must be designed to withstand flooding (and ice loading) which may occur during construction.	Non-significant
114.	Post-construction	Work in aquatic environments	Soil and sediment quality	Work in water, on the dike and in floodplains to dismantle footings and foundations could cause dispersion of contaminated sediment.	High	Temporary	Local	Major	S-20 When dewatering excavations or confined areas, pump out water and discharge it in compliance with applicable federal, provincial and municipal regulations or call a specialized firm for pumping and final disposal. S-76 Perform work in water in an enclosed, dry area.	Non-significant
115.	Post-construction	Work in aquatic environments	Aquatic vegetation	Aquatic vegetation attached to piers will be destroyed.	Average	Permanent	Limited	Medium	S-77 Ensure that there are no migratory bird nests or habitats of at-risk species in these locations. Should this be the case, act in compliance with prevailing laws and regulations. S-78 During restoration of abandoned sections, promote renaturalization with a suitable substrate to foster the growth of natural vegetation. Where natural recovery is not possible, native species will be planted or seeded.	Non-significant
116.	Post-construction	Transportation, operation and maintenance of machinery	Recreational/tourist activities and recreational boating	River transportation of construction materials could affect the movement of recreational boats.	Average	Temporary	Local	Medium	S-2 When possible, inform users of cycling links of safe detours and closure periods. As for recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services. S-96 Marine equipment used to carry out the work and the personnel working aboard such equipment must comply with the provisions of the *Canada Shipping Act, 2001* (2001, c. 26) and its Regulations. S-97 Contact CCG at 1-800-463-4393 or cell phone *16 to report any marine emergency.	Non-significant
117.	Post-construction	Transportation, operation and maintenance of machinery	Sound environment	Movement of vehicles and machinery will increase noise levels near the worksite.	Average	Temporary	Limited	Medium	PC-1 Noise levels associated with site mobilization activities must not exceed the following thresholds: $L_{10\%}$ = 75 dbA during daytime; ambient noise +5 dbA during evening and night (measured at 5 m from sensitive areas). Where these thresholds cannot be met, mitigation measures must be implemented, such as: - NC 9.9.3.1 - NC 9.9.3.2 - NC 9.9.3.3.	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
118.	Post-construction	Transportation, operation and maintenance of machinery	Air quality	Transporting debris by truck on the roads releases airborne contaminants.	Average	Temporary	Regional	Medium	S-64 Place tarpaulins on trucks. S-65 Avoid transporting materials through residential neighbourhoods.	Non-significant
119.	Post-construction	Transportation, operation and maintenance of machinery	Air quality	Movement of vehicles and machinery on temporary roads could generate dust on and near the worksite.	Average	Temporary	Local	Medium	CCDG 12.4 S-8 During the entire duration of work in urban areas, remove loose material and other debris on a daily basis from streets used by vehicles and machinery. S-63 Use adequate signage and impose appropriate maximum speeds to reduce dust emissions on access roads and work surfaces.	Non-significant
120.	Post-construction	Transportation, operation and maintenance of machinery	Air quality	Movement of vehicles and machinery on temporary roads will produce particulate emissions and airborne contaminants.	Average	Temporary	Local	Medium	CCDG 12.4 S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-9 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-11 Ensure that catalytic converters on all vehicles are in proper working order throughout the construction period. S-12 Ensure that contractors and sub-contractors are made aware of environmental concerns including air quality.	Non-significant
121.	Post-construction	Management of waste and hazardous materials	Air quality	Debris containing asbestos and lead may be found during bridge and building (former toll booth) deconstruction.	Average	Temporary	Local	Medium	S-79 When developing deconstruction plans and specifications, materials characterizations must be conducted to identify and quantify those areas containing asbestos, lead or any other contaminant. Should these substances be detected, actions must be determined to deal with this situation.	Non-significant
122.	Post-construction	Transportation, operation and maintenance of machinery	Surface water quality	Using barges and other equipment on water could affect water quality. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Low	Permanent	Local	Medium	CCDG 7.11, 10.4.2 and 10.4.3.1 S-9 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-58 No isolated machinery or gas-powered equipment is to remain on a coffer-dam, a jetty or in the 60-metre riparian strip along watercourses and lakes during the closing hours of the site. If it is not possible to meet this requirement, adapted environmental measures must be applied (monitoring, etc.). S-67 Before the start of work, develop and implement spill response procedures. S-68 Use vegetable oil in machinery that will be used for long periods on or near water.	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
123.	Post-construction	Transportation, operation and maintenance of machinery	Groundwater quality	During transportation of construction materials, accidental oil or fuel spills could affect groundwater quality.	Average	Temporary	Local	Medium	S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-58 No isolated machinery or gas-powered equipment is to remain on a coffer-dam, a jetty or in the 60-metre riparian strip along watercourses and lakes during the closing hours of the site. If it is not possible to meet this requirement, adapted environmental measures must be applied (monitoring, etc.). S-49 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-53 Before the start of work, develop and implement spill response procedures. CCDG 7.11, 10.4.2 and 10.4.3.1	Non-significant
124.	Post-construction	Transportation, operation and maintenance of machinery	Soil and sediment quality	During transportation (by land or water) of construction material, accidental oil or fuel spills could affect soil quality at the worksite and sediment in the river.	Average	Temporary	Limited	Medium	CCDG 7.11, 10.4.2 and 10.4.3.1 S-9 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-58 No isolated machinery or gas-powered equipment is to remain on a coffer-dam, a jetty or in the 60-metre riparian strip along watercourses and lakes during the closing hours of the site. If it is not possible to meet this requirement, adapted environmental measures must be applied (monitoring, etc.). S-67 Before the start of work, develop and implement spill response procedures. S-80 When critical work is being performed, personnel qualified to use the emergency kits will be permanently on site.	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
125.	Post-construction	Transportation, operation and maintenance of machinery	Surface water quality	Leaks from machinery and vehicles, especially equipment used for work in water, could contaminate surface water. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Average	Temporary	Limited	Medium	CCDG 7.11, 10.4.2 and 10.4.3.1 S-9 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-58 No isolated machinery or gas-powered equipment is to remain on a coffer-dam, a jetty or in the 60-metre riparian strip along watercourses and lakes during the closing hours of the site. If it is not possible to meet this requirement, adapted environmental measures must be applied (monitoring, etc.). S-61 In the event of a spill in an aquatic environment, the emergency response plan will be implemented. This plan includes: - Prompt notification of Environment Canada (1-866-283-2333) and MDDEP (1-866-694-5454) early warning networks, SLSMC's emergency response and shipping management teams as well as the Mohawk community of Kahnawake; - Notification of municipalities downstream with water intakes that could be affected by the spill; - Elimination of the source of the spill; - Implementation of environmental protection measures (absorbent berms); - Clean-up of the affected area. S-67 Before the start of work, develop and implement spill response procedures.	Non-significant
126.	Post-construction	Management of waste and hazardous materials	Surface water quality	Accidental discharges of oil, other hazardous products or waste into watercourses could affect surface water quality. A change in water quality may degrade habitats of fish, migratory birds and fauna as well as special status species.	Low	Permanent	Limited	Medium	CCDG 7.11, 10.4.2 and 10.4.3.1 S-10 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-58 No isolated machinery or gas-powered equipment is to remain on a coffer-dam, a jetty or in the 60-metre riparian strip along watercourses and lakes during the closing hours of the site. If it is not possible to meet this requirement, adapted environmental measures must be applied (monitoring, etc.). S-59 Do not accumulate construction site waste within 30 m of a body of water or within 60 m if the waste contains or could contain contaminants. S-67 Before the start of work, develop and implement spill response procedures. S-81 Asphalt debris must not be reused in aquatic environments.	Non-significant
127.	Post-construction	Management of waste and hazardous materials	Groundwater quality	Storage and disposal of concrete and steel debris in unauthorized locations would affect soil quality in that location.	Low	Permanent	Limited	Medium	CCDG 7.11 and 11.4.7.2.1 NC 9.3.3.1 to 9.3.3.4 S-59 Do not accumulate construction site waste within 30 m of a body of water or within 60 m if the waste contains or could contain contaminants. S-60 The operations site must be free of waste at all times including empty containers of any kind unless they are stored in a sealed repository designed for this purpose.	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
128.	Post-construction	Management of waste and hazardous materials	Soil and sediment quality	Storage and disposal of concrete and steel debris in unauthorized locations would affect soil quality in that location.	Low	Permanent	Limited	Medium	CCDG 7.11 and 11.4.7.2.1 NC 9.3.3.1 to 9.3.3.4 S-59 Do not accumulate construction site waste within 30 m of a body of water or within 60 m if the waste contains or could contain contaminants. S-60 The operations site must be free of waste at all times including empty containers of any kind unless they are stored in a sealed repository designed for this purpose. S-95 Bear in mind MDDEFP's guidelines for managing concrete, brick and asphalt from construction and demolition work and residue from the free stone sector.	Non-significant
129.	Post-construction	Management of waste and hazardous materials	Soil and sediment quality	Debris containing asbestos and lead may be found during deconstruction of engineering structures.	Average	Temporary	Limited	Minor	S-79 When developing deconstruction plans and specifications, materials characterizations must be conducted to identify and quantify those areas containing asbestos, lead or other contaminants. Should these substances be detected, actions must be determined to deal with this situation.	Non-significant
130.	Operations	Presence and use of infrastructure	Aesthetic and visual aspects	The situation of New Bridge for the St. Lawrence will change the landscape although the current and the planned locations are similar. Generally, and over the long term, the new bridge does not constitute a new intrusion on the existing landscape.	Average	Permanent	Regional	Major	CC-7 The New Bridge for the St. Lawrence should reflect the predominant role it plays in the Montreal landscape and enhance its value as a regional landmark with appropriate aesthetics. The views of the city and the river from the bridge will be maintained. CC-8 The design should promote integration of the project into the urban environment so that existing strengths are maintained and weaknesses minimized during execution of this major infrastructure project. CC-9 Residual spaces will be given high-quality landscaping using native vegetation.	Non-significant
131.	Operations	Presence and use of infrastructure	Aesthetic and visual aspects	The new infrastructure will alter views from the bike path network.	Low	Permanent	Local	Medium	CC-10 The project should improve and consolidate the existing bike path network and enhance the views from the paths.	Non-significant
132.	Operations	Presence and use of infrastructure	Aesthetic and visual aspects	The unity of the city and adjacent neighbourhoods will be disrupted.	Average	Permanent	Local	Major	CC-11 Montreal's horizontal links could be enhanced by considering the quality and sizing of the engineering structures (viaducts) at the Atwater, Wellington and LaSalle intersections to improve connectivity between the Sud-Ouest and Verdun boroughs. CC-12 Consider the possibility of a horizontal link between the Sud-Ouest and Verdun boroughs. CC-13 Construction of the New Bridge for the St. Lawrence will not interfere with revitalization projects for the banks of the St. Lawrence. CC-14 Study the possibility of a pedestrian link on both sides Highway 10 on Nuns' Island.	Non-significant
133.	Operations	Presence and use of infrastructure	Avifauna and habitats	Migratory bird mortality during spring and autumn migrations particularly with a cable-stayed bridge.	Average	Permanent	Regional	Major	CC-15 Low intensity, short wavelength lights should be considered rather than red and yellow lights. LED lighting will be called for. Lighting should be directed toward the ground. CC-16 If obstruction lighting is required; flashing lights should be used. S-82 The bridge operator should consider switching off architectural lighting (abutments, piers, cable-stays) or any other appropriate measure during the spring and autumn migration periods, especially when visibility is poor, without compromising safety standards. Adjusting lighting of the cable-stays could reduce the number of birds colliding with the stays; to this end, flexibility should be incorporated into the design of the lighting system to better adapt it to environmental needs (aesthetic, light pollution, bird collisions, navigational aids and air traffic).	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
134.	Operations	Presence and use of infrastructure	Avifauna and habitats	Loss of habitat (permanent).	Low	Permanent	Limited	Medium	CCDG 11.2.5, 11.2.6 and 11.2.7.1 NC 9.4.2	Non-significant
135.	Operations	Presence and use of infrastructure	Sound environment	Road traffic will affect noise levels in nearby sensitive areas. Locations of sensitive areas are presented in figure 84.	High	Permanent	Local	Major	CC-17 Infrastructure design will need to include anti-noise measures where the impact is major in noise-sensitive areas (see figure 84). The impact level is presented in Table 74. Sound mitigation measures should reduce the LAeq (24 hr.) residual noise level to an acceptable noise level of 60 dBA. Design criteria are presented in Section 7.3.6.	Non-significant
136.	Operations	Presence and use of infrastructure	Special status wildlife and plant species	Permanent loss of brown snake habitats.	High	Permanent	Limited	Major	S-83 Develop the area around the new infrastructure so as to create a suitable habitat for the brown snake. S-84 Consider installing permanent barriers to prevent road-kill of the brown snake in those areas where there is most risk.	Non-significant
137.	Operations	Presence and use of infrastructure	Herpetofauna and habitats	Permanent loss of habitats following construction of the project's engineering structures.	Low	Permanent	Limited	Medium	S-85 Develop the area around the new abutments so as to create a suitable habitat for herpetofauna.	Non-significant
138.	Operations	Presence and use of infrastructure	Ichthyofauna and habitats	Accidental spills of oil or other products could harm fish and fish habitats.	Average	Short	Local	Medium	S-67 Before the start of work, develop and implement spill response procedures. CCDG 10.4.2	Non-significant
139.	Operations	Presence and use of infrastructure	Heritage and archeology	Potential loss of an archeologically important site.	High	Permanent	Local	Major	CC-18 The bridge design should enhance the historical character of the site when planning landscaping near the abutment.	Non-significant
140.	Operations	Presence and use of infrastructure	Air quality	Road traffic will affect air quality in the vicinity (GHG, atmospheric contaminants). Since atmospheric emissions are primarily a result of traffic speed and flow, better infrastructure design should improve traffic flow.	High	Permanent	Local	Major	CC-23 The design of the structures should consider integrating an intelligent traffic-control system linked to sensors that will analyze local air quality. S-86 Before the start of work, set up an air sampling station on Nuns' Island. Details on changes to GHGs are presented in section 8.1.	Non-significant
141.	Operations	Presence and use of infrastructure	Quality of surface water	Runoff may degrade water quality in the receiving environment.	Average	Temporary	Local	Medium	S-112 Implement retention and treatment measures respecting City of Montreal C-1.1 bylaws and the MDDEFP Rainwater Management Guide.	Non-significant
142.	Operations	Infrastructure maintenance and repair	Recreational/tourist activities and recreational boating	Structural maintenance could temporarily impede boating.	Average	Temporary	Local	Medium	S-2 When possible, inform users of cycling links of safe detours and closure periods. As for recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services.	Non-significant
143.	Operations	Infrastructure maintenance and repair	Ichthyofauna and habitats	De-icing salt and accidental spills of waste snow could affect the quality of the fish habitat. Given the river's average flow of 7,060 m3/s (see Part I, s. 4.1.8.1), chloride concentrations of 22 mg/L in the river (see Part I, Appendix 3C) and an application rate of 14.2 t/km/yr (MTQ, 2006) the contribution of chloride from the bridge represents less than 0.002% of the river's annual chloride load (85t/yr vs. 12,960 t/day). The CCME's recommendation for environmental quality / water quality / protection of aquatic life for chlorides will not be exceeded.	Average	Temporary	Local	Medium	S-87 Implement a management program for de-icing salt that minimizes use and maintains safe driving conditions. CC-19 The design must prevent meltwater from being discharged directly into sensitive areas (wetlands, MBS, fish habitats); an approach for treating meltwater will be studied. CC-20 The design must include collection and settling basins for runoff along the land sections of the route. CC-21 The structural geometry should limit accumulations of snow and ice on the infrastructures in order to reduce the need for de-icing.	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
144.	Operations	Infrastructure maintenance and repair	Infrastructure	Structural maintenance could temporarily impede traffic with detours and closures.	Low	Temporary	Local	Minor	S-88 The bridge operator will be responsible for informing the public of obstructions and alternate routes.	Non-significant
145.	Operations	Infrastructure maintenance and repair	Commercial ship traffic	Structural maintenance could temporarily impede commercial shipping.	Average	Temporary	Local	Medium	S-18 Work is prohibited during periods when the seaway is open without a memorandum of understanding between TC, SLSMC and the private partner. S-44 Negotiate and sign a lease with SLSMC to occupy the space required for the work. S-89 Observe the requirements of SLSMC's land use lease during maintenance and coordinate work with SLSMC.	Non-significant
146.	Operations	Infrastructure maintenance and repair	Air quality	Structural maintenance could produce dust and debris.	Average	Temporary	Local	Medium	S-90 Where available, use equipment fitted with a dust collection system during maintenance. S-91 Use tarpaulins during dust-producing work. S-92 Comply with dust emission standards of *Regulation 90 Respecting Air Quality* for work performed in Montreal, and the standards of the *Clean Air Regulation* of the Government of Quebec in Brossard.	Non-significant
147.	Operations	Infrastructure maintenance and repair	Surface water quality	Accidental discharges of oil or other products could affect surface water quality.	Average	Temporary	Local	Medium	CCDG 7.11, 10.4.2 and 10.4.3.1 S-9 Maintain vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous and noise emissions. S-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log. S-58 No isolated machinery or gas-powered equipment is to remain on a coffer-dam, a jetty or in the 60-metre riparian strip along watercourses and lakes during the closing hours of the site. If it is not possible to meet this requirement, adapted environmental measures must be applied (monitoring, etc.). S-59 Do not accumulate construction site waste within 30 m of a body of water or within 60 m if the waste contains or could contain contaminants. S-61 In the event of a spill in an aquatic environment, the emergency response plan will be implemented. This plan includes: - Prompt notification of Environment Canada (1-866-283-2333) and MDDEP (1-866-694-5454) early warning networks, SLSMC's emergency response and shipping management teams as well as the Mohawk community of Kahnawake; - Notification of municipalities downstream with water intakes that could be affected by the spill; - Elimination of the source of the spill; - Implementation of environmental protection measures (absorbent berms); - Clean-up of the affected area. S-67 Before the start of work, develop and implement spill response procedures.	Non-significant

Table 71 (Cont'd) Analysis of environmental effects - New Bridge for the St. Lawrence

NO.	PROJECT PHASE	PROJECT COMPONENT	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	SCOPE	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
148.	Operations	Infrastructure maintenance and repair	Surface water quality	Structural maintenance over and underwater could release contaminants into surface water.	Average	Short	Local	Medium	MPO-4, MPO-5 and MPO-25	Non-significant
149.	Operations	Infrastructure maintenance and repair	Surface water quality	Dispersal of de-icing and snow-melting products on roads could affect water quality. Given the river's average flow of 7,060 m3/s (see Part I, s. 4.1.8.1), chloride concentrations of 22 mg/L in the river (see Part I, Appendix 3C) and an application rate of 14.2 t/km/yr (MTQ, 2006) the contribution of chloride from the bridge represents less than 0.002% of the river's annual chloride load (85t/yr vs. 12,960 t/day). The CCME's recommendation for environmental quality / water quality / protection of aquatic life for chlorides will not be exceeded.	Low	Temporary	Local	Minor	S-87 Implement a management program for de-icing salt that minimizes use and maintains safe driving conditions. CC-19 The design must prevent meltwater from being discharged directly into sensitive areas (wetlands, MBS, fish habitats); an approach for treating meltwater will be studied. CC-20 The design must include collection and settling basins for runoff along the land sections of the route. CC-21 The structural geometry should limit accumulations of snow and ice on the infrastructures in order to reduce the need for de-icing.	Non-significant
150.	Operations	Infrastructure maintenance and repair	Groundwater quality	De-icing and snow melting products could show up in groundwater.	Average	Permanent	Local	Major	S-87 Implement a management program for de-icing salt that minimizes use and maintains safe driving conditions. CC-19 The design must prevent meltwater from being discharged directly into sensitive areas (wetlands, MBS, fish habitats); an approach for treating meltwater will be studied. CC-20 The design must include collection and settling basins for runoff along the land sections of the route. CC-21 The structural geometry should limit accumulations of snow and ice on the infrastructures in order to reduce the need for de-icing.	Non-significant
151.	Operations	Presence and use of infrastructure	Ichthyofauna and habitats	The presence of new piers will result in a potentially permanent loss of spawning, nursery and feeding grounds.	Average	Permanent	Local	Major	MPO-10 and MPO-13 As a compensation measure, fish habitats could be created within the study area, for example, at the site of the old Champlain Bridge piers.	Non-significant
152.	Operations	Construction of infrastructure	Groundwater quality	Construction of infrastructure (abutments, foundations, footings) on the Montreal side, in the area of the Technoparc, could affect the installation and operation of a groundwater collection and treatment system.	Average	Temporary	Local	Medium	CC-22 Where necessary, the bridge design must take into account the geometry of the containment system in the western sector. S-93 Since work will be carried out in the same location; the private partner will need to plan construction on Montreal Island in collaboration with the operator of the Western sector containment system.	Non-significant
153.	Operations	Infrastructure maintenance and repair	Soil and sediment quality	De-icing and snow-melting products are likely to be found in soil near the infrastructure.	Average	Permanent	Local	Major	S-94 Meltwater will not be directly discharged into sensitive areas such as wetlands.	Non-significant
154.	Decommissioning	Deconstruction of infrastructure	The effects and mitigation measures associated with decommissioning the structures at the end of their useful life in approximately 125 years are similar to those associated with the post-construction phase found in lines 88 to 127 of this Table.							Non-significant

Appendix 4 Restriction periods for work in water

Table 74 is from the *Environmental Assessment, Part II, Sections 5 to 13, Assessment of Effects and Mitigation Measures, Preliminary Version – August 2013.*

Table 74 Restriction periods for work in water

SECTOR	HABITATS (FIGURE 73)	PERIOD
On the right bank of Nuns' Island from Champlain Bridge to the eastern point (690 m), a distance of 90 m from shoreline; on the right bank of the Lesser La Prairie Basin (375 m), a distance of 90 m from shoreline.	Still water phytolithophil (types 2 and 4)	April 1 to August 1
Clément Bridge. Area of small islands 100 m from the right bank of Nuns' Island.	Fast-flowing water lithophil (type 22)	April 1 to July 1
Entire shoreline of Nuns' Island.	Types 12, 13, 16, 17 and 20	April 15 to June 15