Transport Canada Transports Canada

A new bridge for the St. Lawrence

Environmental Assessment

Part I, Sections 1 to 4

Project and Environmental Description

Final Version

March 2012

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EXECUTIVE SUMMARY

This report constitutes the initial stage of the environmental assessment process. It consists of the description of the project and of the environment. A second report completes the assessment by describing the project's environmental impacts and the proposed mitigation measures.

Upon reviewing the conclusions of expert reports on the current state of the bridge's deterioration and the estimate of the increasingly higher maintenance costs needed to maintain the required level of safety, Transport Canada has decided to build a new bridge (the "New Bridge for the St. Lawrence") to replace the components of the current Champlain Bridge.

When it was launched, the New Bridge for the St. Lawrence project was subject to the Canadian Environmental Assessment Act (CEAA). Although the former CEAA was repealed in 2012, because of a transitional provision, this environmental assessment (EA) will continue under the former Act. Transport Canada, Fisheries and Oceans Canada and Environment Canada are the authorities in charge of this EA.

The project part of this EA consists of the following: construction of the New Bridge for the St. Lawrence and the Nuns' Island bridge, reconstruction and widening of Highway 15, road work on Nuns' Island, the alignment with Highway 10 on the South Shore, and deconstruction of the existing Champlain and Nuns' Island bridges. Pre-construction and post-construction work along with the project operation will also be included in the EA.

Regarding the description of the physical environment, some "contaminated" soil and groundwater are found in certain sectors of the project. With respect to surface water, the St. Lawrence River's water quality has been monitored since the 1980s. There are no sampling stations in the study area; however, there are stations both upstream and downstream of the study area. According to the assessments, none of the measured parameters exceeds the water quality criteria for the protection of aquatic life. With respect to air quality, despite the direct and indirect impacts of transportation-related pollution on the quality of life and human health, current conditions for both greenhouse gas emissions and those related to the main atmospheric contaminants show that air quality is not a significant issue for the project.

Regarding the description of the biological environment, though they were not all observed in the study area, there are five species of fish that could potentially be found in the study area with special conservation status. The American eel, chain pickerel, lake sturgeon and rosyface shiner are all likely to be designated threatened or vulnerable at the provincial level, while the American shad is a vulnerable species at the provincial level. The brown snake, a wildlife species likely to be designated threatened or vulnerable in Quebec, was the only notable reptile that was sighted. Regarding birds, only one species should be mentioned, the peregrine falcon, which was sighted during the inventories and is nesting on the present bridge. This species is designated as vulnerable in Quebec and has the status of species of concern in Canada. The study area is characterized by a migratory bird sanctuary that is under federal jurisdiction, known as Couvée Island. However, the colony of ring-billed gulls found on this island has been continuously declining in the past decades. The study area also contains a waterfowl concentration area, La Prairie Basin, and Nuns' Island. Lastly, in terms of flora, plant inventories were used to identify two species of water-horehound likely to be designated threatened or vulnerable, i.e. the St. Lawrence water-horehound and the rough water-horehound.

Regarding the description of the human environment, the Aboriginal community of Kahnawake is located a dozen kilometres southwest of the footprint of the New Bridge for the St. Lawrence. There is no commercial fishing in the study area; however, there is recreational fishing all over the waterway. As for navigation, the St. Lawrence, in the study area, is not suitable for navigation, with the exception of the seaway. There are about 15 bicycle paths in the study area. There is also a real estate development project on Nuns' Island very close to the proposed footprint of the new bridge. Lastly, there are two sites of archeological interest on Nuns' Island in the proposed footprint of the new bridge.

The elements described above shed light on the context in which the project is being carried out. The second report highlights the project's environmental impacts and covers the mitigation measures.

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LIST OF ACRONYMS

AADT	Annual average 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)
BNQ	Bureau de normalisation du Québec
BRT	Bus rapid transit
CAP	Criteria air pollutants
CCDG	Cahier de charge et devis généraux
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 Act*, S.C. 1992, c. 37
CEAA (2012)	*Canadian Environmental Assessment Act*, S.C. 2012, c. 19, s. 52
CFE	Concentration of frequent effects
CHS	Canadian Hydrographic Service
CIS	Canadian Ice Service
CMM	Communauté métropolitaine de Montréal (Montreal Metropolitan Community)
CN	Canadian National
CNR	Canadian National Railway Company
COE	Concentration of occasional effects
COSEWIC	Committee on the Status of Endangered Wildlife in Canada

Ct	Total concentration
DBH	Diameter at breast height
DFO	Fisheries and Oceans Canada
DRTL	Dedicated rapid transit lane
EA	Environmental assessment
ÉPOQ	Étude des populations d'oiseaux du Québec (Study of Bird Populations in Quebec)
FHWA	Federal Highway Administration
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
Leq_T :	Equivalent continuous noise level.
$L_{10\%}$:	The noise level reached or exceeded during 10% of the analysis period. The analysis period is 30 minute.
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
MDDEP	Ministère du Développement durable, de l’Environnement et des Parcs (Quebec Ministry of Sustainable Development, Environment and Parks)
MDDEFP	Ministère du Développement durable, de l’Environnement, de la Faune et des Parcs (Quebec Ministry of Sustainable Development, Environment, Wildlife 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
$PM_{2.5}$	Fine airborne particulate matter less than 2.5 micron
PM_{tot}	Total airborne particulate matter
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 ingress)
RPCQ	Répertoire du patrimoine culturel du Québec (Cultural Heritage Inventory for Quebec)
SAE	Society for Automobile Engineers
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 m²/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.
Chlorophyll a:	Green pigment in plants, principal element in photosynthesis.
Chloride:	Combination of chlorine and another non-oxygen element.
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.
Depth contour:	Contour line connecting points of equal water depth.
Diameter at breast height:	The diameter at breast height (DBH) of a tree trunk is measured at 1.30 metres above the ground
Deck:	Horizontal part of the frame of a bridge located beneath the roadway.
Downstream:	Occuring 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 rearing.

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 great 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 molluscs.
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.
Lithophile:	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.
Organochlorine:	A chlorine derivative product.
Ornithological:	Relating to the study of birds.
Orthophosphate:	Phosphorus compound (acid or salt) characterized by the following radicals: $H2PO4\text{-}^{1}$, $HPO4\text{-}^{2}$ and $PO4\text{-}^{3}$.
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 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.
Rearing habitat:	Habitat in which fish larvae (fry) absorb their yolk sac and move into another development stage.
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 sulphide 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.
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.
Special status species	Species protected under the *Species at Risk* Act or the *Loi sur les espèces menacées ou vulnérables* (Threatened or Vulnerable Species Act).
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 once 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 a 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:	Occuring 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 details regarding the specifics of the project components presented in this report are provided solely for illustrative purposes. This project description does not constitute a final decision by the promoter. Changes to these details may be made based on the results of this environmental assessment and as the concept for the New Bridge for the St. Lawrence develops.

It should also be noted that this report is the first stage in the environmental assessment process and addresses the project description and the environment. A second report will be published to complete the analysis and will provide a description of the project's effects on the environment and proposed mitigation measures. This report may be modified in order to take into account comments made during the planned public consultation period (please visit the Canadian Environmental Assessment Registry website for more details).

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1.1 BACKGROUND

The Champlain Bridge has been in operation since 1962 and is the busiest bridge 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, 2012b).

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 (TC) 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 (see Section 2.1).

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 New Bridge for the St. Lawrence will be located between the Island of Montreal and Brossard, immediately downstream of the current Champlain Bridge. The project will involve work on both banks of the St. Lawrence as well as on Nuns' Island. The main activities and structures that will be required for construction of the new bridge are: redevelopment of Highway 10 and 15 service lanes accessing the Nuns' Island Bridge and the Champlain Bridge, reconstruction of the Nuns' Island Bridge, construction of the New Bridge for the St. Lawrence and deconstruction of the Champlain and Nuns' Island bridges. The corridor for the New Bridge for the St. Lawrence project is described in greater detail in Section 1.3 and Figure 2.

The activities and structures constitute a project within the meaning of the *Canadian Environmental Assessment Act,* S.C. 1992, c. 37 (CEAA) and, for the reasons set out in Section 1.5 of this report, are subject to a federal environmental assessment screening.

As stated in the preamble of the CEAA:

Environmental assessment provides an effective means of integrating environmental factors into planning and decision-making processes in a manner that promotes sustainable development.

It should be noted that reconstruction of the Nuns' Island Bridge involves building a temporary causeway to maintain traffic flow during deconstruction of the existing bridge and construction of the new bridge. Jacques Cartier and Champlain Bridges Incorporated (hereafter JCCBI) is responsible for building the causeway and this component is therefore not covered by this environmental assessment.

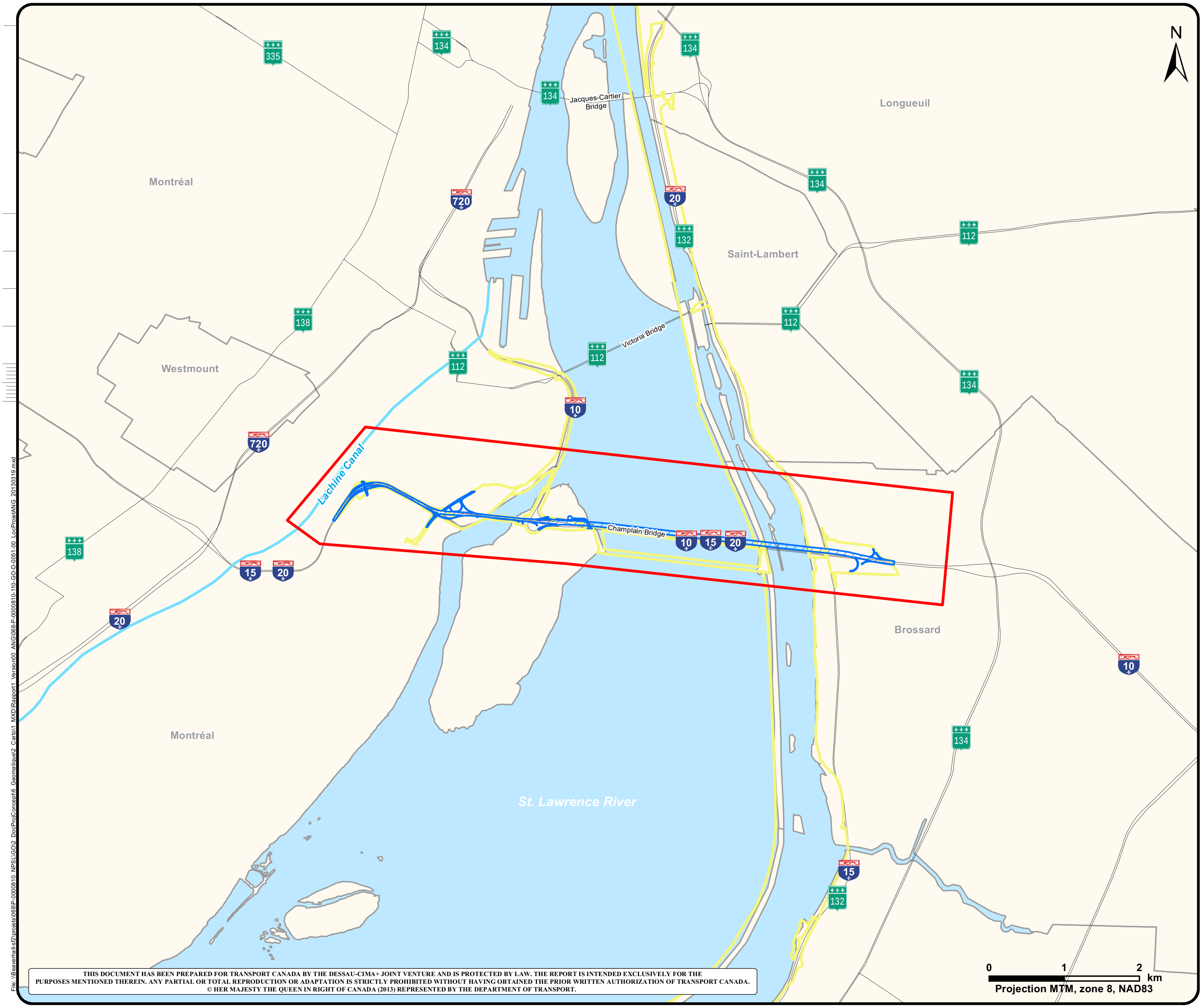
1.2 PROJECT PROPONENT AND ROLE

TC is responsible for developing and applying laws and policies in the area of interprovincial and international transportation in Canada. More specifically, it deals with marine, rail and air transportation infrastructure and equipment certification. As such, TC is responsible for inter-provincial and cross-border transportation policies and programs. Its mission is to serve the public interest through the promotion of a safe and secure, efficient and environmentally responsible transportation system in Canada in order to protect people, ensure the efficient flow of people and goods and contribute to a prosperous economy. (http://www.tc.gc.ca/eng/aboutus-menu.htm).

Further to a decision by the Honourable Denis Lebel, TC is the proponent and responsible authority for the project to build a New Bridge for the St. Lawrence. As such, it will ensure coordination at the federal level with the other departments and agencies concerned with project implementation, including Fisheries and Oceans Canada, Environment Canada, Health Canada, the Federal Bridge Corporation Limited/JCCBI and the St. Lawrence Seaway Management Corporation (SLSMC).

1.3 PROJECT LOCATION AND STUDY AREAS

The New Bridge for the St. Lawrence and its related components will be located in the Montreal area in the province of Quebec. They will lie between the Island of Montreal and the city of Brossard and encompass work on both banks of the River as well as on Nuns' Island (see Figure 1). The new bridge 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 (stabilization and/or anchoring of the temporary structures and barges on existing piles upstream), facilitate the connection to the existing transportation network and protect the temporary structures from ice.



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SIZE 11x17

- 🟨 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

DESSAU | CIMA+

1060, rue University, suite 600
Montréal (Québec) H3B 4V3
Phone: 514.281.1010
Fax: 514.281.1060

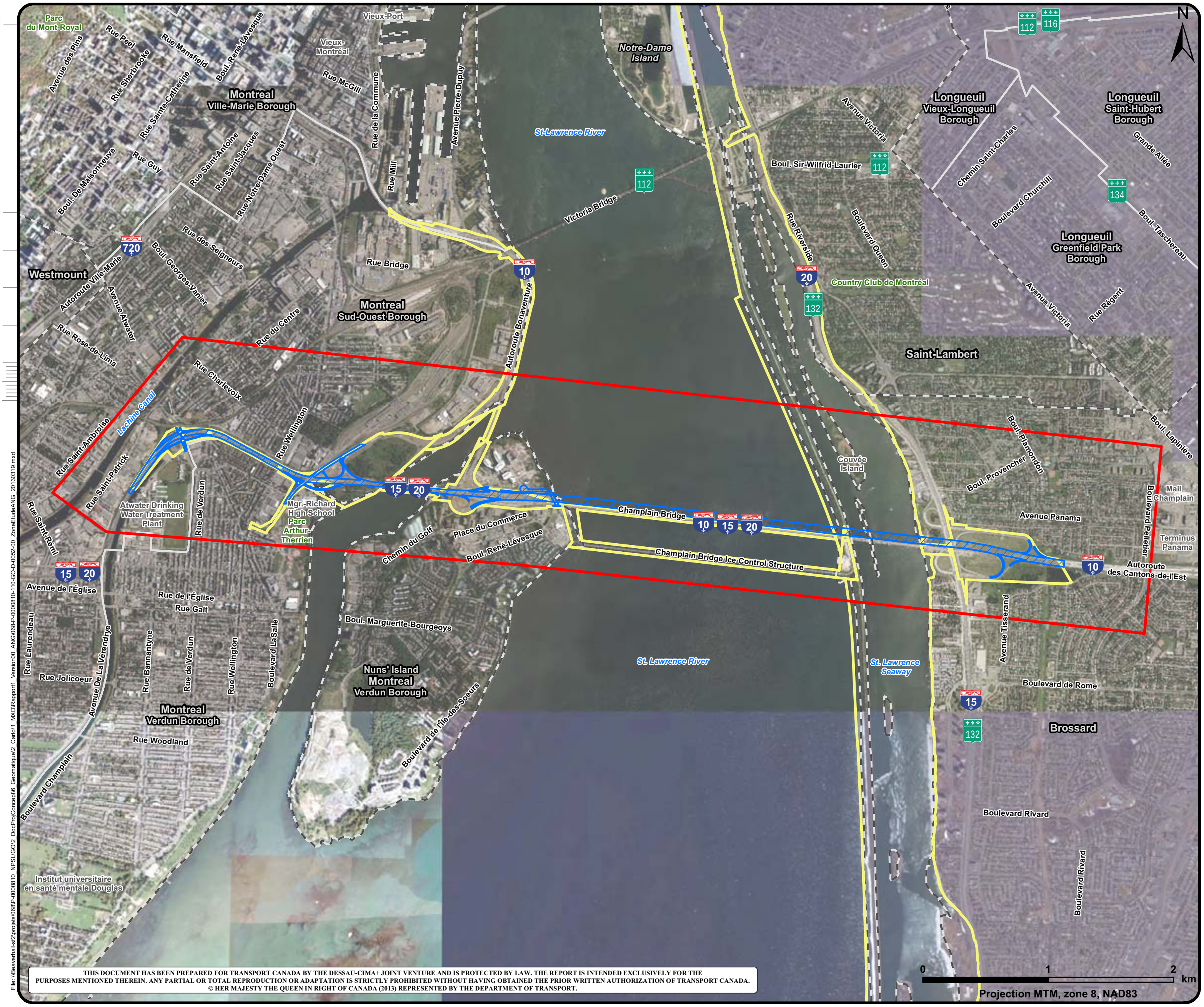
Prepared Ghyslain Pothier
Drawn Geneviève Lemay
Checked Ghyslain Pothier

Discipline Geomatic
Scale 1:50 000
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



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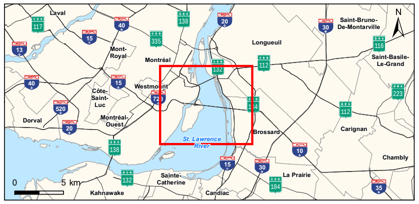
SIZE 11x17

🟨	Federal government property limit
🟥	Study area
▨	Proposed infrastructure right-of-way
⬚	Municipal limit
☐	Borough limit

SOURCES :
- Proporty limit and right-of-way : Transports 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
Study and Work Areas
New Bridge for the St. Lawrence

DESSAU | CIMA+

1060, rue University, suite 600
Montréal (Québec) H3B 4V3
Phone: 514.281.1010
Fax: 514.281.1060

Prepared	Ghyslain Pothier	Discipline	Geomatic
Drawn	Geneviève Lemay	Scale	1:30 000
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	0052	00

The study area identified for the New Bridge for the St. Lawrence project covers an area around the existing and planned bridges that is sufficiently broad to take into account most of the potential direct and indirect effects that the project may cause. The study area is shown in Figure 2 and the boundaries are defined as follows:

- A line 1 km to the north of and parallel to the Champlain Bridge;
- A line 500 metres to the south of and parallel to the Champlain Bridge;
- A line parallel to the western bank of the Lachine Canal;
- Pelletier Boulevard, within the Brossard city limits, to the east.

Although the boundaries encompass most of the potential impact that will be felt by the various area components, it is possible that for certain specific elements the inventories will need to cover a larger area (e.g.: fish fauna, aesthetic and visual aspects, navigation, etc.). In those cases, the area considered will be defined in the section on the area component in question.

Lastly, the project work area, i.e. the right of way in which the actual work will take place, basically corresponds to the footprint of the existing Champlain and Nuns’ Island Bridges, as well as the components of the New Bridge for the St. Lawrence. The area is shown in blue in Figure 2.

1.4 PROJECT RATIONALE

The Champlain Bridge provides a commercial link between Canada and the United States and Quebec and the other Canadian provinces and ensures the flow of goods and people between the Island of Montreal and the South Shore. Traffic flow over the bridge is estimated at close to 60 million vehicles per year, making it the busiest bridge in Canada and one of the busiest in North America.

The Champlain Bridge was built in 1962. A 10-year maintenance plan has been initiated to extend the life of the bridge long enough to build a new one. The plan will cost over $212 million and is not sufficient to correct all structural problems, which would require over time increasingly extensive, complex and costly work. Given that situation, Transport Canada (TC) has concluded that the Champlain Bridge has reached the end of its useful life and must be replaced. This is an essential, priority project. A new bridge over the St. Lawrence will therefore be built downstream from the existing bridge and the Champlain Bridge will be deconstructed.

The Nuns’ Island Bridge, built in 1960, sits alongside Champlain Bridge and connects the Island of Montreal and Nuns’ Island. Like the Champlain Bridge, the Nuns' Island Bridge has reached the end of its useful life. Inspection studies conducted in 2009 indicated that both the bridge superstructure and infrastructure are in a general state of disrepair and that deterioration of the structures is accelerating rapidly. Replacement of Nuns' Island Bridge is also therefore unavoidable. It will be deconstructed and a new bridge built in the same location.

1.5 LEGAL FRAMEWORK FOR THE ENVIRONMENTAL ASSESSMENT

1.5.1 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. 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 (Canadian Environmental Assessment Agency, 2012.). It focuses on federal areas of jurisdiction and consequently on the potential adverse environmental effects that are within federal jurisdiction. Projects subject to environmental assessment under CEAA 2012 are generally those designated by that Act.

On July 6, 2012, the Minister of the Environment designated the New Bridge for the St. Lawrence Project, for which the environmental assessment was begun in accordance with the CEAA, pursuant to subsections 14(2) and 124(2) of the CEAA (2012). The environmental assessment of the project was thus carried out in accordance with the CEAA.

1.5.2 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, and is not an excluded project as provided for in Section 7 of CEAA and the *Exclusion List Regulations of 2007*.

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 subsection 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 require permits to be obtained from various agencies that are responsible authorities, including:

- Transport Canada, pursuant to:
  - paragraph 5(1)(*a*) of the CEAA: TC is the project proponent; and
  - paragraph 5(1)(*d*) of the CEAA: project approval is required under section 5 of the *Navigable Waters Protection Act*, which is subject to the *Regulations on Designated Legislative and Regulatory Provisions*.
- Fisheries and Oceans Canada, pursuant to:
  - paragraph 5(1)(*d*) of the CEAA: authorization to modify the fish habitat as a result of the project is required under subsection 35(2) of the *Fisheries Act*, which is subject to the *Regulations on Designated Legislative and Regulatory Provisions*.
- Environment Canada, pursuant to:
  - paragraph 5(1)(*d*) of the CEAA: permits are required for the project under subsection 9(1) of the *Migratory Bird Sanctuary Regulations*, which is subject to the *Regulations on Designated Legislative and Regulatory Provisions*.

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.

1.5.3 Environmental assessment by objectives

Since the pre-feasibility 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 selected because it is suitable for projects where certain details are not yet defined or will be identified at a later date.

The first preliminary report and the future reports will therefore be completed using this proven approach, which makes it possible to achieve environmental objectives without delaying the project. The mitigation measures are set out in the report in the form of objectives to be achieved rather than specific parameters that must be met. The result, ultimately, is the same, i.e. sensitive environmental components are protected and the environment is taken into consideration upstream of the later stages of the project.

2 PROJECT DESCRIPTION

In 2012, TC accorded the joint venture led by PricewaterhouseCoopers a three-year mandate to complete, among other tasks, the project's preliminary design and costing. Consequently, no final decision has yet been made concerning the manner in which the project is to be carried out and new project completion options could arise from this or subsequent studies.

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 the JCCBI and the Quebec Ministry of Transport. The information concerns the construction of the New Bridge for the St. Lawrence and the Nun's Island Bridge, reconstruction and expansion of Highway 15, road work on Nun's Island, alignment with Highway 10 on the South Shore and deconstruction of the existing Champlain and Nun's Island Bridges (see Figure 3).

In addition, the report on the pre-feasibility study for options for the two bridges described seven bridge types being considered for the New Bridge for the St. Lawrence. Since no choice has yet been made as to the solution for the new bridge, a technical summary of proposed solutions considered in the pre-feasibility study is presented in Appendix 1.

2.1 DESCRIPTION OF PROJECT COMPONENTS AND ASSOCIATED WORK

The following sections present details regarding the specifics of the project components and are provided solely for illustrative purposes. This project description does not constitute a final decision by the promoter (TC). Changes to these details may be made based on the results of this environmental assessment and as the concept for the New Bridge for the St. Lawrence develops.

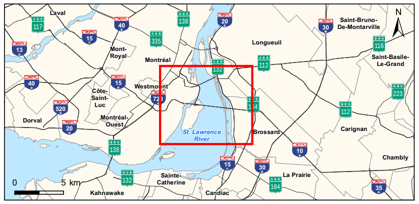
2.1.1 Reconstruction and Expansion of Highway 15 (Component A)

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

For this segment of the corridor, the solution recommended in the report on the pre-feasibility study prepared for the JCCBI (May 2010) concerning the rehabilitation of the Highway 15 link, would involve enlarging the current highway in order to increase the number of traffic lanes from two to three in both directions. Lane width would be standardized to 3.7 m and a 1.0 m shoulder on the left and a 2.0 m on the right would be added. The proposed solution would also reconfigure the Atwater interchange and the Wellington Street – Highway 10 East/Downtown interchange.

- 🟥 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 3
Project Components for the New Bridge for the St. Lawrence

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Two options were reviewed for the approach to the Nun's Island Bridge and for the bridge itself:

- Option 1 involves a cross-section of three 3.7 m traffic lanes in both directions with a 1.3 m shoulder on the left and a 2 m shoulder on the right. This option also proposes two 6.5 m-wide lanes, in each direction, reserved exclusively for public transit with a cycle lane on the upstream side. On the Montreal side, the route of the public transit lane, which would follow the same route as the highway, would leave the centre of the route on Montreal Island, pass beneath the highway going west and head downtown via the Bonaventure Expressway (JCCBI September 2010).
- Option 2 differs from Option 1 in that there is no provision for a reserved lane since this lane would leave the centre of the highway on Nun's Island (JCCBI March 2011).

The decision on the public transit route will be made by the Government of Quebec. Discussions are ongoing between TC and the Agence métropolitaine de transport (AMT) to finalize this route. Interestingly, both options share the advantage of having been designed with possibility of integrating Light Rail Transit (LRT) rather than Bus Rapid Transit (BRT). However, Option 2 would follow the route recommended in the AMT Preliminary Design Study of February 2007 for a Light Rail Transit (LRT) system along the Highway 10 corridor between the South Shore and downtown Montreal.

In addition, the cross-section of the Nun's Island Bridge for options 1 and 2 could be modified to add weaving lanes (a 4th lane in each direction) between the on and off ramps near the bridge (JCCBI March 2011).

2.1.1.1 *Scope of work*

Given that the proposed solution entails the complete reconstruction and widening of the highway, the principal tasks planned in connection with this work would be:

- Implementation of traffic maintenance measures based on work phases to free up work sites and allow construction to proceed;
- Deconstruction of existing structures (bridges, retaining walls, etc.);
- Construction of temporary structures (temporary retaining walls, etc.);
- Construction of engineering works (bridges, retaining walls);
- Embankments including excavation and backfilling beneath the infrastructure corridor;
- Relocation of municipal (water and sewer) and public (Hydro-Québec power lines, etc.) services;
- Construction of drainage system (pipes, manholes, catch basins, drains, etc.);
- Civil engineering work for lighting, traffic lights, signage and the intelligent transportation system (ITS) (foundations and pipes);

- Construction of the road surface (sub-base, base and possibly a concrete slab surface depending on the choice made for the Turcot project and the road surface of Highway 10 on the South Shore);
- Construction of restraint systems (guardrails), sidewalks, curbs;
- Installation of overhead sign gantries and other signs;
- Installation of lighting, traffic lights, ITS system (drums, brackets, variable message signs, cameras, etc.);
- Landscaping (planting, topsoil, turf).

2.1.1.2 Estimated work duration

Reconstruction work is estimated at three years.

2.1.1.3 Traffic management

Traffic maintenance was analyzed in the pre-feasibility study report of May 2010 with regard to rehabilitation of the Highway 15 corridor. The main points are summarized below:

Widening work in this sector will take place in a confined space due to the restricted highway footprint in this urban area.

During the three construction phases, traffic lanes and ramps will be partly or completely closed, which would affect two types of traffic movement: through traffic on Highway 15 and exchanges between Highway 15 and the adjacent road system. However, for the most part, two lanes in both directions would be maintained during each construction phase.

According to the phasing plans, phase 1 would involve widening Highway 15 northbound, construction of new ramps for the Atwater interchange, construction of a temporary bridge for Nun's Island. Phase 2 would consist in completing the widening of Highway 15 south, beginning reconstruction of Nun's Island Bridge and deconstructing the old Atwater interchange ramps. Lastly, phase 3 would consist in finalizing widening work and deconstruction of temporary structures for the complete recommissioning of Highway 15.

The temporary changes that would disrupt traffic are chiefly limited to the elimination of auxiliary lanes during certain construction phases, the temporary closure of the Atwater Avenue East exit (interchange 61) and the temporary closure of the bus access to the reserved lane on the Champlain bridge (interchange 58). In effect, access by AMT buses to the reserved lane on Highway 15 south would be adversely affected: the access ramp would be closed during the first two construction phases; reopening is planned for the third phase with a new graded access (without intersecting the lanes of Highway 15 north). A solution is being studied in collaboration with AMT.

Finally, closure of the exit to Atwater Avenue from Highway 15 northbound (for the first construction phase) could adversely affect traffic on Highway 15 northbound and on the neighbouring road network. The only realistic option for this situation would be to use the upstream interchange (interchange 60) for the exit from Highway 15 northbound and a route west or east of the highway to rejoin Atwater Avenue. This would increase traffic flow in the nearby residential neighbourhoods. Therefore, during the first construction phase, the closure period for this ramp would have to be limited and the recommended detours well-signed.

2.1.2 New Nuns' Island Bridge (Component B)

Five road geometry scenarios were developed for the replacement of the Nun's Island Bridge as part of the pre-feasibility study prepared for the JCCBI. The description below is based on the results of that study. However, it should be kept in mind that other studies are in preparation or will soon be underway. Consequently, the solution chosen for the new bridge could very well differ from the scenarios developed in the pre-feasibility study.

No complete scenario has yet been adopted. However, the JCCBI is in the process of awarding design contracts and, possibly, construction contracts for the temporary causeway-bridge to begin replacement of the Nun's Island Bridge. The passage below describes the only scenario discussed in the pre-feasibility study, which includes building a temporary causeway-bridge. This scenario would entail the construction of two bridges, one downstream from the current bridge and the other following the route of the current bridge. A temporary causeway-bridge would be built to maintain traffic during deconstruction of the existing bridge and construction of the new bridge. Work related to the construction of the temporary causeway-bridge is subject to a separate environmental assessment under the responsibility of the JCCBI.

This solution was developed with the idea of building two separate parallel structures, one for each traffic direction. The preferred solution for each direction would include:

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

Three types of bridge structure would be possible according to the pre-feasibility studies for the new Nun's Island Bridge:

- Short-span bridge;
- Medium-span bridge;
- Long-span bridge.

The geometry of short-span bridges is similar to that of the existing structure, twelve 39 m spans. Medium-span options would halve the number of support piers in the river, and so would consist of six 78 m spans. Lastly, long-span bridges were also considered given that the total length of approximately 450 m is feasible with this design.

2.1.2.1 Scope of work

2.1.2.1.1 Deck

For the bridge deck, the construction techniques proposed in the pre-feasibility are presented in Table 1.

Table 1 Summary of bridge deck construction methods

CATEGORY	# OF SPANS	LENGTH (M)	TYPE OF STRUCTURE	CONSTRUCTION METHOD
Short-span bridge	12	12x39m = 468 m	Concrete frame	Launching gantry
			Steel frame	Crane assembly
Medium-span bridge	6	6x78m = 468 m	Steel frame	Crane assembly
Long-span bridge	4	140m-210m–2x50m = 450 m	Steel frame	Crane assembly

2.1.2.1.2 Piers

For short- and medium-span bridges, the piers would be reinforced concrete columns topped with a portal cap beam. As the columns are not very high (never more than 15 m), there is no particular advantage to using hollow sections; therefore, solid sections would be proposed. The exact shape of the columns (circular, elliptical, sail, etc.) will be decided based on the solution chosen. However, the number of piers would vary for each type of structure.

For a cable-stayed bridge (long-span), a hollow section would be feasible given the height of the pylons. The amount of concrete required and the weight of the concrete would make a solution with solid sections less attractive.

2.1.2.1.3 Foundations

The foundations would most likely be shallow footings resting on bedrock, as is the case with the existing bridge. Placement of the foundations would vary with the type of structure chosen and the potential construction techniques such as the use of coffer-dams following completion of the temporary access.

2.1.2.2 Estimated work duration

For the chosen solution, work is estimated to stretch over four years from the date the private partner is authorized to begin construction.

2.1.2.3 *Traffic management*

The Nun's Island Bridge will be rebuilt along the same route as the existing bridge. A temporary causeway will be constructed downstream from the current structure to carry traffic during construction of the new bridge.

Work on structures for the bridge approaches may disrupt traffic, particularly on the Montreal Island side, where it may be necessary to build tunnels for the reserved bus lane beneath Highway 15 westbound and beneath the Wellington Street–Highway 10/Downtown exit ramp.

Traffic maintenance with respect to work proposed for the approaches to the new Nun's Island Bridge was not examined in the pre-feasibility studies used to assess the impact the work would have on traffic, to define traffic maintenance needs and to develop a work completion strategy. However, as the JCCBI has begun the bidding process for the temporary causeway-bridge, a strategy should be in place before the start of work on the New Bridge for the St. Lawrence.

In principle, this component, a crucial element to consider during highway work carried out in a high-volume urban setting, should be examined as part of the mandate to construct the temporary causeway-bridge downstream from the future Nun's Island Bridge.

2.1.3 Work on Nuns' Island (Component C)

Based on the pre-feasibility studies, there are two construction options for the Nun's island sector, depending on the scenario finally chosen for public transit service.

In principle, the cross-section of the highway on Nun's Island would be similar to the cross-section for the Nun's Island Bridge and for the New Bridge for the St. Lawrence. There would be three 3.7 m-wide traffic lanes with a 1.3 m shoulder on the left and a 2 m wide shoulder on the right. This would reduce the highway's footprint since the former toll station would be deconstructed. The longitudinal profile would be similar to the current profile.

With regard to the space required for public transit, the route could either follow the Nun's Island Bridge or leave the centre of the highway on Nun's Island, run beneath the highway going west, cross the river and join the route proposed in the AMT February 2007 preliminary study for the LRT 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 Nun's 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.

2.1.3.1 *Scope of work*

Given that the proposed solution entails the complete reconstruction of the highway, the principal tasks planned in connection with this work would be:

- Implementation of traffic maintenance measures based on work phases to free up work sites and allow construction to proceed;
- Embankments including excavation and backfilling beneath the infrastructure corridor;
- Relocation of municipal (water and sewer) and public (Hydro-Québec, Bell, etc.) services:
- Construction of drainage system (pipes, manholes, catch basins, drains, etc.);
- Civil engineering work for lighting, traffic lights, signage and the intelligent transportation system (ITS) (foundations and pipes);
- Construction of the road surface (sub-base, base and possibly a concrete slab surface depending on the choice made for the Turcot project and the road surface of Highway 10 on the South Shore);
- Construction of restraint systems (guardrails), sidewalks, curbs;
- Installation of overhead sign gantries and other signs;
- Installation of lighting, traffic lights, ITS system (drums, brackets, variable message signs, cameras, etc.);
- Landscaping (planting, topsoil, turf).

2.1.3.2 *Estimated work duration*

For this component of the project, the construction period was estimated at 8 months in the pre-feasibility studies. Work should start in the year prior to the end of bridge construction.

2.1.3.3 *Traffic management*

The work on this approach could be executed in two main phases since the corridor is wide enough to build a temporary road surface making it possible to completely rebuild the road surface for the approach to the New Bridge for the St. Lawrence.

Construction of temporary access ramps to the Bonaventure Expressway and to Nun's Island will be necessary in order to maintain an uninterrupted link between the adjacent road system and Highway 10. In the René-Lévesque Boulevard sector, construction of the New Bridge for the St. Lawrence over this boulevard imposes a constraint which will have to be taken into account when choosing the type of structure in order to minimize the number of complete closures of this major link to Nun's Island. Traffic management in this sector will involve closing René Lévesque Boulevard completely at night and implementing detours.

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

The following paragraphs describe the options considered for the New Bridge for the St. Lawrence, as presented in the pre-feasibility study. 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 Nun's 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 dedicated public rapid transit lane (DRTL). The implementation designs for the piers were developed to take into account this constraint: the number of piers must not exceed the number for the existing bridge.

Structural studies carried out for the pre-feasibility study produced five concepts for the New Bridge for the St. Lawrence:

- Pre-stressed concrete single-box bridge;
- Hybrid steel-concrete bridge;
- Composite superstructure bridge;
- Composite superstructure with V-shaped piers;
- Cable-stayed bridge with composite superstructure deck.

Depending on the type of structure chosen, the quantities of materials required will vary.

2.1.4.1 Components D1a and D1b: crossing the St. Lawrence River between Nun's Island and the Seaway and the Lesser La Prairie Basin

The span lengths chosen 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.

Table 2 presents the various concepts studied in the pre-feasibility study for construction of these two sections and the applicable construction methods. The different types of structures are presented in sub-section 2.1.4.3 and the construction methods are explained in detail in sub-section 2.1.4.4. The number of spans is important in the study since this is directly related to the number of piers required, which in turn has a direct impact on the biophysical environment.

Table 2 Summary of concepts considered for crossing components D1a and D1b

CONCEPT	SECTION	NUMBER OF SPANS	LENGTH (M)	TYPE OF STRUCTURE	CONSTRUCTION METHOD
Pre-stressed concrete single box	River	30	60m-70m-28x80m = 2,370 m	Concrete superstructure	Balanced cantilever (launch gantry)
	Lesser La Prairie Basin	10	4x80m-5x72.3m-55m = 737 m	Concrete superstructure	Balanced cantilever (launch gantry)
Hybrid steel-concrete	River	30	60m-70m-28x80m = 2,370 m	Concrete superstructure	Balanced cantilever (launch gantry)
				Concrete superstructure	Launched superstructure
					Crane assembly
	Lesser La Prairie Basin	10	4x80m-5x72.3m-55m = 737 m	Concrete superstructure	Balanced cantilever (launch gantry)
				Composite superstructure	Launched superstructure
					Crane assembly
Composite superstructure	River	30	60m-70m-28x80m = 2,370 m	Composite superstructure	Launched superstructure
	Lesser La Prairie Basin	10	4x80m-5x72.3m-55m = 737 m	Composite superstructure	Launched superstructure
Composite superstructure with V-shaped piers	River	29	70m-28x80m = 2,310 m	Composite superstructure	Launched superstructure
					Crane assembly
	Lesser La Prairie Basin	12	11x70.2m-55m = 827 m	Composite superstructure	Launched superstructure
					Crane assembly
Cable-stayed	River	27	70m-26x80m = 2,140 m	Composite superstructure	Launched superstructure
					Crane assembly
	Lesser La Prairie Basin	12	7x72.9m-63m-3x72.9m-55m=847m	Composite superstructure	Launched superstructure
					Crane assembly

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.

Table 3 presents the various concepts studied in the pre-feasibility study for construction of this section and the applicable construction methods. The different types of structures are presented in sub-section 2.1.4.3 and the construction methods are explained in detail in sub-section 2.1.4.4.

Table 3 Summary of concepts considered for crossing components D2

SECTION	CONCEPT	NUMBER OF SPANS	LENGTH (M)	TYPE OF STRUCTURE	CONSTRUCTION METHOD
Seaway	Pre-stressed concrete single box	3	110m-200m-110m = 420 m	Concrete superstructure	Balanced cantilever (cast-in-place)
	Hybrid steel-concrete	3	110m-200m-110m = 420 m	Concrete superstructure and composite superstructure	Balanced cantilever (cast-in-place) and hoisting central span
	Composite superstructure	3	110m-200m-110m = 420 m	Composite superstructure	Launched superstructure
	Composite superstructure with V-shaped piers	5	65m-48.5m-157m-48.5m-65m = 384 m	Composite superstructure	Crane assembly and hoisting central span
	Cable-stayed	5	2x80m-90m-200m-80m = 530 m	Composite superstructure	Launched superstructure Hoisting central span
	2 pylon cable-stayed	4	250m-3x80m = 490 m	Composite superstructure	Hoisting central span

2.1.4.3 *Types of structures considered*

Detailed information on the range of structures considered in the pre-feasibility study is presented in Appendix 1 in order to simplify this section. This information does not usefully contribute to an understanding of the environmental impact.

2.1.4.4 *Scope of work*

2.1.4.4.1 *Deck construction*

The St. Lawrence River crossing (Component D1a and b) and the Seaway crossing (Component D2) will be built using distinct construction methods. Given that the Seaway constraints are particularly demanding, the solutions proposed in the pre-feasibility study were developed with these in mind. The study identified three possible construction methods:

- Balanced cantilever construction over the channel;
- Hoisting the central span, in one or more segments, from the channel;
- Launched superstructure over the canal.

For the river crossing, the construction methods considered in the pre-feasibility study are:

- Launch beam assembly;
- Launched superstructure;
- Crane assembly.

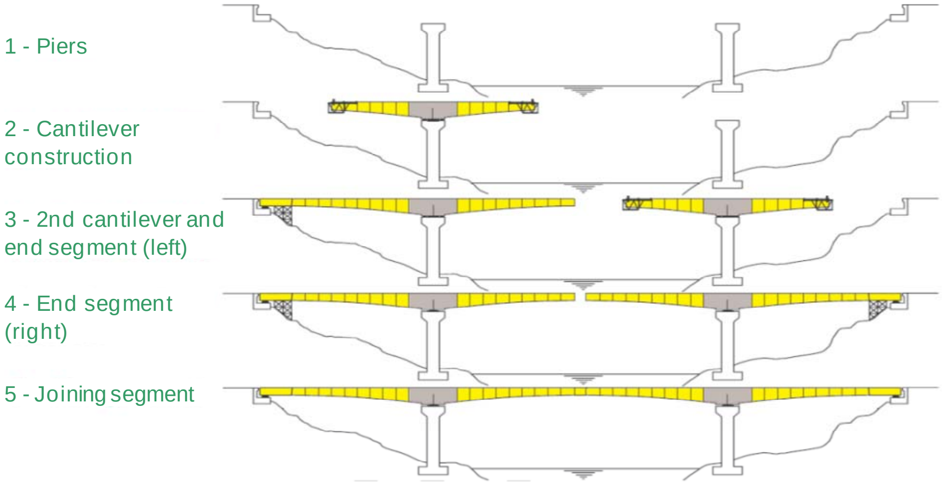
Tables 1, 2 and 3 present the construction techniques considered for the deck. The following sub-sections summarize each technique.

Balanced cantilever

This structure consists of a concrete superstructure that is built by successively increasing the length the deck extends from both sides of a pier. The elements of the superstructure, called segments, are either cast in place or prefabricated and are assembled by pre-stressing to form a part of the deck called a balance bar (since during construction, the deck looks like a gigantic set of scales balanced on its pier). The stability and safety of the balance bar is assured by fitting it provisionally on the pier.

In practice, the construction begins by building the segment over the pier, which effectively extends the pier and constitutes the first element of the deck. The pier segment is a hybrid piece, complex to make, which transfers forces between the superstructure and the pier. Once this first element is completed, construction continues symmetrically with respect to the pier, in order to ensure that the gigantic balance stays in equilibrium, with the segments being concreted as they advance using a machine called a form traveller. Since the work is performed mirror-wise at each end of the balance bar, two form travellers are needed, with each one moving forward after each segment has been completed. Concreting is done by a crane supplying the material in buckets, or by concrete pumps. The segments are connected to each other by prestressing to hold them fixed. Each pier thus has its half balance bars advance to meet those of the neighbouring piers, and the operation to join the two parts of the deck, called joint concreting, occurs using an element known as the keying segment, as shown in Figure 4.

Figure 4 Balanced cantilever – Construction flow

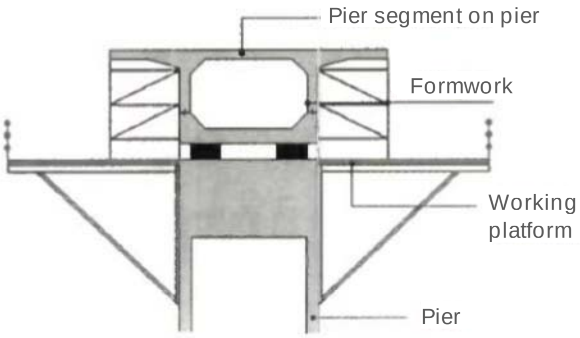


Segments cast in place

When the number of segments required is less than 350 to 400, which is the case for the vast majority of bridges, the deck is cast in place. Beyond that number, prefabrication is preferred to reduce construction time. However, prefabrication is not feasible for spans over 110 m due to the size of the segments and the launch beam.

Pier segments are always built with formwork specific to a given part of the deck and placed on a work platform attached to the top of the pier (see Figure 5).

Figure 5 Balanced cantilever – Construction of pier segment



Fixed steel forms are used for external formwork. Wood is generally used for internal formwork but an articulated metal tool may also be used. On some structures with only one or two piers, both the length and the cost of external formwork for pier segments are reduced by using the external formwork of the form travellers to frame the lateral sections of these segments.

The work platform attached to the metal inserts embedded at the top of the pier cap is rectangular in shape. It is perforated at the centre to allow direct contact direct between the underside of the pier segment, the top of the support stabilizers and the bridge bearings.

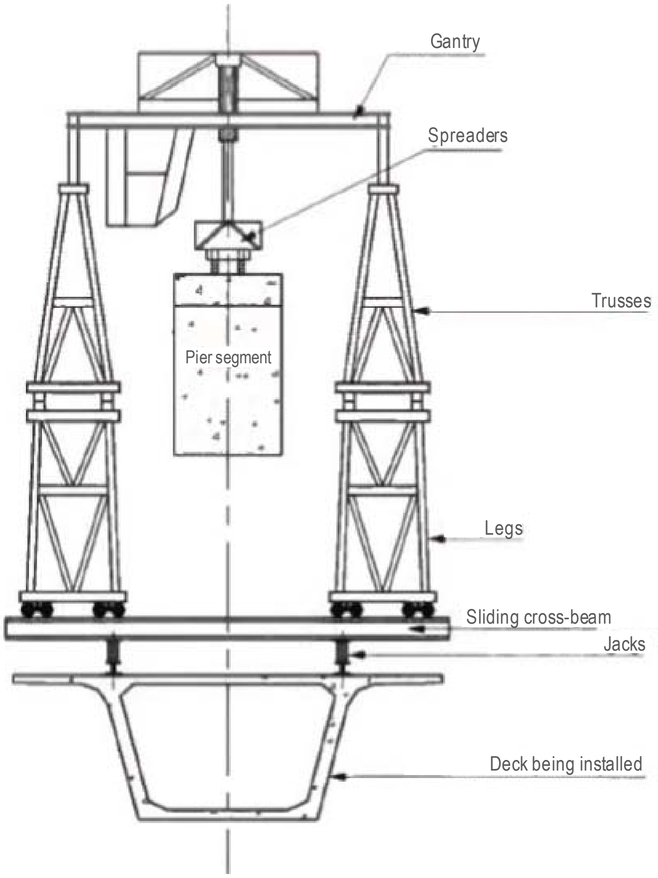
Pier segments are usually constructed in two phases: the first involves the lower slab, gussets and the web toes; the second phase includes the rest of the transverse section and the pier crossbeam. Construction time for a pier segment is between 6 and 10 weeks for a traditional structure but can rise to 15 weeks for very wide structures or structures with very long spans. Standard segments are constructed with very complex formwork tools called form travellers (see Figure 6). Depending on the circumstances, such tools are built for a particular project or can be adapted to a project.

Figure 6 Balanced cantilever – Form traveller

Prefabricated segments – Launch beams

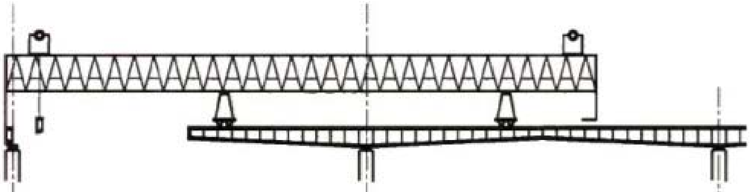
The most common construction method for installing prefabricated segments for a balanced cantilever is the launching gantry. The launching gantry, or launcher (see Figure 7), is a self-propelled independently controlled material handler that is supported on the deck and the piers, and which is therefore free from most crossing constraints.

Figure 7 Launching gantry



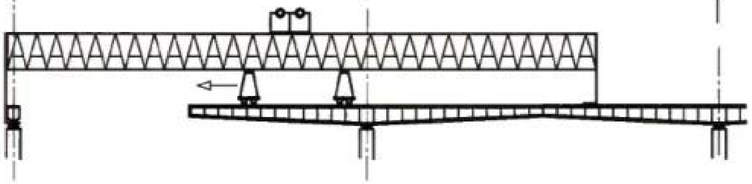
Construction begins by installing segments on the pier. At this stage, the launcher is resting on its two towers and the front jack leg. Once the twin segments on the pier have been assembled, adjusted and bolted, the rear jack leg is extended and the front tower slides to rest above the segment on pier. The launching gantry can then advance so that the rear tower is at the end of the balance bar centred on the previous pier. The front jack leg is then placed at the end of the tower, on the side of the next pier, in order not to interfere with the placement of the current segments, which can then start. During construction of a balance bar, the two symmetrical segments are usually placed one after the other. On some sites, a so-called symmetrical method of installation is used. This method, which consists of synchronizing the release of the segments to the left and the right of the pier by the two gantries, limits the stress placed on the supports by eliminating situations of deliberate imbalance. The construction flow is shown in Figure 8.

Figure 8 Launching gantry – Construction flow



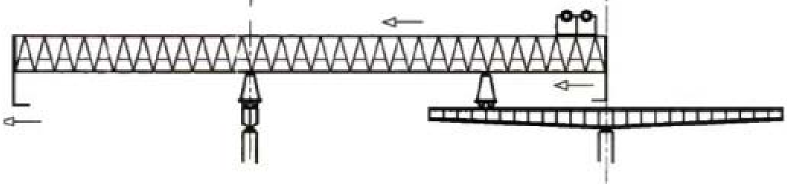
① **Placement position of ½ segments on piers**

(supported by the front jack leg and the towers)



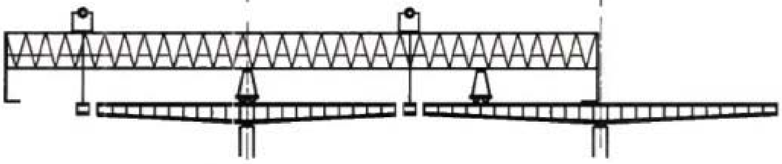
② **Tower shifting scheme**

(supported on jack legs)



③ **Shifting of main truss girder and jack legs**

(supported by the towers)



④ **Position for placing regular segments**

(supported by the towers)

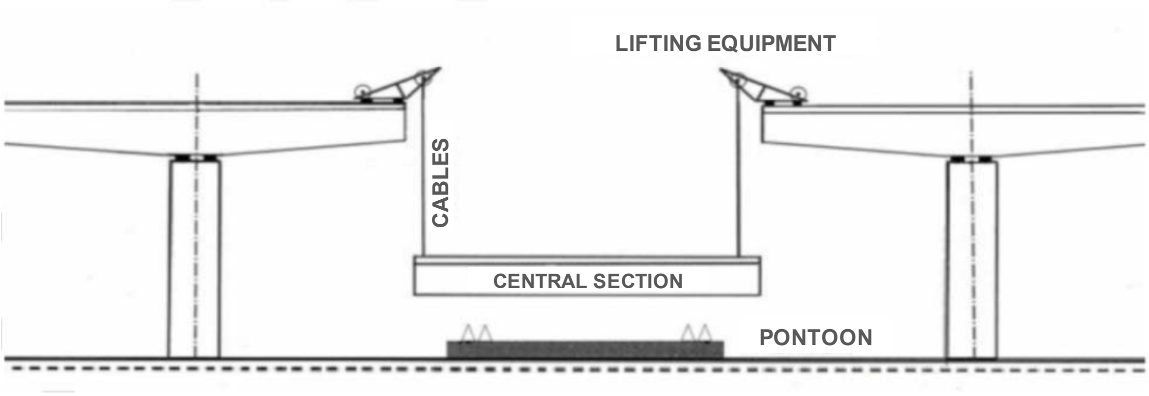
Hoisted structure

When it is necessary to cross a navigable waterway that requires substantial clearance, one method often used is hoisting. This proven method consists of fabricating the central section on land and then transporting it by barge in the channel to the foot of the bridge. The section is then hoisted by equipment attached to the portion of the deck already built or by cranes mounted on barges. Once the new section is in place, it is connected to the existing deck.

The main advantage of this method is that it makes it possible to minimize disruption of marine traffic. The equipment can also lift very large loads, thus limiting the number of hoisting operations. Figure 9 illustrates this construction method. The main disadvantage of this method is its dependence on the weather, since winds must be moderate to be able to control the assembly operations.

It is also possible to divide up the operation by hoisting several smaller, lighter deck components. This solution has the advantage of limiting the importance of the lift equipment but requires a greater number of hoisting operations.

Figure 9 Hoisting concept



Launched superstructure

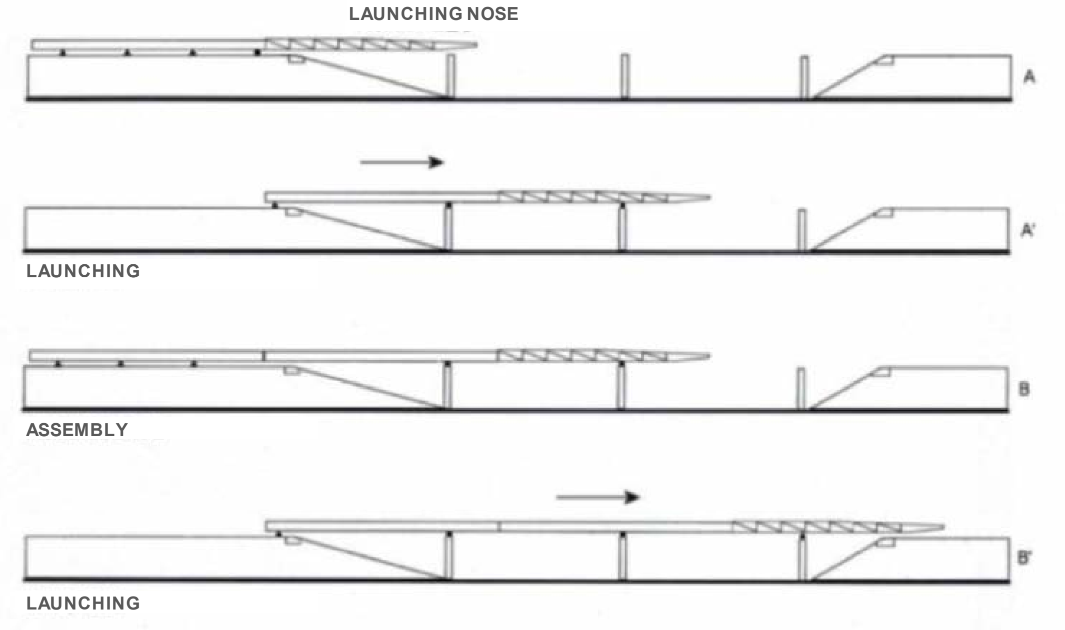
It is unlikely that the Seaway authorities will authorize the installation of temporary groups of piers in the channel. Therefore, given the size of this span, incremental launching from both sides should be considered. In fact, the maximum launching range is in the order of 140 m, which is far below the span of approximately 200 m required by the channel.

Incremental launching can be carried out while the Seaway is in use, as is done in many places around the world. This technique is in fact used commonly in many countries for crossing traffic zones – road, railway, marine – without imposing special restrictions on their operations.

Incremental launching is one of the most common methods used around the world for erecting metal superstructures. The principle of incremental launching is to advance the structure by having it roll or slide on supports until it reaches its final position, after being assembled in a staging area behind one of the abutments (Figure 10). The launching nose, a light, temporary, metallic structure attached to the front of the superstructure, is required to reduce the cantilever stresses and to facilitate docking on the next pier.

When launching is done from both sides, the launching nose is no longer required for launching operations where the two half-structures meet. In fact, it must be dismantled in order to bring the two deck halves together.

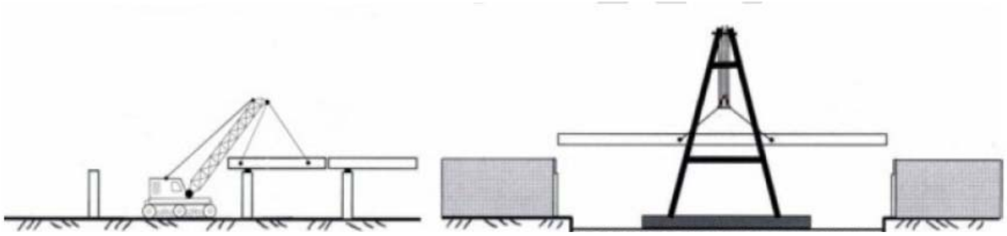
Figure 10 Launching concept



Crane assembly – Metal superstructures

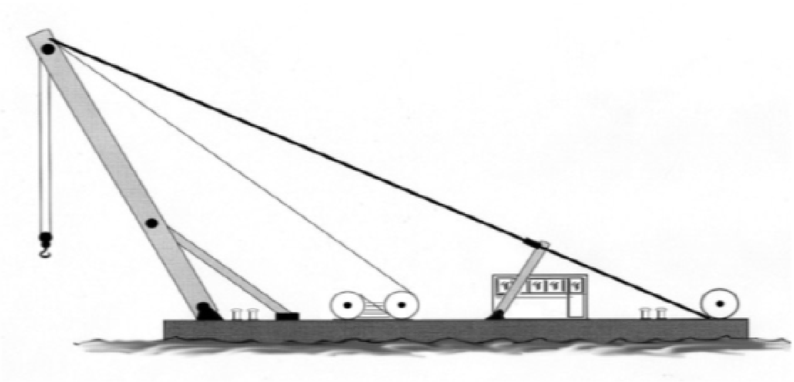
Another possible construction method for the river crossing is crane assembly (Figure 11). The concept consists of lifting the superstructure, using one or more pieces of lifting apparatus to place it on its supports. The dimensions of the elements to be lifted are the result of optimizing the number of crane operations, the weight of the elements and the equipment necessary to perform the lift.

Figure 11 Crane assembly



Cranes can be used both on land and at aquatic sites. In the latter case, a crane barge with a heavy lift derrick is used. A crane barge is a mechanized barge on which a lifting apparatus is attached consisting of a frame hinged at its base, with a variable angle, carrying a hoist at its upper end (Figure 12). This type of equipment can lift components a hundred metres. Depending on the site, each segment is manoeuvred into place by one or two cranes positioned at the ends of the structure, or on the route being crossed.

Figure 12 Crane assembly – Heavy lift derrick



Depending on the dimensions of the parts and the capacity of the cranes, the frame can be lifted in complete, previously assembled sections and thus in one piece, or in multiple pieces which are then assembled at height.

The heavy lift derrick is positioned to best facilitate lifting while taking into account interactions with river traffic and ensuring sufficient draught, which will require a bathymetric survey.

2.1.4.4.2 Piers

As mentioned earlier, the placement of the piers will be chosen to reduce the number of piers in comparison with the existing bridge while offering economically attractive spans. With spans in the order of 80 m in the current zone, the number of piers per deck is lower (approximately 12 piers fewer per deck).

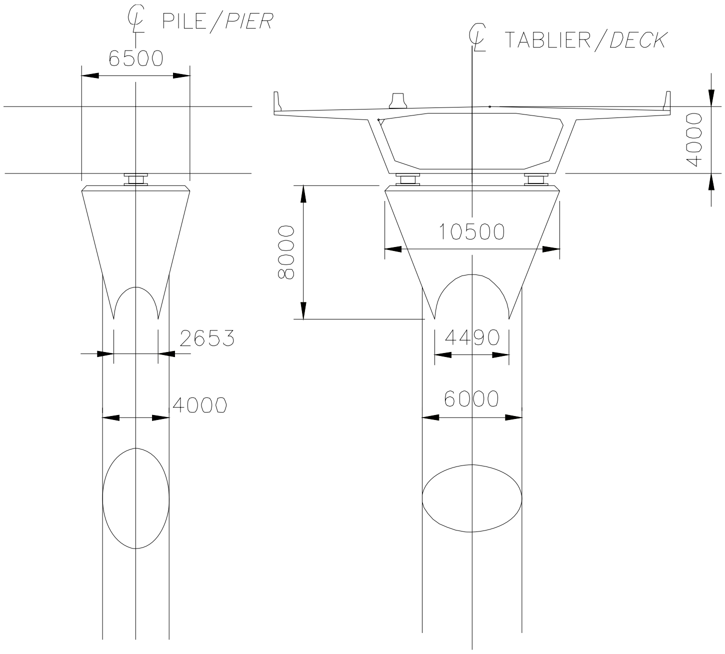
For the balanced cantilever bridge solutions, both composite and hybrid, two options are possible for the location of the piers. Since two distinct decks are necessary, the piers for the two decks can be offset, or not, in the longitudinal axis of the bridge. The offset solution for locating the piers was chosen in the pre-feasibility study as this seemed preferable given the hydraulic constraints though it is less favourable from an aesthetic standpoint.

For solutions with V-shaped piers and for a cable-stayed bridge, the piers must be aligned for aesthetic considerations, which slightly increases the distance to cross over the Seaway. For those solutions, if it is deemed necessary, in particular by hydraulic constraints, it is possible to go back to offset piers for the St-Lawrence crossing by using transition spans on each side of the main span.

The piers considered for all the solutions except the V-shaped piers are elliptical or circular in section, hollow and made of concrete. The section and the height of the piers favour the use of hollow piers. In fact, the volume of concrete required, as well as the weight of the pier, amply justifies the use of hollow piers, which while more difficult to install offer an economic benefit.

A similar solution – a hollow section – was chosen for the cable-stayed bridge pylons.

Figure 13 Piers



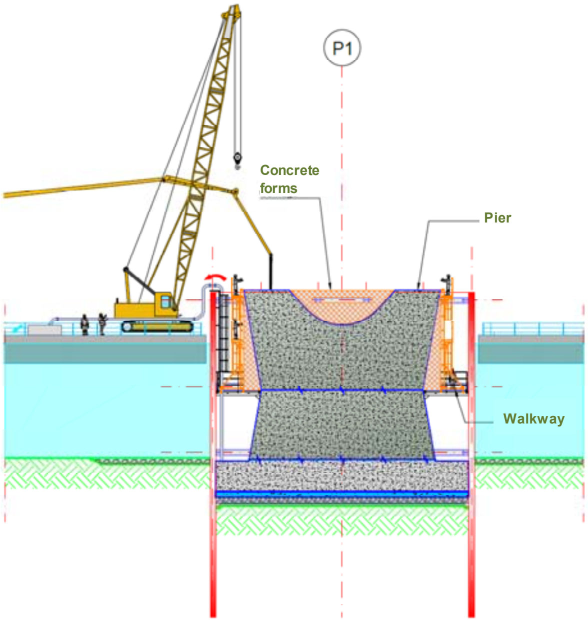
For V-shaped piers, metal piers are proposed. This type of structure has been used notably in Le Havre in France, as seen in Figure 14. These metal piers have the advantage of being light and are better suited to the deck for this particular solution.

Figure 14 V-shaped piers– Le Havre Grand Canal

2.1.4.4.3 *Foundations*

Since the existing bridge was built on shallow foundations, it seems feasible, at this point in the development phase, to opt for a similar solution for the new bridge. The foundation footings would be built inside sheet pile coffer-dams and would lie on the basement rock, below the modified surface area (see Figure 15).

Figure 15 Coffer-dams



If the future geotechnical investigations indicate that piles are required, sheet pile coffer-dams would also be needed to create a dry space where the connecting footings for the piles can be poured.

The use of coffer-dams would certainly be a quite valid option. This option could, however, entail some difficulties and disadvantages that should be noted.

In terms of construction, while it is naturally possible to drive sheet piles into fractured rock, the type of sheet pile used can depend on penetration resistance rather than the strength of the sheet pile wall. If necessary, various techniques, such as predrilling, can minimize this problem, and may be necessary for the embankments required.

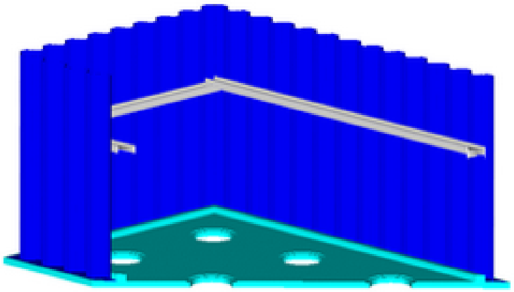
Dewatering the coffer-dam may also be difficult, in the case where the rock is so broken up that water ingress is possible. In fact, water ingress in the coffer-dams posed some difficulties during the foundation work on the existing bridge. To eliminate this problem and provide a safe work area for personnel, leaks can be plugged with underwater concrete.

To minimize the impact on the environment, a special solution could be used, either for all foundation work or only for the most critical areas. This would involve the use of a box consisting of a concrete base and sheet pile sides.

The box would be constructed on dry land. Openings – plugged temporarily – would be provided in the base for bored piles (see Figures 16 and 17). The box would be floated into position over the footprint of the future foundation and secured in place at a specified distance from the river bed by tubes (not shown in the figures) lying on the bottom. The plugs would then be removed and the box would fill with water.

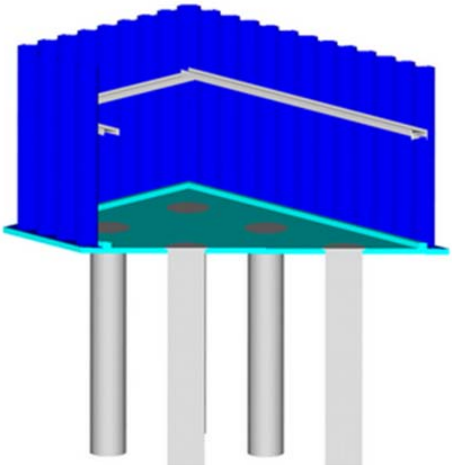
Figure 16 Prefabricated coffer-dam

Figure 17 Prefabricated coffer-dam – Stage 1



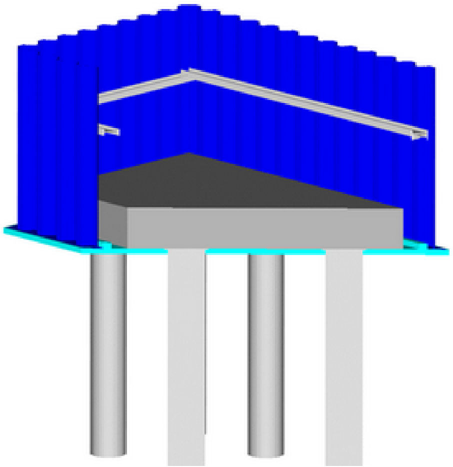
Tubes for the piles would then be inserted through the openings. As the pile is bored, its tube is driven down. When the pile boring is complete, the tube presses against a steel collar and a seal on the bottom of the box (see Figure 18).

Figure 18 Prefabricated coffer-dam – Stage 2



When all the piles are in place, the box can be pumped out, and the buoyant force presses the box against the steel collars. The pile connecting footing can then be built (see Figure 19), followed by the pier. The sheet pile walls can be removed and reused to build another box.

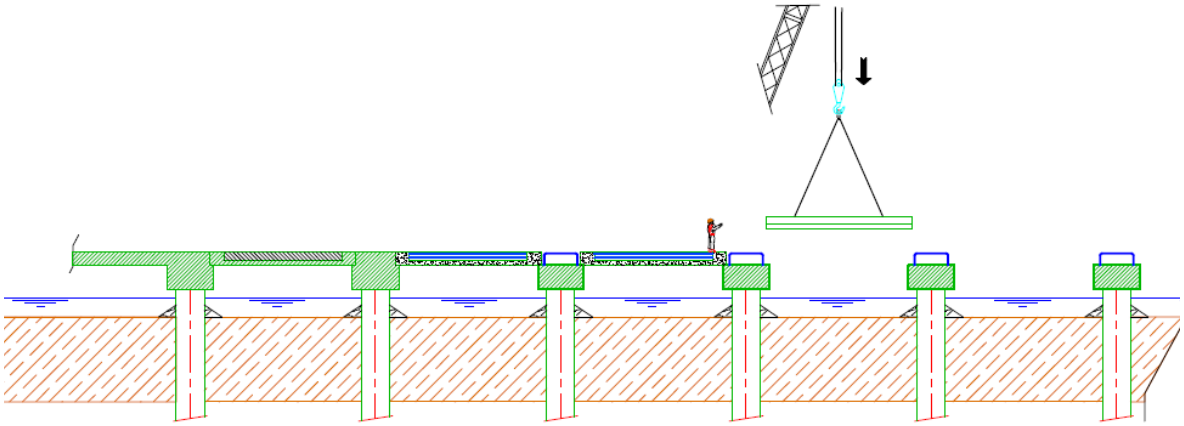
Figure 19 Prefabricated coffer-dam – Stage 3



This solution presupposes, however, that the water level will be at a minimum during the low water season, depending essentially on the thickness of the footing. One possible outcome is that the footing is visible at low water.

For piers close to the shore, where the water is too shallow to use barges, several solutions are available, such as building jetties or a temporary bridge on piles (see Figure 20). The latter solution has the advantage of providing a dock for the marine components of the site work.

Figure 20 Temporary bridge on piles



2.1.4.5 *Estimated work duration*

The duration of the work depends on the type of structure and the construction method used. Following the decision by the authorities concerned, the work duration can therefore be determined.

However, depending on the construction method used for the deck, it is possible to estimate the duration of the interaction between this work and the Seaway. The interaction of the work with the Seaway may simply require that additional precautions be taken when ships are going by, but the Seaway may also need to be closed for brief periods. These estimates are provided in Table 4.

Table 4 Duration of interaction with Seaway based on construction method and type of structure

TYPE OF STRUCTURE	CONSTRUCTION METHOD FOR DECK	DURATION OF INTERACTION WITH SEAWAY
Cable-stayed bridge	Hoisting	7 days
Steel-concrete framework	Hoisting	2 to 4 days
Prefabricated concrete	Launching	2 days

The duration of certain activities can be estimated for each of the construction methods selected. However, the supply of construction materials and job site organization are determining factors in the progress of work.

2.1.4.5.1 *Balanced cantilever*

Cast-in-place segments

Current segments of standard dimensions and shape are almost always poured in a single phase. As a rule, a pair of current segments takes one week to build (placing concrete, shifting the mobile crew, etc.).

Prefabricated segments – launching gantry

At any given time, the rate of progress of a job site employing prefabricated segments can vary widely. The average rate of progress is 6 m per day, which translates to one pair of segments per day.

2.1.4.5.2 Hoisted structure

Where the centre span consists of just one section, it is possible to place it in alignment with the piers, hoist it, and secure the connections between the centre span and the previously assembled part of the structure in one to two days.

When hoisting in sections, the operation takes less time. For each section, generally four hours must be allocated just for hoisting, and one to two days in total including securing to the previously built part of the structure.

2.1.4.5.3 Launched bridge

Given the large number of launched bridges around the world, average construction times have been worked out. The operations can be summarized as follows:

- assembling frame components in the assembly area: for double girders with bracing, one week on average per section to create the two girder joints and attach the braces; with double girders for deck parts, from 1.5 to 2 weeks for the two welded joints between the main girders and assembling the deck parts;
- launching: one week per launch, although the launch itself takes only one day for a span of 50 to 70 m and two days to launch a bridge with three spans 100 to 150 m in length, but time must be allowed for installing the winch, adjusting the bracket levels, intermediate jacking, etc.;
- lowering onto temporary supports: must be done in stages, alternating between the various supports, and will of course depend on the number of supports involved and the height of the launch supports or braces. The number of days of work can be estimated by dividing the cumulative height to be lowered on all the support lines by 50 cm. Beforehand, the launching equipment must be removed and replaced with supports or braces, which takes about one additional week per support line.

When optimum speed has been achieved and not counting unforeseen elements, the rate of launching progress is about 50 cm per minute, or 30 m per hour, although the rate at any given time can be as high as 45 or even 60 m/h. The average rate, however, is much lower due to the delicate work involved in positioning on a pier, the dropping of a bracket at the rear, differences in intermediary support levels, and repositioning the cables in the system of pulleys connected to the traction winch.

2.1.4.5.4 Assembling by crane – steel framework

Once the section is in place below its final position, installing it doesn't take much time: about 4 hours. Considering the various operations involved and securing the component in place, the overall time can be estimated at one to two days.

2.1.4.6 Traffic management

The New Bridge for the St. Lawrence will be erected on the downstream (north) side of the existing Champlain Bridge. This location was preferred due to the availability of land north of Nuns' Island, but in particular with a view to minimizing the adverse impact on nearby residential areas. The alignment of the new bridge was determined with a view to preserving existing infrastructure as much as possible. However, on Nuns' Island, René Lévesque Boulevard and the bike path may need to be relocated (to a minor extent), since they are currently within the proposed alignment, which will also require adjustments to the traffic circle. As regards the South Shore, the on-ramps and off-ramps of the new bridge will require some improvements and adjustments to expedite traffic flow, particularly with regard to acceleration and deceleration lanes.

The pre-feasibility study proposed the following in order to maintain traffic flow with the alignment selected. The principal element for facilitating traffic flow stems from the fact that the existing bridge will continue to be used essentially throughout construction of the new bridge just downstream. Work on the approaches, however, will affect traffic. In order to complete all roadwork on the two approaches to the new bridge simultaneously, it will be necessary to work in phases on both the west (Nuns' Island) and the east approaches (Brossard). Three main phases have been proposed, as follows:

- The preparation phase is to consist of building temporary detour roads and putting in place all elements required to maintain traffic flow (marking, work site signage and others);
- Phase 1 of the work will consist of building almost all roadways on the bridge approaches;
- Phase 2 will consist of completing work on the west approach to connect the on-ramp from Bonaventure Expressway/Nuns' Island to the new section of Highway 10 East. Also included in this phase is the work on the east bridge approach for the access ramps (off-ramp for Highway 10 East/Route 132 and on-ramp for Route 132/Highway 10 East) and on Highway 10 East. Finally, this phase will include dismantling the temporary facilities and deconstructing the existing roadways, except those elements required in the deconstruction of the existing Champlain Bridge.

Under this proposal, during all phases of the project, the current number of traffic lanes will be maintained on all roads in the area. However, during the work on the approaches, the configuration of on- and off-lanes may cause some slowing of traffic due to the slope and curve radius of temporary ramps. It is noted that the work on the approaches will be of limited duration when compared with the bridge project as a whole.

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, as on the New Bridge for the St. Lawrence, each lane being 3.7 m wide, and a 1.3 m shoulder on the left and a 3.0 m shoulder on the right. Also, a space on the site in the middle of the highway reserved exclusively for urban transit (LRT or dedicated bus lane) is planned to link up with existing transit infrastructure on the South Shore, which is currently used by buses.

Since the new bridge will be erected downstream of the existing bridge, the new section of Highway 10 will be about 60 m closer to the residential area in the northeast quadrant of the Highway 10/132 interchange (the distance will decrease from 220 to 160 m). As for longitudinal profile, conditions related to height clearance over the St. Lawrence Seaway require that the structure be raised by 4 to 8 m, depending on the bridge type decided upon.

At present, there are no plans to purchase property to accommodate this solution because the footprint falls within properties owned by either the MTQ or the City of Longueuil.

2.1.5.1 Scope of work

The proposed solution calls for the reconstruction of about 750 metres of Highway 10 to connect with the existing highway. The main components of this work would be:

- Provision for maintaining traffic flow as required during the different phases of the project in order to clear the work areas and allow work to proceed;
- Earthwork, including excavation and fill below the infrastructure line;
- Moving utilities (e.g., Hydro-Québec high tension lines);
- Construction of drainage systems (pipes, manholes, catch basins, sewer drains, etc.);
- Civil engineering work for lighting, signage and intelligent transportation systems (ITS) (bases and conduit);
- Roadway construction (sub-base, base and possibly a surface concrete slab given the option selected for the Turcot interchange and for Highway 10 on the South Shore);
- Building retaining systems (guardrails), sidewalks and curbs;
- Installing overhead and other signage;
- Installing lighting and ITS (towers, poles, changeable message signs, cameras, etc.);
- Installing noise barriers (if required);
- Landscaping (plantings, topsoil and grass seeding).

2.1.5.2 Estimated work duration

The time required for this component of the project is 6 months.

2.1.5.3 Traffic management

The issue of traffic flow maintenance in the project area was examined in the pre-feasibility study. It can be broken down into three specific sectors, each with its own particular features, which are taken into account when determining what temporary configurations are needed to maintain traffic flow.

2.1.5.3.1 Section of Route 132

In this sector, the future bridge crosses over Route 132 and the service roads. This requires traffic management procedures that involve completely closing Route 132 and/or the service roads at night during some construction activities (installing beams, formwork and pouring concrete for the slab). Completely closing Route 132 and/or the service roads will require establishing narrower lanes, by-pass lanes and contraflow configurations on Route 132.

2.1.5.3.2 Access ramps for Route 132

This sector poses the greatest challenge for maintaining traffic because of the very great difference in level between the existing and proposed profiles. For this reason, a retaining wall will have to be built between the lanes of traffic and the work area. Also, the temporary configurations (slopes and radii of the access ramps) may reduce user comfort and impact capacity.

2.1.5.3.3 Eastern sector – Connection to the existing A-10

This sector is different because the proposed profile lies on the existing road. Despite this, the work can be carried out in the same phases as in the other sectors, except that there is a smaller margin for manoeuvre because the right-of-way is narrower here. This may reduce capacity along the axis of the highway.

2.1.6 Deconstruction of existing Champlain Bridge and Nuns’ Island Bridge (Components F and G)

For both bridges, the proposed deconstruction method is based on the principle of sawing the concrete spans and piers using diamond-encrusted wire cables and dismantling the entire steel spans, and then dismantling various other elements singly. In the case of the Champlain Bridge, the largest pieces would be transported by barge to the Seaway jetty, where the blocks would be reduced and then taken by truck to the South Shore (see Figure 21). In the case of the Nuns’ Island Bridge, the largest pieces would be taken to Montreal, either by barge or using a launch beam. The blocks would then be reduced and taken by truck to disposal or reclamation sites (see Figure 23). Reclamation is always the preferred option.

Figure 21 Transport of deconstruction items from the Champlain Bridge to the jetty

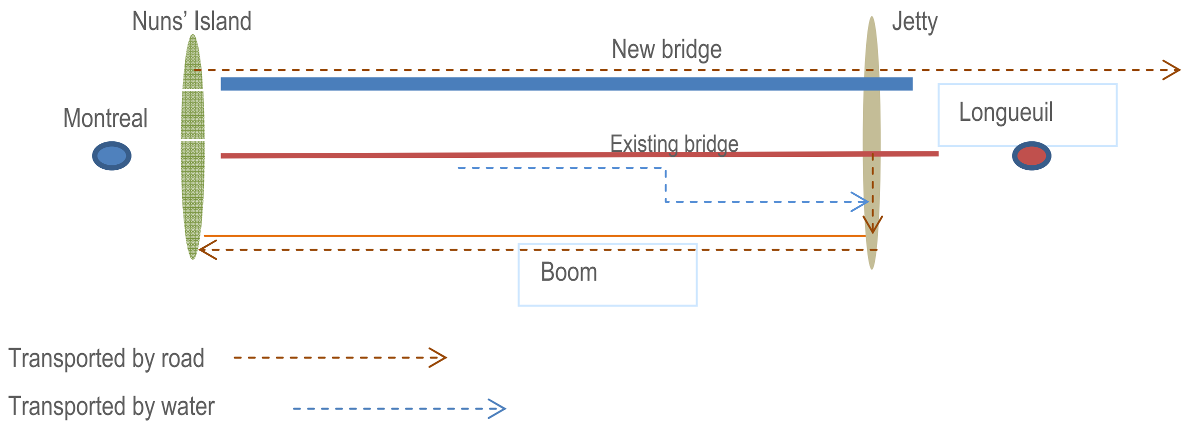
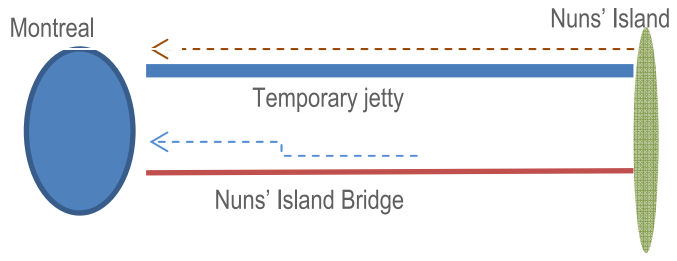


Figure 22 Transport of deconstruction items from Nuns' Island Bridge to Montreal



2.1.6.1 *Deconstruction of Champlain Bridge*

The Champlain Bridge will be deconstructed once construction of the New Bridge for the St. Lawrence has been completed.

The structure of the Champlain Bridge can be divided into two main sections—the “steel portion” and the “concrete portion.” The steel structure is in the major section above the Seaway and sits on adjacent spans. The concrete structure, which was built of prefabricated, pre-stressed concrete beams, is made up of more than 40 spans crossing the St. Lawrence River on the Montreal side and 10 spans in the area between the Seaway and the South Shore.

The entire structure contains approximately 165,000 tonnes of concrete and 13,300 tonnes of steel (6,500 in the structure and 6,800 in the deck.

2.1.6.1.1 *Scope of work*

Table 5 shows the various activities that need to be carried out in connection with the deconstruction of the Champlain Bridge.

Table 5 Activities involved in deconstruction of the Champlain Bridge

PORTION	SECTION	ACTIVITY
Seaway	Central suspended span (1,050 tonnes)	► Coordinate with SLSMC to carry out these activities when there is no ice on the Seaway and prior to the official opening (if the water level allows access). Consideration must be given to the fact that water-based operations are prohibited from December to July. ► Install strand-jack support/lift system. ► Detach span and lower it to barges (55 m x 16 m). ► Transport on barges away from the navigable channel to the South-Shore basin. ► Stabilize barge system using anchors or stabilizing piers. ► Reopen Seaway (the following day). ► Dismantle the span on the barge and load simplest elements using a LIEBHERR LHM 600 S crane (cap. of 208 tonnes at 21 m) onto a transport barge. ► Transport by barge to site of jetty. ► Load onto trucks and transport to recycling/reclamation plant. ► Clean up in compliance with environmental restrictions (possible presence of lead and other contaminants[1]).
	Cantilevered spans (2 x 390 tonnes)	► Successively dismantle and lower small elements using two (2) cranes. ► Transport by barge (South-Shore side) to site of jetty or by truck (Montreal side) directly to a recycling plant. ► Unload barge (span from South Shore side) to the jetty site, load onto trucks and take to recycling/reclamation plant. ► Clean up in compliance with environmental restrictions.
	Anchor spans (2 x 1,280 tonnes)	► Install support systems on ground (jetty and dike) and in the water at each end of the spans (near piers), in compliance with restriction period on conducting work on water and in the spawning area around the island. ► Detach the span and place on barges and on the ground (jetty and dike). ► Dismantle spans into smaller pieces. ► Transport by barge to the jetty or by truck (jetty) directly to a recycling/reclamation plant. ► Unload from barge and load onto trucks. ► Transport to recycling/reclamation plant. ► Clean up in compliance with environmental restrictions.

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[1] **Originally, lead paint was used to paint the Champlain Bridge structure. The structure was repainted with a zinc-epoxy-urethane system and the orthotropic deck (built in 1992) has a zinc-based system.**

Table 5 (Cont'd) Activities involved in deconstruction of the Champlain Bridge

PORTION	SECTION	ACTIVITY
	Approach spans (4 x 520 tonnes)	► Install support system in water at each end of the spans (near piers). ► Detach span and place on a barge. ► Dismantle spans in small pieces. ► Transport by barge to jetty site. ► Load onto trucks. ► Truck to recycling plant and clean up in compliance with environmental limitations.
River and Lesser La Prairie Basin	Deck 40 spans of approx. 54 m on the Montreal side and 10 spans (of ± 51 m to ± 54 m) on the South Shore side	► Install launch girder (± 120 m long) with three (3) lift systems and four (4) diamond cable saws. ► Drill 18 holes in the longitudinal saw lines (6 holes per saw cut). ► Install lift system to support the sectioned portions. ► Moor barge underneath the span. ► Install a system to recover water resulting from sawing (sawing mud). ► Saw deck longitudinally. ► Saw transversally into blocks of ± 60 or ± 150 T. ► Lower blocks in succession and place on barge; "waiting" portions of deck remain in place supported by beams suspended from the launch girders. ► Transport by barge to jetty site.
	Portal cap beams (100 and 125 T)	► Install a system to capture water resulting from sawing operation at base of pier. ► Moor a transport barge and floating crane. ► Install lift device to support the sawn portion. ► Saw near extremities of the pier. ► Lift and place blocks onto barge for transport to jetty site.
Seaway, river and Lesser La Prairie Basin	Piers Section 6: 8 piers - 3 columns Sections 5 and 7: 50 piers in blocks 2 m high and weighing 110 T	► Over-water sawing. ► Moor transport barge. ► Install sawing apparatus. ► Moor floating crane. ► Partial sawing prior to installation of lift equipment. ► Anchor crane lift equipment to support sawn portions. ► Transversally cut portal cap beam near extremities of pier. ► Lift and place blocks on barge. ► Install sawing apparatus for next section. ► Etc. (repeat sequence). ► Dismantle system for capturing water resulting from sawing process.
		► Below-water sawing. ► Install equipment for sawing below water level. ► Install underwater system for suctioning water produced during sawing process and nets (screens) to confine suspended particles. ► Lift blocks and place on barge for transport to jetty site. ► Etc. (repeat sequence). ► Saw down to within 300 mm above base of pier.

Deconstruction of the piers will be carried out toward the end of the recommended deconstruction period. The bases of the piers could be left in place in order to avoid disturbing the river bottom and to allow for the establishment of potential fish habitats, provided this practice would not entail any dangers to navigation or have any negative or undesirable impact on the ice process, visual aspects, ownership rights, etc. All of these aspects will have to be assessed before any final decision is made. Further, the work will have to be authorized in advance by the appropriate officials. From a financial standpoint, the complete deconstruction of the bases would represent additional costs of approximately $20 million.

In addition, it must be remembered that the blocks taken from the deck or the piers will have to be sawn, once they arrive at the jobsite. This work involves:

- Unloading onto the jetty on the sawing lines;
- Sawing into truck-transportable pieces (± 20 T);
- Transportation to a crushing plant for re-use as backfill, subject to environmental classification.

The duration of the operations to deconstruct the spans resulting from limitations on work in the water and a suspension of deconstruction operations in the winter have led to consideration of two areas where the work could possibly be done in parallel. This work would begin in parallel with the work to deconstruct the steel spans, or immediately after removal of the orthotropic deck, which is part of steel component D2.

2.1.6.1.2 *Estimated work duration*

It is estimated that the work to deconstruct the Champlain Bridge will take three years. This estimate takes the winter period (December-March) into account.

2.1.6.2 *Deconstruction of Nuns' Island Bridge*

Deconstruction of the Nuns’ Island Bridge will occur after a temporary causeway has been built downstream of the existing bridge. The construction, operation and dismantling of this causeway will be analyzed under a separate environmental assessment for which JCCBI will be responsible. The new Nuns’ Island Bridge will be built along the same axis as the existing bridge using pre-stressed pre-fabricated concrete beams. It will be made up of twelve 39-metre spans, and include 11 beams mounted on a 165-mm slab.

There are approximately 16,500 tonnes of concrete decking to be deconstructed, approximately 18,000 tonnes of concrete in the piers and 16,200 tonnes of concrete in the bases.

2.1.6.2.1 *Scope of work*

One method often used in deconstructing bridges involves deconstruction from barges. For example, the concrete elements are cut up using hydraulic shears and are then taken by barge to shore. While the height of the piers above the water level lends itself to this type of deconstruction, it is not certain that this method can be used because the draught is rather shallow. In order to use this method, the bathymetry and the water-level fluctuations will need to be carefully studied to ensure that the water depth is sufficient for the barges throughout the deconstruction operations.

If barge-based deconstruction is eliminated as an option, the same method that was proposed for the deconstruction of sections 5 and 7 of the Champlain Bridge could be used, because these two sections, like the Nuns’ Island Bridge, are made of prefabricated beams that are simply supported. The spans on the Nuns’ Island Bridge are shorter than those on the Champlain Bridge and so the same type of equipment can be used for both the deck and the piers.

2.1.6.2.2 *Estimated work duration*

Deconstruction of the Nuns’ Island Bridge is estimated to take five months.

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. A map of the areas where the private partner can potentially set up shop will need to be determined, as will a listing of the various available river access locations. There is no doubt that a portion of the jobsite will have to be supplied via the river, but it is important to state that the scope of this project will amply justify investments on the part of the private partner. For example, it is natural that a new jetty will need to be built.

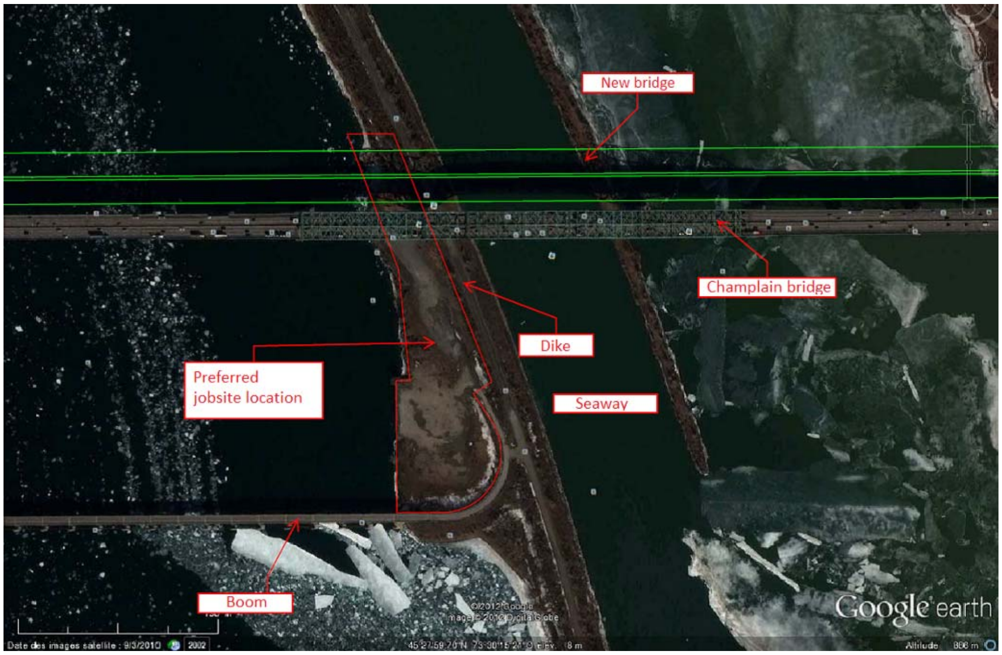
When the contractor is working in close proximity to the riverbanks, it is quite likely that it will need to use temporary bridges or causeways. Approvals will be required for all temporary work, and the locations of these sites will need to be submitted for approval, as will their detailed plans. The private partner will need to pay special attention to the operations of pleasure craft, both motorized and non-motorized, pedestrian pathways and bike trails.

Areas with a potential for the installation of jobsite facilities have been identified for this contract by the Dessau-Cima joint venture. One possibility is to allow the private partner to locate its jobsite on the extension of the planned bridge, on Nuns’ Island. To allow this to happen, the roadway will have to be realigned, and it is possible that the area currently occupied by the former Champlain Bridge tollbooth will have to be completely modified, or even deconstructed, in order to allow traffic to pass. This area will be especially important if the new bridge is launched. The space between the boom and the existing Champlain Bridge could also serve as a jobsite (see Figure 23).

Figure 23 Jobsite location – Nuns' Island

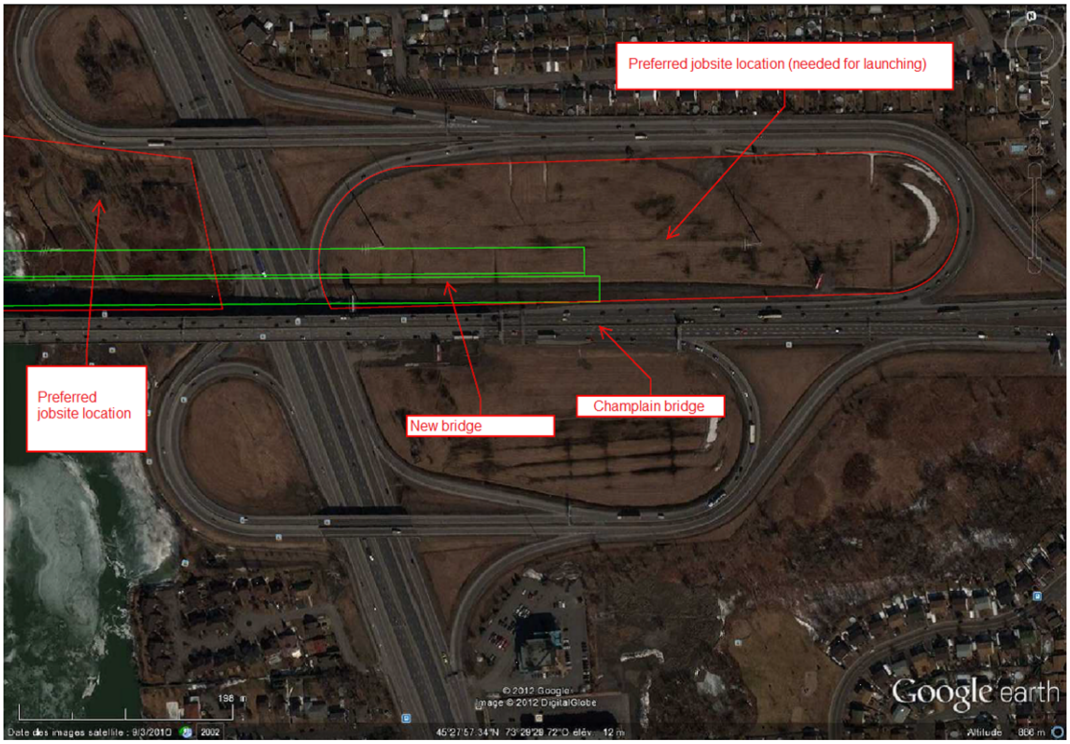
For the Seaway span, a jobsite could be set up on the dike (see Figure 24).

Figure 24 Jobsite location – Dike



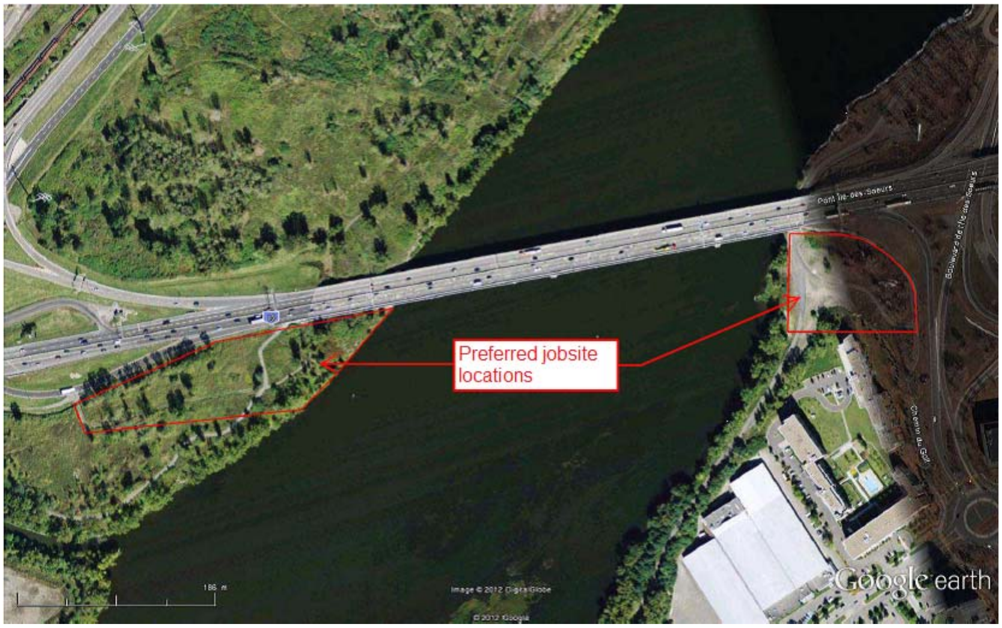
Finally, for the spans of the La Prairie Lesser Basin, space is required in the extended part of the new bridge, as shown in Figure 25. This area is important if the bridge is to be launched. The area in between the ramps could also be used for various site facilities.

Figure 25 Jobsite – South Shore



Regarding the construction of the new Nuns' Island Bridge there are two possible options upstream from the existing bridge, one on Nuns' Island and the other on the Island of Montreal (see Figure 26). The space available on Nuns' Island may not be large enough and using it would require closing the bike path. On the Montreal side, an area owned by the federal government and identified as contaminated would be suitable for setting up a jobsite.

Figure 26 Jobsite – 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 have to be dismantled. Areas used by the private partner for its jobsite (pre-fabrication area, launch area, etc.), must 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

During the operational phase, monitoring of the structures' conditions (inspections) will be required in order to ensure user safety throughout the useful lifespan of the bridge and to appropriately plan for maintenance activities that could have an impact on commercial ship traffic whenever the maintenance work is required in the St. Lawrence Seaway section.

2.1.9.1 Inspection

Inspections will be required at regular pre-defined intervals specified by the operating authorities. 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.

Provision must also be made for underwater inspections, in particular to ensure that there are no problems involving underwashing.

2.1.9.2 Maintenance

Throughout their useful lifespans, structures require maintenance, which can be subdivided into two categories: routine maintenance and heavy 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.

Bearing replacement requires a perimeter of approximately 5 m around the piers. None of this maintenance activity must encroach upon the Seaway clearances.

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.

Repairs to the concrete and painting should not encroach on the Seaway clearances, and replacement of the slab could impact seaway traffic, depending on the method used for the deck.

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. For example, efforts need to be made to minimize the number of expansion joints included in the design. In so doing, the number of locations where interventions are required is reduced. In addition, by minimizing the number of joints, damage caused to the foundation units by possible waterproofing-related problems will be reduced.

Numerous maintenance operations, such as replacement of the joints or the asphalt, will require traffic on the structures to be interrupted. If the bridge has two separate decks, all traffic could be rerouted to the other deck while maintenance work is being done.

2.1.10 Summary of activities

Table 6 shows all activities that are required as part of the various works. These activities have been grouped into project components, as described in the previous sections.

2.2 IMPLEMENTATION PHASES AND COMPLETION TIMETABLE

The total estimated time required to build the New Bridge for the St. Lawrence is 5 years. Deconstruction of the existing bridge is estimated to take 3 years.

These estimates must take into account the following periods, when restrictions will be in place:

- Restriction on in-water work;
- Restriction on work on Seaway;
- Suspension of certain work during the winter period.

2.3 DESCRIPTION AND ANALYSIS OF ALTERNATE SOLUTIONS CONSIDERED

2.3.1 Maintain the existing bridge

The pre-feasibility report contains expert findings which show that ever-increasing maintenance costs would be required to extend the useful life of the existing Champlain Bridge; this would not raise the level of its seismic performance or rehabilitate the deck.

Based on the information reported in this study, a seismic analysis shows a substantial lack of resistance, even without taking into account the degree of pier deterioration. Further, the concrete superstructure of the existing Champlain Bridge, which accounts for 80% of the total length of the bridge, is configured in such a way that rehabilitating the deck, which is deemed critically necessary after so many years of service, would involve a complete reconstruction of all the spans. Add to this the fact that, according to the consultant's report, the original concrete is contaminated with chloride ions, which promote corrosion in the reinforcing steel and the prestressing steel.

The current level of bridge deterioration, maintenance work that will require ever-increasing amounts of money, and the technical challenges encountered all mean that maintaining the existing bridge is not one of the options chosen by TC.

Table 6 Activities planned for the project

	PROJECT COMPONENTS						PROJECT COMPONENTS			
	Component A -Reconstruction and expansion of Highway 15	Component B: New Nuns' Island bridge	Component C: Work on Nuns' Island	Component E: Alignment with Highway 10	Component D: New bridge over the St. Lawrence		Component F: Demolition of the Champlain and Nuns' Island bridges		Pre-construction work	Post-construction work
					Components D 1 a and b: Spanning the river and the Petit Bassin de Laprairie	Component D2: Seaway	Demolition of the Seaway (section 6)	Demolition of the river segments (sections 5 and 7) and the Nuns' Island bridge		
Objectives	▸ Increase the number of lanes from two to three traffic lanes in each direction ▸ Standardization of the lane width to 3.7 m, shoulders of 1.3 m on the left and 2.0 m on the right ▸ Reconfiguration of the Atwater interchange into a "diamond" interchange and the Wellington Street and A-10 East/Downtown interchange	▸ Construction and development of the new Nuns' Island bridge	▸ Standardization of the lane width to 3.7 m, shoulders of 1.3 m on the left and 2.0 m on the right	▸ Connection of the new St. Lawrence bridge to Highway 10 ▸ Standardization of the lane width to 3.7 m, shoulders of 1.3 m on the left and 2.0 m on the right	Construction of the bridge segment (30 spans – 2 370 m)	Construction of the bridge segment (3 spans - 420 m)	Demolition of the Champlain bridge (after construction of the NSLB)	Demolition of the Nuns' Island bridge	Preparation of areas to set up work sites	Restoration of work areas
Work	▸ Traffic flow control according to work phase ▸ Demolition of existing works (bridges, retaining walls, etc.) ▸ Construction of temporary works such as temporary retaining walls ▸ Construction of bridge infrastructure (bridges and retaining walls) ▸ Earthworks including excavation and backfilling ▸ Relocation of municipal (waterworks and sewer) and public services ▸ Construction of the drainage system's components ▸ Civil engineering work for lighting, traffic lights, signalization and ITS (bases and conduits) ▸ Construction of the roadway ▸ Construction of retaining devices (guardrails), sidewalks and curbs ▸ Installation of road signs and portal frames for overhead signs ▸ Installation of the lighting, traffic lights and ITS equipment ▸ Landscaping	▸ Construction of the foundations ▸ Construction of the bridge piers ▸ Construction of the deck ▸ Installation of the lighting, traffic lights and ITS equipment	▸ Traffic flow control according to work phase ▸ Earthworks, which include excavation and backfilling under the infrastructure ▸ Relocation of municipal (waterworks and sewer) and public services (e.g.: Bell, Hydro-Québec) ▸ Construction of the drainage system's components ▸ Civil engineering work for lighting, traffic lights, signalization and ITS (bases and conduits) ▸ Construction of the roadway ▸ Construction of retaining devices (guardrails), sidewalks and curbs ▸ Installation of portal frames for overhead signs and road signs ▸ Installation of the lighting, traffic lights and ITS equipment ▸ Landscaping		▸ Construction of the foundations ▸ Construction of the bridge piers ▸ Construction of the deck ▸ Installation of the lighting, traffic lights and ITS equipment		▸ Dismantling of deck spans ▸ Demolition of the bridge piers by sawing over the water and in the water ▸ Transportation of the material on barges, then on trucks to recycling plants	▸ Removal of deck ▸ Demolition of the bridge piers by sawing over the water and in the water ▸ Transportation of the material on barges, then on trucks to recycling plants	▸ Organization and installation of the work site ▸ Construction of a dock ▸ Construction of a temporary bridge or causeway	Dismantling of the work site
Period/ length	3 years (phase 1: 18 months/ phase 2 and 3: 18 months)	4 years	8 months	6 months	Varies according to the bridge options chosen		3 years			

2.3.2 Tunnel solutions

Replacing the Champlain Bridge with a tunnel infrastructure has been analyzed by a number of experts. Two types of solution were examined from technical, environmental and financial standpoints, and from the standpoint of the transportation of dangerous goods (TDG).

Solutions involving bored tunnels are technically possible, but involve a certain number of major disadvantages, specifically the connections to various highway axes, on both the right and left banks, as well as serving Nuns' Island with a direct highway connection from the right bank of the St. Lawrence. Dealing with these situations would involve acquiring and demolishing numerous buildings, which could have a severe impact on the duration and costs of building a tunnel. This is in addition to the fact that the length of the construction for this type of solution is greater and the cost of construction is much higher than those of sub-river tunnels.

Solutions involving sub-river tunnels can be achieved, but crossing the Seaway remains complex. This would have to be done in three winter periods in order to avoid hindering navigation. In addition, the construction of a sub-river tunnel would impact the fish habitat and, depending on the construction method chosen, would result in the complete or partial loss of a spawning area of one vulnerable species on Nuns' Island (±1 ha).

The TDG issue was also examined in conjunction with the tunnel solution, given the dangers relating to this activity, that is, primarily, explosions, toxic clouds, fire and water and soil contamination. If these events were to occur inside a tunnel, they would likely result in serious consequences that would be difficult to manage, given the confined space that a tunnel constitutes.

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. No preferred construction scenario has been chosen, so as not to favour one approach over another during the tender process. Instead, the project description in the previous section presents a set of potential construction activities that the potential service providers who will be invited to bid on the project will combine to draft a preferred scenario.

This approach will lead to the establishment of mitigation measures that will in turn become environmental objectives to be achieved at later stages of development of the New Bridge for the St. Lawrence concept. This type of approach therefore makes it possible to consider environmental concerns before the project design is finalized and thus better integrate them into the environmental components of the project area.

As defined in Transport Canada's Final Environmental Assessment Guidelines for the New Bridge for the St. Lawrence (2012b), the final plans and specifications for the New Bridge for the St. Lawrence will be prepared after the contract is awarded. The environmental assessment will assess 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 infrastructures 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 3 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, 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 Small 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: Deconstruction of the 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 the temporary bridge is built, the existing Nuns' Island Bridge will be deconstructed to make way for reconstruction in the same right-of-way.

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:

- Deconstruct the current bridge;
- Dismantle temporary facilities (access roads, storage areas, maintenance and supply areas, trailers, etc.);
- Site restoration (levelling, 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:

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

3.1.5 Decommissioning phase

Although the infrastructures will be designed to last at least 125 years, at some point they will have to be replaced. The decommissioning phase activities are the same as those listed for the post-construction phase, although they are not necessarily limited to this list.

3.2 FACTORS TO BE CONSIDERED

Subsection 16(1) of the *Canadian Environmental Assessment Act* 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 effects 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; 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 *Canadian Environmental Assessment Act*:

“Environment”:

> means the 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; and
>
> c) the interacting natural systems 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* will also be 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 will have to demonstrate what impact the project will have on these components.

Special attention will be 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 tentative list of the valued environmental components selected for this project is shown in Table 7.

The consultation that the federal authorities will conduct with interested parties and the public during the environmental assessment could result in the addition of other environmental components.

Table 7 Tentative 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” will be 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.

3.3.2 Effect of the environment on the project

The assessment must take 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 should also consider any potential effect of climate change[2] 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 must be done step by step, rather like the assessment of project effects. The possible major interactions between potential natural hazards and the project will be 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 should not be limited to events that occur on a regular b.

3.3.3 Assessment of accidents and malfunctions

The environmental assessment will examine the malfunctions and accidents that might occur, so that relevant environmental effects are taken into account in the assessment. The information provided will include 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 must be 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 will be taken into consideration.

The temporal boundaries of the project components must include the construction, operation and maintenance of the New Bridge for the Saint Lawrence and the new Nuns' Island Bridge, and the decommissioning of the existing Champlain Bridge and the Nuns' Island Bridge as well as site restoration.

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[2] **For example, would roadway drainage structures be able to safely accommodate the modest increase in the frequency and intensity of precipitation extremes and associated flood flows expected to occur in the future (based on climate change predictions), compared with those provided for under current drainage design standards?**

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 will be 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 will be 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.

The consideration of cumulative effects on the environment will be based on the reference guide entitled *Cumulative Effects Assessment Practitioners' Guide* (Canadian Environmental Assessment Agency, 1999) available on the following Web site: http://www.ceaa.gc.ca/default.asp?lang=en&n=43952694-1

4 DESCRIPTION OF ENVIRONMENT AND VALUED ENVIRONMENTAL COMPONENTS (VECs)

4.1 PHYSICAL ENVIRONMENT

4.1.1 Meteorological

Four Environment Canada weather stations are located around the study area. The closest one is the Montreal-McGill station, 5.2 km northwest of the area. The farthest station is the Montreal/Pierre-Elliot-Trudeau International Airport station, located 16.8 km west of the area. Between these two extreme distances is the Montreal-Lafontaine station, 5.7 km north-northwest of the area, and the Montreal-St-Hubert station, 10.6 km from the area on the other side of the St. Lawrence River. While the climate data collected by the Montreal-McGill station may be considered representative of the conditions in the study area, the data from the four stations were compared to determine whether they were actually uniform over a larger area. As the climate data in Table 8 show relative similarity between the four stations, the climate data for the study area are considered similar to those shown here. All the climate data are determined based on the most recent monthly climate normals in the National Climate Archive of Canada as published by Environment Canada (2012). They represent the period 1971-2000. Monthly climate normals based on data from the last decade are not available. However, although some changes have been observed in the occurrence and intensity of certain climate events during the last decade, and this can have an influence on those climate normals, the difference between the climate normals for the period 1971-2010 and the known normals for 1971-2000 should not be very significant because the data from the first 30 years would be common to both groups of statistics. For that reason, the data on which the monthly climate normals for the period 1971-2000 are based are considered as representative for purposes of describing the physical environment for this environmental assessment.

4.1.1.1 Temperature

4.1.1.1.1 Average temperature

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.

Table 8 Annual climate data for weather stations around the study area

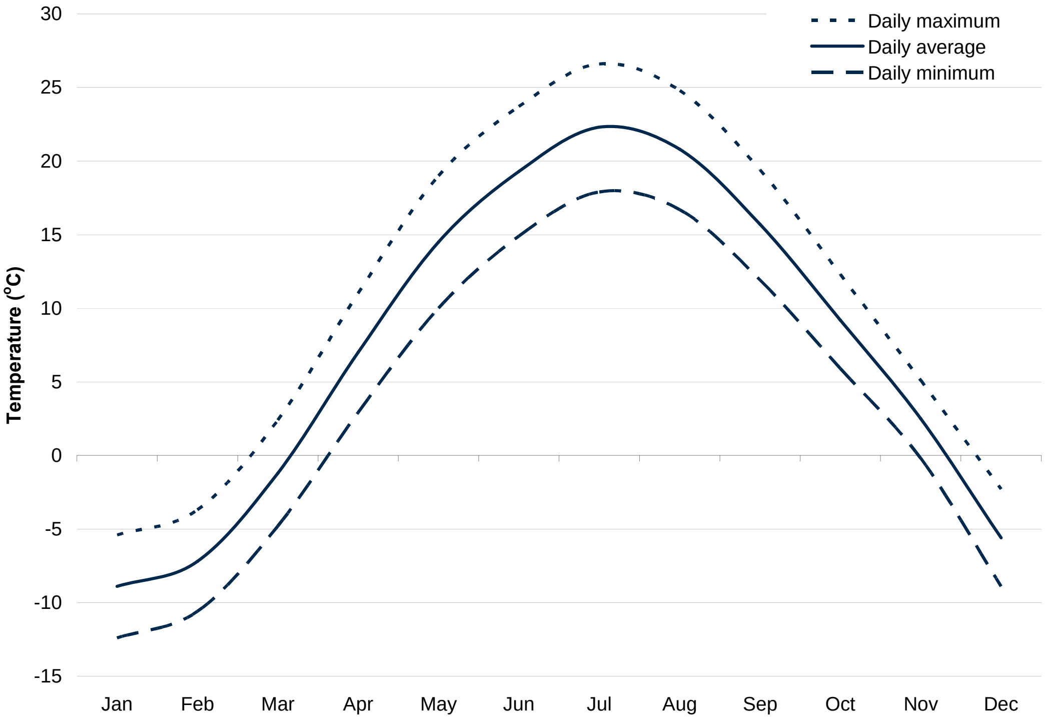
DATA	MONTREAL-MCGILL	MONTREAL-LAFONTAINE	MONTREAL-PIERRE-ELLIOTT-TRUDEAU	MONTREAL-SAINT-HUBERT
Annual avg. temperature	7.4°C	7.3°C	6.2°C	5.8°C
Annual maximum temperature	11.1°C	11.3°C	11.1°C	11.1°C
Annual minimum temperature	3.6°C	3.3°C	1.4°C	0.5°C
Annual number of days with Tmin <20°C	7.7	8.9	16.9	21.5
Annual number of days with Tmax >20°C	111.2	114.0	112.7	113.7
Annual total precipitation	1,062.5 mm	1,053.4 mm	978.9 mm	1,046.2 mm
Hourly avg. wind speed	11.5 km/h	NA	14.3 km/h	15.6 km/h
Prevailing wind direction	Southwest	NA	Southwest	Southwest

Table 9 shows the daily temperatures at the Montreal-McGill weather station. The coldest period is December to February, with an average temperature over these three months of -7.2°C. The average minimum temperature over these three months is -10.6°C and a minimum in January (-12.4°C). The average maximum temperature over the three months is 3.8°C. As for the warmest period, it occurred from June to August, with an average temperature for these three months of 20.8°C. The average minimum temperature over the three summer months is 16.5°C, while the average maximum is 25.0°C. The average temperature is at its maximum in July (26.6°C). Figure 27 shows these temperature variations in graphic form, as recorded at the Montreal-McGill weather station.

Table 9 Daily average, maximum and minimum temperatures at Montreal-McGill station

DATA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Daily max. (°C)	-5.4	-3.7	2.4	11	19	23.7	26.6	24.8	19.4	12.3	5.1	-2.3	11.1
Daily min. (°C)	-12.4	-10.6	-4.8	2.9	10	14.9	17.9	16.7	11.9	5.9	-0.2	-8.9	3.6
Daily avg. temp. (°C)	-8.9	-7.2	-1.2	7	14.5	19.3	22.3	20.8	15.7	9.2	2.5	-5.6	7.4

Figure 27 Daily average, maximum and minimum temperatures at Montreal-McGill station



4.1.1.1.2 Temperature changes

Temperatures at Montreal Airport (PET-A) were analyzed over the period 2002 to 2012. figure 28 and figure 29 show how the average temperature changed and how it differed from the curves including the standard deviation calculated from the available data.

Figure 28 Changes in average temperature at Montreal, 2002-2012 (P.E. Trudeau Airport)

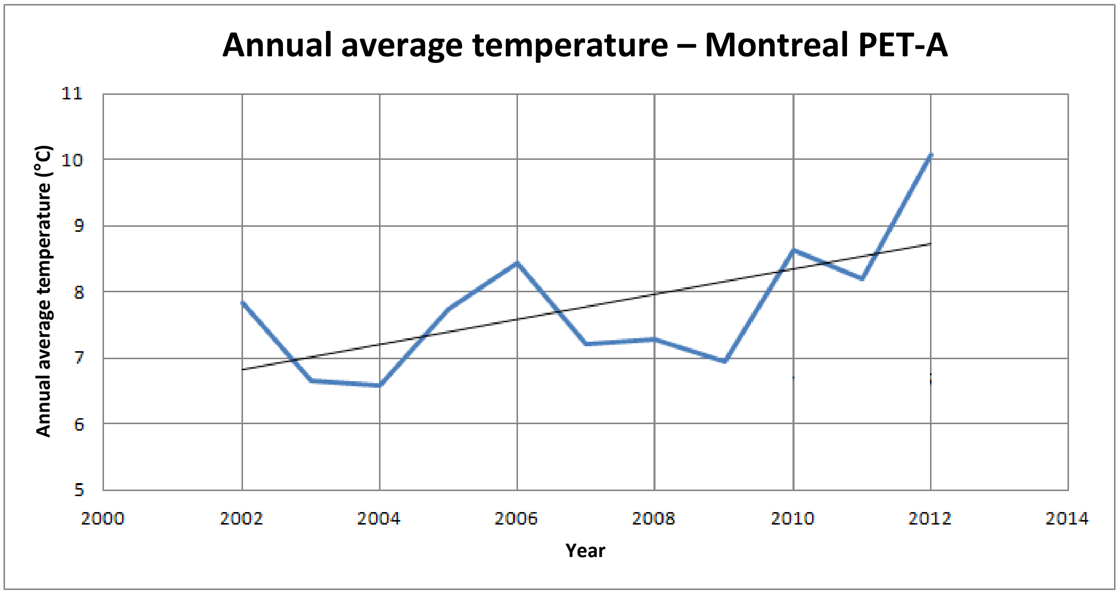
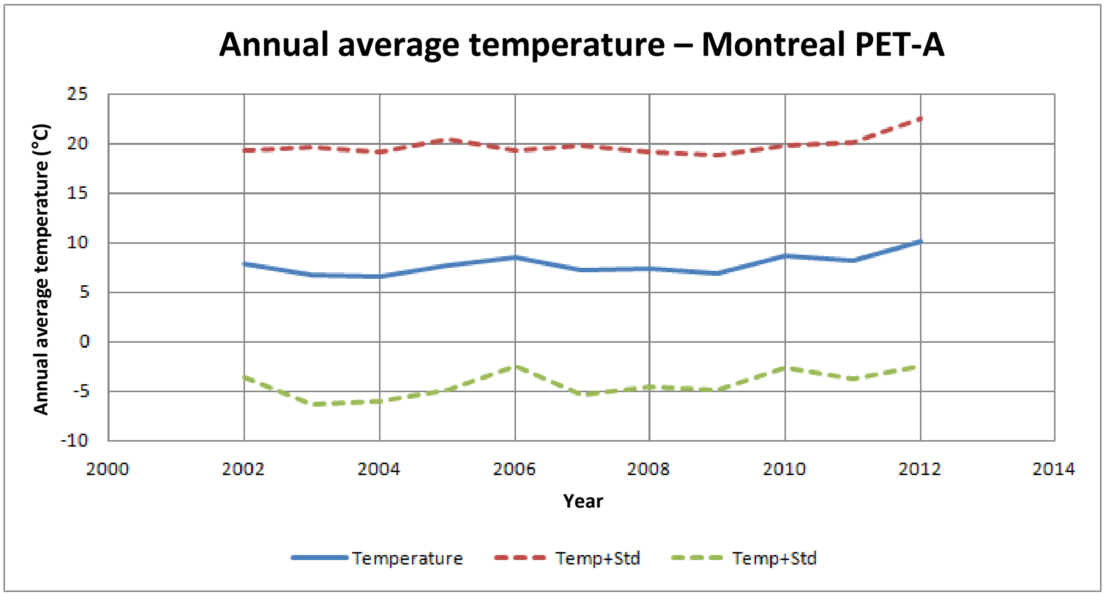


Figure 29 Confidence interval of annual average temperature at Montreal PET-A (average +/- standard deviation)



From these figures it can be seen that the average temperature at Montreal rose by an average of about 1.5°C over the decade shown. It is noted, however, that since the data available for 2012 cover only the period from January 1 to August 31, the analysis may be skewed somewhat; 10 years is a very short period on which to base this kind of trend analysis.

4.1.1.2 *Precipitation*

With regard to precipitation, including both snow and rain, the annual total is just over 1,060 mm, with the minimums in January and February (73.6 and 70.9 mm, respectively, and mainly as snow); and the maximums in July and August (106.2 and 100.6 mm, respectively, and solely as rain). From 1971 to 2000, on average the month of December had the most snow (57.8 cm). Figre 30 shows how precipitation levels have changed as recorded at Montreal-McGill station. Figure 31 shows the trend in precipitation over the last 10 full years (2002-2011) at Montreal PET Airport. Year-to-year changes can be relatively significant, notably in terms of snowfall (in 2008 there was almost three times as much snow as in 2006). However, total precipitation showed an upward trend during this period. Figure 32 shows the daily extremes of precipitation as rain and snow over the same period, as well as the average snowfall. From 1971 to 2000, July had both the most rain on average and the daily rainfall extremes (102.2 mm).

Figure 30 Average precipitation as rain or snow at Montreal-McGill station, 1971-2000

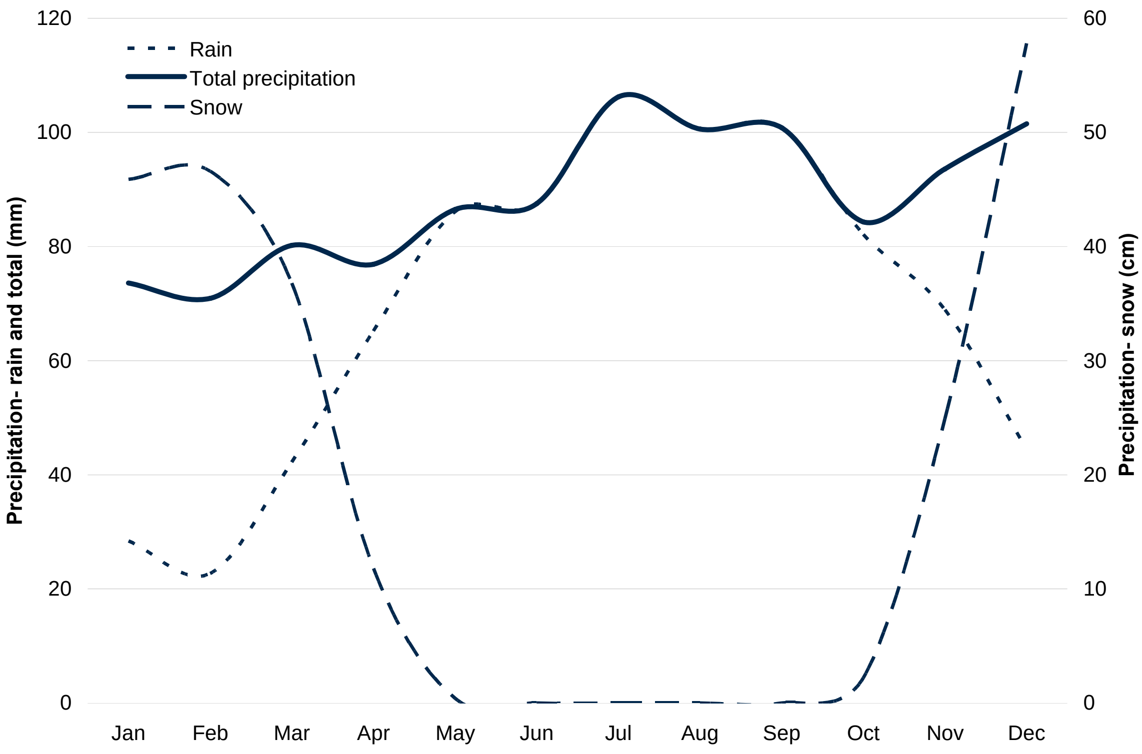


Figure 31 Trend in precipitation over last 10 years (2002-2011) at Montreal PET Airport

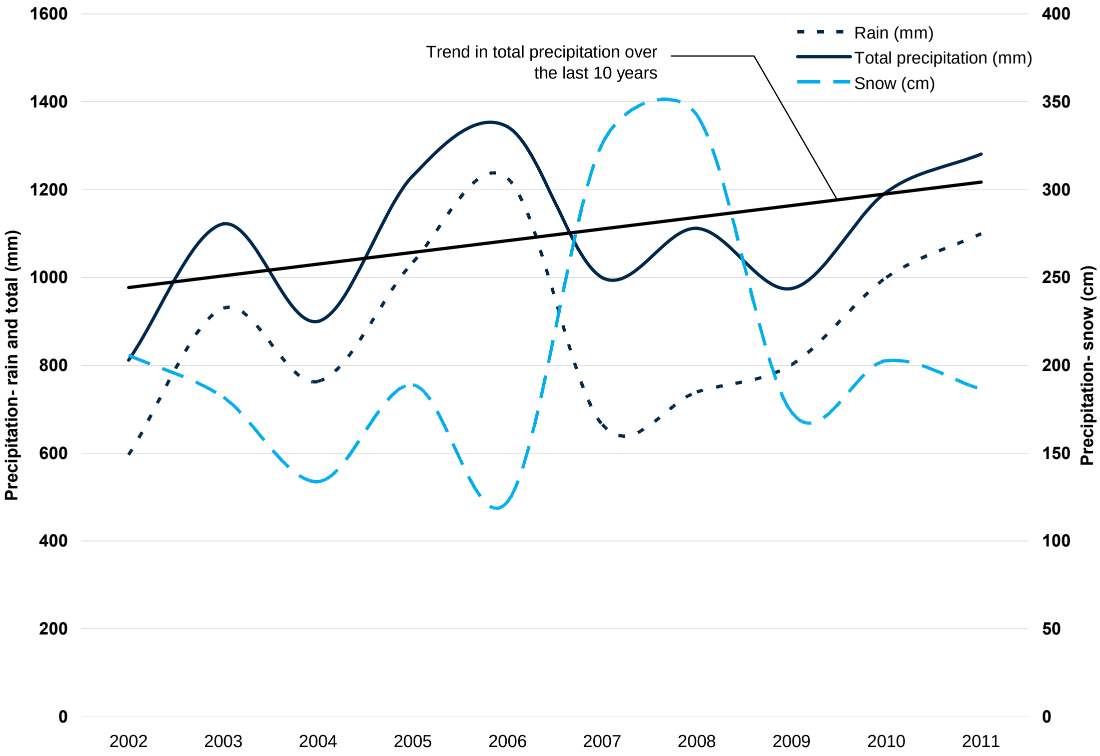
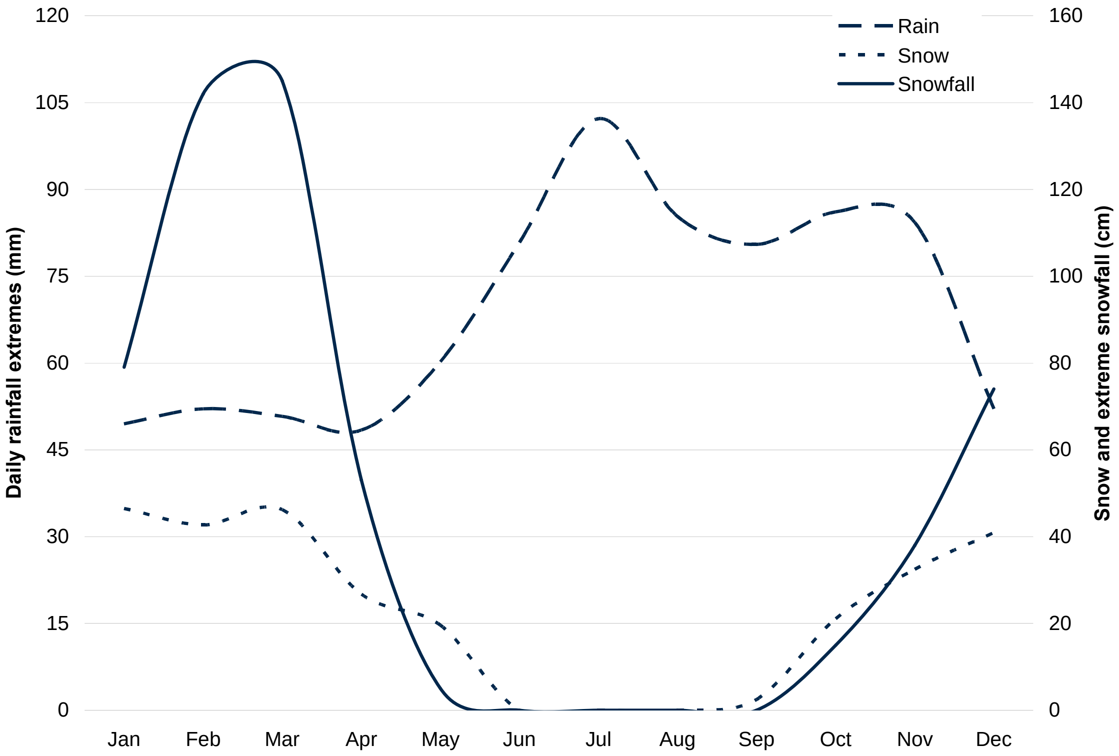


Figure 32 Daily precipitation extremes and snowfall at Montreal-McGill station, 1971-2000



4.1.1.3 *Wind*

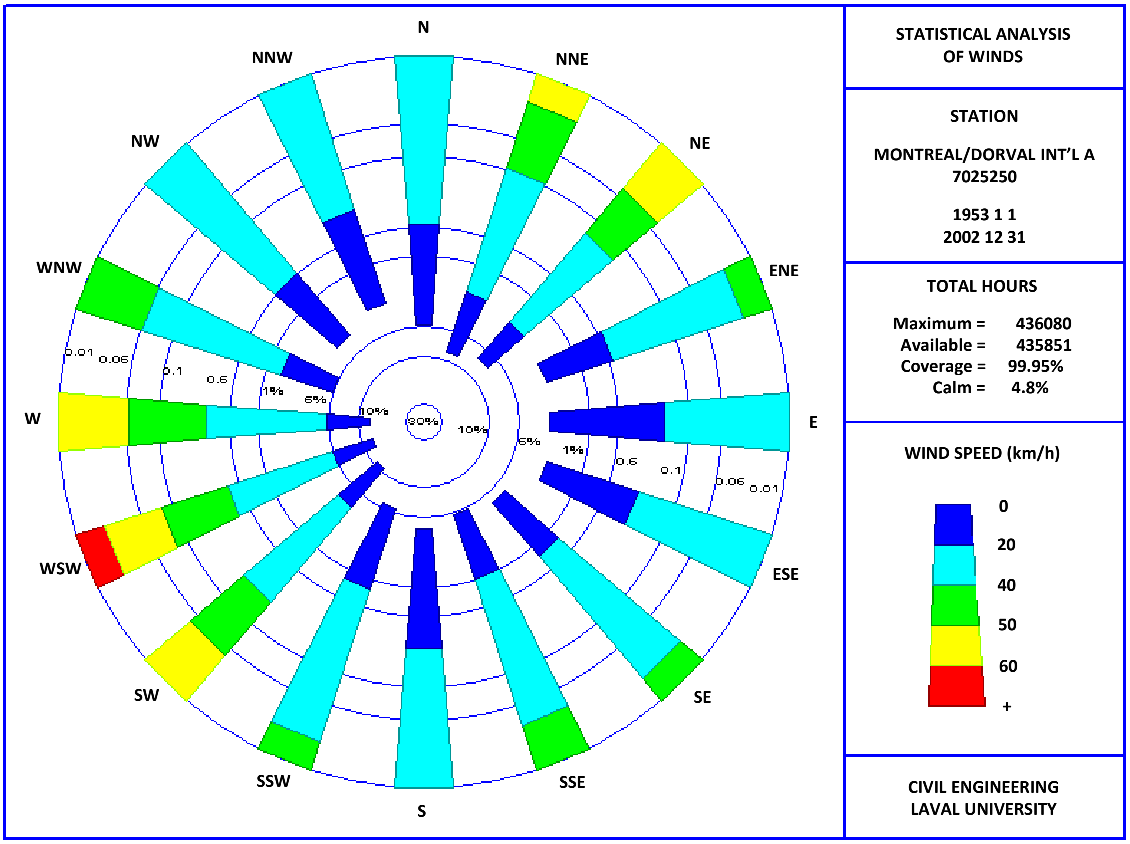
Wind data have been recorded at Montreal Airport (Pierre-Elliot-Trudeau-A, or PET-A) since 1953. This station is located about 17 km west of Champlain Bridge, which makes it a valid source for the Champlain Bridge site.

A first series of wind data from the period 1953-2002 was analyzed to get an idea of the general wind pattern. Then the data series from January 2002 to August 2012 was analyzed in greater detail to represent the current conditions. Finally, a third analysis was done to determine the distribution of winds over the course of a year using the monthly climate normals from 1971 to 2000.

4.1.1.3.1 *1953-2002 period*

Figure 33 and 34 show the wind rose for the full year and for the summer period of May 1 to October 31. The dominance of the west-southwest wind can be seen in the wind rose. The two next most prevailing wind directions are west and northeast, in that order.

Figure 33 Wind rose from Montreal PET Airport, 1953 to 2002 – Full year



STATISTICAL ANALYSIS OF WINDS

STATION

MONTREAL/DORVAL INT'L A
7025250

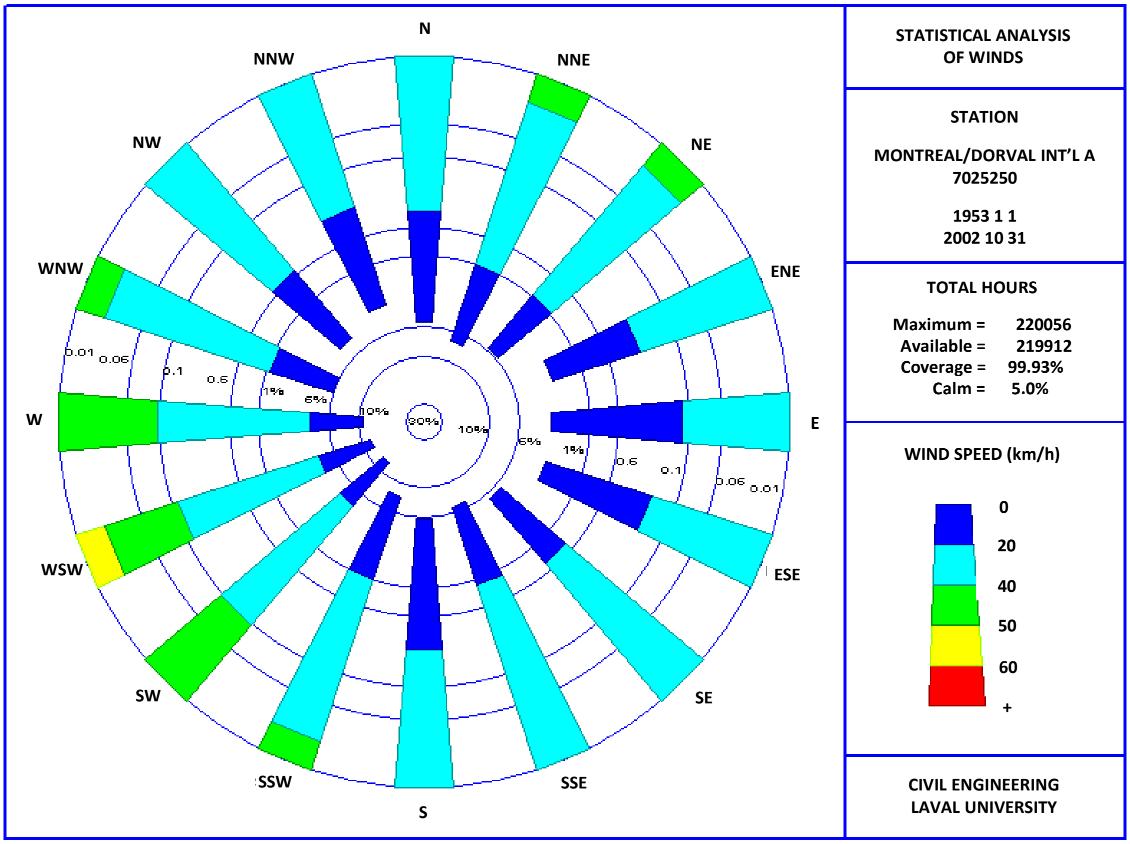
1953 1 1
2002 12 31

TOTAL HOURS

Maximum = 436080
Available = 435851
Coverage = 99.95%
Calm = 4.8%

CIVIL ENGINEERING
LAVAL UNIVERSITY

Figure 34 Wind rose from Montreal PET Airport, 1953 to 2002 – May 1 to Oct. 31

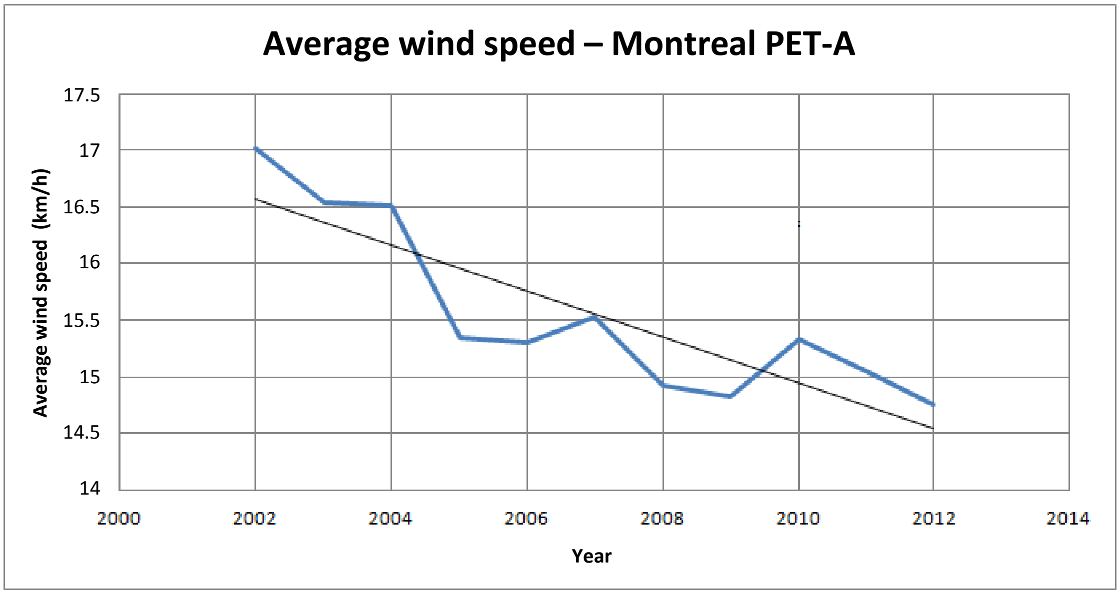


4.1.1.3.2 2002-2012 period

The more recent period was then examined in greater detail to identify the recent trends in the regional weather. Specific analyses were done on the period from January 1, 2002 to August 31, 2012.

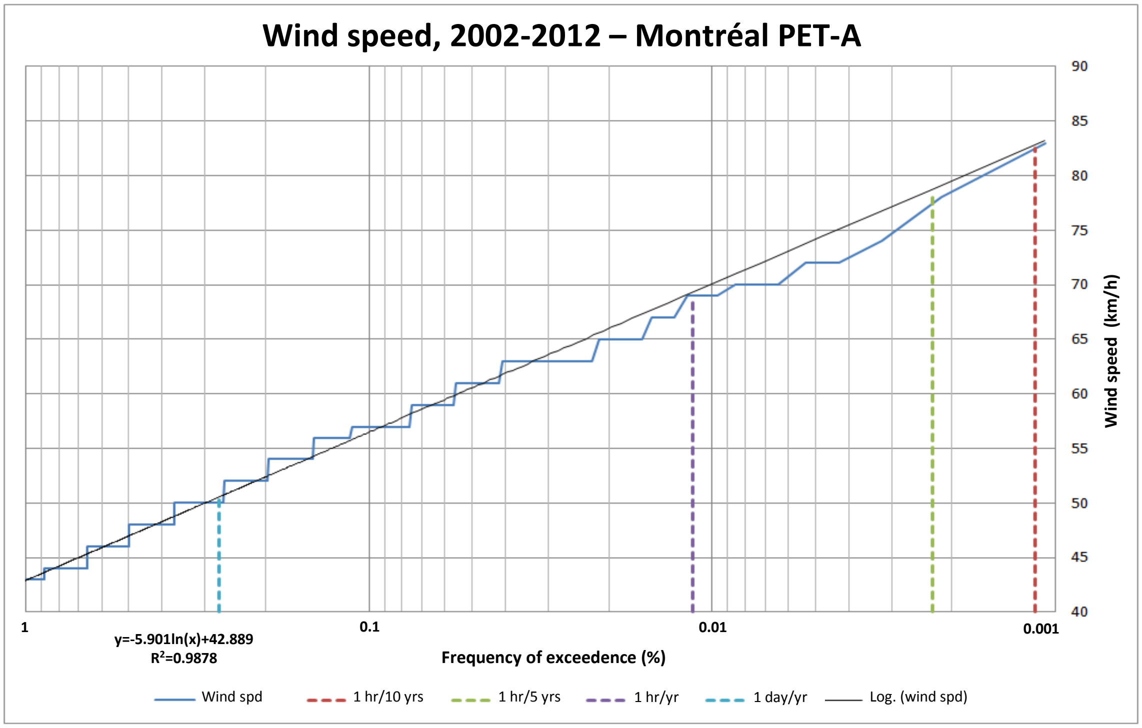
Figure 35 shows the change in the annual average wind speed for the period 2002-2012. There is a relatively significant and constant decrease (2 km/h or 13%) in this average speed over the decade considered.

Figure 35 Annual average wind speed at Montreal PET-A station – From 2002 to 2012



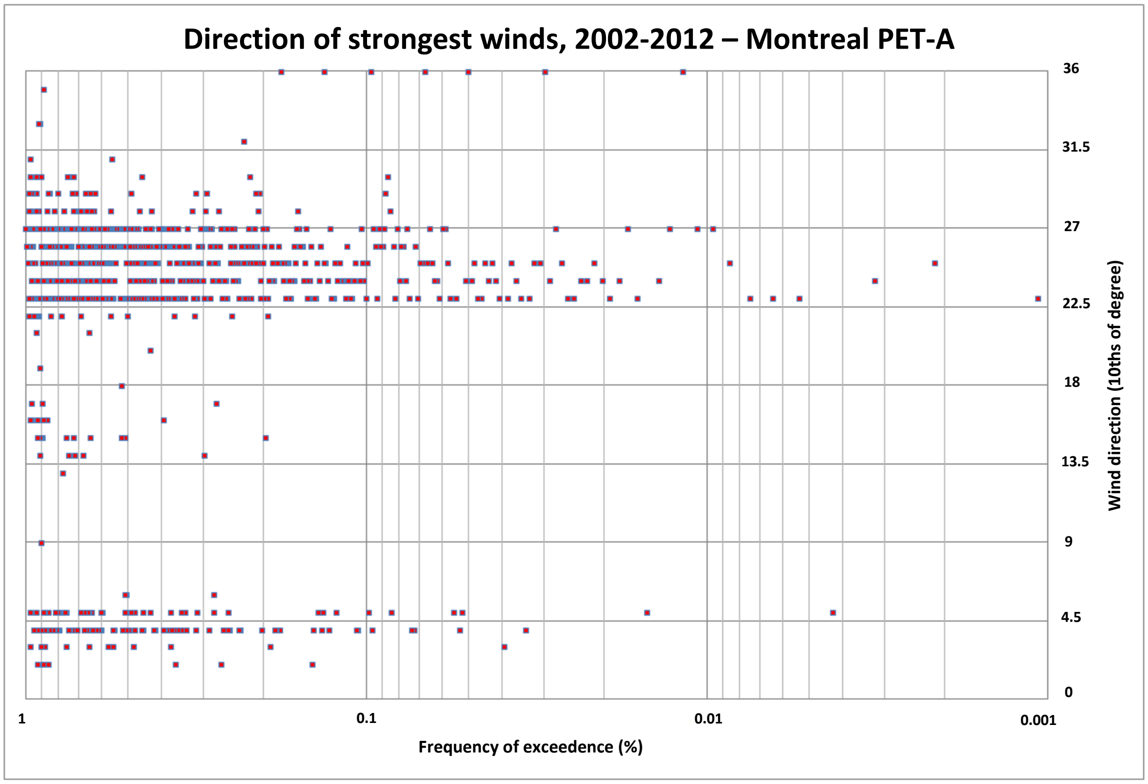
The stronger winds recorded over this decade were then analyzed specifically. Figure 36 shows the frequency of exceedence of a given wind speed based on the information collected between 2002 and 2012. The following figure records high-wind events occurring at given intervals. For example, the wind speed that is exceeded for one hour every 10 years is 83 km/h, whereas the wind speed of 69 km/h would be exceeded once a year (on average).

Figure 36 Frequency of exceedence of high wind speeds, Montreal PET-A – 2002-2012 database



The graph in Figure 37 illustrates the directions of these strong winds (same abscissa scale as the preceding figure). Wind directions are indicated in tenths of a degree (unit used by Environment Canada). This figure clearly shows that the winds in the arc from west-southwest (225°) to west (270°) were dominant, followed by the northeast winds (45°).

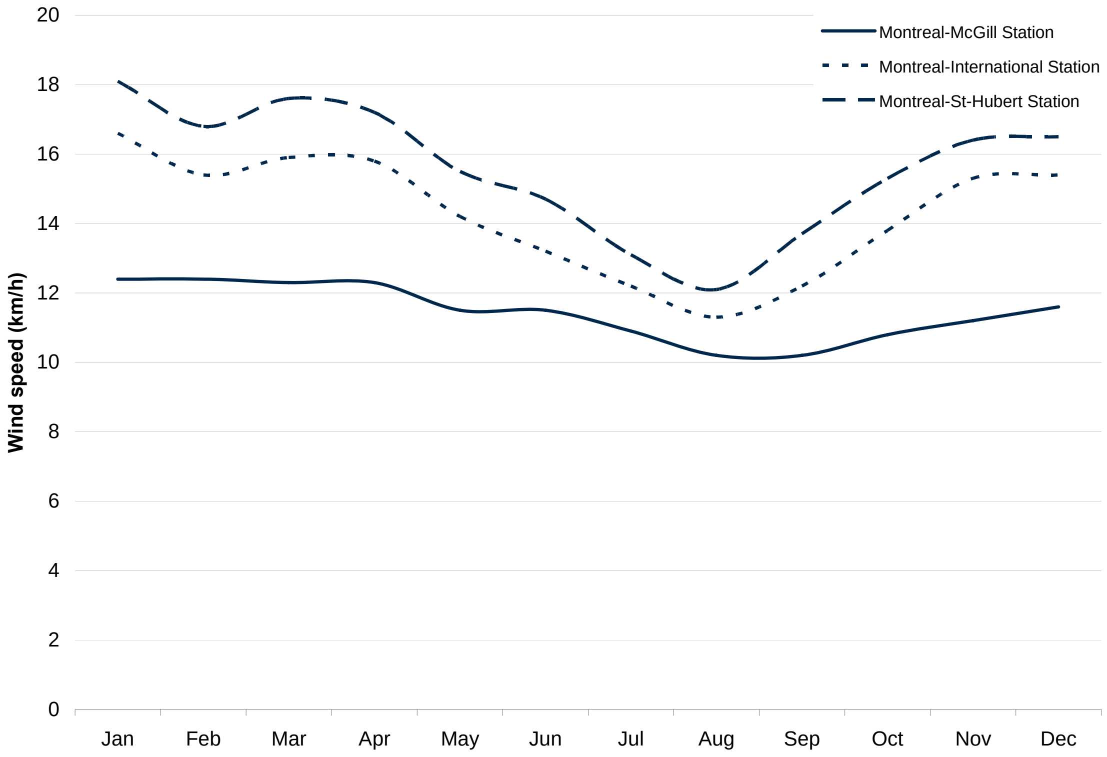
Figure 37 Direction of strongest winds, Montreal PET-A – 2002-2012



4.1.1.3.3 *Monthly breakdown of wind speeds*

The monthly climate normals from 1971 to 2000 (Figure 38) revealed that, for the three weather stations considered, wind speeds are highest during the months of November to March, then diminish to the lowest levels in July and August.

Figure 38 Wind speeds at Montreal-McGill, Montreal-International and Montreal-St-Hubert stations

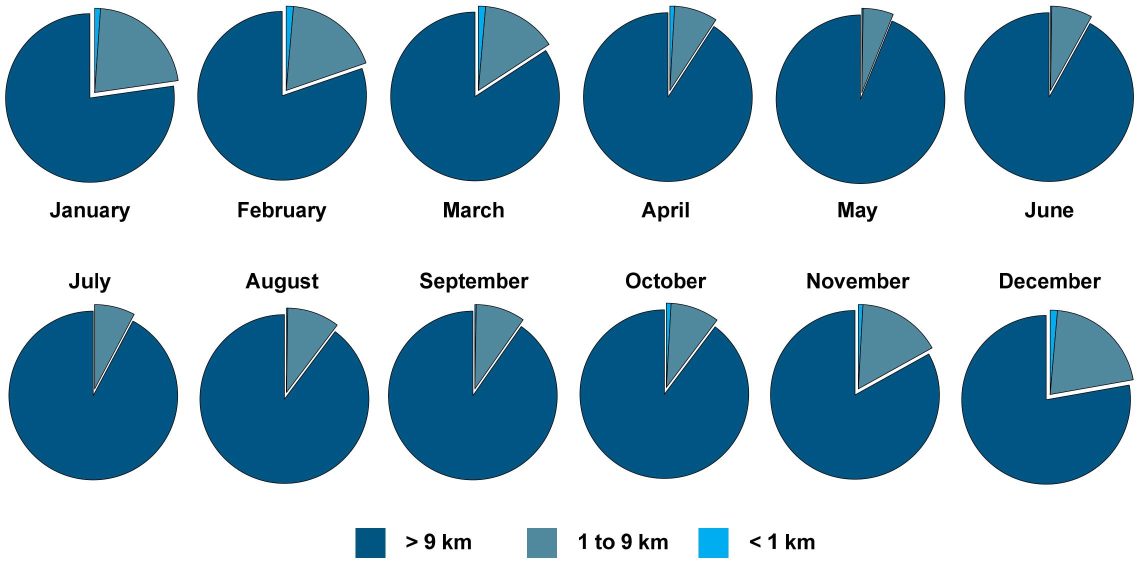


4.1.1.4 Visibility

There may be some concerns about using the data from Montreal Airport to assess visibility in the area under study, since even where the term “fog” appears, the visibility distance recorded in the Environment Canada database is almost never less than 1 kilometre.

In terms of navigation, which is the activity most affected by visibility in the study area, visibility of 1 km is fairly reasonable, especially with the navigational aids available to vessels (GPS and radar in particular). Navigation problems are more serious when visibility is less than the length of the vessel (around 200 m in this case), although the database from the airport cannot be used to identify such cases. But as Figure 39 illustrates, visibility is very rarely less than 1 km. Over the period 1971-2000, visibility was less than 1 km for under 1% of the hours of the year, with slightly more hours (1.3%) during the months of December, January, February and March. Given this very low frequency, there is no need to further refine the data for visibilities of less than 1 km.

Figure 39 Distribution of hours with visibility as indicated at Montreal International Airport – 1971-2000



4.1.2 Topography

The surface of the land adjacent to Champlain Bridge is relatively flat, be it in the Montreal sector, on Nuns' Island or on the South Shore. According to the topographical information on the maps distributed by the Ministère des Ressources naturelles du Québec (MRN) (Quebec Ministry of Natural Resources) numbers 31H05-200-202 (LaSalle) and 31H06-200-201 (Saint-Hubert), the average elevation above sea level of the land adjacent to Champlain Bridge is approximately 16 m on Montreal Island, 14 m on Nuns' Island and 15 m on the South Shore. The maximum elevation, i.e., just over 19 m, is found on Montreal Island on the vacant land bordered by the access ramp from Champlain Bridge to Bonaventure Expressway (photo below).

Given the average level of the St. Lawrence at Champlain Bridge (about 10 m above mean sea level), the maximum difference in elevation of 9 m above the river surface is located on Montreal Island.

Figure 40 Maximum elevation – Access ramp from Champlain Bridge to Bonaventure Expressway

4.1.3 Soil stratigraphy and quality

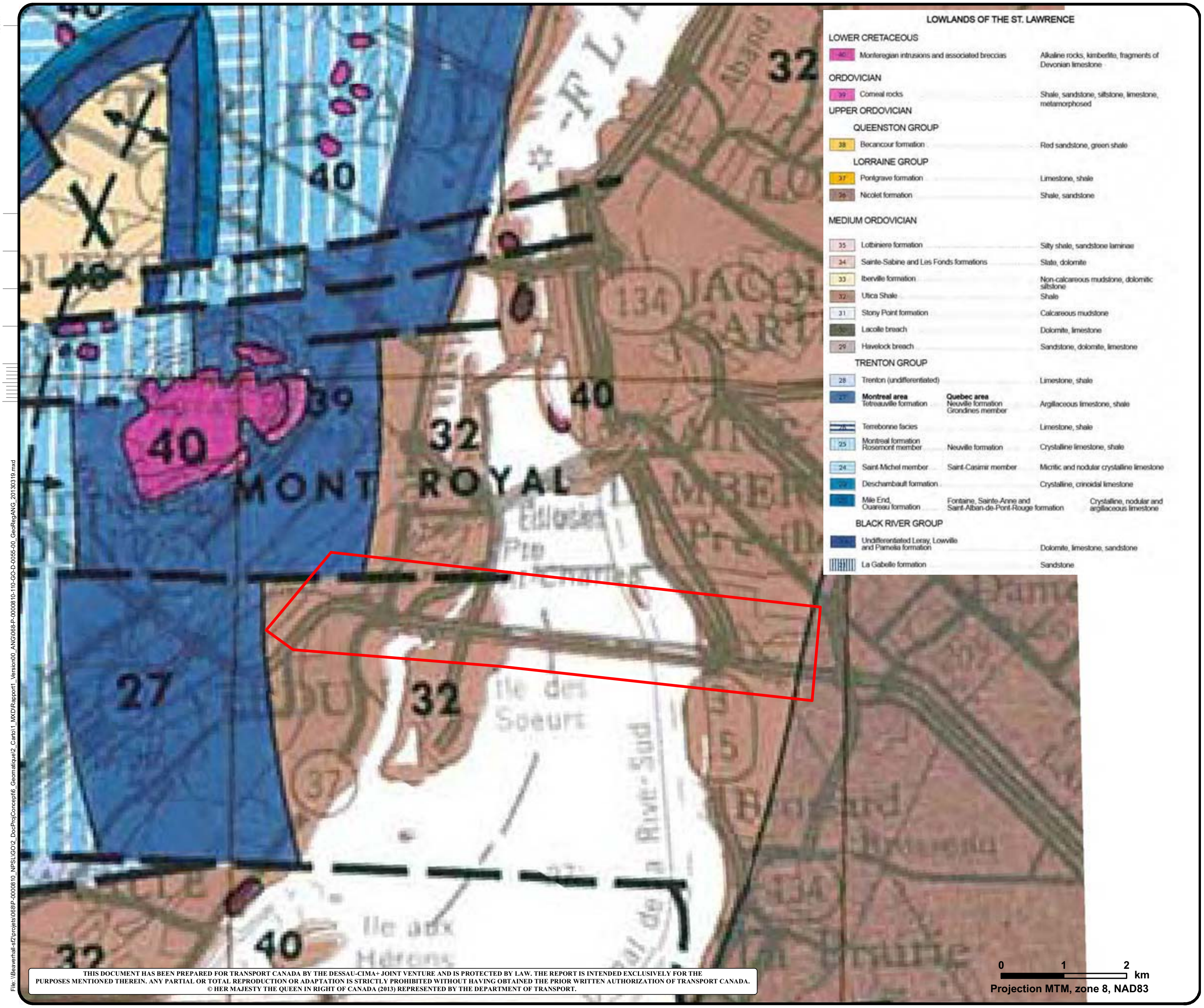
4.1.3.1 Regional geological setting

4.1.3.1.1 Basement rock

The geology of the basement rock in the area of the Champlain Bridge right-of-way is identified as Utica black shale dating from the middle Ordovician epoch. Utica shale is found on Montreal Island, Nuns' Island and on the South Shore at Brossard (Clark, 1972; Globensky, 1985). The estimated maximum thickness of the Utica shale in the Montreal area is 125 m (Clark, 1972)

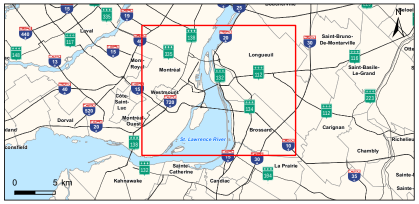
4.1.3.1.2 Unconsolidated deposits

The geology of the natural unconsolidated deposits in the Montreal area is generally represented by three separate deposit episodes (Prest et Hode-Keyser, 1982). Starting at the top, one finds relatively thin horizons of stream and estuarine sediments of the St. Lawrence (9,500 years to the present), consisting generally of sand and gravel; thicker deposits of fine sediments (silty clay and silt) characteristic of the Champlain Sea sedimentation episode (12,500-9500 years); and glacial deposits of sand and silt to gravel which constitute the Malone and Fort Covington tills (60,000-13,000 years).



🟥 Study area

SOURCE :
Globensky Y. 1985. Géologie des Basses-Terres du Saint-Laurent. Gouvernement du Québec, Ministère de l'Énergie et des Ressources, Direction générale de l'Exploration géologique et minérale. Carte 1:250 000



Client Transport Canada Transports Canada

Project

New Bridge for the St. Lawrence
Environmental Assessment

Title

Figure 41
Regional Geological Map of Study Area

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Prepared Ghyslain Pothier
Drawn Gabriel Corbin
Checked Ghyslain Pothier

Discipline Geomatic
Scale 1:60 000
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	0055	00

File: \\Beaverhall-sf2\projets\068\P-0000810_NPSL\GO\2_DocProjConcept\6_Geomatique\2_Carto\1_MXD\Rapport1_Version00_ANG\068-P-0000810-110-GO-D-0055-00_GeoRegANG_20130319.mxd

SIZE 11x17

According to the map of unconsolidated deposits on Montreal Island by Prest and Hode-Keyser (1982), the study area runs through zones covered solely by 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. As noted in the report by Prest and Hode Keyser, horizons of muck soil or sapropel were identified locally in the study area. These deposits of muddy sediment originate in former salt marshes or fluvial marshes. The muck soil forms a thin horizon, which generally does not pose a problem for construction (See Figure 42).

In the same report, the estimated thicknesses of the natural unconsolidated deposits covering the basement rock adjacent to Champlain Bridge on Montreal Island range from 6 to 12 m on average.

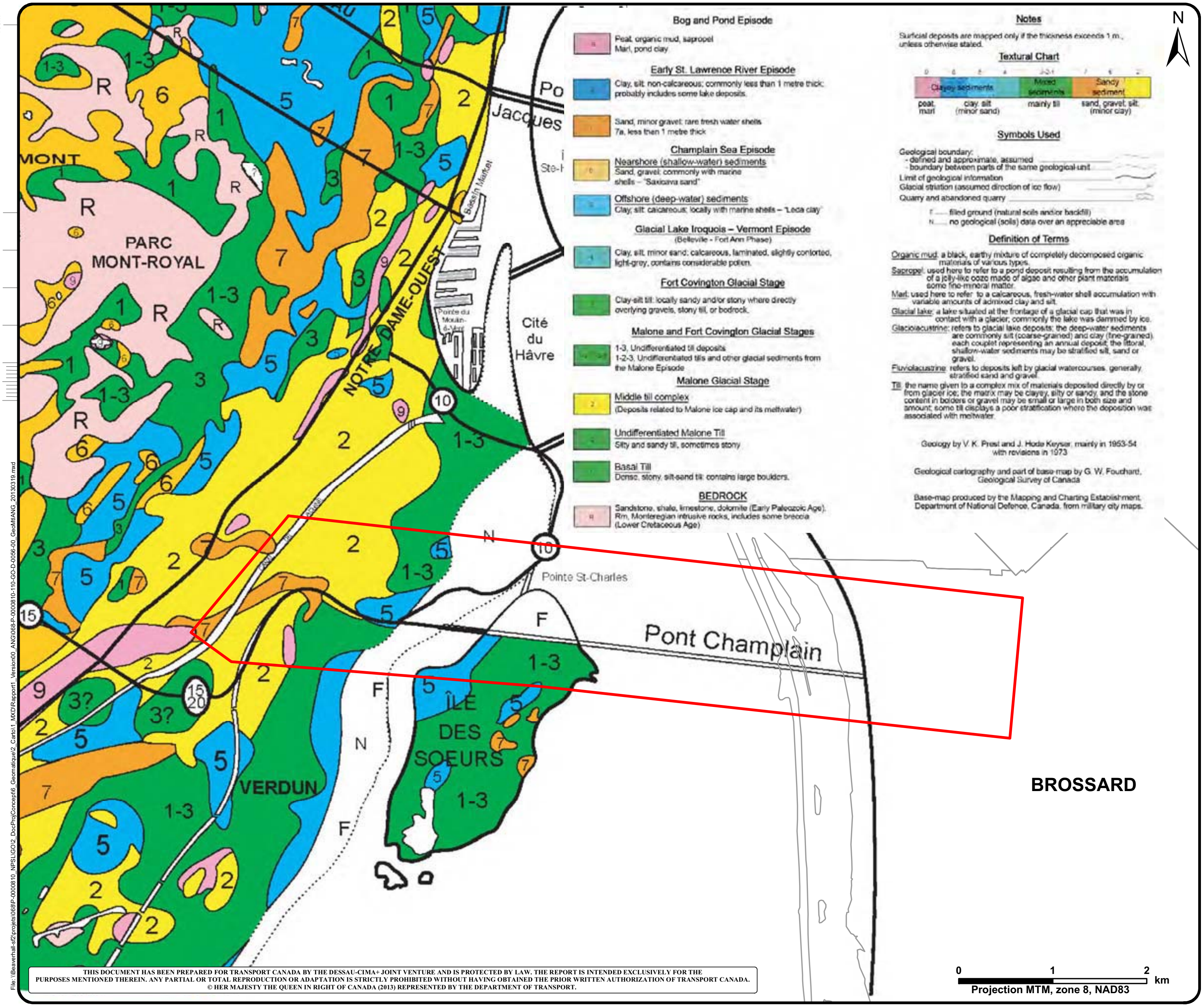
On the South Shore, according to the study by Dion and Caron, the natural unconsolidated deposits over the basement rock are about 8 m in total thickness, and consist of clayey sediment topped by a thin horizon of sand (less than 2 m) (Dion and Caron, 1982).

4.1.3.1.3 Historical fill

Significant episodes of fill characterize the area of the St. Lawrence shore on Montreal Island. Placed during the period from 1864 to 1965, this fill resulted in the current position and geometry of the river shore from Victoria Bridge in the east to Champlain Bridge in the west as far as the mouth of the former Saint-Pierre stream (Saint-Pierre drain).

As documented in "L'autoparc Victoria, Petite histoire d'une occupation fluviale," produced for the infrastructure, transportation and environment department of the City of Montreal in 2004, and summarized in the report prepared by Tecsult in 2005, the history of the occupation and filling of the area is described as follows:

- 1662 to 1731: the Congrégation de Notre-Dame de Montréal is the owner of a property known as Pointe-Saint-Charles farm, which included the shore of the St. Lawrence in the study area.
- 1851: the Grand Trunk Railway (GTR) acquired land on the farm and developed the area northeast of the study area.
- 1864 to 1868: part of the site is used as a dump.
- 1880: an enormous dike is built along the shore of the St. Lawrence.
- 1904 to 1937: part of the site is used as a dump.



Bog and Pond Episode

Peat, organic mud, sapropel
Marl, pond clay

Early St. Lawrence River Episode

Clay, silt non-calcareous; commonly less than 1 metre thick; probably includes some lake deposits.

Sand, minor gravel: rare fresh water shells
7a, less than 1 metre thick

Champlain Sea Episode

Nearshore (shallow-water) sediments
Sand, gravel: commonly with marine shells – "Saxicava sand"

Offshore (deep-water) sediments
Clay; silt calcareous; locally with marine shells – "Leda clay"

Glacial Lake Iroquois – Vermont Episode
(Belleville - Fort Ann Phase)

Clay, silt, minor sand; calcareous, laminated, slightly contorted, light-grey, contains considerable pollen.

Fort Covington Glacial Stage

Clay-silt till: locally sandy and/or stony where directly overlying gravels, stony till, or bedrock.

Malone and Fort Covington Glacial Stages

1-3, Undifferentiated till deposits
1-2-3, Undifferentiated tills and other glacial sediments from the Malone Episode

Malone Glacial Stage

Middle till complex
(Deposits related to Malone ice cap and its meltwater)

Undifferentiated Malone Till
Silty and sandy till, sometimes stony

Basal Till
Dense, stony, silt-sand till: contains large boulders.

BEDROCK

Sandstone, shale, limestone, dolomite (Early Paleozoic Age).
Rm, Monteregian intrusive rocks, includes some breccia (Lower Cretaceous Age)

Notes

Surficial deposits are mapped only if the thickness exceeds 1 m., unless otherwise stated.

Textural Chart

Symbols Used

Geological boundary:
- defined and approximate, assumed
- boundary between parts of the same geological unit

Limit of geological information
Glacial striation (assumed direction of ice flow)
Quarry and abandoned quarry

F ...... filled ground (natural soils and/or backfill)
N ...... no geological (soils) data over an appreciable area

Definition of Terms

Organic mud: a black, earthy mixture of completely decomposed organic materials of various types.

Sapropel: used here to refer to a pond deposit resulting from the accumulation of a jelly-like ooze made of algae and other plant materials some fine-mineral matter.

Marl: used here to refer to a calcareous, fresh-water shell accumulation with variable amounts of admixed clay and silt.

Glacial lake: a lake situated at the frontage of a glacial cap that was in contact with a glacier; commonly the lake was dammed by ice.

Glaciolacustrine: refers to glacial lake deposits; the deep-water sediments are commonly silt (coarse-grained) and clay (fine-grained), each couplet representing an annual deposit; the littoral, shallow-water sediments may be stratified silt, sand or gravel.

Fluviolacustrine: refers to deposits left by glacial watercourses, generally stratified sand and gravel.

Till: the name given to a complex mix of materials deposited directly by or from glacier ice; the matrix may be clayey, silty or sandy, and the stone content in bolders or gravel may be small or large in both size and amount; some till displays a poor stratification where the deposition was associated with meltwater.

Geology by V. K. Prest and J. Hode Keyser, mainly in 1953-54 with revisions in 1973

Geological cartography and part of base-map by G. W. Fouchard, Geological Survey of Canada

Base-map produced by the Mapping and Charting Establishment, Department of National Defence, Canada, from military city maps.

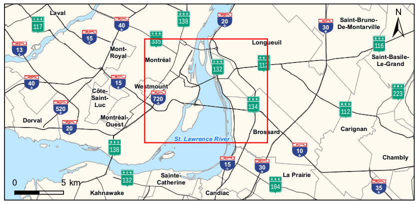
SIZE 11x17

File: \\Beaverhall-sf2\projets\068P-0000810_NPSL\GO\2_DocProj\Concept\5_Geomatique\2_Carto\1_MXD\Rapport1_Version00_ANG\068-P-0000810-110-GO-D-0056-00_GeoMtlANG_20130319.mxd

10cm

🟥 Study area

SOURCE :
Prest V. K. et Hode Keyser J. (1982). Carte des dépôts meubles - Île de Montréal. Carte 1:50 000



Client
Transport Canada Transports Canada

Project
New Bridge for the St. Lawrence Environmental Assessment

Title
Figure 42
Regional Geological Map of Unconsolidated Deposits on the Island of Montreal

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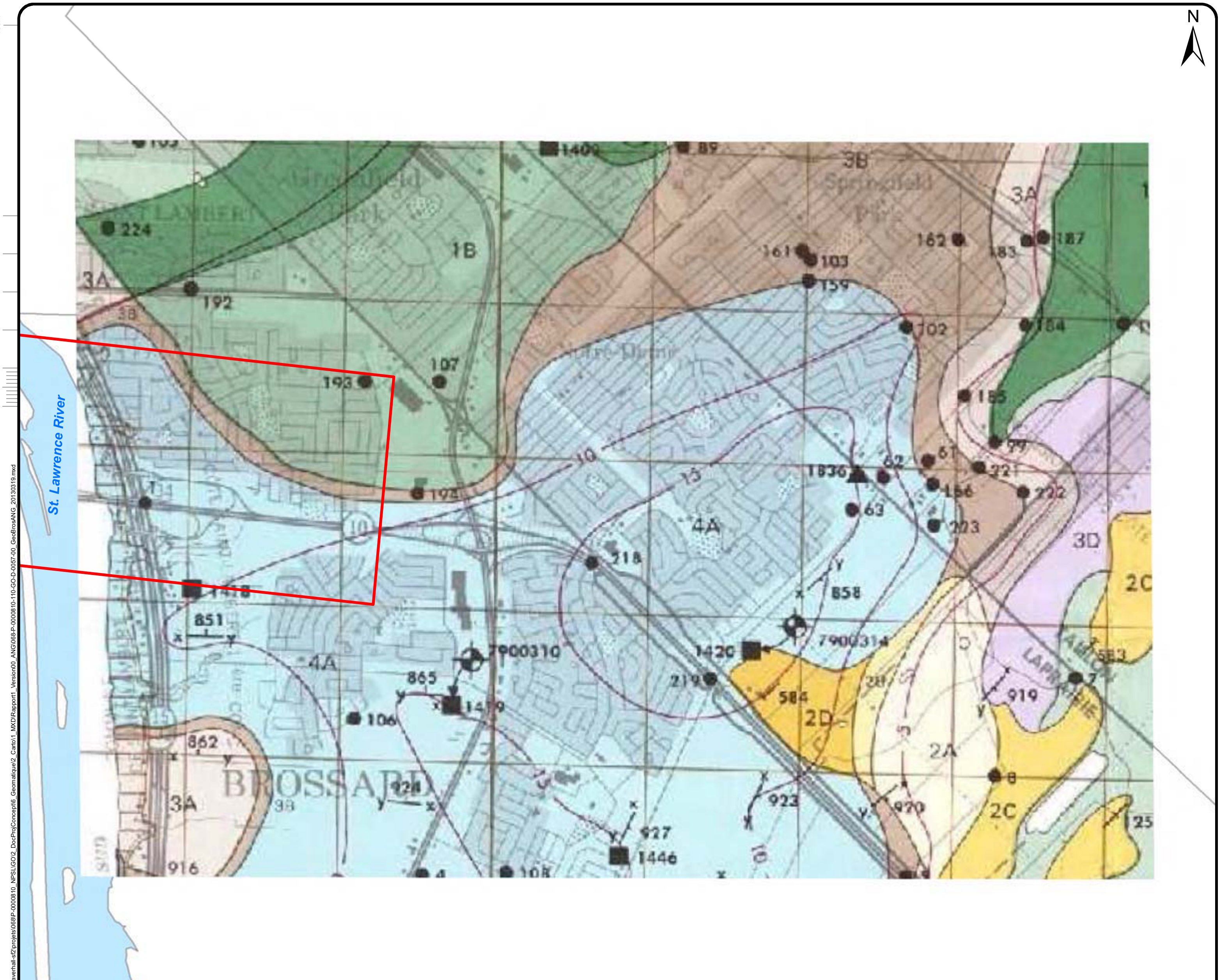
Prepared	Ghyslain Pothier	Discipline	Geomatic
Drawn	Alexandra Rutherford	Scale	1:40 000
Checked	Ghyslain Pothier	Date	2013-03-19
Project manager	Sylvie Côté	Sequence No.	01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0056	00



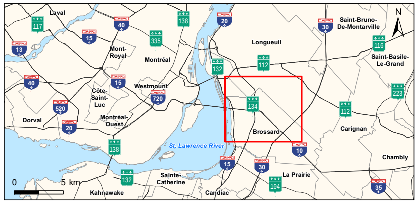
0 1 2 km

Projection MTM, zone 8, NAD83

🟥 Study area

3D	Surface: Clay sometimes covered with a layer of sandy deposits. Rock within 3 m of the surface. See Map C for its type. Presence of till in the rock. The clay is stiff and is affected by changes in the groundwater.
4A	Surface: Clay sometimes covered with a layer (<2 m) of Champlain Sea or low terrace sand. Till more than 6 m from the surface. For the depth of the rock, see the isoline thickness on Map A. Clay below 17 m has the following properties: w ≈ 64%, St = low, Cu > 40 kPa.
4B	Same as 4A except for the clay over 17 metres altitude, which has the following properties: w ≈ 68%, St = High, Cu > 20 kPa.

SOURCE :
Dion D.J. et Caron P. 1982. Levé géotechnique de la région de Laprairie-Saint-Jean.
Direction générale de l'Exploration géologique et minière. Ministère de l'Énergie et des Ressources.
DPV-901, 1982.



Client

Transport Canada | Transports Canada

Project

New Bridge for the St. Lawrence
Environmental Assessment

Title

Figure 43
Regional Geological Map of Unconsolidated Deposits
in Brossard Sector

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Project manager
Sylvie Côté

Sequence No.
01 of 01

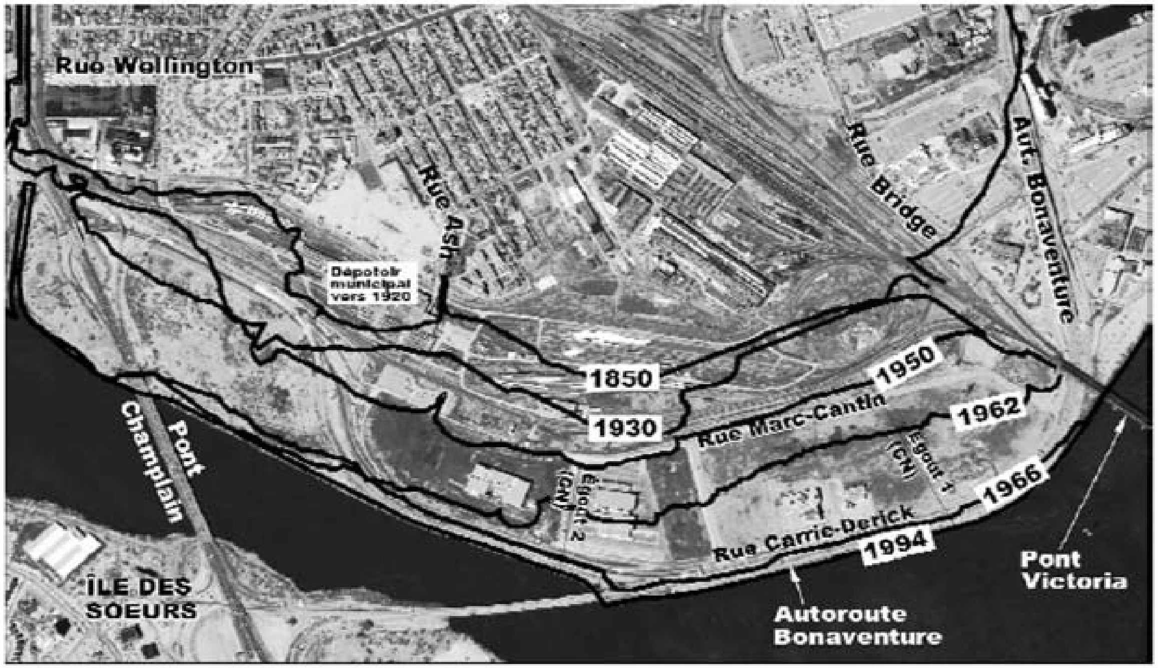
Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0057	00

SIZE 11x17

- 1919: the Canadian National Railway (CNR) is founded, and in 1922 it absorbs the GTR.
- 1937: the dump site is transferred to the CNR.
- 1955 to 1965: the dump extends from Victoria Bridge to Champlain Bridge.
- 1958 to 1962: construction of Champlain Bridge, opened in 1962.
- 1965 to 1967: construction of Bonaventure Expressway and Autoparc Victoria, a huge parking lot used for Expo 67. These two construction projects involved major fill operations on the St. Lawrence shore between Champlain Bridge and Victoria Bridge.

The figure below illustrates the modification of the St. Lawrence shoreline in the study area between Victoria Bridge in the east and Champlain Bridge in the west.

Figure 44 Modification of St. Lawrence shoreline between Victoria and Champlain Bridges



4.1.3.2 Local geology

The geology encountered on the property of JCCBI was documented through a series of drilling campaigns conducted for JCCBI during the period from 1993 to 2011. The drilling operations stemmed from environmental concerns (migration of contaminants) associated with the shoreline fill, to the west of Technoparc Montreal (formerly Autoparc Victoria).

The studies in question, which were provided by JCCBI, are those carried out by Inspec-Sol in June 1993 and February 1996, by Dessau-Soprin in March 2005, by Tecsult in July and September 2005, and by TechnoRem in March 2007 and October 2011.

These drilling studies confirmed that the fill material on the land adjacent to Champlain Bridge ranges from 4 to 12 m in thickness. The fill consists of sand, silt and gravel, and contains significant concentrations of various waste materials, brick, concrete, wood, metal, glass, plastic, ash and other substances, in concentrations which locally exceed 50% of the fill volume.

The fill containing waste materials lies on natural fine silty sand or on dense silty till to gravel of thicknesses ranging from 1 to 3 m at the most. The basement rock, of locally calcareous black shale, is encountered below the natural deposit at depths of 9 to 16 m below grade.

Other work aimed at describing the local geology was carried out in the form of an environmental and geotechnical investigation for the rehabilitation of on- and off-ramps and viaducts on Nuns' Island. There were two such studies done by Dessau in December 2008.

These drilling studies led to the identification of the natural soils under the pavement structures, consisting of silty sand to clayey silt to gravel in thicknesses ranging from 1 m to over 9 m locally. The natural soils lie on the basement rock (black shale) located from 1.1 to 14.3 m below grade.

On Highway 15 in Montreal, from the south Atwater on-ramp until west of Wellington Street, about 100 drilling operations were done in 1963 as part of the construction of the highway and the Champlain Bridge approach (Lalonde and Valois, 1963).

Fill is found in almost all of these cores over an average thickness of 4 m (0.3 m to 12 m). The fill mainly consists of sand or sand and gravel, with variable quantities of silt and clay. The fill is heterogeneous and can contain construction debris (bricks, concrete, glass and wood) along with combustion waste (ash, cinder and coal) in unspecified quantities. The natural soil under the fill consists of sandy silt. The bedrock is found at a depth of 10-13 m below the ground. The presence of till containing combustion waste points to the presence of relatively high concentrations of metals and PAH, in particular.

Not specifically mandated in the previous studies, the geology of the unconsolidated deposits in the zones on the eastern half of Nuns' Island and at the south end of Champlain Bridge in Brossard can be extrapolated from the regional geology and the extension of the units observed.

4.1.3.3 *Quality of soils*

Of all the areas included in the footprint of the New Bridge for the St. Lawrence, the soils near the St. Lawrence shore of Montreal Island to the west of Technoparc Montreal potentially represent the most complex environmental conditions by far. As indicated previously, 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).

Studies provided by JCCBI allowed a more detailed assessment of soil quality in this part of the footprint of the future bridge and on part of Nuns' Island.

Of the studies provided by JCCBI, the studies reviewed in the evaluation of soil quality are those that involved coring and soil sampling inside or within 100 m of the footprint designated for future work.

Information derived from a total of 46 boreholes drilled between 1993 and 2011 was used to create an overall portrait of soil quality in the areas covered by those studies. Borehole positions and identification are shown in Figure 45.

The information on the type of fill, the soils and the analysis findings are summarized in the two tables in Appendix 2, one for Montreal Island and one for Nuns' Island.

Figure 46 illustrates, in simplified form, the environmental quality of the soils at the borehole locations. The environmental quality of the soils was determined with reference to the contamination categories 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). The soil quality determined for each borehole indicated in Figure 46 represents the worst finding, considering all sampling intervals and all analysis parameters for any given borehole.

4.1.3.3.1 *Soil*

As shown in Figure 46, most of the cores taken from the area on the shore of Montreal Island have concentrations for soils matching criteria BC or higher than criteria C of the Policy. As indicated in the table for Montreal Island at Appendix 2, the concentrations BC or >C observed are associated with various parameters (petroleum hydrocarbons C_{10}-C_{50}, polycyclic aromatic hydrocarbons and/or metals), and are found at various depths in the fill, both at the surface (0-1.0 m) and at depth (9-10 m).

In the west part of Nuns' Island, all concentrations measured in the soils were below criteria C prescribed by the Policy, and most are below criteria B (see the Table for Nuns' Island at Appendix 2 and Figure 46).

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SIZE 11x17

Boreholes

◒	Dessau - December 2008
⊙	Inspec-Sol 1993 et 1996
⊕	Technorem - October 2011
⌖	Technorem - March 2007
◎	Tecsult - September 2005
⬚	Municipal limit
▭	Borough limit

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

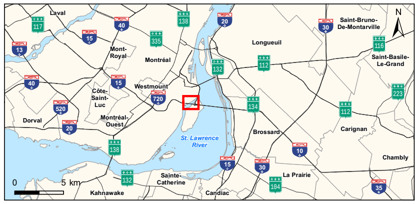

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Figure 45
Borehole Locations – Previous Studies

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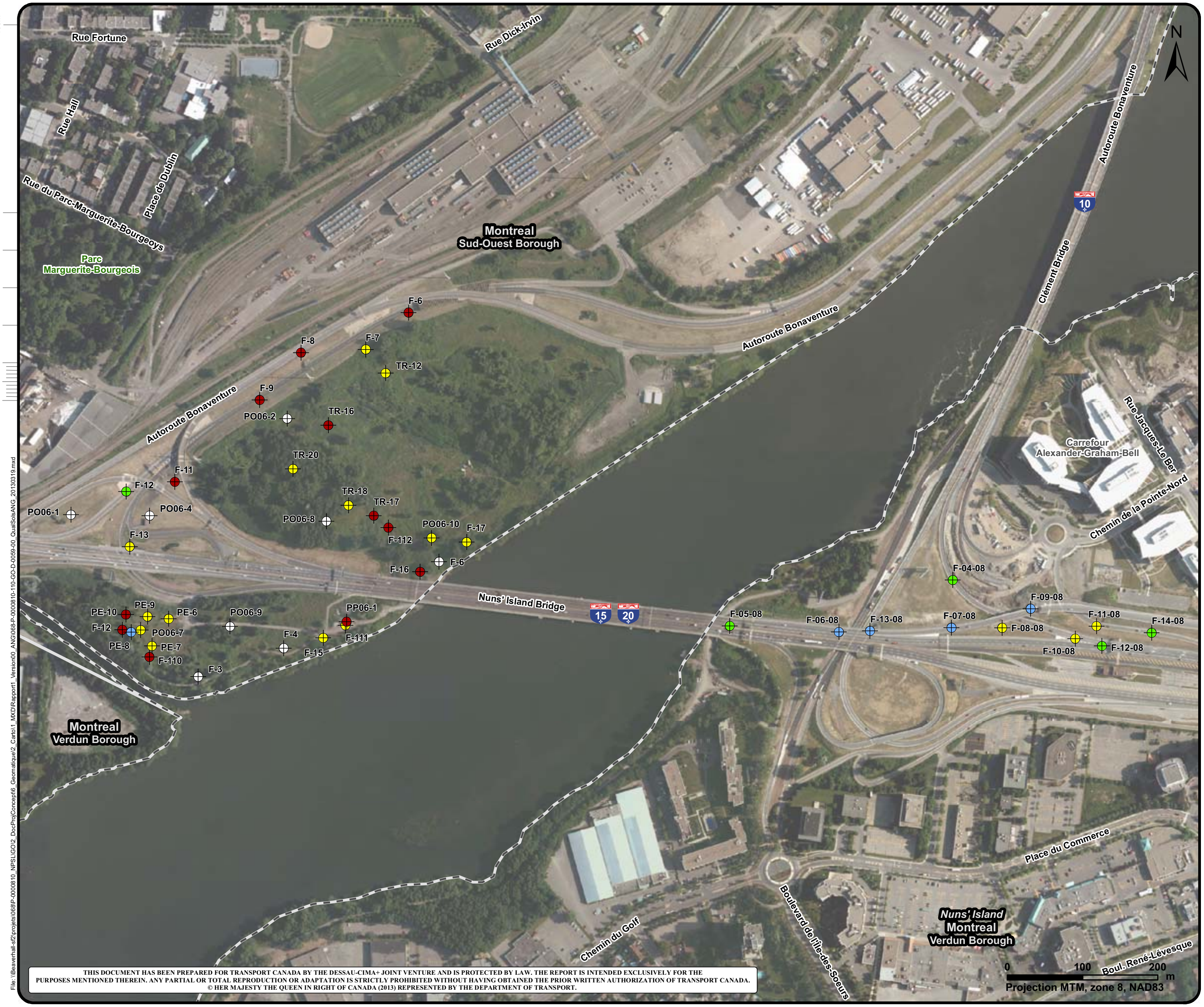

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SIZE 11x17

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

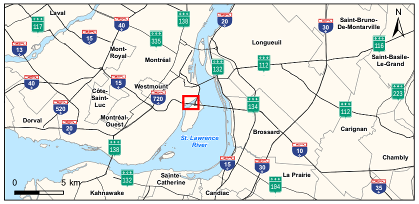

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Figure 46
Environmental Soil Quality

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068	P-0000810	110	GO	D	0059	00

4.1.3.3.2 *Waste materials*

In addition to the problem of contaminated soil in the categories BC or exceeding criteria C found in the area adjacent to Champlain Bridge on Montreal Island, studies identified localized waste materials representing over 50% of the fill. Cores locally revealed waste materials as much as 1.8 m in thickness. When excavated, if fill is found to contain over 50% waste material, it must be managed as waste, not soil.

4.1.3.3.3 *Methane*

Another problem associated with the presence of waste material in the fill area on the shore of Montreal Island is the local presence of significant concentrations of methane gas (CH_4), which is a product of waste degradation in an anaerobic environment. Concentrations of CH_4 exceeding 15% by volume were measured by TechnoRem Inc. in 2007 in three wells in the study area.

The potential presence of methane in the soil must be taken into consideration in the design of the future bridge structures to avoid any situation conducive to the collection of methane in an area or enclosed space containing an ignition source or in a space or room that is occupied, even on an occasional basis, by a worker or anyone else.

4.1.3.4 *Quality assessment in areas not previously studied*

As with the local geology, the quality of the soils and groundwater in areas not covered by the studies provided by JCCBI cannot be assessed at this stage. The same applies to the area within the footprint designated for future projects along Highway 15 North, to the west of Wellington Street, on the eastern half of Nuns' Island, and at the south end of Champlain Bridge in Brossard.

To determine the risk of soil contamination associated with the historical uses of these lands and adjacent areas, a brief review of historical drawings, aerial photographs and topographical maps in archives was undertaken.

Several environmental issues were identified in connection with the lands adjacent to the footprint 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.).

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 footprint since it was built about 50 years ago.

4.1.3.5 *Additional characterization of soil*

Building the new bridge does not entail an obligation to perform an environmental rehabilitation of the lands that it will cross. This particularly applies to the area of Technoparc Montreal, where the problem and the environmental issues go well beyond the scope of the construction of the new bridge.

However, material that is excavated for the construction of the new bridge and associated development work must be managed in accordance with applicable laws and regulations based on the level of contamination involved.

Accordingly, additional soil characterization work appears to be required, both in the areas where no characterization has been done and in the areas covered by previous characterization studies, since most previous studies were not intended to characterize soil that was to be excavated.

Before any further environmental characterization of soil is undertaken, we recommend waiting until the design parameters of the future bridge are defined (e.g., utilization, locations and description of piers), as well as the nature of the excavation work required for the construction of the bridge infrastructure and access routes (e.g., areas for excavated material and backfill, resurfacing, etc.).

Since the work areas where soil is to be excavated and handled have not yet been identified, it is too soon to put forward a specific characterization program at this stage or to identify specific borehole locations. However, the basic parameters that are usually selected for soil characterization studies in industrial areas should be adopted for the additional work, i.e. polycyclic aromatic hydrocarbons (PAH), metals, petroleum hydrocarbons C_{10}-C_{50} and volatile organic compounds (VOC). Performance of analytical scans for a wider range of parameters (including PCBs, phenols, etc.) using 10% of the basic parameter samples analyzed may also be indicated.

Additional characterization work must in all cases be conducted in accordance with the characterization chart provided in the *Guide de caractérisation des terrains* (land characterization guide) published by the MDDEP (2003), and the findings must provide a basis for the development of plans for the management of excavated materials according to their environmental quality.

4.1.3.6 *Assessment of risks to human health from contaminated sites and risk management*

It is important to remember that the proposed work part of the construction of a New Bridge for the St. Lawrence does not involve the rehabilitation of contaminated sites with respect to soil, sediment and groundwater, but rather the proper management of the excavated materials or pumped water to enable the construction of the new roadway infrastructures. From then on, the assessment of the risks to human health at this stage of the project is intended as qualitative and will focus solely on the potential risk created during the construction period.

The risk can be defined by the result of the exposure of human receptors and the toxicity of the contaminants that are found. These elements are then described summarily.

4.1.3.6.1 Sources of contamination and identification of contaminants

The soil characterization studies described in section 4.1.3.3 revealed the presence of several contaminants measured at concentrations exceeding criteria C in the MDDEFP's *Policy on Soil Protection and Rehabilitation of Contaminated Land* (the Policy), the criteria applicable for roadway infrastructures. These contaminants mainly consist of petroleum hydrocarbons (e.g. PH C_{10}-C_{50}), polycyclic aromatic hydrocarbons (PAH) and metals. Note that individual PAHs that exceed criteria C are associated with heavy PAHs and not with petroleum products. This contamination is mainly due to a heterogeneous fill of up to 12 m in depth, depending on the zone.

4.1.3.6.2 Contamination transport and outcome

Several transport and transformation mechanisms can contribute to the transfer of contaminants to other environmental compartments. The main mechanisms likely to be observed during the work when there are no mitigation methods are:

- Suspension of soil particles through wind erosion;
- Precipitation or wet or dry deposition following suspension in air;
- Percolation in the soil and infiltration into the water table;
- Off-site dispersion;
- Infiltration of outdoor air into indoor air;
- Suspension of sediment as a result of physical disruption.

4.1.3.6.3 Human receptors

The land on which the new infrastructures will be built is vacant but located near the present Champlain Bridge and commercial and residential areas. The new infrastructures will also stretch across the St. Lawrence River. The population potentially exposed to contamination will therefore consist of:

- On site: workers at the New Bridge for the St. Lawrence work site;
- Off site:
  - Workers at the commercial areas;
  - Local residents;
  - Recreational fishermen.

4.1.3.6.4 *Potential routes of exposure*

Given the previously mentioned transport and transformation mechanisms, the main potential routes of exposure consist of:

- On site:
  - Work on land:
    - Inhalation of outdoor contaminated air and dust;
    - Accidental ingestion of soil;
    - Skin exposure to soil;
  - Work in water:
    - Contact with sediment;
    - Accidental ingestion of sediment;
- Off site:
  - Inhalation of outdoor contaminated air and dust;
  - Inhalation of indoor contaminated air;
  - Ingestion of indoor contaminated dust;
  - Ingestion of fish.

4.1.4 Hydrography and hydrogeology

4.1.4.1 *Hydrographic context*

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 (see Figure 49).

4.1.4.1.1 *Greater La Prairie Basin*

The Greater La Prairie Basin is fed by two large masses of water: the mass from the Great Lakes (80%) and that from the Ottawa River (16%) (St. Lawrence Centre, 1996). The relative importance of these two masses water varies with the seasonal variations in discharge rates, particularly the fluctuations in the Ottawa River, which can represent up to 50% of inflow during the spring runoff. The mass of water coming from the Great Lakes varies according to a flow rate management plan designed to provide the minimum water level required for safe navigation in the Seaway. The water mass inflowing from the Ottawa River is partially regulated and is subject to nival streamflow control based on natural seasonal variations (Robitaille, J., 1997). Affluent from the Ottawa River splits at Deux-Montagnes Lake. Most of it enters the Milles-Îles and Prairies rivers. The remainder flows through the Vaudreuil and Sainte-Anne canals and from there into Saint-Louis Lake, where it mixes with the waters of the St. Lawrence, then it flows through the Lachine Rapids and into the Greater La Prairie Basin. The hydrodynamic regime is characterized by the unidirectional (downstream) flow of fresh water. This type of flow induces very little friction in the water mass and in the waters of the different tributaries, resulting in little mixing and in the preservation of their individual physical and chemical characteristics (St. Lawrence Centre, 1996). 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 (Robitaille, J., 1997).

4.1.4.1.2 Lesser La Prairie Basin

The Lesser La Prairie Basin, which is separated from the Greater La Prairie Basin by a dike extending from Kahnawake to Longueuil, is divided by a string of artificial islets. These islets demarcate the Seaway channel. The Seaway bypasses the Lachine Rapids by running along the south shore starting at Saint-Louis Lake. The flow rate here is about 200 m^3/s. The water level at this point is regulated by locks (at Sainte-Catherine and Saint-Lambert, operated by the St. Lawrence Seaway Management Corporation), where there are two small, private, hydroelectric generating stations.

The Lesser La Prairie Basin is fed mainly by the water mass from the Great Lakes. There are three main feeders supplying inflow to the Lesser Basin: the Saint-Régis, Tortue and Saint-Jacques rivers (the Saint-Jacques also known as the Saint-Lambert River). However, these three affluents represent only 5% of the streamflow, with a minimal effect on the water level in the basin (Robitaille, J., 1997).

4.1.4.2 Hydrogeological setting

On both Montreal Island and the South Shore, water from precipitation and runoff on the land near Champlain Bridge seeps directly into the ground because most of these surfaces are not paved or drained. These areas are largely seen as recharge sources for the groundwater.

The flow of groundwater on these lands 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.

The previous characterization studies mentioned in Section 4.1.3.2, including the TechnoRem study of March 2007, provide a substantial quantity of relevant hydrogeological information about the lands adjacent to Champlain Bridge on the Montreal side.

According to the piezometric data reported in these studies, 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 fill represents the dominant hydrogeological unit and constitutes the surface aquifer. The silty till to gravel underlying the fill represents a hydrogeological unit of very low permeability, described as aquitard.

The 2007 TechnoRem study concludes that the average hydraulic conductivity in the fill is on the order of 1.5 X 10^{-5} m/s. The piezometric charts provided in the study show isopiestic lines that follow the contours of the shoreline and do not indicate that the Champlain Bridge structures have any effect whatsoever on the estimated speed or directions of flow. Farther to the northeast, the base structure of the Bonaventure Expressway (riprap), with which are associated high flow rates, locally modify the isopiestic lines close to the shoreline.

The rate of flow in the fill in the area of Champlain Bridge as estimated by TechnoRem is on the order of 200 m/yr. This flow rate is undoubtedly higher in the coarse permeable materials in the base of the Bonaventure Expressway.

4.1.5 Water quality

4.1.5.1 *Quality of surface water*

The portrait of the quality of surface water is based on a study by Roche Ltd., Consulting Group, (1982) and on the archive of surveys carried out since 1990 by the MDDEP (MDDEP, 2012a; Hébert and Belley, 2005). These sources of information are currently the only and the most recent ones available upon which a description of surface water quality can be based.

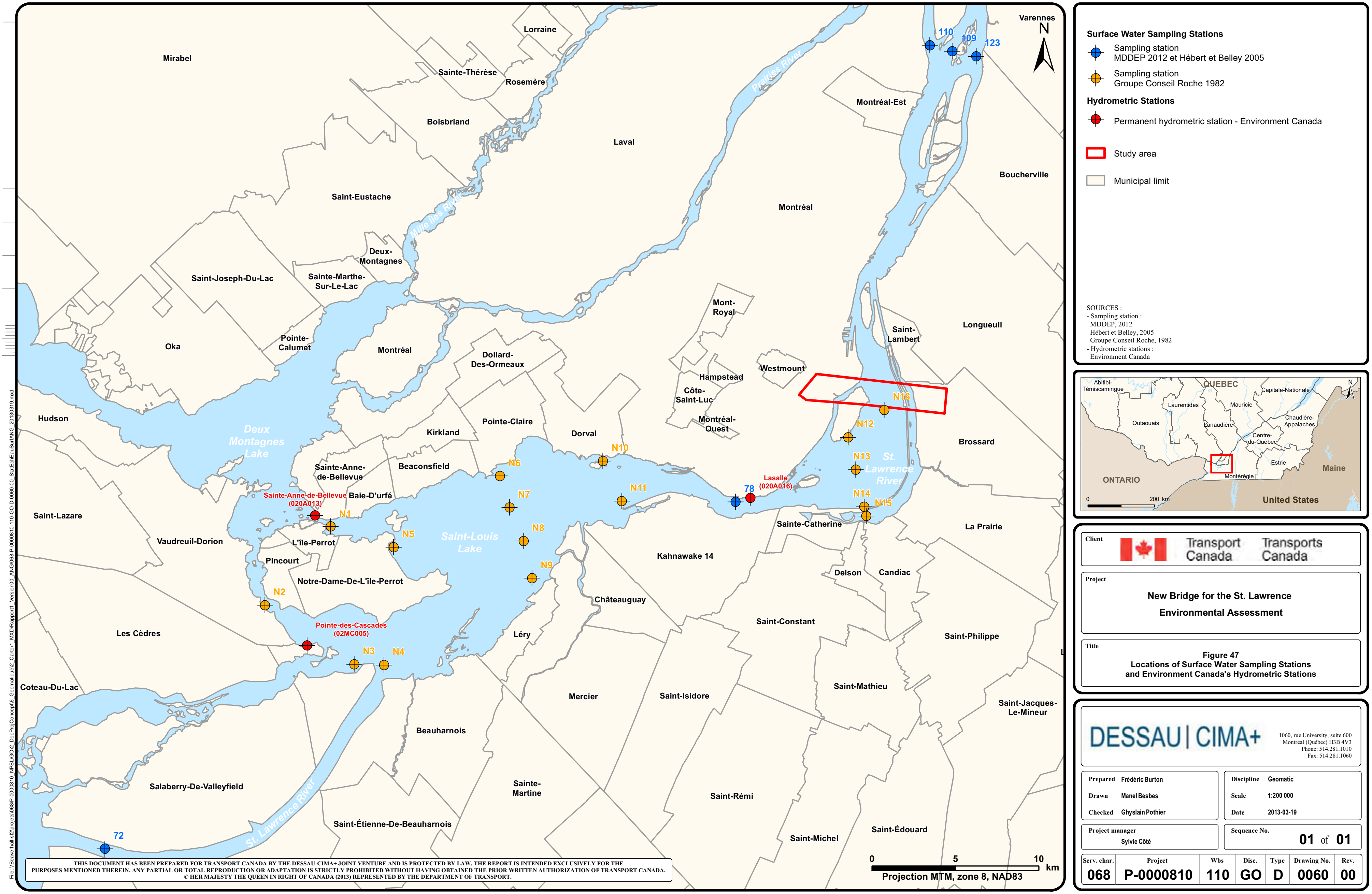
In the report entitled “Projet Lachine étude des communautés planctoniques du lac Saint-Louis et du La Prairie Basin,” the Roche Consulting Group describes the physical-chemical surveys performed over the one-year period from November 1980 to October 1981. The surveys were generally carried out every month at each of the 16 stations (see Figure 47). The parameters measured in this study are:

- conductivity;
- total hardness;
- total alkalinity;
- turbidity;
- suspended solids;
- pH;
- dissolved oxygen;
- chlorides;
- silicates;
- nitrites and nitrates;
- nitrites;
- total Kjeldahl nitrogen;
- ammoniacal nitrogen;
- total inorganic phosphorus;
- orthophosphates;
- temperature;
- transparency.

This study shows the influence of the St. Lawrence River and the Ottawa River on Saint-Louis Lake and the La Prairie Basin. It reports that the water masses remain relatively separated, even when they go over the Lachine Falls. However, the report describes only how these parameters evolve as average values for all stations sampled over time. The result is that, besides the fact that the surveys were done 30 years ago, only a general average is available, not the results from the station closest to Champlain Bridge (site No. 16).

Since 1990, the MDDEFP has been monitoring water quality in the St. Lawrence River on a monthly basis (30 stations are sampled). Five stations are located in the Montreal area, but none are close to Champlain Bridge (see Figure 47). The parameters measured at the stations are:

- ammoniacal nitrogen;
- total dissolved nitrogen;
- chlorophyll a and phaeopigments;
- total organic carbon;
- chlorides;
- fecal coliforms;
- conductivity;
- nitrates;
- nitrites;
- pH;
- total, dissolved and particulate phosphorus;
- suspended solids;
- temperature;
- turbidity.



Surface Water Sampling Stations

🔵 Sampling station
MDDEP 2012 et Hébert et Belley 2005

🟠 Sampling station
Groupe Conseil Roche 1982

Hydrometric Stations

🔴 Permanent hydrometric station - Environment Canada

🟥 Study area

▭ Municipal limit

SOURCES :
- Sampling station :
MDDEP, 2012
Hébert et Belley, 2005
Groupe Conseil Roche, 1982
- Hydrometric stations :
Environment Canada

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Figure 47
Locations of Surface Water Sampling Stations
and Environment Canada's Hydrometric Stations

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Data are available for the following periods:

- Variations in surface water quality parameters from 1990 to 2001 for the five stations monitored in the Montreal area (see Appendix 3);
- Variations in surface water quality parameters from May to October 2000 and from May to October 2001, at stations 72 and 78 (see Appendix 3);
- Variations in surface water quality parameters from January 7, 2008 to December 6, 2010, for stations 72 and 78 (see Appendix 3);
- Variations in surface water quality parameters from May 6, 2008 to October 12, 2010, for stations 109, 110 and 123 (see Appendix 3).

These monitoring activities found that none of the measured parameters exceeded the water quality criteria for the protection of aquatic life. (MDDEP, 201b2; CCME, 2012).

4.1.5.1.1 Current status of the area

No comprehensive water quality survey has been done directly on the site concerned. According to the data available in the Montreal area, the water quality criteria for aquatic life (CCME and MDDEFP) are complied with for the parameters measured (including turbidity, to which special attention will be paid in future work).

4.1.5.2 Quality of groundwater

The findings of the analyses of groundwater quality in the areas previously covered by characterization studies are summarized in the table on Montreal Island at Appendix 2. The results of previous studies were compared against the regulatory requirements for storm sewer or surface outfall (by-law 2008-047 of the Montreal Metropolitan Community (CMM).

As shown in Figure 48 and Appendix 2, all groundwater samples collected from the area of fill on the Montreal shore exceed the levels prescribed by the CMM for at least one parameter.

In most cases, exceedence was noted for metals, manganese and/or barium or PAHs. It is noted that the CMM standards for these parameters are especially stringent, notably in comparison with the criteria in the MDDEFP Policy for surface water outfall and sewer ingress (RESIE).

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Excess of the discharge criteria (RESIE) as per MDDEP policy (1998). All criteria combined.

- ⊕ In excess of the criteria for one or more parameters analyzed
- ⊕ Not analyzed
- ⬚ Municipal limit
- ▭ Borough limit

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

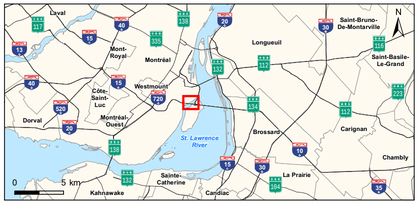

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Figure 48
Quality of Ground Water

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068	P-0000810	110	GO	D	0061	00

4.1.6 Bathymetry

4.1.6.1 Compilation of bathymetric data

The compilation of the available bathymetric data is not complete for the Greater La Prairie Basin as a whole. For that reason, in this study, additional bathymetric surveys were carried out from July 10 to 14, 2012 on a strip running parallel to the centre-lines of Champlain Bridge and Nuns' Island Bridge (see Figure 49). The data published by the Canadian Hydrographic Service (station 15520: Montreal Jetty #1) for this period show that the water level at the time of the measurements was 30 to 40 cm below the chart datum. The bathymetric chart was completed based on data from different sources (Table 10). Bathymetric coverage in the Greater La Prairie Basin is incomplete. The Canadian Hydrographic Service (CHS) provides coverage upstream of Honoré Mercier bridge and downstream of Victoria Bridge, but does not cover the section between the two bridges, as it is not considered navigable. Data are however available for the section adjacent to Champlain Bridge, originating from JCCBI (2007 coverage) and from a survey by Environnement Illimité, conducted for this study (2012), and between Nuns' Island and Verdun (JCCBI, 2007 coverage). They provide coverage on both sides of the centre-line of the existing bridge and extend over an average width of 350 m. They were incorporated into the data resulting from the 2012 survey campaign presented in Figure 49.

Bathymetric coverage of the Lesser La Prairie Basin is complete due to the presence of the St. Lawrence Seaway. The data shown on the hydrographic chart are not very detailed, however, as the bathymetry of the shipping channel is controlled (<8.2 m), while the adjacent zone is generally within the area where the depth is less than 2.5 m. At Champlain Bridge, detailed data from different sources are available, originating from the St. Lawrence Seaway Management Corporation (2010), the JCCBI (2010 and 2011) and the survey by Environnement Illimité conducted for this study (2012).

Table 10 Information on different sets of bathymetric data

SOURCE	SURVEY DONE BY	AREA SURVEYED	SURVEY DATE	COORDINATES AND PROJECTION SYSTEM	VERTICAL DATUM
St. Lawrence Seaway	St. Lawrence Seaway	Seaway	July 2010	NAD83, MTM8	IGLD85
Jacques Cartier and Champlain Bridges Inc.	Environnement Illimité and Brad-Tremblay	Basin downstream of bridge	July 2010	NAD83 CSRS, MTM8	CGVD-28 (MSL)
Jacques Cartier and Champlain Bridges Inc.	Entreprises Normand Juneau	Basin upstream of bridge	October 2011	NAD83, MTM8	CGVD-28 (MSL)
Jacques Cartier and Champlain Bridges Inc.	Entreprises Normand Juneau	Between Nuns' Island and Verdun	May 2007	NAD83, MTM8	CGVD-28 (MSL)
Environnement Illimité	Environnement Illimité	Basin, Seaway, river	July 2012	NAD83 CSRS, MTM8	CGVD-28 (MSL)

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Flow facies

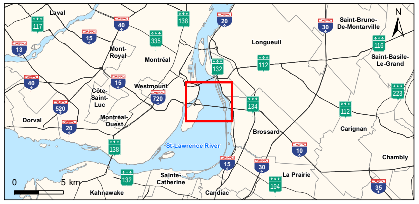
- Lotic – Whitewater
- Laminar lotic
- Lentic
- Flow facie limit

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



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Project

New Bridge for the St. Lawrence
Environmental Assessment

Title

Figure 49
Bathymetry and flow facies

DESSAU | CIMA+

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4.1.6.2 *Greater La Prairie Basin*

The banks of the Greater Basin are 26 km in length and are 100% artificial (Robitaille, J., 1997). At the foot of the rapids, the river widens to form the Greater La Prairie Basin, the entrance of which contains a few scattered islands. Some of the islands (Hérons, Chèvres and Diable) have enough elevation to remain above the level of the spring flood. The others, like Sept-Soeurs, Rock and numerous rocky islets, may be partially or completely submerged, depending on the severity of spring flooding (Robitaille, J., 1997). At the foot of the rapids, the depth is 5 m on average, with one hole 10 m deep (Robitaille, J., 1997).

Under Champlain Bridge (see Figure 49), 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 (see Figure 49). Along the left bank, at Nuns' Island, the variations were greater. 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.

4.1.6.3 *Lesser La Prairie Basin*

The banks of the Lesser Basin are 79 km in length, and 85% of the shoreline is artificial (Robitaille, J., 1997). The artificial and natural banks are being constantly degraded owing to the management of water levels to allow for Seaway maintenance work after the boating season (Robitaille, J., 1997).

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 49).

4.1.7 Ice Flow

The principal source of information concerning ice on the St. Lawrence is the Canadian Ice Service (CIS), a unit of the Canadian Coast Guard (CCG). Ice charts covering from the outlet of Saint-Louis Lake to the Port of Montreal were obtained from the CIS for the period from December 2000 to March 2012.

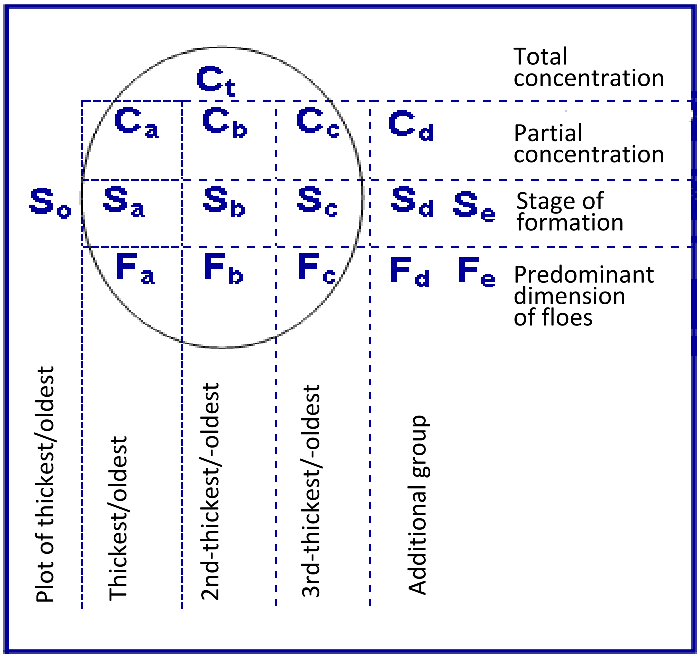
4.1.7.1 *Canadian Ice Service charts*

The ice charts produced by the CIS are thematic charts that represent a synthesis of information from a variety of sources, including photos and observations made by CIS staff. The charts may be viewed as “snapshots” of the ice cover, which is often in a state of constant change. Ice charts are issued at very irregular intervals (there may be as little as one day or as much as two months between two consecutive editions).

From December 9, 2000 to March 19, 2012, 147 charts were issued by the CIS. However, five of those charts had to be set aside, either because they were illegible (corrupted files) or because they contained no information on ice. A total of 142 ice charts were used in the analysis of 12 ice seasons (12 charts per season on average).

The ice charts use an egg-shaped symbol to describe ice conditions. This code (see Figure 50) is described in a document available from the Environment Canada website. Since this report is about navigation conditions, and to ensure clarity of analysis, only the total concentration (Ct) was used to describe ice conditions.

Figure 50 Code based on an egg shape to describe ice conditions (Environment Canada)



4.1.7.2 *Analysis of existing data*

Two zones were defined for the purpose of this analysis: the bridge zone over the St. Lawrence River and the bridge zone over the Seaway.

For each ice chart (corresponding to a given date), the total ice concentration in the river and that in the Seaway were noted. These items of information were plotted on the graphs shown in Figures 51 and 52 (two groups of six seasons of observation).

Figure 51 Total ice concentration near Champlain Bridge – 2000 to 2006

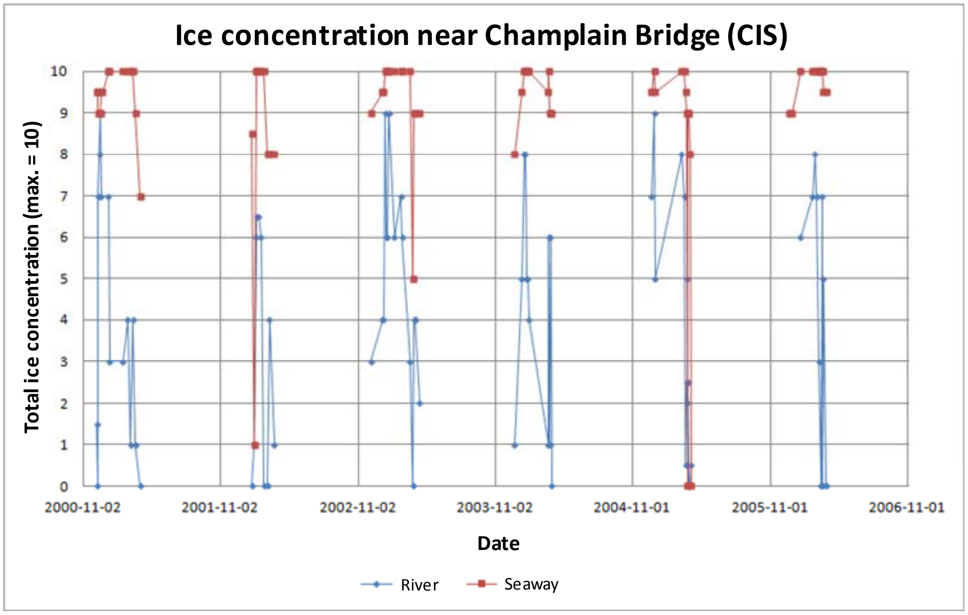
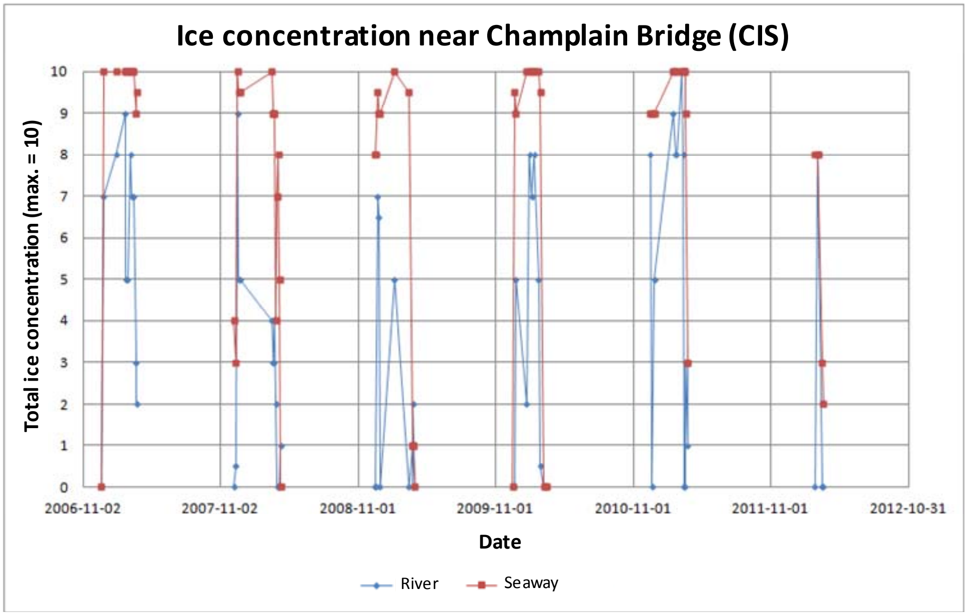


Figure 52 Total ice concentration near Champlain Bridge – 2006 to 2012



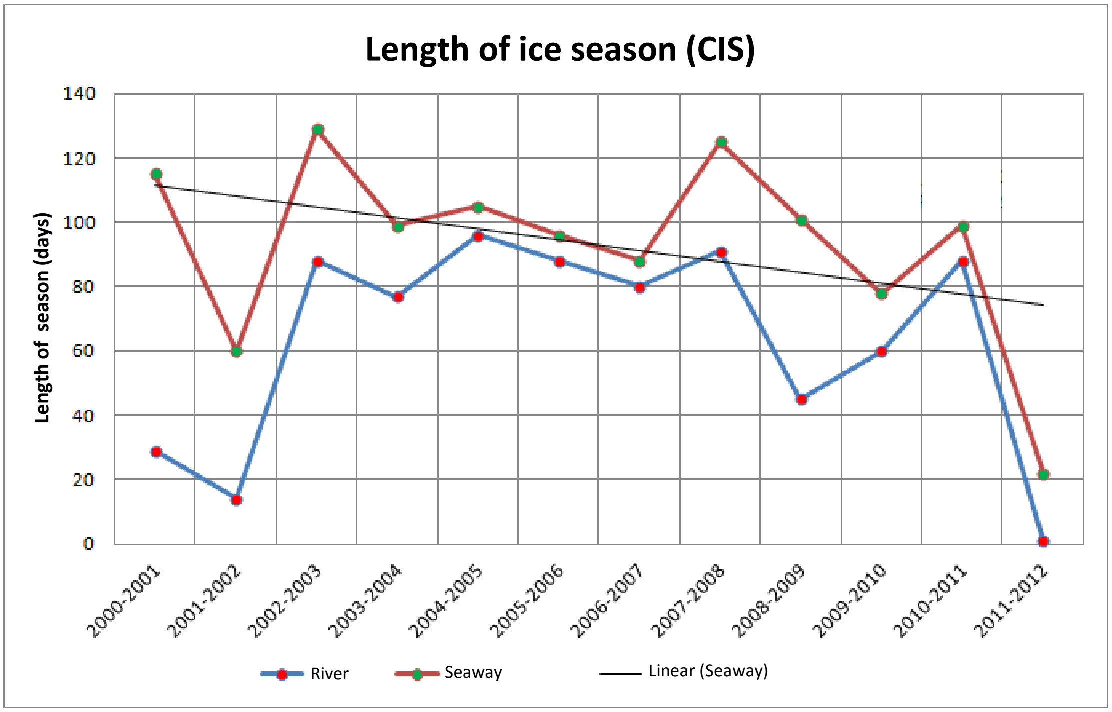
From the two figures above, it is clear that there is a lower concentration of ice in the river than in the Seaway at Champlain Bridge. The difference is due to the existence of two different hydraulic regimes in these two masses of water.

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

The ice charts also gave some idea of how long the ice season lasts at Champlain Bridge. The graph below describes the evolution of this parameter from year to year. However, the information provided by the CIS is too succinct to allow the figures in the graph to be utilized without some precautions.

According to the graph below, the ice season appears to have become shorter during the observation period (36 days on average over the 12 years available for the Seaway, i.e., three days shorter per year on average).

Figure 53 Length of ice season at Champlain Bridge, in river and in Seaway



The CIS ice charts provide a clear picture of the process of icing up in the St. Lawrence and in the Seaway.

At the start of the season, the Seaway freezes over sooner than the river, and as the season is ending, the Seaway generally stays icebound longer than the river.

Figure 54 illustrates the ice conditions on December 7, 2007 (winter is starting), and the river is completely free of ice, but the Seaway is icebound near Saint-Louis Lake with total concentrations of 9 or 9+ and a total concentration of 4 in the reach between the locks.

Figure 55 illustrates the ice conditions on March 31, 2005 (winter is ending), and the river is completely free of ice, but the Seaway is icebound upstream of the Sainte-Catherine lock with a total concentration of 9 and upstream of the Saint-Lambert lock with a total concentration of 8.

Figure 54 Ice chart for December 7, 2007 – Beginning of winter

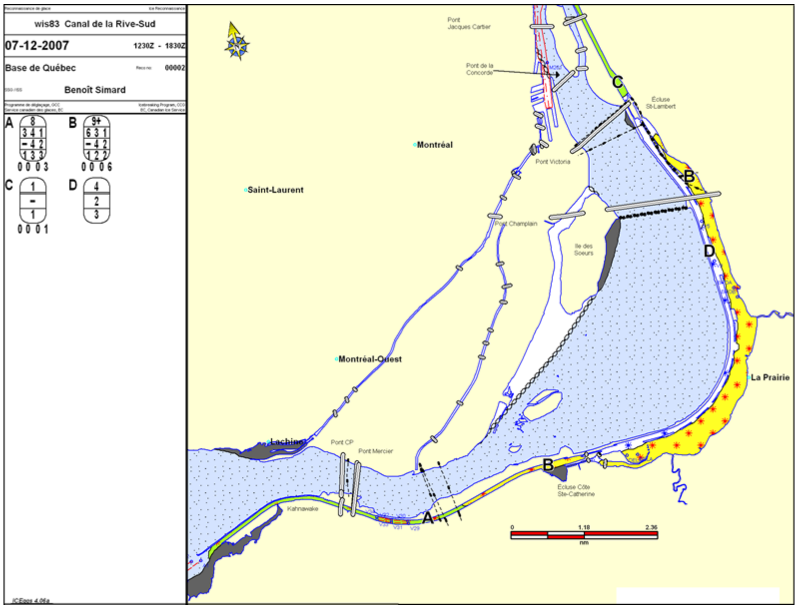
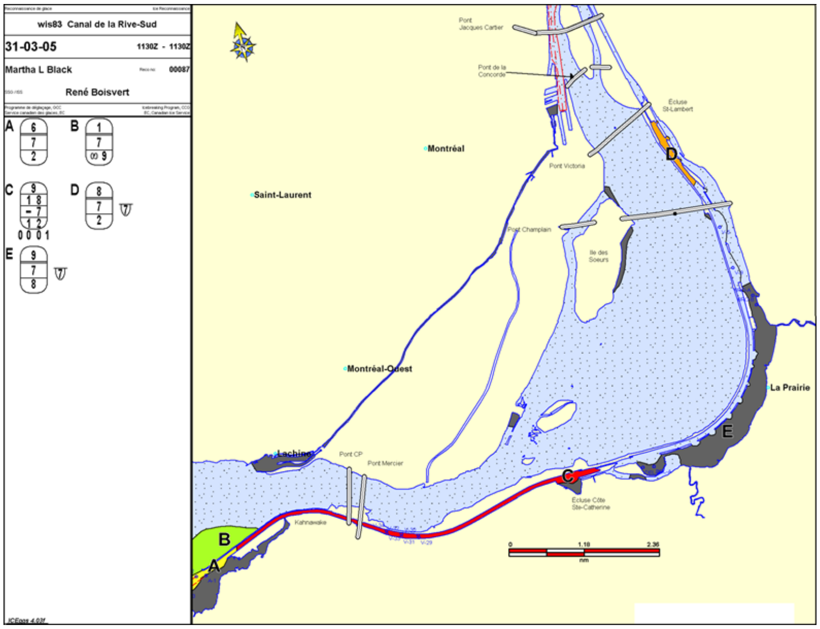


Figure 55 Ice chart for March 31, 2005 – End of winter

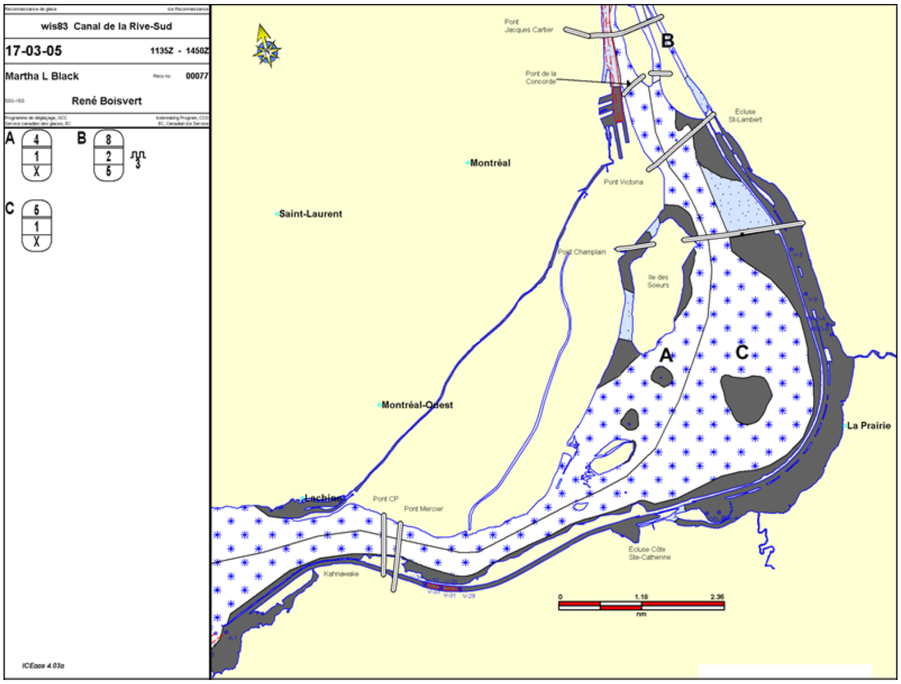


The other particular features of ice dynamics in the area of Champlain Bridge are:

- The ice boom upstream of Champlain Bridge. The ice boom can be quite effective in retaining ice in La Prairie Basin.
- With the prevailing wind from the west, fast ice is regularly observed along the east shore of La Prairie Basin.
- The shoals in La Prairie Basin tend to keep some of the ice cover in the Basin. This blocking effect can sometimes have a significant impact.

The ice chart for March 17, 2005 (Figure 56) shows a combination of ice being blocked over three-quarters of the length of the ice boom, on the east side, and fast ice along the east bank of La Prairie Basin. The total concentration of ice in La Prairie Basin varies from 4 to 5, which indicates possible downstream movement of the ice. This chart also shows the influence of the shoals in La Prairie Basin, as they are blocking some small ice plates (below the letters A and C in the following figure).

Figure 56 Ice blocked by ice boom – March 17, 2005



The ice chart for January 29, 2004 (Figure 57) shows a large ice pack caught at the middle of the ice boom combined with fast ice along the southeast shore of La Prairie Basin. The total concentration of ice in La Prairie Basin varies from 4 to 7, which indicates possible downstream movement of the ice.

The ice chart for December 20, 2007 (Figure 58) shows a large ice pack held back by the shoals in the middle of La Prairie Basin.

Figure 57 Ice blocked by ice boom – January 29, 2004

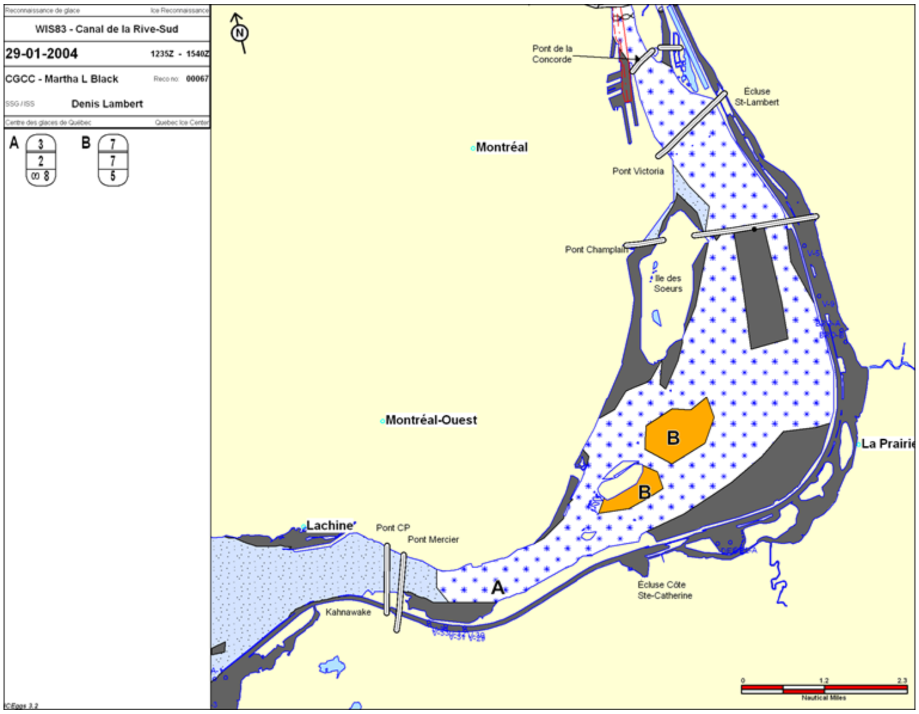
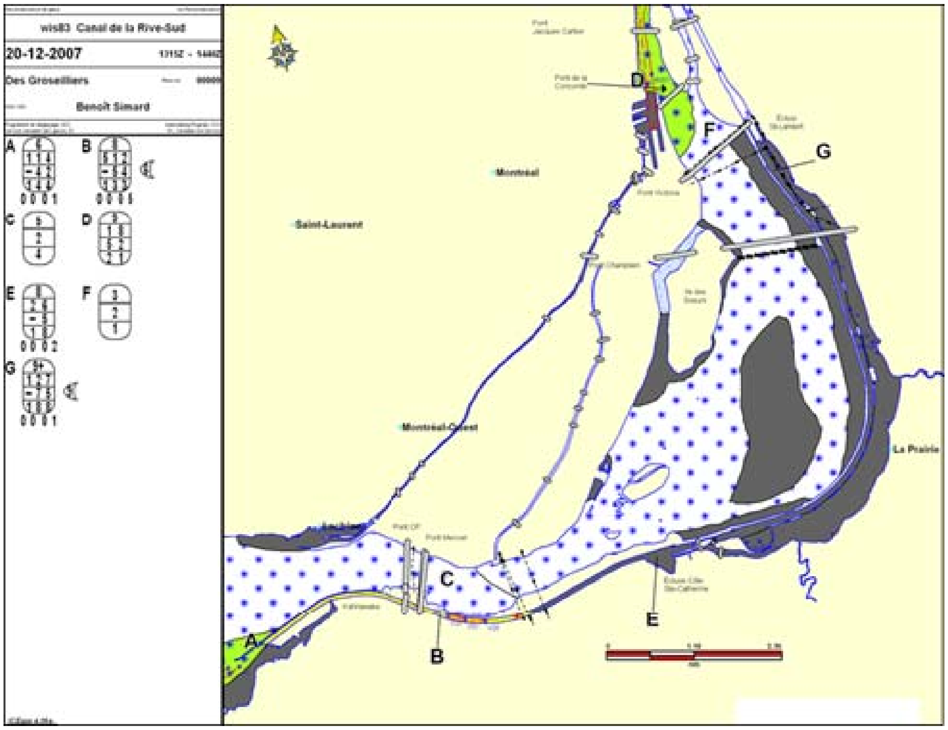


Figure 58 Ice blocked by shoals in Basin – Dec. 20, 2007



4.1.8 Current measurement

4.1.8.1 *Greater La Prairie Basin*

Figure 59 shows the water levels (1919 to 2011) in the St. Lawrence River at the Pointe-des-Cascades station. Water levels at this station are influenced mainly by the streamflow in the St. Lawrence and partly by the flow from the Ottawa River, which goes through the Vaudreuil channel on its way to Pointe-des-Cascades. Figure 59 shows the water levels (1919 to 2011) in the Ottawa River at the Sainte-Anne-de-Bellevue gauging station, and Figure 60 shows the levels (1955 to 2011) in the St. Lawrence River at the LaSalle gauging station (downstream of the area where the two water masses mix) (see Figure 47). One notes that the variations in water level (average from 1919 to 2011) are about 0.75 m at Pointe-des-Cascades, 1.15 m at Sainte-Anne-de-Bellevue and 0.5 m in the LaSalle area. In 2011, the maximum variations observed between the spring peak and minimum flow levels are 1.2 m at the Pointe-des-Cascades station, 2.0 m at Sainte-Anne-de-Bellevue and 1.0 m at the LaSalle station.

Figure 59 Water levels recorded at Pointe-des-Cascades station (02MC005) (1919 to 2011)

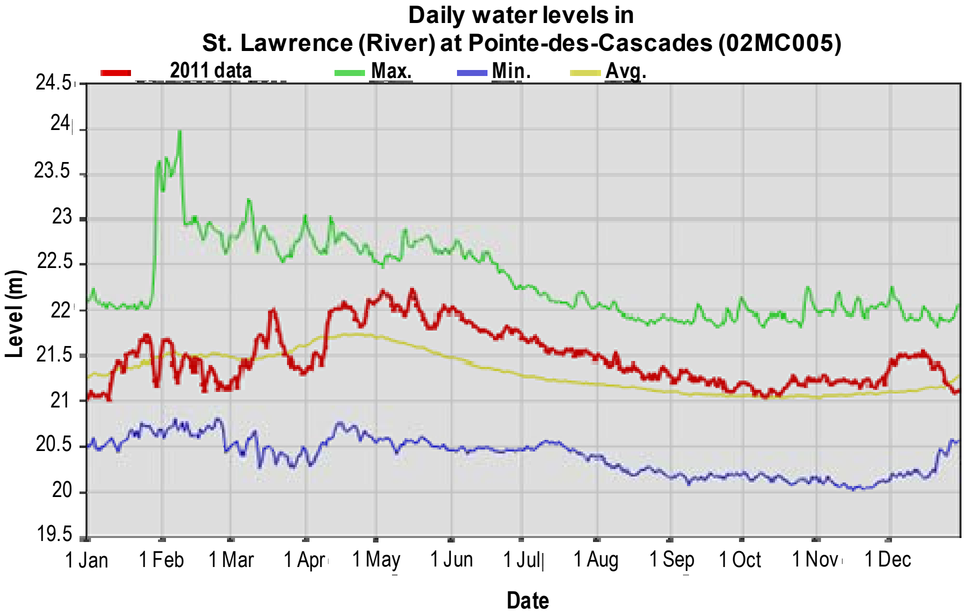


Figure 60 Water levels recorded at Sainte-Anne-de-Bellevue station (020A013) (1919 to 2011)

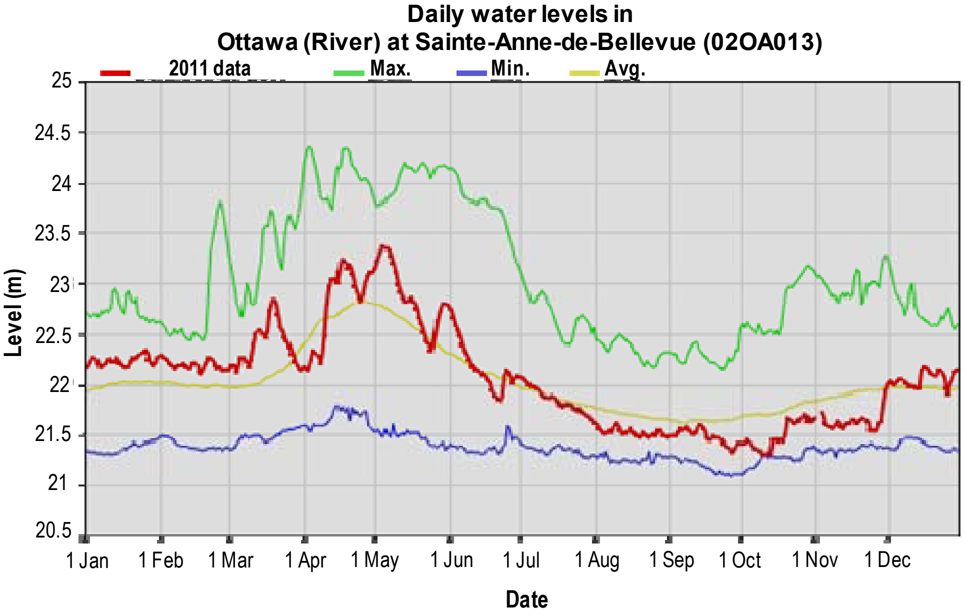
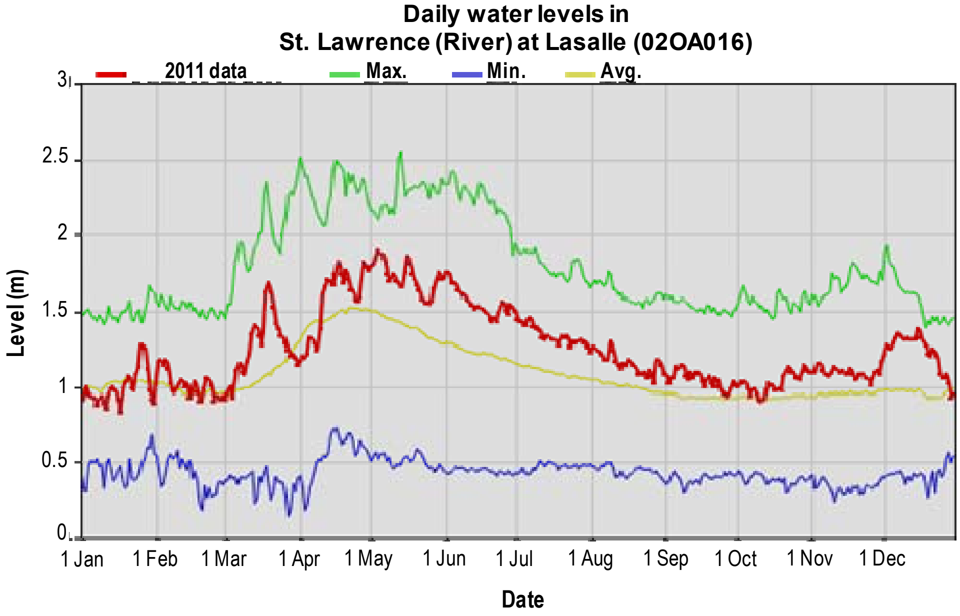


Figure 61 Water levels recorded at LaSalle station (020A016) (1955 to 2011)



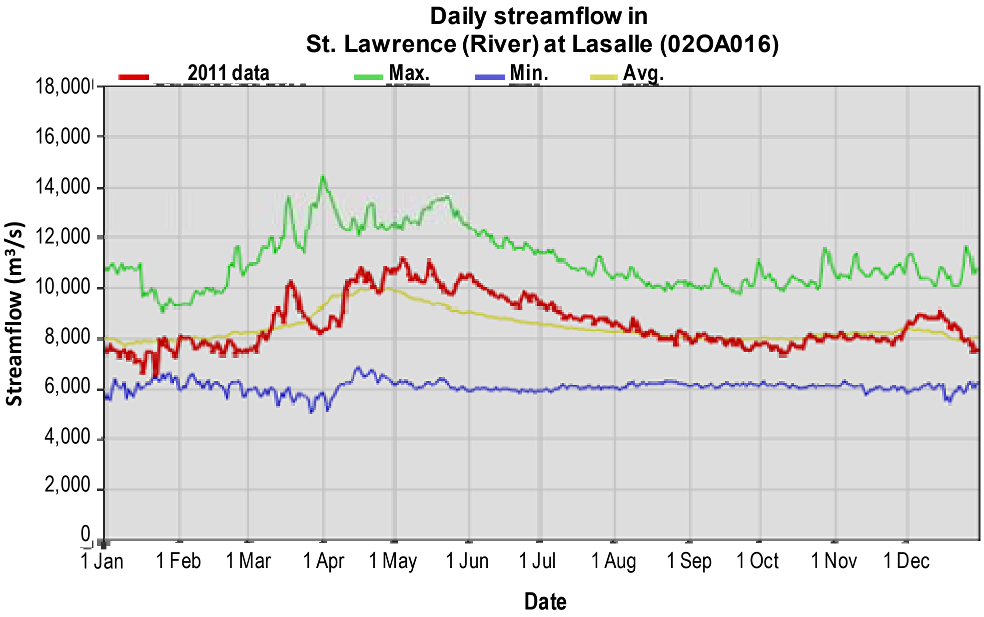
Streamflow in the St. Lawrence and Ottawa Rivers is controlled by several dams in their upper reaches. The St. Lawrence is regulated above Saint-François Lake by three major dams: the Moses-Saunders, the Long-Sault and the Iroquois. Downstream flow is regulated by the Beauharnois and Les

Cèdres hydroelectric power plants at the outlet of Saint-François Lake. The southern part of the Ottawa River, below Lake Timiskaming, serves as the provincial boundary between Quebec and Ontario. On the river itself and its tributaries, there are over 50 major dams and hydroelectric power plants (the plant with the greatest output on the Ottawa River being the Carillon power plant).

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. However, is has exceeded 9,000 m^3/s in the past, which is almost as much as the average flow in the St. Lawrence at LaSalle (9,780 m^3/s) (Robitaille, J., 1997).

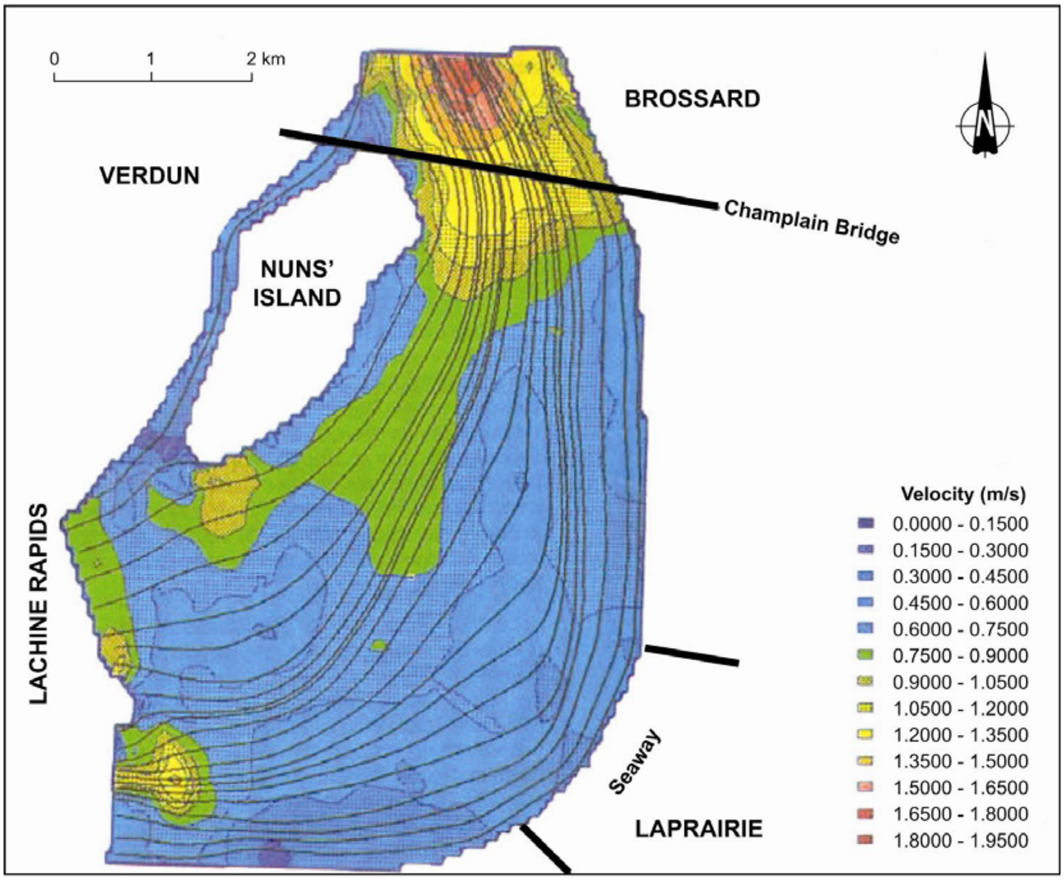
Streamflow levels recorded at LaSalle gauging station (02OA016) from 1955 to 2011 are plotted on the graph in Figure 61 (curves showing minimum, maximum, average and 2011 levels). The average curve indicates that the spring runoff usually starts in early April and peaks towards the end of April. Streamflow stabilizes around 8,000 m^3/s (on average) from August to late February.

Figure 62 Streamflow recorded at LaSalle station (020A016)



The primary flow of the St. Lawrence enters the study area via the Lachine Rapids. The current reaches a speed of over 3 m/s at the foot of the rapids (St. Lawrence Centre, 1996). When it reaches this point, the flow decelerates and is split by Hérons Island. A little farther downstream, the north arm is further divided by Nuns' Island. All arms come together again at the outlet of the Greater Basin at Victoria Bridge. In these different channels, current speed varies from 1.0 to 1.8 m/s during the runoff, but decreases to 0.75 to 0.90 m/s in summer (St. Lawrence Centre, 1996). 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 63 shows the velocity fields and flow trajectories in the Greater Basin.

Figure 63 Velocity fields and flow trajectories (Leclerc et al. 1987)



Climate change will have an impact on water levels in the St. Lawrence River, in particular upstream of Bécancour (D'Arcy et al., 2005). Working from simulations based on the most recent findings, four climate scenarios were generated for the Great Lakes and Ottawa River system. In all cases, a decrease in affluent is forecast (Table 11). The decrease varies from -4% (scenario NHH: climate not so hot and humid) to -24% (scenario HD: hot and dry climate) for the Great Lakes, and from -1% (scenario NHH) to -7% (scenario HD) for the Ottawa River. The simulations are referenced to the water levels in an average hydrological year (1969) and a low hydrological year (2001).

Table 11 Variation of percentage total affluent from Great Lakes and Ottawa River under four climate scenarios

SCENARIOS	GREAT LAKES	OTTAWA
HD (hot and dry)	-24%	-7%
NHD (not so hot and dry)	-17%	-4%
HH (hot and humid)	-21%	-8%
NHH (not so hot and humid)	-4%	-1%

Under these four scenarios, the forecast decrease in affluent will have an impact on water levels which would vary considerably. However, assuming an average hydrological year and scenario NHH, water levels in Greater La Prairie Basin would remain above chart datum. Scenarios HD and HH would have a greater impact, with water level falling to 1 m below chart datum from May to October under scenario HD, and from July to October under scenario HH. Under scenario NHD the water level would fall less dramatically, but it would be below chart datum from July to September.

4.1.8.2 Lesser La Prairie Basin

The average streamflow at the inlet of the Lesser Basin is evaluated at 149 m^3/s (St. Lawrence Centre, 1991). Inflow from 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).

4.1.9 Sedimentation hydrodynamics

4.1.9.1 Greater La Prairie Basin

Sedimentation hydrodynamics in the Greater Basin vary with the seasons, depending on streamflows, wind and ice. The spring runoff and strong autumn winds are especially significant, because during these periods the dynamics of riverbed and bank are clearly greater, often resulting in erosion and suspension (St. Lawrence Centre, 1996).

A study by Rondeau et al (2000) examined the sedimentary budget in the St. Lawrence from Cornwall to Quebec City based on data collected between 1989 and 1993. To determine the sources of sediment inflow, different stations along the St. Lawrence were sampled. It was found that the Ottawa River carries an average of 435,000 tonnes/year of suspended matter, while the St. Lawrence River at Cornwall carries 199,000 tonnes/year. The study concluded that Lake Ontario contributes less than 3% of the suspended matter carried in the St. Lawrence River towards Quebec City, while the tributaries contribute 32%, which suggests that about 65% of the suspended matter comes from erosion of the banks and bed of the St. Lawrence.

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 cobbles. 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.

4.1.9.2 Lesser La Prairie Basin

The low current speeds in this area (about 0.1 m/s) are conducive to the sedimentation of fine particles on the riverbed, forming a layer of silt. The Lesser Basin acts a sort of sediment trap (St. Lawrence Centre, 1996). This area was previously identified as a sedimentation zone for suspended material from the tributaries and bank erosion (GPR, 1985).

4.1.10 Characteristics of Sediments

A number of studies deal with the upstream (Lake Saint-Louis and Lake Saint-François) or downstream (freshwater reach of the St. Lawrence River and Lake Saint-Pierre) sectors of the La Prairie Basins. The upstream area includes studies of surface contamination in Lake Saint-François (Lavalin, 1989; Lorrain et al., 1993; Lorrain and Jarry, 1993; Sloterdijk, 1985) and Lake St-Louis (Champoux and Sloderdijk, 1988; Jarry et al., 1984; Sérodes and Talbot, 1978). Other studies deal with the downstream sector, like Lake Saint-Pierre (Hardy et al., 1990). A number of studies also deal with contamination in the St. Lawrence River as a whole (Malo and Gouin, 1977; Frenette et al., 1989; Carignan et al., 1993).

The quality of sediments in the area of interest, the Small and Greater La Prairie Basins (including the channel between Nuns' Island and Montreal Island), was assessed based on the results of analysis of sediments samples. The data used as a base for comparison in this report come from a study done for the St. Lawrence River Study Committee (Sérodes, 1978). It summarizes a thorough physicochemical inventory performed between 1972 and 1976 by various university and government agencies on river sediments from Cornwall to Montmagny (sampling stations not included). Also, in 1975 Environment Canada released general observations on the historical quality of sediments in the Greater La Prairie Basin from six stations (Sérodes, 1978) (see Figure 64). As part of another program, in 1987 Environment Canada characterized sediments sampled at 18 stations in the Small La Prairie Basin (Hardy et al., 1991) (see Figure 64). The results of these studies will be used to evaluate the nature of the substrate and the level and distribution of contamination in the Small La Prairie Basin.

To round out the reference state for sediments located in the footprint for the New Bridge for the St. Lawrence project, a campaign to determine the physicochemical characterization of the substrate took place in July 2012 in the Greater and Small La Prairie Basins (Table 12, Figure 64). The sediment samples taken using a Ponar-type grab sampler were analyzed for the following parameters: metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead, and zinc), petroleum hydrocarbons C10-C50 (PH), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), sedimentology and total organic carbon (TOC). Tables 14 to 16 present the analysis results. Also, nearly 275 video observations were done in August 2012 across the sectors of the study area to characterize the substrate (see Figure 65). Figure 64 indicates the location of the sampling sites from the July campaign, as well as those from the reference studies.

Figure 64 Sampling stations from studies by Sérodes, 1978, and Hardy et al., 1991, as well as the current study (New Bridge for the St. Lawrence Project)

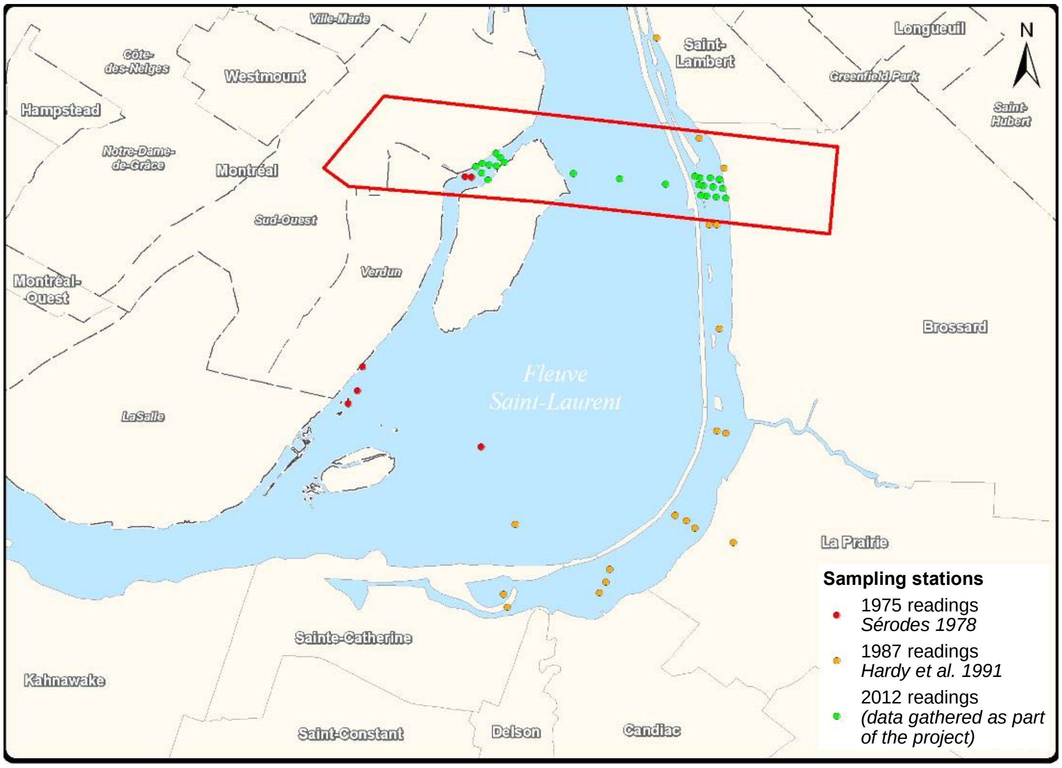


Table 12 Sediment sampling stations in the study area for the July 2012 campaign

STUDY AREA		STATION	LONGITUDE	LATITUDE	NOTE
Lesser La Prairie Basin	Lesser La Prairie Basin	PB1	-73.49883	45.46898	
		PB2	-73.49809	45.46757	
		PB3	-73.49745	45.46604	
		PB4	-73.50077	45.46918	
		PB5	-73.50020	45.46777	
		PB6	-73.49954	45.46623	
		PB7	-73.50304	45.46923	Macrophytes in the water column
		PB8	-73.50234	45.46794	
		PB9	-73.50164	45.46638	
	Lesser La Prairie Basin (navigation channel)	PB10	-73.50425	45.46946	Lots of mussels and mussel fragments
		PB11	-73.50339	45.46815	Lots of mussels and mussel fragments
		PB12	-73.50297	45.46646	Lots of mussels and mussel fragments
Greater La Prairie Basin	Large basin downstream from the pillars of the present bridge	GB13	-	-	Gravelly, rocky substrate (no sample)
		GB14	-	-	Gravelly, rocky substrate (no sample)
		GB15	-	-	Gravelly, rocky substrate (no sample)
	Between Nuns' Island and Verdun	IS16	-	-	Gravelly, rocky substrate (no sample)
		IS17	-	-	Gravelly, rocky substrate (no sample)
		IS18	-	-	Gravelly, rocky substrate (no sample)
		IS19	-73.55106	45.47138	Coarse sediments
		IS20	-	-	Gravelly, rocky substrate (no sample)
		IS21	-	-	Gravelly, rocky substrate (no sample)
		IS22	-	-	Gravelly, rocky substrate (no sample)
		IS23	-	-	Gravelly, rocky substrate (no sample)
		IS24	-	-	Gravelly, rocky substrate (no sample)

4.1.10.1 *Stratigraphy*

4.1.10.1.1 Greater La Prairie Basin

The bottom of the Lachine Rapids and the Greater La Prairie Basin has not been thoroughly sampled, but the information available indicates that they are made up of gravel, rock or compacted marine clay. Fast currents make it very improbable that large quantities of fine sediments will be deposited in this sector (Frenette et al., 1989). Strong currents are not very favourable to the deposition of fine materials. The main characteristic of this stretch is the difference in granulometry between the North and South Shores: material along the North Shore is much coarser than that found on the South Shore.

Also, the south is where the zones occur with the highest accumulation of sediments, principally upstream from the Champlain Bridge, more precisely along the shore at Longueuil-Boucherville and the Contrecoeur Islands.

In 2012, as part of the New Bridge for the St. Lawrence project, twelve grab sampling stations were established, three in the Greater Basin, downstream from the pillars of the Champlain Bridge, and nine in the sector of Nuns' Island. Only one sample of sediment was harvested in the Greater Basin because the substrate is very coarse. Also, almost 275 video observations were made throughout these sectors (see Figure 65). A coarse substrate made up of pebbles and blocks is scattered over the main sector of the Greater Basin (see Figure 66). 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 (station IS19) (see Figure 66). The substrate downstream from the Clément Bridge gets coarser, ranging from stones and pebbles near the 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. These results corroborate previous studies.

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SIZE 11x17

Sampling stations using a grab sampler

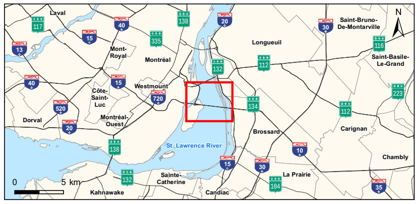
- 🟢 Sample collected
- 🔴 No sample collected

Video observation points

- ● Observation of the substrate and aquatic vegetation

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

SOURCES :
- Sampling stations using a grab sampler : Environnement Illimité inc., 2012
- Video observation : 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 65
Sediment Sampling Effort and Characterization
of the Substrate and Aquatic Vegetation

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Scale	1:15 000
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	0063	00

File: \\Beaverhall-sf2\projets\068\P-0000810_NPSL\GO\2_DocProj\Concept\6_Geomatique\2_Carto\1_MXD\Rapport1_Version00_ANG\068-P-0000810-110-GO-D-0064-00_SubstratSurfANG_20130319.mxd

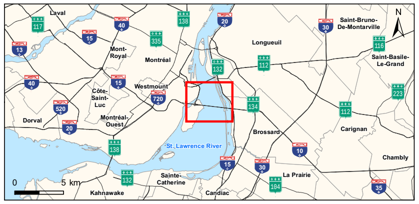
SIZE 11x17

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 66
Composition of the Surface Substrate

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Discipline Geomatic
Scale 1:15 000
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	0064	00

4.1.10.1.2 Lesser de La Prairie Basin

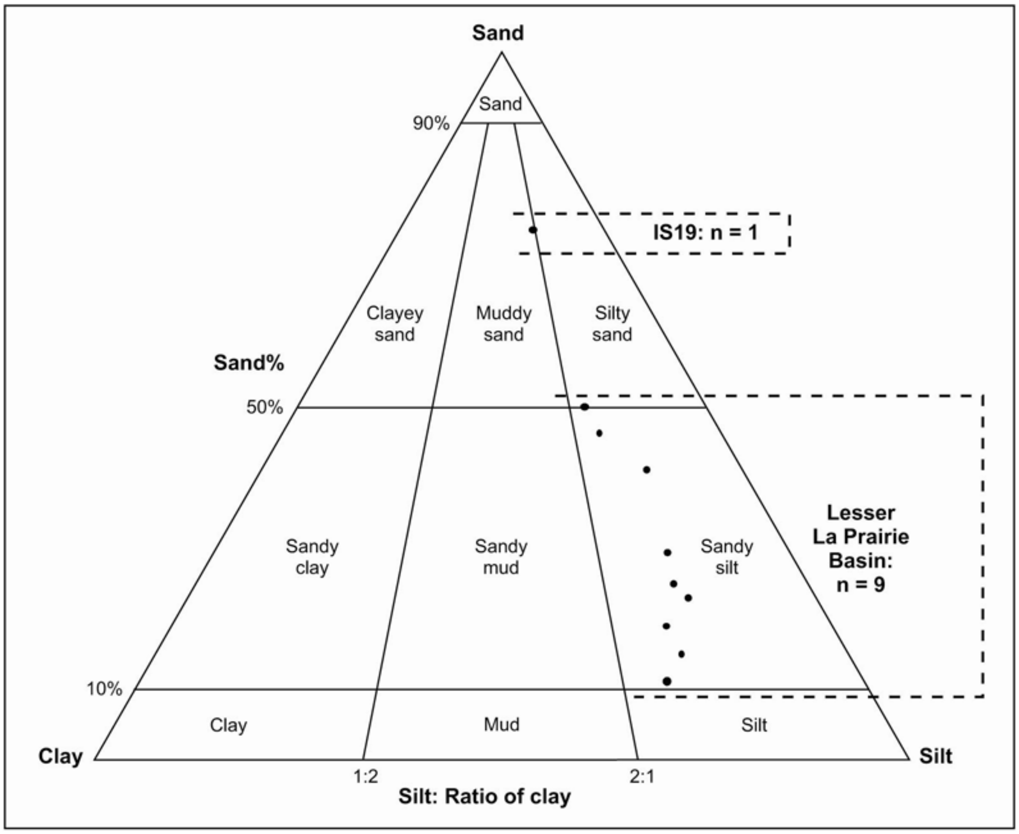
Unlike the Greater Basin, the Lesser La Prairie Basin is composed of a thick, relatively uniform, layer of fine sediments built up since construction of the Seaway watertight dike between 1955 and 1959. A major proportion of these sediments come from the Châteauguay River. Its waters flow along the right bank of the river from the time they enter Lake Saint-Louis (St. Lawrence Centre, 1993). Hardy et al. (1991) and St. Lawrence Centre (1996) show that this sector is characterized by lacustrine conditions and heavy sedimentation of fine particles.

In 2012, as part of the New Bridge for the St. Lawrence project, 12 Ponar-type grab sampler sampling stations and 87 video observations were carried out in the Lesser Basin (see Figure 65). Sediment samples from the Lesser La Prairie Basin consist mainly of silt (median 48%, n = 9), followed by clay (median 26%, n = 9) and sand (median 24%, n=9) (Table 13), with a total organic carbon of 31%. Analyses using the Gradistat software, following the models of Udden (1914) and Wentworth (1922), show that the granulometric characterization of the sediments is found in a large proportion in the sandy silt substrate (Figure 67). 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.

Table 13 Granulometric Distribution and Total Organic Carbon at Sampling Stations During the July 2012 Field Campaign

PARAMETER	LIMIT OF DETECTION (%)	GRANULOMETRIC DISTRIBUTION (%)												
		PB1	PB2	PB3	PB4	PB5	PB6	PB7	PB8	PB9	PB10	PB11	PB12	IS19
Total organic carbon (TOC) (g/kg)	0.2-2.7	27	22	15	36	36	33	17	34	30	31	14	11	8.2
Size class														
>16 mm	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	<0.1
8-16 mm	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	<0.1
4-8 mm	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	<0.1
2-4 mm	0.1	2.3	0.6	25	0.39	<0.1	0.29	7.6	<0.1	<0.1	-	-	-	34
1-2 mm	0.1	4.8	3.9	13	4.8	5.9	4	11	2.3	3.6	-	-	-	7.8
0.5-1 mm	0.1	4.3	6.5	6.1	3.3	4.4	3.5	7	1.9	2.4	-	-	-	10
0.25-0.5 mm	0.1	5.2	17	5.5	2.8	4.5	4.2	8.6	2.4	2.7	-	-	-	11
0.125-0.25 mm	0.1	6.1	12	2.8	3.1	3.5	4.7	6.7	1.9	2.5	-	-	-	14
0.0625-0.125 mm	0.1	8.6	11.0	3.2	4.5	5	8.0	9.3	2.8	4	-	-	-	7.6
0.031-0.062 mm	0.1	11	6.3	3.8	5.3	4.6	15	4.9	6.6	9.5	-	-	-	1.7
0.016-0.031 mm	0.1	12	6.4	7.5	13	16	13	6.9	14	15	-	-	-	2.3
0.0078-0.016 mm	0.1	16	9.4	11	21	22	16	11	25	21	-	-	-	3.4
0.0039-0.0078 mm	0.1	5.7	3.6	3.7	7.9	7.1	5.2	4	7.8	5.7	-	-	-	1.4
0.0020-0.0039 mm	0.1	9.2	8.5	8.5	12	12	9.2	8.7	11	12	-	-	-	1.5
Sediment class														
Gravel	0.1	2.3	0.6	25	0.39	<0.1	0.29	7.6	<0.1	<0.1	-	-	-	34
Sand	0.1	29	50	31	18	23	24	43	11	15	-	-	-	50
Silt	0.1	45	26	26	48	50	49	27	53	51	-	-	-	8.9
Clay	0.1	24	24	17	33	27	26	22	36	34	-	-	-	7.2

Figure 67 Texture of sediments in the Lesser La Prairie Basin during work in 2012



4.1.10.2 Chemical Quality of Sediments

Contaminant concentrations are compared to certain sediment quality criteria to assess the level of contamination. Previous studies were compared to the criteria set by the Ontario Ministry of the Environment (OME) or to the interim criteria reviewed by Procéan under the direction of an intergovernmental committee (Procéan, 1991). In 1995, the Canadian Council of Ministers of the Environment adopted the *Protocol for the Derivation of Canadian Sediment Quality Guidelines for the Protection of Aquatic Life*. In the case of resuspension of sediments in the environment, analysis results from the 2012 campaign were compared to criteria to assess sediment quality used to manage sediments resulting from dredging. Values for the criteria differ to some extent, so close attention is needed when comparing the different studies.

Note that previous results on inorganic contamination only reported total concentrations of trace metals, including the mineral fraction and the extractible fraction. The latter is associated with anthropogenic deposition. Very few studies have allowed the extractible fraction alone to be determined, meaning that sediment quality is overestimated. However, given the importance of anthropogenic deposition in the area of interest, the overestimation may be considered to be minor.

4.1.10.2.1 Greater La Prairie Basin

In 1970, the only area where contaminated sediments had been identified was around the dike and dam of the old LaSalle hydroelectric generating station. The data, dating from the late 1970s, indicated high concentrations of heavy metals (copper, chromium, mercury, lead and zinc). Sediments from six stations (see Figure 64) in the Greater Basin were also characterized to verify the presence of contamination in 1975 (Sérodes, 1978). Heavy metal concentrations found in the three stations on the North Shore were all above the minimal effect level (MEL) (Procéan, 1991). This partial data suggests a high level of contamination in this area associated with its historical usage.

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. The sample (IS19), located in the reach of Nuns' Island (see Figure 65), showed class 2 (the classes are defined in a note beneath Tables 14, 15 and 16) heavy metal contamination (chromium, copper, nickel, lead and zinc (Table 14), along with PAH and PCB (Table 15). These contaminants come from the industrial park (Technoparc) developed in the early 1990s on contaminated fill (Bibeault et al., 1997) and leaks of waste oil.

4.1.10.2.2 Lesser La Prairie Basin

Contamination of sediments in the Lesser Basin was studied in 1987, that is, before municipalities and industries were connected to the collector system (in 1989, the Lesser La Prairie Basin received wastewater from 17 municipalities (St. Lawrence Centre, 1993)), an also in July 2012, after the sewer systems were connected to regional water treatment plants. To compare the effect of connecting the sewer systems, the results for contamination of sediments in both studies are presented below.

In 1987, the average mercury, chromium, copper, nickel, lead, zinc and total PCB concentrations for the study area (see Figure 64) exceeded the quality criteria recommended by the OME (1979) for the deposit of dredging waste in open water (Hardy et al, 1991). They had established that a major share of the contaminants found in the Basin came from the St. Lawrence, that is, the southeast portion of Lake Saint-Louis (Centre St. Lawrence, 1996). The rest came from tributaries and from emissions from some nearby communities. Work in 1987 also determined that the Lesser La Prairie Basin was prone to the accumulation of contaminants because of high sedimentation and elevated organic material concentrations.

In 2012, after the sewer systems were connected, concentrations were lower than or similar to median values from 1987. Samples (see Figure 65) from the navigation channel (PB10, PB11 and PB12) show class 1 contamination for the majority of metals (Table 14) and organic contaminants (Table 15). Samples from a shallow area of low current speed in the middle of the Lesser Basin (PB4, PB5 and PB6) contain class 2 sediments for the majority of metals (mercury, chromium, copper, lead and zinc; Table 14), total PCB and some hydrocarbons (Table 15). As well, sample PB5 shows class 3 lead contamination (Table 15). Sediments from the stations near the navigation channel dike (PB7 to PB9) show class 2 contamination for mercury (PB9 only), chromium (PB8 and 9 only), lead and zinc

(Table 14), as well as for total PCB (Table 15). The same pattern repeats itself for the stations along the South Shore (PB1 to PB3).

Table 14 Metal concentrations in sediment samples at sampling stations during the July 2012 field campaign

PARAMETER	LIMIT OF DETECTIONS	CONCENTRATION IN THE SAMPLE													QUALITY CRITERION RESULTING FROM DREDGING				
		PB1	PB2	PB3	PB4	PB5	PB6	PB7	PB8	PB9	PB10	PB11	PB12	IS19	≤ COE	CEO[2]	> COE AND ≤ CFE	CEF[3]	> CFE
Metals (mg/kg)															Class 1		Class 2		Class 3
Mercury (Hg)	0.05	0.44	0.20	0.18	0.29	0.27	0.27	0.21	0.20	0.28	0.08	0.09	0.09	0.22		0.25		0.87	
Silver (Ag)	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2		-		-	
Arsenic (As)	2	5	5	6	6	6	5	4	5	6	7	4	4	4		7.6		23	
Barium (Ba)	5	120	110	90	150	150	130	110	170	160	120	130	120	55		-		-	
Cadmium (Cd)	0.2	1.2	1.3	0.7	1.5	1.4	1.4	1.0	1.3	1.1	0.7	0.4	0.4	1.7		1.7		12	
Cobalt (Co)	2	13	13	13	14	14	13	14	15	15	12	12	11	12		-		-	
Chromium (Cr)	2	46	49	43	62	62	57	49	63	58	34	47	38	110		57		120	
Copper (Cu)	1	72	92	57	68	74	77	50	58	53	34	34	33	140		63		700	
Tin (Sn)	5	7	6	<5	6	6	6	5	<5	<5	<5	<5	<5	15		-		-	
Manganese (Mn)	2	450	440	430	510	530	460	480	590	550	1200	810	680	810		-		-	
Molybdenum (Mo)	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	10		-		-	
Nickel (Ni)	1	36	36	41	43	41	37	42	53	41	38	44	33	64		47		-	
Lead (Pb)	5	150	110	65	150	190	140	78	100	97	45	59	45	72		52		150	
Selenium (Se)	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		-		-	
Zinc (Zn)	5	350	310	210	380	360	330	220	270	270	110	130	120	200		170		770	
Vanadium (V)	5	39	38	33	44	44	40	38	45	45	31	37	34	22		-		-	

[1] Criteria from Environment Canada and the Quebec Ministry of Sustainable Development, the Environment and Parks (MDDEP). *Criteria for the Assessment of Sediment Quality in Quebec and Application Frameworks: Prevention, Dredging and Remediation.* 39 pages.

[2] Concentration of occasional effects.

[3] Concentration of frequent effects.

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.

Table 15 Organic compound concentrations in sediments from sampling stations during the July 2012 field campaign (PCB, C_{10}-C_{50} and PAH)

Paramètres	Limite de détection	Teneur de l'échantillon													Critère de qualité résultant de travaux de dragage				
		PB1	PB2	PB3	PB4	PB5	PB6	PB7	PB8	PB9	PB10	PB11	PB12	IS19	≤ CEO	CEO^2	> CEO et ≤ CEF	CEF^3	> CEF
Hydrocarbure pétroliers (C10-C50) (mg/kg)	100	1500	1200	520	1500	1300	1700	330	690	570	nd	170	<100	230	Classe 1	nd	Classe 2	nd	Classe 3
Biphényles polychlorés (BPC) (mg/kg)*																			
BPC Totaux (mg/kg)	0,01	0,20	0,15	0,10	0,24	0,19	0,19	0,19	0,08	0,22	nd	0,08	0,09	0,33		0,079		0,78	
Hydrocarbures aromatiques polycycliques (HAP) (mg/kg)																			
Naphtalène	0,01	0,01	0,01	0,02	0,02	0,01	0,01	<0.01	<0.01	<0.01	nd	0,01	0,01	0,04		0,12		1,2	
Acénaphtylène	0,003	0,012	0,007	0,004	0,011	0,011	0,014	0,004	0,006	0,009	nd	0,003	<0.003	0,19		0,03		0,34	
Acénaphtène	0,003	0,012	0,010	0,008	0,015	0,012	0,016	0,008	0,006	0,009	nd	0,004	0,003	0,056		0,021		0,94	
Fluorène	0,01	0,03	0,04	0,03	0,04	0,03	0,04	0,03	0,02	0,02	nd	0,01	0,01	0,12		0,061		1,2	
Phénanthrène	0,01	0,11	0,12	0,10	0,15	0,13	0,26	0,06	0,06	0,07	nd	0,04	0,04	0,55		0,13		1,1	
Anthracène	0,01	0,04	0,03	0,02	0,04	0,04	0,06	0,02	0,02	0,04	nd	0,01	0,01	0,31		0,11		1,1	
Fluoranthène	0,01	0,43	0,42	0,30	0,55	0,54	0,99	0,16	0,20	0,27	nd	0,09	0,09	1,3		0,45		4,9	
Pyrène	0,01	0,38	0,34	0,26	0,46	0,46	0,80	0,13	0,16	0,22	nd	0,07	0,07	1,0		0,23		1,5	
Benzo(a)anthracène	0,01	0,20	0,19	0,11	0,27	0,28	0,55	0,07	0,10	0,13	nd	0,03	0,03	0,98		0,12		0,76	
Chrysène	0,01	0,26	0,26	0,20	0,37	0,37	0,59	0,10	0,15	0,18	nd	0,04	0,04	0,97		0,24		1,6	
Benzo(b+j+k)fluoranthène	0,01	0,59	0,50	0,28	0,73	0,83	1,3	0,16	0,29	0,36	nd	0,08	0,07	1,3		nd		nd	
Benzo(e)pyrène	0,01	0,24	0,20	0,11	0,27	0,32	0,48	0,06	0,11	0,13	nd	0,03	0,03	0,48		nd		nd	
Benzo(a)pyrène	0,01	0,22	0,19	0,10	0,26	0,30	0,49	0,05	0,10	0,12	nd	0,02	0,02	0,70		0,15		3,2	
Indéno(1,2,3-cd)pyrène	0,01	0,18	0,15	0,08	0,22	0,25	0,36	0,04	0,08	0,09	nd	0,02	0,01	0,39		nd		nd	
Dibenz(a,h)anthracène	0,003	0,050	0,039	0,022	0,060	0,069	0,086	0,012	0,023	0,026	nd	0,006	0,004	0,13		0,043		0,2	
Benzo(ghi)pérylène	0,01	0,21	0,17	0,10	0,25	0,27	0,38	0,05	0,09	0,10	nd	0,02	0,02	0,40		nd		nd	
2-Méthylnaphtalène	0,01	0,01	0,02	0,03	0,01	0,01	0,01	0,02	<0.01	<0.01	nd	0,02	0,02	0,03		nd		nd	
1-Méthylnaphtalène	0,01	<0.01	<0.01	0,02	<0.01	<0.01	<0.01	0,01	<0.01	<0.01	nd	<0.01	0,01	0,02		nd		nd	
Benzo(c)phénanthrène	0,01	0,03	0,03	0,02	0,04	0,04	0,08	0,01	0,02	0,02	nd	<0.01	<0.01	0,12		nd		nd	
3-Méthylcholanthrène	0,01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	nd	<0.01	<0.01	<0.01		nd		nd	
7,12-Diméthylbenzanthracène	0,01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	nd	<0.01	<0.01	<0.01		nd		nd	
Dibenzo(a,i)pyrène	0,01	0,03	0,02	0,02	0,03	0,03	0,05	<0.01	<0.01	<0.01	nd	<0.01	<0.01	0,05		nd		nd	
Dibenzo(a,l)pyrène	0,01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	nd	<0.01	<0.01	<0.01		nd		nd	
Dibenzo(a,h)pyrène	0,01	<0.01	<0.01	<0.01	<0.01	<0.01	0,01	<0.01	<0.01	<0.01	nd	<0.01	<0.01	0,03		nd		nd	
1,3-Diméthylnaphtalène	0,01	0,02	0,02	0,03	0,01	0,01	0,01	0,02	<0.01	0,01	nd	0,02	0,02	0,04		nd		nd	
2,3,5-Triméthylnaphtalène	0,01	0,02	0,02	0,03	0,01	<0.01	0,01	0,02	<0.01	<0.01	nd	<0.01	0,01	0,03		nd		nd	

[1] Critères tirés de Environnement Canada et ministère du Développement durable, de l'Environnement et des Parcs du Québec, 2007. *Critères pour l'évaluation de la qualité des sédiments d'eau douce au Québec et cadre d'application: prévention, dragage et restauration* . 39 pages.

[2] Concentration d'effets occasionnels

[3] Concentration d'effets fréquents

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.

4.1.10.2.3 Overall portrait of the Lesser La Prairie Basin

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. Trace metal concentrations from 1976, 1987 and 2012 were all compared to current MDDEFP and Environment Canada (2007) sediment quality criteria (Table 16). Data on mercury and chromium from 1976 and 1987 indicates the existence of moderate contamination (corresponding to class 2), higher than the present COE value, distributed throughout the Lesser Basin (Table 16). The highest mercury concentrations are mainly found, however, near the outflow from the municipality of Candiac; those for chromium are downstream from industrial or urban outflows releasing this contaminant into the environment. Work in 2012 indicated that the level of contamination has improved for mercury and chromium (corresponding to class 1) (Table 14, Table 16). Copper contamination has remained stable at a moderate level in the Lesser La Prairie Basin from 1976 to 2012 (respective medians of 55.3, 62.9 and 57.5 mg/kg) and its pattern of distribution has shown a slight increase in concentrations in the centre of Basin in relation to upstream and downstream. The same trend occurs for nickel. The median concentration of zinc increased from 1976 to 1987 in the Lesser Basin, rising from 315 to 392 mg/kg, and dropped in 2012 to 270 mg/kg. The median concentration of lead also rose from 1976 to 1987 in the Lesser Basin, going from 48 to 137 mg/kg, and dropped in 2012 to 98.5 mg/kg. These last two are within class 2.

In conclusion, between 1976 and 1987, contamination in the Lesser La Prairie Basin rose for zinc, lead and chromium, decreased for cadmium and remained stable for mercury, copper and nickel. In 2012, concentrations of trace metals decreased or remained stable, indicating a positive influence from the connection of the sewer systems. The degree of contamination remains moderate (class 2), however, for arsenic, lead, zinc and organic PCB contaminants. Thus there is no uniform trend in changes over time in and distribution of contaminants, except for local sources or those upstream from the area of interest coming from the waters of the Châteauguay River and the Saint-Louis River, and part of the green water from the St. Lawrence.

Table 16 Comparison of metal concentrations in sediment samples from the Lesser La Prairie Basin in 1976, 1987 and 2012 with current MDDEFP criteria

Parameter	Sérodes, 1978		Hardy *et al*., 1991		Study for the New Champlain Bridge, 2012		* OME Criterion (mg/kg)	** MDDEFP and EnvCan Criterion (mg/kg)				
	Median (mg/kg)	Effective (n)	Median (mg/kg)	Effective (n)	Median (mg/kg)	Effective (n)		≤ COE	CEO^2	> COE and ≤ CFE	CEF^3	> CFE
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.

4.1.11 Air quality and greenhouse gases

4.1.11.1 Reference framework

The New Bridge for the St. Lawrence project is not subject to provincial and municipal regulations. However pollutants emitted outside the project footprint should be subject to these regulations. In the absence of federal regulation the following documents may serve as a reference framework. In Quebec, air quality standards were established in 1979 under the *Regulation respecting the quality of the atmosphere*. On June 30, 2011, this was replaced by the *Clean Air Regulation*. In comparison to the old regulation, this new regulation introduced new standards and tightened existing ones. Moreover, in the Montreal region CMM Regulation 2001-10 also sets standards for atmospheric emissions. This regulation comes under the Montreal Metropolitan Community. A number of pollutants for which this regulation sets standards are associated with road traffic. Table 17 gives the air quality standards for the principal contaminants associated with highway transportation in effect in Quebec and in the CMM.

Table 17 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/m^3	150 µg/m^3
	1 yr	None	70 µg/m^3
Particles in suspension under 2.5 microns (PM2,5)	24 hr	30 µg/m^3	None[3]
Nitrogen dioxide (NO$_2$)	1 hr	414 µg/m^3	400 µg/m^3
	8 hr	None	253 µg/m^3
	24 hr	207 µg/m^3	200 µg/m^3
	1 yr	103 µg/m^3	100 µg/m^3
Carbon monoxide (CO)	1 hr	34,000 µg/m^3	35,000 µg/m^3
	8 hr	12,700 µg/m^3	15,000 µg/m^3
Sulphur dioxide (SO$_2$)	15 min	None	860 µg/m^3
	1 hr	None	1,300 µg/m^3
	8 hr	None	490 µg/m^3
	24 hr	288 µg/m^3	260 µg/m^3
	1 yr	52 µg/m^3	52 µg/m^3
Ozone (O$_3$)	15 min	None	265 µg/m^3
	1 hr	160 µg/m^3	160 µg/m^3
	8 hr	120 µg/m^3	75 µg/m^3
	24 hr	None	50 µg/m^3
	1 yr	None	30 µg/m^3

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)

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[3] **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/m^3.**

4.1.11.2 Present air quality

Present air quality in Montreal is generally acceptable. According to the 2011 Air Quality Report for the Island of Montreal published by the Environment and Sustainable Development Division of the City of Montreal, there were 69 days with poor air quality on the Island of Montreal in 2011. 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. According to the Environment and Sustainable Development Division of the City of Montreal, fine particles are the main cause of days with poor air quality (68 of the 69 days declared) rather than ozone (1 day of the 69 declared). Analysis of air quality at each station illustrates that from 2008 to 2011, air quality improved in many parts of Montreal Island. A number of stations showed a lower number of days with poor air quality in 2011 than in 2008. These include the sampling stations at Pilon Park in Montreal-North, at Rivière-des-Prairies, at Chénier in Anjou and at Hochelaga-Maisonneuve. Concentrations of contaminants in the air at several sites in the area approach those measured at station 99- in Sainte-Anne-de-Bellevue, which is considered to be the indicator of air quality brought by prevailing winds. On the other hand, other stations, including station 13- Drummond, Ville-Marie, saw the number of days of poor air quality per year increase from 29 in 2008 to 49 in 2011.

There is one sampling station near the study area, station 68-Verdun. However, taking into consideration the direction of the prevailing winds (west-south-west) and this station's location in relation to the axis of the Champlain Bridge, it does not satisfactorily measure polluting emissions associated with traffic on the bridge. At the same time, it is the closest station to the study area and there are no other stations downstream from the bridge and close enough to it. This station only measures three contaminants: ozone (O_3), nitrogen monoxide (NO) and nitrogen dioxide (NO_2). Over the past ten years, NO_2 concentrations have all been below the CMM standards for a 24-hour period and a one-hour period (Figure 68). As shown in Figure 69, the maximum ozone concentration for a one-hour period was exceeded three times. Only a very small number of all the samples collected exceed this standard. When the data is analyzed over a 24-hour period, the maximum value of the average is exceeded every year. The number of times that this occurs is also greater. However, there has been a clear downward trend in the concentration of ozone in the atmosphere at this station over the past 10 years.

Figure 68 Changes in the concentration of nitrogen dioxide (NO_2) at station 68-Verdun on an hourly average and a 24-hour average

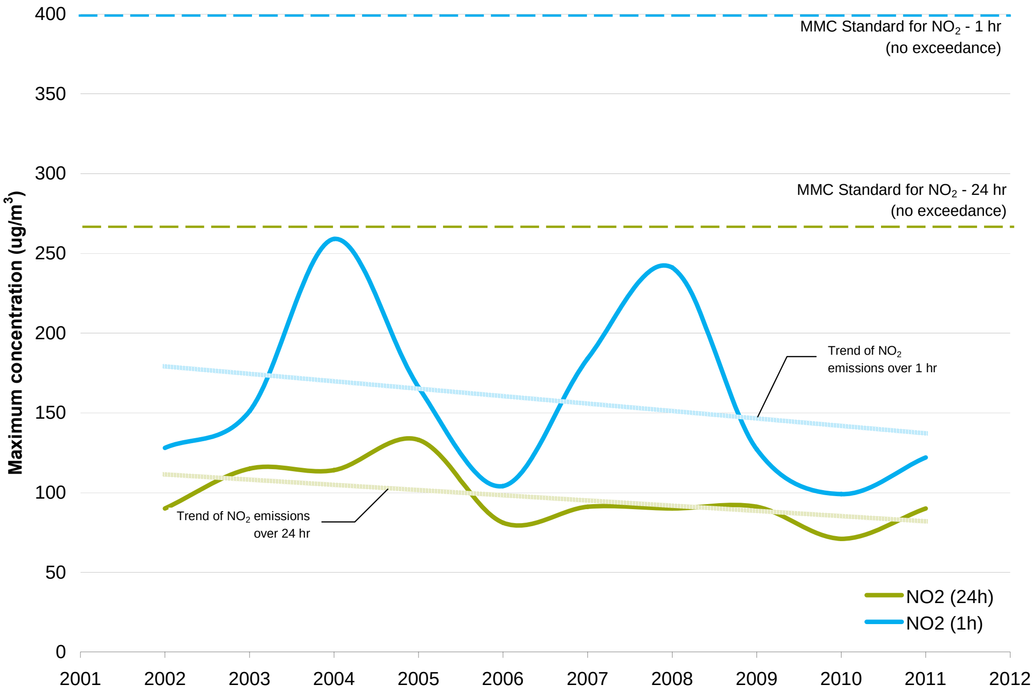
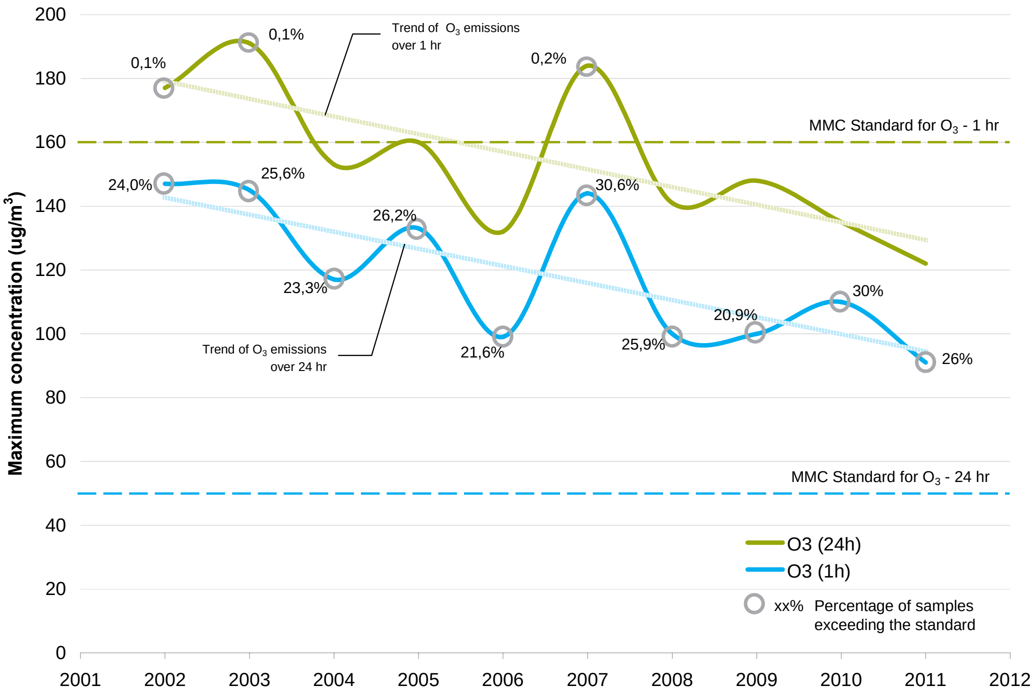


Figure 69 Changes in the concentration of ozone (O_3) at station 68-Verdun on an hourly average and a 24-hour average



4.1.11.3 Methodology selected to assess the potential effects of the new infrastructure

Although the effects of the New Bridge for the St. Lawrence are discussed in the next report, an overview of the methodological approach chosen to assess the new infrastructure's potential effect on air quality. The objective of this methodology is to determine the level of emissions of criteria air pollutants (CAP) and greenhouse gases (GG) by highway vehicles using the current infrastructure and to make projections of possible future emissions according to various traffic level scenarios. Total CAP and GG emissions for a given stretch depend on the number of vehicles moving on a highway, the distance driven and an emission factor. The latter depends mainly on the type of vehicle and its speed.

The MOBILE6.2C model usually used to determine the emission factor of a contaminant emitted by a vehicle on a road does not take into account vehicle speed for GG emissions. Tables of correlations for speed, GG emissions rates per kilometre driven and type of vehicle are used to compensate for this limitation of the model. These tables were published by the Ministry of Transportation of Quebec in the *Guide d'analyse avantages-coûts des projets publics en transport.* Three types of vehicles are included in these tables: gasoline-powered light vehicles (passenger vehicles) (see Table 18), light diesel trucks with three or fewer axles (see Table 19) and heavy diesel trucks (public transit busses are in this third category) (see Table 20). These three types of vehicles are representative of traffic on the current infrastructure. Although the MOBILE6.2C model takes vehicle speed into consideration to establish emission factors for CAP, emissions factors for carbon monoxide (CO), hydrocarbons, nitrous oxides (NO_x), sulphur oxides (SO_x) and fine particles are taken from the same MTQ document so that all the emission factors will be based on the same assumptions.

To estimate average daily CAP and GG emissions associated with vehicles on the present infrastructure, representative 2012 annual average daily traffic (AADT) values are used, along with vehicle speed, emission factors and distances traveled on this highway structure.

Table 18 Average polluting emissions at morning rush hour for a light vehicle

SPEED (km/h)	GG (g eCO_2/km)	CO (g CO/km)	NOx (g NOx/km)	SOx (g SOx/km)	PM (g PM/km)
5	914	22.797	1.027	0.004	0.025
10	458	12.395	0.824	0.004	0.025
15	350	8.784	0.669	0.004	0.025
20	289	7.171	0.567	0.004	0.025
25	256	6.323	0.511	0.004	0.025
30	235	6.059	0.517	0.004	0.025
35	222	5.870	0.522	0.004	0.025
40	211	5.727	0.525	0.004	0.025
45	202	5.614	0.528	0.004	0.025
50	193	5.552	0.530	0.004	0.025
55	185	5.551	0.531	0.004	0.025
60	183	5.693	0.535	0.004	0.025
65	180	5.869	0.541	0.004	0.025
70	178	6.060	0.548	0.004	0.025
75	174	6.249	0.556	0.004	0.025
80	172	6.435	0.563	0.004	0.025
85	174	6.634	0.573	0.004	0.025
90	176	6.850	0.583	0.004	0.025
95	178	7.122	0.594	0.004	0.025
100	178	7.398	0.605	0.004	0.025
105	182	7.644	0.614	0.004	0.025

From MTQ, 2007

Table 19 Average polluting emissions at morning rush hour for a light truck (three or fewer axles)

SPEED (km/h)	GG (g eCO_2/km)	CO (g CO/km)	NOx (g NOx/km)	SOx (g SOx/km)	PM (g PM/km)
5	1.599	28.249	3.460	0.034	0.181
10	806	19.987	3.093	0.034	0.181
15	632	15.498	2.838	0.034	0.181
20	531	12.360	2.622	0.034	0.181
25	490	10.235	2.469	0.034	0.181
30	464	8.654	2.354	0.034	0.181
35	458	7.502	2.273	0.034	0.181
40	444	6.619	2.213	0.034	0.181
45	417	5.970	2.183	0.034	0.181
50	407	5.481	2.169	0.034	0.181
55	399	5.127	2.174	0.034	0.181
60	392	4.917	2.205	0.034	0.181
65	389	4.781	2.246	0.034	0.181
70	388	4.750	2.321	0.034	0.181
75	388	4.786	2.416	0.034	0.181
80	378	4.875	2.527	0.034	0.181
85	373	5.091	2.694	0.034	0.181
90	381	5.362	2.881	0.034	0.181
95	388	5.751	3.120	0.034	0.181
100	394	6.311	3.435	0.034	0.181
105	403	6.873	3.745	0.034	0.181

From MTQ, 2007

Table 20 Average polluting emissions at morning rush hour for a heavy truck (four or more axles)

VITESSE (km/h)	GES (g eCO_2/km)	CO (g CO/km)	NOx (g NOx/km)	SOx (g SOx/km)	PM (g PM/km)
5	1 943	21,230	9,252	0,059	0,381
10	984	16,099	8,279	0,059	0,381
15	782	12,852	7,623	0,059	0,381
20	666	10,288	7,046	0,059	0,381
25	629	8,482	6,625	0,059	0,381
30	605	7,050	6,270	0,059	0,381
35	610	6,002	6,011	0,059	0,381
40	598	5,195	5,813	0,059	0,381
45	556	4,599	5,694	0,059	0,381
50	549	4,147	5,625	0,059	0,381
55	543	3,813	5,609	0,059	0,381
60	531	3,587	5,663	0,059	0,381
65	531	3,425	5,747	0,059	0,381
70	531	3,358	5,922	0,059	0,381
75	537	3,352	6,156	0,059	0,381
80	519	3,395	6,434	0,059	0,381
85	507	3,550	6,866	0,059	0,381
90	519	3,754	7,357	0,059	0,381
95	531	4,061	7,993	0,059	0,381
100	543	4,515	8,842	0,059	0,381
105	555	4,974	9,678	0,059	0,381

From MTQ, 2007

4.1.11.4 Assessment of current situation

To quantify the current situation in terms of air quality, daily vehicle traffic data on highways 15 and 10 between La Vérendrye Blvd. in Montreal and Taschereau Blvd. in Brossard was used. Table 21 shows the AADT distribution while making a distinction between morning rush hour traffic (AMRH), afternoon rush hour traffic (PMRH) and the rest of the day, along with in both directions. The assumption is that vehicles are travelling at the speed limit (70 km/h) during off-peak hours. During rush hours, speed is reduced to about one-third of the speed limit (25 km/h) toward Montreal in the morning and toward the South Shore in the evening, and twice this speed (50 km/h) in the opposite direction during the same rush-hour periods. Lastly, the distribution of traffic outside of rush hours was set at 50%–50% between both directions. For modeling purposes, light cars were used (emission factors in Table 18) and heavy-duty trucks (emission factors in Table 20). Using the traffic distribution and the emission factors for the speeds considered for the two types of vehicles, CAP and GG emissions could be assessed by type of vehicle, direction and time of day. Tables 22, 23, 24, 25 and 26 show the total emissions over one day for 2012 for GHG, CO, NOx, SOx and fine particles, respectively.

Table 21 Distribution of traffic flow, speed and percentage of trucks on the various sections of highways 15 and 10

			VÉRENDRYE-ATWATER	ATWATER-WELLINGTON	NUNS' ISLAND BRIDGE	CHAMPLAIN BRIDGE	132-TASCHEREAU
Distance (km)			1.16	0.86	1.23	4.20	2.23
AADT (Avg. Annual Daily Traffic)			121,000	123,000	124,000	151,000	132,000
% trucks			6%	6%	6%	5%	5%
AMRH	To Montreal	Traffic	13,107	12,500	14,333	19,186	14,369
		% trucks	5%	5%	4%	4%	3%
		Avg. speed (km/h)	25	25	25	25	25
	To South Shore	Traffic	10,535	9,623	8,859	8,707	7,510
		% trucks	5%	9%	9%	10%	9%
		Avg. speed (km/h)	50	50	50	50	50
PMRH	To Montreal	Traffic	8,804	13,102	9,113	10,240	9,923
		% trucks	10%	4%	5%	5%	5%
		Avg. speed (km/h)	50	50	50	50	50
	To South Shore	Traffic	11,238	10,294	12,466	16,265	15,794
		% trucks	5%	5%	5%	4%	3%
		Avg. speed (km/h)	25	25	25	25	25
Remaining day/night	All directions	Traffic	77,316	77,481	79,229	96,602	84,404
		% trucks	6%	6%	6%	5%	5%
	To Montreal	Traffic	38,658	38,741	39,615	48,301	42,202
		% trucks	6%	6%	6%	5%	5%
		Avg. speed (km/h)	70	71	72	73	74
	To South Shore	Traffic	38,658	38,740	39,614	48,301	42,202
		% trucks	6%	6%	6%	5%	5%
		Avg. speed (km/h)	70	71	72	73	74

Table 22 GHG emissions (tonnes) for a traffic day in 2012

			VÉRENDRYE -ATWATER	ATWATER-WELLINGTON	NUNS' ISLAND BRIDGE	CHAMPLAIN BRIDGE	132-TASCHEREAU	TOTAL	
AMRH	To Montreal	Cars	3.70	2.61	4.33	19.80	7.96	38.41	**287.25**
		Trucks	0.48	0.34	0.44	2.03	0.60	3.89	
		Total	**4.18**	**2.95**	**4.78**	**21.83**	**8.56**	**42.30**	
	To South Shore	Cars	2.24	1.45	1.91	6.35	2.94	14.90	
		Trucks	0.34	0.41	0.54	2.01	0.83	4.12	
		Total	**2.58**	**1.86**	**2.45**	**8.36**	**3.77**	**19.02**	
PMRH	To Montreal	Cars	1.77	2.09	2.06	7.89	4.06	17.86	
		Trucks	0.56	0.25	0.31	1.18	0.61	2.90	
		Total	**2.33**	**2.34**	**2.36**	**9.07**	**4.66**	**20.76**	
	To South Shore	Cars	3.17	2.15	3.73	16.79	8.75	34.59	
		Trucks	0.41	0.28	0.48	1.72	0.66	3.55	
		Total	**3.58**	**2.43**	**4.21**	**18.51**	**9.41**	**38.14**	
Remaining day/night	To Montreal	Cars	7.50	5.56	8.13	34.33	15.85	71.38	
		Trucks	1.43	1.11	1.63	5.30	2.68	12.14	
		Total	**8.93**	**6.67**	**9.76**	**39.63**	**18.53**	**83.52**	
	To South Shore	Cars	7.50	5.56	8.13	34.33	15.85	71.38	
		Trucks	1.43	1.11	1.63	5.30	2.68	12.14	
		Total	**8.93**	**6.67**	**9.76**	**39.63**	**18.53**	**83.52**	

Table 23 CO emissions (tonnes) for a traffic day in 2012

			VÉRENDRYE-ATWATER	ATWATER-WELLINGTON	NUNS' ISLAND BRIDGE	CHAMPLAIN BRIDGE	132-TASCHEREAU	TOTAL	
AMRH	To Montreal	Cars	0.09	0.06	0.11	0.49	0.20	0.95	**7.91**
		Trucks	0.01	0.00	0.01	0.03	0.01	0.05	
		Total	**0.10**	**0.07**	**0.11**	**0.52**	**0.20**	**1.00**	
	To South Shore	Cars	0.06	0.04	0.06	0.18	0.08	0.43	
		Trucks	0.00	0.00	0.00	0.02	0.01	0.03	
		Total	**0.07**	**0.04**	**0.06**	**0.20**	**0.09**	**0.46**	
PMRH	To Montreal	Cars	0.05	0.06	0.06	0.23	0.12	0.51	
		Trucks	0.00	0.00	0.00	0.01	0.00	0.02	
		Total	**0.06**	**0.06**	**0.06**	**0.24**	**0.12**	**0.54**	
	To South Shore	Cars	0.08	0.05	0.09	0.41	0.22	0.85	
		Trucks	0.01	0.00	0.01	0.02	0.01	0.05	
		Total	**0.08**	**0.06**	**0.10**	**0.44**	**0.22**	**0.90**	
Remaining day/night	To Montreal	Cars	0.26	0.19	0.28	1.17	0.54	2.43	
		Trucks	0.01	0.01	0.01	0.03	0.02	0.08	
		Total	**0.26**	**0.20**	**0.29**	**1.20**	**0.56**	**2.51**	
	To South Shore	Cars	0.26	0.19	0.28	1.17	0.54	2.43	
		Trucks	0.01	0.01	0.01	0.03	0.02	0.08	
		Total	**0.26**	**0.20**	**0.29**	**1.20**	**0.56**	**2.51**	

Table 24 NOx emissions (tonnes) for a traffic day in 2012

			VÉRENDRYE-ATWATER	ATWATER-WELLINGTON	NUNS' ISLAND BRIDGE	CHAMPLAIN BRIDGE	132-TASCHEREAU	TOTAL	
AMRH	To Montreal	Cars	0.01	0.01	0.01	0.04	0.02	0.08	**1.10**
		Trucks	0.01	0.00	0.00	0.02	0.01	0.04	
		Total	**0.01**	**0.01**	**0.01**	**0.06**	**0.02**	**0.12**	
	To South Shore	Cars	0.01	0.00	0.01	0.02	0.01	0.04	
		Trucks	0.00	0.00	0.01	0.02	0.01	0.04	
		Total	**0.01**	**0.01**	**0.01**	**0.04**	**0.02**	**0.08**	
PMRH	To Montreal	Cars	0.00	0.01	0.01	0.02	0.01	0.05	
		Trucks	0.01	0.00	0.00	0.01	0.01	0.03	
		Total	**0.01**	**0.01**	**0.01**	**0.03**	**0.02**	**0.08**	
	To South Shore	Cars	0.01	0.00	0.01	0.03	0.02	0.07	
		Trucks	0.00	0.00	0.01	0.02	0.01	0.04	
		Total	**0.01**	**0.01**	**0.01**	**0.05**	**0.02**	**0.11**	
Remaining day/night	To Montreal	Cars	0.02	0.02	0.03	0.11	0.05	0.22	
		Trucks	0.02	0.01	0.02	0.06	0.03	0.14	
		Total	**0.04**	**0.03**	**0.04**	**0.16**	**0.08**	**0.36**	
	To South Shore	Cars	0.02	0.02	0.03	0.11	0.05	0.22	
		Trucks	0.02	0.01	0.02	0.06	0.03	0.14	
		Total	**0.04**	**0.03**	**0.04**	**0.16**	**0.08**	**0.36**	

Table 25 SOx emissions (kg) for a traffic day in 2012

			VÉRENDRYE-ATWATER	ATWATER-WELLINGTON	NUNS' ISLAND BRIDGE	CHAMPLAIN BRIDGE	132-TASCHEREAU	TOTAL	
AMRH	To Montreal	Cars	0.06	0.04	0.07	0.31	0.12	0.60	**9.18**
		Trucks	0.04	0.03	0.04	0.19	0.06	0.37	
		Total	**0.10**	**0.07**	**0.11**	**0.50**	**0.18**	**0.97**	
	To South Shore	Cars	0.05	0.03	0.04	0.13	0.06	0.31	
		Trucks	0.04	0.04	0.06	0.22	0.09	0.44	
		Total	**0.08**	**0.07**	**0.10**	**0.35**	**0.15**	**0.75**	
PMRH	To Montreal	Cars	0.04	0.04	0.04	0.16	0.08	0.37	
		Trucks	0.06	0.03	0.03	0.13	0.07	0.31	
		Total	**0.10**	**0.07**	**0.08**	**0.29**	**0.15**	**0.68**	
	To South Shore	Cars	0.05	0.03	0.06	0.26	0.14	0.54	
		Trucks	0.04	0.03	0.05	0.16	0.06	0.33	
		Total	**0.09**	**0.06**	**0.10**	**0.42**	**0.20**	**0.87**	
Remaining day/night	To Montreal	Cars	0.17	0.12	0.18	0.77	0.36	1.60	
		Trucks	0.16	0.12	0.18	0.59	0.30	1.35	
		Total	**0.33**	**0.25**	**0.36**	**1.36**	**0.65**	**2.95**	
	To South Shore	Cars	0.17	0.12	0.18	0.77	0.36	1.60	
		Trucks	0.16	0.12	0.18	0.59	0.30	1.35	
		Total	**0.33**	**0.25**	**0.36**	**1.36**	**0.65**	**2.95**	

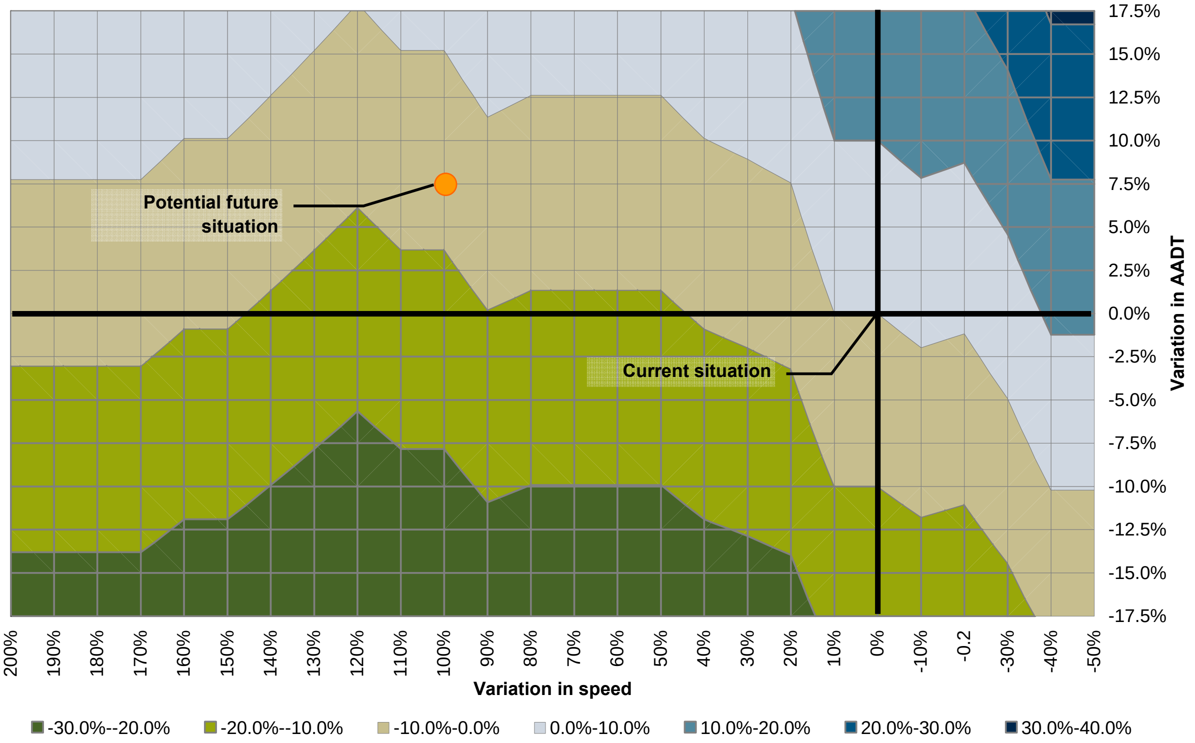
Table 26 Fine particle emissions (kg) for a traffic day in 2012

			VÉRENDRYE-ATWATER	ATWATER-WELLINGTON	NUNS' ISLAND BRIDGE	CHAMPLAIN BRIDGE	132-TASCHEREAU	TOTAL	
AMRH	To Montreal	Cars	0.36	0.26	0.42	1.93	0.78	3.75	**58.22**
		Trucks	0.29	0.20	0.27	1.23	0.37	2.36	
		Total	**0.65**	**0.46**	**0.69**	**3.16**	**1.14**	**6.11**	
	To South Shore	Cars	0.29	0.19	0.25	0.82	0.38	1.93	
		Trucks	0.23	0.28	0.37	1.39	0.57	2.86	
		Total	**0.52**	**0.47**	**0.62**	**2.22**	**0.96**	**4.79**	
PMRH	To Montreal	Cars	0.23	0.27	0.27	1.02	0.53	2.31	
		Trucks	0.39	0.17	0.21	0.82	0.42	2.02	
		Total	**0.62**	**0.44**	**0.48**	**1.84**	**0.95**	**4.33**	
	To South Shore	Cars	0.31	0.21	0.36	1.64	0.85	3.38	
		Trucks	0.25	0.17	0.29	1.04	0.40	2.15	
		Total	**0.56**	**0.38**	**0.66**	**2.68**	**1.26**	**5.53**	
Remaining day/night	To Montreal	Cars	1.05	0.78	1.14	4.82	2.23	10.03	
		Trucks	1.02	0.79	1.17	3.80	1.92	8.71	
		Total	**2.08**	**1.58**	**2.31**	**8.62**	**4.15**	**18.73**	
	To South Shore	Cars	1.05	0.78	1.14	4.82	2.23	10.02	
		Trucks	1.02	0.79	1.17	3.80	1.92	8.71	
		Total	**2.08**	**1.58**	**2.31**	**8.62**	**4.15**	**18.73**	

4.1.11.5 Analysis of future changes in emissions

While the parameters for the New Bridge for the St. Lawrence were defined in the pre-feasibility study, traffic dynamics on this future structure could be influenced by the mode of public transit operating on it. Thus, rather than estimating future average daily CAP and GG emissions for a given scenario, ranges for AADT and for speed were defined for which average daily CAP and GG emissions are similar, within ±5%, to the present situation, as well as ranges for AADT and for speed both for emissions lower than at present and for emissions higher than at present. The variance of ±5% was chosen to allow for rounding of speed and AADT values obtained for total future emissions equivalent to present emissions. Figure 70 shows an example representing various ranges of variation in AADT and speed and their effect on the variation of GG emissions with respect to the current situation. The centre point of this graph represents the present situation. This makes it possible to estimate emission trends for a future situation (orange point) where vehicle speed would be doubled (for example, from 40 km/h to 80 km/h) and the annual average daily flow would be increased by 7.5%. Such a situation would reduce GG emissions between 0 and 10% in comparison to current levels.

Figure 70 Sample ranges for variations in AADT and speed and their influence on GG emissions compared to the present situation (this is presented as per example only)



4.2 BIOLOGICAL ENVIRONMENT

4.2.1 Flora

4.2.1.1 *Terrestrial vegetation*

4.2.1.1.1 *Methodology of terrestrial botanical inventories*

Photo-interpretation of the study site's natural environments was conducted prior to the field trip. Observation of tones, textures, colours and contrasts in the aerial photography carried out in July 2011 identified the different vegetation units at the study site and facilitated planning for the inventory work (CMM 2011).

Floristic inventories were conducted in all the vegetation units identified by photo-interpretation. These inventories were carried out June 5, July 17, August 20, 21, 22, 28 and 29 and September 10, 2012.

The purpose of these inventories is to document, for each vegetation unit, the plant species present in each stratum (tree, shrub and herbaceous) and their cover percentage. In addition, in forested environments, i.e., vegetation units containing trees with a diameter at breast height (dbh) of more than 10 cm, the following characteristics were recorded:

- Density of tree stratum (% cover)[4];
- Height of tree stratum (m);
- Average tree diameter (cm);
- Basal area of tree stratum (m^2/ha) assessed with a forest prism factor of 2.

Wetlands were identified and delineated according to the botanical, biophysical and hydrological criteria described in the Identification and Delineation of Aquatic, Riparian and Wetland Ecosystems data sheet, Ministère du Développement durable, de l'Environnement et des Parcs (MDDEP 2006) (Ministry of Sustainable Development, Environment and Parks). These limits were georeferenced with a MobileMapper 10 GPS and accurate to between 1 and 4 m. Wetlands were classified according to the Canadian Wetland Classification System (National Wetlands Working Group, 1997).

Identification, characterization and delineation of aquatic vegetation was carried out August 20 and 22, 2012. These inventories were conducted by boat using an underwater camera and a MobileMapper 10 GPS.

The presence or absence of threatened or vulnerable species or species likely to be so designated was documented with the Centre de données sur le patrimoine naturel du Québec – CDPNQ (Quebec Natural Heritage Data Centre), the only data still available. Formerly, the federal government had an online tool that could be used to view the list of endangered species in a given territory. However, this tool has not been available for several years. Consequently, the CDPNQ is only source of information documenting occurrences of endangered species listed for a specific territory. For the purposes of this mandate, particular attention was paid to the status of inventoried species at both the provincial and federals levels. The raw data sent by the CDPNQ are attached in Appendix 4. The list of species identified by the CDPNQ was validated in order to identify those species that come under the *Species At Risk Act*, i.e., those species considered endangered, threatened or of special concern.

The spring and fall floristic inventories carried out on June 5 and September 10, 2012 were specifically aimed at identifying species at risk and with a provincial status.

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[4] **The tree stratum includes trees with a DBH over 10 cm. Trees with a DBH less than 10 cm are included in the shrub stratum.**

4.2.1.1.2 *Description of units of terrestrial vegetation*

A biophysical and human environments distribution map illustrating the various vegetation units is attached in Appendix 5.

Forest stands

Eastern cottonwood poplar stands

Vegetation units 4, 9, 10, 16, 18, 21, 23a, 23b, 26a, 26b, 26c and 26d are characterized by a dominance of cottonwoods in the tree stratum. Eastern cottonwood poplar stands occupy a total area of 72,450 m^2. These stands are located north and south of the Champlain Bridge on the eastern shore of Nun's Island, in Brossard, north of Champlain Bridge and on the west side of the Ice Control Structure north of the Champlain Bridge. The characteristics of the eastern cottonwood poplar stands are presented in the table below. Based on the average diameter of the trees, their age varies between 20 and 30 years.

The vegetation composition of these stands is fairly homogenous. Tables illustrating the floristic composition of the eastern cottonwood poplar stands are attached in Appendix 6. Photographs of these vegetation units are attached in Appendix 7.

Table 27 Characteristics of eastern cottonwood poplar stands

STAND NUMBER	4	9	10	16	18	21	23A
Density (%)	25 to 40	25 to 40	25 to 40	25 to 40	< 25	25 to 40	25 to 40
Height (m)	17 to 22	17 to 22	12 to 17	12 to 17	12 to 17	17 to 22	12 to 17
Average dbh (cm)	35	30	25	25	30	20	20
Basal area (m^2/ha)	18	8	8	16 to 24	4	6	4

STAND NUMBER	23B	26A	26B	26C	26D
Density (%)	25 to 40	25 to 40	25 to 40	25 to 40	25 to 40
Height (m)	17 to 21	17 to 21	17 to 21	17 to 22	17 to 22
Average dbh (cm)	25	30	30	25	25
Basal area (m^2/ha)	10	6	6	12	10

Black locust stands

Vegetation units 12, 13, 15, 19, 20, 24, 25 and 28 are characterized by a dominance of black locusts in the tree and shrub strata. Black locust stands occupy a total area of 33,233 m^2. These stands are found on both shores of Nun's Island and on the Montreal shore. The characteristics of the black locust stands are presented in the table below.

The vegetation composition of these stands is fairly homogenous. Tables illustrating the floristic composition of the black locust stands are attached in Appendix 6. Photographs of these vegetation units are attached in Appendix 7.

Table 28 Characteristics of black locust stands

STAND NUMBER	12	13	15	19	20	24	25	28
Density (%)	25 to 40	25 to 40	25 to 40	25 to 40	25 to 40	25 to 40	25 to 40	25 to 40
Height (m)	12 to 17	12 to 17	12 to 17	7 to 12	12 to 17	7 to 12	7 to 12	7 to 12
Average dbh (cm)	20	25	25	15	20	25	25	15
Basal area (m^2/ha)	4	6	24	0	10	12	20	0

Red ash stands

Vegetation units 2a, 2b and 3 are characterized by a dominance of red ash in the tree and shrub strata. The red ash stands occupy a total area of 52,724 m^2. These stands are found in Brossard. The characteristics of the red ash stands are presented in the following table.

The vegetation composition of these stands is fairly homogenous. Tables illustrating the floristic composition of the red ash stands are attached in Appendix 6. Photographs of these vegetation units are attached in Appendix 7.

Table 29 Characteristics of red ash stands

STAND NUMBER	2A	2B	3
Density (%)	40 to 60	40 to 60	40 to 60
Height (m)	17 to 22	17 to 22	17 to 22
Average dbh (cm)	25	30	30
Basal area (m^2/ha)	18	14	12

Shrublands

Staghorn sumac fields

Vegetation units 7, 8, 27a and 27b are characterized by a dominance of staghorn sumac in the shrub stratum. Mature trees are sparsely distributed in these fields. The staghorn sumac shrublands occupy a total area of 23,592 m^2. These fields are found on the Couvée Islands, on the east side of the ice control structure and on the Montreal shore.

The vegetation composition of these stands is fairly homogenous. Tables illustrating the floristic composition of the staghorn sumac fields are attached in Appendix 6.

Herbaceous fields

Vegetation units 1, 5, 6, 14, 17, 22 and 29 are characterized by the presence of herbaceous fields. Mature trees are sparsely distributed in these fields, which occupy a total area of 157,296 m^2. They are found on the Brossard shore, on both sides of Nun's Island and on the Montreal shore.

The vegetation composition is fairly homogeneous and includes species common to these fields. Tables illustrating the floristic composition of the herbaceous fields are attached in Appendix 6.

4.2.1.2 Aquatic plant communities

4.2.1.2.1 Methodology and delineation of aquatic plant communities

Identification and delineation of aquatic plant communities was carried out August 20 and 22, 2012. The joint venture's specialists used a boat, an underwater camera and a GPS to delineate and inventory the aquatic plant communities. The plant communities were mapped based on the percentage of plant coverage on the bed of St. Lawrence River. They are presented in a biophysical and human environments distribution map attached in Appendix 5. The aquatic species inventoried in the plant beds are listed in the table below:

Table 30 Floristic composition of aquatic plant communities

STRATUM	ENGLISH NAME	LATIN NAME
Herbaceous	Elodea	*Elodea canadensis*
	Yellow cowlily	*Nuphar variegata*
	Large-leaved pondweed	*Potamogeton amplifolius*
	Sago pondweed	*Stuckenia pectinata*
	Clasping pondweed	*Potamogeton perfoliatus*
	Pondweed	*Potamogeton sp.*
	Erect arrowleaf	*Sagittaria rigida*
	Great bulrush	*Schoenoplectus tabernaemontani*
	Tapegrass	*Vallisneria americana*

4.2.1.3 Wetlands

4.2.1.3.1 Pond

Vegetation unit 31 is a 1,555 m^2 pond. The identifying criteria used to determine the existence of this wetland are the presence of standing surface water (90%) and near-surface water. Depressions filled with dark forest litter cover approximately 10% of this wetland. The table illustrating the floristic composition of the pond is attached in Appendix 6. Lastly, as this pond is not connected to any other watercourse, it is unlikely to provide a habitat for fish.

4.2.1.3.2 Tree swamp

Vegetation unit 3 is a 15,458 m^2 tree swamp. The identifying criteria used to determine the existence of this wetland are the presence of standing surface water (85%) and near-surface water. This wetland is also characterized by the presence of signs of stagnation on bark, emergent tree roots and depressions filled with dark forest litter (5%). The table illustrating the floristic composition of the tree swamp is attached in Appendix 6. Given that this swamp is not connected to any body of water and dries out completely in summer, it cannot be considered a fish habitat.

4.2.1.3.3 Emergent nearshore marsh

Vegetation units 11, 30 and 33 to 42 are emergent nearshore marshes located below the St. Lawrence River's natural high water mark. Tables illustrating the floristic composition and the density of each stratum of the emergent nearshore marshes are attached in Appendix 6. These marshes constitute one of the components of the fish habitats presented in Section 4.2.2.1.

4.2.1.4 Special status species of flora

The federal government no longer maintains an inventory of observations of species at risk. However, a similar inventory is available in Quebec from the CDPNQ. The CDPNQ lists 19 threatened or vulnerable species or species likely to be so designated under the *Act respecting threatened or vulnerable species* within a radius of 3 km of the study area. Of these species, four are subject to the *Species at Risk Act.*

Table 31 CDPNQ list of occurrences of special status plant species 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
Wild leek (*Allium tricoccum*)	-	V	S3	Deciduous forest	NO
Wild onion (*Allium canadense var. canadense*)	1	-	LDTV	Open or wooded area, high rocky banks, alvar, marsh, wet meadows, riparian deciduous woodland, calcicole	NO
Green dragon (*Arisaema dracontium*)	1	SC	T	Floodplains, natural high-water mark, silver maple stands and red ash, reed phalaris alluvial meadows	YES
Cutleaf toothwort (*Cardamine concatenata*)	1	-	LDTV	Deciduous forest	NO
Bur-reed sedge (*Carex sparganioides*)	1	-	LDTV	Deciduous forest	NO
American water-willow (*Justicia americana*)	1	T	T	Stream and pond banks on gravel, sand or organic matter substrate. Prefers hard water, i.e., rich in dissolved carbonates and bicarbonates, soil rich in organic matter and swift currents	YES
Shagbark hickory (*Carya ovata var. ovata*)	1	-	LDTV	Rich, cool, wet woodlands, sugar maple stands	NO
Swamp white oak (*Quercus bicolor*)	1	-	LDTV	Swamp (paludal)	NO
Narrow-leaved springbeauty (*Claytonia virginica*)	1	-	LDTV	Cool or wet wooded areas, silver or red maple stands or sugar maple-basswood and sugar maple-hickory stands, American elm, bur oak, red ash stands	NO
Walking fern (*Asplenium rhizophyllum*)	1	-	LDTV	Sugar maple stands on shaded, mossy limestone rock, calcicole	NO
Downy wildry (*Elymus villosus*)	1	-	LDTV	Open, rocky woodlands, shores	YES
False mermaid (*Floerkea proserpinacoides*)	1	Not at Risk	V	Cool open or partially open areas, riparian floodplains, scrubland or mixed deciduous forest, linden, American elm, ash, hackberry tree and silver maple	NO

Table 31 (Cont'd) CDPNQ list of occurrences of special status plant species 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
Common hackberry (*Celtis occidentalis*)	1	-	LDTV	Tolerant deciduous forest in rich, cool limestone soil, gravel or rocky riparian gradients, steep banks; calcicole	YES
Butternut (*Juglans cinerea*)	1	D	LDTV	Deciduous forest	NO
Switchgrass (*Panicum virgatum*)	1	-	LDTV	Dry shores and alluvial deposits	YES
Broad beech-fern (*Phegopteris hexagonoptera*)	1	P	T	Rich to moderately acidic soil	NO
Virginia mountain-mint (*Pycnanthemum virginianum*)	1	-	LDTV	Rocky or gravel shores (palustrine)	NO
Rough dropseed (*Sporobolus compositus var. compositus*)	1	-	LDTV	Prairie	NO
Simple vervain (*Verbena simplex*)	1	-	T	Alvar, dry, open, rocky or gravelly areas, calcicole.	NO
Annual wildrice (*Zizania aquatica var. aquatica*)	1	-	LDTV	Still, shallow water, marsh, muddy shores	NO

* 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

*** Priority: Decreasing priority for conservation (from 1 to 5). N: National; S: Provincial; NR: No rank assigned at national level; ZZ: No national ranking

**** Accuracy: S: 150 m radius; M: 1.5 km radius; G: 8 km radius; U: > 8 km radius

The floristic inventories identified two species of horehound likely to be designated threatened or vulnerable, the St. Lawrence water horehound (*Lycopus americanus var. laurentianus*) and the rough water horehound (*Lycopus asper*). Their location is presented in the biophysical and human environments distribution map attached in Appendix 5.

Two specimens of St. Lawrence water horehound were observed in vegetation unit 11, on the islands located to the east of Nun's Island. Seven colonies of a few specimens of rough water horehound were observed in vegetation units 6 and 8.

4.2.2 Fauna and habitats

4.2.2.1 Ichthyofauna and aquatic habitats

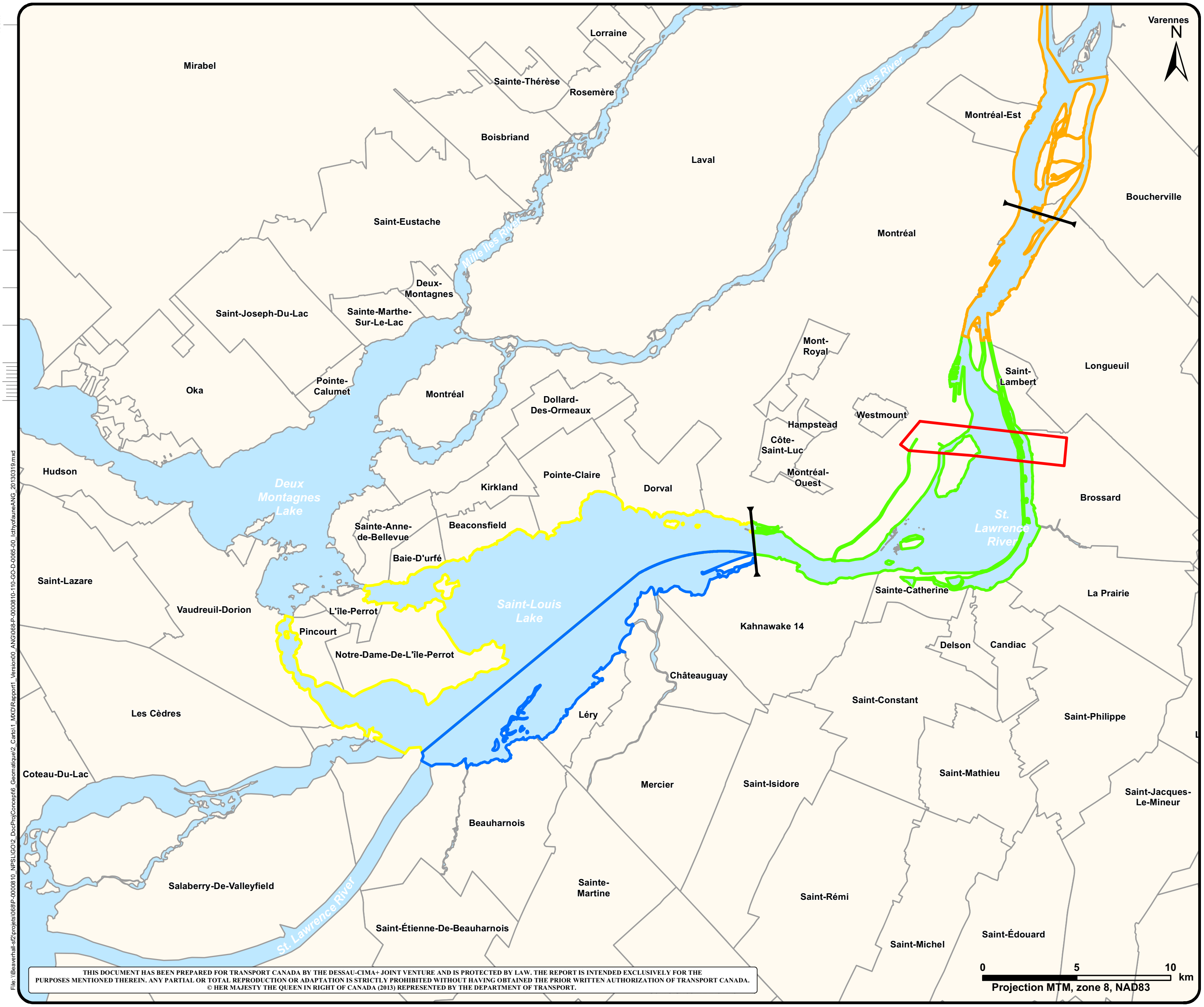
4.2.2.1.1 Study area

The aquatic environment study area is approximately 4.5 km long and extends out along both sides of the Champlain Bridge (100 m upstream and 200 m downstream) (see Figure 71). In addition to this zone, there is a potential spawning zone upstream from Nun's Island extending for more than 1 km upstream from Champlain Bridge. Thus, the study area covers the entire sector that could be affected by construction work and, in the long term, by the new bridge. Within the study area, two major sectors were investigated, the Lesser La Prairie Basin and the Greater La Prairie Basin.

4.2.2.1.2 Literature review

The description of the study area and the extended study area was initially developed through a search of departments and agencies that had conducted work involving fish and fish habitats.
A wealth of information about the species in this sector and their habitats is available and served as a basis to complete the description of this environment.

A review of the literature concerning the habitats and fish communities covers a far larger area, from the beginning of the Lachine Rapids (approximately 15 km upstream from the Champlain Bridge) to the Louis-Hippolyte-La Fontaine Bridge-Tunnel (approximately 15 km downstream from the Champlain Bridge). Thus, the study area covers approximately 30 km (see Figure 72). Numerous surveys and knowledge syntheses were conducted in the course of establishing the priority intervention zone (ZIP) committees by Stratégies Saint-Laurent (Stratégies Saint-Laurent 2012), a non-profit organization working to promote joint action among stakeholders concerned with sustainable development of the St. Lawrence River. The study comprises the ZIP Ville-Marie (Armellin *et al.* 1997, ZIPs 7 and 8) and part of the ZIP Jacques-Cartier (Armellin *et al.* 1995, ZIP 9). The upstream (Armellin *et al.* 1994, ZIP 5 and 6) and downstream (ZIP 9) sections of the study area are designated the extended study area.



SOURCES :
- Priority intervention zones :
Centre Saint-Laurent, Conservation de l'environnement, Environnement Canada - Région du Québec, 1994, 1995 et 1997

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Client
Transport Canada   Transports Canada

Project
New Bridge for the St. Lawrence
Environmental Assessment

Title
Figure 71
Ichtyofauna Study Area
and Locations of Priority Intervention Zones

DESSAU | CIMA+
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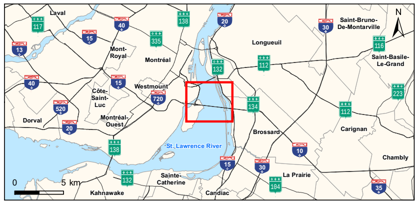
Drawn: Manel Besbes
Checked: Ghyslain Pothier
Discipline: Geomatic
Scale: 1:200 000
Date: 2013-03-19
Project manager: Sylvie Côté
Sequence No.: 01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0065	00

Aquatic vegetation cover (in %)

▢	0-25
🟩	25-50
🟩	50-75
🟩	75-100
🟥	Bathymetry study area and surface substrate
⬚	Municipal limit
▢	Borough limit

SOURCES :
- 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 72
Percentage of Aquatic Vegetation Coverage

DESSAU | CIMA+

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Sequence No. 01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0066	00

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4.2.2.1.3 Survey method and description of habitats

A complete survey of the study area documenting fish habitats was carried out in August 2012.

Survey method

Characterizations of the substrate and the aquatic plant communities were conducted August 20 to 24, 2012, during a severe low-water period. Surveys were performed by boat with an underwater camera (Aquavu Scout SRT) and all video images were georeferenced (Garmin GPS-76 and Geostamp from Intuitive Circuits LLC) and recorded (Sony DRC-SR80 digital camera). Transect characterizations were initially planned to cover the entire study area, with a pitch of 50 m. However, in the Greater La Prairie Basin sector, downstream and upstream from the Champlain Bridge, the homogeneity of the sector made it possible to space the transects from 100 to 200 m. This was done following the direction of the current and recorded using hydrographic software (HYPACK 2012). The same software was used to precisely delineate the aquatic plant communities and the potential spawning substrate. While acquiring these data, observations regarding the substrate and the vegetation were recorded on field sheets.

For the most part, transects were conducted as planned. However, water levels and flow direction meant that some transects had to be adjusted in the Nun's Island and Clément Bridge sectors. Pour Visual observations were conducted by boat to ensure complete coverage and data collection in difficult-to-access locations. All transects produced for this project are attached in Appendix 8.

This study area survey defined the flow facies, the composition of the substrate and the aquatic vegetation. This information along with the bathymetric survey and the data on vegetation in the floodplain (see Section 4.2.1) made it possible to separate the study area into zones representing aquatic habitat type. A grid showing the 24 habitat types was used (see Appendix 9).

Potential spawning habitat

Spawning potential was assessed based on criteria established by Lavoie and Talbot (1984), as set forth in Armellin and Mousseau (1998), for six fish groups (guilds) using similar spawning habitats, namely: fast-flowing water lithophile, calm water lithophile, calm water phytolithophile, phytophile, lithopelagophile and pelagophile. The last two guilds (lithopelagophile and pelagophile) are not represented in the study area and are therefore 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). Table 32, which presents this information, was adjusted to include all the species present in the study area and to integrate the latest data from the literature. One or more of the 24 habitat types were then assigned to a type of spawning ground (see Table 32).

Potential rearing and feeding habitats

In general, rearing and feeding habitats were considered in light of the type of habitat used by a large proportion of the species in the study area. Habitats of status species or species important for fishing were specifically examined to ensure that the impact assessment considered the needs of these species. This made it possible to evaluate the most sensitive sectors of the study area and to assess the environmental impact on the major species.

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 lithophile	Lake sturgeon, white sucker, northern sucker, silver redhorse, shorthead redhorse, smallmouth bass, channel catfish, tadpole madtom, walleye, sauger, silver lamprey, rosyface shiner, rainbow trout rainbow, 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
Calm water lithophile	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-
Calm water phytolithophile	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 turbidity	6 to 8	2-4-6-8
Phytophile	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

4.2.2.1.4 *Fish communities and habitats*

In the knowledge synthesis of the biological communities in the La Prairie basins study area (Armellin *et al.* 1997), Mongeau *et al*. (1980) is cited as reporting a total of 67 fish species recorded between 1963 and 1977 in the sector covering the Lesser and Greater La Prairie basins and the Lachine Rapids. These species represent 23 families, the principal ones being cyprinidae, percidae and catostomidae. Among these species, five have special conservation status, the American eel, the chain pickerel, the lake sturgeon and the rosyface shiner are likely to be designated threatened or vulnerable at the provincial level. In addition, the American shad has vulnerable status at the provincial level (Armellin *et al.* 1997; see Table 33). In the same document, the fish communities of the three sectors are separately described in more detail.

Table 33 Fish species found or likely to be found in the study area

FISH SPECIES FOUND OR LIKELY TO BE FOUND IN THE STUDY AREA									
		SPECIAL STATUS		STUDY AREA (VILLE-MARIE ZIP)					
SPECIES	FAMILY	PROVINCIAL	FEDERAL	ALL	GREATER LA PRAIRIE BASIN	LESSER LA PRAIRIE BASIN	LACHINE RAPIDS	UPSTREAM (HAUT-RICHELIEU ZIP)	DOWNSTREAM (JACQUES-CARTIER ZIP)
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		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

Table 33 (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									
		SPECIAL STATUS		STUDY AREA (VILLE-MARIE ZIP)					
SPECIES	FAMILY	PROVINCIAL	FEDERAL	ALL	GREATER LA PRAIRIE BASIN	LESSER LA PRAIRIE BASIN	LACHINE RAPIDS	UPSTREAM (HAUT-RICHELIEU ZIP)	DOWNSTREAM (JACQUES-CARTIER ZIP)
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
Copper redhorse	CATOSTOMIDAE	Threatened							x
River redhorse	CATOSTOMIDAE	Vulnerable	Special concern						x
Greater redhorse	CATOSTOMIDAE								x
Shorthead redhorse	CATOSTOMIDAE								x
Quillback	CATOSTOMIDAE			x				x	x
Ongear 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

Table 33 (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		
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
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

Table 33 (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		
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
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

Table 33 (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		
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 Natural Resources and Wildlife) (2011), Government of Canada 2012

Lesser La Prairie Basin

The Lesser La Prairie Basin, located on the south shore of the St. Lawrence River, is divided into two sections. The first is the South Shore Canal, a deep seaway (8.6 m) for commercial vessels, and the second is the Lesser La Prairie Basin, which, when the bathymetric survey was conducted (July 2012), was less than 5 m deep. Physically separated from the river current by locks, the Lesser La Prairie Basin is a lentic flow zone. 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 33) and among these 12 families cyprinidae, percidae and centrarchidae dominate.

As stated above, the Lesser La Prairie Basin is a lentic flow zone (see Figure 49, Section 4.1.6). The substrate is fine-textured (see Figure 66, Section 4.1.10), there is little vegetation (see Figure 72) and the depth ranges from 2 to 5 m (type 19) in over 63% (122,180 m^2) of the area of this sector (see Figure 73). In the shallow areas, there are large aquatic plant communities (16,570 m^2) such as the one along the south shore of the basin. This habitat (type 4) is a favourable breeding zone for many phytolithophile species such as bass, perch and some members of the carp family. The Seaway canal covers 25% of this sector. The canal is deeper (8.6 m, type 20) and is colonized, for the most part, by zebra mussels on a gravel substrate. Many fish were observed during characterization in the Seaway canal. It is possible that the passage of commercial vessels stirs up particles that attract certain invertebrates able to feed on these particles, including zebra mussels, which in turn attract fish in search of food.

Greater La Prairie Basin

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

Approximately 50% of the Greater La Prairie Basin is composed of coarse substrate and is bare of vegetation as is the central sector extending under the Champlain Bridge (see Figure 72). The depth of this sector, which presents a laminar water flow pattern, varies between 2 m and 15 m (types 17 and 20). Two main zones along Nun's Island attracted our attention. The combination of coarse substrate, a depth of less than 3 m and the fast-flowing cross current has created two zones, the first, comprising approximately 69,740 m², downstream from the Clément Bridge, and the second, 28,180 m², downstream from the Champlain Bridge (type 22). Both zones have favourable spawning conditions for several fast-flowing water lithophile 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 (type 12 and 16). The channel between Nun's Island and Montreal contains a variety of intermingled habitats (types 12, 13, 16 and 7), 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 (type 2), are found along Nun's Island, and serve as refuges, feeding areas and even spawning grounds for some phytolithophile species. Two especially deep sectors (type 20) were also observed, one along Montreal Island and the other, smaller one, along the north shore of Nun's Island. These depressions were probably created artificially during backfilling work.

10cm 5 4 3 2 1 0

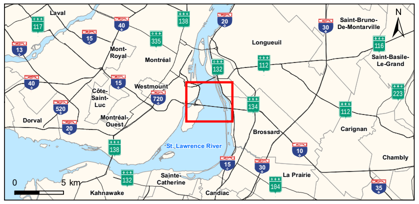
File: \\Beaverhall-sf2\projets\068\P-0000810_NPSL\GO\2_DocProjConcept\6_Geomatique\2_Carto\1_MXD\Rapport1_Version00_ANG\068-P-0000810-110-GO-D-0067-00_HabAquaANG_20130319.mxd

Summary of Aquatic Habitats	0 - 2 m	2 - 5 m	5 - 15 m	> 15 m	0 - 3 m	> 3 m	Fine substrate	Coarse substrate	Gravel - pebbles	Blocks - cobbles	Bedrock	Existing vegetation	Stripped	Type of spawning ground: Fast-flowing water lithophil	Calm water lithophil	Calm water phytolithophil	Phytophil
Floodplain																	
1												●					
Lentic flow																	
2	●							●				●				●	
3	●							●					●				
4	●						●					●				●	●
5	●						●						●		●		
6		●						●				●					
7		●						●					●				
8		●					●					●					
9		●					●						●		●		
10			●														
11				●													
Laminar lotic flow																	
12	●							●				●					
13	●							●					●	●			
14	●						●					●					
15	●						●						●				
16		●						●				●					
17		●						●					●	●			
18		●					●					●					
19		●					●						●				
20			●	●										●			
Whitewater lotic flow																	
21					●				●								
22					●					●				●			
23					●						●						
24						●											

SIZE 11x17

🟥 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 73
Summary of Aquatic Habitats

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Prepared	Frédéric Burton	Discipline	Geomatic
Drawn	Manel Besbes	Scale	1:15 000
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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	0067	00

Species at risk and with a provincial status

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.

American Shad

The American shad is an anadromous species; in other words, it lives mainly in salt water, but travels to fresh water for spawning, which takes place in a water column (pelagic). The American shad generally feeds on plankton at sea, but feeds little or not at all during the spawning migration to fresh water (MRNF 2010). The major obstacles to reproduction for the shad are the man-made barriers erected on the migration routes such as hydroelectric dams. Two spawning grounds have been confirmed in western Quebec, one downstream from the Carillon Dam on the Ottawa River (upstream from the study area), and one downstream from the Des Prairies River Dam, between Montreal and Laval (Bilodeau and Massé 2005). The likelihood of a spawning ground located near Sainte-Anne-de-Bellevue has been considered for a number of years, but further study is needed (ERAS 2001). Based on this information, the American shad could be found in the study area during its migration to spawning sites between May and July and during its return to salt water before the end of August. The larvae head to sea as soon as they hatch and are present in the study area until September (Robitaille 1997).

American eel

The American eel is a catadromous species (i.e., it lives in fresh water but reproduces in salt water) and breeds in the Sargasso Sea (COSEWIC 2006). It can travel upstream as far as the Great Lakes during its growth period. Juveniles migrate upstream throughout the summer (COSEWIC 2006) and adults migrate downstream mainly from June to October (COSEWIC 2006). As eels adapt easily to a range of habitats and are essentially omnivorous, they could use the study area as both a migration route and a feeding ground. Eels overwinter in the mud and there is no habitat in the study area with this substrate.

Chain pickerel

The chain pickerel is found in calm rivers and lakes with clear water. It feeds on fish and a variety of other prey found in the aquatic vegetation and remains active all winter. The chain pickerel breeds in flooded shoreline herbaceous areas in spring (MRNF 2008a). Several sites in the study area are suitable for spawning and feeding, including the type 2, 4, 12 and 16 habitats along the shores, which have a high vegetation density.

Lake sturgeon

The lake sturgeon's spawning habitat is characterized by the presence of fast-flowing water and a substrate of boulders and pebbles, with a depth varying between 0 to 3 m (Environnement Illimité Inc. 2003), i.e., a type 22 habitat in the study area. Although this habitat is present in the study area particularly around the eastern end of Nun's Island, the spawning ground of this species has not been identified in the Champlain Bridge sector (La Haye *et al.* 2003). The lake sturgeon spawns in late May and early June in the St. Lawrence River and one of the spawning grounds is located upstream from the study area in the Mercier Bridge sector (La Haye *et al.* 2003).

The sturgeon feeds on a variety of organisms found in the benthos and can feed in a range of habitats (Environnement Illimité Inc. 2003). There is no substrate in the Greater La Prairie Basin specifically suitable to its diet owing to the absence of fine-textured substrate, but the presence of sand throughout the coarse-textured substrate of the Greater La Prairie Basin may allow sturgeon to feed, as confirmed by the observation of lake sturgeon on August 23, 2012 during the survey period, near the site upstream from the Champlain Bridge.

This species overwinters in trenches anywhere between 8 and 16 m deep, in a current of less than 0.8 m/s (Environnement Illimité Inc. 2003). The two trenches (type 20) upstream and downstream from Clément Bridge, meet these criteria, and could serve as overwintering sites for sturgeon.

Rosyface shiner

The rosyface shiner is usually found in medium to fast-flowing water. It spawns in shallow, clear water on a gravel substrate (Houston 1994). Therefore, rosyface shiner spawning is unlikely in the study area as conditions in the Lesser La Prairie Basin are characterized by low flow and a somewhat clogged bed and the Greater La Prairie Basin by coarse substrate. The rosyface shiner is an insectivore but can also feed on plants (Houston 1994), so some habitats in the Greater La Prairie Basin are suitable for feeding (type 12 and 16).

Migratory movements

Breeding sites can be found in fast-flowing water in the study area as well as upstream in the Lachine Rapids and near the Mercier Bridge (Centre Saint-Laurent 1996, La Haye et al. 2003). Lithophile species in the study area and upstream (Table 32) tend to make seasonal migrations to these spawning grounds. Among the species that spawn upstream from the study area are the lake sturgeon, with a spawning ground in the Mercier Bridge sector (La Haye *et al.* 2003), and the American Shad, with one of two spawning sites in the sector located downstream from Carillon in the Ottawa River (ERAS 2011). The American eel also migrates through the study area, with juveniles heading upstream and adults downstream (COSEWIC 2006).

Although the upstream migration paths are not known in the study area, fish migrating upstream usually take routes where flow velocity is low. In the study area, possible migration corridors with low flow velocity are the channel between Nun's Island and Montreal Island, the eastern shore of Nun's Island and along the right bank of the Greater La Prairie Basin (see Figure 63). Downstream migrations normally take place in open fast-flowing water.

Upstream zone

The Lake St. Louis zone (Armellin *et al.* 1994) is located upstream from the study area and comprises several habitat types, including fast-flowing water and calm water areas, islands and large, shallow areas (3 m deep on average). Large aquatic plant communities and swampy areas shelter a multitude of wildlife species. The water flow comes from both the St. Lawrence River and the Ottawa River. A total of 76 fish species from 23 families were counted, mainly cyprinidae, percidae and catostomidae.

Downstream zone

Located in the most urbanized section of the river, the downstream sector (Armellin *et al.* 1995) of the study area has been under great pressure (e.g., dredging, filling) due to Montreal's urbanization, the port expansion and construction of the many bridges linking Montreal to the South Shore. However, this zone still contains areas of special interest for wildlife, particularly in the Boucherville Islands archipelago. Furthermore, several of these islands are part of a conservation zone and include the most significant of this sector's habitats such as aquatic plant communities, marshes and swamps. There are 95 fish species from 24 families in this zone.

4.2.2.2 Plankton community

4.2.2.2.1 Phytoplankton

According to Hudon *et al*. (1995), the structure of the phytoplankton community in Lake Saint-Louis and the La Prairie basin is mainly influenced by two masses of water: the mass of water originating from the Great Lakes, dominated by diatoms, and the mass of water from the Ottawa River, dominated by cryptophytes. In the spring, the input from these masses of water is substantial and the La Prairie basin is dominated by these groups. In the summer, the flow decreases and the community gives way to chlorophytes, with certain cyanophytes sporadically dominating over a short period of time. A total of 300 species of phytoplankton (for a species richness of 35) was identified in this environment. The concentration of chlorophyll-a associated with these organisms ranges from 0.9 to 7.0 µg/l, but on average is roughly 3 µg/l, typical of a low to moderate primary production (Hudon *et al*., 1995; Centre Saint-Laurent, 1996; Cusson, 2011).

4.2.2.2.2 Zooplankton

In a fluvial environment, the presence and abundance of zooplankton is mainly influenced by advection and thus depends on current speed, species composition and the abundance of the various species in the transit water (Lair, 2006). The Champlain Bridge area contains significant species richness (N=61) but low abundance typical of fluvial environments. Spring is mainly characterized by cyclopoids while summer and fall are respectively characterized by water fleas and calanoids (Cusson, 2011).

In the above studies, the results reveal that the structure of the community and the abundance of the plankton species in the Champlain Bridge area is greatly influenced by the flowing masses of water. This system is thus highly dynamic and especially resilient. As a result, sporadic changes in habitat conditions are quickly offset by the constant upstream river inflow.

4.2.2.3 Mammals

4.2.2.3.1 Methodology

The relative information on wildlife comes from a review of the literature available online and of the assessment of the habitat requirements of mammals likely to occur in the study area based on their distribution range. In addition, all observations of individuals and signs of mammal activity (e.g. tracks, layers, feces, carcasses, burrows, dens, browse) made during the various surveys for plants, herpetofauna and birds was collected in order to inventory the species with a confirmed presence in the study area.

4.2.2.3.2 Results

Current data

Little information is available on mammals specific to the study area. Based on the distribution range of the species, Des Granges and Jobin (2002) estimated the procession of mammals occurring in the St. Lawrence Lowlands in southwestern Quebec at about 50 species. However, the number of species potentially occurring in urban and peri-urban environments is significantly lower. In fact, of the 71 species of mammals found in Quebec, about 20 have adapted to, and even thrive in, the presence of humans (Prescott 2011).

In the study area, based on the information gathered in the literature that was reviewed, about 15 to 20 species of mammals occur in the area. In fact, the mammals in the Ville-Marie ZIP appear to be primarily species associated with urban and peri-urban environments: racoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), squirrels and foxes (Ville-Marie ZIP, 2012). The ZIP shoreline also appears to contain more aquatic species such as the muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*) and American mink (*Mustela vison*). Giroux (2012) reports numerous sightings over the last few years of the red fox (*Vulpes vulpes*) on the Couvée Islands.

Near the study area, the occurrence of coyotes (*Canis latrans*) was noted in the Pointe-Saint-Charles district (Gagnon, 2012) along with a white-tailed deer (*Odocoileus virginianus*) in LaSalle (Paradis 2011). These sightings are unusual and likely consist of animals that succeeded in crossing the river from the south shore. North of the study area in the Saint-Jacques ravine and along the Lachine Canal, surveys were used to record a dozen species of mammals, including the racoon, red fox, woodchuck (*Marmota monax*), striped skunk, grey squirrel (*Sciurus carolinensis*), short-tailed shrew (*Blarina brevicauda*), house mouse (*Mus musculus*), mouse (genus *Peromyscus*; *leucopus* or *maniculatus*), beaver, eastern cottontail (*Sylvilagus floridanus*) and small rodents (DESSAU-SM, 2008). These mammals appear to occur in the study area along with the Norway rat (*Rattus norvegicus*).

Species observed during inventories

Individuals or signs of the presence of 13 species of mammals were identified during inventories (Table 34). These species are part of three orders (lagomorphs, rodents and carnivores) and seven families (*Leporidae*, *Sciuridae*, *Castoridae*, *Cricetidae*, *Canidae*, *Procyonidae* and *Mustelidae*). All the reported species are common in Quebec and in the area (see Desrosiers et al. 2002 and Prescott and Richard 2004). Mammals were sighted throughout the study area: South Shore, Couvée Islands and seaway dike, Nuns' Island and Montreal. The grey squirrel occurs all over the study area. Small rodents also appear to be well represented in grassy wildland and at the edge of wooded areas where natural and artificial debris can provide reproduction sites. The red fox was observed on Nuns' Island but not on the Couvée Islands. The St. Lawrence shoreline on the south shore, in Montreal and on Nuns' Island appears to be highly used by predators such as the fox, racoon, skunk and mink. These species were all sighted in riverside areas.

Table 34 Mammals observed during study area surveys

ORDER	FAMILY	FRENCH NAME	ENGLISH NAME	LATIN NAME	CONFIRMED PRESENCE			
					SOUTH SHORE	COUVEE ISLANDS AND DIKE	NUNS' ISLAND	MONTRÉAL
LAGOMORPHS	LEPORIDAE	Léporidé sp.	Hare or Rabbit	*Leporidae sp.*	–	–	–	Feces
RODENTS	SCIURIDAE	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	–
	CASTORIDAE	Castor du Canada	American Beaver	*Castor canadensis*	–	Browse	–	–
	CRICETIDAE	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	–
CARNIVORES	CANIDAE	Renard roux	Red Fox	*Vulpes vulpes*	–	–	Individual	–
	PROCYONIDAE	Raton laveur	Racoon	*Procyon lotor*	Tracks	–	Individual	Tracks
	MUSTELIDAE	Vison d'Amérique	American Mink	*Mustela vison*	–	–	Individual	–
		Moufette rayée	Skunk	*Mephitis mephitis*	Tracks	–	–	Tracks

Habitats

The surveyed mammals are common species in Quebec and for the most part well adapted to urban and somewhat open environments. More natural habitats are characterized by brushy and grassy wildland. A few hardwood groves, mainly consisting of poplars, supplement the terrestrial habitats in the study area. These plant succession and transitional environments contain few snags and are part of the urban network. The highways split up and isolate the residual habitats and limit mammal movement. The habitats in the study area are thus not very suitable for use as a daytime resting site by tree bats (see Tremblay and Jutras, 2010), provide poor quality for large mammals with extensive home ranges, and are not very suitable for forest mammals associated with mature stands and larger tree clumps (see Desrosiers et al. 2002 and Prescott and Richard, 2004). In addition, the St. Lawrence's rocky shoreline and relatively strong current along with the lack of small rivers and streams restrict the study area's potential for semi-aquatic mammals such as the muskrat and beaver. Lastly, it would appear the urban activity is a source of disturbance for certain wilder species. All of these conditions account for the limited procession of mammal species that may regularly occur in the study area.

4.2.2.4 *Herpetofauna*

4.2.2.4.1 *Methodology*

First, the database of the Atlas of Amphibians and Reptiles of Quebec (AARQ 2011) was consulted in order to obtain a list of amphibian and reptile species previously observed in the study area. This list is attached in Appendix 10.

Second, a range of inventory techniques was used to validate the presence and distribution of amphibian and reptile species in the study area and to document their habitats. One very common method to inventory anurans (frogs, tree frogs and toads) is to conduct listening sessions for their songs. The Inventory stations were set up in different locations near wetlands within the study area, namely, on the Brossard shore (stations 1 and 2), on the Seaway dyke (station 3), on Nun's Island (stations 4 to 7) and on Montreal Island (stations 8 and 9) (see Figure 74). At these stations, anuran listening sessions were conducted based on the amphibian populations monitoring protocol in the Atlas of Amphibians and Reptiles of Quebec (AARQ 2011).

Each anuran manifestation was rated according to an index of relative abundance, from 0: no call, 1: individuals were counted, 2: a few individuals were counted, others overlapped and, lastly, 3: a chorus of calls in which it was impossible to count individuals (Lepage et al. 1994). The inventories were conducted thirty minutes after sunset, at nightfall and in the following three hours. In total, nine anuran listening stations were positioned in the habitats (mainly riverside or reed marshes) along the St. Lawrence River and the Champlain Bridge. The stations were inventoried and visited once during the summer, on June 4, 2012.

S5 ●	Anuran listening station
Ve4 ●	Fyke installation station
⌜⌟	Municipal limit
☐	Borough limit

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Figure 74
Locations of Anuran Listening Stations and
Fyke Nets for Capturing Turtles

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Sequence No. 01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0068	00

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SIZE 11x17

In order to maximize the chances of identifying turtles, fyke nets were installed in eight fishing stations along the St. Lawrence River. The stations were positioned so as to inventory the entire area of the riverbank that could be affected by the construction work and which may be frequented by turtles. Four fyke nets were installed at the chosen stations (see Figure 74) leaving the upper portion of the nets in the open air so as to allow captured turtles to breathe. The fyke net were baited with canned sardines and left in place for approximately 24 hours each. They were then moved to another station for a second 24-hour period. This turtle capture effort using fyke nets lasted a total of 160 hours.

Snake shingles were also positioned in suitable habitats and later revisited. This technique is based on the Ministry of Natural Resources and Wildlife method (MRNF, 2008b) and involves placing asphalt shingles (the same as those used for roofing) directly on the ground. This technique attracts snakes that use the shingle as a thermal refuge. The shingles are checked on several occasions after a minimum period of two weeks. In total, 50 shingles were installed June 5, 2012, and monitored June 19 and October 10 (see Figure 75). These were located in areas directly affected by the construction work, principally in open grounds near woodlands.

Lastly, active and visual searches were conducted for examples of the main species likely to be present in suitable habitats. These searches covered the entire study area. Special attention was paid to at-risk species (threatened or vulnerable). For turtles, a search was made in June for signs of egg-laying by identifying tracks, burrows and shells from eggs, which are frequently stolen by predators. The search was conducted based on the method described by Bouthillier (2012), which involves walking along the shore and searching up to a distance of ten metres on either side. Searches inland and near the shore were also conducted in the course of other field activities by looking under rocks, logs, branches, bark and stone mounds. This active search technique favours detection of the shyer amphibian and reptile species such as salamanders. A total of approximately eight hours was allocated to the active search. All individual observations and all signs indicating the presence of herpetofauna were recorded.

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SIZE 11x17

B24	Cover boards to observe snakes
⬚	Municipal limit
▭	Borough limit

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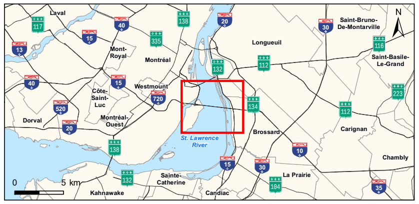

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Figure 75
Locations of Cover Boards for Observing Snakes

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4.2.2.4.2 *Results*

Current data

According to the Atlas of Amphibians and Reptiles of Quebec (AARQ 2012), 20 species of amphibians and 18 species of reptiles have been identified within a 5 km radius encompassing the study area (see Appendix 10).). 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. Most of the other species inventoried were found near Battures Lake on Nun's Island or outside the study area.

Species observed during inventories

Weather conditions during the inventories of anuran calls favoured data collection: little wind (1 to 2 on the Beaufort wind scale), a temperature of approximately 18°C and no precipitation. Sound conditions during the inventories were acceptable and did not reduce listening quality or affect species detection. In general, anuran habitats are uncommon in the study area. Furthermore, no species of salamander was detected during the inventories in the study area. However, no anuran species was heard over the course of the inventories, and none was seen during the active search.

No species of turtle was captured in the fyke nets during the inventories. However, three species of snake were identified under the shingles, the common garter snake (*Thamnophis sirtalis*), the red-bellied snake (*Storeria occipitomaculata*) and the brown snake (*Storeria dekayi*). The latter is a special status species (see Section 4.2.2.4). The common garter snake and the brown snake were also identified during the active and visual searches.

Appendix 11 presents detailed results on the inventories of amphibians and reptiles (anuran listening stations, fyke net captures, snake shingles and active search). The locations of sampling stations are presented in Figure 74.

Habitats

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. However, although no anuran species was heard during the inventory, some of the wetlands located near the existing bridge seem suitable for anuran species.

With regard to reptiles, the habitat is not suitable for turtles due to the fairly rocky shores and the lack of substrate favourable to nest building near the river. However, the habitat is suitable for snakes, mainly brown snakes, which were seen in open ground such as fields, on the edge of woodlands and on the rocky banks of the St. Lawrence River. These snakes also use stones and artificial debris for shelter (see Section 4.2.2.4). This species was found mainly on Nun's Island, the shores of Montreal Island and the Seaway dyke. No hibernacula (openings between rocks, holes in the ground, such as abandoned burrows or other locations below the frost line in winter) were confirmed in the study area, but stone mounds such as those located on the Island of Montreal, south of the highway could serve as winter refuges.

4.2.2.5 Avifauna

4.2.2.5.1 Methodology

First, the database of the Atlas of the Breeding Birds of Quebec (2012) was consulted in order to obtain, on the basis of previous observations, an initial list of avian species likely to be found in the study area (see Appendix 12). In addition, a request was sent to the Regroupement Québec Oiseaux (Quebec Association of Birdwatching Groups) for information from ÉPOQ (Étude des populations d’oiseaux du Québec [Studies of Bird Populations in Quebec]), the ornithological data management system (see Appendix 13). Lastly, requests to the MRNF and the Canadian Wildlife Service (CWS) were submitted in 2012 in order to obtain information on the species of birds inventoried in the migratory bird sanctuary as well as in the waterfowl concentration area, occurring in the study area (Appendix 14).

Next, avifauna inventories were conducted in the field in order to do a count of bird species found in the study area and to document their habitats. The line transect method was favoured for identifying avifauna in the study area (Environment Canada 1997; Bibby et al. 2000; Gibbons and Gregory 2006). This technique makes it possible to cover a large territory per time unit thus increasing the scope of the inventory. Moreover, this inventory method is ideal for characterizing very open areas such as abandoned fields (Environment Canada 1997).

Avifauna inventories were conducted June 5 and 20, 2012, using the line transect method. A total of twelve, 250 m long transects were established within the natural environments representative of the study area, each transect in a different homogeneous habitat: the Brossard shore (transects 1 and 2), the Couvée Islands (transects 3 and 6), the Seaway dyke (transects 4 and 5), Nun's Island (transects 7 to 10) and Montreal Island (transects 11 and 12) (see Figure 76 and Appendix 16). Thus, the observer was able to inventory a linear distance of 3,000 m. Birds seen or heard outside the transects and during other field trips were also recorded.

The number of breeding pairs was estimated by counting one pair for every singing male heard. A single female or a non-singing male was counted as 0.5 of a couple. However, the number of couples counted excludes observations of individuals in flight and nursing juveniles, as was the case with Canada geese and European starlings. Furthermore, the abundance and density of breeding pairs calculated applies only to the area covered by the inventory, not to the entire study area. The area counted is based on the length of the transects inventoried and the detection distance of the species. The latter was estimated to be 75 m on either side of the transect, which corresponds to a total inventoried area of approximately 450,000 m^2 (3,000 linear metres x 150 m), or 45 hectares.

Bird counts during the fall migration periods were conducted in order to finalize the characterization of avifauna use of the study area. These counts were carried out October 10, 2012, mainly of waterfowl and birds of prey using the waterfowl concentration area (aire de concentration des oiseaux aquatiques – ACOA) located east of Nun's Island. Five visual observation counting stations, using telescopes, were set up along the St. Lawrence near transects 5, 7, 8, 9 and 10 (see Figure 76). Observation at each station lasted a minimum of 30 minutes of observation was given to counting the bird species present, for a total of 2.5 hours of observation.

4.2.2.5.2 Results

Current data

According to the Atlas of the Breeding Birds of Quebec (2012), the study area is located within parcel 18XR13 of the Atlas' subdivisions, with an area of 100 km² (10 km x 10 km). In total, 71 species were listed in the database of the Atlas of the Breeding Birds of Quebec for this parcel (Appendix 12). However, this number of species was identified in a zone very much larger than the study area.

Furthermore, based on information from ÉPOQ from the Regroupement Québec Oiseaux, 254 avian species were observed between 1981 and 2010 in the Champlain Bridge and Nun's Island sectors including Des Battures Lake (Appendix 13).

Migratory bird sanctuary (MBS)

The study area is characterized by the presence of a migratory bird sanctuary (MBS), protected under federal jurisdiction, called “Couvée Island” (IBA 2012) (see the Biophysical and Human Environments Distribution Map attached in Appendix 5). This consists of four elongated artificial islands with surface areas of between 0.36 km^2 and 0.94 km^2 (see the Biophysical and Human Environments Distribution Map attached in Appendix 5). The Couvée Islands are located within the South Shore Canal along the south bank of the St. Lawrence River, near the municipalities of Saint Lambert and Brossard, 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 counted between 1989 and 1994, as well as a small number of herring gulls and common terns. Since then, the colony has been in continuous decline (10,750 pairs were counted in 2000) due in part to the presence of a family of red foxes (IBA 2012). Lists of species inventoried on the Couvée Islands by the Canadian Wildlife Service (CWS) are presented in Appendix 14.

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SIZE 11x17

T3	Avifauna transect
⌜ ⌟	Municipal limit
☐	Borough limit

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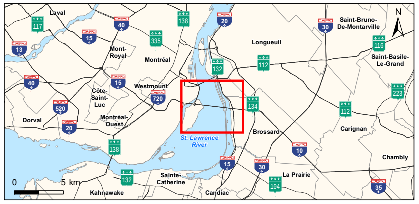

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Figure 76
Locations of Avifauna Transects

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Waterfowl concentration area (ACOA)

The study area includes a protected wildlife habitat, the Nun's Island La Prairie Basin waterfowl concentration area (ACOA) (habitat number: 02-06-0167) (see the Biophysical and Human Environments Distribution Map attached in Appendix 5). Aerial inventories conducted in this ACOA by government organizations began in 1981 and ended in 1997. The principal species using this ACOA surveyed in the fall and spring are: dabblers (n=689)[5], such as the American widgeon (n=343), the northern pintail (n=109), the mallard (n=89) and the American black duck (n=62); diving ducks (n=662) such as the bluebill (n=344) and the common goldeneye (n=263). The ring-billed gull (n=111) is also common in the ACOA. The information in parentheses corresponds to the total number of individuals counted during those years. The detailed results of these inventories, supplied by the MRNF, are attached in Appendix 14.

In addition, aerial inventories over the St. Lawrence River were conducted by the Canadian Wildlife Service in April 2004, 2007 and 2008 near or within the study area. The results give a good idea of the use waterfowl make of the study area in springtime (Appendix 14). These results are summarized in Table 35.

Table 35 Summary of aerial inventories conducted by the Canadian Wildlife Service in the study area

ENGLISH NAME	LATIN NAME	2004	2007	2008	TOTAL
Canada goose	*Branta canadensis*	-	2	8	10
Gadwall	*Anas strepera*	7	8	8	23
Mallard	*Anas platyrhynchos*	35	23	56	114
American widgeon	*Anas americana*	29	12	7	48
American black duck	*Anas rubripes*	-	10	19	29
Double-crested cormorant	*Phalacrocorax auritus*	1	1	35	37
Ring-necked duck	*Aythya collaris*	46	4	-	50
Greater or lesser scaup	*Aythya sp.*	-	25	-	25
Ring-billed gull	*Larus delawarensis*	-	1	1	2
Great black-backed gull	*Larus marinus*	-	-	2	2
Seagull	*Larus sp.*	25,000	-	-	25,000
Common merganser	*Mergus merganser*	8	1	17	26
Great blue heron	*Ardea herodias*	-	-	3	3
Hooded merganser	*Lophodytes cucullatus*	-	-	1	1
Black scoter	*Melanitta nigra*	2	-	-	2
Bufflehead	*Bucephala albeola*	1	-	6	7
Common loon	*Gavia immer*	-	1	-	1
Total		**25,129**	**88**	**164**	**25,381**

---

[5] **The data in parentheses corresponds to the total number of individuals counted in these years.**

Over the course of the three inventory years, more than 25,000 individuals were counted for the 17 species observed. After the 25,000 seagulls observed in 2004, dabblers are the most common, principally the mallard, followed by diving ducks, mainly bluebills.

Species observed during inventories

Weather conditions during transect listening inventories were favourable for data collection; the wind was generally low, varying between 0 and 3 on the Beaufort wind scale. There was no precipitation and the temperature ranged between 12°C and 30°C. Listening conditions during the inventories were acceptable and did not reduce listening quality or affect species detection.

Appendix 15 presents the list of avian species, the number of individuals identified and an estimate of the number of breeding pairs per transect in the study area for the two inventory periods.

Table 36 presents a summary of the inventories per transect for the different sectors of the study area. In the Table, the results are presented to allow comparison between the different sectors of the study area. Table 37 presents the number of individuals and the number of breeding pairs counted for each species. The best result during the two visits was used to calculate the total (Best result) in order to avoid underestimating the number of individuals and the number of breeding pairs.

Table 36 Summary of inventories per inventory sector

INVENTORY SECTOR	TRANSECT NUMBERS	NUMBER OF SPECIES PER SECTOR	NUMBER OF BREEDING PAIRS					
			June 5, 12	June 20, 12	Best result	June 5, 12	June 20, 12	Best result
Brossard shore	T1, T2	22	63	44	**63**	51	37	**51**
Couvée Islands	T3, T6	18	165	58	**165**	69	41	**69**
Seaway dyke	T4, T5	19	139	90	**139**	77	53	**77**
Nun's Island (east)	T7, T8	19	152	197	**197**	55	48	**55**
Nun's Island (west)	T9, T10	23	99	222	**222**	78	41	**78**
Montreal Island	T11, T12	19	63	72	**72**	59	62	**62**

Table 37 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
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

Table 37 (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	
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 and with a provincial status (see Section 4.2.2.4 for more detail)

According to Table 36, the total number of species observed during the two visits was fairly similar across the two sectors inventoried, an average of 20 species per sector. The greatest number of individuals was found in the Nun's 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 Nun's Island. Lastly, the Brossard shore held the lowest number of individuals and breeding pairs.

Based on the results presented in Table 37, a total of 41 species were listed in the natural environments inventoried within the study area. In addition, a total of 930 individuals were heard or observed during the two inventory periods, and the number of breeding pairs calculated during the two visits totalled 427.

The study area's natural environments largely consist of abandoned fields and open woodland. Consequently, the detection distance is fairly large compared to closed environments. Based on the total area inventoried, evaluated at 45 ha, the bird population density is approximately 9.5 breeding pairs per hectare, counting all species in the study area (see Table 37).

The most numerous species identified during the inventories, in terms of breeding pairs, are, in order of importance: the red-winged blackbird, the yellow warbler, the song sparrow and the cedar waxwing. These four species account for 72% of observations. The remaining 37 species represent 28% of the breeding pairs counted. Two special status birds were observed in the study area, the peregrine falcon and the chimney swift (see Section 4.2.2.4).

Migratory bird sanctuary (MBS)

While the inventories on the two southernmost islands (transects 3 and 6) counted several bird species (see Table 37), no breeding gulls were found and none nested successfully over the course of the summer. However, some gull pairs successfully reproduced outside the migratory bird sanctuary. Indeed, young individuals still being fed by their parents were observed on the stone islets supporting the electric power line located to the east of the MBS.

Waterfowl concentration area (ACOA)

Bird counts were conducted October 10, 2012 in order to document the use of this sector by waterfowl and birds of prey. Weather conditions during the inventories were fairly mild. There was no precipitation and the temperature ranged between 7°C and 14°C. However, the wind was strong, rising to 5 on the Beaufort wind scale.

The results for counts by direct visual observation conducted along the St. Lawrence River are shown in Table 38.

Table 38 Count per direct visual observation of birds during migration period

ENGLISH NAME	LATIN NAME	OBSERVATION STATION					TOTAL
		Transect 5	Transect 7	Transect 8	Transect 9	Transect 10	
Canada goose	*Branta canadensis*	-	108	-	-	-	**108**
Gadwall	*Anas strepera*	-	2	-	-	-	**2**
Mallard	*Anas platyrhynchos*	2	9	5	6	-	**22**
Double-crested cormorant	*Phalacrocorax auritus*	8	7	6	2	12	**35**
Great blue heron	*Ardea herodias*	-	1	1	2	1	**5**
Peregrine falcon[1]	*Falco peregrinus anatum*	1	-	-	-	-	**1**
Ring-billed gull	*Larus delawarensis*	3	2	15	6	6	**32**
Herring gull	*Larus argentatus*	-	3	5	-	-	**8**
Great black-backed gull	*Larus marinus*	-	-	1	-	1	**2**
Belted kingfisher	*Ceryle alcyon*	-	-	-	-	1	**1**
Yellow-rumped warbler	*Dendroica coronata*	-	-	-	12	-	**12**
Dark-eyed junco	*Junco hyemalis*	-	-	-	2	-	**2**
White-crowned sparrow	*Zonotrichia leucophrys*	2	-	-	1	-	**3**
Total		**16**	**132**	**33**	**31**	**21**	**233**

1: Species at risk and with a provincial status (see Section 4.2.2.4 for more detail)

In total, 13 species of birds were observed during the inventories and 233 individuals were counted. The principal species were the Canada goose, the double-crested cormorant, the ring-billed gull and the mallard. A single bird of prey, a peregrine falcon, was observed in flight near the Champlain Bridge. All Canada geese observed were located in the ACOA, to the south of the Ice Control Structure, which is crossed by the cycle path. This is the station that had by far the greatest number of observations (n=132).

Habitats

On the whole, the birds listed are species common to Quebec and characteristic of open, urbanized environments. 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. Furthermore, the river itself is an important component of the habitat and is used for the most part by aquatic avifauna. Appendix 16 presents the photographic report characterizing each transect.

4.2.2.6 Special status species

4.2.2.6.1 Methodology

In 2012, a request for information was sent to the CDPNQ (of the MDDEP) and to the MRNF for data on occurrences of threatened or vulnerable species or species likely to be so designated under the *Act respecting threatened or vulnerable species (R.S.Q., c. E-12.01)* in the study area. To complete the information at the federal level, Environment Canada's Species at Risk Public Registry (2012), which presents the at-risk species found in the Schedules to the *Species at Risk Act (SARA; R.S.C, 2002, c. 29)* was also consulted.

4.2.2.6.2 Results

Current data

According to the CDPNQ, two amphibian, six reptile and six avian special status species, 14 fish species and two mollusc species were identified between 1933 and 2011 within an 8 km radius encompassing the study area (Appendix 17). Table 39 presents the list of these species and their respective protected status.

Table 39 List of special status species listed by the CDPNQ

	ENGLISH NAME	LATIN NAME	STATUS	
			Provincial	Federal
Herpetofauna	Chorus frog	*Pseudacris triseriata*	Vulnerable	Threatened
	Pickerel frog	*Lithobates palustris*	LDTV	Not at risk
	Spiny softshell	*Apalone spinifera*	Threatened	Threatened
	Map turtle	*Graptemys geographica*	Vulnerable	Special concern
	Ringneck snake	*Diadophis punctatus*	LDTV	None
	Milk snake	*Lampropeltis triangulum*	LDTV	Special concern
	Brown snake	*Storeria dekayi*	LDTV	Not at risk
	Smooth green snake	*Opheodrys vernalis*	LDTV	None
Avifauna	Least bittern	*Ixobrychus exilis*	Vulnerable	Threatened
	Bald eagle	*Haliaeetus leucocephalus*	Vulnerable	Not at risk
	Tundra peregrine falcon	*Falco peregrinus anatum*	Vulnerable	Special concern
	Yellow rail	*Coturnicops noveboracensis*	Threatened	Special concern
	Red-headed woodpecker	*Melanerpes erythrocephalus*	Threatened	Threatened
	Grasshopper sparrow	*Ammodramus savannarum*	LDTV	None
Ichthyofauna	Bridle shiner	*Notropis bifrenatus*	Vulnerable	Special concern
	Lake sturgeon	*Acipenser fluvescens*	LDTV	None
	Atlantic sturgeon	*Acipenser oxyrinchus*	LDTV	None
	River redhorse	*Maxostoma carinatum*	Vulnerable	Special concern
	Copper redhorse	*Maxostoma hubbsi*	Threatened	Endangered
	Longear sunfish	*Lepomis megalotisi*	LDTV	None
	American shad	*Alosa sapidissima*	Vulnerable	None
	American eel	*Anguilla rostrata*	LDTV	Special concern
	Stonecat	*Noturus flavus*	LDTV	None
	Channel darter	*Percina copelandi*	Vulnerable	Threatened
	Chain pickerel	*Esox niger*	LDTV	None
	Grass pickerel	*Esox americanus vermiculatus*	LDTV	Special concern
	Rainbow darter	*Etheostoma caeruleum*	LDTV	None
	Rosyface shiner	*Notropis rubellus*	LDTV	None
Mollusk	Spike	*Elliptio dilatata*	LDTV	None
	Elephantear	*Elliptio crassidens*	LDTV	None

Species observed during inventories

Table 40 lists the species of herpetofauna and avifauna identified during the inventories in the study area with their respective protected status. No fish catches were carried out under the Ichthyofauna field activities. Effectively, given the extent of the territory being studied, the seasonality and the availability of studies on species found in the territory were the main factors in deciding to use the information available in the literature for the fish survey. The observation locations of special status species is shown on the biophysical and human environments distribution map attached in Appendix 5.

Table 40 Special status species listed during 2012 inventories within the study area

	ENGLISH NAME	LATIN NAME	STATUS	
			Provincial	Federal
Herpetofauna	Brown snake	*Storeria dekayi*	**LDTV**	**Not at risk**
Avifauna	Peregrine falcon	*Falco peregrinus anatum*	**Vulnerable**	**Special concern**
	Chimney swift	*Chaetura pelagica*	**LDTV**	**Threatened**

The following section provides a summary of the state of knowledge on the general biology of the special status fauna species observed during the inventories in the study area. This information clarifies the essential habitat needs of these species in order to reduce or minimize the project's impact on these species and their habitats.

Brown snake

Habitat and reproduction

This is the rarest of Quebec snake species and is only found in the Montreal region. The brown snake lives mainly in urban and periurban environments, in clearings, meadows, abandoned fields, dry material disposal sites, abandoned farms and other shrublands where there is an abundance of boards, logs, flat stones and other shelter. Its home range is limited and it moves less than 60 m a day (Desroches and Rodrigue 2004). The brown snake mates in early April and gives birth to its young (14 on average) at the end of summer (CDPNQ 2012). The birthing period in Quebec is from July to September (Pouliot 2008). The brown snake hibernates in groups, sometimes with other species, in natural depressions, abandoned burrows, stone piles, holes, rock crevices, mammal hibernation burrows or in loose earth and rock on construction slopes (CDPNQ 2012).

Primary threats

The distribution of the brown snake in urban areas renders its habitats especially susceptible to fragmentation and destruction. The many human activities which cause habitat loss are considered the primary threat to the survival of this species in Quebec (Pouliot 2008). Furthermore, many old brown snake sites on Perrot Island and on Montreal Island have disappeared under urban sprawl. The capture of individual snakes and habitat changes are proving extremely detrimental to the survival of the species (CDPNQ 2012).

Habitat potential in the study area

In total, 15 brown snakes were found in the study area during the 2012 inventories, ten on Nun's Island, four on Montreal Island and one on the Seaway dyke. Their location is shown on the biophysical and human environments distribution map attached in Appendix 5. None has yet been seen on the Brossard shore or on the Couvée Islands. The brown snakes were found in open habitats consisting of abandoned fields with some deciduous trees and a variety of ground debris (stones, bricks, construction waste, etc.). They are also found at the edges of woodlands and on the rocky shores along the St. Lawrence River.

Peregrine falcon

Habitat and reproduction

The habitat of the peregrine falcon can be divided into three main components: 1) the nesting site: nests are usually built on natural or artificial cliffs such as buildings, bridges and quarries; 2) the nesting territory, in other words, the territory around the nest defended by the falcon, which may extend to a radius of 1 km, which ensures a sufficient food supply for the breeding pair and their nestlings; 3) the sphere of activity, or the area not defended by the falcon that is used for hunting; this area may extend up to 27 km from the nest. The peregrine falcon prefers large open spaces for hunting such as water courses, marshes, beaches, mudflats and fields as these provide good visibility and facilitate the pursuit and capture of prey. Peregrine falcons can return to the same nesting site year after year and exploit the same hunting grounds year after year. This seems to be the case in the study area based on previous observations and recent telemetric monitoring conducted as part of the development of wind power projects (MRNF, 2012). Egg-laying is from early April to early June depending on the latitude. The clutch averages from three to four eggs (CDPNQ 2012; COSEWIC 2012).

Primary threats

The primary cause for the decline in populations of peregrine falcons was the presence of pesticides in the environment, especially organochlorines, which caused eggshells to thin and break, led to a fall in the number of eggs that hatched and reduced clutch size and reproduction rates. Given that peregrine falcons are at the top of the food chain, their tissues accumulated and concentrated these substances. Since organochlorines are now banned, they are no longer a significant factor for peregrine falcons. Current threats include the small size of the population and habitat deterioration, as well as collisions with electric power lines, cars and windows (CDPNQ 2012; COSEWIC 2012).

Habitat potential in the study area

There are no cliffs in the study area. However, some falcons are known to nest successfully in man-made constructions such as buildings and bridges (CDPNQ 2012; COSEWIC 2012). The species has been observed on several occasions on the existing structure of the Champlain Bridge, which seems to have been successfully used for reproduction by a falcon pair in summer 2012. The pair was observed from the canal embankment with an offspring in flight and perched on the bridge near Couvée Island further south (transect 3). The artificial nesting boxes, in which the species nested in 2010,[6] installed under the Champlain Bridge were listed in the inventories of the Brossard shore.

Chimney swift

Habitat and reproduction

The majority of chimney swifts arrive in Quebec over the last two weeks of May. They use twigs to build their nests in the shape of a half-cup, which is cemented to a vertical wall with sticky saliva. In Canada, swifts produce only one clutch per year. Females and males share nesting duties, which last about twenty days (COSEWIC 2012).

Chimney Swifts spend most of the day in flight feeding on insects. They are often seen in groups near bodies of water due to the abundance of insects. Prior to the arrival of Europeans in North America, the chimney swift nested mainly in the trunks of large hollow trees and occasionally on the walls of caves and rocky crevices. However, as a result of the deforestation that accompanied colonization, hollow trees became increasingly difficult to find, and so the chimney swift adopted house chimneys as nesting sites. Today, the species is mainly associated with urban and rural areas where chimneys are available as nesting and resting sites (COSEWIC 2012).

Primary threats

The primary threat factor for chimney swifts is the reduction in the number of nesting and resting sites due to logging, the demolition of old abandoned buildings and the steep drop in the number of suitable and accessible traditional chimneys, which are the species main nesting habitat (COSEWIC 2012).

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[6] **http://fauconsudem.blogspot.ca/2010/07/nouvelles-du-pont-champlain.html**

Habitat potential in the study area

The chimney swift can use any building with a chimney for nesting. However, no suitable chimney was observed in the study area. Swifts can also use trees with chimney-type cavities, but these were not specifically inventoried so their number in not known.

4.3 HUMAN ENVIRONMENT

4.3.1 Administrative framework

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 (CMM).

Created on January 1, 2001, the CMM encompasses 82 municipalities and is home to more than 3.7 million residents spread over an area of 4,360 square kilometres. Its territory consists of five regions: the agglomeration of Montreal (Island of Montreal), the agglomeration of Longueuil, the city of Laval, the North Shore and the South Shore. As a planning, coordinating and funding body, the CMM is responsible for ensuring, among other things, that its entire territory develops on the basis of a shared and just vision, in harmony with government policies and programs, and with a diversified tax base that enables it to fund its activities (CMM, 2012).

The agglomeration of Montreal (Montreal Island) brings together the 19 boroughs of the city of Montréal as well as the 15 cities that were reborn on January 1, 2006. It is home to 1,886,481 residents spread over an area of nearly 500 square kilometres. The agglomeration council has jurisdiction over various shared services common to all island residents, notably with respect to safety (police, fire and 911 emergency service), drinking water production, wastewater treatment, waste management, arterial road network management, public transit and nature parks (City of Montreal, 2012 (1)).

Since 2006, the city of Montreal has been made up of 19 boroughs, and it is home to 1,649,519 residents spread out over a 365 square kilometre area (Statistics Canada, 2012). The municipal council’s areas of jurisdiction include land use planning, economic, cultural and community development, the environment, public safety, and intergovernmental discussions. It intervenes to structure or approve certain decisions made by borough councils (MAMROT, 2012 (1)).

The boroughs have local powers over various fields, including urban planning, roads, parks, housing, local and community development, culture, recreation, waste removal and financial management (MAMROT, 2012).

The borough of Sud-Ouest is bisected by the Lachine canal and borders on four boroughs and two cities: Verdun to the southeast, LaSalle to the west, Côte-Saint-Luc to the northwest, Côte-des-Neiges-Notre-Dame-de-Grâce to the northwest, Montreal West to the northwest and Ville-Marie to the northwest. The Sud-Ouest borough is 15.7 square kilometres in size and had 71,546 residents in 2011 (City of Montreal, 2012 (2)).

The borough of Verdun hugs the St. Lawrence River and borders on two boroughs: LaSalle to the south, and Sud-Ouest to the northwest. It includes Nuns' Island. The Verdun borough is 9.8 square kilometres in size and had 66,158 residents in 2011 (City of Montreal, 2012 (3)).

The city of Brossard, as it is known today, was created in 1958. On January 1, 2002, the city of Brossard became the Brossard borough of the agglomeration of Longueuil, which had seven boroughs: Boucherville, Greenfield Park, Lemoyne, Saint-Bruno-de-Montarville, Saint-Hubert and Saint-Lambert for a total population of 320,671. It was only in 2006 that Brossard became a city again, following a referendum in 2004. Still today, the city of Brossard shares certain services with the Longueuil agglomeration, including the police service and the fire department (City of Brossard, 2012). The city of Brossard is 52.2 square kilometres in area and has a population of 80,120 (MAMROT, 2012 (2)). Its municipal council's areas of jurisdiction include land use planning, economic, community and cultural development, the environment, public safety and intergovernmental discussions (MAMROT, 2012 (1)).

4.3.2 Socio-economic portrait

It is important to note that this socioeconomic portrait of the communities concerned cannot include data specific to Nuns' Island, because data are only available by borough. Nuns' Island is a neighbourhood of the borough of Verdun, and the available data pertain to that borough as a whole.

4.3.3 Population

The borough of Sud-Ouest is the thirteenth most populous borough of Montreal, with 71,546 residents in 2011, representing 4.3% of the city's population and 3.7% of the agglomeration's population. The borough's population declined (by 3.5%) between 1986 and 2001. However, significant growth took place between 2001 and 2006 (5.4%) as shown by table 41 (City of Montreal, 2009 (4)).

Verdun is the fifteenth most populous borough of Montreal, with 66,158 residents in 2011, representing 4.0% of the city's population and 3.5% of the agglomeration's population.
The borough's population declined slightly (2.6%) between 1991 and 2001. However, from 2001 to 2006, the population grew significantly (9.1%) (City of Montreal, 2009 (5)).

Brossard is the third most populous city in the Montérégie administrative region, with 79,273 residents in 2011 (5.1% of the population of Montérégie). Brossard's population grew strongly from 1986 to 2011 (34%) (Statistics Canada, 1991 to 2011 censuses). This high growth rate is attributable to the numerous building development projects in recent years.

Table 41 Population change, boroughs of Sud-Ouest and Verdun, 1986–2011

TERRITORY	1986	1991	1996	2001	2006	2011
Sud-Ouest	68,911	67,929	66,695	66,474	69,860	71,546
Growth rate, %	-	-1.4	-1.8	-0.3	5.1	2.4
Verdun	60,246	61,307	59,714	60,564	66,078	66,158
Growth rate, %	-	1.8	-2.6	1.4	9.1	0.1
Agglomeration of Montréal	1,752,361	1,775,691	1,775,788	1,812,723	1,854,442	1,886,481

Source: City of Montreal, 2012

Table 42 Population change, city of Brossard, 1986–2011

TERRITORY	1986	1991	1996	2001	2006	2011
Brossard	57,441	64,793	65,927	65,026	71,154	79,273
Growth rate, %	-	12.8	1.8	-1.4	9.4	11.4
Montérégie	1,120,198	1,234,901	1,282,798	1,313,169	1,383,020	1,456,743

Sources: Statistics Canada

Population density is markedly higher in the boroughs of Sud-Ouest (4,562 residents/km²) and Verdun (6,809 residents/km²) than in the city and agglomeration of Montreal (4,517 and 3,779 residents/km² respectively) (City of Montreal, 2012 (2) and (3)).

The population density of Brossard is 1,753 residents/km², compared to129 residents/km² for the Montérégie region as a whole (Statistics Canada, 2011).

As for age distribution, the proportions of the various age groups in the two boroughs are similar to those of the agglomeration and of Brossard and the Montérégie region.

The age group that stands out the most is the 20-39 group, which is much larger in the two boroughs and the agglomeration than on the South Shore. Thus, young adults are more of a presence on the Island of Montreal.

Table 43 Distribution of age groups – City of Montreal

AGE GROUP	BOROUGH OF SUD-OUEST (%)	BOROUGH OF VERDUN (%)	MONTREAL AGGLOMERATION (%)
0-19	18.8	18.0	20.7
20-39	35.3	32.2	30.3
40-59	27.7	28.9	27.8
60-79	17.4	16.9	16.3
80+	3.5	4.2	4.8
Total	100.0	100.0	100.0

Source: City of Montreal, 2011

Table 44 Distribution of age groups – City of Brossard and Montérégie

AGE GROUP	CITY OF BROSSARD (%)	MONTÉRÉGIE (%)
0-19	21.6	23.5
20-39	26.6	23.9
40-59	28.6	30.7
60-79	19.7	18.1
80+	3.2	3.5
Total	100.0	100.0

Source: Statistics Canada, 2011

4.3.3.1 *Households and families*

The borough of Sud-Ouest has 33,005 private households, and an average household size of 2.0. The borough of Verdun has 32,365 private households, and an average household size of 2.1. Both averages are similar to the Montreal agglomeration average (2.2 persons per household).

Table 45 Household sizes – City of Montreal

NUMBER OF PERSONS PER HOUSEHOLD	BOROUGH OF SUD-OUEST (%)	BOROUGH OF VERDUN (%)	MONTREAL AGGLOMERATION (%)
1	41.6	40.8	38.2
2	31.6	34.4	31.0
3	13.7	13.5	14.1
4-5	11.3	10.2	14.9
6 or more	1.8	1.1	1.9
Total	100.0	100.0	100.0
Average number of persons per household	2.1	2.0	2.2

Source: City of Montreal, 2009

The city of Brossard has 26,645 private households and an average of 2.7 persons per household (Institut de la statistique du Québec, 2006), while the Montérégie region has 547,705 households and an average of 2.4 persons per household.

Table 46 Household sizes – City of Brossard and Montérégie, 2006

NUMBER OF PERSONS PER HOUSEHOLD	BROSSARD (%)	MONTÉRÉGIE (%)
1	21.5	26.0
2	33.3	35.3
3	18.2	16.6
4-5	23.5	20.3
6 or more	3.3	1.6
Total	100.0	100.0
Average number of persons per household	2.7	2.4

Source: Institut de la statistique du Québec, 2006

The borough of Sud-Ouest is home to 17,410 families. The majority (71.7%) have couples, and the remainder (28.3%) are single-parent families. Of the families with couples, 62.1% have married couples, which is lower than the Montreal agglomeration average (73.7%), and 37.5% have unmarried couples. Families with children account for 52.8% of the borough's families, which is also lower than the agglomeration average (62.6%). Among children, the largest age group is 6–14 years of age (34.5%) and the average number of children living at home is 1.7 per family with children (City of Montreal, 2009 (4)).

The borough of Verdun is very similar to its neighbour. It has 17,450 families. The majority of them (78.1%) have couples, and the rest (21.9%) are single-parent families. Of the families with couples, 61.2% have married couples, which is lower than the borough average (73.7%), and 38.8% have unmarried couples. Families with children account for 48.6% of the borough's families, which is also below the agglomeration average (62.6%). Among children, the largest age group is 6–14 years of age (34.4%) and the average number of children living at home is 1.6 per family with children (City of Montreal, 2009).

In 2006, the city of Brossard was home to 20,795 families. Most of these (85.5%) were families with couples, and the remainder (14.5%) were single-parent families. Among the families with couples, 80%had married couples and 19.9% had unmarried couples (Statistics Canada, 2006).

4.3.3.2 *Immigration and languages*

15,995 immigrants live in the borough of Sud-Ouest, and 12,575 immigrants live in the borough of Verdun. Both boroughs have a lower proportion of immigrants than the agglomeration (23% and 19%, versus 31% for the agglomeration). In the borough of Sud-Ouest, the largest immigrant groups by country of origin are Chinese (11%), Italian (8%) and Bangladeshi (7%). In Verdun, immigrants of Chinese origin (20%), French origin (9%) and Algerian origin (5%) are the most numerous (City of Montreal, 2009 (4) and (5)).

Most residents of the boroughs of Sud-Ouest and Verdun use only one language at home (96% and 97%); of these, 62% of Sud-Ouest residents and 66% of Verdun residents speak only French, 21% of Sud-Ouest residents and 20% of Verdun residents speak only English, and less than a quarter speak another language (City of Montreal, 2009 (4) and (5)).

The city of Brossard is home to 23,640 immigrants, who account for 23.4% of the Montérégie region's immigrants. More than half of Brossard's immigrant population settled prior to 1991 (53%). Most Brossard residents speak only one language at home, and that language is French for 53% of them (Statistics Canada, 2006).

4.3.3.3 *Educational attainment, income and occupation*

Between the two boroughs under consideration and the Montreal agglomeration, the most educated population aged 15 and over is the population of Verdun: 34% of Verdun residents in that age group have a university degree. The agglomeration is in second place, with 31%, followed in third place by the Sud-Ouest, with 24%. Both boroughs have a significant percentage of persons with no certificate, diploma or degree: that figure stands at 29% for the borough of Sud-Ouest and 20% for the borough of Verdun (and it stands at 21% for the Montreal agglomeration) (City of Montreal, 2009 (4) and (5)).

Table 47 Educational attainment, population aged 15 and above – City of Montreal, 2006

EDUCATIONAL ATTAINMENT	BOROUGH OF SUD-OUEST (%)	BOROUGH OF VERDUN (%)	MONTREAL AGGLOMERATION (%)
Certificate, diploma or degree:	70	79	78
Secondary school diploma or equivalent	22	20	21
Apprenticeship or trade school certificate or diploma	10	9	10
Certificate or diploma from another educational institution other than a university	13	14	15
University certificate or degree	24	34	31
No certificate, diploma or degree	29	20	21
Total	100	100	100

Source: City of Montreal, 2009

Brossard's population aged 15 and over is more educated than the Montérégie's: 26% of Brossard residents in that age group have a university degree or certificate, versus 14% of the region's residents. Both Brossard (17%) and the Montérégie region (24%) have a significant number of persons without a certificate, diploma or degree (Statistics Canada, 2006).

Table 48 Educational attainment, population aged 15 and above – City of Brossard and Montérégie, 2006

EDUCATIONAL ATTAINMENT	BROSSARD (%)	MONTÉRÉGIE (%)
Certificate, diploma or degree:	*83*	*80*
Secondary school diploma or equivalent	22	23
Apprenticeship or trade school certificate or diploma	9	15
Certificate or diploma from another educational institution other than a university	17	16
University certificate or degree	26	14
No certificate, diploma or degree	17	24
Total	100	100

Source: Statistics Canada, 2006

Incomes are lower in the borough of Sud-Ouest than in the agglomeration as a whole, whereas they are higher in Verdun. In 2005, the average personal income before taxes among people 15 years and above who had an income was $26,151 in the borough of Sud-Ouest and $36,407 in the borough of Verdun, compared with an average of $32,970 for the Montreal agglomeration. In the borough of Sud-Ouest, 68% of the population aged 15 and above with an income earns less than $30,000. In Verdun, 59% of the same group earns less than $30,000 (City of Montreal, 2009 (4) and (5)).

As for the average household income before taxes, it is $43,275 in the borough of Sud-Ouest and $59,708 in Verdun, compared to $57,792 in the agglomeration as a whole (City of Montreal, 2009 (4) and (5)).

In 2006, the activity rate was slightly lower among people ages 15 and over in the borough of Sud-Ouest (61%) than among the same group in Verdun (63%) and in the agglomeration as a whole (63%). Rates of employment among the active population ages 15 and over in the boroughs of

Sud-Ouest and Verdun (at 54% and 57%) are slightly lower than the agglomeration's employment rate (58%) (City of Montreal, 2009 (4) and (5)).

In the borough of Sud-Ouest, manufacturing businesses provide the most jobs (12%), followed by retail businesses (11%) and healthcare or social assistance institutions (10%). In Verdun, professional, scientific or technical services employ the largest share of the active population (12%), followed by healthcare or social assistance institutions (11%) and retail businesses (also 11%) (City of Montreal, 2009 (4) and (5)).

In the city of Brossard, the median income of persons aged 15 and over with an income is $26,326, which is very close to the $26,967 median income for the Montérégie region. The percentage of low-income persons in Brossard is 16%; it is 12% in the Montérégie region (Statistics Canada, 2007).

The median household income for Brossard in 2005 was $60,885, compared to $53,322 in the Montérégie region (Statistics Canada, 2007).

The rates of activity in Brossard and the Montérégie are essentially the same, at 66% and 67% respectively. Employment rates are also similar for Brossard (61%) and the Montérégie (64%) (Statistics Canada, 2007).

The largest employment sectors in Brossard and the Montérégie are the sales and services sector (25% and 22%), the business, finance and administration sector (22% and 18%) and the management sector (13% and 9%) (Statistics Canada, 2007).

4.3.4 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 footprint. 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 km^2.

Kahnawake is one of the communities that make up the Mohawk Nation, and has 10,053 members, of whom 7,672 live on the reserve (AANDC, 2012). The languages spoken are English, Mohawk (Kanienke:ha) and French (AAS, 2009).

The Mohawk Council of Kahnawake is composed of 12 elected representatives (Chief and councillors). At the most recent elections in June 2012, Grand Chief Michael Ahrihron Delisle Jr. was re-elected for a three-year term. (MCK, 2012)

In addition to several public services, Kahnawake manages its own police and fire departments. The community established a financial institution, Kahnawake Credit Union, in 1987 and since 1984, has had full responsibility for its hospital, Kateri Memorial Hospital. The community's schools offer a curriculum that incorporates various Mohawk cultural aspects and traditions. The

Kahnawake Environment Protection Office provides a variety of environmental protection services, including outreach and education, wildlife studies and inventories, wildlife habitat characterization, water quality monitoring programs, and so on. (MCK, 2012 and AAS, 2009).

4.3.5 Land use designation

The city of Montreal Master Plan (City of Montreal, 2005 (6)), defines the land use designation for the entire territory. For the borough of Sud-Ouest, the study area includes seven of the nine designation categories (see the Biophysical and Human Environments Distribution Map in Appendix 5):

- residential area;
- mixed-use area;
- employment area;
- convent, monastery or place of worship;
- major green space or riverside park;
- major transportation corridor; and
- public utilities.

The residential area designation covers the largest portion of the study area.

In the Borough of Verdun (City of Montreal, 2005 (7)), the area includes four of the nine designation categories (see the Biophysical and Human Environments Distribution Map in Appendix 5). They are:

- residential area;
- mixed-use area;
- major green space or riverside park; and
- public utilities.

Like Sud-Ouest, the residential category predominates in Verdun.

According to the city of Brossard master plan and land-use designation map (Plan d’urbanisme, carte des grandes affectations du sol, 2001), the study area includes five of the 13 land designation categories (see the Biophysical and Human Environments Distribution Map in Appendix 5). They are:

- residential;
- businesses and services;
- recreation;
- right-of-way; and
- multipurpose regional centre.

For the entire study area, the residential category predominates, both in the two boroughs and in Brossard.

4.3.6 Commercial and industrial infrastructure

4.3.6.1 Commercial infrastructure

Within the study area in Sud-Ouest, commercial infrastructures are approved everywhere, with the exception of the banks of the Lachine Canal, which is reserved for major green spaces and riverside parks, and within the public utilities land-use designation located south of the aqueduct canal. There is a stronger business presence on the main arteries, such as St. Ambroise, St. Patrick, Charlevoix and Wellington streets and Atwater Avenue, where the Atwater Market is located.

Like the neighbouring borough, a large section of the study area within Verdun is approved for commercial infrastructure. However, two designations do not allow for businesses: major green space or riverside parks and public utilities. The first designation encircles Nuns' Island, which is part of Verdun, includes Arthur Therrien Park on the St. Lawrence and borders the aqueduct canal.

In the city of Brossard, three sectors within the study area allow commercial infrastructure. The largest, the Champlain Mall on Pelletier Boulevard, is located east of the sector's boundary. The two other sectors are located along Route 132.

4.3.6.2 Industrial infrastructure

There are three land-use designation categories in the study area in Sud-Ouest that allow industrial use. The first is the mixed-use area located along St. Patrick and St. Ambroise streets, where the borough allows light-industry buildings. The borough also allows industrial buildings in the second category, the employment area adjacent to Highway 15 and the Bonaventure Expressway and near the CN railway lines. The third designation that allows industrial infrastructure is the public utilities designation, which is located south of the aqueduct canal.

In Verdun, there are two designations that allow for industrial infrastructure. The first is the mixed-use area located along Golf Road and Highway 15 in the Nuns' Island sector and on Hickson Street (east of the aqueduct canal). The second is the public utilities area located on Dupuis Street east of the aqueduct canal.

Within the study area in the city of Brossard, no industrial infrastructure is permitted within the major land designation categories.

4.3.7 Residences

In Sud-Ouest, 72% of its 33,010 residential housing units are rented, which is higher than in Verdun (67%) and in greater Montreal (62%) (City of Montreal, 2009, (4) and (5)). In Brossard, on average, less than 25% of dwellings are rentals (Statistics Canada, 2007).

Tables 49 and 50 illustrate general dwelling characteristics. Apartment buildings with fewer than five stories are the most common type of residential construction in both boroughs (61.2% and 48%), and in greater Montreal (54.1%). In Brossard, single-detached houses are more prevalent (48.1%).

Table 49 Dwelling characteristics – City of Montreal, 2009

STRUCTURAL TYPE OF DWELLING	BOROUGH OF SUD-OUEST (%)	BOROUGH OF VERDUN (%)	GREATER MONTREAL (%)
Single-detached house	1.4	3.2	11.7
Semi-detached house	1.0	1.5	3.8
Row house	6.1	4.8	3.5
Apartment or flat in a duplex	22.3	24.2	13.5
Apartment in a building that has 5 or more stories	7.1	18.1	12.9
Apartment in a building that has fewer than 5 stories	61.2	48.0	54.1
Other single-attached house	0.8	0.2	0.4
Mobile home	0.1	0.0	0.1

Source: City of Montreal, 2009

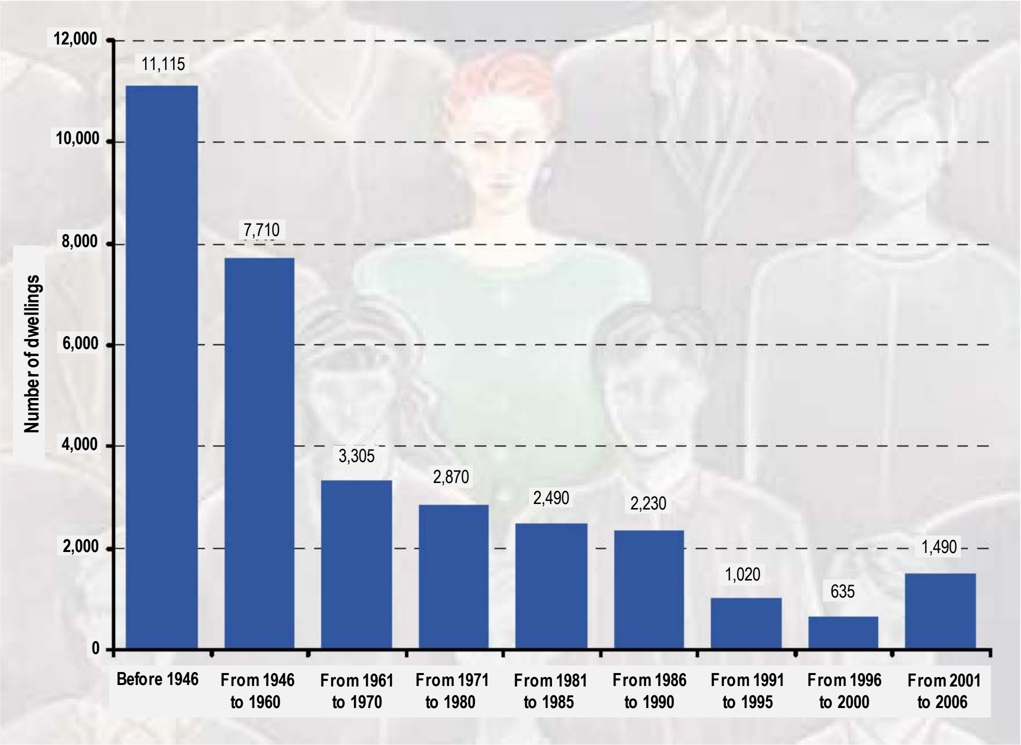
Table 50 Dwelling characteristics – City of Brossard and Montérégie, 2006

STRUCTURAL TYPE OF DWELLING	BROSSARD (%)	MONTÉRÉGIE (%)
Single-detached house	48.1	57.8
Semi-detached house	10.7	4.8
Row house	6.3	2.2
Apartment or flat in a duplex	1.2	4.9
Apartment in a building that has 5 or more stories	5.8	1.8
Apartment in a building that has fewer than 5 stories	27.8	27.2
Other housing	0.1	1.3

Source: Statistics Canada, 2007

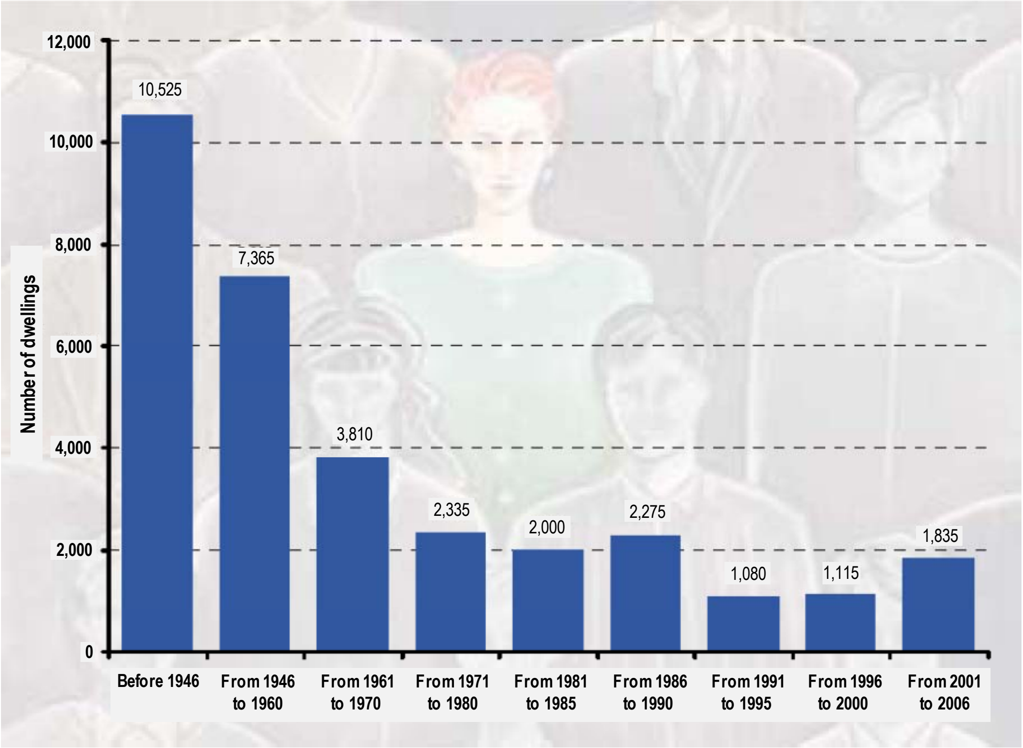
Residential construction peaked before 1946 in Sud-Ouest and Verdun (11,115 and 10,525 dwellings) and reached its lowest point from 1996 to 2000 (635 dwellings) in Sud-Ouest and from 1991 to 1995 (1,080 dwellings) in Verdun, as shown below in Figures 77 and 78.

Figure 77 Housing construction periods – Sud-Ouest



Source: City of Montreal, 2009 (4)

Figure 78 Housing construction periods – Verdun



Source: City of Montreal, 2009 (5)

In Brossard, 17,807 dwellings were built before 1986 and 8,840 new homes were built between 1986 and 2006 (Statistics Canada, 2007).

4.3.8 Roads and railways

4.3.8.1 Roads

The study area is well served by the road system and includes a large number of roadways running north-south and east-west. The major roads serving the study area include the following Montreal roads:

- East-west: Highway 15, Atwater Avenue, D'Argenson Street, LaSalle Boulevard and Charlevoix Street;
- North-south: Bonaventure Expressway (A-10), St. Ambroise, St. Patrick, Verdun and Wellington streets, Golf Road, Nuns' Island Boulevard and René-Lévesque Boulevard.

And in Brossard:

- East-west: Eastern Townships Highway (A-10), Provencher Boulevard, Panama Avenue and Tisserand Avenue;
- North-south: Route 132 and Pelletier Boulevard.

In addition to these major roads, which are shown on the biophysical and human environments distribution map in Appendix 5, the study area also contains several residential streets.

4.3.8.2 Railways

The railways in the study area are located only in Sud-Ouest and are operated by Canadian National (CN). They are primarily located north of Highway 15 (Canadian National Railway, 2012) and are used essentially by freight trains. These infrastructures are shown on the biophysical and human environments distribution map in Appendix 5.

4.3.9 Navigation

The following subsections address navigation in the Seaway sector and in the St. Lawrence River and Lesser La Prairie Basin sectors. Although the Lachine Canal is included in the study area shown in Figure 2, it will not be affected by the work associated with the New Bridge for the St. Lawrence. The aspects of navigation on the Canal were therefore not considered.

4.3.9.1 Seaway

4.3.9.1.1 Description

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.

The St. Lawrence Seaway is the only waterway for the transportation of goods between the St. Lawrence River and the Great Lakes. It includes some of the largest ports in North America, which are connected to an excellent multi-modal transportation network.

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. Over 50 years, a large number and wide variety of products with an estimated value of over $375 billion have been transported on the Seaway.

The Champlain Bridge crosses the Seaway between the Saint-Lambert and Côte-Sainte-Catherine locks in the Brossard area. In this sector, the Seaway is bordered by a dike and an island (see Figures 1 and 2).

In the Champlain Bridge area, the Seaway has a governing width of 91 m and governing depth of 8.23 m, with a radius of curvature for navigation of 2,900 m (nautical chart 1409 - Canal de la Rive-Sud – Canadian Hydrographic Service (CHS)). Between the +3.0 m and +10.0 m mean sea level (MSL) depth contours, the slope of the dike or the island varies from 1.95 to 2.3 H/1 V.

Environnement Illimité conducted bathymetric surveys, referenced to the Mean Sea Level (MSL) (CGVD-28), in the Champlain Bridge area in 2012 (see Section 4.1.6). The surveys show that to the right of the Champlain Bridge, the distance between the +2.5 m MSL depth contours (channel width) is approximately 82 m and that the distance between the +3.0 m MSL depth contours is approximately 89 m. These surveys show a relatively uniform topography on the channel bottom to the right of the Champlain Bridge, with elevations between +2.0 and +2.5 m MSL.

The information on water levels was compiled between 1961 and 1997 by the CHS at the St-Lambert Amont station (No. 15505) and is available on the Integrated Science Data Management (ISDM) website. Given the relatively artificial nature of the variation in water level in the Canal de la Rive-Sud, a specific analysis of the variation in water levels during the navigation season was done between 1980 and 1997. This analysis showed that 95% of the water level values were between +0.74 m chart datum (CD) and +1.04 m CD during the navigation seasons in which water levels were measured. The minimum level observed during this period (1980-1997 / navigation season) was -0.01 m CD. During the same period, the maximum level recorded was +1.65 m CD.

The CHS indicates a difference of 10.6 m between the CHS reference level (CD) and MSL-29 (approximate altitude obtained from MRNF) for the St-Lambert Amont station7

If we can rely on the nautical chart (guaranteed draft of 8.2 m), this would be the +2.43 MSL depth contour (10.66 – 8.23), which would define the lateral limits of the Seaway channel in the Champlain Bridge area. Consequently, the channel would not have 91 m in width to the right of the Champlain Bridge, as the nautical chart indicates, but more in the order of 80 m in width.

The Seaway is subject to the *Navigable Waters Protection Act.* The ships transiting the St. Lawrence Seaway are required to adhere to certain requirements, as set out in Table 51.

Table 51 Requirements for ships transiting the Seaway

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

Source: Joint practices and procedures respecting the transit of ships on the St. Lawrence Seaway (2012)[8]

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[7] **Station 15505-Saint-Lambert Amont: B.M. unique number: 69L029, Altitude at CD: 2.967 m, Altitude at MSL-29: 13.6 m**

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

With respect to draught, Section 29 of the practice and procedures states that, “The main channels between the Port of Montreal and Lake Erie have a controlling depth of 8.23 m”, and that “The draught of a ship shall not, in any case, exceed 79.2 dm or the maximum permissible draught designated in a Seaway Notice”.

These requirements are dictated by the Seaway clearance template, which is more restricted at certain locations. Under the existing Champlain Bridge, vertical clearance is 36.3 metres above high water and the minimum vertical clearance at all times is 35.7 metres. However, according to the SLSMC, the minimum vertical clearance (air draught) above the Seaway for the New Bridge for is 38.5 metres, measured from high water (SLSMC, correspondence, September 24, 2012).

The distance between the piers on each side of the Seaway is over 210 m, which is greater than the Seaway width of 91 m (nautical chart 1409 - Canal de la Rive-Sud – Canadian Hydrographic Service (CHS)).

4.3.9.1.2 Traffic, types of ships and products transported

Each year, the St. Lawrence Seaway records over 4,000 vessel movements.

Over the last 10 years, the SLSMC has reported stable traffic in terms of number of transits. Table 52 shows commercial vessel and pleasure craft traffic on the Seaway between 2007 and 2001. The SLSMC anticipates annual traffic growth of less than 1% over 10 years, i.e., an increase of 150 transits per season, for an estimated total increase of 3 million tonnes by 2022.

Table 52 Commercial vessel and pleasure craft traffic, Montreal-Lake Ontario section

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

According to the SLSMC 2011 Traffic Report, 2,889 commercial vessels transited the Montreal-Lake Ontario section. Generally, vessel transits are relatively constant during the 10 months the Seaway is open, with no marked differences in traffic, except in March and November, which respectively represent the lowest and highest numbers of transits. For example, there were 46 transits (1.5% of total transits) in March 2011 and 414 transits (13.8% of total transits) in November 2011.

Pleasure craft of all types also transit the Seaway. These vessels must be motorized and meet the requirements shown in Table 51, i.e., minimum length of 6 m and minimum weight of 900 kg.

According to the SLSMC 2011 Traffic Report, there were 7,992 pleasure craft lockages in 2011 on the Montreal-Lake Ontario section.

The 2011 Traffic Report also shows that the main categories of commodities transported on the Montreal-Lake Ontario section are mining commodities, primarily iron ore and coal. The second largest category is agricultural commodities, mainly wheat and corn, while the third largest is processed commodities, including other petroleum products. Table 53 shows cargo tonnes and the number of vessels per class/type.

Table 53 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)

In 2011, 502 tankers (ocean and laker) transited the Montreal-Lake Ontario section, carrying 2,708,433 tonnes of petroleum products, which represents approximately 10% of tonnes transported on this section of the Seaway.

Other products transported are bulk products, such as petroleum products or salt, and general cargo, such as asphalt, finished steel and machinery.

According to information obtained from the SLSMC, 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 (SLSMC, September 24, 2012). Instructions on responding to incidents are set out in the *Emergency Response Guidelines* (see Appendix 18).

Recreational activities such as swimming, water skiing, fishing and diving are strictly prohibited in all Seaway canals, channels, pleasure craft docks, locks and their approaches, and vessels under sail (no motors) are not allowed to transit Seaway canals and locks (Pleasure Craft Guide, 2010).

4.3.9.2 Navigation on the Lesser La Prairie Basin (river section)

The boundaries of the study area for this valued environmental component are 500 m upstream and downstream of the Champlain Bridge.

Given the shallow water and strength of the current, the La Prairie basin (river section) does not have a buoyed channel for recreational and pleasure boating. The Canadian Coast Guard (CCG) does not have a register of pleasure craft navigating in the study area. However, the Canadian Coast Guard's hovercrafts, the Saute-Moutons jet boats and a few dozen motorized and non-motorized vessels use this section of the St. Lawrence from April to October.

The managers of marinas in the Champlain Bridge area confirm that most (if not all) vessels use the Seaway to pass under the Bridge.

The CCG and Saute-Moutons/Lachine Rapids Jet Boat Tours are the only two organizations known to transit in the St. Lawrence River sector using motorized vessels (see the Biophysical and Human Environments Distribution Map in Appendix 5).

Saute-Moutons/Lachine Rapids Jet Boat Tours offers jet boat tours in the Lachine Rapids.

The CCG uses two hovercrafts from spring to fall. In the spring, the hovercraft is used for breaking up river ice and as a buoy-tender, and in summer for search and rescue and to respond to trouble calls. In the fall, the hovercraft is used to recover buoys and for monitoring. The frequency of hovercraft use is thus highly variable and depends on external requests (personal communication with Lyne White, Captain, Trois-Rivières Hovercraft Base, August 7, 2012).

Because the CCG does not lay buoys in the St. Lawrence River and Lesser La Prairie Basin sectors located in the study area, vessels that navigate under the Champlain Bridge in these sectors do so by drawing primarily on local navigation knowledge. According to CCG Search and Rescue, the main cause of accidents is the shallow water in the study area. Between May and October, approximately one to two cases of small rowboats that have run aground or are disabled are reported each month. Exact figures on accidents in the study area are forthcoming.

Table 54 summarizes transits by the CCG and Saute-Moutons/Lachine Rapids Jet Boat Tours.

Table 54 Organizations transiting the study area

ORGANI-ZATION	VESSEL CHARACTERISTICS		NAVIGATION CORRIDOR			NAVIGA-TION PERIOD	TRANSIT FREQUENCY
	Width (m)	Minimum required depth (m)	Point of departure	Point of crossing	Point of return		
CCG	~ 12.20	No minimum depth requirement. Hovercraft	Port of Montreal Charron Island Trois-Rivières	Pont Champlain, Ice Control Structure (centre) Via the River	Lake St-Louis Lake des Deux-Montagnes Ottawa River	Spring: Late March – late May	~ Twice a day
						Summer: Early June – September	Variable: ~ Once or twice a month
						Fall: Late September – early November	~ Twice a day
Saute-Moutons/ Lachine Rapids Jet Boat Tours	~ 4.3	1.5	Old Port of Montreal		Heron Island	May	~ Twice a day (60 times)
						June	~ Four times a day (120 times)
						July-August	~ Five times a day (150 times)
						September	~ Once a day (40 times)

Sources: A) Personal communication with Jack Kowalski, owner of Saute-Moutons, July 25 and August 10, 2012.
B) Personal communication with Lyne White, Captain, Trois-Rivières Hovercraft Base, August 7 and 9, 2012

The Canadian Coast Guard hovercraft and Saute-Moutons jet boats navigate under the Champlain Bridge and ice bridge about halfway across these structures where the distance between these piers is greater than between the other piers. For the CCG, the minimum width of the navigation corridor to be retained therefore equals the distance between the central piers of the Ice Control Structure (47.24 m). Also, the minimum vertical clearance required by the CCG equals the actual air draught of the ice control structure's special spans (axes 19 to 22). At this location, the clearance between the bottom of the steel beams and the water level can vary from 5.89 m (min.) to 10.21 m (max.), (JCCBI, Nov. 2012). After crossing the Ice Control Structure via hovercraft, the CCG has little room left to cross the Champlain Bridge and must proceed in a straight line as much as possible (personal communication with Lyne White, Captain, Hovercraft Base, August 9, and personal communication with Jack Kowalski, owners and captain of Saute-Moutons, August 10, 2012). This element must be taken into account in the final design of the new bridge for the St. Lawrence, particularly the location of the piers.

Although Clobé Maritime offers ferry service from Verdun to Nuns' Island (near Adrien-D.-Archambault park on the Island's south side), the ferry always stays over 500 m from the Nuns' Island Bridge (communication with Marlène Gagnon, Head, Parks and Recreation, Verdun, July 25, 2012). No cruise vessels pass under the Champlain Bridge via the St. Lawrence River and Lesser La Prairie Basin sectors (communication with managers of Bateau-Mouche and Croisières Navark).

According to recreational directors for Brossard, Saint-Lambert and Verdun, there are no known marinas or boat launch ramps within the study area. However, there are several marinas located in the Champlain Bridge area (see Table 55 and the Biophysical and Human Environments Distribution Map in Appendix 5) and a boat launching ramp and floating docks are also available free of charge for pleasure boaters at the Léon-Gravel park in Brossard, approximately two km south of the study area. This confirms the information shown on the map of the Rive-Sud Nautical Station (AMQ, 2012).

Also, some private docks on the Lesser La Prairie Basin are located within 500 m of the Champlain Bridge (personal communication with Yves Paquette, executive director of AMQ, August 1, 2012).

Table 55 shows the marinas located within 10 km of the Champlain Bridge and the marinas located in the Lachine Rapids area. These marinas are identified on the biophysical and human environments distribution map in Appendix 5.

Table 55 Marinas in the Champlain Bridge area

MARINAS	ADDRESS	TYPE OF VESSELS	CAPACITY	BUSY PERIOD	COMMENTS	SOURCE
St-Lambert yacht club	1 Le Havre St-Lambert	Powerboats (~70 %), sailboats, pontoons, water ski boats, rowboats, etc. (~30 %)	60 boats On land: ~20 boats + Boat launch ramp	May 1 to October 15 Very busy area Only for the Club, 10 visits per day in summer	Most of the boats take the Seaway. After the Champlain Bridge, they go via the Lesser La Prairie Basin	Jean-Luc Gervais, President
Longueuil nautical club	601 La Rive Road, Longueuil	Sailboats (~50 %) Powerboats (~50 %)	100 boats + Boat launch ramp	Summer and mainly on statutory holidays	The boats that dock here never go on the St. Lawrence River (they use the Seaway)	Jocelyn St-Amour (Manager) and Marco Mollot (service clerk)
Réal-Bouvier marina	101 Rive Road, Longueuil	Powerboats and sailboats	400 boats + Boat launch ramp	N/A	N/A	http://www.nautiguide.ca/
Verdun Marina	5150 LaSalle Blvd., Verdun	Rowboats only	99 boats + Boat launch ramp	Open May 1 to October 31	Public ramp (users live mainly on Heron Island and Goat Island)	Marlène Gagnon, Head, Sports and Recreation, Verdun
Lachine marina	1800 Iroquois Road, Lachine	Powerboats and sailboats	500 docks + Boat launch ramps	N/A	N/A	http://www.nautiguide.ca/

In terms of navigation, the main constraints to take into account during the work are navigation in the Seaway, hovercraft navigation and the Saute-Moutons routes.

4.3.10 Recreational/tourist activities

The main recreational / tourist activities identified in the study area are use of bike lanes, fishing (wade and boat fishing), sightseeing tours and recreational boating, particularly kayaking and canoeing.

4.3.10.1 Use of bike paths

4.3.10.1.1 Location and characteristics of affected bike paths

The boundaries of the study area for this component are 500 m from the project footprint.

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. These bike paths are generally open from April 15 to October 31 (from 6:00 a.m. to 11:00 p.m.). The Route verte is made up of 4,500 km of bike paths linking approximately 10 Quebec regions.

Table 56 shows the bike paths that are directly and indirectly affected by the project, and their location is shown on the biophysical and human environments distribution map in Appendix 5. The bike paths that are directly affected are those that are located within the project footprint and which may lose their links to other bike paths during construction. The bike paths that are indirectly affected are located within the study area but they will remain accessible to the public and linked to other bike paths.

Table 56 All bike paths affected

LANES	BIKE PATHS AFFECTED	NETWORK	LOCATION
1	Bike path along Highways 15 and 20 from Gibbons Street to Jacques-Lauzon	Verdun bike path	Within the project footprint
2	Les Berges bike path from Gilberte-Dubé to the Nuns' Island Bridge bike path	Route verte # 5	The bike path starts and ends within the project footprint
3	Nuns' Island Bridge bike path	Route verte # 1	Within the project footprint
4	Seaway bike path	Route verte # 1	Under the project footprint
5	Designated roadway, St. Charles Street/D'Argenson/ LaSalle Blvd.	Route verte # 1	Within the project footprint
6	Bike lane on Wellington Street	Sud-Ouest and Verdun bike lane	Under the project footprint
7	Bike path near shoulders from Simard Blvd to Matte Blvd. via Marie Victorin Blvd.	St-Lambert and Brossard bike paths	Under the project footprint
8	Bike path on Henri Duhamel Street/ Gilberte Dubé	Route verte # 1	Within the study area
9	Bike path on Nuns' Island from Golf Road/Place du Commerce/ René Lévesque Blvd.	Route verte # 1	Within the study area

Table 56 (Cont'd) All bike paths affected

LANES	BIKE PATHS AFFECTED	NETWORK	LOCATION
10	Bike path on north Nuns' Island	Nuns' Island bike path	Within the study area
11	Bike path on the Ice Control Structure	Route verte # 1	Within the study area
12	Lachine Canal bike path	Route verte # 1	Within the study area
13	Multi-use trail between Trahan Street and Toscanni Crescent	Brossard multi-use trail	Within the study area
14	Designated roadway from Tisserand Avenue to Provencher Blvd.	Brossard designated roadway	Within the study area

A total of seven bike paths will be directly affected by the work. Their main characteristics are shown in Table 50. These bike paths allow cyclists to cross the St. Lawrence River, linking Montreal, Nuns' Island and the South Shore. Paths 1 to 4 link the borough of Sud-Ouest and Verdun to Nuns' Island and to the municipalities of Saint-Lambert and Sainte-Catherine in Roussillon. Paths 5 and 6 in Montreal link Sud-Ouest and Verdun, and path 7 on the South Shore links Brossard and Saint-Lambert.

Table 57 Characteristics of bike paths directly affected by the project

PATHS	CHARACTERISTICS				
	LENGTH	PHYSICAL SEPARATION	PAVEMENT MARKINGS	TYPE OF MATERIAL	LIGHTING
1	~790 m	No	Yes	Asphalt	Yes
2	~350 m	Yes	No	Asphalt	No
3	~1,600 m	No	Yes	Asphalt	Yes
4	~820 m	No, not necessary	Yes	Asphalt	No
5	~490 m	Yes	Yes	Asphalt	Yes
6	~13,300 m	No, not necessary	Toward Ste-Catherine: Yes Toward Notre-Dame Island: No	Toward Ste-Catherine: Asphalt (average) Toward the island: Stone dust (good)	No
7	~5,000 m	Yes	Yes	Asphalt	Yes

Source: A) Pierre Lavoie, Project Manager, Route verte, personal communication July 27, 2012

4.3.10.1.2 Estimated number of users on affected bike paths

According to a Vélo Québec study conducted in Fall 2010, approximately 500 cyclists use the bike path to Nuns' Island during the week and 1,000 cyclists use it on weekends (Route A), and 850 cyclists use the designated roadway on D'Argenson Street (Route B) on weekdays. This number could double during the summer, according to the Route verte representative.

According to information obtained from Route verte, bike paths are used on weekends primarily for recreation, whereas during the week a large number of cyclists use the paths to go to and from work. The data gathered during the week on the Nuns' Island Bridge show that approximately three-quarters of trips in the morning are towards Montreal, and in the afternoon, 75% of trips are toward the South Shore. Route verte estimates that cyclists coming from as far away as Saint-Lambert (over 9 km southwest) and from the municipality of Ste-Catherine west of Brossard (over 15 km southwest) use the Nuns' Island Bridge bike path to travel to work (personal communication with Pierre Lavoie, Project Manager, Route verte, July 27, 2012).

4.3.10.2 Fishing

4.3.10.2.1 Fishing on the Seaway

The study area boundaries for this valued ecosystem component are 1 km above and below the Champlain Bridge (see the Human and Biophysical Environments Distribution Map in Appendix 5).

There is no commercial fishery on the Seaway. Further, sport fishing is strictly prohibited.

4.3.10.2.2 Fishing on the river and in the Lesser La Prairie Basin

The study area boundaries for this valued ecosystem component are 1 km above and below the Champlain Bridge and 100 m on the North and South shores from the St. Lawrence River.

According to the MRNF, there is no commercial fishing activity within the study area (Audrey Jobin, personal communication, 2012); the shallow water depth near the Champlain Bridge does not allow for the passage of large ships.

However, the MRNF claims that the area is often used by sport fishermen, both on the South Shore and on the City of Montreal side but does not have any statistics on sport fishing in the study area.

According to the representative from Maison de jeunes Point de mire, on the Montreal side the only area where there is known to be sport fishing is along the forested property belonging to the Monseigneur Richard high school. In that area, there are between 5 and 10 persons per day who wade fish between May and November. Also, during the summer, this organization arranges wade-fishing sessions involving 5 to 7 young people per week. The fishing methods normally practiced in these locations are line fishing and fly-fishing.

On the South Shore, des Vélos Park and St. Lawrence Park are the preferred sites for fishing from the riverbank (City of Brossard, 2007). However, there are no available statistics on the number of fishers or the techniques used.

The AMQ estimates that about a dozen persons a day fish on the ice between January and March in the vicinity of the Champlain Bridge, within 300 m above and below the bridge.

The human and biophysical environments distribution map in Appendix 5 shows the favoured shore and ice-fishing sites.

Line and fly-fishing for sport is also done from small boats. Generally speaking, fishers use small motorboats to navigate the river section, near the banks on the Montreal side and Nuns’ Island, and in the Lesser La Prairie Basin.

Boat fishing in the study area takes place between April and October, but at higher levels in the summer and on weekends; according to the Captain of the hovercraft base and the owner of Saute-Moutons, fewer than a dozen boats a day are seen fishing in the summer.

Further, the Maison de jeunes Point de mire arranges fly-fishing trips by boat, starting in May, up until October or November. Table 58 describes the trips arranged by this organization.

Table 58 Boat-based fishing activities sponsored by Maison de Jeunes Point de Mire

ORGANIZATION	TYPE	SHIPPING CORRIDOR			NAVIGATION SEASON	NUMBER OF PASSAGES	# OF PERSONS PER TRIP
		DEPARTURE POINT	BRIDGE CROSSED	RETURN POINT			
Maison de jeunes Point de mire	Motor boat (16-foot)	Verdun Marina	May-June June-August Sept.-Nov.	3 times per week Once a week 2- 3 times per week	3-5	3 times a week	3-5
					3-5	Once a week	3-5
					3-5	2 to 3 times a week	3-5

Source: Personal contact with Mario Viboux, Director of Maison de Jeunes Point de Mire, August 29

There is no information available regarding the species of fish taken, but Table 59 lists the species of sport fish taken in the past by the MRNF in the study area, and the species known to be present in the area, obtained from the Association des Pêcheurs de Longueuil and Maison de Jeunes Point de Mire.

Table 59 Possible species of fish caught in the area

ENGLISH NAME	LATIN NAME
Brown bullhead	*Ameiurus nebulosus*
Brown trout*	*Salmo trutta*
Common carp	*Cyprinus carpio*
Muskellunge*	*Esox masquinongy*
Rock bass	*Ambloplites rupestris*
Northern pike	*Esox lucius*
Rainbow trout*	*Oncorhynchus mykiss*
Smallmouth bass	*Micropterus dolomieu*
Walleye	*Sander vitreus*
Sturgeon	*Acipenser*
Yellow perch	*Perca flavescens*

* Species stocked in past years.

4.3.10.3 *Other recreational river-based activities*

The study area boundaries for this valued ecosystem component are 1 km above and below the Champlain Bridge and 100 m on the north and south banks from the St. Lawrence River. The human and biophysical environments distribution map included in Appendix 5 shows the location of marinas and a number of river-based activities, such as kayaking routes, the Blue Route, etc.

Besides pleasure craft, water activities such as kayaking, canoeing, rabascaw, windsurfing and water skiing were identified in the study area (City of Brossard, 2007, and personal contact with Ms. Ariane Cimon-Fortier, General Manager of the Comité ZIP Ville-Marie, August 1, 2012).

The study area includes two of Greater Montreal's Blue Routes. Kayakers and canoeists can navigate these routes on their own. The first route, which involves circling Nuns' Island in a clockwise direction, begins and ends at the Verdun marina. The second route starts at Radisson Park in Brossard, goes north across the Lesser La Prairie Basin and ends at the St. Lambert Yacht Club, a short distance past the Champlain Bridge (Comité ZIP Ville-Marie, 2012). The Greater Montreal Blue Route totals 150 km in length and includes 15 different trails. It is one of six existing Blue Routes that make up the St. Lawrence River Water Trail.

There is no information available regarding the number of watercraft on the two aforementioned routes (personal contact with Ms. Ariane Cimon-Fortier, General Manager of the Comité ZIP Ville-Marie, August 1, 2012).

However, the following information is available for the two commercial enterprises operating within the study area that offer services to kayakers: Enviro Kayak and Navi Kayak.

Table 60 summarizes the features of the routings offered by these firms.

Table 60 Recreational firms operating in the study areas

COMPANY	TYPE	SHIPPING CORRIDOR			NAVIGATION SEASON	FREQUENCY OF PASSAGE	NO. OF PERSONS PER TRIP
		DEPARTURE POINT	BRIDGE CROSSED	RETURN POINT			
Enviro Kayak	Kayaking	St. Jacques River	Champlain Bridge, through the Lesser La Prairie Basin. Near the banks of the South Shore.	St. Lambert Yacht Club	July-August	Once a week	12
		Sainte Catherine	Nuns' Island Bridge, close to the Montreal banks	Boucherville	July-August	1-2 times a week	15
Navi Kayak	Kayaking	Verdun, near the Lachine Rapids	Nuns' Island Bridge, close to the Montreal banks	Verdun/ rapids/ Nuns' Island/ Verdun loop	Course planned for 2013, between June and September. 2,000 persons expected.		

Sources: A) Personal contact with Michel Lajoie, owner of Enviro Kayak, July 30, 2012.
(B) Personal contact with Michel Tremblay, owner of Navi Kayak, July 26, 2012.

All suggested routings, either self-guided or those that use the services of a company, pass close to the banks.

The canoeing/kayaking season begins at the start of May and ends in mid-October. It could therefore conflict with the construction work. This factor emerges as one aspect that needs to be considered in planning and deciding on construction techniques to be used.

Further, according to the officials contacted, none of the water sport clubs or schools that are known to operate in the area, but outside the study area, will be affected by the planned work. However, windsurfers could be affected by the work near Champlain Bridge Park, which has been identified as an excellent location for this sport (City of Brossard, 2007). There are no available statistics on the number of windsurfers who use the park.

Finally, no nautical events were identified within the study area.

4.3.11 Development projects

There are two development projects within the Sud-Ouest study area. The first one, a project to redevelop the former CN workshops, is located at 1830 Le Ber Street in Pointe Saint Charles. On this 33-ha property, a former industrial site (railroad marshalling yard), the promoter plans a mixed-use development. Rail activities are planned by the Agence métropolitaine de transport (AMT); a number of areas will be set aside for industrial and commercial use. The promoter also plans to build more than 850 housing units (25% of the units being built will be social and community housing) (Montreal's office of public consultation, 2012).

Walter, the second Sud-Ouest project, is located on St. Patrick Street between D'Argenson Street and Atwater Avenue. The Walter project involves mixed uses, with the ground floor set aside for businesses, while the other five floors will see 105 condominium units (borough of Sud-Ouest, personal contact, 2012).

There are three development projects scheduled for the borough of Verdun. The first one is a residential project in the Gaétan Laberge section and is located on Gaétan Laberge Boulevard between Rhéaume and Hickson streets. Approximately 11,150 m^2 (120,000 pi^2) in size, there are plans for 126 co-op units and 300 condominium units.

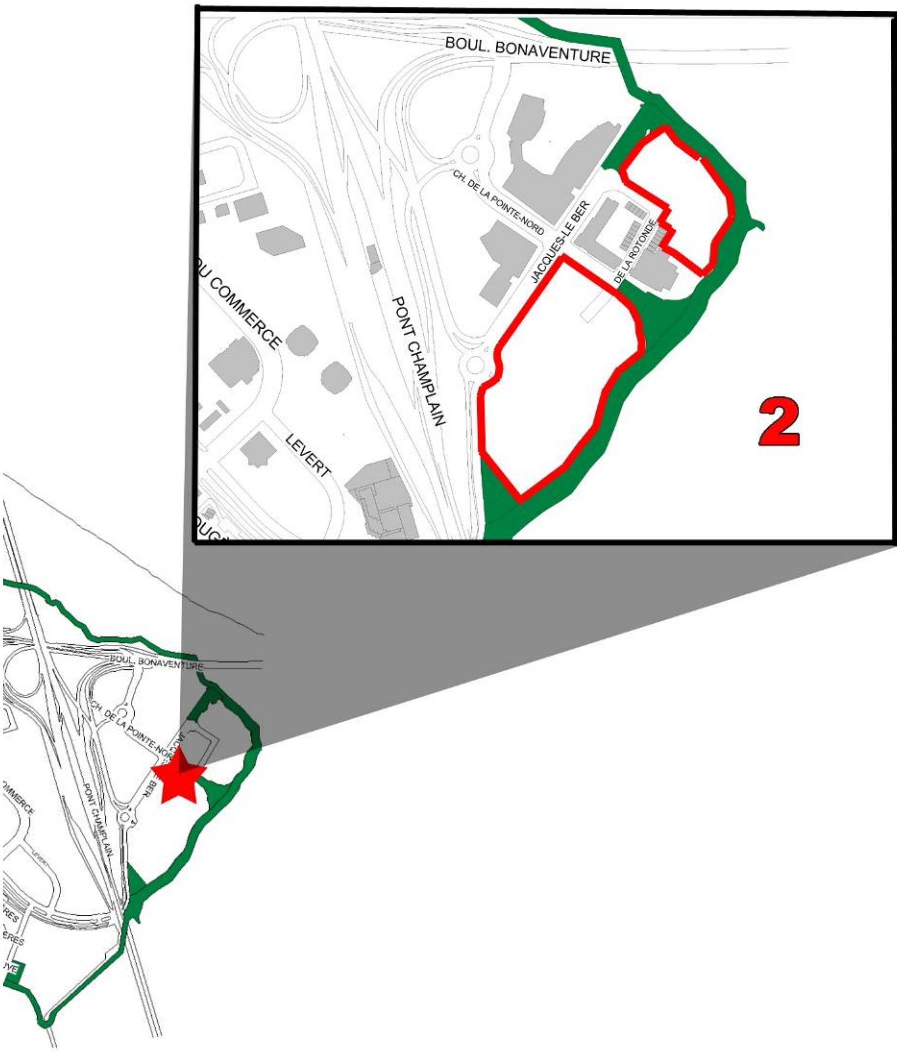
The second mixed-use project, Pointe Nord on Nuns' Island, is located in the Nuns' Island sector, east of Jacques le Ber Street. The project is planned to include neighbourhood-type services, apartments (1,505), townhouses (24) and condominium units (167) on a piece of property that is 92,900 m^2 (1,000,000 pi^2) in size.

The third residential project, Secteur Chemin du Golf, is also situated in the Nuns' Island sector, on Golf Road, near William Paul and Roland Jeanneau streets. The property is currently occupied by warehouses. Once they have been demolished, 950 rental units will be built, spread out over seven buildings of from 4 to 10 floors. (borough of Verdun, personal contact, 2012).

While the City of Brossard has identified a number of sites with development potential within the study area, there are currently no development projects being planned.

To sum up, just one of the projects referred to above presents an assumed footprint that appears to encroach on the project footprint for the New Bridge for the St. Lawrence. That is the Pointe Nord project on Nuns' Island, which will apparently be adjacent to the assumed footprint near the east bank of the island, on the north side of the footprint.

Figure 79 Location of Pointe Nord project on Nuns' Island



4.3.12 Sound environment

4.3.12.1 Methodology

The sound study required as part of this environmental assessment must use existing standards or regulations that can be applied to the proposed road project. On the federal side, Health Canada does not have any guidelines in relation to noise. Similarly, in Quebec, there are no applicable regulations regarding road noise. However, the MTQ has drawn up a policy on road noise (*Politique sur le bruit routier*). The MDDEFP, for its part, has an administrative practice on the assessment of road projects.

The methodology used for the sound portion of the environmental assessment for the operation phase of the New Bridge for the St. Lawrence is thus partly based on the one drawn up by the MTQ’s environmental department in 1989 and is entitled *Étude de pollution sonore pour des infrastructures routières existantes – Méthodologie* (Sound pollution study for existing road infrastructures – Methodology), in particular with respect to the assessment of the level of noise disturbance, location of the measurement points, and choice of measuring instruments used. The study is also based on the MTQ’s road noise policy for the inventory of the noise-sensitive areas affected by the project. Lastly, the project’s potential anticipated noise impacts on the sensitive areas were assessed using the approached proposed by the MDDEFP.

An inventory of the environmental components was first done within the study area in order to identify the various elements of the receiving environment (e.g. municipal zoning, buildings, topography, ridges) along with the characteristics of the actual and proposed road infrastructures (routes, profiles and traffic) that may have an effect on the sound environment.

Next, noise-sensitive areas were delineated within the study area. The MTQ’s road noise policy defines a noise-sensitive area as being a zone with outside areas where the sound environment is a crucial element for the performance of human activities. The noise-sensitive areas have residential, institutional and recreational uses. Within this area, it is possible to delineate the previously defined noise-sensitive areas (residential, institutional and recreational) likely to be acoustically affected by the project. The sensitive areas for the current project have been determined based on an inventory of soil use for the two municipalities found along the route.

The road noise forecasting software used for the various modelings is “TNM” (version 2.5), developed by the U.S. Federal Highway Administration (FHWA) and recommended by the MTQ. The software takes into account the data related to the various road infrastructures and the receiving environment.

Using the software, computer models simulating the sound environment generated by road traffic on the current road infrastructure for the entire study area were developed while taking into account the receiving environment and the various parameters of existing traffic lanes. The models were validated using the sound surveys conducted in fall 2012 at different locations within the study area along with traffic counts performed simultaneously.

The validated models were then used to estimate the sound progression of the existing infrastructure in order to anticipate the potential sound impacts during the operation phase of the future infrastructure.

4.3.12.1.1 Sound environment characteristics

The sound environments within the study area were analyzed using the MTQ's sound environment quality assessment grid. This grid is based on the Leq_{24h} index used by the MTQ, which is the equivalent level of continuous noise over a 24-hour period. The grid comes from the methodology used to carry out the MTQ's sound studies (1989) and quantifies the discomfort level as follows:

Table 61 Sound environment quality assessment grid

SOUND ENVIRONMENT AREA					NOISE DISCOMFORT
65 dBA	≤	Leq_{24h}			High
60 dBA	<	Leq_{24h}	<	65 dBA	Moderate
55 dBA	<	Leq_{24h}	≤	60 dBA	Low
		Leq_{24h}	≤	55 dBA	Acceptable

Source: "Étude de pollution sonore pour infrastructures routières existantes – Méthodologie," April 1989

In its road noise policy (MTQ, 1998), the MTQ considers that an existing traffic lane becomes a major constraint for land use when the Leq_{24h} noise level is equal to or above the limit of 65 dBA in a noise-sensitive area. The sound environment is considered acceptable with a Leq_{24h} equal to or less than 55 dBA.

4.3.12.1.2 Assessment of the potential noise impacts of the road project

The MDDEFP's administrative practice has established the following objectives for the sound environment during the project's operation phase along with the acceptable increases for the sources of road noise attributable to a road project:

Table 62 Recommended noise objectives for the sound environment in noise-sensitive areas during the project's operation phase

CURRENT NOISE LEVEL (LEQ_{24H})	RECOMMENDED NOISE OBJECTIVES
Less than 55 dBA	Maintenance of current noise level, if possible, or 55 dBA limit
Equal to or above 55 dBA	Acceptable increase of 1 dBA
Above 60 dBA	No increase allowed. The mitigation measures should bring the forecast noise level as close to 60 dBA as possible.

The modeling of the sound environment (Leq_{24h}) generated by the current infrastructure allowed the noise-sensitive areas to be identified where noise mitigation measures will be potentially required for the proposed infrastructure in order to meet these objectives. To take into account the duration of the project, the current sound environment was assessed for the period when traffic forecasts are available from the MTQ (up to 2026).

4.3.12.2 Noise study area and inventory of existing environmental components

4.3.12.2.1 Receiving environment and land use

The noise study area is within the defined study area of the environmental assessment. It delineates those sectors that could potentially be acoustically affected by the project and extends along the axis corresponding to highways 10/15/20, between Atwater Avenue in the City of Montreal in the west, extending as far as Pinard Street in the City of Brossard in the east, and is 300 m wide on either side of this axis.

To simply the presentation of the inventory of existing environmental components, the sound study area has been divided into the following three sectors:

- **City of Montreal**: the sector located between Atwater Avenue and the Nuns' Island Bridge;
- **Nuns' Island**: the sector located between the Nuns' Island Bridge and the St. Lawrence River;
- **City of Brossard**: the sector located between the St. Lawrence River and Pinard Street.

City of Montreal sector

In the City of Montreal sector, three noise-sensitive areas, numbered 1 to 3, have been delineated (see Figure 80). These are primarily residential areas.

Area 1 is located between Atwater Avenue and Mullin Street, that is, northwest of the axis of highways 10/15/20. It should be noted that Argenson Park (a baseball field) is located close to the centre of this area. Area 2 is located north of the highway axis, between Reading Street on the west and Wellington Street on the east. Finally, Area 3 is located between LaSalle Boulevard and extends as far as the Nuns' Island Bridge. The Centre de formation professionnelle (Gaétan-Laberge Blvd.) is found in this area. It should be noted that within Area 3 there are commercial buildings located along Gaétan Laberge Boulevard. None of these buildings have been taken into account because they are considered less sensitive to noise.

Nuns' Island sector

In the Nuns' Island's western sector, two noise-sensitive areas, identified as 4a and 4b, have been delineated (see Figure 81).

Area 4a is located west of Île-des-Sœurs Blvd. near the Nuns' Island Bridge. This area is defined by mixed residential and commercial zoning and includes a few residential buildings. Area 4b is located northeast of the Island near Rue Jacques-Le Ber. The latter area is a residential sector that is expected to be developed in the coming years.

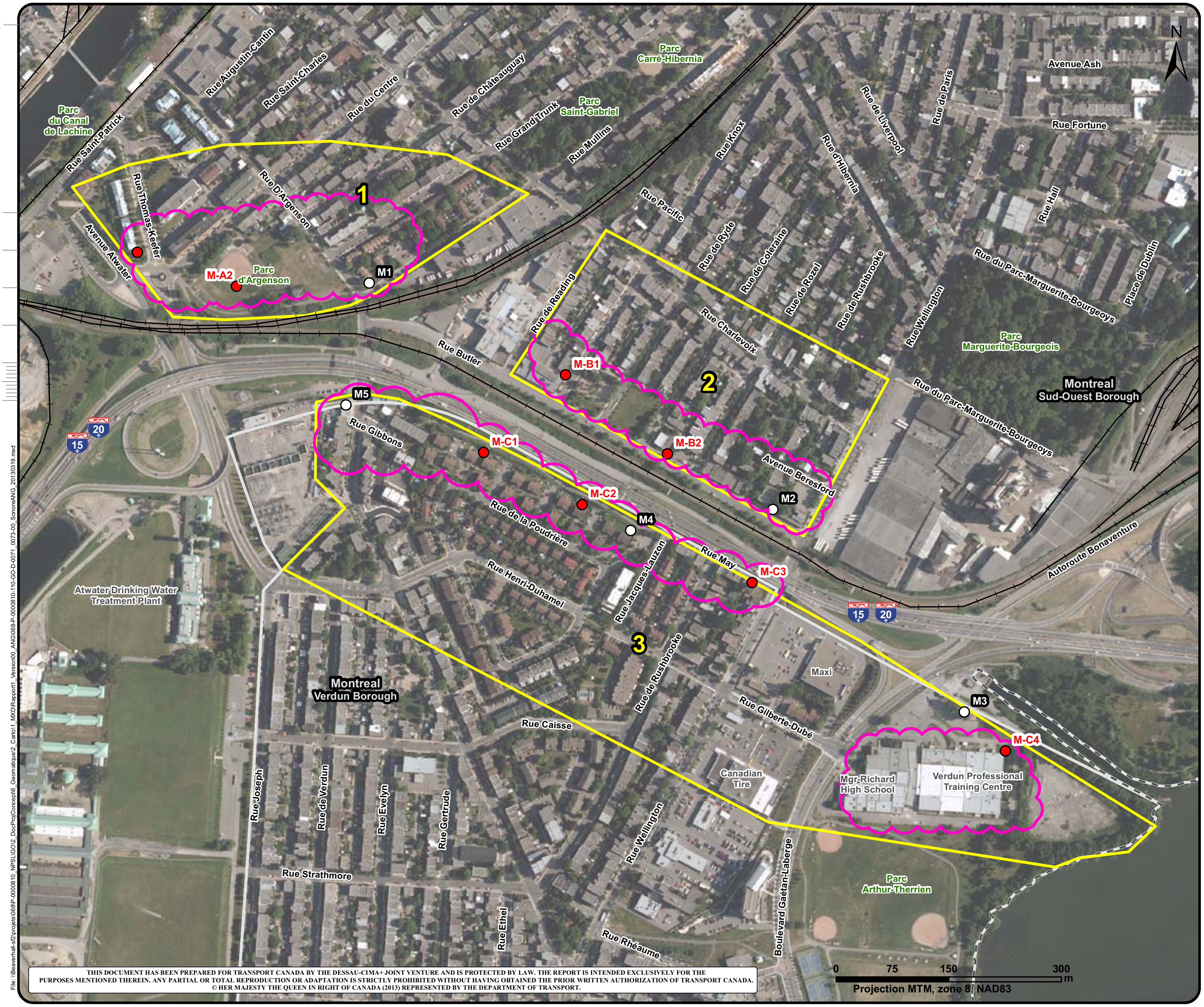
In addition to this noise-sensitive area, a number of riverfront parks have been identified as being potentially sensitive, but have not been defined as being noise-sensitive because they are used primarily by cyclists, who are only in the area for very brief moments.

The other buildings adjacent to the project (within 300 m) are primarily commercial-use buildings and have not been deemed noise-sensitive.

City of Brossard sector

In the City of Brossard sector, three noise-sensitive areas, numbered 4 through 6, have been delineated. Figure 82 shows these areas, which are all primarily residential. Area 5 is located on the south side of the axis for highways 10/15/20, between the river and the axis for highways 15/route 132. Area 6, which is also located south of the axis for highways 10/15/20, encompasses a group of residential buildings arranged around a portion of Tisserand Avenue, Turgeon Crescent and Tchad Place. In addition to the residential buildings, there is one other noise-sensitive element within this area, and that is a children’s playground. Area 7 is located north of Highways 10/15/20, between Highway 20 on the west and Pinard Street on the east (project boundary).

In addition to the noise-sensitive areas that have already been selected, there are a number of riverfront parks along the Seaway but these parks have not been deemed noise-sensitive because the users are primarily cyclists, who are there only for brief moments.



● B-C2	Proposed noise measurement point with duration
○ B1	Location of noise surveys
1	Noise-sensitive area - Preliminary
🟩	Noise sensitive area not retained (bike path)
🟪	Potentially negative sound impact area
┼─┼	CN railway track
⬚	Municipal limit
☐	Borough limit

SOURCE :
- Orthophotographs: © Montreal Metropolitan Community, 2005-2011

Client
Transport Canada
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Project
New Bridge for the St. Lawrence
Environmental Assessment

Title
Figure 80
Location of Noise-Sensitive Areas in the City of Montreal Sector

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Drawn	Geneviève Lemay	Scale	1:5 000
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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	0071	00

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SIZE 11x17

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SIZE 11x17

● B-C2	Proposed noise measurement point with duration
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┼	CN railway track
⬚	Municipal limit
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SOURCE :
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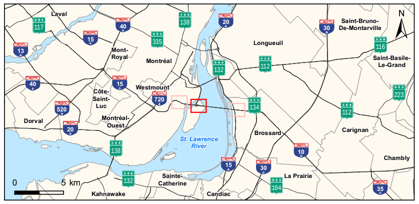

Client
Transport Canada Transports Canada

Project
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Title
Figure 81
Location of Noise-Sensitive Areas in the Nuns' Island Sector

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Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
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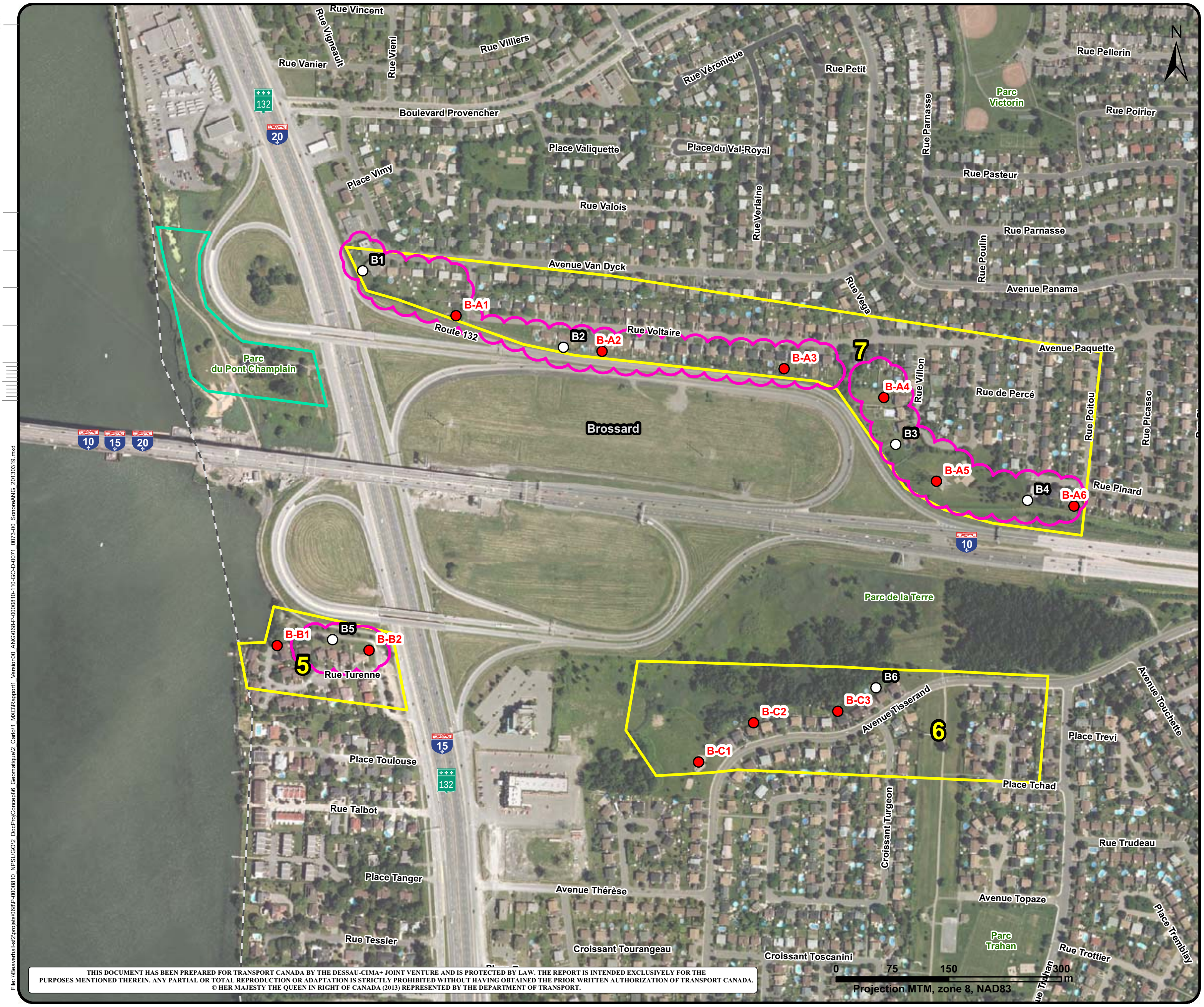

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● B-C2	Proposed noise measurement point with duration
○ B1	Location of noise surveys
1	Noise-sensitive area - Preliminary
🟩	Noise sensitive area not retained (bike path)
🟪	Potentially negative sound impact area
┼─┼	CN railway track
▭	Municipal limit
▭	Borough limit

SOURCE :
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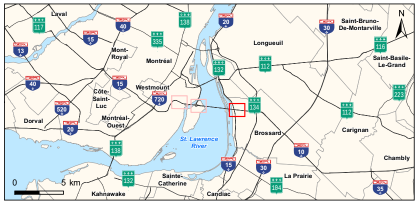

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Title
Figure 82
Location of Noise-Sensitive Areas
in the City of Brossard Sector

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Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
068	P-0000810	110	GO	D	0073	00

4.3.12.2.2 Existing highway infrastructure

The primary existing highway infrastructure that will be affected by the New St. Lawrence Bridge Project is a section of highway close to 8 km long that includes the Champlain and the Nuns' Island bridges and the Atwater and Gaétan Laberge interchanges in Montreal, the Highway 10 (Bonaventure) interchange on Nuns' Island and the Highway 10/15/20 interchange in Brossard.

In Brossard, the existing Highway 10/15/20 axis includes a four-lane roadway from the eastern boundary of the project up to the entrance to the Champlain Bridge. In this sector, the roadway is situated at virtually the same elevation as the first rows of houses. Then, the number of lanes in each direction is reduced to three from the approach to the Champlain Bridge to the Gaétan Laberge interchange on Montreal Island. This section of roadway is raised, except on Nuns' Island, where the road surface is at virtually the same elevation as the surrounding land. At the approach to the Highway 10 interchange, the Highway 10/15/20 roadway elevation increases slightly.

On the Island of Montreal, there are two Highway 15/20 traffic lanes in each direction, from the Gaétan Laberge interchange to the project's western boundary. In this sector, the elevation of the road surface between Wellington and Jacques Lauzon streets is higher than that of the houses located on either side. From Jacques Lauzon Street to Reading Street the road elevation is essentially the same as that of the adjacent houses. Further on, the road surface is at a higher elevation than that of the riverside homes where it passes over Atwater Avenue.

There are rail lines between the highway and the noise-sensitive areas to the north. These rail lines are on an embankment and therefore act as a noise barrier, protecting the houses from highway noise.

The posted speed limit on highways 10/15/20 and 10 (Bonaventure Expressway) and on the service roads is 70 km/h. On highways 15 (Route 132) and 20 (Route 132) in Brossard the posted speed limit is 100 km/h. Finally, the posted speed limit on the freeway access ramps is generally 45 km/h.

4.3.12.2.3 Results of (roadway) noise surveys

The noise surveys were conducted according to the methodology developed by the MTQ's environment section (*Méthodologie – Étude de pollution sonore pour des infrastructures routières existantes* (MTQ, 1989)).

Twelve measurement points were chosen within the study area to complete the validation of the computer models reproducing the sound environment generated by highway traffic on the existing highway infrastructure. The locations of these various measurement points, which are identified as M1 to M5 in the City of Montreal sector, i1 in the Nuns' Island sector, and B1 to B6 in the City of Brossard sector, are shown in the previous figures. More specifically, the measuring instruments were located on the property of the following dwellings:

- **Point M1:** One-hour noise survey at 2785 Rue Mullins;
- **Point M2:** 24-hour noise survey at 2694 Rue Rushbrooke;

- **Point M3:** Three-hour noise survey at the Centre de formation professionnelle de Verdun, located at 3010 Boulevard Gaétan-Laberge;
- **Point M4:** 24-hour noise survey at 436 Rue de la Poudrière;
- **Point M5:** One-hour noise survey at 3013 Boulevard LaSalle;
- **Point i1:** Three-hour noise survey at 210-230 Chemin du Golf;
- **Point B1:** One-hour noise survey at 447 Avenue Van-Dick;
- **Point B2 :** 24-hour noise survey at 485 Rue Voltaire;
- **Point B3:** Three-hour noise survey at 6560 Rue Villon;
- **Point B4:** One-hour noise survey at 6850 Rue Pinard;
- **Point B5:** 24-hour noise survey at 7010 Rue Turenne;
- **Point B6:** Three-hour noise survey at 6165 Avenue Tisserand.

The noise measurement campaigns in Brossard were carried out between 7:00 p.m. on November 5, 2012 and 7:00 p.m. on November 6, 2012, and between 12:15 p.m. and 1:15 p.m. on November 28, 2012. The noise measurement campaigns in Montreal and on Nuns' Island took place between 9:00 p.m. on November 6, 2012 and 9 :00 p.m. on November 7, 2012, and between 10:00 a.m. and 2:00 p.m. on November 28, 2012.

4.3.12.2.4 Noise survey instruments

The following equipment was used for the noise surveys conducted by Consortium personnel for the study:

- Quest sound-level meter, Sound Pro Model (S/N: BLL040007);
- Larson Davis sound-level meter, Model 831 (S/N: 1917);
- Larson Davis sound-level meters, Model Lxt1 (S/N: 2662, S/N: 1253);
- Quest calibrator, Model AC-300 (S/N: AC-30001138);
- Larson Davis calibrator, Model CAL200 (S/N: 7250).

The sound-level meters were calibrated before each measurement session and verified afterwards with a calibrator to ensure that a difference of less than 0.5 dBA was obtained. The microphone cartridge was equipped with an anti-wind ball for the duration of the noise surveys. For each survey, the measuring instruments were positioned 1.5 m above the ground and more than 3.5 m from any reflecting surface or building.

The following table presents the results from the various noise surveys conducted during the November 2012 noise measurement campaigns.

Table 63 Summary of noise survey results

NOISE-SENSITIVE AREA	MEAS. POINT	ADDRESS OF RESIDENTIAL PROPERTY OR LOCATION	DATE (NOV.. 2012)	PERIOD	DURATION	NOISE PARAMETERS (IN DBA)						
						LAeq	$L_{1\%}$	$L_{10\%}$	$L_{50\%}$	$L_{90\%}$	$L_{95\%}$	$L_{99\%}$
1	M1	2785 Rue Mullins	28	10 am to 11 am	1h	60.5	65.4	62.1	59.0	55.1	54.8	54.2
2	M2	2694 Rue Rushbrooke	6 to 7	9 pm to 9 pm	24h	61.2[A]	71.1[A]	63.2[A]	57.5[A]	54.9[A]	54.4[A]	53.4[A]
			7	9 am to 10 am	1h[B]	62.9	73.9	65.6	58.6	56.2	55.7	54.8
3	M3	3010 Boulevard Gaétan-Laberge	28	11 am to 2 pm	3h	63.6[A]	73.3[A]	64.8[A]	61.3[A]	58.7[A]	58.0[A]	57.0[A]
	M4	436 Rue de la Poudrière	6 to 7	9 pm to 9 pm	24h	66.3[A]	72,1[A]	68.7[A]	65.4[A]	62.6[A]	61.8[A]	60.1[A]
			7	9 am to 10 am	1h[B]	68.2	73.7	70.3	67.5	65.1	64.3	62.9
	M5	3013 Boulevard LaSalle	7	9 am to 10 am	1h	65.9	71.6	68.2	64.9	61.9	60.9	59.0
4a	I1	210-230 Chemin du Golf	7	11 am to 2 pm	3h	66.5[A]	72.7[A]	67.9[A]	65.8[A]	64.0[A]	63.5[A]	62.5[A]
5	B5	7010 Place Turenne	5 to 6	7 pm to 7 pm	24h	62.0[A]	70.0[A]	63.7[A]	60.5[A]	58.4[A]	57.8[A]	56.7[A]
			6	11 am to 12 pm	1h[B]	62.6	71.0	64.8	60.9	58.6	58.0	57.0
6	B6	6165 Avenue Tisserand	6	9 am to 12 pm	3h	55.9[A]	64.2[A]	57.2[A]	53.0[A]	50.5[A]	49.9[A]	49.0[A]
				11 am to 12 pm	1h	54.4	59.7	54.6	51.9	50.0	49.6	49.0
7	B1	447 Avenue Van Dick	28	12:15 pm to 1:15 pm	1h	71.5	77.6	74.3	70.5	65.8	64.7	62.8
	B2	485 Rue Voltaire	5 to 6 6	7 pm to 7 pm	24h	63.2[A]	70.9[A]	65.6[A]	61.4[A]	57.9[A]	57.8[A]	56.0[A]
				11 am to 12 pm	1h[B]	65.4	72.9	67.7	64.0	60.9	60.2	58.9
	B3	6560 Rue Villon	6	9 am to 12 pm	3h	64.3[A]	68.6[A]	66.5[A]	63.7[A]	60.5[A]	59.8[A]	58.5[A]
				11 am to 12 pm	1h[B]	64.8	69.0	66.6	64.3	62.1	61.5	60.6
	B4	6850 Rue Pinard	6	12:15 pm to 1:15 pm	1h	62.1	65.4	63.8	61.7	59.8	59.2	57.9

[A] Results presented in the form of a logarithmic average of the hourly measurements.

[B] Noise survey results obtained during one of the periods during which a traffic count was done.

4.3.12.3 Computer-generated models and validation

The various computer simulations will be produced using the U.S. Federal Highway Administration's (FHWA) TNM 2.5 (Traffic Noise Model), which has been approved for use by the MTQ. The physics equations used by this software are described in document FHWA-PD-96-010, entitled *FHWA – Traffic Noise Model-Technical Manual* (US DTO, 1996).

The basic data used to develop the various models are as follows:

- Location and topography of the existing highway infrastructure;
- Traffic data (DJME, percentage of trucks with two or more axles, posted speed limits);
- Topography of the noise study area;
- Locations of measurement points and buildings;
- Additional abatements (ground effect, rows of buildings, mounds, etc.).

The computer models for the existing situation (no project) were validated using the previously presented results of the noise surveys and traffic counts.

The following table shows the difference between the noise equivalent levels LAeq$_{1h}$ measured at the site and those calculated using the different computer models with the results of the traffic counts over the same period.

Table 64 Validation of computer models based on noise surveys

MEAS. POINT	ADDRESS OF RESIDENTIAL PROPERTY	DATE OF NOISE SURVEY	PERIOD	MEASURED LAEQ$_{1H}$ (IN DBA) DURING TRAFFIC COUNTS	SIMULATED LAEQ$_{1H}$ (IN DBA)	DIFFERENCE (IN DBA)
B2	485 Rue Voltaire	Nov. 6, 2012	11 am – 12 pm	65.5	67.3	+ 1.9
B3	6560 Rue Villon	Nov. 6, 2012	11 am – 12 pm	64.8	63.1	- 1.7
B4	6850 Rue Pinard	Nov. 6, 2012	12:15 pm – 1:15 pm	62.1	60.1	- 2.0
B5	7010 Place Turenne	Nov. 6, 2012	11 am – 12 pm	62.6	61.8	- 0.8
B6	6165 Avenue Tisserand	Nov. 6, 2012	11 am – 12 pm	54.4	52.8	- 1.6
i1	210-230 Chemin du Golf	Nov. 7, 2012	11 am – 2 pm	66.5	64.6	-1.9
M2	2694 Rue Rushbrooke	Nov. 7, 2012	9 am – 10 am	62.9	61.6	- 1.3
M4	436 Rue de la Poudrière	Nov. 7, 2012	9 am – 10 am	68.2	66.9	- 1.3
M5	3013 Boulevard LaSalle	Nov. 7, 2012	9 am – 10 am	65.9	65.3	- 0.6

The differences between the measurements and simulations range from -2.0 to +1.9 dBA, an absolute mean of 1.5 dBA. These differences constitute an acceptable accuracy level and validate the computer models.

4.3.12.3.1 Traffic data for 2012 and 2026

The traffic data used in the computer models of the existing roads to simulate the sound environment over a 24-hour period in 2012 and 2026 originate from traffic survey held in November 2012 as describe earlier. The information that is provided pertains to the following vehicle categories: cars and truck percentage.

The speeds used for the modeling, similarly to the model validation, are those displayed on road signs.

For the highway access ramps, the speeds used vary since the TNM simulation software assesses the noise from the vehicles based on acceleration or deceleration pre-determined based on the initial speed, such as when stopped, up to the final speed, i.e. 100 km/h for the highway.

4.3.12.3.2 Modeling and analysis of the sound environment of the existing situation in 2012 and 2026

The modeling of the sound environment over a 24-hour period (Leq_{24h} 1.5 metres from the ground) within the noise study area for 2012 and 2026 with the existing road infrastructure was done using the previously described ASDT data and the validated computer models.

The sound environment was assessed at the different noise survey locations. It was also assessed at other calculation points in order to be representative of the overall sound environment in the eight noise-sensitive areas that were surveyed.

The following table shows the results obtained at the different calculation points. The sectors are also indicated where noise mitigation measures may be required by the project in order to meet the recommended acoustic objectives.

Table 65 Noise level Leq_{24h} with the existing road infrastructure (current situation) in 2012 and 2026 and noise-sensitive areas where mitigation measures will be required by the project

NOISE-SENSITIVE AREA	CALCULATION POINT	ADDRESS OF RESIDENTIAL PROPERTY	NOISE LEVEL LEQ_{24H} 2012 (IN DBA)	NOISE LEVEL LEQ_{24H} 2026 (IN DBA)	ZONE WHERE MITIGATION MEASURES MAY POTENTIALLY BE REQUIRED BY THE PROJECT
1	M1	2785 Rue Mullins	55	56	Yes
	M-A1	Rue Thomas-Keefer	57	57	Yes
	M-A2	Parc d'Argenson	61	61	Yes
2	M2	2694 Rue Rushbrooke	60	61	Yes
	M-B1	Rue Knox	57	57	Yes
	M-B2	Rue de Coleraine	58	58	Yes
3	M3	3010 Boulevard Gaétan-Laberge	62	63	Yes
	M4	436 Rue de la Poudrière	66	66	Yes
	M5	3013 Boulevard LaSalle	64	64	Yes
	M-C1	Rue de la Poudrière	66	66	Yes
	M-C2	Rue de la Poudrière	65	65	Yes
	M-C3	Avenue May	64	64	Yes
	M-C4	Centre de formation professionnelle	60	61	Yes
4a	I1	210-230 Chemin du Golf	63	63	Yes
	I-A1	Chemin du Golf	62	62	Yes
	I-A2	Chemin du Golf	58	58	Yes
4b	I-A3	Boul. René-Lévesque	62	63	Yes
	I-A4	Rue Jacques-Le Ber	61	61	Yes
	I-A5	Rue de la Rotonde	55	56	Yes
5	B5	7010 Rue Turenne	63	64	Yes
	B-B1	Rue Turenne	60	61	Yes
	B-B2	Rue Turenne	68	69	Yes
6	B6	6165 Avenue Tisserand	53	53	No
	B-C1	Parc de la Terre	53	54	No
	B-C2	Avenue Tisserand	52	52	No
	B-C3	Avenue Tisserand	51	51	No
7	B1	447 Avenue Van Dick	70	71	Yes
	B2	485 Rue Voltaire	65	66	Yes
	B3	6560 Rue Villon	62	62	Yes
	B4	6850 Rue Pinard	59	60	Yes
	B-A1	Rue Voltaire	62	63	Yes
	B-A2	Rue Voltaire	65	66	Yes
	B-A3	Rue Voltaire	65	65	Yes
	B-A4	Rue Villon	60	61	Yes
	B-A5	Parc Villon	64	65	Yes
	B-A6	Rue Pinard	57	58	Yes

4.3.13 Heritage and archaeology

4.3.13.1 Geographic context

The study area comprises three landscape units separated by the St. Lawrence River and is located downstream of the Greater La Prairie Basin. The segment on the south-east bank of the Island of Montreal sits astride a sector that until the 19th century was crossed by the winding St. Pierre River. This area was greatly transformed by development of the tail race of the Montreal aqueduct and its replacement, the St. Pierre Collector. The bridge approaches are located in a wide strip where the riverbed was banked up circa 1935. On the north end of Nuns' Island, the highway alignment crosses a very flat area used for farming as early as the 17th century. In addition, Jacques Le Ber built his estate on a mound along the eastern edge of the island. On the South Shore, the bridge accesses are also located in a very flat area that rises gradually as it approaches the riverbank. The location of the current bridge is approximately 325 metres north of a small tributary that joined the river.

4.3.13.2 Methodology

4.3.13.2.1 Prehistoric archaeological potential

Areas of prehistoric potential were identified and pinpointed in stages, as follows:

- Reconstruction of former landscapes using historical maps and identification of changes due to urbanization and addition of various infrastructures;
- Establishment of a body of data on the evolution of the physical environment in order to identify the point in time when human occupation may have been possible and under what conditions;
- Establishment of a summary of human occupation during prehistory, making it possible to develop the framework in which occupation of the study area may have taken place. At this stage, the data on known archaeological sites within the boundaries of the study area were taken and assembled using the *Inventaire des sites archéologiques du Québec* (inventory of archaeological sites in Quebec) (ISAQ) data base;
- Consultation of the primary reports on archaeological investigations relating specifically to the study area.

The ISAQ data base belonging to the Quebec Department of Culture, Communications and the Status of Women (MCCCF) and the reports on archaeological investigations indicate that only the sector on the eastern edge of Nuns' Island contains known prehistorical archaeological sites, i.e. BiFj-1 and BiFj-49[9] (see Table 66). The sectors on the shore of the Island of Montreal and on the South Shore of the River, however, have never been inventoried for archaeological purposes to determine the presence of any sites. Human occupation of the St. Lawrence Valley is evidenced, however, by the discovery of a significant number of sites dating back at least six thousand years. Table 65 presents the currently known archaeological sites in the immediate vicinity of the study area, which indicate more intensive occupation over the past three to four thousand years.

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[9] **Canadian archeological sites are assigned an alphanumeric code number, referred to as a Borden Site Number, used to identify findspots.**

Table 66 Known archaeological sites in the study area

BORDEN CODE	LOCATION	DISTANCE FROM PROJECT (KM)	CULTURAL AFFILIATION	REFERENCES
BjFj-1	Le Ber site, Nuns' Island	0	Prehistoric (Middle and Late Woodland); Euro-Quebec, 17th and 18th centuries	Sellar, 1888; Webster, 1970; Gaumond s.d.; Archéocène Inc., 1993; Arkéos Inc. and Archéocène Inc., 1994a and 1998; Ethnoscop Inc., 1997d
BiFj-35	Maison Saint-Gabriel	0.5	Euro-Quebec (1608-1950)	Ethnoscop Inc., 1992 and 2004
BiFj-49	Le Ber site, northern tip of Nuns' Island	0	Prehistoric (Archaic, Middle and Late Woodland); Euro-Quebec, 17th and 18th centuries	Arkéos Inc. and Archéocène Inc., 1998; Ethnoscop Inc., 1997
BiFj-78	Verdun Dyke	0.1	Euro-Quebec (1800-1950)	S.A.C.L., 2005

4.3.13.2.2 Historical archaeological potential

The body of data

Assessment of the historical archaeological potential first involves taking stock of the historical data regarding the area in order to identify the major phases of occupation of the space and the areas most likely to hold archaeological remains that are evidence of the various past occupations. Establishing a body of historical data, mainly comprising visual documents (engravings, old photographs and aerial photographs) and historical maps from a variety of sources (LAC, BANQ, City of Montreal archives, Geomatics Department of Montreal Public Works, and McCord Museum archives), is an important first step. Consultation of monographs and historical summaries dealing with the historical development of the various sectors in the study area is also critical to establishment of this body of data. Finally, reports from studies of potential and archaeological investigations carried out in the study area are also a key source of relevant historical data.

To complete the assessment of the theoretical archaeological potential, it was necessary to identify the known archaeological sites (see Table 66 and the Biophysical and Human Environments Distribution Map in Appendix 5), as well as heritage buildings. The MCCCF's ISAQ data base was consulted to identify the known archaeological sites. Each site is located on current topographical maps and a descriptive record is attached, containing a summary of the relevant information taken from the archaeological investigation reports. The archaeological sites located in or near the study area have been plotted on a map of the current built heritage and the study area, and the related investigation reports have also been consulted to identify the results and recommendations provided therein. As for the heritage status property, the MCCCF's *Répertoire du patrimoine culturel du Québec* (cultural heritage inventory for Quebec) online data base was consulted for all sectors in the study area. To complete the identification of the heritage data, the City of Montreal's land-use plan prepared in 2004, as well as the *Grand répertoire du patrimoine bâti de Montréal* (greater inventory of Montreal's built heritage), were reviewed for the boroughs of Verdun and Sud-Ouest. In order to prepare an evolving profile of the urban landscape of the study area, the *Répertoire toponymique des rues de Montréal* (inventory of street names of Montreal) was also consulted.

To assess the residual or other archaeological potential or, in other words, the integrity of the remains and soil layers that may subsist after the modern-day disturbances that inevitably come with the urbanization process, it was necessary to locate information regarding the modern urban development of the study area. We should clarify, however, that while modern development certainly often affects archaeological evidence, it does not always necessarily do so entirely. There remains therefore the possibility that a piece or even most and in some cases all of the evidence may remain. To determine the residual archaeological potential, very useful data were consulted regarding construction of the Champlain Bridge in the 1960s, the installation of the various access roads and the periods of related fill (JCCBI), various developments related to the Montreal aqueduct (City of Montreal Public Works archives, BANQ and the *Grand répertoire du patrimoine bâti de Montréal*), development of various streets, highways and overpasses (BANQ, the City of Montreal archives and *Répertoire toponymique*), and railroad installations located partly within and partly near the study area (BANQ and City of Montreal archives). These are all events that marked and modified the study area and are in part responsible for the current state of the sites.

4.3.13.3 Results

4.3.13.3.1 Prehistoric archaeological potential

The study of the potential for the prehistoric period generated the following preliminary results for the various sections of land in the study area:

North Shore on Island of Montreal

In the area of the bridge approaches, the archaeological potential of a slight mound located along Wellington Street was completely destroyed when the tail race of the Montreal aqueduct was built. Elsewhere, heading west, the archaeological potential was very low, due to the nature of the terrain and the distance from the river; in any case, there again, any potential would have been destroyed when the aqueduct was developed and the railroad and Highway 15 were built in 1961-62. On the riverfront, redevelopment of the on and off ramps will be done in a ± 380-metre-wide strip of fill that covers the riverbed.

Nuns' Island

The proposed new alignment for René Lévesque Boulevard (east side of the Island) heading towards the roundabout in the northern area of the island crosses the Le Ber site (BiFj-1) (see the Biophysical and Human Environments Distribution Map in Appendix 5). The prehistoric archaeological potential of the sector was verified during work on the site in 1995 (Ethnoscop, 1997) and prehistoric Amerindian remains have been identified in the northeast sector of the Le Ber built area of the estate, as well as the eastern part (BiFj-49) of the island heading towards the northern tip. Human remains (skull and clavicle) were also recently discovered at the burial site of a child who died at the age of six. The analysis of the burial site confirmed its Amerindian origins and carbon-14 dating puts the site in the Late Woodland period, around 1300 A.D. Because the bones were not well preserved and there were few bones other than the skull, and given the child’s age, it was not possible to identify the child’s sex or cause of death (Arkéos Inc., 1998; Ethnoscop, 1997). Following the discovery, the site is considered important to the Mohawk Community of Kahnawake

In the northeast corner of the Le Ber site, the new proposed alignment for René Lévesque Boulevard will overlap the edge of an area of prehistoric archaeological potential (P-2) extending toward the east.

The other corrections to the highway alignment and access roads will affect areas that have already been disturbed and hold no archaeological potential.

South Shore (Brossard)

Due to its location along the St. Lawrence River, it is likely that there have been prehistoric human occupations in the sector that will be affected by construction of the new bridge. This is all the more likely due to the proximity of the stream that joins the river to the south. Although the soil's integrity may have been diminished by clearing, cropping and construction of dwellings, there is sufficient potential for identifying soil that is relatively undisturbed to warrant verification through archaeological surveys (inventory). An examination of photos taken during construction of the bridge further shows that the construction site would not have crossed into the sector of built heritage at the time.

4.3.13.3.2 Historical archaeological potential

The current analysis of the data regarding the historical archaeological potential has already identified the known archaeological sites and cultural property in the area and established approximate areas of archaeological potential for consideration during future work in the study area.

Two historical archaeological sites are located in the study area, i.e. BiFj-1 (the Le Ber site on Nuns' Island) and BiFj-78 (Verdun dike site). The Saint-Gabriel farm site (BiFj-35) is also located near the right of way for future work in the borough of Sud-Ouest. All of these sites are shown on the biophysical and human environments distribution map in Appendix 5.

As for the heritage value of the area, the buildings on Saint-Gabriel farm and the chapel of the Congregation of Notre-Dame (borough of Sud-Ouest) should be considered, as well as the various developments connected to the aqueduct and canal, the institutional and commercial core of De l'Église and Wellington Streets, as well as the Église des Montréalais (in Verdun).

Analysis of the historical development of the streets in the study area located in the borough of Verdun revealed, among other things, that some of the current main arteries (LaSalle Boulevard and De l'Église Street) have in fact been present since the very start of historical occupation of the study area.

A study of the visual documents and historical maps led to an assessment of the theoretical archaeological potential. Any modern disturbances likely to have affected the integrity of the archaeological remains and evidence that may theoretically have been present in the subsoil of the study area were removed from the analysis, by consulting the archives regarding the modern work on development of the Champlain Bridge in the 1960s, the Montreal aqueduct, the railroad and major roadwork in the study area.

A preliminary profile of the areas of residual historical archaeological potential in the study area has thus been developed.

In the modern-day borough of Verdun, a sensitive area of archaeological potential has been identified in the sector near the bank of the river, since the known archaeological site of the dike, dating back to the second half of the 19th century, is in that area (BiFj-78), as well as the area along the aqueduct canal, which is always likely to hold remains associated with development of the Montreal aqueduct (19th century), the various industries that occupied the sector, such as the British Munitions Co. (first half of the 20th century), a cotton mill (second half of the 20th century) and the St-Pierre Land & Manufacture Co. (late 19th century). To a lesser extent, keeping in mind that later developments may have erased all traces of older occupations, there is always the possibility of finding traces of agricultural occupations in the sector from the 18th and first half of the 19th centuries.

As for the modern-day borough of Sud-Ouest, the area of potential is located primarily around the known archaeological site (BiFj-35) and the heritage buildings of Saint-Gabriel farm (late 17th century to today). In addition, we must mention the developments related to the Montreal aqueduct and canal and the industries that operated along the bank of the St. Lawrence, such as M. Wap Co. and a glass factory (first half of the 20th century). Again, we must be aware that it is possible that traces of farms that occupied the area in the late 18th and first half of the 19th centuries may remain, although modern disturbances may have reduced or destroyed their integrity.

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. When we superimpose the historical maps, it is clear that the right of way for the access ramps to the new bridge is located in an area where farm buildings were present in the second half of the 19th century.

The Nuns' Island area directly affected by the future work holds one historical archaeological site (BiFj-1: Le Ber site) that is extremely important due to its uniqueness in the Montreal area. Indeed, the site provides evidence of the beginnings of New France with the establishment of a farm estate by Jacques Le Ber, one of the most influential merchants in the colony, particularly in the area of relations with the Amerindians. In the 18th century, the sisters of the Congregation of Notre-Dame took possession of the land and the estate. Current knowledge tells us, on the one hand, that the site has been investigated on a number of occasions and, on the other, that the south portion of it appears to be visibly truncated by development of the Champlain Bridge in the 1960s. The various archaeological investigations led to documentation of the main building, the manor and its enclosure wall and redoubts and a number of secondary buildings that are contemporaneous or later additions. The results of the last investigation in 1998 indicate that there are still new elements that remain to be documented on the site, elements that are not necessarily shown on historical maps or even mentioned in the archive documents (levels of occupation outside the courtyard, gardens and orchard, lime pits, latrines, less significant secondary buildings, etc.). In addition, the historical documentation reveals that some secondary buildings have not yet even been found, including a barn and a stable. The area around the Le Ber site (BiFj-1) must therefore be considered a sector of high historical archaeological potential.

4.3.14 Aesthetic and visual aspects

This section deals with the characterization of the dominant landscape components of the study area of the New Bridge for the St. Lawrence project and the description of sensitive elements that need to be considered in the planned introduction of new infrastructures.

The Champlain Bridge is a structure extending for over 3.4 km and connecting boroughs of Montreal (Sud-Ouest and Verdun) to the city of Brossard. For the last half-century, the bridge has been an icon of the Montreal landscape, both for the 57 million annual users and for residents and observers nearby, as the bridge approaches form an integral part of the surrounding urban fabric. The Champlain Bridge is therefore a cornerstone of the Montreal island landscape. For users, it provides an eloquent gateway that introduces the city's morphology, with the business centre and Mount Royal as the backdrop. Furthermore, this specific visual experience is extensively documented in the November 2006 study report commissioned by the MTQ, titled *Le cadrage paysager des entrées routières de Montréal*. According to the report, the Bridge acts as a lookout, offering a spectacular view of the Montreal skyline (page 189).

Since the new structure will occupy approximately the same footprint as the existing bridge (immediately to the north), and although its architectural expression remains to be defined, there is a danger that the new structure may represent a discordant visual intrusion on the landscape. The bridge, whether current or planned, forms part of the composition of the local landscape. For that reason, the main potential effects that may generally be identified in an impact study should be weighed here according to the real impact of a replacement project.

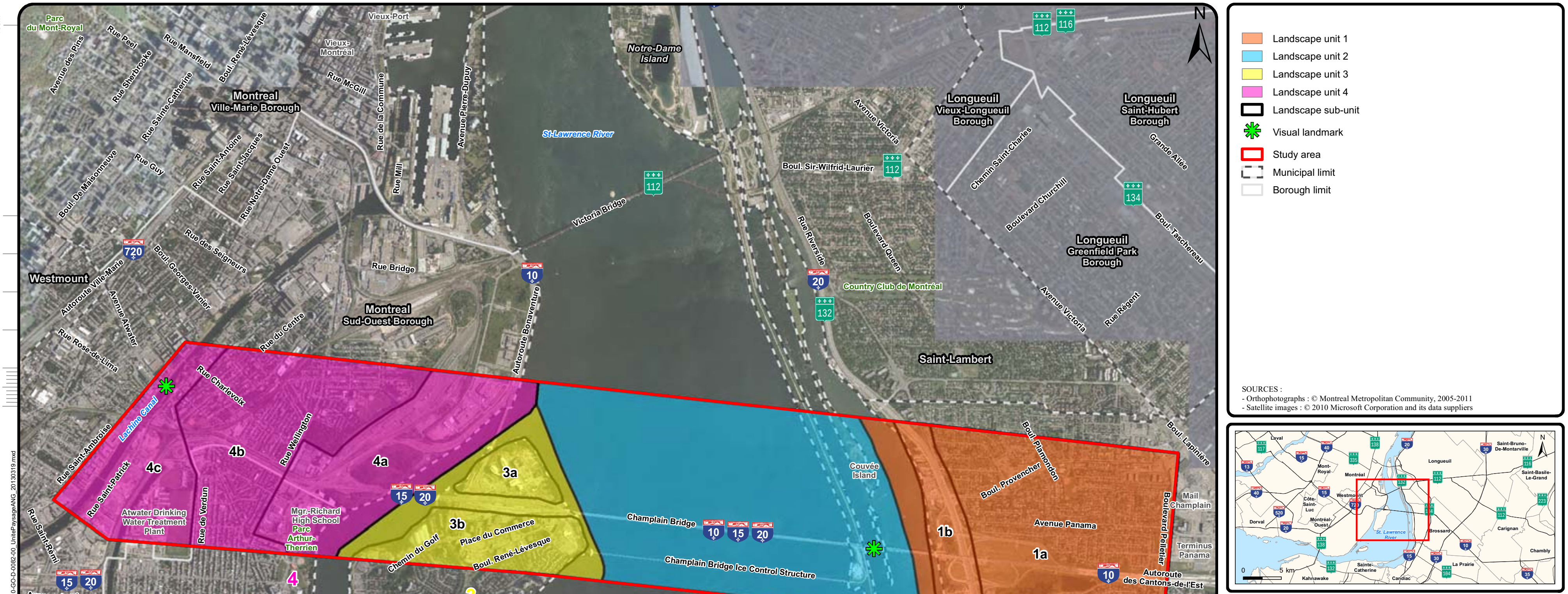
The method selected involves dividing the study area into landscape units and sub-units, i.e. areas of land that have homogeneous landscape components, whether biophysical (topography, vegetation, hydrography) or anthropic (use of land, network, density, etc.). Landscape units and sub-units are characterized according to the dominant distinctive features of that area of land. For that reason and to simplify reading of the issues, some details may occasionally be omitted. Next, the elements and conditions of the area that are potentially sensitive to project implementation and that should be considered in pursuing the study are compiled.

The study area has four (4) landscape units whose boundaries are broadly determined by the presence of the St. Lawrence River (see Figure 83):

- Landscape unit 1, gateway to the city of Brossard. This unit has two sub-units;
- Landscape unit 2, the River;
- Landscape unit 3, Nuns' Island. This unit has two sub-units;
- Landscape unit 4, gateway to the city of Montreal. This unit has three sub-units.

4.3.14.1 *Landscape unit 1, gateway to the City of Brossard*

Landscape unit 1 includes the part of the study area to the east of the River to the edge of Pelletier Boulevard and the commercial hub on Taschereau Boulevard, including Champlain Mall. The landscape unit is an essentially homogenous bedroom community on both sides of the bridge and Highway 10. The landscape is defined by a complicated web of streets giving access to single-family bungalow-style residences. It is a typical suburban setting. We should point out however that the area surrounding Route 132 and the strip of land between the highway and the riverbank area are distinctive. We can therefore distinguish two landscape sub-units.



🟧	Landscape unit 1
🟦	Landscape unit 2
🟨	Landscape unit 3
🟪	Landscape unit 4
▢	Landscape sub-unit
✳	Visual landmark
🟥	Study area
⌜⌟	Municipal limit
▢	Borough limit

SOURCES :
- Orthophotographs : © Montreal Metropolitan Community, 2005-2011
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Client
Transport Canada Transports Canada

Project
New Bridge for the St. Lawrence Environmental Assessment

Title
Figure 83
Landscape Units

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Prepared	Ghyslain Pothier	Discipline	Geomatic
Drawn	Gabriel Corbin	Scale	1:30 000
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	0082	00

SIZE 11x17

4.3.14.1.1 Landscape sub-unit 1a: the suburb

Landscape sub-unit 1a features the following landscape components:

- A homogeneous residential area made up primarily of a broken web of local streets and single-family detached houses, including a sizeable network of public and private land.
- Power line corridors, including an east-west line adjacent to the highway and a north-south line west of Trahan Avenue. The latter also includes a bicycle path.
- Small parks, several of which back onto the A-10 (Villon, Voltaire, Patenaude and Tisserand parks), helping to create a buffer zone through foliage barriers. The parks feature significant highway noise.
- Noise abatement barriers consisting of knolls and walls on both sides of the highway to the east of Villon Street.
- Occasional but clearly visible presence of oversized billboards along the highway.
- Lack of visual screen alongside the houses on Voltaire and Van Dyck Streets.
- The bridge (cantilevered portion) as a landmark of the landscape from various viewpoints, particularly the parks.

Key features of this landscape sub-unit that should be kept in mind:

- The bridge structure is a striking feature of the landscape and contributes to local landscape identity.
- The presence of sound barriers along the highway means that the highway infrastructure is not very noticeable from the residential area, with the exception of the sectors mentioned, which could be sensitive to changes in the landscape potentially caused by the project.
- On the edge of the A-10, billboards are a discordant intrusion.

4.3.14.1.2 Landscape sub-unit 1b: the riverfront

Landscape sub-unit 1b features the following landscape components:

- The landscape sub-unit is made up of Route 132 and various riverfront uses (residential, commercial, parks). It is a heterogeneous urban environment that is in a state of transformation. Some of the existing uses, including a motel, have given way to high-density residential projects, such as towers that are currently under construction. These high-end residential projects make use of the surrounding views and panoramas, including the bridge. A significant change in the sub-unit is foreseeable in the short and medium terms.
- The southern portion of the riverfront is occupied by low-density residential housing (high-end and generally single-family dwellings), whose yards occasionally provide broad panoramas of the river and the bridge structure. Here, the bridge is in the foreground and contributes to the composition of the landscape.
- A widely used recreational bike path is incorporated into the infrastructure in place and runs along Marie Victorin Boulevard.

Key features of this landscape sub-unit that should be kept in mind:

- The bridge structure is omnipresent in all panoramas available to residents and observers going by (motorists and cyclists). It contributes to the composition of the landscape. It is likely that new and existing residential development projects capitalize on the views provided by this singular landscape composition (river/bridge/city).
- The civil engineering structures visible from Marie Victorin Boulevard are an important aspect in the visual sequence of Route 132. The architectural expression of the structures could be taken into account in the upcoming project.

4.3.14.2 Landscape unit 2: the river

The river landscape represents a particularly important and significant part of the study area. It is a landscape sequence that is emblematic of the nature of the Island of Montreal. The existence of the bridge and traffic across it attest to this.

There are few observers on the river portion of the study area, other than those travelling by boat, including recreational boaters. However, we should point out that there is a bicycle path linking the shorelines that runs along the ice control structures and the berm. This path is valued by residents. For users, the views of the river and the panoramas of the bridge are an important concern.

Key features of this landscape unit that should be kept in mind:

- The bicycle path linking the shorelines provides some of the best views of the bridge structure. The new structure could take into account the views from the ice control structures and the seaway.
- The bridge alignment heading west provides some of the best views of the city both at night and during the day. These panoramas are among the most attractive views that can be had of Montreal. The project could preserve and enhance this unique status.

4.3.14.3 Landscape unit 3: Nuns' Island

Landscape unit 3 covers part of Nuns' Island and 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.

4.3.14.3.1 Landscape sub-unit 3a: the northern tip

Landscape sub-unit 3a features the following landscape components:

- Recent addition of corporate head offices, including Bell, with a very contemporary architectural expression, as well as high-end residential towers, with views of the river, the bridge and Montreal.
- The views of the river in the background are part of the surrounding landscape composition.

Key features of this landscape unit that should be kept in mind:

- The northern tip of Nuns' Island is a relatively isolated area with a distinctive character that has been developing constantly for the past several years.
- The urban integration of the new structure and civil engineering structures immediately to the north of the existing axis should take into account the steadfastly contemporary composition of the architectural elements present.

4.3.14.3.2 Landscape sub-unit 3b: Nuns' Island

Landscape sub-unit 3b features the following landscape components:

- A mixed urban fabric dominated by low-to-medium-density residential housing. This fabric is typical of the distinctive landscape of Nuns' Island.
- A complex network of streets and bridge accesses that is somewhat confusing to users.
- The dominant presence of the existing highway infrastructure.

Key features of this landscape unit that should be kept in mind:

- A great deal of effort and money has been expended to develop the Nuns' Island urban project over the past several decades and more recently, with the ongoing development projects and the design and development of roundabouts, for example. The urban integration of the project and civil engineering structures should reflect this process.

4.3.14.4 Landscape unit 4: gateway to the city of Montreal

Landscape unit 4, the city, represents the bridgehead of the project on the Island of Montreal (boroughs of Sud-Ouest and Verdun). The unit 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.

4.3.14.4.1 Landscape sub-unit 4a: the riverfront

Landscape sub-unit 4a features the following landscape components:

- The area to the north of the bridge is defined by heavy industry, i.e. the Via Rail marshalling yard, plus the Bonaventure Expressway and unoccupied green space alongside the bridge.
- The southern area is mixed commercial, institutional and recreational use and includes a large linear park (Georges O’Reilly Park) along the river with views of the highway infrastructures.

Key features of this landscape sub-unit that should be kept in mind:

- The uses and the surrounding landscape are not sensitive to the introduction of the new infrastructures.
- The views from the riverfront park should be maintained as a priority.



4.3.14.4.2 Landscape sub-unit 4b: the residential neighbourhood

Landscape sub-unit 4b features the following landscape components:

- Mixed urban setting dominated by medium- to high-density residential housing between Augustin Cantin and Joseph Streets to the west and Leber Street and Cerf Volant Boulevard to the east.
- A landscape marked by a neighbourhood feel, including local residential streets and commercial thoroughfares nearby (Wellington and LaSalle).
- A wealth of historical buildings that contributes to the overall quality of the landscape (most local residential streets, for example, Hibernia, Liverpool, Charron and Bourgeoys).
- Fragmentation of the homogeneous fabric by the elevated highway right in the heart of the neighbourhood and an industrial strip (Butler Street) that break up the landscape.
- Connections between the two boroughs beneath the highway on LaSalle Boulevard and Wellington Street. These streets are fairly narrow and civil engineering structures are highly visible parts of this urban landscape.

Key features of this landscape sub-unit that should be kept in mind:

- Well-developed neighbourhood vitality on both sides of the imposing transportation route, which has nevertheless dominated the landscape for the past 50 years.
- The need to properly plan or even improve the urban integration of the new infrastructures, particularly using riverfront developments and attractive civil engineering structures (bridges, walls and viaducts) that contribute to the quality of the environment and enhance the connectivity of the residential sectors.



4.3.14.4.3 Landscape sub-unit 4c: the historical area around the Lachine Canal

Landscape sub-unit 4c features the following landscape components:

- The Lachine Canal, an urban component that acts as a visual and cultural cornerstone of the area.
- The area around the Canal, including St. Patrick Street, which is dominated by heritage buildings and industrial establishments, a number of which have been converted into residential housing over the years.
- The Atwater Market, which is a hub of activity and a landmark in the neighbourhood's urban and cultural landscape.
- Municipal infrastructures, including the Atwater water treatment plant at the extreme end of the aqueduct canal.
- A broken network of streets in the north-south axis due to breaks such as the highway and the canals. The only links are the Seigneurs and Charlevoix bridges and the Atwater tunnel.

Key features of this landscape sub-unit that should be kept in mind:

- The landscape sub-unit appears to be insensitive to the bridge replacement project. Only one reconfiguration of the Atwater interchange is planned, and the sector has few fixed observers. An optimal integration of the structures into the urban environment is desirable.

4.4 SUMMARY OF KEY ISSUES

Although effects and mitigation measures will be covered in Part II of the Environmental assessment Report, this section provides an overview of the highlights of the environmental components and the factors to be considered in the next steps of the project.

4.4.1 Soil quality

The environmental quality of the land around the Champlain Bridge in Montreal is the result of a well known problem: the presence of a former landfill and fill site on the river commonly referred to as a "Technoparc." Fill consisting of contaminated soil and waste material up to a depth of12 m has been identified in the area. Concentrations of methane (CH_4) in excess of the flammability threshold (5% volume) have been measured in the underground air in this sector. Elsewhere in the construction zone of the new infrastructure, problems relating to land quality are less serious.

Construction of the new infrastructure does not require decontamination of the land it crosses, particularly the Technoparc. 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 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 Technoparc 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.

4.4.2 Water quality

4.4.2.1 Surface water

The main issue with regard to surface water quality relates to variations in turbidity/TSS. 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 (TSS) should also be gathered in order to learn the high values of the range for TSS and for turbidity under natural conditions.

4.4.2.2 Groundwater

In the Technoparc sector around the Nun's Island Bridge, groundwater is found at an average depth of 6.5 m below the surface. This water shows concentrations in excess of municipal effluent standards for certain substances (manganese, barium and polycyclic aromatic hydrocarbons). 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.

4.4.3 Sediment quality

The Greater La Prairie Basin is an environment where hydrodynamic energy conditions do not promote the accumulation of sediment. There is no erosion and the coarse substrate consists of boulders and pebbles. The Lesser La Prairie Basin is an area of calm water, which favours fine sediment accumulation. Contamination levels in the Greater La Prairie Basin are negligible. Levels in the Lesser

La Prairie Basin are higher, despite the temporal fluctuations described in various studies, but not alarming. In 2012, trace metal levels fell or remained stable. The level of contamination remains moderate for arsenic, lead, zinc and for organic contaminants such as PCBs.

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.

4.4.4 Air quality and GHG

Throughout the entire Island of Montreal, with very few exceptions, air quality is improving. Although existing sampling stations do not directly and solely measure emissions associated with the road network in the study area, there is reason to believe that air quality in this area is good and that the number of exceedances of emission standards for atmospheric pollutants is very low. Although it is true that the situation in Montreal is improving, present concentrations of atmospheric pollutants may be higher within a radius of 300-500 m of the infrastructure footprint.

As for GHG, road transport is the principal source of GHG in Quebec. With the busiest bridge in Canada, there are grounds for believing that the proportion of GHG emissions in the study area is significant when compared to emissions from road transport. The contribution of the transportation sector to carbon dioxide (CO2) emissions is estimated at about 44% in Quebec (MDDEP, 2011). However, total GHG emissions in Quebec and in Canada are falling. Therefore, 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 GHG leave reason to believe that although air quality is a significant issue for the project, no significant effect is expected.

Once the final geometry of the infrastructure is known, a dispersion simulation for criteria air pollutants (CAP) should be conducted in order to validate the project's impact on sensitive areas (schools, seniors' residences, daycares, hospitals) found within a radius of 300 to 500 m from the infrastructures.

4.4.5 Flora

The natural environments located in the study area are mainly successional environments colonized by pioneer species typical of open fields in the metropolitan region. No natural environment constitutes a rare ecosystem at the regional level.

Forest stands, open fields, and wetlands, mainly riparian wetlands, could be affected by the project, either by deconstruction of the existing infrastructure or by construction of the new infrastructure.

No species designated in the *Species at Risk Act* (S.C. 2002, c. 29) or in the *Act respecting threatened or vulnerable species* (R.S.Q., c. E-12.01) was inventoried in the study area. There are only two species likely to be designated threatened or vulnerable in the study area: the St. Lawrence water horehound (*Lycopus americanus var. laurentianus*) and the rough water-horehound (*Lycopus asper*).

During the planning phase for construction work, the location of the St. Lawrence water horehound 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.

4.4.6 Fauna

4.4.6.1 Ichthyofauna

The literature provided information about the fish species that may be present in the study area and upstream and downstream from the study area. Surveys conducted to characterize the area were used to assess the types of aquatic habitats. These two sources of information made it possible to identify important habitats and their potential use by all Ichthyofauna and especially by species at risk with a provincial status.

The study shows that there are many very suitable habitats for Ichthyofauna in the study area. There are significant potential spawning grounds in fast-flowing water at the downstream end of Nun's Island and along the rocky outcropping on the eastern side of the same island. These sites can be used for spring spawning for such species as the northern sucker, the white sucker, the silver redhorse, the shorthead redhorse, the walleye and the sauger. There are also large aquatic plant communities in the channel between Nun's Island and Montreal Island, along the northeast shore of Nun's Island, on the right bank of the Greater La Prairie Basin and on either side of the Lesser La Prairie Basin. These fairly dense vegetation sectors are used for spawning by, among others, the chain pickerel and all the phytolithophile species. These habitats also serve as rearing and feeding grounds for a wide range of fish.

Lastly, the Greater La Prairie Basin constitutes a migration path for such species as the lake sturgeon, the American Shad and the American eel.

In short, 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 Nun's 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, rearing 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.

4.4.6.2 Herpetofauna

The presence of the brown snake (*Storeria dekayi*) is the sole noteworthy element with regard to herpetofauna. This species, whose home range is limited, was surveyed at the stations on Nun's 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.

4.4.6.3 Avifauna

The majority of bird species counted in the inventoried area is of no special interest. They are typical of open urbanized environments, which are the most common habitats in the study area. One species is worth mentioning, 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.

Lastly, for work carried out within the migratory bird sanctuary (MBS) 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.

4.4.7 Navigation

4.4.7.1 St. Lawrence Seaway

The elements to be considered for the Seaway are essentially the SLSMC’s reluctance to authorize 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 SLSMC. 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.

4.4.7.2 St. Lawrence River and Greater La Prairie Basin

For larger vessels, navigation in the St. Lawrence River and La Prairie Basin in the area of the New Bridge for the St. Lawrence is restricted to users who are familiar with the sites (CCG and Saute-Moutons), but they can also be accessed by boaters in light craft, as evidenced by the two Greater Montreal Blue Routes that cross the study area.

An element to be considered is 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, to say nothing of the negative impacts on navigation. 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.

4.4.8 Recreational/tourist activities

4.4.8.1 Commercial and sport fishing

Commercial and sport fishing are prohibited on the St. Lawrence Seaway.

There is no commercial fishery on the River and in the Lesser La Prairie Basin one kilometre above and below the Champlain Bridge. However, from April to October, this area is frequented by sport fishers who line fish or fish from the shore on both the Montreal and South Shore sides, or use small craft to criss-cross the study area. The main fishing points are not known and there is little information available on the frequency of fishing or the number of fishers who use this area. There is ice fishing from January to March near the Champlain Bridge park, less than 300 m above and below the Champlain Bridge.

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.

4.4.8.2 Bike paths

Seven bike paths that are part of the # 1 and # 5 Route verte and of the city of Montreal and South Shore bike pathways are located in the construction footprint of the New Bridge for the St. Lawrence.

Several hundred cyclists use the bike paths on weekdays to travel to and from work. Traffic can double on weekends, but use at this time is mainly recreational.

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.

4.4.9 Sound environment

A number of noise-sensitive areas have been mapped along the project footprint. These sensitive areas have been identified based on various elements in the receiving environment (i.e., municipal zoning, buildings, topography, hills, etc.) and on the characteristics of present and planned highway infrastructures (routes, profiles and traffic) that could influence the sound environment. The MTQ policy on road noise, in effect since 1998, defines a noise-sensitive area as one that includes outdoor spaces where the sound environment is essential to carrying out human activities. They are associated with residential, institutional and recreational purposes. The sensitive areas were determined from an inventory of land use in the two municipalities along the route.

Ambient noise was measured for different periods within the various sensitive areas. Survey results, combined with traffic counts for the same periods, served to calibrate a computer model that were used to evaluate the configurations of current and planned roads. The results of the traffic noise simulations were calculated based on average summer traffic flows (ASTF) for 2012 and 2026.

Subsequently, zones where noise mitigation measures would potentially be required by the project were determined using the results obtained with the current road infrastructure.

4.4.10 Archaeology

Human occupation of the St. Lawrence valley dates back at least six thousand years and has intensified over the last three or four thousand years. Four archaeological sites have been inventoried in the project footprint and areas of archaeological potential have been defined in a preliminary fashion at this stage of the project. Two areas of prehistoric archaeological potential have been identified:

- on Nuns’ Island, because of two known archaeological sites (BiFj-1 and BiFj-49) (see the Biophysical and Human Environments Distribution Map in Appendix 5);
- in Brossard, because of the proximity of a small watercourse flowing into the St. Lawrence.

Areas of historical archaeological potential have also been sketched out:

- in the borough of Verdun, near site BiFj-78;
- in the borough of Sud-Ouest, around site BiFj-35 (see the Biophysical and Human Environments Distribution Map in Appendix 5) and heritage buildings on the Saint-Gabriel farm;
- in Brossard, where the potential is related to agricultural occupation in the 19th century;
- on Nuns’ Island, where site BiFj-1, which shows both prehistoric and historical occupation, has been excavated a number of times but where some elements still remain to be documented.

The identification of the abovementioned areas of potential makes a pre-construction archaeological inventory necessary during the next stages of the project. This will allow archaeologists to verify the presence of soil that is undisturbed by land use and the construction of the Champlain Bridge and to search for any archaeological indicators.

4.4.11 Aesthetic and visual aspects

The visual components of the study area are very diverse and include suburban-type settings, dense urban historical sectors and contemporary-design developments. Within that context, 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, so 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.

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Appendix 1 Detailed Planned Structure Types

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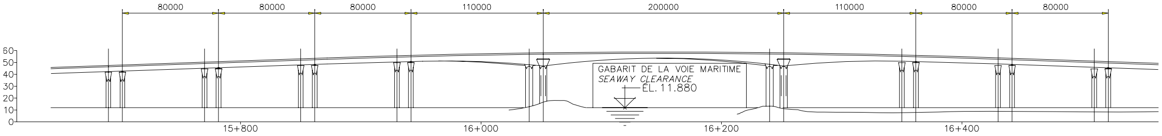
1.1.1.1 Types of structures considered

1.1.1.1.1 Single box girder bridge in prestressed concrete built with successive cantilever segments

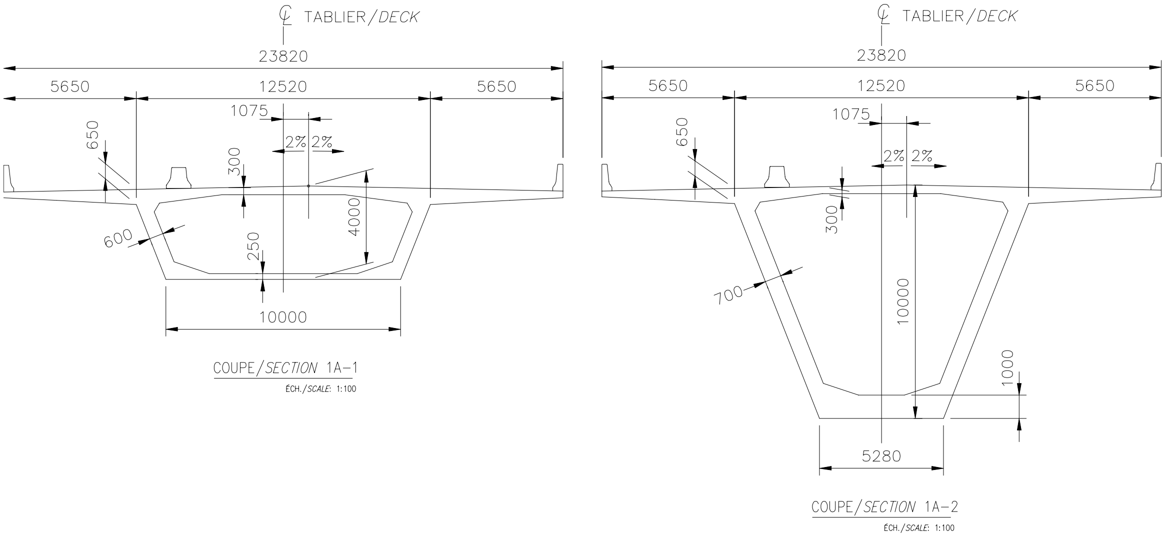
A single box girder bridge made of prestressed concrete is shown in Figure 3. The standard spans are 80 m long while the seaway is crossed by a 200 m span. The transition spans are 110 m.

Figure 1 Elevation – Single box girder in prestressed concrete



A single box girder at a constant height of 4.00 m would cross the standard 80 m spans. To cross the seaway, the height at supports is 10 m, the height at the key being, for geometric reasons, equal to that of the standard spans. The span above the seaway is built with successive cantilever segments, poured in place, while the standard spans, in precast segments, can be set in place by various means, for example, using a launching gantry. Figure 4 presents the proposed cross-sections.

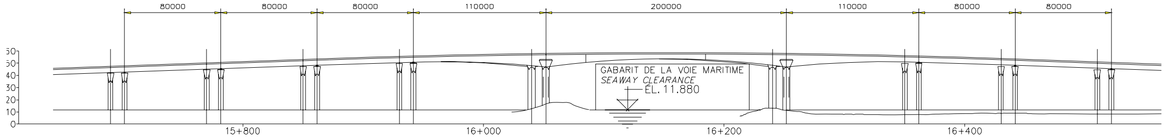
Figure 2 Cross-sections – Successive cantilever segments



1.1.1.1.2 Steel-concrete composite bridge

The structure is composed of a mixed or steel frame span over the seaway, supported by prestressed concrete spans on both sides. The standard spans are either prestressed concrete or mixed frame. The main span is comprised of a 120 m metal section between two concrete segments (40 m from the piers) as shown in Figure 5. The standard spans are 80 m and the transition spans are 110 m.

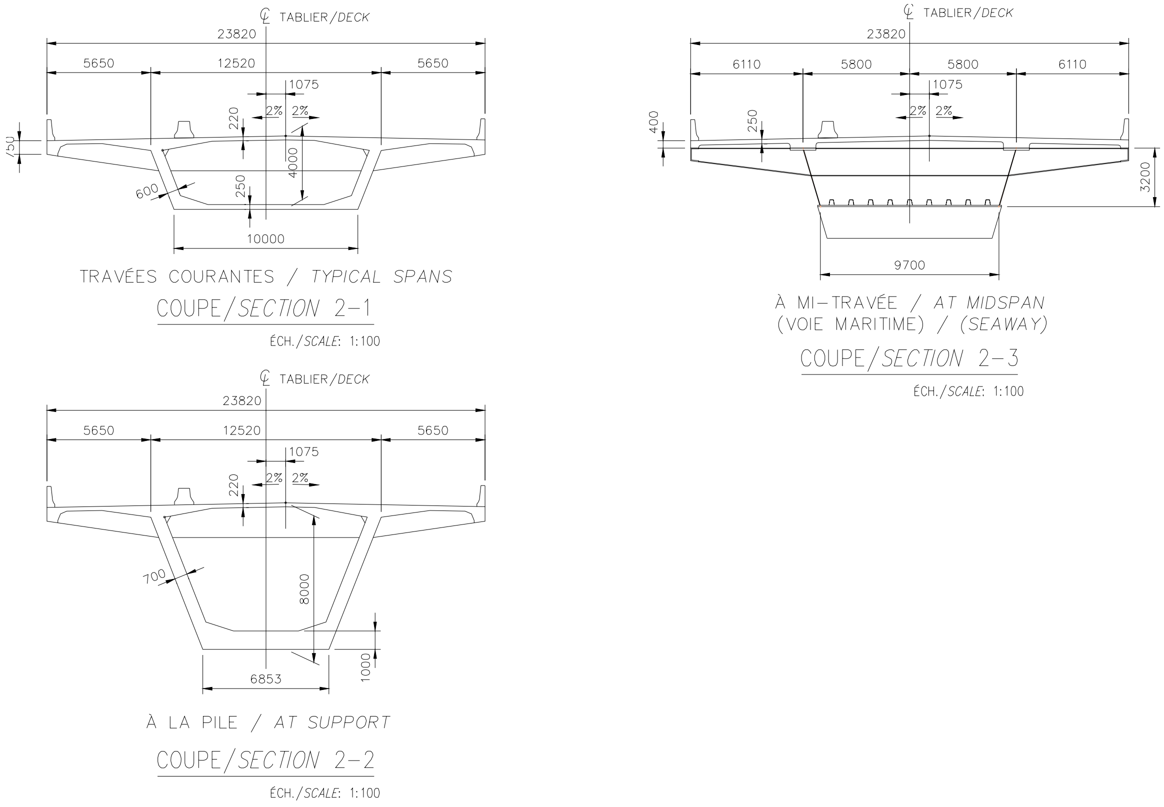
Figure 3 Elevation – Composite bridge



The metal section is hoisted from the seaway. It is then keyed and nailed by prestressing to the concrete section built in successive cantilever segments. The ends of the metal section are then embedded, thus avoiding having to build chair-type bearings, which have durability issues.

The cross-section of the standard spans is similar to the one considered for the successive cantilever segment solution. To the right of the main piers, the 8.00 m high structure is reduced to 3.20 meters for the metal frame, to the key of the steel part of the main span.

Figure 4 Cross-sections – Composite bridge



TRAVÉES COURANTES / TYPICAL SPANS
COUPE/SECTION 2-1
ÉCH./SCALE: 1:100

À MI-TRAVÉE / AT MIDSPAN
(VOIE MARITIME) / (SEAWAY)
COUPE/SECTION 2-3
ÉCH./SCALE: 1:100

À LA PILE / AT SUPPORT
COUPE/SECTION 2-2
ÉCH./SCALE: 1:100

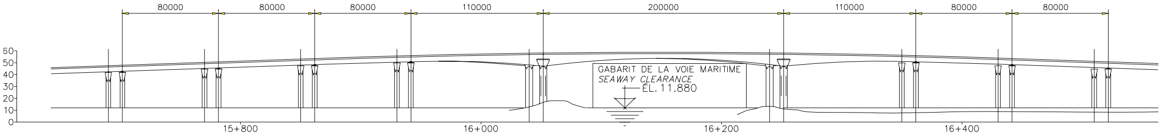
1.1.1.1.3 *Mixed frame bridge*

Several mixed solutions (concrete deck resting on a steel frame) are possible: twin-beam, single box girder and double box girder. For consistency, the metal frames of the different solutions have a height of 3.2 m for the standard 80 m spans and a height of 8 m to the right of the piers framing the seaway.

Given the large area to cross, the main span must be launched from one side of the seaway to the other in order to limit the cantilever to 100 m beyond the main piers. Once launched, the two parts will be connected. The standard spans can be set in place either by launching or lifting with a crane.

If this type of structure is selected to cross the seaway, the longitudinal slopes and connection points will need to be reviewed.

Figure 5 Elevation – Mixed bridge



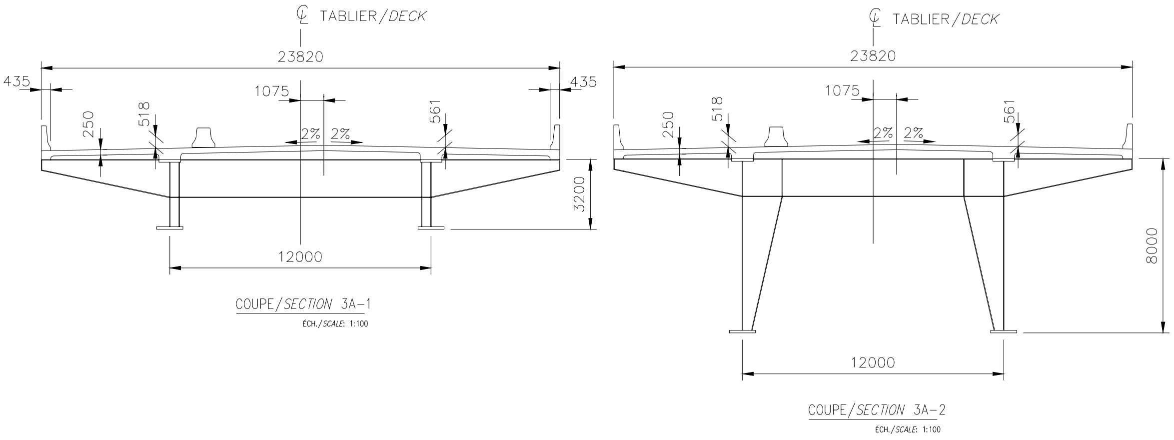
Twin-beam section

A twin-beam bridge solution is favoured over a classic multi-beam solution since it offers several advantages:

- Cost-effective and durable solution;
- Significant reduction in number of welds;
- Reduction in number of bridge bearings;
- Easy maintenance;
- Fewer operations during construction and reduced construction time:
  - Launching of 2 beams only instead of multiple launches of 2 beams
  - Reduced number of operations if the beams are installed with a crane
  - Better control of reactions at the support for structures that are launched or installed with a crane.

The twin-beam section that is considered requires the use of floor beams rather than cross girders, given the width of the supported deck. The main difference between the floor beams and the cross girders are that the floor beams hold the slab. These are generally assembled beams whose centre-to-centre is located at approximately 4 m. The proposed floor beams also have brackets under the cantilevers.

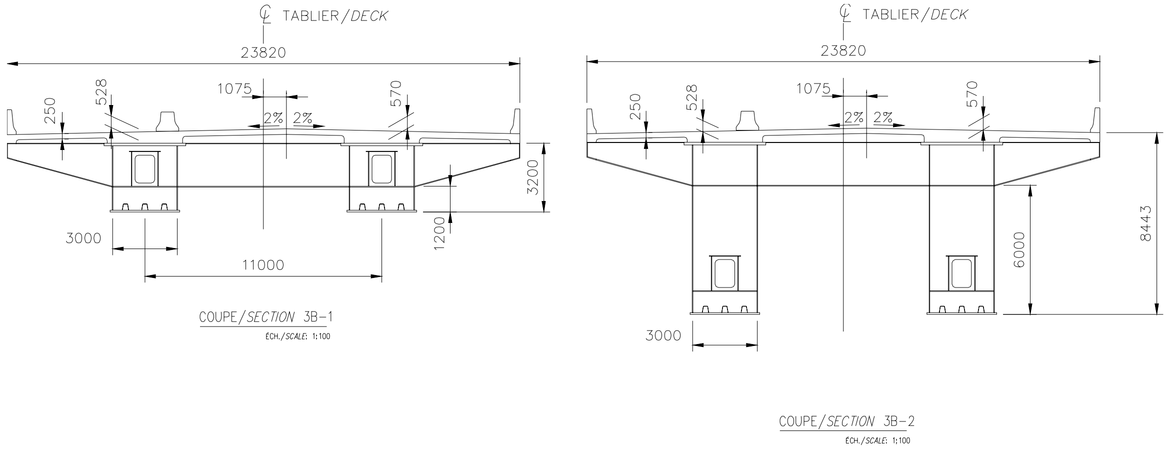
Figure 6 Cross-sections – Mixed frame bridge – twin-beam



Double box girder section

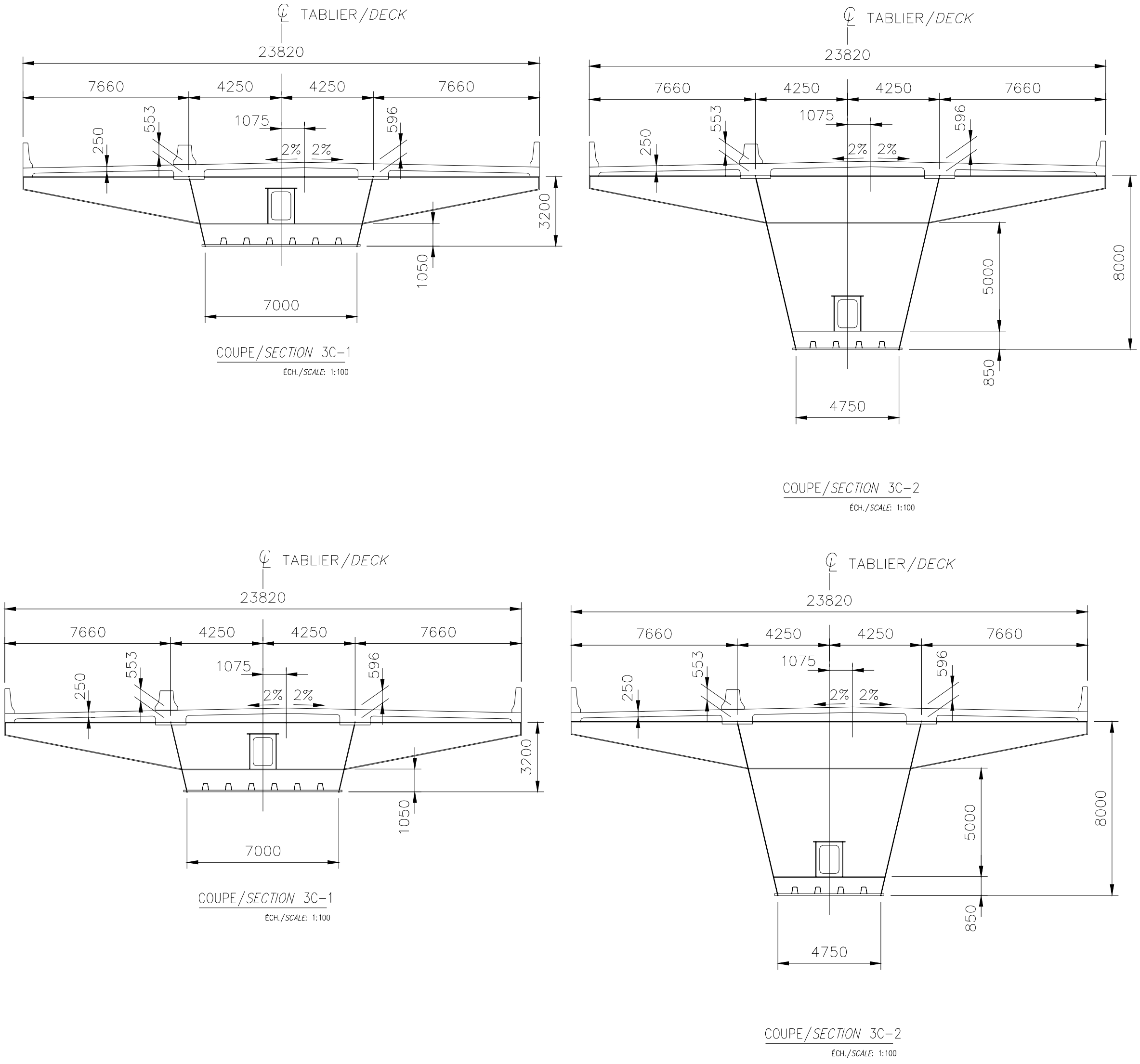
Double box girders are an alternative to twin-beams, offering greater redundancy. In that case, the beams are replaced with narrow box girders, which are easy to transport and install.

Figure 7 Cross-sections – Mixed frame bridge – Double box girder



Single box girder section

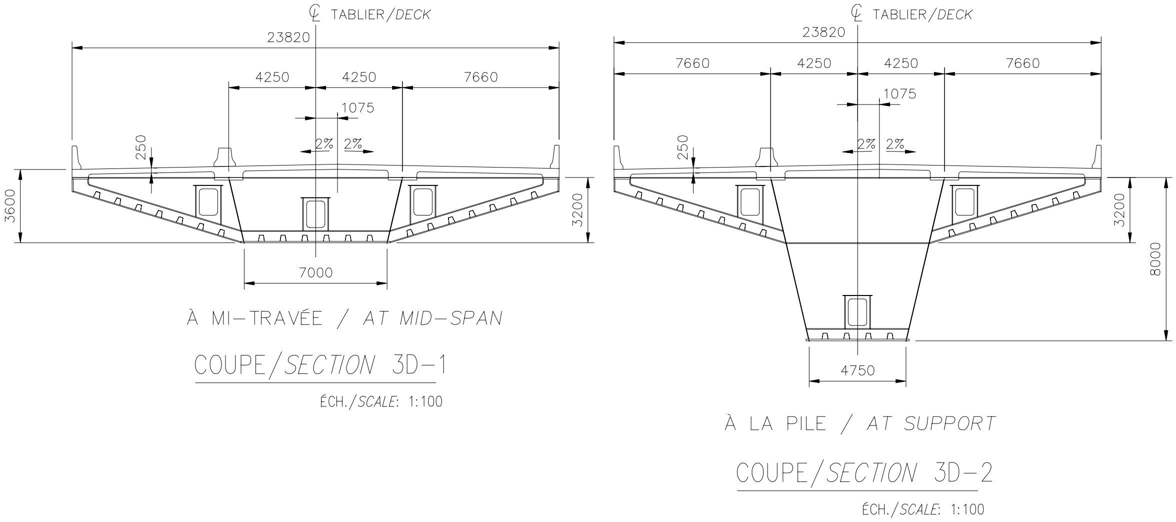
Figure 8 Cross-sections – Mixed frame bridge – Open single box girder



As an alternative to the open box girder, a closed box girder (middle and sides) such as the one presented below, offers the advantage of reducing areas that are exposed to the air and therefore corrosion. Dehumidification of the three inner cells limits the surfaces to be repainted outside the box girder, whose developed surface is weaker than that of an open section. Moreover, simple and smooth forms, without recesses, prevent the accumulation or stagnation of corrosive agents, such as salt mist, for example. It also changes the look of the deck and can be interesting from an architectural viewpoint.

Finally, during construction, the continuity of the lower chord from one side of the deck to the other provides “natural” protection from the seaway during the pouring of the concrete slab.

Figure 9 Cross-sections – Mixed frame bridge – Closed single box girder



1.1.1.1.4 *Mixed frame bridge with V-shaped piers*

A mixed frame bridge with V-shaped piers on each shore of the seaway reduces the length of the main span, thus making it easier to install. Various solutions exist for mounting the main span. If launching from only one side is possible, a careful analysis of the phasing is necessary to specify the specific provisions to adopt, namely regarding the V-shaped piers. In this context, launching from both sides provides more of an advantage. The best solution would be to hoist the central part of the main span.

Figure 12 shows the distribution of the spans. The cross-sections in the standard zone are the same as for the mixed solution presented above. Only the V-shaped support sections are different and presented below. Moreover, this support shape gives a more interesting look to the structure of the main span.

Figure 10 Elevation – Mixed frame bridge with V-shaped piers

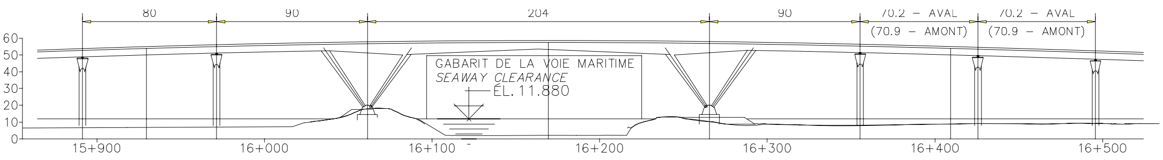


Figure 11 Cross-section- Mixed frame bridge with V-shaped piers – Twin-beam

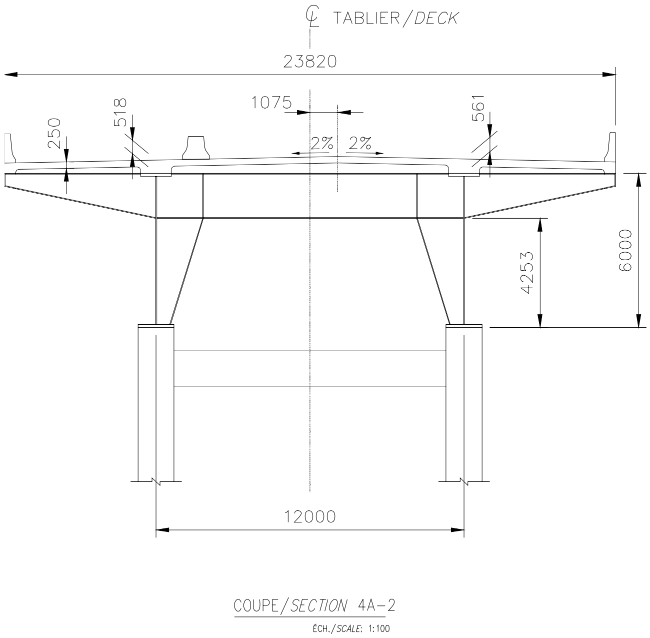


Figure 12 Cross-section – Mixed frame bridge with V-shaped piers – Double box girder

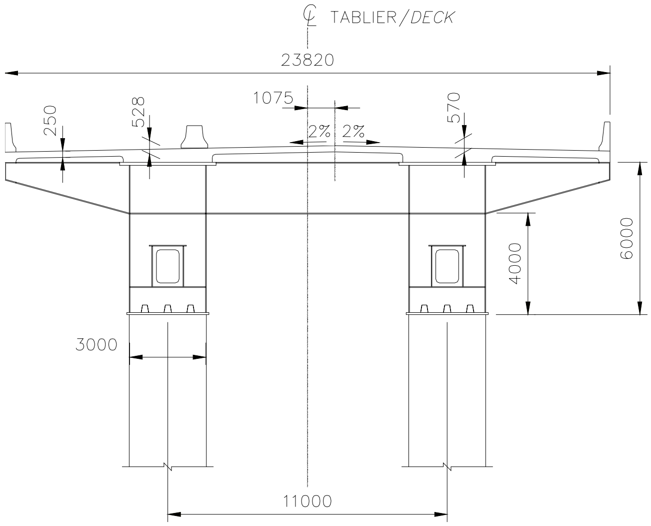


Figure 13 Cross-section– Mixed frame bridge with V-shaped piers – Open single box girder

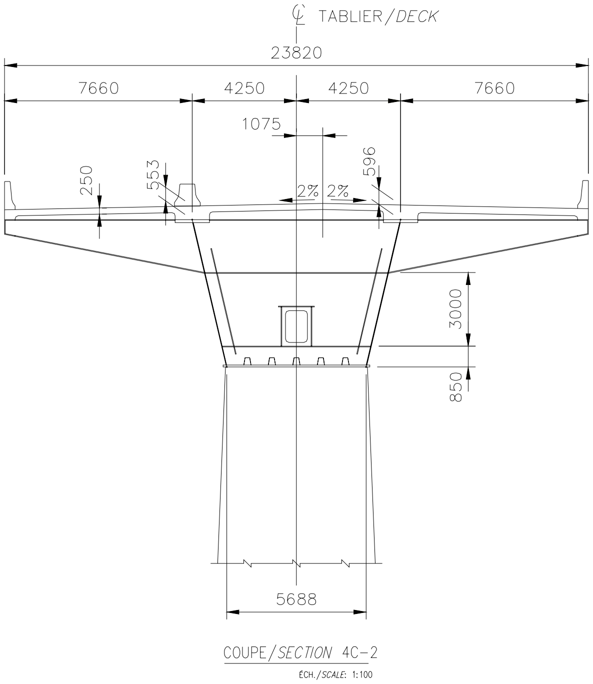
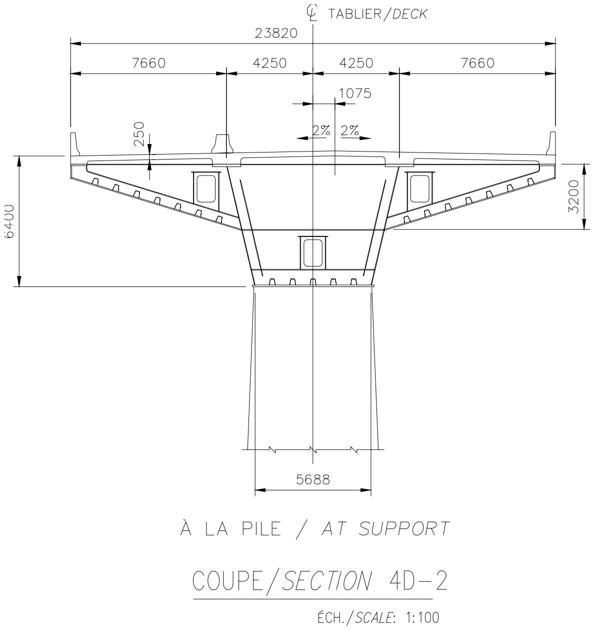


Figure 14 Cross-section– Mixed frame bridge with V-shaped piers – Closed single box girder



1.1.1.1.5 *Cable-stayed bridge with mixed frame deck*

A cable-stayed bridge is also an interesting option for spanning the seaway. Given the relatively short span of 200 m, one pylon on only one side of the main span is sufficient, given that the construction of pylons is costly (Figure 17). Transversally, there is one pylon per deck. Each pylon has two masts, one per deck (Figure 21). The pylons are approximately 80 m above the deck, 124 above the water, at an elevation of approximately 136.00 m, which is not as high as the tallest buildings in the downtown area.

The deck can be installed by launching or hoisting.

Figure 15 Elevation – Cable-stayed bridge

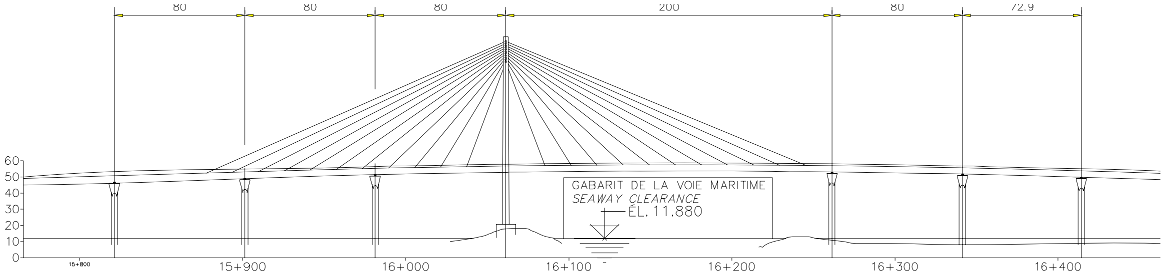


Figure 16 Cross-section – Cable-stayed bridge – Twin-beam solution

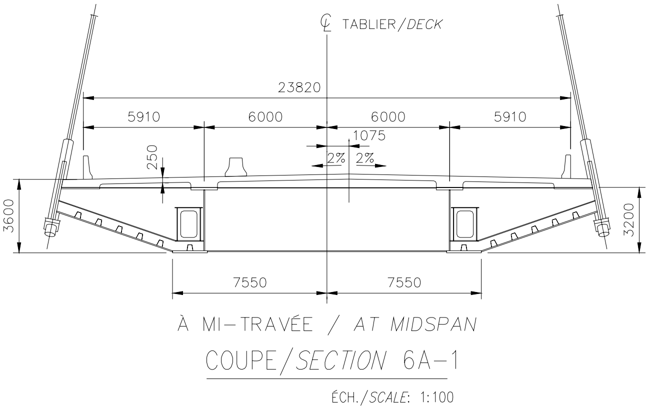


Figure 17 Cross-section – Cable-stayed bridge – Double box girder solution

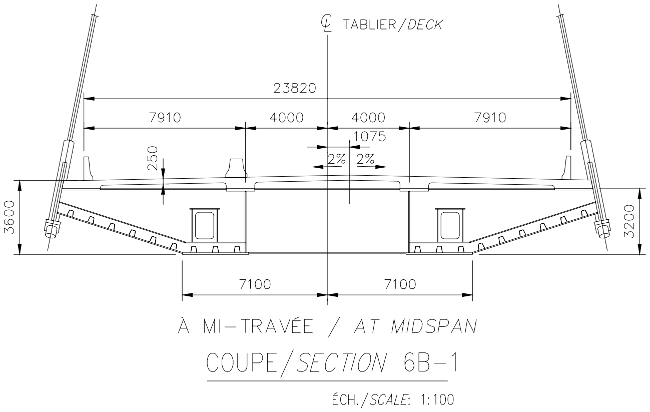


Figure 18 Cross-section – Cable-stayed bridge – Closed girder box solution

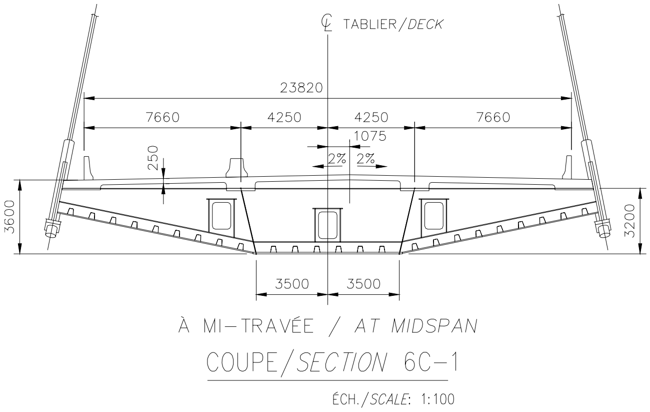
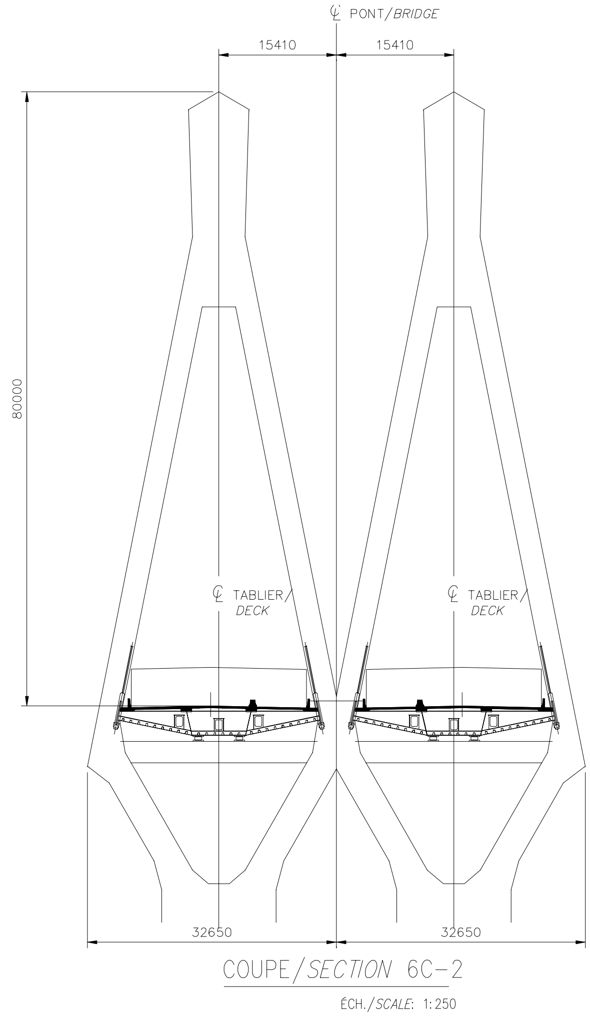


Figure 19 Pylon – Cable-stayed bridge



One pylon per direction

A variation of this solution helps better span the seaway, while enhancing the look of the structure. There is still one pylon per deck, but it is not on the same shore as the seaway in line with the deck in question. The pylon from Montreal to the south shore is north of the seaway, while the one in the opposite direction is south of the seaway.

In order to enhance the look, the piers adjacent to the seaway, next to the pylons, were removed from the design. It would have been difficult to find an architectural style in harmony with the base of the pylons for these piers. With this solution, it is possible to avoid aligning the bearings in this particular area and therefore come slightly closer to the banks, by about 15 metres.

This naturally leads to increasing the stayed span to 250 m. However, this extension of the span does not have a significant impact on the thickness of the deck or the height of the pylons.

Figure 20 Elevation – Cable-stayed bridge -2 pylons

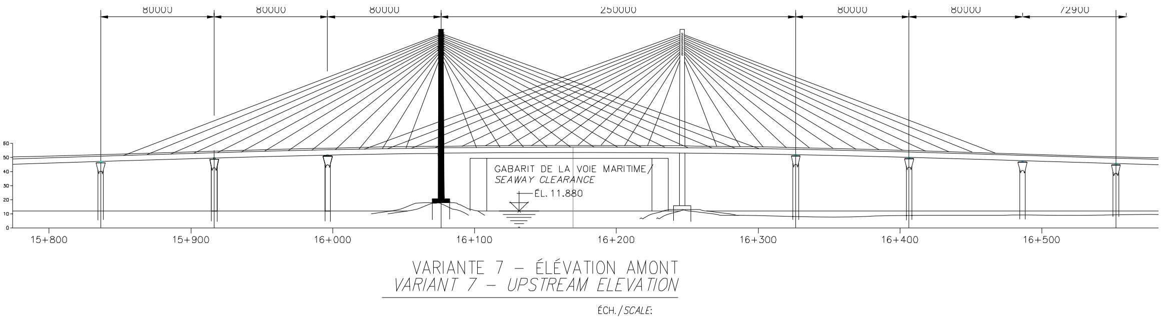
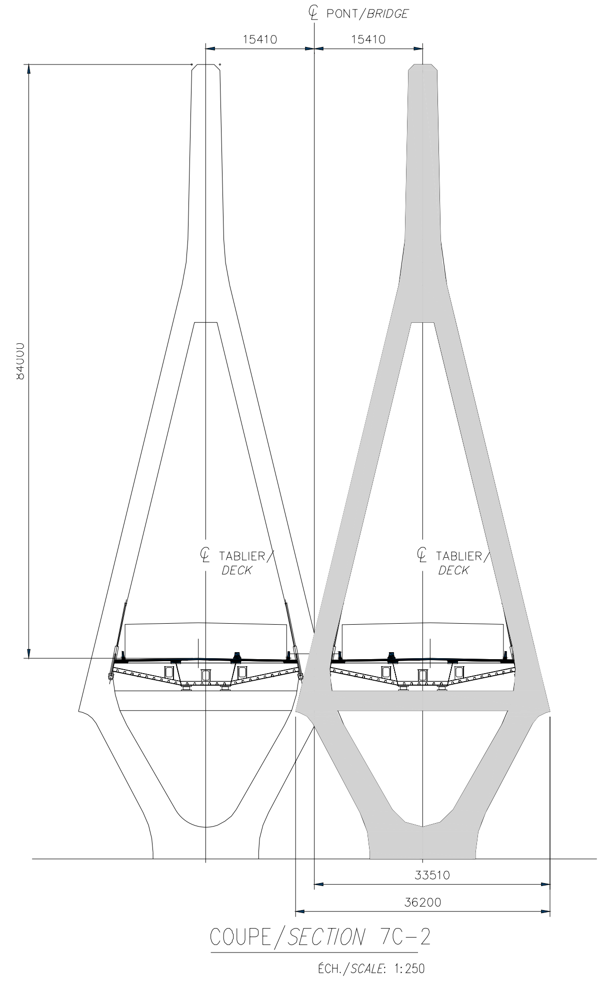


Figure 21 Pylon – Cable-stayed bridge -2 pylons



Appendix 2 Summary of Surface Soil and Groundwater Analysis Findings

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TABLE 1 SUMMARY OF RESULTS OF SURVEYS CONDUCTED LESS THAN 100 METERS FROM THE WORK SITE RIGHT-OF-WAY – MONTREAL SECTOR

Source	Drill hole/Trench					Stratigraphy											Soil results									Underground water results						
	No	Coordinates			Length	Backfill						Natural soil			Rock		Sample number	Depth		Results based on MDDEP Policy criteria					Summary (1)	Depth and *elevation* (m)	Results according to the CMM's discharge standards CMM (2008-47)					Summary (2)
		X	Y	Z	(m)	Soil Type	Residual materials (R.M.) Type	%	From (m)	To (m)	R.M. thickness (>50%)	Type	From (m)	To (m)	Type	Depth (m)		From (m)	To (m)	PH	MET	PAH	MAH	Phen			PH	PAH	MET	MAH	Inorg	
Soil-Inspect June 1993	PE-6				2,1	Silt, sand and black gravel	Brick, wood, glass and metal	30-40%	0	2,1							MA-1	0,0	1,0	AB	BC				BC							
	PE-7				2,1	Silt, sand and gravel	Wood, glass, metal, plastic and brick	2-20%	0	2,1							MA-2	1,0	2,0	AB	BC				BC							
	PE-8				2,1	Silt, sand, shale and gravel	Metal and brick	1%	0	2,1							MA-2	1,0	2,0	<A	<A				<A							
	PE-9				4,0	Silt, sand, shale and gravel	Wood, brick, glass, steel, plastic, cloth, paper	2-40%	0	4,0							MA-3	1,5	2,7	BC	BC				BC							
	PE-10				2,1	Silt, sand and gravel	Wood, brick, metal, plastic, glass, paper, cloth, rubber	1-30%	0	2,1							MA-2	0,2	1,8	BC	>C				>C							
Soil-Inspect February 1996	F-6			13,3	4,8	Chippings, silt, sand and gravel	Ash and black sand	N/A	0	3,6		Fine sand and silt, trace gravel	3,6	4,8			CF-3	1,2	1,8	<A					>C	2,3 *11,0*	<	>	<	<	<	>
																	CF-4	1,8	2,4		>C											
	F-7			19,7	10,4	Silt and gravel	Ash, bricks, wood, glass and wire	N/A	0	9,3		Fine sand and silt, trace gravel	9,3	10,4			CF-8	5,3	5,9	<A					BC							
																	CF-10	6,8	7,4		BC											
	F-8			19,5	10,4	Silt and sand	Wood, plastic, gypsum, ash, slag, brick, coal	N/A	0	8,1		Grey clayey silt	8,1	10,4			CF-8	5,2	5,8	>C		BC	>C	A	>C	7,4 *12,1*	<	>	<	<	<	>
																	CF-9	1,8	2,4		>C											
	F-9			13,6	5,3	Silt, sand and gravel	Bricks and glass	N/A	0	4,0		Fine sand and silt	4,0	5,3			CF-4	1,8	2,4	AB	>C	AB	<A	<A	>C							
	F-11			19,5	10,5	Silt, sand and gravel	Ash and slag	N/A	0	10,0		Fine sand and silt	10,0	10,5			CF-3	1,5	2,2	AB					>C	8,2 *11,3*	<	>	<	<	>	>
																	CF-6	3,8	4,4	AB												
																	CF-8	5,3	5,8		>C	>C	<A	<A								
																	CF-10	6,8	7,4		BC											
	F-12			13,4	4,2	Silt, sand and gravel			0	3,3		Fine sand and silt, trace gravel	3,3	4,2			CF-4	1,8	2,4	<A	AB				AB							
	F-13			13,6	4,5	Silt, sand and gravel	Ash, wood, glass	N/A	0	4,2		Fine sand and silt, trace gravel	4,2	4,5			CF-4	1,8	2,4	BC	BC	AB	<A	<A	BC							
Tecsult September 2005	F-110	300 345	5 036 725	18,9	10,9	Silt, sand and gravel	Wood, slag, coal, bricks, concrete, asphalt, metal, glass	1-95%	0	9,8	1,2	Gravelly fine sand	9,8	10,9		10,9	F-110-5A	2,4	3,1	AB	>C	BC			>C		<	>	>	<	>	>
																	F-110-9	6,1	6,7	>C	>C	>C										
																	F-110-14	9,1	9,8	>C	>C	BC										
	F-111	300 606	5 036 767	18,6	9,2	Silt and coarse sand	Brick, concrete, glass, clinker	1-65%	0	8,5	0,7	Silty sandy gravel	8,5	9,2		9,2	F-111-4A	1,8	2,4	<A	AB	BC			BC		<	<	>	<	>	>
																	F-111-11A	6,7	7,0	<A	AB	BC										
																	F-111-13A	8,5	8,8	BC	BC	AB										
	F-112	300 663	5 036 897	18,9	12,3	Sand, silt and gravel	Tar, wood, glass, metal, concrete, asphalt, clinker	1-95%	0	10,4	1,8	Gravelly fine sand	10,4	12,3		12,3	F-112-3	1,2	1,8	BC	BC	BC			>C		<	>	<	<	>	>
																	F-112-9	4,9	5,5	>C	BC	AB										
																	F-112-14	7,9	8,5	>C	>C	BC										
Technorem March 2007	PP06-1	300 607,1	5 036 771,7	18,6	11,4	Sand and gravel with silt and clay at depth	Wood debris at 8.5 m	0-20%	0	10,6		Till (dense silt and gravel)	10,6	11,4		11,4	PP06-1-4	9,1	9,8	>C	<A	>C	<A		>C			>	>	<		>
	PO06-1	300 240,6	5 036 914,4	15,8	10,0	Sand, silt with traces of clay	Bricks and miscellaneous debris	N/A	0	8,8		Till (dense silt and gravel)	8,8	10,0		10,0										5,7 *10,7*		<	>	<		>
	PO06-2	300 528,1	5 037 042,3	19,8	14,3	Sand, clayey silt	Miscellaneous waste	N/A	0	11,0		Till (dense silt and gravel)	11,0	14,3		14,3										8,8 *11,0*		>	>	<		>
	PO06-4	300 345,2	5 036 912,9	13,9	14,4	Gravel, sand and silt	Miscellaneous waste	N/A	0	12,2		Till (dense silt and gravel)	12,2	14,4		14,4										2,1 *11,8*		>	>	<		>
	PO06-7	300 333,4	5 036 760,6	18,3	12,4	Sand, silt and gravel	Miscellaneous debris	N/A	0	11,4		Till (dense silt and gravel)	11,4	12,4		12,4	PO06-7-1	0,0	6,1	AB		BC			BC	7,4 *11,0*	<	>	>	<		>
																	PO06-7-2	6,1	12,8	BC		BC			BC							
	PO06-8	300 580,4	5 036 905,5	18,4	11,4	Silty sand and clay	Metal, wood, brick, glass and concrete	N/A	0	9,8		Till (dense silt and gravel)	9,8	11,4		11,4										6,6 *11,9*	<	>	>	>		>
	PO06-9	300 452,4	5 036 765,4	18,6	16,0	Sand and gravel, trace silt and clay	Miscellaneous waste	N/A	0	12,5		Till (dense silt and gravel)	12,5	15,0		16,0										7,0 *11,7*		>	>	<		>
	PO06-10	300 720,4	5 036 883,1	18,0	11,8	Sand and gravel, trace clay	Bricks, glass, concrete	0-40%	0	10,0	0,6	Till (dense silt and gravel)	10,0	11,8		11,8	PP06-10-1	7,6	8,2	BC		BC			BC	7,7 *10,3*		>	>	<		>
Technorem October 2011	F-3	300 409,9	5 036 698,7	19,0	17,7	Undifferentiated backfill	A small amount of wood		0	12,2		Silty gravelly sand	12,2	13,6	Shale	13,6																
	F-4	300 523,7	5 036 736,4	19,3	17,9	Gravelly silt small amount of sand	Wood, brick, rubber, glass between 8.7 and 10.1	80%	0	10,1	1,4	Silty sandy gravel	10,1	14,9	Shale	14,9																
	F-6	300 730,3	5 036 851,6	18,0	17,8	Sand and gravel, trace silt		0%	0	10,2		Silty sand to clayey silt	10,2	14,6	Shale	14,6																
	F-12	300 308,8	5 036 761,1	17,8	15,0	Sand and silt with localized debris	Brick, wood, glass, rubber, concrete (4.6 to 5.6 m)	N/A	0	9,4		Sandy gravel till	9,4	12,0	Shale	15,0	F-12-2010-3	1,2	1,8	<A	AB	AB			>C							
																	F-12-2010-7	3,7	4,3	<A	AB	BC										
																	F-12-2010-11	6,1	6,7	>C	>C	BC										
																	F-12-2010-15	8,5	9,2	BC	>C	BC										
	F-15	300 576,3	5 036 750,4	18,8	13,2	Silt, sand and gravel with localized debris	Concrete, asphalt, brick, metal, wood, plastic	0-20%	0	10,4		Sandy gravel till	10,4	11,8	Shale	11,8	F-15-2010-4	1,8	2,4	<A	AB	BC			BC							
																	F-15-2010-9	4,9	5,5	<A	<A	<A										
																	F-15-2010-13	7,3	7,9	<A	AB	BC										
																	F-15-2010-16	9,2	9,8	BC	BC	BC										
	F-16	300 705,3	5 036 838,5	17,7	13,9	Silt, sand and gravel with localized debris	Glass, brick, asphalt, concrete	0-10%	0	11,6		Clayey silt and sandy gravel till	11,6	13,8	Shale	13,9	F-16-2010-6	3,1	3,7	<A	AB	BC			>C							
																	F-16-2010-10	5,5	6,1	<A	AB	AB										
																	F-16-2010-15	8,5	9,2	<A	<A	<A										
																	F-16-2010-18	10,4	11,0	>C	BC	>C										
	F-17	300 767,1	5 036 877,8	18,2	16,3	Silt and gravel sand with localized debris	Concrete, brick, glass	0-20%	0	13,1		Sandy gravel till	13,1	14,4	Shale	14,4	F-17-2010-8	4,3	4,9	<A	<A	<A			BC							
																	F-17-2010-14	7,9	8,5	AB	<A	AB										
																	F-17-2010-19	11,0	11,6	AB	AB	BC										
																	F-17-2010-22	12,8	13,4	BC	AB	AB										
	TR-12	300 659,2	5 037 102,7	20,2	3,0	Fine sand with silt, pebbles and debris	Wood, glass, ash, brick, plastic, metal	N/A	0	3,0							TR12-2010-1	0,0	1,0	BC	BC	BC			BC							
	TR-16	300 583,1	5 037 033,3	19,2	3,0	Sand and gravel with trace debris	Brick, wood, glass, metal, plastic, cloth	0-10%	0	3,0							TR16-2010-1	0,0	1,0	BC	>C	BC			>C							
	TR-17	300 643,4	5 036 912,8	19,0	3,0	Sand and gravel and sandy silt with trace debris	Wood, brick, glass, metal, cloth, concrete	0-10%	0	3,0							TR17-2010-1	0,0	1,0	<A	>C	BC			>C							
	TR-18	300 609,8	5 036 926,7	19,2	3,0	Fine sand with silt, pebbles and debris	Wood, brick, metal, plastic	0-60%	0	3,0	1,0						TR18-2010-1	0,0	1,0	AB	AB	BC			BC							
	TR-20	300 536,0	5 036 975,2	18,6	3,0	Fine sand and gravel with pebble debris	Metal, glass, brick, porcelain, wood, concrete, paper	0-20%	0	3,0							TR20-2010-1	0,0	1,0	<A	BC	BC			BC							

Note (1): Drilling result summary: maximum concentration range obtained, all sampling intervals and parameters combined.

Note (2): Summary of results obtained, all parameters included.

CHAMPLAIN BRIDGE PROJECT
SECTOR STUDY - EVALUATION OF THE ENVIRONMENTAL CONDITION OF SOIL

TABLE 2 SUMMARY OF RESULTS FROM SURVEYS CONDUCTED LESS THAN 100 METERS FROM THE WORK SITE RIGHT-OF-WAY – NUNS' ISLAND SECTOR

Source	Drill hole/Trench					Stratigraphy											Soil results						
	No	Coordinates			Length	Backfill						Natural soil			Rock		Sample number	Depth		Results based on MDDEP Policy criteria			Summary (1)
		X	Y	Z	(m)	Soil Type	Residual materials (R.M.) Type	%	From (m)	To (m)	R.M. thickness (>50%)	Type	From (m)	To (m)	Type	Depth (m)		From (m)	To (m)	PH	MET	PAH	
Dessau December 2008	F-04-08	301 413,5	5 036 827,4	15,1	3,3	Pavement structure (1.2 m)			0	1,2		Till (silty sandy gravel and trace clay)	1,2	3,3			F-04-08 CF-2	1,2	1,8	<A	<A	<A	AB
																	F-04-08 CF-3	1,8	2,4	<A	AB	<A	
	F-05-08	301 116,9	5 036 766,2	18,9	4,3	Pavement structure (1.2 m) followed by sandy silt backfill (2.4 m)	Presence of wood	N/A	0	3,7		Till (silty sandy gravel and trace clay)	3,7	4,3			F-05-08 PW2C	1,0	1,2	<A	<A	<A	AB
																	F-05-08 CF-3	14,2	1,8	<A	AB	<A	
	F-06-08	301 262,1	5 036 758,2	18,6	21,6	Pavement structure (3.35 m) followed by sandy silt backfill (2.44 m)			0	5,5		Clayey silt (till) and trace gravel to dense silty sand	5,5	14,3		14,3	F-06-08-CF-5	1,8	2,4	<A	<A	<A	<A
																	F-06-08-CF-11	3,7	4,3	<A	<A	<A	
	F-07-08	301 411,9	5 036 763,8	15,1	9,1	Silty sand, a small amount of gravel, with org. matter			0	1,4		Silty sand to sand and gravel	1,4	4,8	Black shale	4,8	F-07-8-CFCF-1	0,0	0,6	<A	<A	<A	<A
																	F-07-08-CF-3	1,2	1,8	<A	<A	<A	
	F-08-08	301 479,4	5 036 763,7	16,2	10,5	Sand, a small amount of silt, trace gravel			0	1,7		Clayey silt to sand and silt	1,7	4,1	Black shale	1,1	F-08-08-CF-1	0,0	0,6	BC	AB	AB	BC
																	F-08-08-CF-2	0,6	1,2	<A	<A	AB	
	F-09-08	301 517,1	5 036 789,0	15,6	10,5	Crushed stone followed by clayey silt			0	2,4		Clay, silt and sand	2,4	4,8	Black shale	4,8	F-09-08-CF-4	1,8	2,4	<A	<A	<A	<A
																	F-09-08-CF-5	2,4	3,1	<A	<A	<A	
	F-10-08	301 576,5	5 036 749,3	16,2	4,6	Pavement structure (1.22 m) followed by sandy silt backfill (2.33 m)			0	2,3		Silt and sand, a small amount of gravel	2,3	4,6			F-10-08-PW2B-2	0,6	1,2	<A	BC	BC	BC
																	F-10-08-CF-3	1,2	1,8	<A	AB	<A	
	F-11-08	301 604,6	5 036 765,9	16,0	4,5	Pavement structure (0.91 m) followed by silt and sandy shale backfill (2.44 m)			0	3,4		Topsoil, silt and sand, gravel	3,4	4,5			F-11-08-CF-5	2,8	3,4	<A	<A	BC	BC
																	F-11-08-CF-6A	3,4	3,6	<A	<A	<A	
	F-12-08	301 612,0	5 036 739,6	16,8	4,9	Pavement structure			0	4,3		Clay and silt, trace sand	4,3	4,9			F-12-08-CF-6	3,7	4,3	<A	<A	AB	AB
																	F-12-08-CF-7	4,3	4,9	<A	AB	<A	
	F-13-08	301 303,7	5 036 759,5	14,1	9,0	Topsoil and silt and gravelly sand			0	1,8		Sandy silt	1,8	5,9	Shale	5,9	F-13-08-CF-2	0,6	1,2	<A	<A	<A	<A
																	F-13-08-CF-4	1,8	2,4	<A	<A	<A	
	F-14-08	301 678,1	5 036 757,0	16,5	4,6	Pavement structure (3.35 m)			0	3,4		Clayey silt	3,4	4,6			F-14-08-CF-5	2,8	3,4	<A	<A	<A	AB
																	F-14-08-CF-7	4,0	4,6	<A	AB	<A	

Note (1): Drilling result summary: maximum concentration range obtained, all sampling intervals and parameters combined.

Appendix 3 Variations in Surface Water Quality Parameters

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Appendix 3

A- Variations in surface water quality parameters from 1990 to 2001 for the five monitored stations in the Montreal area

Station no.		1 Beauharnois canal	2 LaSalle water intake	3A Southern Boucherville	3B Central Boucherville	3C Northern Boucherville
Period		1990 to 2001	1990 to 2001	1992 to 2001	1991 to 2001	1991 to 2001
Parameter	Unit					
Total nitrogen	mg/l N	0.44[1] ↑ 0.47[2]	0.44 ↑ 0.48	ns	0.38[1] ↑ 0.41[2]	ns
Total phosphorus	mg/l P	0.025 ↓ 0.014	0.021 ↓ 0.013	0.026 ↓ 0.012	0.016 ↓ 0.011	0.023 ↓ 0.011
Chlorophyll-a[3]	mg/m^3	1.47 ↓ 1.29	ns	3.08 ↓ 1.42	1.46 ↓ 1.33	1.81 ↓ 1.28
DOC[4]	mg/l	2.0 ↑ 2.4	2.2 ↑ 2.6	ns	ns	ns
Conductivity	µs/cm	298 ↓ 293	288 ↓ 284	ns	284 ↑ 287	ns
Turbidity	UNT	1.1 ↓ 0.8	1.9 ↓ 1.2	2.0 ↓ 1.5	ns	ns
Suspended solids	mg/l	3 ↓ 2	4 ↓ 2	5 ↓ 3	4 ↓ 3	5 ↓ 3
Fecal coliforms	UFC/100 ml	ns	ns	513 ↓ 96	461 ↓ 237	3.741 ↓ 46

Note: Stations 1, 2, 3A, 3B and 3C correspond to stations 72, 78, 123, 109 and 110, respectively, in the Appendix C and D tables.

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[1] The values indicated correspond to the initial and final descriptor values estimated based on the regression line.

[2] ↑: significant increase ($P < 0.05$); ↓: significant decrease ($P < 0.05$); ns: not significant trend ($P \geq 0.05$); ?: insufficient data.

[3] The chlorophyll data are available for the summer periods (May to October) from 1995 to 2001, except for station no. 1 (summers from 1991 to 2001).

[4] DOC data are available from 1993 to 2001.

B- Variations in surface water quality parameters May-October 2000 and May-October 2001 at stations 72 and 78

Station no. 72 (Beauharnois canal)

Parameter	Units	N	Average	s	Minimum	25th percentile	50th percentile	75th percentile	Maximum
Ammoniacal nitrogen	mg/l (N)	12	0.01	0.01	0.01	0.01	0.01	0.02	0.03
Total nitrogen	mg/l (N)	12	0.39	0.14	0.16	0.30	0.37	0.51	0.58
Dissolved organic carbon	mg/l	11	2.5	0.3	2.0	2.2	2.4	2.8	3.0
Chlorophyll-a	mg/m^3	9	1.27	0.77	0.62	0.91	1.03	1.36	3.20
Fecal coliforms	UFC/100 ml	11	42	100	1	1	2	18	330
Conductivity	µS/cm	12	289	10	270	284	292	295	299
Suspended solids	mg/l	12	3	4	1	1	2	5	13
Nitrites and nitrates	mg/l (N)	12	0.23	0.12	0.08	0.12	0.21	0.35	0.42
Dissolved oxygen	mg/l	0							
pH	PH units	11	8.4	0.3	8.1	8.2	8.3	8.6	9.0
Phaeophytin (phaeopigments)	mg/m^3	9	0.48	0.38	0.14	0.25	0.42	0.46	1.44
Dissolved phosphorus	mg/l (P)	12	0.005	0.000	0.005	0.005	0.005	0.005	0.005
Suspended phosphorus	mg/l (P)	11	0.009	0.010	0.002	0.004	0.004	0.012	0.035
Total phosphorus*	mg/l (P)	11	0.014	0.010	0.007	0.009	0.009	0.017	0.040
Temperature	°C	11	15.1	5.6	7.0	10.0	15.0	19.0	26.0
Turbidity	UNT	11	1.3	1.0	0.4	0.7	1.0	1.9	3.4

* Calculated

Station no. 78 (LaSalle water intake)

Parameter	Units	N	Average	s	Minimum	25th percentile	50th percentile	75th percentile	Maximum
Ammoniacal nitrogen	mg/l (N)	12	0.02	0.02	0.01	0.01	0.01	0.03	0.06
Total nitrogen	mg/l (N)	12	0.41	0.12	0.26	0.30	0.40	0.53	0.60
Dissolved organic carbon	mg/l	10	2.7	0.3	2.2	2.5	2.7	2.8	3.4
Chlorophyll-a	mg/m^3	11	1.17	1010	0.48	0.53	0.72	1.30	3.83
Fecal coliforms	UFC/100 ml	11	2	2	1	1	2	2	5
Conductivity	µS/cm	12	284	7	270	283	285	287	295
Suspended solids	mg/l	12	2	1	1	1	2	2	2
Nitrites and nitrates	mg/l (N)	12	0.26	0.09	0.16	0.18	0.23	0.37	0.39
Dissolved oxygen	mg/l	0							
pH	PH units	11	8.2	0.1	8.1	8.1	8.2	8.4	8.4
Phaeophytin (phaeopigments)	mg/m^3	11	0.89	0.61	0.43	0.50	0.65	0.91	2.26
Dissolved phosphorus	mg/l (P)	12	0.007	0.002	0.005	0.005	0.005	0.010	0.010
Suspended phosphorus	mg/l (P)	12	0.004	0.002	0.002	0.003	0.004	0.006	0.006
Total phosphorus*	mg/l (P)	12	0.010	0.002	0.007	0.009	0.011	0.012	0.014
Temperature	°C	12	17.5	4.2	10.0	14.5	18.8	20.0	24.0
Turbidity	UNT	11	1.2	0.3	0.7	1.0	1.2	1.3	1.8

* Calculated

C- Variations in surface water quality parameters from January 7, 2008 to December 6, 2010 for stations 72 and 78

72									
Parameter	**Unit**	**N**	**Average**	**Diff.**	**Minimum**	**Q25**	**Median**	**Q75**	**Maximum**
Ammoniacal nitrogen	mg/l	36	0.02	0.01	0.01	0.01	0.01	0.02	0.06
Total filtered nitrogen	mg/l	35	0.46	0.07	0.26	0.41	0.47	0.50	0.57
Organic carbon	mg/l	29	2.3	0.2	1.8	2.1	2.3	2.5	2.8
Active chlorophyll-a	µg/l	18	1.42	0.54	0.52	1.10	1.40	1.70	2.70
Total chlorophyll-a	µg/l	18	2.09	0.69	0.75	1.62	2.08	2.70	3.40
Chloride	mg/l	29	22.4	1.0	21.0	22.0	22.0	23.0	25.0
Fecal coliforms	UFC/100 ml	36	2	4	1	1	1	2	23
Conductivity	µS/cm	36	301.9	11.7	270.0	300.0	300.0	310.0	330.0
Nitrates and nitrites	mg/l	36	0.29	0.08	0.13	0.22	0.29	0.33	0.44
pH	pH	36	8.0		7.4	8.0	8.1	8.2	8.5
Total phosphorus	mg/l	36	0.007	0.004	0.004	0.005	0.006	0.008	0.023
Total dissolved phosphorus	mg/l	15	0.006	0.002	0.005	0.005	0.005	0.005	0.012
Total suspended phosphorus	mg/l	15	0.003	0.003	0.001	0.001	0.002	0.004	0.011
Phaeophytin-a	µg/l	18	0.6711	0.323	0.23	0.49	0.56	0.89	1.5
Suspended solids	mg/l	36	1.5	0.3	1.5	1.5	1.5	1.5	3.0
Temperature	°C	34	10.2	8.4	0.0	2.0	10.0	17.0	25.0
Turbidity	UTN	35	1.8	1.9	0.3	0.8	1.2	2.3	11.0

78									
Parameter	**Unit**	**N**	**Average**	**Diff.**	**Minimum**	**Q25**	**Median**	**Q75**	**Maximum**
Ammoniacal nitrogen	mg/l	32	0.02	0.01	0.01	0.01	0.02	0.02	0.06
Total filtered nitrogen	mg/l	32	0.45	0.07	0.31	0.42	0.45	0.51	0.57
Organic carbon	mg/l	29	2.7	0.4	1.6	2.4	2.6	2.9	4.0
Active chlorophyll-a	µg/l	17	1.08	0.34	0.58	0.81	1.00	1.30	1.74
Total chlorophyll-a	µg/l	17	2.01	0.53	1.32	1.60	1.96	2.40	3.24
Chloride	mg/l	26	21.4	1.4	19.0	21.0	21.5	22.0	24.0
Fecal coliforms	UFC/100 ml	35	10	13	1	2	7	16	66
Conductivity	µS/cm	33	288.5	17.5	250.0	280.0	290.0	300.0	350.0
Fluoride	mg/l	7	0.11	0.03	0.06	0.10	0.11	0.12	0.15
Nitrates and nitrites	mg/l	32	0.29	0.08	0.14	0.25	0.29	0.34	0.44
pH	pH	33	8.0		7.7	7.9	8.0	8.1	8.3
Total phosphorus	mg/l	33	0.011	0.006	0.004	0.008	0.009	0.011	0.031
Total dissolved phosphorus	mg/l	13	0.006	0.004	0.005	0.005	0.005	0.005	0.020
Total suspended phosphorus	mg/l	13	0.005	0.003	0.001	0.003	0.004	0.005	0.011
Phaeophytin-a	µg/l	17	0.9271	0.345	0.4	0.7	0.89	1.11	1.5
Suspended solids	mg/l	32	2.2	1.3	1.5	1.5	1.5	3.0	7.0
Temperature	°C	34	9.8	8.9	0.0	0.3	8.9	20.1	23.3
Turbidity	UTN	32	3.1	2.4	0.9	1.5	2.6	3.6	10.0

D- Variations in surface water quality parameters from May 6, 2008 to October 12, 2010 for stations 109, 110 and 123

109

Parameter	Unit	N	Average	Diff.	Minimum	Q25	Median	Q75	Maximum
Ammoniacal nitrogen	mg/l	18	0.02	0.01	0.01	0.01	0.01	0.02	0.04
Total filtered nitrogen	mg/l	18	0.41	0.07	0.30	0.35	0.41	0.45	0.53
Organic carbon	mg/l	16	2.6	0.4	1.9	2.4	2.7	2.9	3.3
Active chlorophyll-a	µg/l	18	1.68	0.64	0.91	1.22	1.55	2.10	3.24
Total chlorophyll-a	µg/l	18	2.98	0.72	2.11	2.40	2.94	3.16	4.77
Fecal coliforms	UFC/100 ml	18	455	338	3	220	455	560	1,500
Conductivity	µS/cm	18	282.2	16.3	250.0	280.0	290.0	290.0	300.0
Field conductivity	µS/cm	1	197		197	197	197	197	197
Fluoride	mg/l	5	0.12	0.02	0.11	0.11	0.12	0.12	0.16
Nitrates and nitrites	mg/l	18	0.25	0.07	0.15	0.18	0.25	0.29	0.38
Dissolved oxygen	mg/l	18	9.4	1.4	7.7	8.2	9.2	9.9	12.2
pH	pH	18	8.0		7.8	7.9	8.0	8.2	8.3
Total phosphorus	mg/l	18	0.009	0.003	0.003	0.007	0.009	0.011	0.014
Total dissolved phosphorus	mg/l	6	0.005	0.000	0.005	0.005	0.005	0.005	0.005
Total suspended phosphorus	mg/l	6	0.005	0.003	0.002	0.002	0.005	0.006	0.008
Phaeophytin-a	µg/l	18	1.3011	0.273	0.84	1.1	1.27	1.4	1.93
Suspended solids	mg/l	18	2.9	1.1	1.5	1.5	3.0	4.0	5.0
Temperature	°C	18	17.4	4.8	9.4	14.8	17.8	21.7	23.4
Turbidity	UTN	18	3.3	1.2	1.1	2.6	3.2	4.5	5.5

110

Parameter	Unit	N	Average	Diff.	Minimum	Q25	Median	Q75	Maximum
Ammoniacal nitrogen	mg/l	18	0.01	0.01	0.01	0.01	0.01	0.02	0.03
Total filtered nitrogen	mg/l	18	0.40	0.07	0.29	0.35	0.42	0.46	0.51
Organic carbon	mg/l	16	3.2	0.6	2.1	2.7	3.4	3.7	4.2
Active chlorophyll-a	µg/l	18	1.65	0.58	0.88	1.23	1.53	1.90	2.99
Total chlorophyll-a	µg/l	18	3.07	0.73	1.98	2.68	2.82	3.40	4.72
Fecal coliforms	UFC/100 ml	18	36	34	2	20	20	40	120
Conductivity	µS/cm	18	256.7	31.4	180.0	240.0	265.0	280.0	290.0
Field conductivity	µS/cm	1	160		160	160	160	160	160
Nitrates and nitrites	mg/l	18	0.24	0.07	0.14	0.18	0.25	0.28	0.40
Dissolved oxygen	mg/l	18	9.2	1.5	6.0	8.1	9.0	10.3	12.0
pH	pH	18	8.0		7.8	7.9	8.0	8.1	8.3
Total phosphorus	mg/l	18	0.011	0.004	0.001	0.009	0.012	0.013	0.018
Total dissolved phosphorus	mg/l	6	0.005	0.000	0.005	0.005	0.005	0.005	0.005
Total suspended phosphorus	mg/l	6	0.008	0.002	0.006	0.007	0.008	0.010	0.011
Phaeophytin-a	µg/l	18	1.4211	0.3919	0.77	1.2	1.325	1.7	2.27
Suspended solids	mg/l	18	4.1	1.7	1.5	3.0	4.0	5.0	8.0
Temperature	°C	18	17.6	4.8	9.7	14.6	18.3	22.2	24.0
Turbidity	UTN	18	5.1	1.8	2.4	3.9	5.5	6.0	9.6

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Parameter	Unit	N	Average	Diff.	Minimum	Q25	Median	Q75	Maximum
Ammoniacal nitrogen	mg/l	18	0.01	0.01	0.01	0.01	0.01	0.02	0.04
Total filtered nitrogen	mg/l	18	0.41	0.10	0.26	0.36	0.40	0.46	0.60
Organic carbon	mg/l	16	2.6	0.2	2.1	2.4	2.7	2.7	3.1
Active chlorophyll-a	µg/l	18	2.22	0.66	1.30	1.70	2.00	2.60	3.46
Total chlorophyll-a	µg/l	18	3.57	0.84	2.36	3.08	3.35	4.30	5.15
Fecal coliforms	UFC/100 ml	18	93	104	20	30	48	110	450
Conductivity	µS/cm	17	288.8	12.2	260.0	290.0	290.0	300.0	300.0
Field conductivity	µS/cm	1	207		207	207	207	207	207
Nitrates and nitrites	mg/l	18	0.25	0.10	0.12	0.16	0.25	0.31	0.47
Dissolved oxygen	mg/l	17	9.4	1.4	6.9	8.8	9.3	10.3	12.0
pH	pH	18	8.0		7.3	7.9	8.0	8.3	8.4
Total phosphorus	mg/l	17	0.012	0.006	0.001	0.009	0.010	0.017	0.023
Total dissolved phosphorus	mg/l	5	0.005	0.000	0.005	0.005	0.005	0.005	0.005
Total suspended phosphorus	mg/l	6	0.006	0.004	0.001	0.005	0.005	0.006	0.012
Phaeophytin-a	µg/l	18	1.3494	0.4282	0.57	1.1	1.4	1.69	2.11
Suspended solids	mg/l	18	4.2	3.3	1.5	1.5	3.0	6.0	13.0
Temperature	°C	17	17.6	5.0	9.8	14.5	18.6	22.2	24.2
Turbidity	UTN	18	4.1	2.6	1.4	2.0	3.9	5.3	12.0

Appendix 4 CDPNQ Flora Data

Pont Champlain, zone 10km 120531

1 – Nombre total d'occurences pour cette requête : 175

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

FLORE

Justicia americana - (3501)

Ile Ronde (Montréal, île Ste-Hélène), au centre de l'île. / Marécage (désséché en 1936). Observé en fleurs entre la deuxième semaine de juillet et la deuxième semaine de septembre. En pleine fructification la deuxième semaine d'octobre.

45,528620 - -73,533320	Minute (1,5 km.)	-	Non	1951-10-10

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Bernard Jean-Paul (1951) QFA; Boivin A., Boivin Bernard (1936) MT; Boivin Alice, Boivin Bernard (1936) MT, DAO; Marie-Victorin Frère (1918) MT; Rolland-Germain Frère (1929) CAN; Rolland-Germain Frère (1929) MT; Rolland-Germain Frère (1929) QFA; Rolland-Germain Frère (1929) SFS; Rouleau Ernest (1934) DAO; Rouleau Ernest (1934) MT; Rouleau Ernest (1935) MT

Justicia americana - (3507)

Saint-Lambert, près du pont Victoria. / --

45,496930 - -73,518780	Minute (1,5 km.)	-	Non	1950-08-11

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cinq-Mars Lionel (1952) QFA; Marie-Victorin Frère (1918) MT, CAN; Marie-Victorin Frère (1918) SFS; Marie-Victorin Frère (1919) MT; Marie-Victorin Frère (1919) SFS; Terrill Lewis McIver (1946) CAN; Terrill Lewis McIver (1946) MTMG; Terrill Lewis McIver (1950) MTMG

Justicia americana - (3508)

MRC de Montéal, ville de Montréal, secteur de Verdun, île Rock. / Rivage rocheux colonisé par une herbaçaie aquatique dominée par Justicia americana, Vallisneria americana, Myriophyllum exalbescens et Elodea nuttallii. 1998 : 3000 individus répartis sur environ 10 m carrés. 1977 : Environ 1000 individus, 857 en fleurs, forme des colonies sur le rivage du fleuve avec Bidens frondosa et Polygonum lapathifolium, base de la tige immergée. 1976 : 848 individus, dont 298 individus en fleurs, dans les eaux du fleuve à proximité d'une cascade des rapides.

45,430480 - -73,570390	Seconde (150 m.)	B5.01	Oui	1998-07-31

MEILLEURE SOURCE : FORMTER 2001 -. Banque de données sur les formulaires de terrain, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Coursol Frédéric (1998)

Justicia americana - (3511)

Brosseau, rive du Saint-Laurent. / Limon humide sur le rivage; début de fructification la deuxième semaine de septembre.

45,439030 - -73,4960	Minute (1,5 km.)	-	Non	1948-09-11

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Terrill Lewis McIver (1948) DAO

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Toxicodendron vernix - (3599)

Laprairie, près du noviciat des Frères de l'Instruction chrétienne. / Dans le marécage de la commune; en fruits en novembre.

45,406480 - -73,485370	Seconde (150 m.)	-	Non	1939

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1939) MT

Taenidia integerrima - (3643)

Montréal, mont Royal. /

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1937-06-19

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Anonyme (1877) MT; Anonyme (1902) MT; Holmes Andrew Fernando (1821) MTMG; Lafond André (1937) QFA

Information sensible - (3688)

----- / communiquer avec le CDPNQ

99,99 - 99,99		--	--	--

MEILLEURE SOURCE : -----

Podophyllum peltatum - (4191)

MRC de Montréal, ville de Montréal, Mont Royal, près du belvedère. / Érablière à chêne rouge. 1994 : Population de 6000 tiges. En floraison de la quatrième semaine de mai à la quatrième semaine de juin. En fructification à la troisième semaine de juin.

45,511980 - -73,594690	Seconde (150 m.)	B3.05	Oui	1994

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Bernard Jean-Paul (1947) CAN; Bernard Jean-Paul (1947) QFA; Boivin Bernard (1936) DAO; Boivin Bernard (1937) MT, DAO; Boivin Richard (1987) MT; Cailloux Marcel, Racine Marcel, Boivin Bernard (1937) MT, DAO; Du Boulay G., Du Boulay P.H. (1961) MTMG; Gauvreau Marcelle (1931) MT; Raymond Marcel (1945) MT; Roy Edmond Frère (1933) MTMG; Roy Edmond Frère (1934) MT, DAO; Roy Edmond Frère (1935) MT, MTMG, DAO; Roy Edmond Frère (1935) MTMG; Roy Edmond Frère (1936) MT; Sainte-Marie Guy (1944) MT; Sainte-Marie Guy (1944) SFS; Scoggan Homer J. (1940) CAN; Taché Bernard (1961) MT; Taché Bernard (1961) SFS; Terrill Lewis McIver (1936) MTMG; Tremblay Adélard (0) QFA

Onosmodium bejariense var. hispidissimum - (4258)

Ile aux Chèvres, îles des rapides de Lachine. / Près du rivage sec, à la rencontre de la rivière et du fleuve; sol rocailleux et parfois rocheux d'une basse arbustaie fermée de Cornus obliqua et Toxicodendron rydbergii; en fleurs à la mi-juin, en fruits à la fin août.

45,425010 - -73,583870	Seconde (150 m.)	B5.04	Oui	2006

MEILLEURE SOURCE : Ranger, J. 1979. Etude floristique des rapides de Lachine. Mémoire de maîtrise, Université de Montréal, Montréal, Québec. 476 p..

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Boechera laevigata - (4281)

Iles des Rapides de Lachine, île aux Chèvres. / Haute herbaçaie avec Allium canadense, Matteucia, Rhus typhina et Urtica dioica; 2001: une colonie de 30 individus; en fleurs de la fin mai à la fin juin.

45,426380 - -73,578470	Seconde (150 m.)	B5.04	Non	2001-06

MEILLEURE SOURCE : Coursol, F. 2003. Tableau récapitulatif sur la flore menacée ou vulnérable des îles des Rapides de Lachine. .

Boechera laevigata - (4283)

Ile aux Hérons, îles des Rapides de Lachine. / Haut des pentes fortes bordant la rive ouest et nord, colonisés par un groupement à Celtis occidentalis avec Prunus virginiana et Parthenocissus quinquefolia, Eupatorium rugosum, Maianthemum racemosum, Anthriscus sylvestris et Heracleum maximum; 8 colonies comportant environ 300 individus au total; en fleurs et fruits à la mi-juin, en fruits à la mi-juilet.

45,4230 - -73,580150	Seconde (150 m.)	B3.05	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Boechera laevigata - (4290)

Ile au Diable, comté de Verdun; Rapides de Lachine. / Lieux très secs; 2 colonies comportant au total environ 400 individus

45,414160 - -73,593160	Seconde (150 m.)	B3.05	Non	1998-08-03

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Cardamine concatenata - (4331)

Mont Royal. / Bois riches et humides. Rhizome à saveur piquante, comestible; en fleurs du début à la mi-mai.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1935-05-17

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Adrien-Robert Frère (1932) MT; Adrien-Robert Frère (1935) QFA; Cléonique-Joseph Frère (1935) MT; Hayes Philip (1935) QFA; Laflamme Herménégilde Frère (1933) QFA; Masson L. (1925) MT; Ouellet Joseph Frère (1915) DAO; S.M.S.H. Soeurs de Sainte-Croix (1915) MT

Cardamine concatenata - (4332)

La Prairie. / Fin de floraison à la mi-mai.

45,419950 - -73,483090	Général (8 km.)	B5.04	Non	1937-05-15

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Euphrosin-Joseph Frère (1937) MT

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Cardamine concatenata - (4335)

Ile des Soeurs, près de l'extrémité du boulevard de l'île des Soeurs. / Érablière à érable argenté et frêne de Pennsylvanie semi-ouverte; plus de 18 colonies comportant plus de 60 000 tiges; pleine floraison de la fin avril à la mi-mai et végétatif à la fin mai.

45,455230 - -73,551940	Seconde (150 m.)	B4.07	Non	1998-05-07

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Cardamine concatenata - (4340)

Ile aux Hérons, largement réparti sur l'île. / Lieux secs colonisés par un groupement de Celtis occidentalis, avec Rhus typhina, Staphylea trifolia, Circaea lutetiana, Eupatorium rugosum et Anthriscus sylvestris; 1999: 19 colonies comportant au total environ 120 000 tiges; en fleurs à la fin avril.

45,4230 - -73,580150	Seconde (150 m.)	B4.03	Non	1999-05

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Ranger Jacques L. (1977) MT

Cardamine concatenata - (4341)

Îles des Rapides de Lachine, Ile au Diable, largement réparti sur l'île. / Lieux secs colonisés par un groupement de Celtis occidentalis, avec Rhus typhina, Staphylea trifolia, Circaea lutetiana, Eupatorium rugosum et Anthriscus sylvestris;1999: 12 colonies pour une superficie d'environ 300 m2 représentant environ 30 000 tiges; en fleurs à la mi-mai.

45,414160 - -73,593160	Seconde (150 m.)	B4.03	Non	1999-05

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Cardamine concatenata - (4353)

Ile Sainte-Hélène. / Dans une tout petite section du bois, près du marécage; très peu d'individus; pleine floraison la troisième semaine de mai.

45,528620 - -73,533320	Minute (1,5 km.)	-	Non	1935-05-15

MEILLEURE SOURCE : Rouleau, E. 1945. La florule de l'île Ste-Hélène. Contributions de l'Institut botanique de l'Université de Montréal. no 57. 65 p..

Cardamine bulbosa - (4377)

Ville de Montréal, au nord-ouest du Parc Angrignon, à l'ouest du lac. / Lieux humides. 1979 : Quelques dizaines d'individus, en fleurs à la fin mai.

45,444480 - -73,607110	Minute (1,5 km.)	B5.04	Non	1979-05-19

MEILLEURE SOURCE : Coursol, F. 2005. Communication personnelle de Frédéric Coursol à Jacques Labrecque du 17-05-2005, concernant des données d'inventaires du printemps 2005 dans la ville de Montréal. 1 p..

Cerastium nutans - (4483)

Montréal, mont Royal. / En pleine floraison la première semaine de juin et la dernière semaine de juin.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1848-06-04

MEILLEURE SOURCE : Coursol, F. 2004. Courriel envoyé à J. Labrecque le 30-07-2004 contenant des précisions sur certaines occurrences de la région de Montréal. 1 p..

Polanisia dodecandra - (4609)

Longueuil. / Île; En fleurs et en fruits à la mi-août.

45,537870 - -73,517710	Général (8 km.)	-	Non	1939-08-15

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Rolland-Germain Frère (1929) SFS; Rolland-Germain Frère (1939) MTMG, CAN, DAO, QFA; Rolland-Germain Frère (1939) QUE; Rolland-Germain Frère (1939) SFS

Polanisia dodecandra - (4615)

Ville de Montréal, île Sainte-Hélène. / Rive. 1821 : Début de fructification la deuxième semaine d'août.

45,528620 - -73,533320	Minute (1,5 km.)	-	Non	1821-08-13

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Holmes Andrew Fernando (1821) MTMG

Quercus bicolor - (4893)

Ile des Soeurs. / Orée d'un bois; rivages du fleuve; pleine floraison la première semaine de juin; pleine fructification la quatrième semaine d'août.

45,4613 - -73,547860	Minute (1,5 km.)	-	Non	1943-08-26

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Rouleau Ernest (1943) MT

Quercus bicolor - (4898)

Ile de Montréal, Ville-Emard. / Pleine floraison la quatrième semaine de mai.

45,444480 - -73,607110	Minute (1,5 km.)	-	Non	1936-05-30

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Roy Edmond Frère (1936) MT

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Quercus bicolor - (4901)

Longueuil, chemin Gentilly. / Boisé; champ; haies; pleine floraison la première semaine de juin; début de fructification la troisième semaine de juillet; pleine fructification les deuxième et troisième semaines de septembre et la troisième semaine d'octobre.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,523370 - -73,475830	Général (8 km.)	-	Non	1933-07-26

MEILLEURE SOURCE : Chayer, M. 2005. Communication personnelle de Michel Chayer à la boîte électronique du CDPNQ volet flore du 29-11-2005, contenant des précisions sur certaines occurrences historiques et extirpées des secteurs de Longueuil et Montréal. 2 p..

Adlumia fungosa - (4923)

Montréal, mont Royal. / En fleurs à la fin août.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,504390 - -73,610750	Minute (1,5 km.)	B5.04	Non	1936-08-25

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Marie-Jean-Eudes Soeur (1936) MT

Bartonia virginica - (4956)

Saint-Hubert. / Tourbière sèche; terrains tourbeux secs, à l'ombre des Kalmia angustifolia, des Chamaedaphne et des Polytrichum; "sud du bout est de la première fosse"; végétatif la deuxième semaine de juin et en boutons fin juin.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,486420 - -73,406450	Minute (1,5 km.)	-	Non	1940-07-08

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Anonyme (1923) MT; Barnabé R. Frère (1940) SFS; Bernier Germaine (1931) MT; Brisson S. (1938) SFS; Caron Armand Frère (1940) SFS; Dominique Frère (1940) SFS; Legault Albert (1937) SFS; Marie-Anselme Frère (1937) SFS; Marie-Ste-Judith-de-Milan Soeur (1940) MT; Marie-Victorin Frère (1908) MT; Marie-Victorin Frère (1918) CAN; Marie-Victorin Frère (1918) MT; Marie-Victorin Frère (1918) QFA; Marie-Victorin Frère (1918) QUE; Marie-Victorin Frère (1918) SFS; Marie-Victorin Frère, Rolland-Germain Frère (1930) MT; Marie-Victorin Frère, Rolland-Germain Frère (1937) MT; Marie-Victorin Frère, Rolland-Germain Frère (1937) QFA; Rolland-Germain Frère (1926) CAN; Rolland-Germain Frère (1926) QFA; Rolland-Germain Frère (1926) SFS; Rolland-Germain Frère (1940) MT; Rolland-Germain Frère (1940) SFS; Rolland-Germain Frère, Marie-Anselme Frère (1926) QUE; Rolland-Germain Frère, Marie-Anselme Frère (1938) CAN; Rolland-Germain Frère, Marie-Anselme Frère (1938) QUE; Rolland-Germain Frère, Marie-Anselme Frère (1938) SFS; Servule Frère (1931) QFA; Valiquette Germain Frère (1940) MTMG

Geranium maculatum - (5092)

Westmount. / Nil.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,493550 - -73,607820	Minute (1,5 km.)	-	Non	1896-06

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Campbell Robert (1896) MTMG; Campbell Robert (1896) QUE

Agastache nepetoides - (5130)

Mont Royal, Montréal. / Le long de l'escalier descendant de l'université. En fleurs et en fruits en juillet et en fructification en août.

45,504390 - -73,610750	Minute (1,5 km.)	-	Non	1943

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Adrien-Robert Frère (1933) MT; Adrien-Robert Frère (1933) QFA; Ami H.M. (1879) MTMG; Anonyme (1879) DAO; Armstrong A. (1933) QFA; Campbell Robert (1899) MTMG; Cinq-Mars Lionel (1943) QFA; Cléonique-Joseph Frère (1932) MT; Dansereau Antonio (1932) MT; Hayes Philip (1935) QFA; Holmes Andrew Fernando (1821) MTMG; Lévesque Lucien Frère (1935) MT; Marie de Pontmain Soeur (1940) MT; Marie-Victorin Frère (1912) MT; Rolland-Germain Frère (1912) SFS; Rouleau Ernest (1932) MT; Roy Edmond Frère (1927) MT; Roy Edmond Frère (1927) MTMG; Roy Edmond Frère (1927) SFS

Agastache nepetoides - (5132)

Sainte-Catherine (Côte-Sainte-Catherine), près de La Prairie. / En fleurs à la mi-août.

45,407980 - -73,602890	Minute (1,5 km.)	B5.04	Non	1932-08-14

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Euphrosin-Joseph Frère (1932) MT

Pycnanthemum virginianum - (5232)

Montréal, avenue Louis-Colin, en bordure. / Bord de chemin. 1965 : Pleine fructification la deuxième semaine d'août.

45,501770 - -73,617220	Minute (1,5 km.)	-	Non	1965-08-14

MEILLEURE SOURCE : Coursol, F. 2004. Courriel envoyé à J. Labrecque le 30-07-2004 contenant des précisions sur certaines occurrences de la région de Montréal. 1 p..

Pycnanthemum virginianum - (5233)

Iles des Soeurs. / Pleine floraison la deuxième semaine d'octobre.

45,4613 - -73,547860	Minute (1,5 km.)	-	Non	1821-10-10

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Holmes Andrew Fernando (1821) MTMG

Trichostema dichotomum - (5274)

Ile à Boquet, île à Paquette, Côte-Sainte-Catherine, près de La Prairie. / Fleur à fruit en juillet.

45,410970 - -73,573680	Seconde (150 m.)	-	Non	1920-07

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1920) DAO; Cléonique-Joseph Frère (1920) MT

Floerkea proserpinacoides - (5276)

Communauté métropolitaine de Montréal, île des Soeurs, bois Saint-Paul / Station nord : frênaie à frêne rouge (Fraxinus pennsylvanica) et à érable argenté (Acer saccharinum); présence du tilleul d'Amérique (Tilia americana), de l'orme d'Amérique (Ulmus americana), du noyer cendré (Juglans cinerea), du peuplier à feuilles deltoides (populus deltoides) et du chêne bicolore (Quercus bicolor), Impatiens capensis (espèce herbacée dominante), Symplocarpus foetidus et Hydrophyllum virginianum; recouvrement du Floerkea entre 5 et 25%; environ 100 000 individus sur une superficie de 3944 mètres carrés; légère cuvette dans un dépôt d'argile sablo-limoneuse, drainage imparfait. Station sud : érablière à érable argenté (Acer saccharinum) et à frêne rouge (Fraxinus pennsylvanica); présence du tilleul d'Amérique (Tilia americana), de l'orme d'Amérique (Ulmus americana), Impatiens capensis (espèce herbacée dominante), Symplocarpus foetidus, Laportea canadensis, Onoclea sensibilis, Calamagrostis canadensis, Hydrophyllum virginianum, Dicentra canadensis, Athyrium filix-femina et Claytonia virginica; recouvrement du Floerkea entre 1 et 5%; environ 18 000 individus sur une superficie de 364 mètres carrés; légère dépression humide dans un dépôt d'argile sablo-limoneuse; drainage mauvais. Présence de quelques talles isolées de superficie inférieure à 1 mètre carré, entre les stations nord et sud. Boisé humide; boisé décidu mésique-humide; marécage intérieur, terrain très humide; érablière humide; sous-bois herbeux; avec Symplocarpus foetidus, Arisaema atrorubens et Impatiens capensis; avec Polygonum virginianum, Claytonia virginica, Hydrophyllum virginianum, Impatiens pallida, Tilia americana et Acer rubrum; avec Ulmus americana, Fraxinus americana, Acer saccharinum et Carya ovata; 1999: une quinzaine de colonies comportant plus de 500 000 individus; début de floraison la deuxième semaine de mai; pleine floraison les première, deuxième et quatrième semaines de mai et la première semaine de juin; début de fructification la quatrième semaine de mai; pleine fructification la quatrième semaine de mai, les première et deuxième semaines de juin.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,455230 - -73,551940	Seconde (150 m.)	B5.01	Non	1999-05

MEILLEURE SOURCE : Bouchard, D. 1993. Localisation du Floerkea proserpinacoides à l'île des Soeurs. Rapport présenté à la Direction de la conservation et du patrimoine écologique, ministère de l'Environnement et de la Faune du Québec. Foramec inc., Québec. 11 pages + annexe..

Floerkea proserpinacoides - (5279)

Communauté urbaine de Montréal, LaSalle, Ile aux Hérons. / Recensé dans différents habitats (peut-être différents EO) par Ranger en 1976-1977: 1) Colonie fermée et dense ceinturant la basse herbaçaie d'un marécage; envahit le sol humide sous les basses arbustaies de Cornus sericea- la colonie s'ouvre et la plante croît en talles denses, éparses. 2) Grande colonie très dense en bordure de la basse herbaçaie d'un terrain marécageux, avec Cardamine pensylvanica et Epilobium coloratum. 3) Arboraie très ouverte d'Ulmus rubra, avec Claytonia virginica, Dentaria maxima, Dicentra cucullaria et Matteucia struthiopteris. 4) Sous-bois frais et humide d'une arboraie d'Ulmus sp. et Fraxinus pensylvanica, avec Tilia americana, Arisaema atrorubens, Dicentra cucullaria et Matteucia struthiopteris. 5) Formant un tapis enchevêtré dans la boue d'un marécage. 1999: une vingtaine de colonies comportant plus de 1 000 000 d'individus; Récolté en fleurs entre le 30 avril et le 10 mai; en fruits entre le 18 mai et le 7 juin.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,4230 - -73,580150	Seconde (150 m.)	B3.05	Oui	1999-05

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Polygala senega - (5462)

Montréal, bois des Franciscains. / Champ négligé; en boutons à la fin mai, en fleurs au début de juin.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1937-06-07

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Béchard Gaston, Boivin Alice, Boivin Bernard (1937) MT; Boivin Bernard (1937) MT; Boivin Bernard (1937) QFA; Lafond André (1937) QFA

Polygala senega - (5465)

Montréal, mont Royal, près du couvent des soeurs Jésus- Marie (environs de la rue Vincent d'Indy); Outremont. / Terrain sec; taillis, sols pierreux, près d'une rue; en fleurs du début à la mi-juin.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,504390 - -73,610750	Minute (1,5 km.)	B5.04	Non	1936-06-04

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Adrien-Robert Frère (1933) MT; Ducharme G. Père (1926) DAO; Godefroy Frère (1922) MT, CAN; Godefroy Frère (1922) QFA; Godefroy Frère (1922) SFS; Ouellet Joseph Frère (1914) DAO; Ouellet Joseph Frère (1914) MT; Roy Edmond Frère (1924) MT; Roy Edmond Frère (1925) MT; Roy Edmond Frère (1926) MT; Roy Edmond Frère (1931) QFA; Roy Edmond Frère (1935) MT; Roy Edmond Frère (1935) QFA; Roy Edmond Frère (1935) QUE; Roy Edmond Frère (1935) SFS; Roy Edmond Frère (1936) MT; Roy Edmond Frère (1936) QFA; Roy Edmond Frère (1936) QUE

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Persicaria hydropiperoides - (5535)

Brosseau. / Bord de ruisseau; lit de rivière; pleine floraison la quatrième semaine d'août; pleine fructification la première semaine de septembre.

45,425780 - -73,447780	Général (8 km.)	B5.04	Non	1943-09-06

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1933) MT, DAO; Cléonique-Joseph Frère (1933) QFA; Terrill Lewis McIver (1943) MTMG

Persicaria hydropiperoides - (5536)

Longueuil. / Nil.

45,523370 - -73,475830	Général (8 km.)	B5.04	Non	1906-07

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Marie-Victorin Frère (1906) MT

Claytonia virginica - (5635)

Ile des Soeurs, près du boulevard de l'île des Soeurs. / Érablière à érable argenté et frêne de Pennsylvanie; 1999: 27 colonies comportant au total environ 125 000 tiges; 1998: près de 1000 individus répartis sur plus de 1000 m carrés; en pleine floraison du début mai à la fin juin.

45,455230 - -73,551940	Seconde (150 m.)	B3.11	Non	1998-05-07

MEILLEURE SOURCE :

Claytonia virginica - (5636)

Laprairie, comté de Laprairie. / Bois riche; en fleurs à la mi-mai.

45,419950 - -73,483090	Général (8 km.)	B5.04	Non	1936

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1935) MT; Euphrosin-Joseph Frère (1936) MT

Claytonia virginica - (5638)

Ile aux Hérons, ouest de l'île. / Lieux secs colonisés par un groupement à Fraxinus pennsylvanica et Celtis occidentalis, avec Staphylea trifolia, Rhus typhina, Anthriscus sylvestris, Eupatorium rugosum; Cardamine concatenata, Erythronium americanum et Matteuccia struthiopteris; 1999: 4 colonies comportant au total moins de 100 individus; pleine floraison la quatrième semaine d'avril, la quatrième semaine de mai et la première semaine de juin.

45,422950 - -73,578940	Seconde (150 m.)	B5.04	Non	1999-05

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Claytonia virginica - (5658)

Saint-Hubert, au sud du boulevard Maricourt (boisé Maricourt), de part et d'autre de la rue Roland. / Boisé sur sol argileux imparfaitement drainé, avec plusieurs mares dans le sous-bois; érablière à Acer rubrum et Fraximus pensylvanica, avec Corylus cornuta, Onoclea sensibilis, Carpinus caroliniana, Rubus pubescens, Toxidendron rydbergii; deux colonies de 25 X 15 m, renfermant plus de 1000 individus au total, 25% des individus en pleine floraison la deuxième semaine de mai.

45,470120 - -73,399230	Seconde (150 m.)	B3.11	Non	1996-05-30

MEILLEURE SOURCE : Sabourin, A. 1996. Lettre adressée à Gildo Lavoie le 12 juin 1996 ..

Lysimachia hybrida - (5673)

La Prairie. / Nil.

45,419950 - -73,483090	Général (8 km.)	-	Non	1940-PRE

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (0) MT

Samolus floribundus - (5699)

La Prairie, rivière. / Berge de la rivière; en pleine floraison la troisième semaine d'août; en début de fructification la troisième semaine de septembre.

45,419950 - -73,483090	Général (8 km.)	B5.04	Non	1928-09-15

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1928) MT

Ranunculus flabellaris - (5722)

Bois des Franciscains, Montréal, ruisseau Molson. / Eau courante d'un ruisseau (60-90 cm) (2-3 pieds); pleine floraison la première semaine de juin.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1937-06-01

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Lafond André (0) QFA; Lafond André (1937) QFA; Moquin Adrien (1937) DAO

Ranunculus flabellaris - (5725)

Ile de Montréal, boisé Lasalle. / Étang peu profond (15 cm à 60 cm de profondeur); pleine floraison la deuxième semaine de juin.

45,444480 - -73,607110	Minute (1,5 km.)	B5.04	Non	1948-05-15

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Terrill Lewis Mclver (1939) DAO; Terrill Lewis Mclver (1948) MTMG

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Agrimonia pubescens - (5829)

Mont-Royal, Montréal. / Groupement à Crataegus sp.. En pleine fructification la deuxième semaine de septembre.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1937-09-11

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Boivin Bernard (1937) MT, DAO

Crataegus brainerdii - (5858)

Montréal, Mont-Royal, près de l'Université, rue van Horne. / Taillis. 1937 : En pleine fructification la quatrième semaine d'août.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1937-08-30

MEILLEURE SOURCE : Coursol, F. 2004. Courriel envoyé à J. Labrecque le 30-07-2004 contenant des précisions sur certaines occurrences de la région de Montréal. 1 p..

Rubus flagellaris - (5897)

Ile de Montréal, Mont-Royal. / Pleine floraison la quatrième semaine de juin.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1900-06-26

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Lyman Henry Herbert (1900) MTMG

Galium circaezans - (5926)

Ile de Montréal, mont Royal. / Pleine fructificaton la quatrième semaine de juin.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1886-1911

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Campbell Robert (1911) MTMG

Saururus cernuus - (5998)

Côte Sainte-Catherine, limite de la réserve (réserve= indienne de Kahnawake? GFJ). / En fleurs, la 3eme semaine de juillet.

45,407980 - -73,602890	Général (8 km.)	-	Non	1899

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Euphrosin-Joseph Frère (1899) MT

Veronica anagallis-aquatica - (6130)

La Tortue, embouchure d'un ruisseau se jetant dans le Saint-Laurent. / Embouchure d'un ruisseau; pleine fructification la première semaine de septembre.

45,402160 - -73,534040	Minute (1,5 km.)	-	Non	1940-09-03

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Marie-Victorin Frère, Rolland-Germain Frère, Rouleau Ernest, Boivin Bernard, Blain Auray (1940) MT, CAN

Veronica anagallis-aquatica - (6131)

Mont Royal. / Pleine fructification la quatrième semaine de mai.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1937-05-24

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Béchard Gaston (1937) QFA

Staphylea trifolia - (6153)

Ile aux Hérons, Rapides de Lachine. / Bois humide ou sec, à l'orée d'une arboraie de Celtis occidentalis, Tilia americana avec Rhus typhina, Anthriscus sylvestris et Matteuccia Struthiopteris; en bordure d'une arboraie à Tilia americana et à Carya cordiformis; 1999: population plus grande que 10 000 individus, occupant des surfaces importantes de la section ouest de l'île; pleine floraison la première semaine de juin; pleine fructification la troisième semaine de juin et la première semaine de juillet.

45,4230 - -73,580150	Seconde (150 m.)	B4.03	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Staphylea trifolia - (6163)

Ile aux Chèvres, Rapides de Lachine. / En bordure d'une basse arboraie; bois humide; pleine floraison la première semaine de juin; 1999: population estimée à 4 500 individus; pleine fructification la quatrième semaine de juin et la quatrième semaine d'août.

45,426380 - -73,578470	Seconde (150 m.)	B4.07	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Staphylea trifolia - (6190)

Ile de Montréal, Westmount, mont Royal, versant est, près du sommet; Parc Summit. / Forêt de feuillus sur un affleurement rocheux; sommet boisé ombragé; pleine floraison la première et la deuxième semaines de juin; pleine fructification la troisième semaine de septembre.

45,511310 - -73,588180	Minute (1,5 km.)	B5.04	Non	1999

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Anonyme (1934) QFA; Barabé Rosario (1940) QUE; Biggar H.H. (1940) DAO; Maycock Paul F. (1961) MTMG, DAO; Terrill Lewis McIver (1945) MTMG; Terrill Lewis McIver (1950) MTMG; Terrill Lewis McIver (1951) MTMG

Celtis occidentalis - (6210)

Îles des rapides de Lachine, Ile aux Hérons, comté de Verdun, sur l'ensemble de l'île mais plus particulièrement dans la partie ouest. / Arboraie d'Ulmus rubra, Tilia americana et Celtis occidentalis; 1999: plus de 1000 individus répartis sur environ 150 000 m2; en fleurs au début mai, en fruits du début juin au début juillet et végétatif la deuxième semaine de septembre.

45,4230 - -73,580150	Seconde (150 m.)	B4.03	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Celtis occidentalis - (6212)

Ile Sainte-Hélène, centre, au sud de la tour / Très abondant dans le bois; en fleurs de la mi à la fin mai, végétatif de la fin mai au début septembre et en fruits durant tout le mois de juin et septembre.

45,517340 - -73,533580	Seconde (150 m.)	B5.04	Non	2000-05-07

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Barnabé R. Frère (1940) SFS; Belzile A., Gervais Camille (1958) DAO; Belzile A., Gervais Camille (1958) MTMG; Belzile A., Gervais Camille (1958) QFA; Belzile A., Gervais Camille (1958) SFS; Bernard Jean-Paul (1947) MTMG, CAN, DAO; Bernard Jean-Paul (1947) QFA; Boivin Bernard (1937) MT, DAO; Dominique Frère (1940) SFS; Dubreuil D. (1931) MT; Héroux Georges, Roy Edmond Frère (1931) MT; Jolicoeur Roger (1952) MT; Jolicoeur Roger, Jolicoeur Jean-Paul (1952) SFS; Marie-Ste-Judith-de-Milan Soeur (1940) MT; Mariniak Oleh B. (1959) MTMG; Racine Marcel (1933) MT; Rolland-Germain Frère (1937) SFS; Rouleau Ernest (1934) SFS; Rouleau Ernest (1935) MT; Roy Edmond Frère (1931) MT, DAO; Roy Edmond Frère (1931) QFA; Roy Edmond Frère (1932) MT; Roy Edmond Frère (1933) MT, DAO; Roy Edmond Frère (1935) MT, CAN; Roy Edmond Frère (1936) MT; Taché Bernard (1948) MT; Taché Bernard (1950) MT

Celtis occidentalis - (6214)

Montréal, pont Jacques-Cartier (dans la cour en arrière du no. 5809 Delaroche). / 1940 : Végétatif à la mi-juillet.

45,522470 - -73,5450	Minute (1,5 km.)	-	Non	1940-07-15

MEILLEURE SOURCE : Coursol, F. 2004. Courriel envoyé à J. Labrecque le 30-07-2004 contenant des précisions sur certaines occurrences de la région de Montréal. 1 p..

Celtis occidentalis - (6215)

Mont Royal, Montréal. / Taillis marginal d'un bois d'érable; végétatif de la fin mai à la mi-septembre.

45,504240 - -73,5986	Minute (1,5 km.)	B5.04	Non	1938-05-26

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1937) MT; Cléonique-Joseph Frère (1938) MT

Celtis occidentalis - (6219)

Ile aux Chèvres, comté de Verdun. / Arboraie de Tilia americana; arbustaies à Rhus typhina et Ulmus rubra; environ 200 arbres matures dispersés sur environ 5 000 m2; végétatif à la fin août.

45,426380 - -73,578470	Seconde (150 m.)	B5.03	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Celtis occidentalis - (6222)

Ile des Soeurs, près de l'extrémité du boulevard de l'île des Soeurs. / Érablière à érable argenté et frêne de Pennsylvanie; au moins 50 arbres répartis sur plus de 1000 m carrés.

45,455230 - -73,551940	Seconde (150 m.)	B5.03	Non	1998-10-07

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Joyal Robert (1963) MT

Celtis occidentalis - (6226)

La Prairie, comté de Napierville. / En fruits à la mi-juin.

45,419950 - -73,483090	Minute (1,5 km.)	B5.04	Non	1935-06-11

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Meilleur René (1935) MT

Celtis occidentalis - (6228)

Ile au Diable, concentré dans une étroite bande au centre de l'île. / Arbre croissant dans une arboraie peu dense où cette espèce est dominante; 1999: quelques arbres matures seulement mais abondante regénération; végétatif à la fin mai.

45,414160 - -73,593160	Seconde (150 m.)	B5.04	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Celtis occidentalis - (6254)

Rapides de Lachine, rive sud du fleuve Saint-Laurent. / Le long d'une clôture; plusieurs arbres atteignant 40 cm de diamètre; pleine fructification la première semaine d'août.

45,407980 - -73,602890	Minute (1,5 km.)	B5.04	Non	1952-08-06

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Dore William G., Cody William J. (1952) DAO; Marie-Victorin Frère (1920) MT; Marie-Victorin Frère, Rolland-Germain Frère (1943) MT, CAN

Celtis occidentalis - (6255)

Ville Lasalle, bois au sud du boulevard Champlain et à l'est de la 35e Avenue. / Boisé de plaine alluviale avec Acer saccharinum, Ulmus americana et Fraxinus americana; végétatif la première semaine d'octobre.

45,422560 - -73,617870	Seconde (150 m.)	B5.04	Non	1966-10-02

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Maycock Paul F., Maycock I.E. (1966) MTMG, CAN, DAO; Maycock Paul F., Maycock I.E. (1966) QFA

Celtis occidentalis - (6280)

Les Sept Soeurs, à l'ouest du seul chalet. / Arboraie de Fraxinus pennsylvanica, Acer saccharinum, Populus deltoides et Celtis occidentalis avec Circaea lutetiana, Prunus virginiana, Parthenocissus quinquefolia. 2004 : 2-5 individus. 1998 : Moins de 10 individus.

45,420560 - -73,588320	Seconde (150 m.)	B5.04	Non	2004

MEILLEURE SOURCE : Coursol, F. 2004. Courriel envoyé à J. Labrecque le 30-07-2004 contenant des précisions sur certaines occurrences de la région de Montréal. 1 p..

Celtis occidentalis - (6281)

LaSalle, île aux Câbles / Quelques individus.

45,414730 - -73,576920	Seconde (150 m.)	B5.04	Non	1998

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Verbena simplex - (6400)

Ile Ste-Hélène. / Rivage rocheux; en fleurs à la troisième semaine de juin et la deuxième semaine d'août.

45,528620 - -73,533320	Minute (1,5 km.)	-	Non	1962-08-12

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Bahr P. (1962) MTMG; Racine Marcel (1934) MT; Rouleau Ernest (1935) MT; Roy Edmond Frère (1933) MT; Roy Edmond Frère (1935) MT, CAN

Verbena simplex - (6401)

Ile des Soeurs (= Ile Saint-Paul). / Rivage du St-Laurent; en fleurs à la fin juin.

45,4613 - -73,547860	Minute (1,5 km.)	-	Oui	1944

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Rouleau Ernest (1944) MT, DAO; Rouleau Ernest (1944) QUE

Verbena simplex - (6403)

Ile à Boquet, côte Sainte-Catherine. / Nil.

45,410970 - -73,573640	Seconde (150 m.)	-	Oui	1920-07

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1920) MT

Viola affinis - (6407)

Ile Sainte-Hélène, près du marécage. / Près du marécage; en pleine floraison la troisième semaine de mai.

45,528620 - -73,533320	Minute (1,5 km.)	-	Non	1936-05-21

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Rouleau Ernest (1936) MT

Viola affinis - (6408)

Montréal, Mont Royal. / Boisé; dans le sous-bois de la montagne; en floraison la troisième et dernière semaine de mai.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1945-05-19

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Beaudry Jean-René (1945) MTMG; Dansereau Antonio (1931) MT; Noé Frère (1918) SFS; Rouleau Ernest (1936) MT

Viola rostrata - (6441)

Mont Royal, Montréal. / En fleurs durant le mois de mai.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1891-05

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Soeurs de Sainte-Croix (1891) MT

Arisaema dracontium - (6530)

Ile des Soeurs, terrain ouvert entre le boisé et la rive nord. / Lieux ouverts; dans un pâturage; mauvais drainage, très rare, pleine fructification la deuxième semaine d'août.

45,4613 - -73,547860	Minute (1,5 km.)	-	Non	1963-08-08

MEILLEURE SOURCE : Joyal, R. 1970. La flore vasculaire de l'île des Soeurs. Nat. can. 97 559-583.

Arisaema dracontium - (6533)

Ile aux Chèvres, le long du rivage sud, à proximité des chalets. Et Ile aux Hérons. / Île aux Chèvres : Plaine de débordement à érable argenté et frêne rouge; arboraie basse de Rhus typhina, près de la rivière avec A. atrorubens et Cornus sericea, sol rocailleux et sec; herbaçaie basse qui semble être un potager abandonné, à 30 m de la rivière, avec Eupatorium rugosum, Fragaria vesca et Ribes hirtellum; sol caillouteux et humide; DÉMOGRAPHIE: 1992, 200 individus. 1995, moins de 20 individus; 1999: 2404 individus recensés dont 3,8% d'individus mâles et 1,5% d'individus bisexués. PHÉNOLOGIE: pleine floraison la première semaine de juin.
Île aux Hérons : Boisé à Celtis occidentalis et ormes morts; (drainage modéré à imparfait); arbustaie à Cornus stolonifera et solidago altissima (drainage imparfait) sous-bois humide d'une arboraie, parmi des semis d'Ulmus americana et de Fraxinus pensylvanica; grande herbaçaie marécageuse, dans une colonie d'Impatiens capensis et d'I.pallida; rivage d'un petit ruisseau traversant une grande herbaçaie marécageuse; avec Acorus calamus, Iris versicolor, Sparganium eurycarpum et Symplocarpus foetidus; 1998: 211 individus recensés dont 9,5% d'individus mâles et 0,5% d'individus bisexués; pleine floraison les première et quatrième semaines de juin.

45,4238 - -73,577610	Seconde (150 m.)	B3.11	Non	1999

MEILLEURE SOURCE : Gagnon, D., P. Nantel, L. Lauzon, G. Forest et N. Lavoie. 1995. Dynamique des populations de huit espèces de plantes menacées ou vulnérables du Québec (rapport final). Rapport non publié, remis au ministère de l'Environnement et de la Faune du Québec. 269 p. + annexes.

Carex cephalophora - (6683)

Ville de Montréal, mont Royal, de part et d'autre du cimetière à proximité de l'Université de Montréal. Occurrence divisée en 3 sous-populations. (1) : Le long de la forêt à l'arrière du pavillon du département de musique de l'Université de Montréal, jusqu'au cimetière. (2) : Forêt débutant à environ 50 m au nord de la Chapelle Notre-Dame, de part et d'autre d'un chemin du cimetière. (3) : Forêt complètement à l'est du cimetière, au sud-ouest d'une grande courbe dans la voie Camillien Houde. / (1) : Aucune caractérisation. 2005 : 17 individus. (2) : Aucune caractérisation. 2005 : 12 individus. (3) : Aucune caractérisation. 2005 : 6 individus.

45,508870 - -73,607790	Seconde (150 m.)	B5.04	Non	2005

MEILLEURE SOURCE : Coursol, F. 2005. Communication personnelle de Frédéric Coursol à Jacques Labrecque du 11-02-2005, contenant des données brutes d'inventaire de plantes rares de la région de Montréal. 1 p. + annexe.

Carex cephalophora - (6684)

Ile de Montréal, Côte Sainte-Catherine, bois près du collège Brébeuf. / Bois.

45,506430 - -73,630540	Minute (1,5 km.)	B5.04	Non	1930-06-27

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1930) MT

Carex folliculata - (6726)

Laprairie, Commune. / Marécages de la commune; pleine fructification au début de juillet.

45,409180 - -73,4853	Minute (1,5 km.)	-	Non	1916-07-06

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1916) MT

Carex folliculata - (6727)

Brosseau (Brossard). / Moullière dans un bois; pleine fructification de la deuxième semaine d'août à la fin de septembre.

45,425780 - -73,447780	Minute (1,5 km.)	B5.04	Non	1951-08-10

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1935) MT; Terrill Lewis Mclver (1951) CAN

Carex molesta - (6891)

LaSalle, rapides de Lachine, Ile aux Chèvres. / Rivage caillouteux, avec Allium canadense, avec des herbes; 2007: une touffe observée; en pleine fructification la première et la quatrième semaines de juin.

45,424970 - -73,581990	Seconde (150 m.)	B5.04	Non	2007-06

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Hébert Louis-Philippe (1968) MT; Ranger Jacques L. (1977) MT

Carex sparganioides - (7001)

Longueuil. / Nil.

45,523370 - -73,475830	Général (8 km.)	-	Non	1914-07

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Marie-Victorin Frère (1914) MT; Marie-Victorin Frère (1914) MTMG

Carex sparganioides - (7010)

Ile de Montréal, Mont Royal, versant sud, au sud-ouest du belvédère du chalet du Mont-Royal, en direction du lac des Castors, sur un sentier qui longe la falaise entre le belvédère et le chemin Olmstead. / Le long d'un sentier dans le sous-bois. Situation humide avec un sol mal drainé; Bois frais; pleine fructification tout le mois de juin et la première semaine de juillet.

45,502410 - -73,589040	Seconde (150 m.)	B5.04	Non	1994-07-03

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Adrien-Robert Frère (1932) MT; Boivin Bernard (1937) DAO; Cléonique-Joseph Frère (1930) MT; Cléonique-Joseph Frère (1938) MT, DAO; Coursol Frédéric (1994) MT; Lepage Ernest Père (1938) QFA; Malte Malte Oskar (1911) CAN; Marie-Victoria Soeur (1932) MT; Ouellet Joseph Frère (1914) MT

Carex sparganioides - (7014)

Ile des Soeurs, nord-est, entrée de l'île. / Pleine fructification la troisième semaine de juin.

45,4613 - -73,547860	Minute (1,5 km.)	-	Non	1967-06-20

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Hébert Louis-Philippe (1967) MT

Carex sychnocephala - (7037)

Ile Sainte-Hélène (île aux Fraises), près de Montréal, Longueuil. / Sur les terrains rocheux et secs, très abondant; en fruits début septembre.

45,528620 - -73,533320	Minute (1,5 km.)	-	Non	1935-09-02

MEILLEURE SOURCE : Coursol, F. 2004. Courriel envoyé à J. Labrecque le 30-07-2004 contenant des précisions sur certaines occurrences de la région de Montréal. 1 p..

Carex appalachica - (7106)

Mont Royal, Montréal. / Bois; végétatif à la mi-juin.

45,504390 - -73,610750	Minute (1,5 km.)	B5.04	Non	1937

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cailloux Marcel, Racine Marcel, Boivin Bernard (1937) MT

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Cyperus odoratus - (7145)

Iles des Rapides de Lachine, île au Diable, comté de Verdun. / Rivage rocheux, avec Epilobium coloratum, Mimulus ringens et Verbena hastata; en fruits à la fin août.

45,414160 - -73,593160	Seconde (150 m.)	B5.04	Non	1977-08-31

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Ranger Jacques L. (1977) MT

Wolffia borealis - (7547)

Verdun, parc Crawford. / Surface d'un petit étang, eau stagnante.

45,4437 - -73,580270	Général (8 km.)	B5.04	Non	1939-10-03

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Wynne-Edwards V.C. (1939) CAN; Wynne-Edwards V.C. (1939) MT, CAN

Allium canadense var. canadense - (7552)

Laprairie, comté de Laprairie, rivière St-Jacques. / En bordure d'un marais; en fruits (bulbilles) à la mi-juillet.

45,419950 - -73,483090	Général (8 km.)	-	Non	1930

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1930) MT

Allium canadense var. canadense - (7553)

Ile aux Chèvres, comté de Verdun, sur l'ensemble de l'île. / Herbes du rivage humide, abondant; terrain ombragé avec Eupatorium rugosum, Sambucus pubens; 1999: au moins 11 colonies comportant au total environ 5000 individus; en fleurs de la fin mai à la fin juin.

45,426380 - -73,578470	Seconde (150 m.)	B3.11	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Allium canadense var. canadense - (7556)

Ile aux Hérons, comté de Verdun, Rapides de Lachine; rivage du fleuve St-Laurent. / Mi-pente d'une pointe érodée dans un sol rocheux ou sol frais sans pierre de texture fine en bordure du chenal; strate arborescente absente, strate arbustive dominée par Rhus typhina ou Vitis riparia, strate herbacée dominée par Urtica dioica, Eupatorium rugosum, Symplocarpus foetidus et Arisaema triphyllum; 1999: 23 colonies pour un total d'environ 525 000 individus répartis sur environ 400 m2 ; en boutons durant le mois de juin.

45,4230 - -73,580150	Seconde (150 m.)	B3.05	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Allium canadense var. canadense - (7557)

Ile Rock, cté. de Verdun, rapides de Lachine. / Sol rocheux et sec d'une basse herbaçaie;1999: une douzaine de petites colonies couvrant moins de 12 m2; post floraison sans fruits à la mi-août.

45,430530 - -73,570380	Seconde (150 m.)	B5.04	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Allium canadense var. canadense - (7558)

Ile au Diable, comté de Verdun; Rapides de Lachine. / 1979: Une douzaine de petites talles de 4 à 5 individus chacune dans une section non particulièrement humide d'un sentier 1999: 1000 individus répartis en 6 colonies et couvrant une superficie de 100 m2; en boutons à la fin mai.

45,414160 - -73,593160	Seconde (150 m.)	B5.01	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Allium canadense var. canadense - (7562)

Ile des Soeurs. / Terrain humide; 1999: 5 colonies comportant au total moins de 500 individus; bouton floral la première semaine de juin.

45,455230 - -73,551940	Seconde (150 m.)	B5.04	Non	1999-05

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Hébert Louis-Philippe (1970) MT; Hébert Louis-Philippe (1970) SFS

Allium canadense var. canadense - (7566)

Les Sept Soeurs, à l'ouest du seul chalet. / Étroit écotone composé de Fraxinus pennsylvanica, Acer saccharinum, Celtis occidentalis et Populus deltoides, avec Prunus virginiana, Rubus idaeus, Vitis riparia et Parthenocissus quinquefolia et Circaea lutetiana; six colonies comportant environ 300 individus répartis sur 5 m2.

45,420560 - -73,588320	Seconde (150 m.)	B5.04	Non	1999-05-

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Allium canadense var. canadense - (7567)

LaSalle, île aux Câbles / Bordure de rivage; quelques colonies d'une dizaine d'individus.

45,414730 - -73,576920	Seconde (150 m.)	B5.04	Non	1998-09-03

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Allium tricoccum - (7633)

Iles des Rapides de Lachine, Ile aux Hérons; berge du chenal entre les 2 îles. / Peuplement de Celtis occidentalis, Carya cordiformis et Populus deltoides avec Rhus typhina, Cornus stolonifera, Parthenocissus quinquefolia, Prunus virginiana et Staphylea trifolia; une quinzaine de colonies réparties sur environ 2400 m2 pour un total d'environ 45000 individus; début d'inflorescence la deuxième semaine de juin, inflorescence la troisième semaine de juin et pleine fructification la première semaine de juillet.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,4230 - -73,580150	Seconde (150 m.)	B5.03	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Allium tricoccum - (7652)

Mont Royal, Ile de Montréal. / Boisé; pleine fructification la première semaine de juillet.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1936-07-07

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Dansereau Antonio (1936) MT; Marie-Victoria Soeur (1931) MT

Allium tricoccum - (7767)

Ile au Diable, comté de Verdun; Rapides de Lachine. / Groupement à Celtis occidentalis et Rhus typhina; moins de 500 individus répartis sur 4m carrés.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,414160 - -73,593160	Seconde (150 m.)	B5.04	Oui	1998-07-31

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Allium tricoccum - (7768)

Les Sept Soeurs, derrière le seul chalet. / Peuplement de Fraxinus pennsylvanica, Acer saccharinum, Celtis occidentalis et Populus deltoides; environ 60 individus répartis sur 1m carré.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,420560 - -73,588320	Seconde (150 m.)	B5.04	Oui	1999-05-

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Allium tricoccum - (7769)

Îles des rapides de Lachine, île aux Chèvres / Peuplement de Celtis occidentalis et Tilia americana; 6 colonies comportant au total environ 3000 individus pour une superficie totale de 150 m carrés.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,426380 - -73,578470	Seconde (150 m.)	B5.04	Oui	1998-07-31

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Galearis spectabilis - (8048)

Montréal, mont Royal, Bois du Collège Jean de Bréboeuf. / Bois riche et humide, taillis pierreux.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1932-05-28

MEILLEURE SOURCE : Coursol, F. 2004. Courriel envoyé à J. Labrecque le 30-07-2004 contenant des précisions sur certaines occurrences de la région de Montréal. 1 p..

Bromus pubescens - (8337)

Ile de Montréal, sur le Mont Royal. / Bois ouvert; pleine fructification la quatrième semaine de juillet et la troisième semaine de septembre.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1937-07-27

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1932) MT; Cléonique-Joseph Frère (1937) MT

Elymus riparius - (8532)

Montréal, mont Royal. / Pleine floraison la troisième semaine d'août.

45,504240 - -73,5986	Minute (1,5 km.)	-	Non	1946-08-21

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cinq-Mars Lionel (1946) QFA

Elymus villosus - (8538)

Ile Sainte-Hélène, centre, au sud de la tour / Bois ouvert sec et rocheux sur la colline, micocoulaie; entre 50 et 100 touffes; pleine fructification la troisième semaine de septembre.

45,516790 - -73,533010	Seconde (150 m.)	B4.02	Non	2000-05-07

MEILLEURE SOURCE : Rouleau, E. 1945. La florule de l'île Ste-Hélène. Contributions de l'Institut botanique de l'Université de Montréal. no 57. 65 p..

Elymus villosus - (8539)

Île du Seigneur, Portion est de la réserve amérindienne de Kahnawake, section au nord de la voie maritime du Saint-Laurent. / Milieu ouvert et sec avec Rhus radicans, Parthenocissus quinquefolia et Equisetum arvense; 1978: commun; 1998: une seule colonie; en fruits au début de juillet.

45,409290 - -73,600170	Seconde (150 m.)	B5.04	Non	1998-08

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Elymus villosus - (8540)

Ile des Soeurs, près de l'extrémité du boulevard de l'île des Soeurs. / Érablière à érable argenté et frêne de Pennsylvanie; 1999: 20 colonies comportant au total plus de 1000 individus; 1998: moins de 10 individus répartis sur moins d'un m carré; pleine fructification la deuxième semaine de juillet et la première semaine d'octobre.

45,455230 - -73,551940	Seconde (150 m.)	B3.03	Non	1999

MEILLEURE SOURCE :

Panicum virgatum - (8646)

Ile des Soeurs. L'étiquette du spécimen indique comme localité: île dans les rapides, face à Pointe Saint-Charles. / En fruits la deuxième semaine de septembre.

45,4613 - -73,547860	Minute (1,5 km.)	-	Non	1821-09-08

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Holmes Andrew Fernando (1821) MT

Panicum virgatum - (8647)

Ile Sainte-Hélène, rivages du Saint-Laurent. / Rivages; en fruits et en fleurs la première et la troisième semaines d'août.

45,528620 - -73,533320	Minute (1,5 km.)	-	Non	1952-08-02

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cinq-Mars Lionel (1946) MT, DAO; Cinq-Mars Lionel (1946) QUE; Cinq-Mars Lionel (1952) DAO; Rouleau Ernest (1933) MT; Rouleau Ernest (1937) MT

Panicum virgatum - (8648)

LaSalle, rapides de Lachine, Ile Rock, rivage d'un ruisseau. / Herbaçaie sur le rivage rocheux et humide d'un ruisseau; en fruits la troisième semaine d'août.

45,430530 - -73,570380	Seconde (150 m.)	-	Non	1976-08-18

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Ranger Jacques L. (1976) MT

Poa saltuensis ssp. languida - (8667)

Montréal, terrain de l'université / Chênaie.

45,504390 - -73,610750	Minute (1,5 km.)	B5.04	Non	1937-06-16

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique-Joseph Frère (1937) MT

Sporobolus heterolepis - (8776)

Ile Ronde (île Sainte-Hélène); près de Montréal (La Ronde, Expo 67). / Rivage rocheux de l'île; en fruits fin août, début septembre.

45,528620 - -73,533320	Minute (1,5 km.)	-	Non	1935-09-02

MEILLEURE SOURCE : Rouleau, E. 1945. Sporobolus asper in Québec. Rhodora 47 272. .

Sporobolus compositus var. compositus - (8791)

Ile des Soeurs (= Ile Saint-Paul). / Rivage rocheux du St-Laurent, avec Verbena simplex, Scutellaria parvula; en fleurs et fruits à la fin août.

45,4613 - -73,547860	Minute (1,5 km.)	-	Non	1943

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Rouleau Ernest (1943) MT, CAN

Torreyochloa pallida var. pallida - (8794)

Longueuil. / Fossés.

45,537870 - -73,517710	Général (8 km.)	B5.04	Non	1938-07-11

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Rolland-Germain Frère (1938) MT

Zizania aquatica var. aquatica - (8800)

La Prairie. / En fruits à la fin juillet.

45,419950 - -73,483090	Général (8 km.)	B5.04	Non	1899-07-26

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Euphrosin-Joseph Frère (1899) MT

Zizania aquatica var. aquatica - (8801)

Ile des Soeurs, étang du golf. / En fleurs à la fin août.

45,4613 - -73,547860	Minute (1,5 km.)	-	Non	1972-08-21

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Campbell C.G. (1895) MTMG

Potamogeton illinoensis - (8893)

Au large de l'île aux Hérons entre l'île Rock. / Dans l'eau rapide du fleuve, dans 1 mètre d'eau; plus de 500 individus répartis sur environ 500 m2; en fleurs au début août.

45,428620 - -73,569980	Seconde (150 m.)	B5.04	Non	1998-08-03

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Potamogeton illinoensis - (8916)

Ile des Soeurs, bassin de Laprairie. / Pleine floraison la quatrième semaine de juin.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,426220 - -73,531740	Minute (1,5 km.)	B5.04	Non	1981-06-30

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . LeSauteur Anne, Bertacchi Walter (1981) MT

Asplenium platyneuron - (9061)

Montréal, mont Royal. / Rochers et rivages; sores au début juin et fructifications en juillet.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,504390 - -73,610750	Minute (1,5 km.)	B5.04	Non	1937-07

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Saint-Cyr D. Napoléon (1937) MT; Sainte-Amélie Soeur (1903) MT

Asplenium rhizophyllum - (9081)

Montagne de Montréal (mont Royal). /

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,504390 - -73,610750	Minute (1,5 km.)	-	Non	1900-PRE

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . M. de Sainte-Amélie Soeur (0) MT

Asplenium rhizophyllum - (9102)

Ile des Soeurs, extrémité ouest. / Pleine sporulation la deuxième semaine d'août.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,4613 - -73,547860	Minute (1,5 km.)	-	Non	1930-08-09

MEILLEURE SOURCE : Coursol, F. 2004. Courriel envoyé à J. Labrecque le 30-07-2004 contenant des précisions sur certaines occurrences de la région de Montréal. 1 p..

Woodwardia virginica - (9133)

Saint-Lambert. / Tourbière à sphaignes, avec Chamaedaphne et Rhododendron; sporange au début d'août, pleine sporulation de la fin août au début de septembre.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,504010 - -73,509640	Général (8 km.)	-	Non	1936-09-05

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Terrill Lewis Mclver (1936) DAO; Terrill Lewis Mclver (1936) MT; Terrill Lewis Mclver (1936) MTMG

Dryopteris clintoniana - (9244)

Saint-Hubert. / Tourbière.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,486430 - -73,406440	Minute (1,5 km.)	-	Non	1927-06-24

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Marie-Victorin Frère, Rolland-Germain Frère (1927) CAN

Botrychium oneidense - (9441)

Brosseau, Brossard. / En sporulation la première semaine d'octobre.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,425780 - -73,447780	Général (8 km.)	B5.04	Non	1928-10-06

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Mousley Henry (1928) MT

Phegopteris hexagonoptera - (9479)

Ile des Soeurs (= Ile Saint-Paul). / Végétatif la deuxième semaine d'août.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,4613 - -73,547860	Minute (1,5 km.)	-	Non	1924-08-12

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Macoun James M. (0) MT; Sainte-Alphonsine Soeur (1924) MT

Ranunculus rhomboideus - (10013)

Environs de Montréal / Nil

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,503890 - -73,593890	Général (8 km.)	-	Non	1821?

MEILLEURE SOURCE : Cayouette, J. 2000. Récoltes anciennes rares au Québec et leurs découvreurs. ALVAREKA 46 (collection éditée par l'auteur, non publiée). 5 p..

Calypso bulbosa var. americana - (10195)

Montréal / Nil

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,499410 - -73,599940	Général (8 km.)	-	Non	1820?

MEILLEURE SOURCE : Cayouette, J. 2001. Communication personnelle. 75 p..

Spiranthes lucida - (10551)

Île aux Chèvres, centre est de l'île. / Petite prairie riveraine à Phalaris arundinacea, ouverte; avec Lythrum salicaria, Carex pellita et Potentilla anserina; 5 tiges; en pleine floraison la troisième semaine de juin.

45,424810 - -73,581530	Seconde (150 m.)	B5.04	Non	2001-06-16

MEILLEURE SOURCE : FORMTER 2001 -. Banque de données sur les formulaires de terrain, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Sabourin André (2001)

Podophyllum peltatum - (10657)

MRC Champlain à Brossard, boulevard Lapinière; environ 30 m au sud du 4190, Jardin du boulevard Lapinière. / Ancien jardin d'une maison de ferme abandonnée et en ruines, jeune frênaie rouge à proximité; avec Ulmus americana, Juglans cinerea, Aesculus hippocastanum, Vitis riparia, Rhus radicans, Solidago sp., Graminées, etc.; 400-450 clones; végétatif la deuxième semaine de mai et en boutons floraux la dernière semaine de mai.

45,454990 - -73,442510	Seconde (150 m.)	-	Non	1996-05-30

MEILLEURE SOURCE : Sabourin, A. 1996. Lettre adressée à Gildo Lavoie le 12 juin 1996 ..

Lycopus americanus var. laurentianus - (10679)

Île-aux-Chèvres, près de la pointe ouest. / Berge rocheuse sur la pointe amont de l'île, une dizaine de mètre de l'occurrence d'onosmodium, avec Aster pilosus; en pleine fructification la troisième semaine de septembre; 5 individus.

45,4250 - -73,583770	Seconde (150 m.)	B5.04	Non	2001-09-21

MEILLEURE SOURCE : Coursol, F. 2003. Tableau récapitulatif sur la flore menacée ou vulnérable des îles des Rapides de Lachine. .

Cyperus odoratus - (10680)

Île aux-Chèvres, rive nord de la rivière entre l'île aux Hérons et l'Île aux Chèvres, près du quai de Percy Temiens / Rivage exondé parmi les quenouilles et les sagittaires; 2 colonies pour un total de 30 individus ; en pleine fructification la troisième semaine de septembre.

45,425020 - -73,582620	Seconde (150 m.)	B5.04	Non	2001-09-21

MEILLEURE SOURCE : Coursol, F. 2003. Tableau récapitulatif sur la flore menacée ou vulnérable des îles des Rapides de Lachine. .

Rorippa aquatica - (11423)

Montréal, côte Saint-Paul. / Ruisseau.

45,4356 - -73,631790	Général (8 km.)	-	Non	1821-07-23

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Holmes Andrew Fernando (1821) DAO; Holmes Andrew Fernando (1821) SFS

Allium tricoccum - (14735)

Île des Soeurs, près de l'extrémité du boulevard de l'île des Soeurs. / Remblai colonisé par Fraxinus pennsylvanica, Populus grandidentata et Acer negundo; 174 bulbes répartis sur 5 m2.

45,452330 - -73,549250	Seconde (150 m.)	B5.04	Non	1999-05

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Cardamine concatenata - (14737)

ïles des Rapides de Lachine, Île aux Chèvres, partie centrale de l'île. / Lieux secs colonisés par un groupement de Celtis occidentalis, avec Rhus typhina, Staphylea trifolia, Circaea lutetiana, Eupatorium rugosum et Anthriscus sylvestris; 7 colonies comportant environ 40 000 tiges.

45,426040 - -73,578670	Seconde (150 m.)	B4.07	Non	1999-05

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Celtis occidentalis - (14739)

Cote Sainte-Catherine, Récré-O-parc, en amont de l'île à Boquet / Rives; une trentaine d'individus matures.

45,410640 - -73,585480	Seconde (150 m.)	B5.04	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Celtis occidentalis - (14740)

Réserve amérindienne de Kahnawake, section au nord de la voie maritime du Saint-Laurent. / Deux stations de quelques individus seulements.

45,4081 - -73,605240	Seconde (150 m.)	B5.04	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Celtis occidentalis - (14741)

La Salle, secteur des ponceaux sur la piste cyclable, secteur face à l'île Jos-Ouellette et secteur de la Jetée au niveau de l'ancienne usine hydroélectrique. / Rives; 3 colonies de 10, 1 et 3 individus.

45,416050 - -73,616190	Seconde (150 m.)	B5.04	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Claytonia virginica - (14742)

Îles des rapides de Lachine, Île aux Chèvres. / Une colonie comportant moins de 60 individus.

45,426060 - -73,578350	Minute (1,5 km.)	B5.04	Non	2001?

MEILLEURE SOURCE : Coursol, F. 2003. Tableau récapitulatif sur la flore menacée ou vulnérable des îles des Rapides de Lachine. .

Potamogeton illinoensis - (14743)

Rapides de Lachine, chenal entre l'île aux Hérons et l'île aux Chèvres. / Eaux courantes; environ 250 individus

45,424750 - -73,583820	Seconde (150 m.)	B5.04	Non	1999

MEILLEURE SOURCE : Coursol, F. 2000. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées du territoire du projet de refuge faunique des rapides de Lachine. Rapport non publié préparé pour le Gouvernement du Québec, ministère de l'Environnement, Direction du patrimoine écologique et développement durable, Québec. 76 p..

Carex folliculata - (14756)

Laprairie, près d'une piste de ski de fond parallèle au chemin Édouard VII. / Érablière à érable rouge inondée en été.

45,399930 - -73,463630	Seconde (150 m.)	-	Non	1993

MEILLEURE SOURCE : Durand, L. 1993. Rapport d'inventaire de l'emprise de l'autoroute 30. 6 p..

Zizania aquatica var. aquatica - (14757)

Laprairie, pont du CN traversant une branche de la rivière Saint-Jacques. / Bord de la rivière sous le pont.

45,420190 - -73,445040	Seconde (150 m.)	B5.04	Non	1993

MEILLEURE SOURCE : Durand, L. 1993. Rapport d'inventaire de l'emprise de l'autoroute 30. 6 p..

Claytonia virginica - (15097)

MRC Roussillon, ville de Laprairie et MRC de Longueuil, ville de Brossard, boisé dans le secteur des ruisseaux Marin et des Bois. Occurrence divisée en 2 sous-populations. (1) : Au nord du ruisseau des Bois, boisé au sud du croisement de 2 grosses lignes hydroélectriques. (2) : Au nord du ruisseau Marin, au sud d'un lac artificiel. / (1) : Peuplement à feuillus tolérants et résineux vieil inéquien, de bonne hauteur et de densité moyenne. 2010 : Plus de 10000 individus en fleurs et en fruits, la deuxième semaine d'avril. (2) : Forêt feuillue mélangée avec ostryer de Virginie sur argile 2009 : Des milliers d'individus sur plus de 100 mètres, la troisième semaine de mai.

45,420860 - -73,439660	Seconde (150 m.)	B3.11	Non	2010-04-12

MEILLEURE SOURCE : FORMTER 2001 -. Banque de données sur les formulaires de terrain, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Coursol Frédéric, Labrecque Jacques, Piché Vincent (2010); Sabourin André et al. (2009)

Quercus bicolor - (16233)

Saint-Hubert: boisé Maricourt, au sud du boulevard Maricourt et à l'est de la rue Roland. / Forêt feuillue mélangée à chêne rouge, érable rouge, frêne rouge, caryer ovale et chêne à gros fruits. 2003: 1 seul individu observé.

45,470320 - -73,398670	Seconde (150 m.)	B5.04	Non	2003-09-25

MEILLEURE SOURCE : Sabourin, A. 2003. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées de la nouvelle ville de Longueuil. .

Quercus bicolor - (16237)

Vieux-Longueuil: parc régional de Longueuil et boisé Pratt et Whitney, de part et d'autre du boulevard Fernand-Lafontaine et au nord du chemin du Lac. / Forêt feuillue mélangée. 2003: Une colonie dans chacun de ces sites voisins, mais puisqu'il y a des individus entre les deux, il n'y a qu'une seule occurrence. Onze individus ont été identifiés, mais il y en a probablement d'autres.

45,552540 - -73,480610 | Seconde (150 m.) | B5.04 | Non | 2003-10-02

MEILLEURE SOURCE : Sabourin, A. 2003. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées de la nouvelle ville de Longueuil. .

Podophyllum peltatum - (16727)

MRC de Montréal, ville de Montréal, secteur d'Outremont, près de la rue Devon situé derrière l'oratoire Saint-Joseph. / Bois. 2005 : Petite colonie d'environ 65 individus.

45,490760 - -73,616370 | Seconde (150 m.) | B5.01 | Non | 2005

MEILLEURE SOURCE : Coursol, F. 2005.. Courriel envoyé à J. Labrecque le 24 mai 2005 1 p..

Staphylea trifolia - (16728)

Boisé environnant (secteur près des coupes) de l'oratoire Saint-Joseph, Montréal. / Boisé. 2005: Grosse colonie, possibilité que quelques individus aient été fauchés lors des coupes qui ont eu lieu dans ce secteur.

45,490610 - -73,616350 | Minute (1,5 km.) | B5.04 | Non | 2005-01-01

MEILLEURE SOURCE : Coursol, F. 2005.. Courriel envoyé à J. Labrecque le 24 mai 2005 1 p..

Carya ovata var. ovata - (16765)

Longueuil, terrain de la compagnie Pratt et Whitney, au nord du boulevard Fernand Lafontaine. Mention d'observation aussi pour la région de longeuil (global). / Erablière sucriére à caryer (les 2 espèces), tilleul et chênes rouges sur terrain plat à légèrement ondulé, sur till calcaire. 1996: Individus couvrant entre 5 et 25 % de la strate arborescente. 1933: Pleine fructification la première semaine de juillet. 1916: Pleine fructification la première semaine de septembre.

45,550050 - -73,487290 | Seconde (150 m.) | B5.04 | Non | 1996-05-30

MEILLEURE SOURCE : FORMTER 2001 -. Banque de données sur les formulaires de terrain, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Sabourin André, Paquette Denis (1996)

Carya ovata var. ovata - (16776)

Saint-Hubert: boisé Maricourt, au sud du boulevard Maricourt et à l'est de la rue Roland. / Forêt feuillue mélangée à chêne rouge, érable rouge, frêne rouge et chêne à gros fruits. 2003: Mention d'observation.

45,470330 - -73,398670 | Seconde (150 m.) | B5.04 | Non | 2003-09-25

MEILLEURE SOURCE : Sabourin, A. 2003. Inventaire des plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées de la nouvelle ville de Longueuil. .

Descurainia pinnata ssp. brachycarpa - (16789)

Île aux Chèvres, Montréal. / Escarpement.

45,4264 - -73,577510 | Minute (1,5 km.) | B5.04 | Non | 1977-06-17

MEILLEURE SOURCE : Sabourin, A. 2007a. Courriel envoyé à J. Labrecque le 14 février 2007. 2 p..

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Descurainia pinnata ssp. brachycarpa - (16790)

Île aux Hérons, Montréal. / Haut rivage rocheux exposé. 2001: 5 individus observés.

45,421270 - -73,577990	Seconde (150 m.)	B5.04	Non	2001-06-16

MEILLEURE SOURCE : Sabourin, A. 2007a. Courriel envoyé à J. Labrecque le 14 février 2007. 2 p..

Descurainia pinnata ssp. brachycarpa - (16791)

Île Rock, Montréal. / Pointe rocheuse exposée. 2001: 1 individu observé.

45,430210 - -73,570160	Seconde (150 m.)	B5.04	Non	2001-06-16

MEILLEURE SOURCE : Sabourin, A. 2007a. Courriel envoyé à J. Labrecque le 14 février 2007. 2 p..

Descurainia pinnata ssp. brachycarpa - (16792)

Presqu'île à Boquet (Côte-Sainte-Catherine) / Rochers exposés, escarpement riverain. 1999: Moins de 50 individus observés.

45,411160 - -73,573720	Seconde (150 m.)	-	Non	1999-06-15

MEILLEURE SOURCE : Sabourin, A. 2007a. Courriel envoyé à J. Labrecque le 14 février 2007. 2 p..

Descurainia pinnata ssp. brachycarpa - (16793)

Île Sainte-Hélène, Montréal. Escarpement en face de la tour. / Sur brèche, rocher sec.

45,517090 - -73,534330	Seconde (150 m.)	B5.04	Non	1938-06-18

MEILLEURE SOURCE : Sabourin, A. 2007a. Courriel envoyé à J. Labrecque le 14 février 2007. 2 p..

Lycopus americanus var. laurentianus - (16901)

Longueuil. / Aucune caractérisation.

45,534140 - -73,520260	Général (8 km.)	B5.04	Non	1932-09-23

MEILLEURE SOURCE : Cayouette, J. 2002. Alvaréka No 65. Spécial: Extension d'aire du Lycopus americanus var laurentinus. (Collection éditée par l'auteur, non publiée) 4p..

Carya ovata var. ovata - (16987)

Parc Angrignon, Ville-Émard. / 1936 :Pleine floraison la dernière semaine de mai.

45,441880 - -73,602870	Minute (1,5 km.)	B5.04	Non	1936-05-30

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Armand Caron c. s. v. (1936) QFA; Edmond Roy Frère (1936) MT

Carya ovata var. ovata - (16994)

Île Sainte-Hélène, Montréal. / Bois rocheux. 1940: Pleine floraison la première semaine de juin.

45,516920 - -73,533960	Minute (1,5 km.)	B5.04	Non	1940-06-04

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Rouleau E., Boivin Bernard (1940) MT

Carya ovata var. ovata - (17006)

ïle Saint-Paul (alias île des Soeurs), près de Montréal. / 1922: Pleine floraison la deuxième semaine de juin.

45,458940 - -73,549710	Minute (1,5 km.)	B5.04	Non	1963-09-11

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Marie-Victorin Frère (1922) MT; Robert Joyal (0) MT; Robert Joyal (1963) MT

Carya ovata var. ovata - (17007)

Laprairie. / Aucune caractérisation.

45,416190 - -73,498990	Général (8 km.)	B5.04	Non	1946-07-20

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cléonique Frère (1934) MT; Hector-Arthur Frère (1946) MT

Carya ovata var. ovata - (17012)

Mont Royal, Montréal. / 1941: Pleine floraison en mai.

45,504470 - -73,602720	Minute (1,5 km.)	B5.04	Non	1941-05

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Lemoine G. (1940) MT; Sr. Sainte-Amélie (1941) MT

Carya ovata var. ovata - (17018)

Au coin du boulevard Mont-Royal et de l'avenue du Parc, Montréal. / Aucune caractérisation.

45,5169 - -73,588660	Seconde (150 m.)	B5.04	Non	1959-07-13

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Marcel Racine (1959) MT

Carya ovata var. ovata - (17019)

Saint-Hubert, Chambly. / 1931: Pleine floraison la première semaine de mai et la première semaine de juin.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,498260 - -73,418190	Minute (1,5 km.)	B5.04	Non	1931-06-04

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Dolorès Dubreuil (1931) MT; Germaine Bernier (1931) MT

Juglans cinerea - (17066)

Communauté métropolitaine de Montréal, île des Soeurs, bois Saint-Paul. / Frênaie à frêne rouge et à érable argenté, présence du tilleul d'Amérique, de l'orme d'Amérique, du peuplier à feuilles deltoides et du chêne bicolore. Espèces herbacées dominantes : Impatiens capensis, Symplocarpus foetidus et Hydrophyllum virginianum. Dépôt d'argile sablo-limoneuse, drainage imparfait. 1999 : Individus couvrant moins de 5 % de la strate arborescente.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,453330 - -73,551410	Seconde (150 m.)	B5.04	Non	1999-05

MEILLEURE SOURCE : FORMTER 2001 -. Banque de données sur les formulaires de terrain, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Bouchard Denis, Gratton Louise (1993)

Hypericum ascyron - (17583)

Ville de Montréal, rapides de Lachine, île aux Chèvres et île aux Hérons. / Île aux Chèvres : 1976 : Herbaçaie sur le rivage rocailleux de la rivière. 1969 : Rivage découvert. Île aux Hérons : 1976 : Herbaçaie avec Vitis riparia et Rubus idaeus.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,425050 - -73,576580	Seconde (150 m.)	B5.04	Non	2008

MEILLEURE SOURCE : FORMTER 2001 -. Banque de données sur les formulaires de terrain, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Coursol Frédéric (2008)

Hypericum ascyron - (17609)

MRC de Roussillon, ville de La Prairie. / 1899 : Aucune caractérisation.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,401130 - -73,449570	Général (8 km.)	B5.04	Non	1899

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Euphrosin-Joseph Frère (1899) MT

Toxicodendron vernix - (18238)

Brossard, au sud de l'autoroute 10. / Marécage sur tourbe.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,419910 - -73,411250	Seconde (150 m.)	B5.04	Non	2008-06

MEILLEURE SOURCE : Coursol, F. 2008. Courriel envoyé à J. Labrecque le 29 juin 2008. 1 p..

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Crataegus suborbiculata - (18542)

Côte-Sainte-Catherine / Nil

45,4101 - -73,577320	Minute (1,5 km.)	-	Non	2003

MEILLEURE SOURCE : Sabourin, A. 2008. Communication personnelle. 2 p..

Quercus alba - (18548)

Montréal, Mont-Royal / Nil

45,506180 - -73,591570	Général (8 km.)	B5.04	Non	1989-11-29

MEILLEURE SOURCE : Sabourin, A. 2007. Communication personnelle. 6 p..

Justicia americana - (19760)

MRC de Montréal, ville de Montréal, Secteur île des Soeurs, versant nord. / Dans l'eau.

45,472020 - -73,545030	Minute (1,5 km.)	-	Non	1964-07-08

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Joyal Robert (1963) MT; Rousseau Camille, Joyal Robert (1964) MTMG, DAO; Rousseau Camille, Joyal Robert (1964) QFA; Rousseau Camille, Joyal Robert (1964) QUE; Rousseau Camille, Joyal Robert (1964) SFS

Justicia americana - (19763)

MRC de Longueuil, Ville de Longueuil, Rivage. / Bord des eaux.

45,533580 - -73,525540	Général (8 km.)	B5.04	Non	1952-08-02

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Cinq-Mars Lionel (1952) QUE; Lorenzo Frère (1933) MT; Raymond Marcel (1933) MT

Podophyllum peltatum - (19798)

MRC de Roussillon, municipalité de La Prairie. /

45,416660 - -73,50	Général (8 km.)	B5.04	Non	1955-05-26

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Louis-Alphonse Frère (1955) MT; Louis-Marie Père (1930) QFA

Podophyllum peltatum - (19800)

Mrc de Montréal, ville de Montréal, secteur d'Outremont, près du chemin Ste-Catherine. / Dans les bois.

45,516660 - -73,616670	Minute (1,5 km.)	B5.04	Non	1936-06-04

MEILLEURE SOURCE :

Strophostyles helvola - (19802)

MRC de longueuil, ville de longueuil. / Sur les rivages du Saint-Laurent, formant un cordon à un certain niveau.

45,535010 - -73,521780	Minute (1,5 km.)	B5.04	Non	1937-08-30

MEILLEURE SOURCE : HERBIERS 2001 -. Banque de données sur les spécimens d'herbier, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Guillaume Frère (1937) SFS; Marie-Victorin Frère (1925) QFA; Marie-Victorin Frère, Rolland-Germain Frère (1934) CAN, DAO; Marie-Victorin Frère, Rolland-Germain Frère (1934) QFA; Marie-Victorin Frère, Rolland-Germain Frère (1934) QUE; Rolland-Germain Frère (1929) QFA; Rolland-Germain Frère (1934) CAN; Rolland-Germain Frère (1934) MT; Rolland-Germain Frère (1934) SFS; Rolland-Germain Frère, Marie-Victorin Frère (1929) SFS

Allium canadense var. canadense - (19853)

MRC de Montréal, ville de Montréal, Mont-Royal. Près du cimetière du Mont-Royal. / 2004 : Aucune information sur le nombre d'individus.

45,510470 - -73,601950	Seconde (150 m.)	B5.04	Non	2004

MEILLEURE SOURCE : Coursol, F. 2005. Communication personnelle de Frédéric Coursol à Jacques Labrecque du 11-02-2005, contenant des données brutes d'inventaire de plantes rares de la région de Montréal. 1 p. + annexe.

Allium canadense var. canadense - (19854)

MRC de Roussillon, municipalité de La Prairie. À environ 300 m au nord-est du ruisseau des Bois, près des lignes hydro-électrique. / Jeune forêt de succession dominée par les frênes, le charme de Caroline, le chêne à gros fruits, caryer cordiforme. Grandes formations de Cornus racemosa en périphérie. Présence de vieilles souches de grande dimension (50 cm de diamètre). Claytonia virginica très abondant : Plusieurs milliers de plants. Allium canadense présent sporadiquement : Probablement plus d'une centaine de petites colonies.Carya ovata var. ovata, vu deux individus isolés : Serait présent en grand nombre près de la carrière. Juglans cinerea, individus isolés, mais difficile à détecter en l'absence de feuilles. 2010 : Plus de 1000 touffes observés à la deuxième semaine du mois de avril.

45,420490 - -73,439760	Seconde (150 m.)	B3.11	Non	2010-04-12

MEILLEURE SOURCE : FORMTER 2001 -. Banque de données sur les formulaires de terrain, active depuis 2001; continuellement mise à jour. Centre de données sur le patrimoine naturel du Québec (CDPNQ). Gouvernement du Québec, ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs. Québec, Québec. . Coursol Frédéric, Labrecque Jacques, Piché Vincent (2010)

2 – Nombre total d'espèces pour cette requête :   76

Nom latin	Rangs de priorité			Statut	Nombre d'occurrences dans votre sélection											Nombre
Nom commun	G	N	S		Total	A	B	C	D	X	H	F	E	I	Autre	au Québec
FLORE																
Justicia americana carmantine d'Amérique	G5	N2	S2	menacée	6	0	0	1	0	4	1	0	0	0	0	13
Toxicodendron vernix sumac à vernis	G5	N4	S2	susceptible	2	0	0	0	1	1	0	0	0	0	0	13
Taenidia integerrima ténidia à feuilles entières	G5	ZZ	S1	susceptible	1	0	0	0	0	1	0	0	0	0	0	6
Information sensible Information sensible	--	--	--	--	1	0	0	0	0	0	0	0	0	0	1	149
Podophyllum peltatum podophylle pelté	G5	N5	S2	menacée	5	1	0	1	0	1	2	0	0	0	0	13
Onosmodium bejariense var. hispidissimum onosmodie hispide	G4	ZZ	S1	menacée	1	0	0	0	1	0	0	0	0	0	0	1
Boechera laevigata arabette lisse	G5	N4	S2	susceptible	3	2	0	0	1	0	0	0	0	0	0	15
Cardamine concatenata cardamine découpée	G5	ZZ	S3	susceptible	7	2	2	0	0	2	0	1	0	0	0	72
Cardamine bulbosa cardamine bulbeuse	G5	ZZ	S2	susceptible	1	0	0	0	0	0	1	0	0	0	0	29
Cerastium nutans céraiste penché	G5	ZZ	S2	susceptible	1	0	0	0	0	1	0	0	0	0	0	11

Nom latin	Rangs de priorité			Statut	Nombre d'occurrences dans votre sélection											Nombre
Nom commun	G	N	S		Total	A	B	C	D	X	H	F	E	I	Autre	au Québec
Polanisia dodecandra polanisie à douze étamines	G5	ZZ	S1	susceptible	2	0	0	0	0	2	0	0	0	0	0	7
Quercus bicolor chêne bicolore	G5	N4	S3	susceptible	5	0	0	0	2	3	0	0	0	0	0	49
Adlumia fungosa adlumie fongueuse	G4	N4	S2	susceptible	1	0	0	0	0	0	0	1	0	0	0	30
Bartonia virginica bartonie de Virginie	G5	N3	S1	susceptible	1	0	0	0	0	1	0	0	0	0	0	20
Geranium maculatum géranium maculé	G5	ZZ	SX	susceptible	1	0	0	0	0	1	0	0	0	0	0	2
Agastache nepetoides agastache faux-népéta	G5	ZZ	S1	susceptible	2	0	0	0	0	1	1	0	0	0	0	15
Pycnanthemum virginianum pycnanthème de Virginie	G5	ZZ	S2	susceptible	2	0	0	0	0	2	0	0	0	0	0	39
Trichostema dichotomum trichostème fourchu	G5	N1	S1	susceptible	1	0	0	0	0	1	0	0	0	0	0	3
Floerkea proserpinacoides floerkée fausse-proserpinie	G5	ZZ	S2	vulnérable	2	1	0	1	0	0	0	0	0	0	0	18
Polygala senega polygale sénéca	G4	ZZ	S2	susceptible	2	0	0	0	0	1	1	0	0	0	0	36
Persicaria hydropiperoides persicaire faux-poivre-d'eau	G5	ZZ	S3	susceptible	2	0	0	0	0	0	0	2	0	0	0	53

Nom latin Nom commun	Rangs de priorité G	 N	 S	Statut	 Total	Nombre d'occurrences dans votre sélection A	 B	 C	 D	 X	 H	 F	 E	 I	 Autre	Nombre au Québec
Claytonia virginica claytonie de Virginie	G5	ZZ	S2	susceptible	6	0	3	0	2	0	1	0	0	0	0	35
Lysimachia hybrida lysimaque hybride	G5	ZZ	S2	susceptible	1	0	0	0	0	1	0	0	0	0	0	32
Samolus floribundus samole à petites fleurs	G5	ZZ	S1	susceptible	1	0	0	0	0	0	1	0	0	0	0	4
Ranunculus flabellaris renoncule à éventails	G5	ZZ	S3	susceptible	2	0	0	0	0	1	1	0	0	0	0	58
Agrimonia pubescens aigremoine pubescente	G5	ZZ	S1	susceptible	1	0	0	0	0	1	0	0	0	0	0	11
Crataegus brainerdii aubépine de Brainerd	G5	N2	SH	susceptible	1	0	0	0	0	1	0	0	0	0	0	3
Rubus flagellaris ronce à flagelles	G5	N4	S2	susceptible	1	0	0	0	0	1	0	0	0	0	0	31
Galium circaezans gaillet fausse-circée	G5	ZZ	S2	susceptible	1	0	0	0	0	1	0	0	0	0	0	28
Saururus cernuus lézardelle penchée	G5	ZZ	S2	menacée	1	0	0	0	0	1	0	0	0	0	0	13
Veronica anagallis-aquatica véronique mouron-d'eau	G5	N4	S2	susceptible	2	0	0	0	0	2	0	0	0	0	0	16
Staphylea trifolia staphylier à trois folioles	G5	ZZ	S3	susceptible	4	1	1	0	0	0	0	0	2	0	0	70

Nom latin	Rangs de priorité			Statut	Nombre d'occurrences dans votre sélection											Nombre
Nom commun	G	N	S		Total	A	B	C	D	X	H	F	E	I	Autre	au Québec
Celtis occidentalis	G5	ZZ	S3	susceptible	15	1	0	2	6	1	4	0	1	0	0	109
micocoulier occidental																
Verbena simplex	G5	ZZ	S1	menacée	3	0	0	0	0	3	0	0	0	0	0	6
verveine simple																
Viola affinis	G5	ZZ	S2	susceptible	2	0	0	0	0	2	0	0	0	0	0	37
violette affine																
Viola rostrata	G5	ZZ	S2	susceptible	1	0	0	0	0	1	0	0	0	0	0	21
violette à long éperon																
Arisaema dracontium	G5	N3	S2	menacée	2	0	1	0	0	1	0	0	0	0	0	33
arisème dragon																
Carex cephalophora	G5	ZZ	S2	susceptible	2	0	0	0	1	0	1	0	0	0	0	28
carex porte-tête																
Carex folliculata	G4	ZZ	S3	susceptible	3	0	0	0	0	2	0	1	0	0	0	51
carex folliculé																
Carex molesta	G4	N4	S1	susceptible	1	0	0	0	1	0	0	0	0	0	0	6
carex dérangeant																
Carex sparganioides	G5	ZZ	S3	susceptible	3	0	0	0	0	2	0	0	1	0	0	48
carex faux-rubanier																
Carex sychnocephala	G4	ZZ	S1	susceptible	1	0	0	0	0	1	0	0	0	0	0	10
carex compact																
Carex appalachica	G4	N2	S2	susceptible	1	0	0	0	0	0	0	1	0	0	0	35
carex des Appalaches																

Nom latin	Rangs de priorité			Statut				Nombre d'occurrences dans votre sélection								Nombre
Nom commun	G	N	S		Total	A	B	C	D	X	H	F	E	I	Autre	au Québec
Cyperus odoratus souchet odorant	G5	N5	S2	susceptible	2	0	0	0	1	0	1	0	0	0	0	29
Wolffia borealis wolffie boréale	G5	ZZ	S2	susceptible	1	0	0	0	0	0	1	0	0	0	0	22
Allium canadense var. canadense ail du Canada	G5	N5	S2	susceptible	10	1	2	1	4	1	0	0	1	0	0	27
Allium tricoccum ail des bois	G5	ZZ	S3	vulnérable	6	0	0	1	4	1	0	0	0	0	0	367
Galearis spectabilis galéaris remarquable	G5	ZZ	S3	susceptible	1	0	0	0	0	1	0	0	0	0	0	74
Bromus pubescens brome pubescent	G5	ZZ	S1	susceptible	1	0	0	0	0	1	0	0	0	0	0	4
Elymus riparius élyme des rivages	G5	ZZ	S2	susceptible	1	0	0	0	0	1	0	0	0	0	0	45
Elymus villosus élyme velu	G5	ZZ	S1	susceptible	3	0	1	1	1	0	0	0	0	0	0	6
Panicum virgatum panic raide	G5	ZZ	S2	susceptible	3	0	0	0	0	3	0	0	0	0	0	24
Poa saltuensis ssp. languida pâturin faible	G3	N3	S1	susceptible	1	0	0	0	0	0	1	0	0	0	0	4
Sporobolus heterolepis sporobole à glumes inégales	G5	ZZ	S2	susceptible	1	0	0	0	0	1	0	0	0	0	0	12

Nom latin	Rangs de priorité			Statut	Nombre d'occurrences dans votre sélection											Nombre
Nom commun	G	N	S		Total	A	B	C	D	X	H	F	E	I	Autre	au Québec
Sporobolus compositus var. *compositus* sporobole rude	G5	NR	S1	susceptible	1	0	0	0	0	1	0	0	0	0	0	5
Torreyochloa pallida var. *pallida* glycérie pâle	G5	ZZ	S1	susceptible	1	0	0	0	0	0	1	0	0	0	0	9
Zizania aquatica var. *aquatica* zizanie à fleurs blanches	G5	N4	S3	susceptible	3	0	0	0	0	1	1	0	1	0	0	32
Potamogeton illinoensis potamot de l'Illinois	G5	ZZ	S2	susceptible	3	0	0	0	0	0	1	0	2	0	0	27
Asplenium platyneuron doradille ébène	G5	N4	S2	susceptible	1	0	0	0	0	0	0	1	0	0	0	16
Asplenium rhizophyllum doradille ambulante	G5	ZZ	S3	susceptible	2	0	0	0	0	2	0	0	0	0	0	67
Woodwardia virginica woodwardie de Virginie	G5	ZZ	S3	susceptible	1	0	0	0	0	1	0	0	0	0	0	62
Dryopteris clintoniana dryoptère de Clinton	G5	ZZ	S3	susceptible	1	0	0	0	0	1	0	0	0	0	0	96
Botrychium oneidense botryche d'Oneida	G4	N3	S1	susceptible	1	0	0	0	0	0	1	0	0	0	0	9
Phegopteris hexagonoptera phégoptère à hexagones	G5	N3	S3	menacée	1	0	0	0	0	1	0	0	0	0	0	18
Ranunculus rhomboideus renoncule rhomboïde	G5	N4	SX	susceptible	1	0	0	0	0	1	0	0	0	0	0	1

Nom latin	Rangs de priorité			Statut	Nombre d'occurrences dans votre sélection											Nombre
Nom commun	G	N	S		Total	A	B	C	D	X	H	F	E	I	Autre	au Québec
Calypso bulbosa var. americana calypso bulbeux	G5	N5	S3	susceptible	1	0	0	0	0	1	0	0	0	0	0	108
Spiranthes lucida spiranthe lustrée	G5	ZZ	S2	susceptible	1	0	0	0	1	0	0	0	0	0	0	26
Lycopus americanus var. laurentianus lycope du Saint-Laurent	G3	N3	S3	susceptible	2	0	0	0	1	0	1	0	0	0	0	62
Rorippa aquatica armoracie des étangs	G4	ZZ	S1	susceptible	1	0	0	0	0	1	0	0	0	0	0	17
Carya ovata var. ovata caryer ovale	G5	ZZ	S3	susceptible	9	0	0	0	0	0	7	0	2	0	0	85
Descurainia pinnata ssp. brachycarpa moutarde-tanaisie verte	G5	N5	S1	susceptible	5	0	0	0	2	0	2	0	0	0	1	10
Juglans cinerea noyer cendré	G4	N3	S3	susceptible	1	0	0	0	0	0	0	0	1	0	0	127
Hypericum ascyron millepertuis à grandes fleurs	G4	ZZ	S2	susceptible	2	0	0	0	1	0	1	0	0	0	0	21
Crataegus suborbiculata aubépine suborbiculaire	G3	N1	S2	susceptible	1	0	0	0	0	0	0	0	0	0	1	13
Quercus alba chêne blanc	G5	N5	S3	susceptible	1	0	0	0	0	0	1	0	0	0	0	75
Strophostyles helvola strophostyle ochracé	G5	N3	S1	susceptible	1	0	0	0	0	0	1	0	0	0	0	27
				Totaux:	175	9	10	8	30	63	34	7	11	0	3	

Signification des termes et symboles utilisés

Rang de priorité : Rang décroissant de priorité pour la conservation (de 1 à 5), déterminé selon trois échelles : G (globale; l'aire de répartition totale) N (nationale; le pays) et S (subnationale; la province ou l'État) en tenant compte principalement de la fréquence et de l'abondance de l'élément. Seuls les rangs 1 à 3 traduisent un certain degré de précarité. Dans certains cas, les rangs numériques sont remplacés ou nuancés par les cotes suivantes :
B : population animale reproductrice (breeding); H : historique, non observé au cours des 20 dernières années (sud du Québec) ou des 40 dernières années (nord du Québec); M : population animale migratrice; N : population animale non reproductrice; NA : présence accidentelle / exotique / hybride / présence potentielle / présence rapportée mais non caractérisée / présence rapportée mais douteuse / présence signalée par erreur / synonymie de la nomenclature / existant, sans occurrence répertoriée; NR : rang non attribué; Q : statut taxinomique douteux; T : taxon infra-spécifique ou population isolée; U : rang impossible à déterminer; X : éteint ou extirpé; ? : indique une incertitude

Qualité des occurrences : A : excellente; B : bonne; C : passable; D : faible; E : à caractériser; F : non retrouvée; H : historique; X : disparue; I : introduite

Précision des occurrences : S : 150 m de rayon; M : 1,5 km de rayon; G : 8 km de rayon; U : > 8 km de rayon

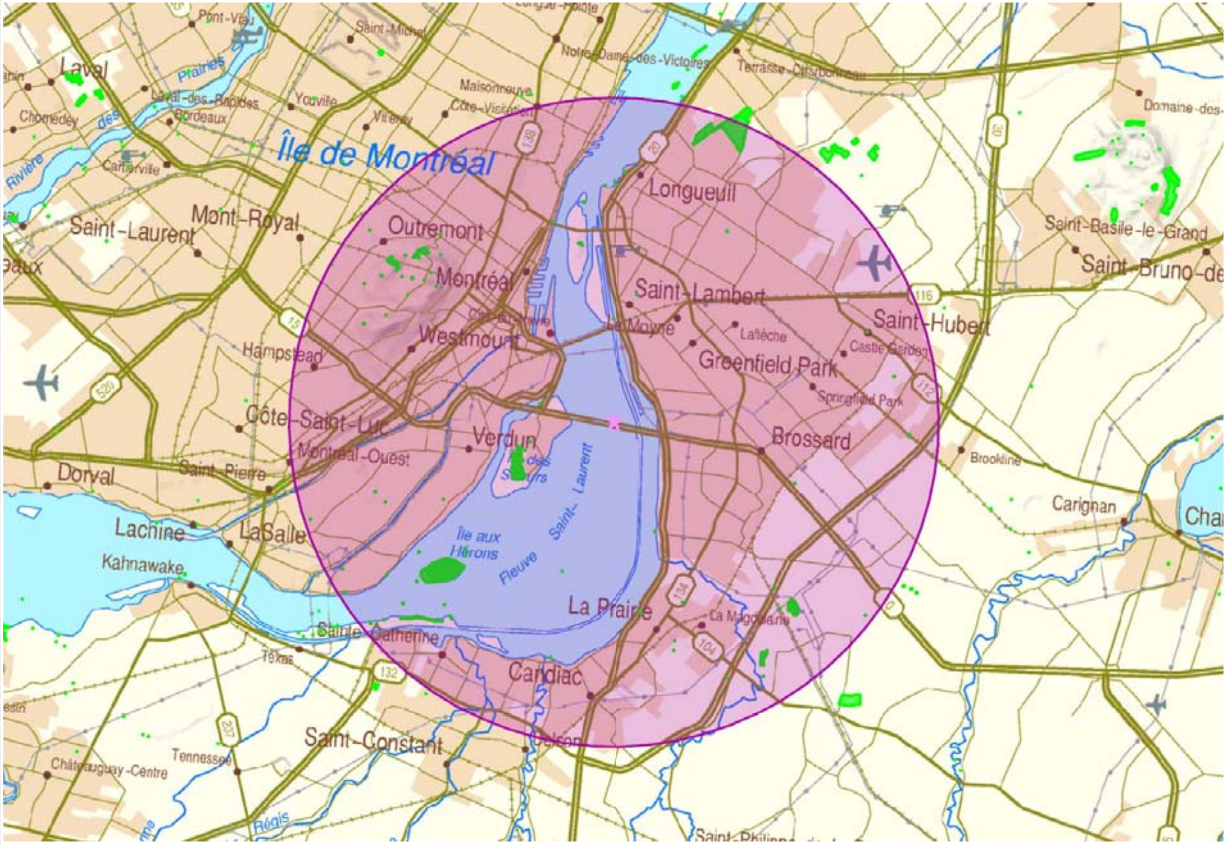
Indice de biodiversité : 1: Exceptionnel; 2: Très élevé; 3: Élevé; 4: Modéré; 5: Marginal; 6: Indéterminé (pour plus de détails, voir à la page suivante)

Cible de conservation : L'étiquette " cible de conservation " identifie les occurrences d'espèces légalement protégées pour lesquelles des actions prioritaires sont définies au plan de conservation.

Acronymes des herbiers : BL : MARCEL BLONDEAU; BM : Natural history museum; CAN : Musées nationaux; CCO : Université de Carleton; DAO : Agriculture Canada; DS : California academy of sciences; F : Field museum of natural history; GH : Gray; GR : Christian Grenier; ILL : University of Illinois; JEPS : Jepson herbarium; K : kew; LG : Université de Liège; MI : Université du Michigan; MO : Missouri; MT : MLCP (fusionné à MT); MT : Marie-Victorin; MTMG : Université McGill; NB : University of New Brunswick; NY : New York; OSC : Oregon state university; PM : Pierre Morisset; QFA : Louis-Marie; QFB-E : Forêts Canada; QFS : Université Laval; QK : Fowler; QSF : SCF; QUE : Québec; SFS : Rolland-Germain; TRTE : Toronto; UC : University of California; UQTA : Université du Québec; US : Smithsonian; V : Royal British Columbia museum; WAT : Waterloo university; WS : Washington state

Pont Champlain, zone 10km 120531

Espèces végétales désignées et susceptibles



Toponyme

★ Localisation par toponyme

Végétales désignées et susceptibles

🟩 **Surface**

Requête - Végé. désignées et susceptibles

🟩 **Surface**

Pont Champlain, zone 10 km 120531

🟪 **Zone tampon**

Échelle approximative : 1 / 169 213

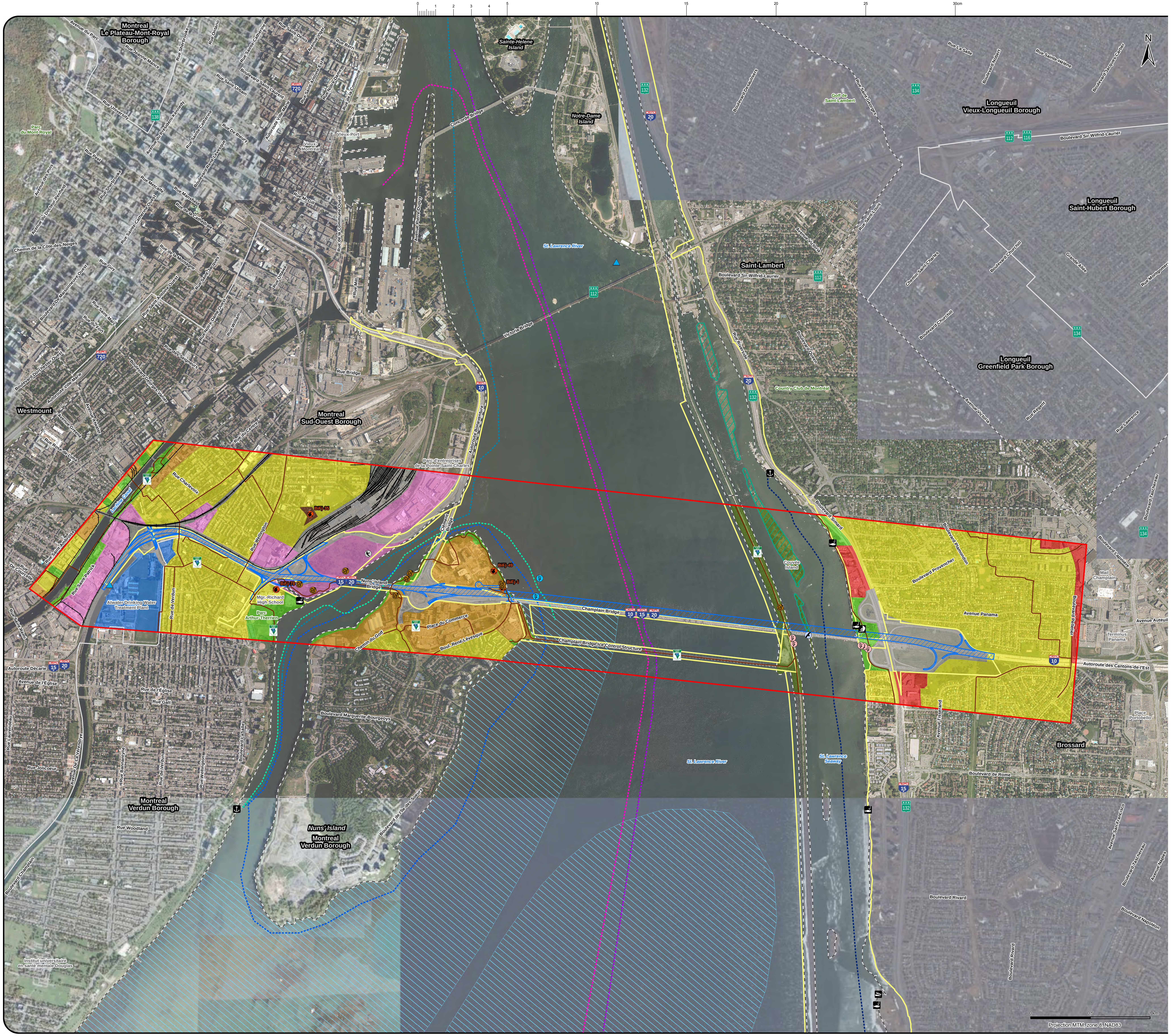
5 km

Source(s) des données :
Carte à titre de support visuel seulement.

Communications Longueuil (A)

Préparé par :
Robert Rubénovitch
2012-06-01

Appendix 5 Biophysical and Human Environments Distribution Map



SIZE A1

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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	GP
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

Inventory Map of Natural and Human Environments

DESSAU | CIMA+

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Discipline: Geomatic
Scale: 1:15 000
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	0076	00

Appendix 6 Floristic Composition of the Wetlands and Terrestrial Environments

1 – Terrestrial Environment Plant Composition

Vegetation Unit 1 – Herbaceous Vegetation

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 5%	Red ash	*Fraxinus pennsylvanica*	1	FACW
	Eastern cottonwood	*Populus deltoides*	1	FACW
	Willow	*Salix sp.*	1-2	Some OBL or FACW
	Staghorn sumac	*Rhus typhina*	1-2	
Herbaceous layer 100%	Cow parsley	*Anthriscus sylvestris*	2-5	
	New England aster	*Symphyotrichum novae-angliae*	2-5	
	Grasses	*Poacea spp.*	2-25	
	Black medick	*Medicago lupulina*	1-2	
	Northern bugleweed	*Lycopus uniflorus*	1-2	OBL
	Foxtail barley	*Hordeum jubatum subsp. jubatum*	1	
	Common dandelion	*Taraxacum officinale*	1-2	
	Broad-leaved plantain	*Plantago major*	1-5	
	Common reed	*Phragmites australis subsp. australis*	40-60	FACW
	Purple loosestrife	*Lythrum salicaria*	2-5	FACW
	Giant foxtail	*Setaria faberi*	1-2	
	Tall goldenrod	*Solidago altissima subsp. altissima*	40-60	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Units 2a, 2b and 3 – Red Ash Stands

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 65%	Northern red oak	*Quercus rubra*	5	
	Box elder	*Acer negondo*	1	
	Red ash	*Fraxinus pennsylvanica*	10-40	FACW
	American elm	*Ulmus americana*	1-2	FACW
	Eastern cottonwood	*Populus deltoides*	1-20	FACW
Shrub layer 25%	Serviceberry	*Amelanchier sp.*	1	
	Hemp dogbane	*Apocynum cannabinum var. hypericifolium*	1	
	Choke cherry	*Prunus virginiana*	2-5	
	Canadian fly honeysuckle	*Lonicera canadensis*	10-20	
	American red raspberry	*Rubus idaeus subsp. idaeus*	2-5	
	Red ash	*Fraxinus pennsylvanica*	2-5	FACW
	Currant sp.	*Ribes sp.*	1-5	Some OBL or FACW
	Alder buckthorn	*Rhamnus frangula*	2-40	
	Eastern cottonwood	*Populus deltoides*	1-2	FACW
	Willow sp.	*Salix sp.*	1-2	Some OBL or FACW
	Frost grape	*Vitis riparia*	2-5	FACW
	Five-leaved ivy	*Parthenocissus quinquefolia*	2-5	
	Virginia creeper	*Parthenocissus inserta*	2-5	
Herbaceous layer 10%	Cow parsley	*Anthriscus sylvestris*	2-10	
	Aster	*Aster sp.*	1-5	Some OBL or FACW
	Common blue wood aster	*Symphyotrichum cordifolium*	1	
	New England aster	*Symphyotrichum novae-angliae*	1-2	
	Avens	*Avens sp.*	1	Some OBL or FACW
	Sedge	*Sedge sp.*	5	Some OBL or FACW
	Virginia knotweed	*Persicaria virginiana*	1-2	
	Wild strawberry	*Fragaria vesca subsp. vesca*	1-2	
	Great burdock	*Arctium lappa*	1	
	Eastern poison ivy	*Toxicodendron radicans var. radicans*	1-2	
	Climbing nightshade	*Solanum dulcamara*	1-2	
	Cinnamon fern	*Osmunda cinnamomea*	1	FACW
	Rosy twisted-stalk	*Streptopus lanceolatus var. lanceolatus*	1	
	Tall goldenrod	*Solidago altissima subsp. altissima*	5-10	

*Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 4 – Eastern Cottonwood Poplar Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	TYPE OF PLANT*
	Common name	Latin name		
Tree layer 30%	Silver maple	*Acer saccharinum*	2	OBL
	Norway maple	*Acer platanoides*	1	
	American elm	*Ulmus americana*	10	FACW
	Eastern cottonwood	*Populus deltoides*	15	FACW
	Scotch pine	*Pinus sylvestris*	2	

Status:

OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 5 – Herbaceous Vegetation

LAYER	DOMINANT PLANT SPECIES		COVER (%)	TYPE OF PLANT*
	Common name	Latin name		
Shrub layer <1%	Willow	*Salix spp.*	<1	Some OBL or FACW
	Weeping willow	*Salix sepulcralis*	1	
Herbaceous layer 90%	Yellow rocket	*Barbarea vulgaris*	1	
	Wild cucumber	*Echinocystis lobata*	5	
	Timothy-grass	*Phleum pratense*	1-2	
	Canada germander	*Teucrium canadense subsp. canadense*	1-2	FACW
	Field sow thistle	*Sonchus arvensis*	2-5	
	Hedge bindweed	*Calystegia sepium subsp. americana*	2-5	
	Bird's-foot trefoil	*Lotus corniculatus*	5	
	European bugleweed	*Lycopus europaeus*	1-2	OBL
	St. John's-wort	*Hypericum perforatum*	1	
	Wild mint	*subsp. borealis*	1-5	FACW
	Climbing nightshade	*Solanum dulcamara*	1-5	
	Wild parsnip	*Pastinaca sativa*	1-2	
	Reed phalaris	*Phalaris arundinacea*	2-10	FACW
	Broad-leaved plantain	*Plantago major*	2-5	
	Silver cinquefoil	*Potentilla argentea*	2-5	
	Common tansy	*Tanacetum vulgare*	2-5	
	Red clover	*Trifolium pratense*	2-10	
	Tall goldenrod	*Solidago altissima subsp. altissima*	2-15	

*Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 6 – Riparian Zone

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 1%	American black currant	*Ribes americanum*	1	FACW
	Siberian elm	*Ulmus pumila*	1	
Herbaceous layer 15-60%	Rayless aster	*Aster brachyactis*	1	
	Devil's beggarticks	*Bidens frondosa*	1-2	FACW
	Dwarf snapdragon	*Chaenorhinum minus subsp. minus*	1-2	
	Rough bugleweed	*Lycopus asper*	1	OBL
	Canada bluegrass	*Poa compressa*	2-15	
	Pale smartweed	*Persicaria lapathifolia*	1-5	FACW
	Common reed	*Phragmites australis subsp. australis*	2-10	FACW
	Spurry	*Spergularia sp.*	1-2	One OBL species
	Poverty grass	*Sporobolus vaginiflorus var. vaginiflorus*	5-25	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 7 – Staghorn Sumac Shrubland

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 5%	American elm	*Ulmus americana*	1	FACW
	Siberian elm	*Ulmus pumila*	1	
	Eastern cottonwood	*Populus deltoides*	1-5	FACW
	Crack willow	*Salix x fragilis*	1	
Shrub layer 70%	Gray birch	*Betula populifolia*	1	
	Red-osier dogwood	*Cornus stolonifera*	2-5	FACW
	Tatarian honeysuckle	*Lonicera tatarica*	1-2	
	American red raspberry	*Rubus idaeus subsp. idaeus*	2-5	
	Red ash	*Fraxinus pennsylvanica*	1-2	FACW
	Balsam poplar	*Populus balsamifera*	1	
	Eastern cottonwood	*Populus deltoides*	2-5	FACW
	Black locust	*Robinia pseudoacacia*	2-5	
	Rose bush	*Rosa sp.*	2-5	Some OBL or FACW
	Crack willow	*Salix x fragilis*	1	FACW
	Red elderberry	*Sambucus racemosa subsp. pubens var. pubens*	1-2	
	Staghorn sumac	*Rhus typhina*	5-20	
	American basswood	*Tilia americana*	2	
	Frost grape	*Vitis riparia*	2-5	FACW
	Virginia creeper	*Parthenocissus inserta*	5-10	
Herbaceous layer 70%	Garlic mustard	*Alliaria petiolata*	1	
	Canada anemone	*Anemone canadensis*	2-5	
	Mugwort	*Artemisia vulgaris*	2-10	
	Common milkweed	*Asclepias syriaca*	2-5	
	Yellow avens	*Geum aleppicum*	1	
	Wild carrot	*Dauca carotta*	2-5	
	Thistle	*Cirsium sp.*	1-2	
	Virginia strawberry	*Fragaria virginiana subsp. virginiana*	2-5	
	Cleavers	*Galium aparine*	2	
	Common mullein	*Verbascum thapsus subsp. thapsus*	2	
	Spotted jewelweed	*Impatiens capensis*	1-2	FACW
	Cocklebur	*Xanthium strumarium*	2	
	Field sow thistle	*Sonchus arvensis*	1-2	
	Ground ivy	*Glechoma hederacea*	1-2	
	Yellow toadflax	*Linaria vulgaris*	1-2	
	Ox-eye daisy	*Leucanthemum vulgare*	2	

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
	White sweet clover	*Melilotus albus*	1-10	
	Wild mint	*Mentha arvensis*	1-2	OBL
	Climbing nightshade	*Solanum dulcamara*	2-5	
	Indian mustard	*Brassica juncea*	1	
	Yellow evening primrose	*Oenothera biennis*	2	
	Stinging nettle	*Urtica dioica subsp. dioica*	1-2	FACW
	Dock	*Rumex sp.*	1	Some OBL or FACW
	Common burdock	*Arctium minus*	1-2	
	Common ragweed	*Ambrosia artemisiifolia*	2-5	
	Reed phalaris	*Phalaris arundinacea*	2-5	FACW
	Common silverweed	*Potentilla anserina*		
	Common reed	*Phragmites australis subsp. australis*	2-10	FACW
	Knotweed	*Polygonum sp.*	2	Some OBL or FACW
	Common tansy	*Tanacetum vulgare*	1-2	
	Bird vetch	*Vicia cracca*	2	

*Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 8 – Staghorn Sumac Shrubland

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 80%	Sea buckthorn	*Hippophae x rhamnoides*	2-5	
	Choke cherry	*Prunus virginiana*	1-5	
	Red-osier dogwood	*Cornus stolonifera*	2	FACW
	Canadian fly honeysuckle	*Lonicera canadensis*	<1	
	Box elder	*Acer negondo*	1-2	
	Red ash	*Fraxinus pennsylvanica*	1	FACW
	Common lilac	*Syringa vulgaris*	1	
	Siberian elm	*Ulmus pumila*	1-2	
	Eastern cottonwood	*Populus deltoides*	2-5	FACW
	Rose bush	*Rosa sp.*	2-20	Some OBL or FACW
	Staghorn sumac	*Rhus typhina*	10-35	
	American basswood	*Tilia americana*	1	
	Virginia creeper	*Parthenocissus inserta*	2-20	
Herbaceous layer 20%	Cow parsley	*Anthriscus sylvestris*	2-5	
	Mugwort	*Artemisia vulgaris*	2-10	
	Common milkweed	*Asclepias syriaca*	2-5	
	Great burdock	*Arctium lappa*	1-2	
	Smooth brome	*Bromus inermis*	1-5	
	Bull thistle	*Cirsium vulgare*	1-2	
	Quackgrass	*Elymus repens*	1	
	Virginia strawberry	*Fragaria virginiana*	5-20	
	Blue flag	*Iris versicolor*	10	OBL
	Yellow toadflax	*Linaria vulgaris*	1	
	Hedge bindweed	*Calystegia sepium subsp. americana*	1-2	
	Rough bugleweed	*Lycopus asper*	1	OBL
	White sweet clover	*Melilotus alba*	2-5	
	Climbing nightshade	*Solanum dulcamara*	1	
	Yellow evening primrose	*Oenothera biennis*	1	
	Meadow goat's-beard	*Tragopogon pratensis*	1	
	Bladder campion	*Silene cucubalus*	1	
	Tall goldenrod	*Solidago altissima subsp. altissima*	20-30	
	Bird vetch	*Vicia cracca*	1	

*Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 9 – Eastern Cottonwood Poplar Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 15%	American elm	*Ulmus americana*	2	FACW
	Eastern cottonwood	*Populus deltoides*	2-10	FACW
Shrub layer 40%	American hog peanut	*Amphicarpa bracteata*	1	
	Choke cherry	*Prunus virginiana*	1	
	Red-osier dogwood	*Cornus stolonifera*	2	FACW
	Canadian fly honeysuckle	*Lonicera canadensis*	<1	
	Box elder	*Acer negondo*	1-2	
	American red raspberry	*Rubus idaeus subsp. idaeus*	1-5	
	Red ash	*Fraxinus pennsylvanica*	1	FACW
	Siberian elm	*Ulmus pumila*	1	
	Eastern cottonwood	*Populus deltoides*	2-5	FACW
	Common ninebark	*Physocarpus opulifolius*	1	FACW
	Rose bush	*Rosa sp.*	2-40	Some OBL or FACW
	Staghorn sumac	*Rhus typhina*	25-60	
	American basswood	*Tilia americana*	1	
	Virginia creeper	*Parthenocissus inserta*	2-40	
Herbaceous layer 45%	Cow parsley	*Anthriscus sylvestris*	2-5	
	Mugwort	*Artemisia vulgaris*	2-10	
	Common milkweed	*Asclepias syriaca*	2-5	
	Nodding beggarticks	*Bidens cernua*	1	OBL
	Discoid beggarticks	*Bidens discoidea*	1-2	OBL
	Great burdock	*Arctium lappa*	1-2	
	Smooth brome	*Bromus inermis*	1-5	
	Bull thistle	*Cirsium vulgare*	1-2	
	Quackgrass	*Elymus repens*	1	
	Virginia wildrye	*Elymus virginicus var. virginicus*	1-2	FACW
	Spotted spurge	*Euphorbia maculata*	1	
	Virginia strawberry	*Fragaria virginiana*	5-20	
	Blue flag	*Iris versicolor*	10	OBL
	Yellow toadflax	*Linaria vulgaris*	1	
	Hedge bindweed	*Calystegia sepium subsp. americana*	1-5	
	White sweet clover	*Melilotus alba*	2-5	
	Climbing nightshade	*Solanum dulcamara*	1	
	Black nightshade	*Solanum nigrum*	1	
	Yellow evening primrose	*Oenothera biennis*	1	
	Meadow goat's-beard	*Tragopogon pratensis*	1	
	Giant foxtail	*Setaria faberi*	1-2	
	Bladder campion	*Silene cucubalus*	1	
	Tall goldenrod	*Solidago altissima subsp. altissima*	20-30	
	Bird vetch	*Vicia cracca*	1	

*Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 10 – Eastern Cottonwood Poplar Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 25%	Red ash	*Fraxinus pennsylvanica*	2	FACW
	Siberian elm	*Ulmus pumila*	1	
	Eastern cottonwood	*Populus deltoides*	5-20	FACW
Shrub layer 40%	Red-osier dogwood	*Cornus stolonifera*	2-5	FACW
	Canadian fly honeysuckle	*Lonicera canadensis*	<1	
	Alder buckthorn	*Rhamnus frangula*	1-5	
	Staghorn sumac	*Rhus typhina*	25-40	
	Virginia creeper	*Parthenocissus inserta*	5-10	
Herbaceous layer 35%	Reed phalaris	*Phalaris arundinacea*	1-5	FACW
	American hog peanut	*Amphicarpa bracteata*	1	
	Canada anemone	*Anemone canadensis*	1-2	
	Rayless aster	*Aster brachyactis*	1	
	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1-2	
	New England aster	*Symphyotrichum novae-angliae*	1	
	Thistle	*Cirsium sp.*	1-2	
	Barnyard grass	*Echinochloa crus-galli*	1	
	Great burdock	*Arctium lappa*	1	
	Common gromwell	*Lithospermum officinale*	1	
	Cocklebur	*Xanthium strumarium*	2	
	Yellow toadflax	*Linaria vulgaris*	1-2	
	American bugleweed	*Lycopus americanus var. americanus*	1	OBL
	White sweet clover	*Melilotus albus*	1-5	
	Witch grass	*Panicum capillare subsp. capillare*	1	
	Silver cinquefoil	*Potentilla argentea*	1-2	
	Knotweed	*Polygonum sp.*	2	Some OBL or FACW
	Purple loosestrife	*Lythrum salicaria*	2	FACW
	Giant foxtail	*Setaria faberi*	1-2	
	Bladder campion	*Silene vulgaris*	1	
	Blue vervain	*Verbena hastata*	<1	FACW

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 11 – Emergent Shore Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 15%	Hemp dogbane	*Apocynum cannabinum var. hypericifolium*	1	
	Silver maple	*Acer saccharinum*	1	FACW
	Red ash	*Fraxinus pennsylvanica*	1-2	FACW
	Siberian elm	*Ulmus pumila*	1	
	Eastern cottonwood	*Populus deltoides*	2-10	FACW
	Willow	*Salix sp.*	1	Some OBL or FACW
	Sandbar willow	*Salix interior*	1-2	
Herbaceous layer 100%	Amaranth	*Amaranthus sp.*	1	One FACW species
	Common milkweed	*Asclepias syriaca*	1-2	
	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1-2	
	Flowering rush	*Butomus umbellatus*	1-2	OBL
	Barnyard grass	*Echinochloa crus-galli*	1-2	
	Stachys	*Stachys sp.*	1-2	Some OBL
	Hairy willowherb	*Epilobium ciliatum subsp. ciliatum var. ciliatum*	1-2	OBL
	Lace grass	*Eragrostis capillaris*	1	
	Boneset	*Eupatorium perfoliatum*	6-25	FACW
	Low cudweed	*Gnaphalium uliginosum*	1-2	FACW
	Cocklebur	*Xanthium strumarium*	2	
	Field sow thistle	*Sonchus arvensis*	1-2	
	American bugleweed	*Lycopus americanus var. americanus*	1	OBL
	European bugleweed	*Lycopus europaeus*	1-2	OBL
	Laurentian bugleweed	*Lycopus americanus var. laurentianus*	1	OBL
	Northern bugleweed	*Lycopus uniflorus*	5	OBL
	Water milfoil	*Myriophylla sp.*	1-5	OBL
	Witch grass	*Panicum capillare subsp. capillare*	1-2	
	Reed phalaris	*Phalaris arundinacea*	2-5	FACW
	Common dandelion	*Taraxacum officinale*	1	
	Water plantain	*Alisma gramineum*	2	OBL
	Broad-leaved plantain	*Plantago major*	1	
	Clasping pondweed	*Potamogeton perfoliatus*	1	OBL
	Pondweed	*Potamogeton sp.*	1	OBL
	Cinquefoil	*Potentilla sp.*	1	Some FACW
	Common purslane	*Portulaca oleracea*	1	
	Common reed	*Phragmites australis subsp. australis*	2-10	FACW
	Pale smartweed	*Persicaria lapathifolia*	5-10	FACW
	Amphibious watercress	*Rorippa amphibia*	<1	OBL
	Purple loosestrife	*Lythrum salicaria*	2	FACW
	Giant foxtail	*Setaria faberi*	1	
	Spartina sp.	*Spartina sp.*	1	OBL
	Awned cyperus	*Cyperus squarrosus*	1	FACW
	Grass-leaved goldenrod	*Euthamia graminifolia*	1-2	
	Blue vervain	*Verbena hastata*	<1	FACW

*Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 12 – Black Locust Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 30%	Eastern cottonwood	*Populus deltoides*	5-10	FACW
	Black locust	*Robinia pseudoacacia*	5-20	
Shrub layer 40%	Canadian fly honeysuckle	*Lonicera canadensis*	5-10	
	Black locust	*Robinia pseudoacacia*	10-15	
	Staghorn sumac	*Rhus typhina*	10-30	
	Virginia creeper	*Parthenocissus inserta*	15-25	
Herbaceous layer 30%	Mugwort	*Artemisia vulgaris*	10-20	
	Wild chicory	*Cichorium intybus*	1-2	
	White sweet clover	*Melilotus albus*	5-20	
	Dock	*Rumex sp.*	1	
	Tall goldenrod	*Solidago altissima subsp. altissima*	5-15	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 13 – Black Locust Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 20%	Eastern cottonwood	*Populus deltoides*	5	FACW
	Black locust	*Robinia pseudoacacia*	5-15	
Shrub layer 30%	Choke cherry	*Prunus virginiana*	1-5	
	American elm	*Ulmus americana*	1-5	
	Staghorn sumac	*Rhus typhina*	2-5	FACW
	Virginia creeper	*Parthenocissus inserta*	15-20	
Herbaceous layer 15%	Tall goldenrod	*Solidago altissima subsp. altissima*	5-15	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 14 – Herbaceous Vegetation

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Herbaceous layer 100%	Mugwort	*Artemisia vulgaris*	15-40	
	Wild carrot	*Dauca carotta*	2-15	
	Grasses	*Poacea spp.*	2-25	
	Black medick	*Medicago lupulina*	2-5	
	Wild parsnip	*Pastinaca sativa*	1-2	
	Common dandelion	*Taraxacum officinale*	1-2	
	Common tansy	*Tanacetum vulgare*	5-40	
	Red clover	*Trifolium pratense*	2-5	
	Tall goldenrod	*Solidago altissima subsp. altissima*	15-50	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 15 – Black Locust Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 50%	Box elder	*Acer negondo*	2-5	
	Russian olive	*Elaeagnus angustifolia*	<1	
	Eastern cottonwood	*Populus deltoides*	15-20	FACW
	Black locust	*Robinia pseudoacacia*	15-25	TER
Shrub layer 50%	Choke cherry	*Prunus virginiana*	1	TER
	Canadian fly honeysuckle	*Lonicera canadensis*	5	TER
	Alder buckthorn	*Rhamnus frangula*	1-2	TER
	Eastern cottonwood	*Populus deltoides*	5	FACW
	Black locust	*Robinia pseudoacacia*	10	
	Staghorn sumac	*Rhus typhina*	5-15	TER
	Frost grape	*Vitis riparia*	2-5	FACW
	Virginia creeper	*Parthenocissus inserta*	15-25	
Herbaceous layer 60%	Thistle	*Cirsium sp.*	1-2	
	Climbing nightshade	*Solanum dulcamara*	2-5	
	Common reed	*Phragmites australis subsp. australis*	2-10	FACW
	Common tansy	*Tanacetum vulgare*	5-40	
	Coltsfoot	*Tussilago farfara*	10-20	
	Tall goldenrod	*Solidago altissima subsp. altissima*	15-50	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 16 – Eastern Cottonwood Poplar Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 40%	Eastern cottonwood	*Populus deltoides*	25-40	FACW
Shrub layer 50%	Canadian fly honeysuckle	*Lonicera canadensis*	5	
	American red raspberry	*Rubus idaeus subsp. idaeus*	2-5	
	Alder buckthorn	*Rhamnus frangula*	1-5	
	Staghorn sumac	*Rhus typhina*	5-15	
	Virginia creeper	*Parthenocissus inserta*	15-25	
Herbaceous layer 60%	Canada anemone	*Anemone canadensis*	1-5	
	Common milkweed	*Asclepias syriaca*	1-2	
	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1-2	
	New England aster	*Symphyotrichum novae-angliae*	1	
	Wild carrot	*Dauca carotta*	2-5	
	Thistle	*Cirsium sp.*	1-2	
	Wild chicory	*Cichorium intybus*	1	
	Grasses	*Poacea spp.*	2-25	
	Common mullein	*Verbascum thapsus subsp. thapsus*	1	
	Fall dandelion	*Leontodon autumnalis*	2	
	Black medick	*Medicago lupulina*	2-5	
	Wild parsnip	*Pastinaca sativa*	1-2	
	Common reed	*Phragmites australis subsp. australis*	2-10	FACW
	Tall goldenrod	*Solidago altissima subsp. altissima*	2-5	
	Bird vetch	*Vicia cracca*	2-5	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 17 – Herbaceous Vegetation

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 25%	American red raspberry	*Rubus idaeus subsp. idaeus*	10-15	
	Eastern cottonwood	*Populus deltoides*	1	FACW
	Staghorn sumac	*Rhus typhina*	5-10	
Herbaceous layer 100%	Mugwort	*Artemisia vulgaris*	2	
	Common milkweed	*Asclepias syriaca*	1	
	New England aster	*Symphyotrichum novae-angliae*	1	
	Wild carrot	*Dauca carotta*	5-15	
	Thistle	*Cirsium sp.*	2	
	Flat vetchling	*Lathyrus sylvestris*	5-10	
	Cocklebur	*Xanthium strumarium*	2	
	White sweet clover	*Melilotus albus*	5	
	Mustard	*Brassica sp.*	2	
	Common ragweed	*Ambrosia artemisiifolia*	2-5	
	Broad-leaved plantain	*Plantago major*	5-15	
	Common reed	*Phragmites australis subsp. australis*	5	FACW
	Purple loosestrife	*Lythrum salicaria*	2	FACW
	Common tansy	*Tanacetum vulgare*	10-20	
	Tall goldenrod	*Solidago altissima subsp. altissima*	5-40	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 18 – Eastern Cottonwood Poplar Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 5%	Russian olive	*Elaeagnus angustifolia*	1	
	American elm	*Ulmus americana*	1	FACW
	Siberian elm	*Ulmus pumila*	1	
	Eastern cottonwood	*Populus deltoides*	5	FACW
Shrub layer 15%	Canadian fly honeysuckle	*Lonicera canadensis*	5-10	
	American red raspberry	*Rubus idaeus subsp. idaeus*	2-5	
Herbaceous layer 90%	Mugwort	*Artemisia vulgaris*	5-10	
	Common milkweed	*Asclepias syriaca*	2	
	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1-2	
	New England aster	*Symphyotrichum novae-angliae*	1	
	Wild carrot	*Dauca carotta*	5-20	
	Virginia strawberry	*Fragaria virginiana subsp. virginiana*	2-5	
	Grasses	*Poacea spp.*	2-20	
	Witch grass	*Panicum capillare subsp. capillare*	2	
	Tall goldenrod	*Solidago altissima subsp. altissima*	5-40	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 19 – Black Locust Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 65%	Black locust	*Robinia pseudoacacia*	40	
	Staghorn sumac	*Rhus typhina*	25	
Herbaceous layer 20%	Noble yarrow	*Achillea millefolium*	1-2	
	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1-2	
	White sweet clover	*Melilotus albus*	5	
	Common reed	*Phragmites australis subsp. australis*	5	FACW
	Common tansy	*Tanacetum vulgare*	2	
	Tall goldenrod	*Solidago altissima subsp. altissima*	2	
	Bird vetch	*Vicia cracca*	2	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 20 – Black Locust Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 20%	American elm	*Ulmus americana*	1	FACW
	Siberian elm	*Ulmus pumila*	1	
	Eastern cottonwood	*Populus deltoides*	2-5	FACW
	Black locust	*Robinia pseudoacacia*	5-10	
Shrub layer 70%	Canadian fly honeysuckle	*Lonicera canadensis*	2	
	American red raspberry	*Rubus idaeus subsp. idaeus*	2	
	Alder buckthorn	*Rhamnus frangula*	2	
	Black locust	*Robinia pseudoacacia*	5-10	
	Willow	*Salix sp.*	1	Some OBL or FACW
	Staghorn sumac	*Rhus typhina*	40	
	Frost grape	*Vitis riparia*	10	FACW
	Virginia creeper	*Parthenocissus inserta*	10	
Herbaceous layer 10%	New England aster	*Symphyotrichum novae-angliae*	5	
	Stachys	*Stachys sp.*	1	Some OBL
	Wild mint	*Mentha arvensis*	1-2	OBL
	Field horsetail	*Equisetum arvense*	2	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 21 – Eastern Cottonwood Poplar Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 25%	Red ash	*Fraxinus pennsylvanica*	5-10	FACW
	American elm	*Ulmus americana*	1	FACW
	Eastern cottonwood	*Populus deltoides*	15	FACW
Shrub layer 45%	Canadian fly honeysuckle	*Lonicera canadensis*	10-20	
	Red ash	*Fraxinus pennsylvanica*	2	FACW
	Eastern cottonwood	*Populus deltoides*	5	FACW
	Staghorn sumac	*Rhus typhina*	10-15	
	Frost grape	*Vitis riparia*	10	FACW
Herbaceous layer 5%	Canada anemone	*Anemone canadensis*	1-5	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 22 – Herbaceous Vegetation

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 5%	American elm	*Ulmus americana*	1-2	FACW
	Siberian elm	*Ulmus pumila*	1	
	Eastern cottonwood	*Populus deltoides*	2	FACW
Herbaceous layer 100%	Noble yarrow	*Achillea millefolium*	1-2	
	Mugwort	*Artemisia vulgaris*	5-10	
	Common milkweed	*Asclepias syriaca*	2	
	New England aster	*Symphyotrichum novae-angliae*	1-2	
	Wild carrot	*Dauca carotta*	2	
	Wild chicory	*Cichorium intybus*	1	
	Virginia strawberry	*Fragaria virginiana*	5	
	Grasses	*Poacea spp.*	2-25	
	Great burdock	*Arctium lappa*	1-2	
	Giant ragweed	*Ambrosia trifida*	2	
	Common mullein	*Verbascum thapsus subsp. thapsus*	1	
	Bird's-foot trefoil	*Lotus corniculatus*	1-2	
	Ox-eye daisy	*Leucanthemum vulgare*	1	
	White sweet clover	*Melilotus albus*	2	
	St. John's wort	*Hypericum perforatum*	<1	
	Mexican muhly	*Muhlenbergia mexicana var. mexicana*	1-2	
	Foxtail barley	*Hordeum jubatum subsp. jubatum*	1-2	
	Common ragweed	*Ambrosia artemisiifolia*	2-5	
	Broad-leaved plantain	*Plantago major*	5-15	
	Common reed	*Phragmites australis subsp. australis*	5-25	FACW
	Bladder campion	*Silene vulgaris*	1	
	Common tansy	*Tanacetum vulgare*	2	
	Red clover	*Trifolium pratense*	2-5	
	Tall goldenrod	*Solidago altissima subsp. altissima*	40	
	Bird vetch	*Vicia cracca*	2	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 23a – Eastern Cottonwood Poplar Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 30%	Silver maple	*Acer saccharinum*	15	FACW
	Russian olive	*Elaeagnus angustifolia*	1	
	American elm	*Ulmus americana*	1	FACW
	Siberian elm	*Ulmus pumila*	1	
	White poplar	*Populus alba*	1	
	Eastern cottonwood	*Populus deltoides*	2-10	FACW
	Large-toothed aspen	*Populus grandidata*	1-2	
Shrub layer 40%	Pin cherry	*Prunus pennsylvanica*	1	
	Choke cherry	*Prunus virginiana*	1	
	Canadian fly honeysuckle	*Lonicera canadensis*	10-20	
	Box elder	*Acer negondo*	2-5	
	American red raspberry	*Rubus idaeus subsp. idaeus*	2	
	Red ash	*Fraxinus pennsylvanica*	2	FACW
	Alder buckthorn	*Rhamnus frangula*	2	
	American elm	*Ulmus americana*	2-5	FACW
	Siberian elm	*Ulmus pumila*	1	
	Staghorn sumac	*Rhus typhina*	10-15	
	Virginia creeper	*Parthenocissus inserta*	10	
Herbaceous layer 80%	Noble yarrow	*Achillea millefolium*	2-5	
	Garlic mustard	*Alliaria petiolata*	1-2	
	Mugwort	*Artemisia vulgaris*	5-10	
	Common milkweed	*Asclepias syriaca*	2	
	Common blue wood aster	*Symphyotrichum cordifolium*	1-2	
	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1-2	
	New England aster	*Symphyotrichum novae-angliae*	5	
	Smooth brome	*Bromus inermis*	<1	
	Wild carrot	*Dauca carotta*	2	
	Bird’s-foot trefoil	*Lotus corniculatus*	1-2	
	White sweet clover	*Melilotus albus*	2	
	St. John's wort	*Hypericum perforatum*	<1	
	Climbing nightshade	*Solanum dulcamara*	2-5	
	Common burdock	*Arctium minus*	1-2	
	Broad-leaved plantain	*Plantago major*	5-15	
	Common reed	*Phragmites australis subsp. australis*	5-20	FACW
	Bouncing bet	*Saponaria officinalis*	<1	
	Bladder campion	*Silene vulgaris*	1-2	
	Common tansy	*Tanacetum vulgare*	2	
	Coltsfoot	*Tussilago farfara*	10-20	
	Valerian	*Valeriana officinalis*	1	
	Tall goldenrod	*Solidago altissima subsp. altissima*	10-40	
	Nettle-leaved vervain	*Verbena urticifolia subsp. urticifolia*	1	
	Bird vetch	*Vicia cracca*	2	

*Status:
OBL– Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 23b – Eastern Cottonwood Poplar Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 25%	Russian olive	*Elaeagnus angustifolia*	1	
	American elm	*Ulmus americana*	1	FACW
	Eastern cottonwood	*Populus deltoides*	2-20	FACW
Herbaceous layer 60%	Noble yarrow	*Achillea millefolium*	1-2	
	Common milkweed	*Asclepias syriaca*	2	
	Wild carrot	*Dauca carotta*	2-10	
	Grasses	*Poacea spp.*	2-25	
	Common reed	*Phragmites australis subsp. australis*	5-20	FACW
	Common tansy	*Tanacetum vulgare*	2	
	Bird vetch	*Vicia cracca*	2	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 24 – Black Locust Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 30%	Silver maple	*Acer saccharinum*	1-2	FACW
	Sugar maple	*Acer saccharum*	1	
	Russian olive	*Elaeagnus angustifolia*	<1	
	Eastern cottonwood	*Populus deltoides*	2-5	FACW
	Black locust	*Robinia pseudoacacia*	5-20	
Shrub layer 60%	Choke cherry	*Prunus virginiana*	1	
	Canadian fly honeysuckle	*Lonicera canadensis*	10-20	
	Box elder	*Acer negondo*	2-5	
	Red ash	*Fraxinus pennsylvanica*	2	FACW
	Alder buckthorn	*Rhamnus frangula*	2	
	Siberian elm	*Ulmus pumila*	1	
	Eastern cottonwood	*Populus deltoides*	2	FACW
	Black locust	*Robinia pseudoacacia*	15	
	Elderberry	*Sambucus sp.*	1	One FACW species
	Staghorn sumac	*Rhus typhina*	15	
	American basswood	*Tilia americana*	2	
	Frost grape	*Vitis riparia*	10	FACW
	Wither-rod	*Viburnum cassinoides*	1	FACW
Herbaceous layer 50%	Field sow thistle	*Sonchus arvensis*	1-2	
	White sweet clover	*Melilotus albus*	2	
	Reed phalaris	*Phalaris arundinacea*	2-5	FACW
	Cinquefoil	*Potentilla sp.*	1-5	Some FACW
	Common tansy	*Tanacetum vulgare*	2	
	Common valerian	*Valeriana officinalis*	1	
	Tall goldenrod	*Solidago altissima subsp. altissima*	40	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 25 – Black Locust Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 50%	Box elder	*Acer negondo*	10	
	Red ash	*Fraxinus pennsylvanica*	5-10	FACW
	Eastern cottonwood	*Populus deltoides*	2-10	FACW
	Black locust	*Robinia pseudoacacia*	20	
Shrub layer 60%	Choke cherry	*Prunus virginiana*	1-5	
	Canadian fly honeysuckle	*Lonicera canadensis*	2-20	
	Red ash	*Fraxinus pennsylvanica*	2-5	FACW
	Eastern cottonwood	*Populus deltoides*	2	FACW
	Black locust	*Robinia pseudoacacia*	40	
	Bramble	*Rubus sp.*	1	Some FACW
	Staghorn sumac	*Rhus typhina*	10-15	
Herbaceous layer 70%	Mugwort	*Artemisia vulgaris*	2-10	
	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1-2	
	Devil's beggarticks	*Bidens frondosa*	1-2	FACW
	Thistle	*Cirsium sp.*	2	
	Stachys	*Stachys sp.*	1	Some OBL
	European bugleweed	*Lycopus europaeus*	1	OBL
	White sweet clover	*Melilotus albus*	2	
	Black mustard	*Brassica nigra*	2	
	Wild parsnip	*Pastinaca sativa*	1-2	
	Reed phalaris	*Phalaris arundinacea*	2-5	FACW
	Common reed	*Phragmites australis subsp. australis*	5-20	FACW
	Coltsfoot	*Tussilago farfara*	10-20	
	Tall goldenrod	*Solidago altissima subsp. altissima*	10-30	
	Bird vetch	*Vicia cracca*	2-5	
	Violet	*Viola sp.*	2-5	Some OBL and FACW

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 26a – Eastern Cottonwood Poplar Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 30%	Eastern cottonwood	*Populus deltoides*	20	FACW
	Common hackberry	*Celtis occidentalis*	<1	
	American elm	*Ulmus americana*	10	FACW
Shrub layer 30%	Canadian fly honeysuckle	*Lonicera canadensis*	1-5	
	American red raspberry	*Rubus idaeus subsp. idaeus*	2-5	
	Alder buckthorn	*Frangula alnus*	1-5	
	Bramble	*Rubus sp.*	1-2	Some FACW
	Staghorn sumac	*Rhus typhina*	5-15	
	Virginia creeper	*Parthenocissus inserta*	10	
Herbaceous layer 60%	Garlic mustard	*Alliaria petiolata*	2-5	
	Mugwort	*Artemisia vulgaris*	5-10	
	Common milkweed	*Asclepias syriaca*	2	
	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1-2	
	New England aster	*Symphyotrichum novae-angliae*	1-2	
	Thistle	*Cirsium sp.*	2	
	Wild chicory	*Cichorium intybus*	1	
	Spotted jewelweed	*Impatiens capensis*	1-2	FACW
	Common gromwell	*Lithospermum officinale*	1-2	
	Common ragweed	*Ambrosia artemisiifolia*	2-5	
	Broad-leaved plantain	*Plantago major*	1-5	
	Tall goldenrod	*Solidago altissima subsp. altissima*	5-35	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Units 26b, 26c and 26d – Eastern Cottonwood Poplar Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 20%	American elm	*Ulmus americana*	1-2	FACW
	Eastern cottonwood	*Populus deltoides*	20	FACW
Shrub layer 70%	Choke cherry	*Prunus virginiana*	2	
	Canadian fly honeysuckle	*Lonicera canadensis*	2-10	
	American red raspberry	*Rubus idaeus subsp. idaeus*	2	
	Eastern cottonwood	*Populus deltoides*	25-40	FACW
	Black locust	*Robinia pseudoacacia*	2-5	
	Bramble	*Rubus sp.*		Some FACW
	Staghorn sumac	*Rhus typhina*	2-20	
	Virginia creeper	*Parthenocissus inserta*	2-5	
Herbaceous layer 60%	Noble yarrow	*Achillea millefolium*	1-2	
	Common milkweed	*Asclepias syriaca*	2	
	Wild carrot	*Dauca carotta*	2-5	
	Field sow thistle	*Sonchus arvensis*	1-2	
	White sweet clover	*Melilotus albus*	5	
	Wild parsnip	*Pastinaca sativa*	1-2	
	Tall goldenrod	*Solidago altissima subsp. altissima*	25-40	
	Bird vetch	*Vicia cracca*	2-5	
	Violet	*Viola sp.*	1-2	Some OBL and FACW

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Units 27a and 27b – Staghorn Sumac Shrubland

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 25%	Eastern cottonwood	*Populus deltoides*	15-20	FACW
	American basswood	*Tilia americana*	2-5	
Shrub layer 80%	Choke cherry	*Prunus virginiana*	1-5	
	Staghorn sumac	*Rhus typhina*	40-80	
Herbaceous layer 50%	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1-2	
	New England aster	*Symphyotrichum novae-angliae*	5	
	Wild carrot	*Dauca carotta*	2	
	Grasses	*Poacea spp.*	2-25	
	Tall goldenrod	*Solidago altissima subsp. altissima*	10-30	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 28 – Black Locust Stand

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 20%	Canadian fly honeysuckle	*Lonicera canadensis*	2-10	
	Black locust	*Robinia pseudoacacia*	2-5	
	Virginia creeper	*Parthenocissus inserta*	2-5	
Herbaceous layer 80%	Catnip	*Nepeta cataria*	2-5	
	White sweet clover	*Melilotus albus*	5	
	Common ragweed	*Ambrosia artemisiifolia*	2-5	
	Common reed	*Phragmites australis subsp. australis*	20-60	FACW
	Tall goldenrod	*Solidago altissima subsp. altissima*	20	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 29 – Herbaceous Vegetation

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 5%	Siberian elm	*Ulmus pumila*	1	
	Black locust	*Robinia pseudoacacia*	1-2	
	Virginia creeper	*Parthenocissus inserta*	2-5	
Herbaceous layer 100%	Cow parsley	*Anthriscus sylvestris*	2-10	
	Mugwort	*Artemisia vulgaris*	2-15	
	Common milkweed	*Asclepias syriaca*	2	
	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1	
	New England aster	*Symphyotrichum novae-angliae*	5	
	Smooth brome	*Bromus inermis*	1-5	
	Wild carrot	*Dauca carotta*	2-5	
	Thistle	*Cirsium sp.*	2	
	Wild chicory	*Cichorium intybus*	1-5	
	Bird's-foot trefoil	*Lotus corniculatus*	2-5	
	White sweet clover	*Melilotus albus*	10-20	
	Wild parsnip	*Pastinaca sativa*	1-2	
	Broad-leaved plantain	*Plantago major*	1-5	
	Common reed	*Phragmites australis subsp. australis*	10-80	FACW
	Giant foxtail	*Setaria faberi*	1-2	
	Common tansy	*Tanacetum vulgare*	2	
	Tall goldenrod	*Solidago altissima subsp. altissima*	25-80	
	Bird vetch	*Vicia cracca*	2-5	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

2 – Wetland Plant Composition

Vegetation Unit 30 – Common Reed Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 1%	Weeping willow	*Salix sepulcralis*	1	
Shrub layer 1%	Hemp dogbane	*Apocynum cannabinum var. hypericifolium*	1	
	Eastern cottonwood	*Populus deltoides*	<1	FACW
Herbaceous layer 100%	New England aster	*Aster novae-engliae*	1	
	Lance-leaved aster	*Symphyotrichum lanceolatum subsp. lanceolatum var. lanceolatum*	1	
	Chinese lantern	*Physalis alkekengi*	1	
	Swamp dodder	*Cuscuta gronovii var. gronovii*		FACW
	Swamp willow-herb	*Epilobium palustre*	2	OBL
	Canada germander	*Teucrium canadense subsp. canadense*	5	FACW
	Hedge bindweed	*Calystegia sepium subsp. americana*		
	Common reed	*Phragmites australis subsp. australis*	90	FACW
	Water smartweed	*Persicaria amphibia var. emersa*	2-5	
	Purple loosestrife	*Lythrum salicaria*	10	FACW
	Tall goldenrod	*Solidago altissima subsp. altissima*	2-5	
	Blue vervain	*Verbena hastata*	2	FACW

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 31 – Pond

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 15%	Red ash	*Fraxinus pennsylvanica*	10	FACW
	Eastern cottonwood	*Populus deltoides*	2	FACW
Shrub layer 2%	Five-leaved ivy	*Parthenocissus quinquefolia*	2	
Herbaceous layer 100%	Flowering rush	*Butomus umbellatus*	2	OBL
	Spotted jewelweed	*Impatiens capensis*	25	FACW
	Duckweed	*Lemna minor*	85	OBL
	Common burdock	*Arctium minus*	5	
	Common reed	*Phragmites australis subsp. australis*	15	FACW

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 32 – Treed Swamp

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Tree layer 30%	Box elder	*Acer negondo*	2	
	Red ash	*Fraxinus pennsylvanica*	25	FACW
	Eastern cottonwood	*Populus deltoides*	1	FACW
Shrub layer 50%	Red-osier dogwood	*Cornus stolonifera*	20	FACW
	Silky dogwood	*Cornus amomum subsp. obliqua*	5	
	Canadian fly honeysuckle	*Lonicera canadensis*	20	
	Willow	*Salix sp.*	2	Some OBL or FACW
Herbaceous layer 70%	Eastern poison ivy	*Toxicodendron radicans var. radicans*	5	
	Spotted jewelweed	*Impatiens capensis*	5	FACW
	Swamp loosestrife	*Lysimachia terrestris*	2	
	Common reed	*Phragmites australis subsp. australis*	60	FACW

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 33 – Emergent Shore Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 30%	Red-osier dogwood	*Cornus stolonifera*	2-5	FACW
	Eastern cottonwood	*Populus deltoides*	5-15	FACW
	Willow	*Salix sp.*	1	Some OBL or FACW
	Broad-leaved meadowsweet	*Spiraea latifolia*	2-5	
	Frost grape	*Vitis riparia*	2-5	FAC
Herbaceous layer 30%	Knapweed	*Centaurea sp.*	1	
	Bulbous water-hemlock	*Cicuta bulbifera*	1	OBL
	Spotted jewelweed	*Impatiens capensis*	5-10	FACW
	American bugleweed	*Lycopus americanus var. americanus*	2-4	OBL
	European bugleweed	*Lycopus europaeus*	1-2	OBL
	Rough bugleweed	*Lycopus asper*	1	OBL
	St. John's wort	*Hypericum perforatum*	1	
	Cinquefoil	*Potentilla sp.*	1-2	Some FACW
	Coltsfoot	*Tussilago farfara*	1-2	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 34 – Emergent Shore Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 15%	Eastern cottonwood	*Populus deltoides*	2-10	FACW
	Common ninebark	*Physocarpus opulifolius*	<1	FACW
	Willow	*Salix sp.*	1	Some OBL or FACW
	Frost grape	*Vitis riparia*	2-5	FACW
Herbaceous layer 20%	Discoid beggarticks	*Bidens discoidea*	1-2	OBL
	Nodding beggarticks	*Bidens cernua*	1	OBL
	Devil's beggarticks	*Bidens frondosa*	1-2	FACW
	Barnyard grass	*Echinochloa crus-galli*	1-2	
	Canada wild rye	*Elymus canadensis var. canadensis*	1	
	Virginia wildrye	*Elymus virginicus var. virginicus*	1-2	FACW
	Stachys	*Stachys sp.*	1	Some OBL
	Spotted spurge	*Euphorbia maculata*	1-2	
	Cocklebur	*Xanthium strumarium*	1	
	Northern bugleweed	*Lycopus uniflorus*	1-2	OBL
	Black nightshade	*Solanum nigrum*	1	
	Witch grass	*Panicum capillare subsp. capillare*	1	
	Canada bluegrass	*Poa compressa*	2-5	
	Cinquefoil	*Potentilla sp.*	1-2	Some FACW
	Common reed	*Phragmites australis subsp. australis*	2-10	FACW
	Water smartweed	*Persicaria amphibia var. emersa*	1-2	OBL
	Purple loosestrife	*Lythrum salicaria*	2	FACW
	Giant foxtail	*Setaria faberi*	1-2	
	Coltsfoot	*Tussilago farfara*	1-2	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 35 – Emergent Shore Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 15%	Eastern cottonwood	*Populus deltoides*	1-2	FACW
	Frost grape	*Vitis riparia*	2-5	FACW
	Virginia creeper	*Parthenocissus inserta*	2-5	
Herbaceous layer 60%	Devil's beggarticks	*Bidens frondosa*	1-2	FACW
	Flowering rush	*Butomus umbellatus*	1-2	OBL
	Hedge bindweed	*Calystegia sepium subsp. americana*	1-2	
	Black medick	*Medicago lupulina*	1-2	
	Mustard	*Brassica sp.*	2	
	Reed phalaris	*Phalaris arundinacea*	2-5	FACW
	Water plantain	*Alisma gramineum*	2	OBL
	Cinquefoil	*Potentilla sp.*	1-2	Some FACW
	Common reed	*Phragmites australis subsp. australis*	2-40	FACW
	Knotweed	*Polygonum sp.*	1	Some OBL or FACW
	Water smartweed	*Persicaria amphibia var. emersa*	1-2	OBL
	Purple loosestrife	*Lythrum salicaria*	2	FACW
	Black-girded wool-grass	*Scirpus atrocinctus*	1-2	FACW
	Narrow-leaved cattail	*Typha angustifolia*	2-5	OBL

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 36 – Emergent Shore Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Herbaceous layer 100%	Narrow-leaved cattail	*Typha angustifolia*	100	OBL

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 37 – Emergent Shore Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Herbaceous layer 100%	Common reed	*Phragmites australis subsp. australis*	100	FACW

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 38 – Emergent Shore Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 5%	American elm	*Ulmus americana*	2-5	FACW
	Eastern cottonwood	*Populus deltoides*	1-2	FACW
Herbaceous layer 30%	Devil's beggarticks	*Bidens frondosa*	1-2	FACW
	Reed phalaris	*Phalaris arundinacea*	2-10	FACW
	Water plantain	*Alisma gramineum*	2-5	OBL
	Cinquefoil	*Potentilla sp.*	1-2	Some FACW
	Common reed	*Phragmites australis subsp. australis*	2-10	FACW
	Purple loosestrife	*Lythrum salicaria*	1-2	FACW

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 39 – Emergent Shore Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 10%	Siberian elm	*Ulmus pumila*	1	
	Eastern cottonwood	*Populus deltoides*	1-2	FACW
	Willows	*Salix spp.*	1-2	Some OBL or FACW
	Frost grape	*Vitis riparia*	2-5	FACW
Herbaceous layer 70%	Stachys	*Stachys sp.*	1	Some OBL
	Spotted jewelweed	*Impatiens capensis*	5-10	FACW
	Hedge bindweed	*Calystegia sepium subsp. americana*	1-2	
	American bugleweed	*Lycopus americanus var. americanus*	2-4	OBL
	Wild mint	*Mentha arvensis*	1-2	OBL
	Reed phalaris	*Phalaris arundinacea*	2-40	FACW
	Common reed	*Phragmites australis subsp. australis*	2-10	FACW
	Purple loosestrife	*Lythrum salicaria*	2	FACW
	Common tansy	*Tanacetum vulgare*	2	
	Narrow-leaved cattail	*Typha angustifolia*	2-5	OBL
	Tall goldenrod	*Solidago altissima subsp. altissima*	2	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 40 – Emergent Shore Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 5%	Siberian elm	*Ulmus pumila*	1	
	Eastern cottonwood	*Populus deltoides*	1-2	FACW
	Willow	*Salix sp.*	1-2	Some OBL or FACW
	Frost grape	*Vitis riparia*	2-5	FACW
Herbaceous layer 30%	Spotted jewelweed	*Impatiens capensis*	5-10	FACW
	Hedge bindweed	*Calystegia sepium subsp. americana*	1-2	
	Wild mint	*Mentha arvensis*	1-2	OBL
	Common reed	*Phragmites australis subsp. australis*	2-10	FACW
	Purple loosestrife	*Lythrum salicaria*	2	FACW
	Narrow-leaved cattail	*Typha angustifolia*	2-5	OBL
	Tall goldenrod	*Solidago altissima subsp. altissima*	2	

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 41 – Emergent Shore Marsh

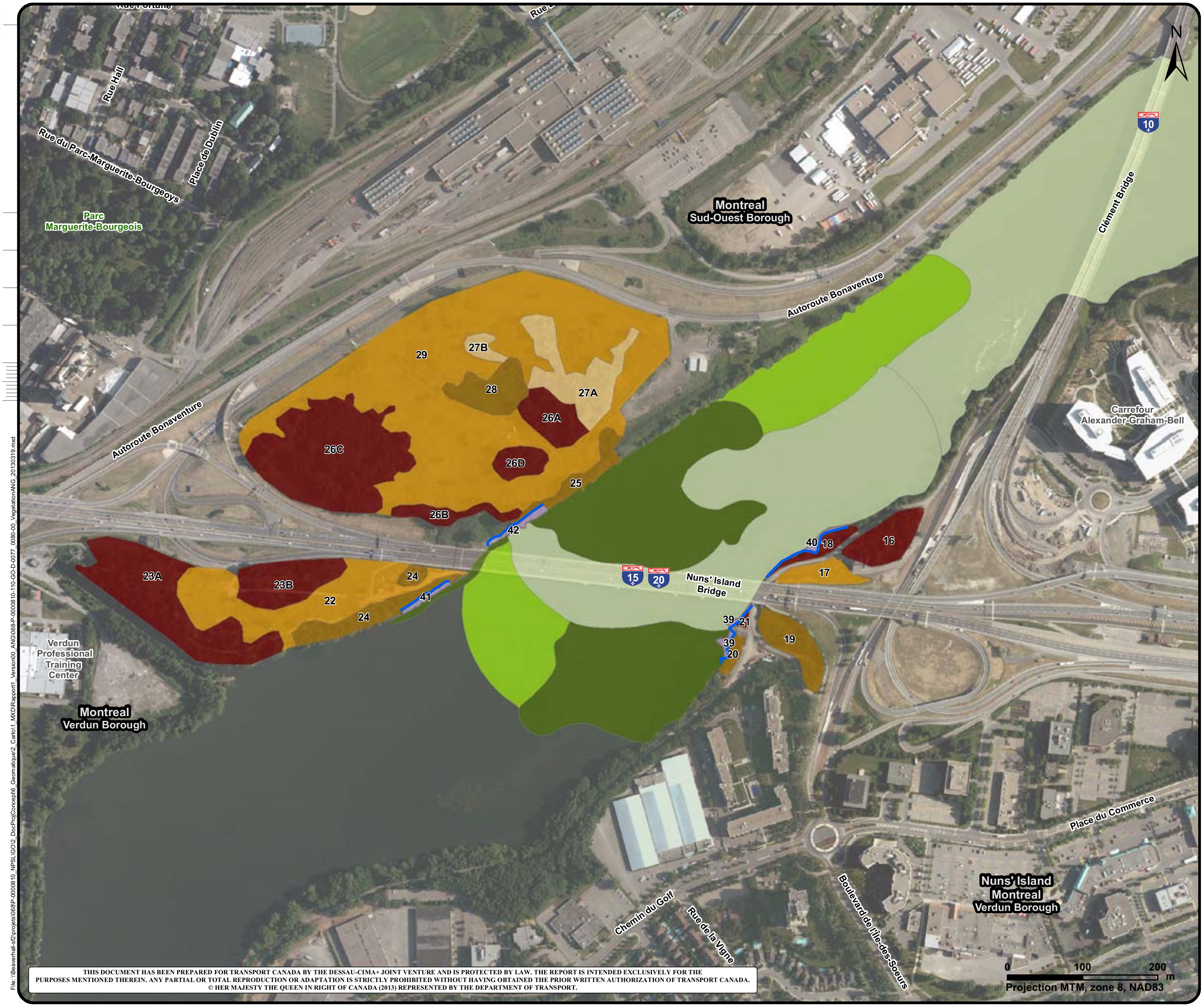
LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 5%	Eastern cottonwood	*Populus deltoides*	1-2	FACW
	Frost grape	*Vitis riparia*	2-5	FACW
Herbaceous layer 20%	Flowering rush	*Butomus umbellatus*	1-2	OBL
	Stachys	*Stachys sp.*	1-2	Some OBL
	Common reed	*Phragmites australis subsp. australis*	2-10	FACW
	Purple loosestrife	*Lythrum salicaria*	2-5	FACW

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec

Vegetation Unit 42 – Emergent Shore Marsh

LAYER	DOMINANT PLANT SPECIES		SPECIES COVER (%)	STATUS*
	Common name	Latin name		
Shrub layer 10%	Canadian fly honeysuckle	*Lonicera canadensis*	2-5	
	Red ash	*Fraxinus pennsylvanica*	1-2	FACW
	Eastern cottonwood	*Populus deltoides*	1-2	FACW
Herbaceous layer 30%	Devil's beggarticks	*Bidens frondosa*	1-2	FACW
	European bugleweed	*Lycopus europaeus*	1-2	OBL
	White sweet clover	*Melilotus albus*	2-5	
	Climbing nightshade	*Solanum dulcamara*	2-5	
	Mustard	*Brassica sp.*	2	
	Reed phalaris	*Phalaris arundinacea*	2-10	FACW

Status:
OBL – Obligate wetland plant of southern Quebec
FACW – Facultative wetland plant of southern Quebec



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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

Floristic Composition of the
Wetlands and Terrestrial Environments

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Scale 1:5 000
Date 2013-03-19

Project manager Sylvie Côté

Sequence No. 01 of 01

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
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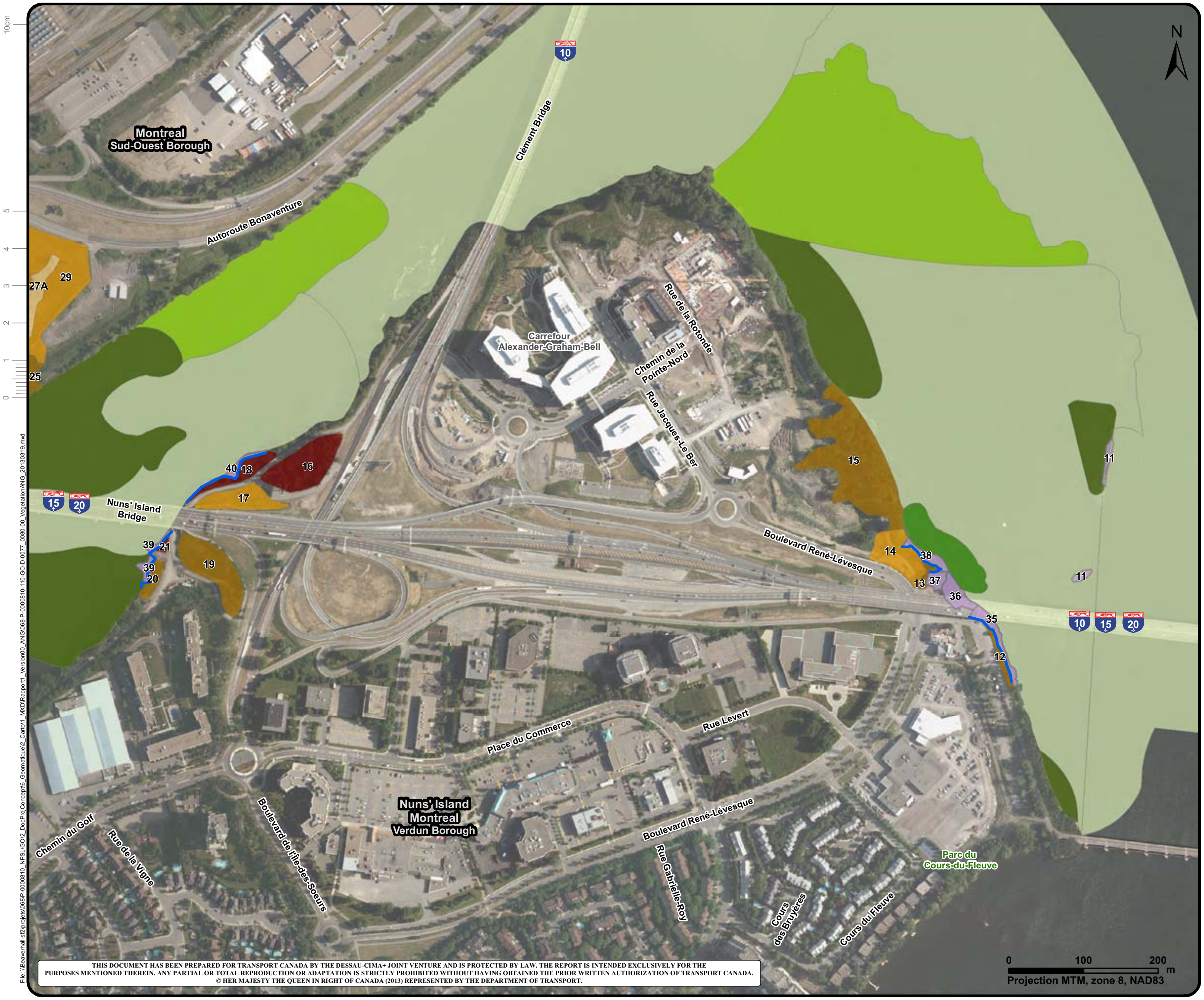

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SIZE 11x17

▬ High water line

Wetland

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

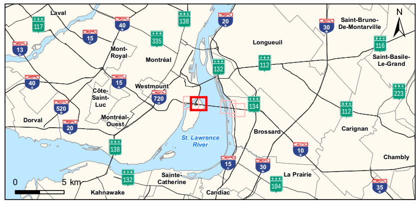
Terrestrial environment

🟨 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



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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	0078	00

SIZE 11x17

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—	High water line

Wetland

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

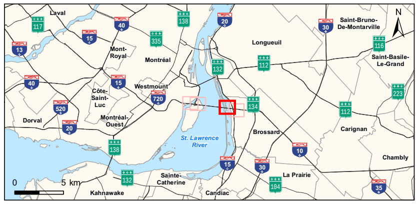
Terrestrial environment

🟨	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



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Floristic Composition of the
Wetlands and Terrestrial Environments

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Discipline Geomatic
Scale 1:5 000
Date 2013-03-19

Project manager Sylvie Côté

Sequence No. 01 of 01

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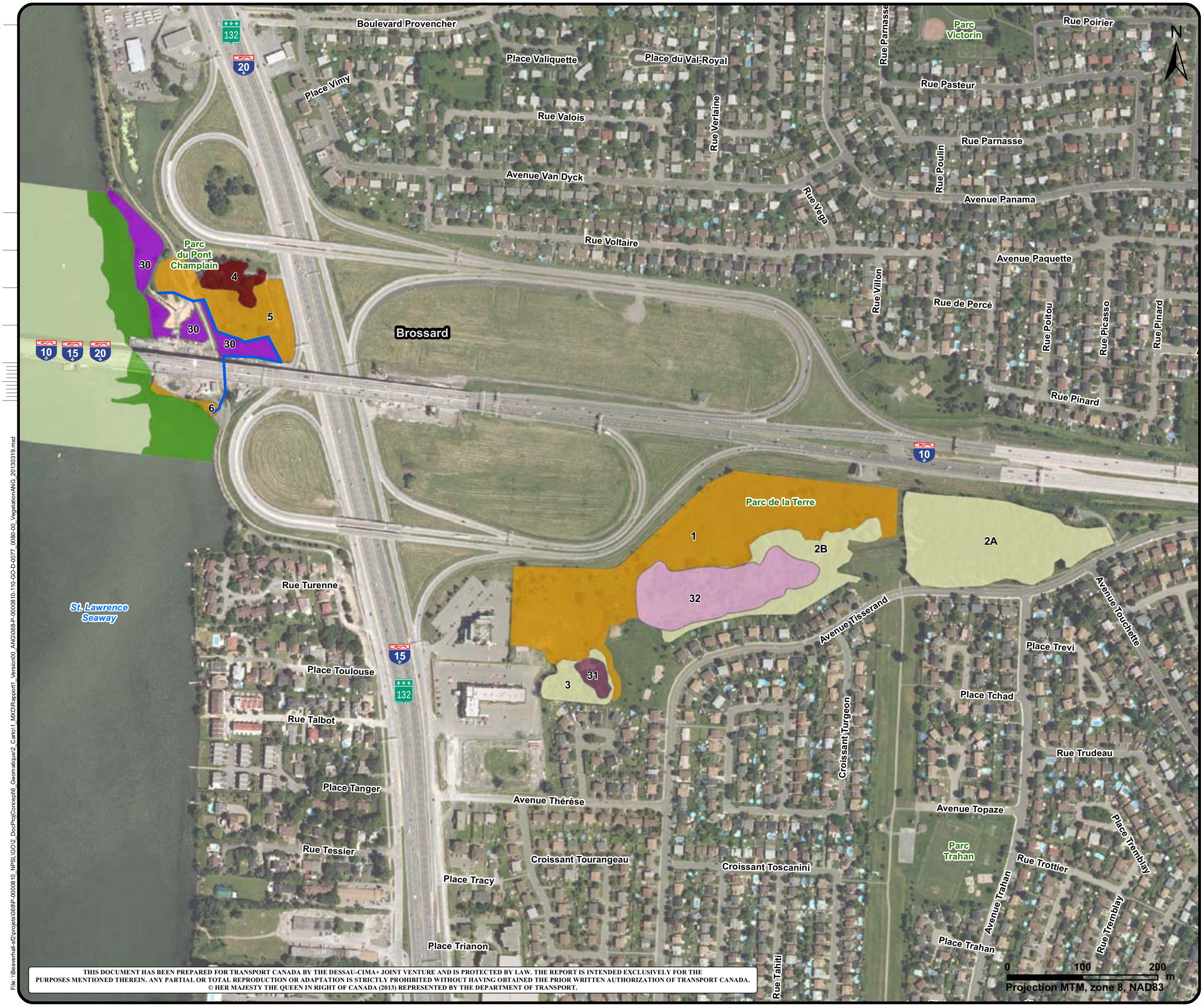

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SIZE 11x17

— High water line

Wetland

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

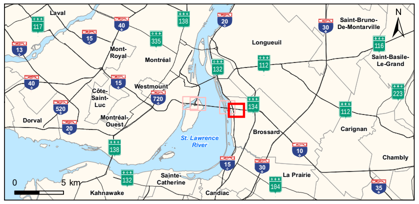
Terrestrial environment

- ▨ 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
Floristic Composition of the
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Appendix 7 Photographs of Vegetation Units

Photo 1: Vegetation unit 1 – Herbaceous wildland.

Photo 2: Vegetation unit 2a – Red ash woodland.

Photo 3: Vegetation unit 2b – Red ash woodland.

Photo 4: Vegetation unit 3 – Red ash woodland.

Photo 5: Vegetation unit 4 – Eastern cottonwood poplar stand.

Photo 6: Vegetation unit 5 – Herbaceous wildland.

Photo 7: Vegetation unit 6 – Herbaceous wildland.

Photo 8: Vegetation unit 7 – Shrubby wildland with staghorn sumac.

Photo 9: Vegetation unit 8 – Shrubby wildland with staghorn sumac.

Photo 10: Vegetation unit 9 – Eastern cottonwood poplar stand.

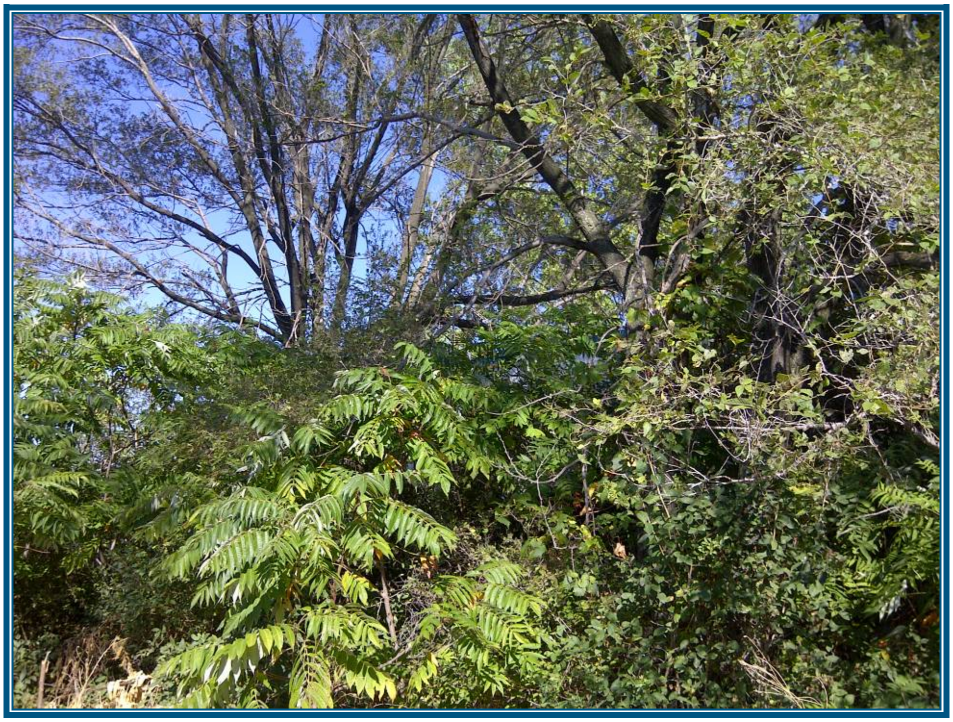

Photo 11: Vegetation unit 10 – Eastern cottonwood poplar stand.

Photo 12: Vegetation unit 11 – Emergent riverside marsh.

Photo 13: Vegetation unit 12 – Black locust stand.

Photo 14: Vegetation unit 13 – Black locust stand.

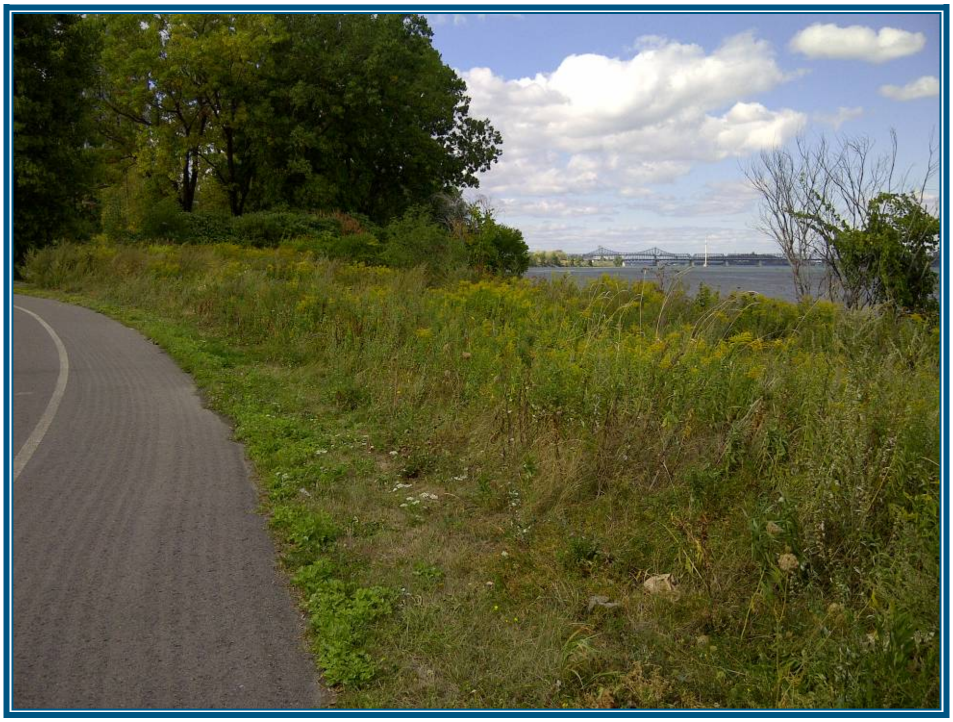

Photo 15: Vegetation unit 14 – Herbaceous wildland.

Photo 16: Vegetation unit 15 – Black locust stand.

Photo 17: Vegetation unit 16 – Eastern cottonwood poplar stand.

Photo 18: Vegetation unit 17 – Herbaceous wildland.

Photo 19: Vegetation unit 18 – Eastern cottonwood poplar stand.

Photo 20: Vegetation unit 19 – Black locust stand.

Photo 21: Vegetation unit 20 – Black locust stand.

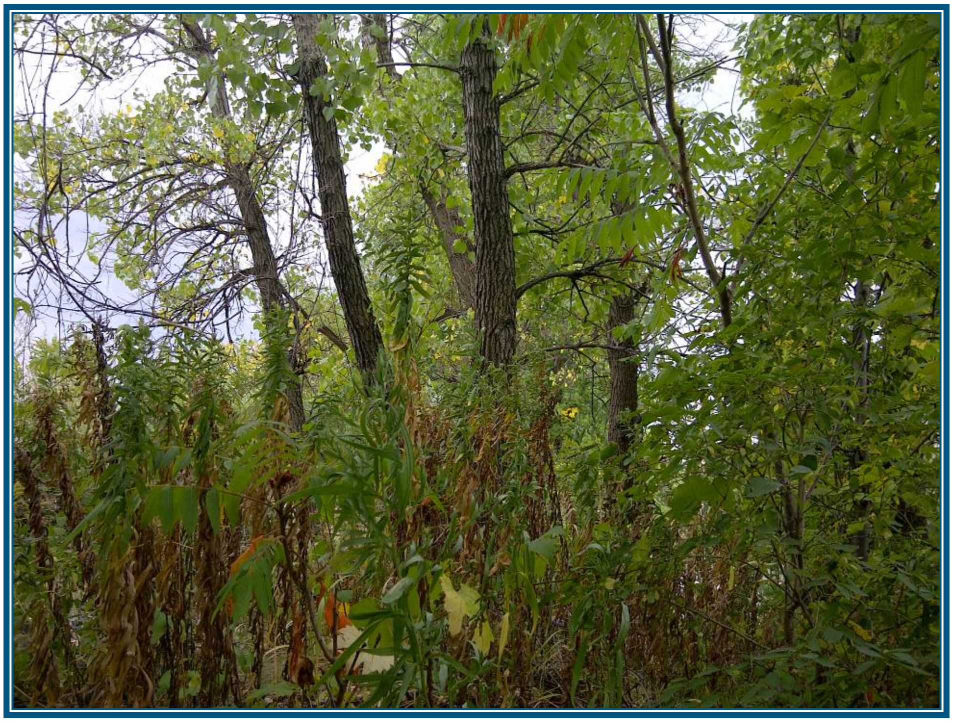

Photo 22: Vegetation unit 21 – Eastern cottonwood poplar stand.

Photo 23: Vegetation unit 22 – Herbaceous wildland.

Photo 24: Vegetation unit 23a – Eastern cottonwood poplar stand.

Photo 25: Vegetation unit 23b – Eastern cottonwood poplar stand.

Photo 26: Vegetation unit 24 – Black locust stand.

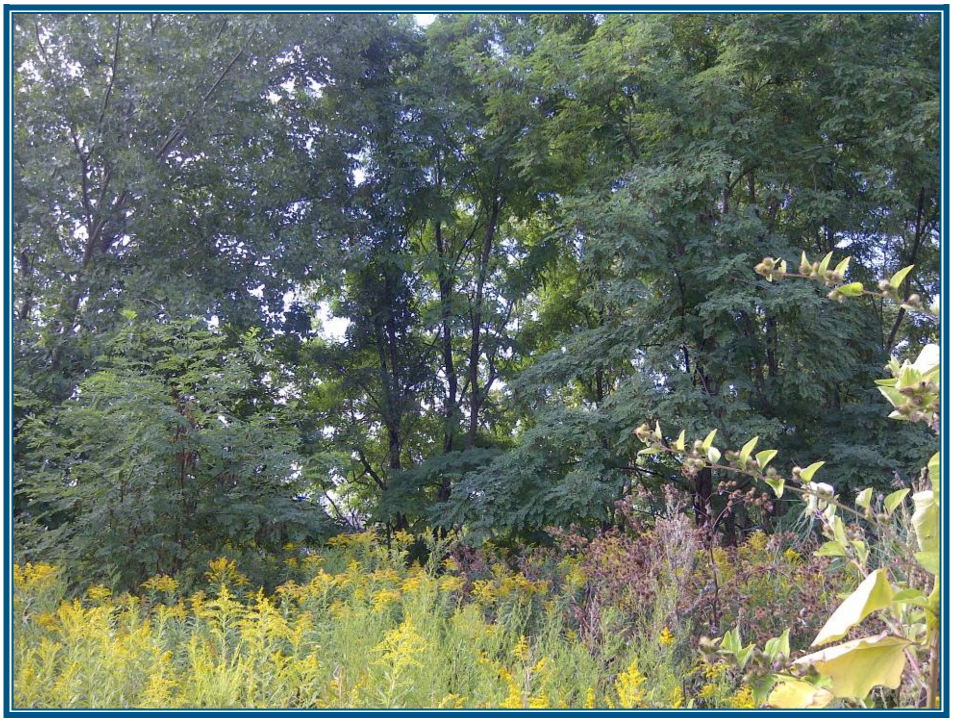

Photo 27: Vegetation unit 25 – Black locust stand.

Photo 28: Vegetation unit 26a – Eastern cottonwood poplar stand.

Photo 29: Vegetation unit 26b – Eastern cottonwood poplar stand.

Photo 30: Vegetation units 26c and 26d – Eastern cottonwood poplar stand.

Photo 31: Vegetation units 27a and 27b – Shrubby wildland with staghorn sumac.

Photo 32: Vegetation unit 28 – Black locust stand.

Photo 33: Vegetation unit 29 – Herbaceous wildland.

Photo 34: Vegetation unit 30 – Common water reed marsh.

Photo 35: Vegetation unit 31 – Pond.

Photo 36: Vegetation unit 32 – Treed swamp.

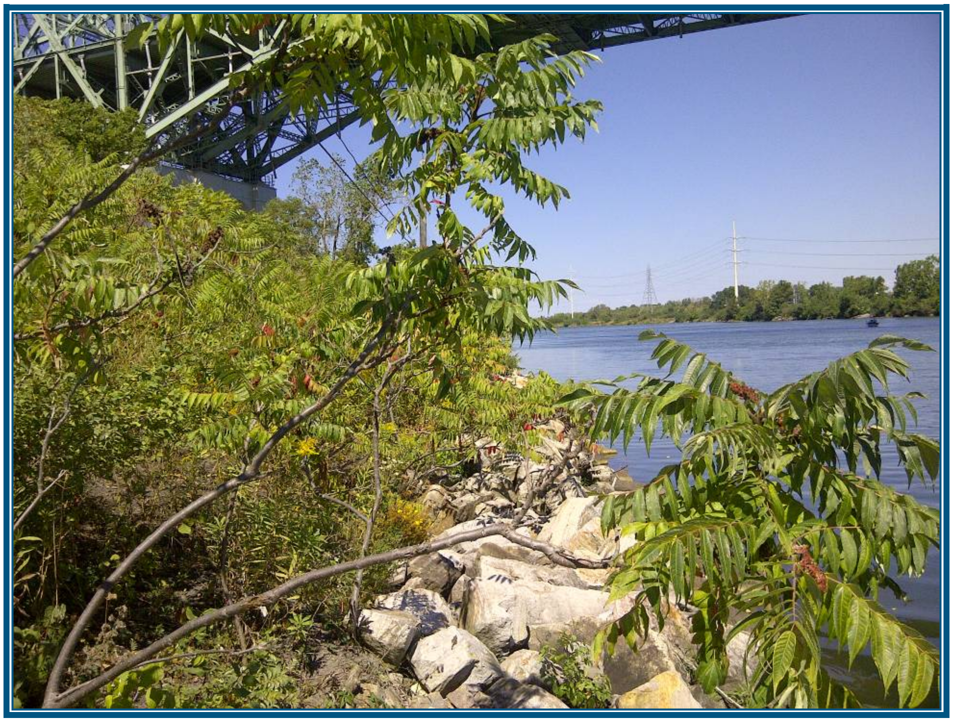

Photo 37: Vegetation unit 33 – Emergent riverside marsh.

Photo 38: Vegetation unit 34 – Emergent riverside marsh.

Photo 39: Vegetation unit 35 – Emergent riverside marsh.

Photo 40: Vegetation unit 36 – Emergent riverside marsh.

Photo 41: Vegetation unit 37 – Emergent riverside marsh.

Photo 42: Vegetation unit 38 – Emergent riverside marsh.

Photo 43: Vegetation unit 39 – Emergent riverside marsh.

Photo 44: Vegetation unit 40 – Emergent riverside marsh.

Photo 45: Vegetation unit 41 – Emergent riverside marsh.

Photo 46: Vegetation unit 42 – Emergent riverside marsh.

Appendix 8 Location of Aquatic Habitat Survey Transects

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SIZE 8.5x11

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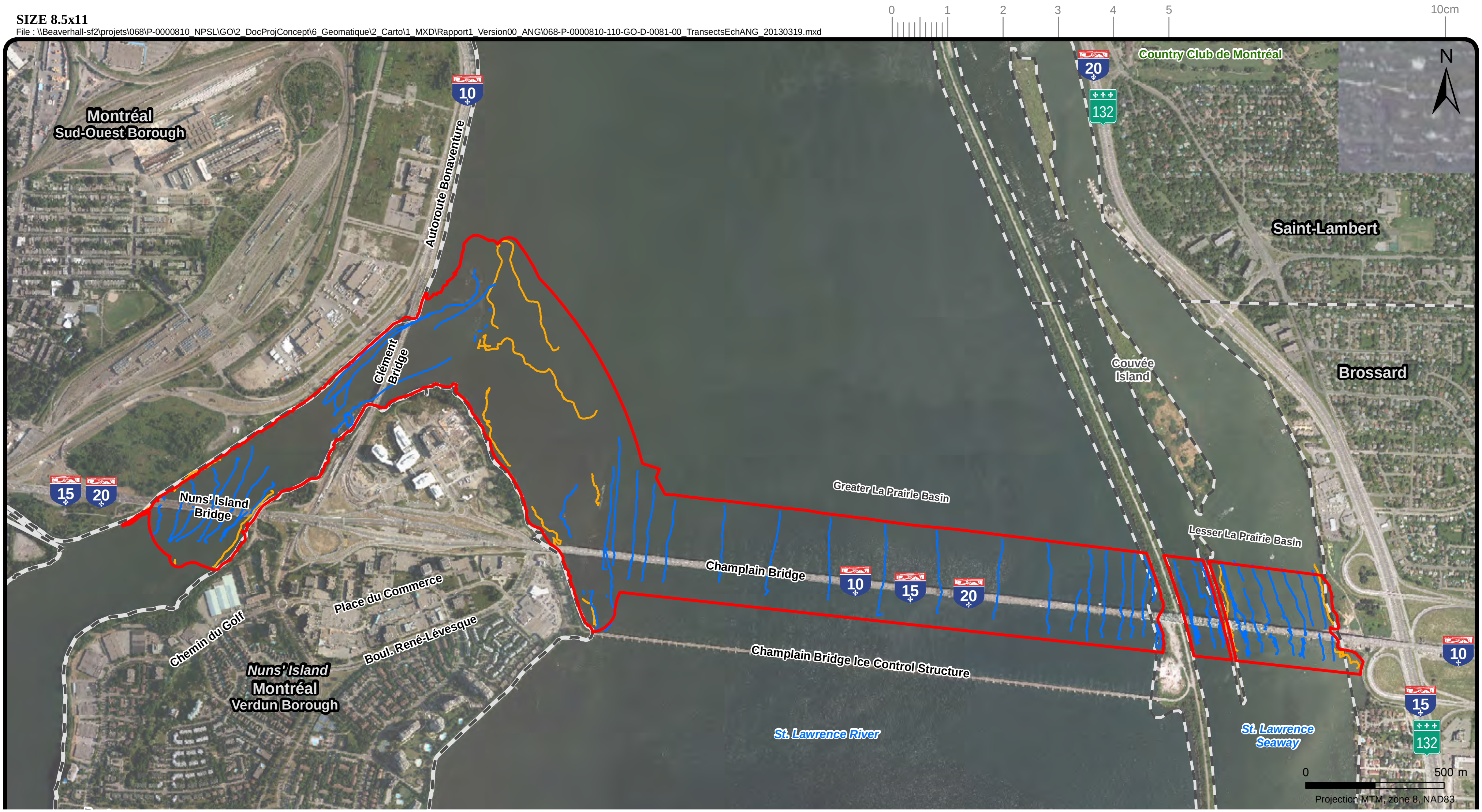

— Demarcation of major areas

— Analyzed transect

🟥 Bathymetric study area and surface substrate

☐ Municipal limit

☐ Borough limit

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

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Client

Transport Canada | Transports Canada

Project

New Bridge for the St. Lawrence Environmental Assessment

Title

Transects of sampling conducted for aquatic habitats and surface substrate

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Checked	Ghyslain Pothier	Date	2013-03-19		

Serv. char.	Project	Wbs	Disc.	Type	Drawing No.	Rev.
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Appendix 9 Grid of Aquatic Habitat Types

Classification criteria for aquatic environments

Flow	Depth (m)	Substrate	Vegetation	Type
Flood plain (marsh)				1
Lentic	0-2	Coarse	Present	2
			Bare	3
		Fine	Present	4
			Bare	5
	2-5	Coarse	Present	6
			Bare	7
		Fine	Present	8
			Bare	9
	5-15			10
	> 15			11
Laminar	0-2	Coarse	Present	12
			Bare	13
		Fine	Present	14
			Bare	15
	2-5	Coarse	Present	16
			Bare	17
		Fine	Present	18
			Bare	19
	> 5			20
Turbulent	0-3	Gravel/pebbles		21
	0-3	Boulders/cobble		22
	0-3	Boulders/bedrock		23
	> 3			24

Coarse: > sand
Fine: ≤ sand

The flood plain as well as three types of flow were considered: lentic, laminar and turbulent, defined as follows:

Flood plain:	Area along a river or stream that is flooded during high water. Corresponds to marshes as defined in the Federal Policy on Wetland Conservation (Environment Canada, 1996);
Lentic flow:	Slow flow (velocities of 0.2 m/s and less);
Laminar flow:	Fast flow characterized by a smooth water surface (velocities greater than 0.2 m/s);

Turbulent flow:	Flow characterized by current velocities greater than 0.2 m/s and a loss of load, which can be caused either by a break in slope in the riverbed, or by a shallow section of the river (shoal) creating an increase in current speed. Eddies are visible on the water surface. Sills, rapids, cascades and waterfalls are included in this type of flow.

The depth classes retained for lentic flow and for laminar flow are 0 to 2 m, 2 to 5 m, 5 to 15 m, and 15 m and over (over 5 m for laminar flow). Two classes were retained for turbulent flow, i.e. 0 to 3 m and over 3 m.

Two classes of substrate were used to represent the dominant substrate in a river section characterized by lentic or laminar flow. A coarse substrate is characterized by a prevalence of materials coarser than sand and a fine substrate by materials ranging from sand to silt and clay; organic materials are also included in this class. A more detailed classification is used for turbulent flow, namely the prevalence of gravel/pebbles, boulders/cobble, or boulders/bedrock.

The last classification criterion is the presence of emergent and submerged aquatic vegetation. The absence of vegetation is characterized by a bare substrate. This class is used to identify 24 types of aquatic environments.

Appendix 10 List of Herpetofauna Species (*Atlas des amphibiens et des reptiles du Québec*)

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GENUS	SPECIES	FRENCH COMMON NAME	ENGLISH COMMON NAME	SPECIES CODE
Necturus	maculosus	Necture tacheté	Mudpuppy	NEMA
Notophthalmus	viridescens	Triton vert	Eastern Newt	NOVI
Ambystoma	laterale	Salamandre à points bleus	Blue-spotted Salamander	AMLA
Ambystoma	maculatum	Salamandre maculée	Yellow-spotted Salamander	AMMA
Desmognathus	fuscus	Salamandre sombre	Northern Dusky Salamander	DEFU
Desmognathus	ochrophaeus	Salamandre sombre des montagnes	Mountain Dusky Salamander	DEOC
Eurycea	bislineata	Salamandre à deux lignes	Northern Two-lined Salamander	EUBI
Gyrinophilus	porphyriticus	Salamandre pourpre	Spring Salamander	GYPO
Hemidactylium	scutatum	Salamandre à quatre doigts	Four-toed Salamander	HESC
Plethodon	cinereus	Salamandre rayée	Eastern Redback Salamander	PLCI
Anaxyrus	americanus	Crapaud d'Amérique	American Toad	BUAM
Hyla	versicolor	Rainette versicolore	Tetraploid Gray Treefrog	HYVE
Pseudacris	crucifer	Rainette crucifère	Northern Spring Peeper	PSCR
Pseudacris	triseriata	Rainette faux-grillon de l'O.	Western Chorus Frog	PSTR
Pseudacris	maculata	Rainette faux-grillon boréale	Boreal Chorus Frog	PSMA
Lithobates	sylvaticus	Grenouille des bois	Wood Frog	RASY
Lithobates	pipiens	Grenouille léopard	Northern leopard Frog	RAPI
Lithobates	palustris	Grenouille des marais	Pickerel Frog	RAPA
Lithobates	clamitans	Grenouille verte	Green Frog	RACL
Lithobates	septentrionalis	Grenouille du Nord	Mink Frog	RASP
Lithobates	catesbeianus	Ouaouaron	Bullfrog	RACA
Chelydra	serpentina	Chélydre serpentine	Common Snapping Turtle	CHSE
Sternotherus	odoratus	Tortue musquée	Common Musk Turtle	STOD
Chrysemys	picta	Tortue peinte	Painted Turtle	CHPI
Graptemys	geographica	Tortue géographique	Common Map Turtle	GRGE
Emydoidea	blandingi	Tortue mouchetée	Blanding's Turtle	EMBL
Glyptemys	insculpta	Tortue des bois	Wood Turtle	GLIN
Clemmys	guttata	Tortue ponctuée	Spotted Turtle	CLGU
Apalone	spinifera	Tortue-molle à épines	Eastern Spiny Softshell	APSP
Dermochelys	coriacea	Tortue luth	Leatherback Turtle	DECO
Thamnophis	sirtalis	Couleuvre rayée	Common Garter Snake	THSI
Nerodia	sipedon	Couleuvre d'eau	Northern Water Snake	NESI
Storeria	occipitomaculata	Couleuvre à ventre rouge	Redbelly Snake	STOC
Storeria	dekayi	Couleuvre brune	Brown Snake	STDE
Liochlorophis	vernalis	Couleuvre verte	Smooth Green Snake	LIVE
Diadophis	punctatus	Couleuvre à collier	Ringneck Snake	DIPU
Lampropeltis	triangulum	Couleuvre tachetée	Milk Snake	LATR
Trachemys	scripta elegans	Tortue à oreilles rouges	Red-eared turtle	TRSC
Ambystoma	species	Ambystome non-identifiée	Unidentified mole salamander	AMSP
Desmognathus	species	Salamandre sombre non-identifée	Unidentified dusky salamandre	DESP
Thamnophis	sauritus	Couleuvre mince	Nothern Ribbonsnake	THSA
		Espèce de tortue non identifiée	Unidentified turtle species	TOSP
Turtle	exotic	Tortue exotique	Exotic Turtle	TOEX
		Rana non identifiée	Unidentified Rana	RANI
		Couleuvre non identifiée	Unidentified snake species	COSP

Appendix 11 Detailed Results of Amphibian and Reptile Inventories

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Anuran Survey per Station

Date	Station	Species	Abundance
04-06-2012	SEA-1	None	0
04-06-2012	SEA-2	None	0
04-06-2012	SEA-3	None	0
04-06-2012	SEA-4	None	0
04-06-2012	SEA-5	None	0
04-06-2012	SEA-6	None	0
04-06-2012	SEA-7	None	0
04-06-2012	SEA-8	None	0
04-06-2012	SEA-9	None	0

Amphibian and Reptile Surveys Using Snake Shingle and Active Search Techniques

Date	English name	Latin name	Inventory techniques	Number	Location	GPS coordinates
04-06-2012	Brown Snake	*Storeria d. dekayi*	Active search	1	Nuns’ Island, northwest of the road	N45 28.309 W73 32.719
05-06-2012	Common Garter Snake	*Thamnophis sirtalis*	Active search	1	Dyke, south of Champlain Bridge	N45 28.001 W73 30.279
09-10-2012	Brown Snake	*Storeria d. dekayi*	Shingle (B15)	1	Island of Montreal, south of the road	N45 28.235 W73 33.340
09-10-2012	Brown Snake	*Storeria d. dekayi*	Shingle (B42)	1	Island of Montreal, south of the road	N45 28.260 W73 33.431
10-10-2012	Brown Snake	*Storeria d. dekayi*	Shingle (B32)	1	Dyke, north of Champlain Bridge	N45 28.156 W73 30.343
10-10-2012	Brown Snake	*Storeria d. dekayi*	Shingle (B43)	2	Nuns’ Island, northwest of the road	N45 28.284 W73 32.741
10-10-2012	Brown Snake	*Storeria d. dekayi*	Shingle (B26)	2	Nuns’ Island, southwest of the road	N45 28.209 W73 32.814
19-06-2012	Brown Snake	*Storeria d. dekayi*	Shingle (B39)	2	Nuns’ Island, northeast of the road	N45 28.254 W73 32.125
19-06-2012	Brown Snake	*Storeria d. dekayi*	Shingle (B40)	3	Nuns’ Island, northeast of the road	N45 28.264 W73 32.129
19-06-2012	Common Garter Snake	*Thamnophis sirtalis*	Shingle (B40)	1	Nuns’ Island, northeast of the road	N45 28.264 W73 32.129
20-06-2012	Brown Snake	*Storeria d. dekayi*	Shingle (B19)	1	Island of Montreal, north of the road	N45 28.320 W73 33.135
20-06-2012	Brown Snake	*Storeria d. dekayi*	Shingle (B15)	1	Island of Montreal, south of the road	N45 28.233 W73 33.343
21-06-2012	Redbelly Snake	*Storeria o. occipitomaculata*	Shingle (B36)	1	Dyke, south of Champlain Bridge	N45 27.967 W73 30.258
21-06-2012	Common Garter Snake	*Thamnophis sirtalis*	Active search	1	Dyke, south of Champlain Bridge	N45 27.878 W73 30.276
21-06-2012	Common Garter Snake	*Thamnophis sirtalis*	Shingle (B26)	1	Nuns’ Island, southwest of the road	N45 28.209 W73 32.814

Turtle Hoop Net survey

Sampling station	Date installed	Time installed	Date removed	Time removed	Harvesting effort (hours)	Catch
Ve1	19-06-2012	14:30	20-06-2012	18:00	27,5	None
Ve2	19-06-2012	16:00	20-06-2012	16:00	24,0	None
Ve3	19-06-2012	17:00	20-06-2012	12:30	19,5	None
Ve4	19-06-2012	18:00	20-06-2012	14:30	21,5	None
Ve5	20-06-2012	15:00	21-06-2012	08:00	17,0	None
Ve6	20-06-2012	15:30	21-06-2012	09:00	17,5	None
Ve7	20-06-2012	17:00	21-06-2012	09:30	16,5	None
Ve8	20-06-2012	18:30	21-06-2012	11:00	16,5	None

Appendix 12 List of Avian Species (*Atlas des oiseaux nicheurs du Québec*)

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Data from the Quebec Breeding Bird Atlas (square 18XR13)

Species	Max BE	Categ	Species	Max BE	Categ
Canada Goose	NO	CONF	Eastern Wood-Pewee	S	POSS
Wood Duck	H	POSS	Willow Flycatcher	S	POSS
Gadwall	JE	CONF	Eastern Phoebe	AT	CONF
American Wigeon	JE	CONF	Great Crested Flycatcher	AT	CONF
Mallard	JE	CONF	Eastern Kingbird	JE	CONF
Common Merganser	H	POSS	Warbling Vireo	AT	CONF
Red-breasted Merganser	JE	CONF	Red-eyed Vireo	A	PROB
Wild Turkey	JE	CONF	American Crow	NJ	CONF
Pied-billed Grebe	JE	CONF	Purple Martin	NJ	CONF
Double-crested Cormorant	NO	CONF	Tree Swallow	NO	CONF
Least Bittern	A	PROB	Cliff Swallow	NJ	CONF
Great Blue Heron	NO	CONF	Barn Swallow	JE	CONF
Great Egret	NO	CONF	Black-capped Chickadee	CN	CONF
Green Heron	H	POSS	White-breasted Nuthatch	S	POSS
Black-crowned Night-Heron	NO	CONF	Brown Creeper	CN	CONF
Bald Eagle	NO	CONF	Carolina Wren	T	PROB
Cooper's Hawk	NJ	CONF	Winter Wren	T	PROB
Red-shouldered Hawk	NO	CONF	American Robin	NJ	CONF
American Kestrel	JE	CONF	Gray Catbird	JE	CONF
Merlin	H	POSS	Northern Mockingbird	NJ	CONF
Peregrine Falcon	NJ	CONF	European Starling	NJ	CONF
Killdeer	S	POSS	Cedar Waxwing	T	PROB
Spotted Sandpiper	NF	CONF	Yellow Warbler	NO	CONF
Ring-billed Gull	H	POSS	American Redstart	CN	CONF
Herring Gull	P	PROB	Chipping Sparrow	T	PROB
Great Black-backed Gull	NO	CONF	Savannah Sparrow	T	PROB
Common Tern	NJ	CONF	Song Sparrow	AT	CONF
Rock Pigeon	NO	CONF	Northern Cardinal	JE	CONF
Mourning Dove	M	PROB	Red-winged Blackbird	AT	CONF
Eastern Screech-Owl	NO	CONF	Common Grackle	NO	CONF
Common Nighthawk	S	POSS	Brown-headed Cowbird	JE	CONF
Chimney Swift	NO	CONF	Baltimore Oriole	JE	CONF
Belted Kingfisher	H	POSS	House Finch	T	PROB
Downy Woodpecker	JE	CONF	American Goldfinch	NJ	CONF
Hairy Woodpecker	JE	CONF	House Sparrow	NJ	CONF
Northern Flicker	NO	CONF			

Appendix 13 List of Aviary Species (Regroupement Québec Oiseaux, EPOQ)

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Study of Bird Populations in Québec (ÉPOQ)
List of Species in the Champlain Bridge area

English name	Latin name	Nb. mentions	Max. nb. of indiv.	Avg. nb. of ind./mention	Std. dev. NMI/mention	Constancy	Abundance index	Nb. indiv. per hour	Nb. mentions per hour	Nb. years occurring since 2000	Breeding			At risk	
											Confirmed	Probable	Possible	Canada	Québec
Snow Goose	Chen caerulescens	14	3000	629,29	943 329	1,13	7 082	51 059	0,0081	6	0	0	0		
Brant	Branta bernicla	23	1200	97,74	249 486	1,85	1 807	13 028	0,0133	4	0	0	0		
Canada Goose	Branta canadensis	109	5000	136,17	557 158	8,76	11 931	86 018	0,0632	10	0	0	0		
Wood Duck	Aix sponsa	36	8	1,56	1 275	2,89	0,045	0,0325	0,0209	4	0	0	0		
Gadwall	Anas strepera	127	30	4,50	5 075	10,21	0,460	0,3315	0,0736	10	0	0	0		
Eurasian Wigeon	Anas penelope	7	3	1,57	0,787	0,56	0,009	0,0064	0,0041	2	0	0	0		
American Wigeon	Anas americana	334	200	9,99	18 700	26,85	2 682	19 340	0,1936	10	0	1	0		
American Black Duck	Anas rubripes	237	750	11,88	57 971	19,05	2 263	16 315	0,1374	9	0	4	0		
Mallard	Anas platyrhynchos	509	750	14,50	41 011	40,92	5 934	42 783	0,2950	11	1	8	2		
Blue-winged Teal	Anas discors	37	8	2,11	1 449	2,97	0,063	0,0452	0,0214	2	2	0	0		
Northern Shoveler	Anas clypeata	33	26	6,00	6 481	2,65	0,159	0,1148	0,0191	2	0	0	0		
Northern Pintail	Anas acuta	131	125	8,86	18 375	10,53	0,933	0,6729	0,0759	8	0	2	0		
Green-winged Teal	Anas crecca	35	100	5,14	16 575	2,81	0,145	0,1043	0,0203	5	0	0	0		
Canvasback	Aythya valisineria	4	4	1,75	1 500	0,32	0,006	0,0041	0,0023	0	0	0	0		
Redhead	Aythya americana	3	3	2,33	0,577	0,24	0,006	0,0041	0,0017	0	0	0	0		
Ring-necked Duck	Aythya collaris	114	100	8,14	12 046	9,16	0,746	0,5378	0,0661	10	0	0	0		
Great Scaup	Aythya marila	93	200	17,22	28 872	7,48	1 287	0,9279	0,0539	7	0	0	0		
Lesser Scaup	Aythya affinis	68	200	11,18	25 768	5,47	0,611	0,4405	0,0394	8	0	0	0		
Common Eider	Somateria mollissima	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Harlequin Duck	Histrionicus histrionicus	3	1	1,00	0,000	0,24	0,002	0,0017	0,0017	1	0	0	0	Of special concern	Vulnerable
Surf Scoter	Melanitta perspicillata	9	86	13,89	27 665	0,72	0,100	0,0724	0,0052	3	0	0	0		
White-winged Scoter	Melanitta fusca	21	300	31,90	66 351	1,69	0,539	0,3883	0,0122	4	0	0	0		
American Scoter	Melanitta americana	12	400	40,50	113 349	0,96	0,391	0,2817	0,0070	1	0	0	0		
Long-tailed Duck	Clangula hyemalis	15	50	12,13	13 912	1,21	0,146	0,1055	0,0087	3	0	0	0		
Bufflehead	Bucephala albeola	55	58	7,76	10 627	4,42	0,343	0,2475	0,0319	8	0	0	0		
Common Goldeneye	Bucephala clangula	137	520	43,45	84 478	11,01	4 785	34 495	0,0794	11	0	0	0		
Barrow’s Goldeneye	Bucephala islandica	6	2	1,33	0,516	0,48	0,006	0,0046	0,0035	2	0	0	0	Of special concern	Vulnerable
Hooded Merganser	Lophodytes cucullatus	65	20	5,26	4 721	5,23	0,275	0,1982	0,0377	10	0	0	0		
Common Merganser	Mergus merganser	242	300	16,11	28 516	19,45	3 133	22 591	0,1403	10	0	0	0		
Red-breasted Merganser	Mergus serrator	90	200	11,83	23 566	7,23	0,856	0,6172	0,0522	9	0	0	0		
Gray Partridge	Perdix perdix	36	26	6,81	7 183	2,89	0,197	0,1420	0,0209	0	0	0	0		
Northern Bobwhite	Colinus virginianus	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	1	0	0	0		
Red-throated Loon	Gavia stellata	23	5	1,74	1 214	1,85	0,032	0,0232	0,0133	3	0	0	0		
Common Loon	Gavia immer	82	26	2,93	3 424	6,59	0,193	0,1391	0,0475	6	0	0	0		
Pied-billed Grebe	Podilymbus podiceps	397	15	2,89	2 500	31,91	0,923	0,6653	0,2301	11	8	15	0		
Horned Grebe	Podiceps auritus	21	50	8,57	12 675	1,69	0,145	0,1043	0,0122	4	0	0	0		Threatened
Red-necked Grebe	Podiceps grisegena	78	50	7,09	8 766	6,27	0,445	0,3205	0,0452	5	0	0	0		
Double-crested Cormorant	Phalacrocorax auritus	334	500	26,85	51 858	26,85	7 208	51 969	0,1936	11	0	0	0		
Great Cormorant	Phalacrocorax carbo	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	1	0	0	0		
American White Pelican	Pelecanus erythrorhynchos	3	2	1,33	0,577	0,24	0,003	0,0023	0,0017	3	0	0	0		
American Bittern	Botaurus lentiginosus	11	2	1,09	0,302	0,88	0,010	0,0070	0,0064	3	0	0	1		
Least Bittern	Ixobrychus exilis	22	2	1,14	0,351	1,77	0,020	0,0145	0,0128	4	0	0	1	Threatened	Vulnerable
Great Blue Heron	Ardea herodias	342	25	2,44	2 504	27,49	0,671	0,4839	0,1982	11	0	0	0		
Great Egret	Ardea alba	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Little Blue Heron	Egretta caerulea	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Green Heron	Butorides virescens	30	14	1,67	2 426	2,41	0,040	0,0290	0,0174	4	0	0	0		
Black-crowned Night-Heron	Nycticorax nycticorax	63	11	2,40	2 240	5,06	0,121	0,0875	0,0365	8	0	0	0		
Turkey Vulture	Cathartes aura	10	7	2,10	1 969	0,80	0,017	0,0122	0,0058	4	0	0	0		
Osprey	Pandion haliaetus	32	3	1,13	0,421	2,57	0,029	0,0209	0,0185	8	0	0	0		
Bald Eagle	Haliaeetus leucocephalus	7	1	1,00	0,000	0,56	0,006	0,0041	0,0041	4	0	0	0		Vulnerable
Northern Harrier	Circus cyaneus	61	3	1,18	0,428	4,90	0,058	0,0417	0,0354	6	0	0	0		
Sharp-shinned Hawk	Accipiter striatus	39	2	1,05	0,223	3,14	0,033	0,0238	0,0226	10	0	0	0		
Cooper’s Hawk	Accipiter cooperii	31	3	1,23	0,497	2,49	0,031	0,0220	0,0180	6	1	3	3		
Northern Goshawk	Accipiter gentilis	3	1	1,00	0,000	0,24	0,002	0,0017	0,0017	0	0	0	0		
Red-shouldered Hawk	Buteo lineatus	26	2	1,27	0,452	2,09	0,027	0,0191	0,0151	6	1	2	0	Of special concern	
Broad-winged Hawk	Buteo platypterus	4	3	1,75	0,957	0,32	0,006	0,0041	0,0023	0	0	0	0		
Red-tailed Hawk	Buteo jamaicensis	44	6	1,32	0,934	3,54	0,047	0,0336	0,0255	4	0	0	0		
Rough-legged Hawk	Buteo lagopus	16	2	1,06	0,250	1,29	0,014	0,0099	0,0093	2	0	0	0		
Golden Eagle	Aquila chrysaetos	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	0	0	0	0		Vulnerable
American Kestrel	Falco sparverius	264	6	1,39	0,758	21,22	0,296	0,2133	0,1530	11	1	1	1		
Merlin	Falco columbarius	25	2	1,20	0,408	2,01	0,024	0,0174	0,0145	10	0	0	0		
Gyrfalcon	Falco rusticolus	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Peregrine Falcon	Falco peregrinus	21	3	1,24	0,539	1,69	0,021	0,0151	0,0122	11	0	0	0	Threatened	Vulnerable
Virginia Rail	Rallus limicola	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	1	0	0	0		
Sora	Porzana carolina	1	2	2,00	0,000	0,08	0,002	0,0012	0,0006	0	0	0	0		
Common Gallinule	Gallinula galeata	49	8	2,16	1 650	3,94	0,085	0,0614	0,0284	0	0	0	0		
American Coot	Fulica americana	12	2	1,25	0,452	0,96	0,012	0,0087	0,0070	1	0	0	0		
Black-bellied Plover	Pluvialis squatarola	1	2	2,00	0,000	0,08	0,002	0,0012	0,0006	0	0	0	0		
Semipalmated Plover	Charadrius semipalmatus	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	0	0	0	0		
Piping Plover	Charadrius melodus	1	4	4,00	0,000	0,08	0,003	0,0023	0,0006	0	0	0	0	Endangered	Threatened
Killdeer	Charadrius vociferus	228	18	3,05	2 795	18,33	0,559	0,4034	0,1321	5	0	0	0		
Spotted Sandpiper	Actitis macularius	122	100	4,58	9 447	9,81	0,449	0,3240	0,0707	6	0	0	0		
Solitary Sandpiper	Tringa solitaria	18	15	1,94	3 280	1,45	0,028	0,0203	0,0104	3	0	0	0		
Great Yellowlegs	Tringa melanoleuca	14	20	3,00	4 992	1,13	0,034	0,0243	0,0081	1	0	0	0		
Lesser Yellowlegs	Tringa flavipes	16	150	11,38	37 006	1,29	0,146	0,1055	0,0093	0	0	0	0		
Ruddy Turnstone	Arenaria interpres	1	22	22,00	0,000	0,08	0,018	0,0128	0,0006	0	0	0	0		
Sanderling	Calidris alba	2	25	13,00	16 971	0,16	0,021	0,0151	0,0012	0	0	0	0		
Semipalmated Sandpiper	Calidris pusilla	6	30	8,00	11 153	0,48	0,039	0,0278	0,0035	0	0	0	0		
Least Sandpiper	Calidris minutilla	8	12	3,63	3 926	0,64	0,023	0,0168	0,0046	0	0	0	0		
Pectoral Sandpiper	Calidris melanotos	2	3	2,00	1 414	0,16	0,003	0,0023	0,0012	0	0	0	0		
Purple Sandpiper	Calidris maritima	1	2	2,00	0,000	0,08	0,002	0,0012	0,0006	0	0	0	0		
Dunlin	Calidris alpina	3	150	55,33	82 008	0,24	0,133	0,0962	0,0017	0	0	0	0		
Stilt Sandpiper	Calidris himantopus	1	3	3,00	0,000	0,08	0,002	0,0017	0,0006	0	0	0	0		
Short-billed Dowitcher	Limnodromus griseus	2	25	13,50	16 263	0,16	0,022	0,0156	0,0012	0	0	0	0		
Wilson’s Snipe	Gallinago delicata	17	3	1,18	0,529	1,37	0,016	0,0116	0,0099	2	0	0	0		
American Woodcock	Scolopax minor	11	1	1,00	0,000	0,88	0,009	0,0064	0,0064	1	0	0	0		
Red-necked Phalarope	Phalaropus lobatus	4	20	7,25	8 770	0,32	0,023	0,0168	0,0023	1	0	0	0		
Sabine’s Gull	Xema sabini	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	0	0	0	0		
Bonaparte’s Gull	Larus philadelphia	7	4	2,00	1 155	0,56	0,011	0,0081	0,0041	0	0	0	0		
Ring-billed Gull	Larus delawarensis	627	5000	86,11	378 915	50,40	43 403	312 921	0,3634	11	0	0	0		
Herring Gull	Larus argentatus	139	2000	25,12	174 625	11,17	2 807	20 238	0,0806	8	0	0	0		
Iceland Gull	Larus glaucoides	5	3	1,40	0,894	0,40	0,006	0,0041	0,0029	2	0	0	0		
Lesser Black-backed Gull	Larus fuscus	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	1	0	0	0		
Glaucous Gull	Larus hyperboreus	4	5	2,25	1 893	0,32	0,007	0,0052	0,0023	0	0	0	0		
Great Black-backed Gull	Larus marinus	309	100	5,43	10 806	24,84	1 350	0,9731	0,1791	11	0	1	0		
Caspian Tern	Sterna caspia	3	1	1,00	0,000	0,24	0,002	0,0017	0,0017	2	0	0	0		Threatened
Black Tern	Chlidonias niger	3	2	1,33	0,577	0,24	0,003	0,0023	0,0017	0	0	0	0		
Common Tern	Sterna hirundo	72	30	7,04	8 004	5,79	0,408	0,2938	0,0417	8	0	0	0		
Arctic Tern	Sterna paradisaea	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Pomarine Jaeger	Stercorarius pomarinus	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	0	0	0	0		
Rock Pigeon	Columba livia	429	100	8,08	10 820	34,49	2 788	20 099	0,2486	11	0	0	0		
Mourning Dove	Zenaida macroura	147	30	2,16	2 782	11,82	0,256	0,1843	0,0852	10	0	0	0		
Budgerigar	Melopsittacus undulatus	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	1	0	0	0		
Black-billed cuckoo	Coccyzus erythropthalmus	2	2	1,50	0,707	0,16	0,002	0,0017	0,0012	0	0	0	0		
Barn Owl	Tyto alba	3	1	1,00	0,000	0,24	0,002	0,0017	0,0017	1	0	0	0	Endangered	LDTV
Eastern Screech-Owl	Magascops asio	77	2	1,04	0,195	6,19	0,064	0,0464	0,0446	9	0	2	2		
Great Horned Owl	Bubo virginianus	84	2	1,15	0,364	6,75	0,078	0,0562	0,0487	1	0	0	0		
Snowy Owl	Bubo scandiacus	3	1	1,00	0,000	0,24	0,002	0,0017	0,0017	2	0	0	0		
Northern Hawk Owl	Surnia ulula	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Barred Owl	Strix varia	42	1	1,00	0,000	3,38	0,034	0,0243	0,0243	1	0	0	0		
Great Gray Owl	Strix nebulosa	77	5	1,70	0,875	6,19	0,105	0,0759	0,0446	0	0	0	0		
Long-eared Owl	Asio otus	47	6	1,91	1 365	3,78	0,072	0,0522	0,0272	2	0	0	0		
Short-eared Owl	Asio flammeus	16	4	1,50	1 033	1,29	0,019	0,0139	0,0093	0	0	0	0	Of special concern	LDTV
Boreal Owl	Aegolius funereus	27	2	1,07	0,267	2,17	0,023	0,0168	0,0156	1	0	0	0		

Study of Bird Populations in Québec (ÉPOQ)
List of Species in the Champlain Bridge area

English name	Latin name	Nb. mentions	Max. nb. of indiv.	Avg. nb. of ind./mention	Std. dev. NMI/mention	Constancy	Abundance index	Nb. indiv. per hour	Nb. mentions per hour	Nb. years occurring since 2000	Breeding			At risk	
											Confirmed	Probable	Possible	Canada	Québec
Northern Saw-whet Owl	Aegolius acadicus	108	3	1,26	0,500	8,68	0,109	0,0788	0,0626	4	0	0	0		
Common Nighthawk	Chordeiles minor	3	10	5,00	4 583	0,24	0,012	0,0087	0,0017	0	0	0	0	Threatened	LDTV
Whip-poor-will	Caprimulgus vociferus	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	0	0	0	0		LDTV
Chimney Swift	Chaetura pelagica	57	100	9,32	22 082	4,58	0,427	0,3077	0,0330	7	0	0	0	Threatened	LDTV
Ruby-throated Hummingbird	Archilochus colubris	13	5	1,54	1 127	1,05	0,016	0,0116	0,0075	3	0	0	0		
Belted Kingfisher	Ceryle alcyon	122	8	1,40	0,924	9,81	0,137	0,0991	0,0707	5	0	0	0		
Red-bellied Woodpecker	Melanerpes carolinus	28	1	1,00	0,000	2,25	0,023	0,0162	0,0162	2	0	0	0		
Yellow-bellied Sapsucker	Sphyrapicus varius	116	20	2,37	2 933	9,32	0,221	0,1594	0,0672	10	0	0	0		
Downy Woodpecker	Picoides pubescens	735	15	2,73	2 017	59,08	1 613	11 632	0,4260	11	0	4	0		
Hairy Woodpecker	Picoides villosus	447	10	1,83	1 122	35,93	0,657	0,4735	0,2591	11	0	2	0		
American Three-toed Woodpecker	Picoides dorsalis	15	4	1,60	0,986	1,21	0,019	0,0139	0,0087	0	0	0	0		
Black-backed Woodpecker	Picoides arcticus	15	1	1,00	0,000	1,21	0,012	0,0087	0,0087	0	0	0	0		
Northern Flicker	Colaptes auratus	483	50	3,25	4 095	38,83	1 260	0,9087	0,2799	11	1	1	1		
Pileated Woodpecker	Dryocopus pileatus	16	2	1,06	0,250	1,29	0,014	0,0099	0,0093	6	0	0	1		
Olive-sided Flycatcher	Contopus cooperi	3	1	1,00	0,000	0,24	0,002	0,0017	0,0017	1	0	0	0	Threatened	LDTV
Eastern Wood-Pewee	Contopus virens	50	20	2,28	2 893	4,02	0,092	0,0661	0,0290	5	0	0	0		
Yellow-bellied Flycatcher	Empidonax flaviventris	13	2	1,23	0,439	1,05	0,013	0,0093	0,0075	4	0	0	0		
Alder Flycatcher	Empidonax alnorum	1	4	4,00	0,000	0,08	0,003	0,0023	0,0006	0	0	0	0		
Willow Flycatcher	Empidonax traillii	4	1	1,00	0,000	0,32	0,003	0,0023	0,0023	3	0	0	0		
Least Flycatcher	Empidonax minimus	53	12	2,21	2 187	4,26	0,094	0,0678	0,0307	6	0	0	0		
Eastern Phoebe	Sayornis phoebe	116	10	1,77	1 500	9,32	0,165	0,1188	0,0672	10	0	1	1		
Great Crested Flycatcher	Myiarchus crinitus	76	8	1,80	1 296	6,11	0,110	0,0794	0,0440	7	0	0	1		
Eastern Kingbird	Tyrannus tyrannus	86	10	2,33	2 128	6,91	0,161	0,1159	0,0498	7	0	1	0		
Northern Shrike	Lanius excubitor	30	2	1,03	0,183	2,41	0,025	0,0180	0,0174	3	0	0	0		
Yellow-throated Vireo	Vireo flavifrons	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	1	0	0	1		
Blue-headed Vireo	Vireo solitarius	42	3	1,21	0,470	3,38	0,041	0,0296	0,0243	9	0	0	1		
Warbling Vireo	Vireo gilvus	118	12	2,99	2 510	9,49	0,284	0,2046	0,0684	10	0	0	2		
Philadelphia Vireo	Vireo philadelphicus	14	2	1,21	0,426	1,13	0,014	0,0099	0,0081	4	0	0	0		
Red-eyed Vireo	Vireo olivaceus	68	10	2,16	2 085	5,47	0,118	0,0852	0,0394	9	0	0	2		
Gray Jay	Perisoreus canadensis	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Blue Jay	Cyanocitta cristata	54	50	3,19	7 338	4,34	0,138	0,0997	0,0313	7	0	0	0		
American Crow	Corvus brachyrhynchos	694	100	7,58	7 929	55,79	4 229	30 491	0,4022	11	1	1	1		
Common Raven	Corvus corax	3	1	1,00	0,000	0,24	0,002	0,0017	0,0017	1	0	0	0		
Horned Lark	Eremophila alpestris	12	30	5,92	8 240	0,96	0,057	0,0411	0,0070	2	0	0	0		
Purple Martin	Progne subis	102	200	11,09	25 421	8,20	0,909	0,6555	0,0591	5	0	1	0		
Tree Swallow	Tachycineta bicolor	345	3000	52,54	245 994	27,73	14 572	105 057	0,1999	11	0	2	0		
Northern Rough-winged Swallow	Stelgidopteryx serripennis	6	7	3,83	2 041	0,48	0,018	0,0133	0,0035	4	0	0	0		
Bank Swallow	Riparia riparia	31	400	42,77	99 658	2,49	1 066	0,7685	0,0180	4	0	0	0		
Cliff Swallow	Petrochelidon pyrrhonota	100	2000	83,48	237 990	8,04	6 711	48 382	0,0580	6	4	2	0		
Barn Swallow	Hirundo rustica	56	150	7,66	21 248	4,50	0,345	0,2486	0,0325	5	0	0	0	Threatened	
Black-capped Chickadee	Poecile atricapillus	811	100	10,83	10 212	65,19	7 062	50 914	0,4700	11	0	2	1		
Boreal Chickadee	Poecile hudsonica	2	7	4,00	4 243	0,16	0,006	0,0046	0,0012	1	0	0	0		
Tufted Titmouse	Baeolophus bicolor	24	2	1,04	0,204	1,93	0,020	0,0145	0,0139	2	0	0	0		
Red-breasted Nuthatch	Sitta canadensis	30	4	1,50	0,820	2,41	0,036	0,0261	0,0174	6	0	0	0		
White-breasted Nuthatch	Sitta carolinensis	499	10	2,02	1 323	40,11	0,809	0,5830	0,2892	11	0	0	1		
Brown Creeper	Certhia americana	497	15	2,75	2 173	39,95	1 100	0,7928	0,2880	11	0	0	3		
Carolina Wren	Thryothorus ludovicianus	81	7	1,36	0,870	6,51	0,088	0,0638	0,0469	7	0	0	9		
House Wren	Troglodytes aedon	55	6	1,45	0,959	4,42	0,064	0,0464	0,0319	4	0	1	0		
Winter Wren	Troglodytes hiemalis	166	15	1,92	1 792	13,34	0,256	0,1849	0,0962	10	0	0	2		
Marsh Wren	Cistothorus palustris	6	1	1,00	0,000	0,48	0,005	0,0035	0,0035	1	0	0	0		
Blue-gray Gnatcatcher	Polioptila caerulea	11	2	1,27	0,467	0,88	0,011	0,0081	0,0064	2	0	0	1		
Golden-crowned Kinglet	Regulus satrapa	177	100	7,88	11 177	14,23	1 121	0,8079	0,1026	10	0	0	0		
Ruby-crowned Kinglet	Regulus calendula	215	100	6,37	10 054	17,28	1 101	0,7940	0,1246	10	0	0	0		
Eastern Bluebird	Sialia sialis	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	1	0	0	0		
Veery	Catharus fuscescens	47	6	1,74	1 259	3,78	0,066	0,0475	0,0272	4	0	0	0		
Gray-cheeked Thrush	Catharus minimus	11	1	1,00	0,000	0,88	0,009	0,0064	0,0064	3	0	0	0		
Swainson’s Thrush	Catharus ustulatus	73	20	2,74	3 408	5,87	0,161	0,1159	0,0423	8	0	0	0		
Hermit Thrush	Catharus guttatus	149	40	3,99	6 354	11,98	0,478	0,3448	0,0864	10	0	0	0		
Wood Thrush	Hylocichla mustelina	33	3	1,30	0,529	2,65	0,035	0,0249	0,0191	4	0	0	0		
American Robin	Turdus migratorius	505	500	11,16	26 456	40,59	4 529	32 652	0,2927	11	2	2	0		
Gray Catbird	Dumetella carolinensis	82	8	1,80	1 383	6,59	0,119	0,0858	0,0475	7	0	0	0		
Northern Mockingbird	Mimus polyglottos	6	2	1,17	0,408	0,48	0,006	0,0041	0,0035	1	0	0	0		
Brown Thrasher	Toxostoma rufum	17	2	1,12	0,332	1,37	0,015	0,0110	0,0099	3	0	0	1		
European Starling	Sturnus vulgaris	613	2000	26,19	96 215	49,28	12 908	93 060	0,3553	11	0	0	1		
American Pipit	Anthus rubescens	7	30	13,43	10 081	0,56	0,076	0,0545	0,0041	1	0	0	0		
Common Waxbill	Estrilda astrild	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	1	0	0	0		
Bohemian Waxwing	Bombycilla garrulus	2	7	5,50	2 121	0,16	0,009	0,0064	0,0012	1	0	0	0		
Cedar Waxwing	Bombycilla cedrorum	69	400	14,20	48 466	5,55	0,788	0,5680	0,0400	8	0	1	0		
Lapland Longspur	Calcarius lapponicus	1	4	4,00	0,000	0,08	0,003	0,0023	0,0006	1	0	0	0		
Snow Bunting	Plectrophenax nivalis	13	75	22,92	26 361	1,05	0,240	0,1727	0,0075	3	0	0	0		
Ovenbird	Seiurus aurocapilla	47	6	1,43	1 037	3,78	0,054	0,0388	0,0272	5	0	0	0		
Worm-eating Warbler	Helmitheros vermivorum	3	1	1,00	0,000	0,24	0,002	0,0017	0,0017	0	0	0	0		
Louisiana Waterthrush	Parkesia motacilla	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0	Of special concern	
Northern Waterthrush	Parkesia noveboracensis	59	5	1,51	0,898	4,74	0,072	0,0516	0,0342	6	0	0	0		
Golden-winged Warbler	Vermivora chrysoptera	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	1	0	0	0	Threatened	LDTV
Blue-winged Warbler	Vermivora cyanoptera	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Lawrence’s Warbler	Vermivora lawrencii	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	0	0	0	0		
Black-and-white Warbler	Mniotilta varia	79	15	2,49	2 664	6,35	0,158	0,1142	0,0458	7	0	0	0		
Prothonotary Warbler	Protonotaria citrea	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Tennessee Warbler	Oreothlypis peregrina	41	8	1,95	1 687	3,30	0,064	0,0464	0,0238	5	0	0	0		
Orange-crowned Warbler	Oreothlypis celata	10	2	1,10	0,316	0,80	0,009	0,0064	0,0058	3	0	0	0		
Nashville Warbler	Oreothlypis ruficapilla	109	12	2,44	2 462	8,76	0,214	0,1542	0,0632	11	0	0	0		
Mourning Warbler	Geothlypis philadelphia	9	4	1,44	1 014	0,72	0,010	0,0075	0,0052	2	0	0	0		
Common Yellowthroat	Geothlypis trichas	80	10	1,69	1 446	6,43	0,109	0,0782	0,0464	9	0	0	0		
Hooded Warbler	Setophaga citrina	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	0	0	0	0		
American Redstart	Setophaga ruticilla	102	20	3,05	2 919	8,20	0,250	0,1802	0,0591	9	0	1	1		
Cape May Warbler	Setophaga tigrina	18	4	1,72	1 074	1,45	0,025	0,0180	0,0104	3	0	0	1		
Cerulean Warbler	Setophaga cerulea	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	0	0	0	0	Of special concern	Threatened
Northern Parula	Setophaga americana	56	12	2,16	2 246	4,50	0,097	0,0701	0,0325	9	0	0	0		
Magnolia Warbler	Setophaga magnolia	80	15	3,04	3 116	6,43	0,195	0,1408	0,0464	11	0	0	0		
Bay-breasted Warbler	Setophaga castanea	54	20	2,61	3 218	4,34	0,113	0,0817	0,0313	7	0	0	0		
Blackburnian Warbler	Setophaga fusca	54	8	2,15	1 630	4,34	0,093	0,0672	0,0313	6	0	0	0		
Yellow Warbler	Setophaga petechia	158	50	6,70	9 304	12,70	0,851	0,6138	0,0916	9	0	2	1		
Chestnut-sided Warbler	Setophaga pensylvanica	52	10	1,79	1 460	4,18	0,075	0,0539	0,0301	7	0	0	0		
Blackpoll Warbler	Setophaga striata	39	6	1,85	1 424	3,14	0,058	0,0417	0,0226	7	0	0	1		
Black-throated Blue Warbler	Setophaga caerulescens	88	20	2,86	3 922	7,07	0,203	0,1460	0,0510	11	0	0	0		
Palm Warbler	Setophaga palmarum	46	5	1,57	0,935	3,70	0,058	0,0417	0,0267	8	0	0	0		
Pine Warbler	Setophaga pinus	9	2	1,11	0,333	0,72	0,008	0,0058	0,0052	4	0	0	0		
Yellow-rumped Warbler	Setophaga coronata	257	200	11,57	22 693	20,66	2 390	17 230	0,1489	11	0	0	0		
Yellow-throated Warbler	Setophaga dominica	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Prairie Warbler	Setophaga discolor	3	1	1,00	0,000	0,24	0,002	0,0017	0,0017	1	0	0	0		
Black-throated Green Warbler	Setophaga virens	88	20	2,41	2 646	7,07	0,170	0,1229	0,0510	10	0	0	0		
Canada Warbler	Cardellina canadensis	35	8	1,77	1 437	2,81	0,050	0,0359	0,0203	4	0	0	0	Threatened	
Wilson's Warbler	Cardellina pusilla	30	12	1,73	2 050	2,41	0,042	0,0301	0,0174	5	0	0	0		
Eastern Towhee	Pipilo erythrophthalmus	13	2	1,31	0,480	1,05	0,014	0,0099	0,0075	3	0	0	0		
American Tree Sparrow	Spizella arborea	397	48	5,56	5 537	31,91	1 773	12 785	0,2301	10	0	0	0		
Chipping Sparrow	Spizella passerina	19	10	2,05	2 013	1,53	0,031	0,0226	0,0110	4	0	0	0		
Field Sparrow	Spizella pusilla	4	1	1,00	0,000	0,32	0,003	0,0023	0,0023	2	0	0	0		
Savannah Sparrow	Passerculus sandwichensis	28	15	3,21	3 891	2,25	0,072	0,0522	0,0162	1	0	0	0		
Fox Sparrow	Passerella iliaca	101	20	3,07	3 401	8,12	0,249	0,1797	0,0585	8	0	0	1		
Song Sparrow	Melospiza melodia	525	200	9,24	16 173	42,20	3 899	28 109	0,3043	11	0	0	1		
Lincoln's Sparrow	Melospiza lincolnii	19	2	1,26	0,452	1,53	0,019	0,0139	0,0110	6	0	0	0		
Swamp Sparrow	Melospiza georgiana	54	5	1,54	1 023	4,34	0,067	0,0481	0,0313	5	0	0	0		
White-throated Sparrow	Zonotrichia albicollis	259	300	13,67	27 736	20,82	2 846	20 516	0,1501	11	0	0	1		

Study of Bird Populations in Québec (ÉPOQ)
List of Species in the Champlain Bridge area

English name	Latin name	Nb. mentions	Max. nb. of indiv.	Avg. nb. of ind./mention	Std. dev. NMI/mention	Constancy	Abundance index	Nb. indiv. per hour	Nb. mentions per hour	Nb. years occurring since 2000	Breeding			At risk	
											Confirmed	Probable	Possible	Canada	Québec
White-crowned Sparrow	Zonotrichia leucophrys	64	150	5,92	19 067	5,14	0,305	0,2197	0,0371	8	0	0	0		
Dark-eyed Junco	Junco hyemalis	283	1200	14,82	73 660	22,75	3 371	24 307	0,1640	11	0	0	0		
Summer Tanager	Piranga rubra	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Scarlet Tanager	Piranga olivacea	17	4	1,29	0,772	1,37	0,018	0,0128	0,0099	6	0	0	0		
Northern Cardinal	Cardinalis cardinalis	440	8	1,86	1 125	35,37	0,658	0,4741	0,2550	11	2	2	3		
Rose-breasted Grosbeak	Pheucticus ludovicianus	64	20	2,45	3 002	5,14	0,126	0,0910	0,0371	8	0	1	0		
Blue Grosbeak	Passerina caerulea	2	1	1,00	0,000	0,16	0,002	0,0012	0,0012	0	0	0	0		
Indigo Bunting	Passerina cyanea	7	1	1,00	0,000	0,56	0,006	0,0041	0,0041	2	0	0	0		
Bobolink	Dolichonyx oryzivorus	4	10	4,00	4 082	0,32	0,013	0,0093	0,0023	2	0	0	0		
Red-winged Blackbird	Agelaius phoeniceus	530	1000	44,89	92 870	42,60	19 125	137 889	0,3072	11	0	0	2		
Eastern Meadowlark	Sturnella magna	5	1	1,00	0,000	0,40	0,004	0,0029	0,0029	0	0	0	0	Threatened	
Rusty Blackbird	Euphagus carolinus	67	6	2,40	1 371	5,39	0,129	0,0933	0,0388	5	0	0	1	Of special concern	LDTV
Common Grackle	Quiscalus quiscula	411	200	13,61	20 156	33,04	4 495	32 409	0,2382	11	0	1	0		
Brown-headed Cowbird	Molothrus ater	199	60	5,50	6 933	16,00	0,879	0,6340	0,1153	7	0	0	1		
Orchard Oriole	Icterus spurius	1	1	1,00	0,000	0,08	0,001	0,0006	0,0006	0	0	0	0		
Baltimore Oriole	Icterus galbula	125	13	3,08	2 620	10,05	0,309	0,2231	0,0724	9	0	4	1		
Pine Grosbeak	Pinicola enucleator	6	2	1,17	0,408	0,48	0,006	0,0041	0,0035	1	0	0	0		
Purple Finch	Carpodacus purpureus	27	10	1,48	1 805	2,17	0,032	0,0232	0,0156	4	0	0	1		
House Finch	Carpodacus mexicanus	124	49	3,65	5 354	9,97	0,364	0,2625	0,0719	10	0	0	0		
White-winged Crossbill	Loxia leucoptera	3	2	1,33	0,577	0,24	0,003	0,0023	0,0017	1	0	0	0		
Common Redpoll	Acanthis flammea	56	50	8,05	9 304	4,50	0,363	0,2614	0,0325	4	0	0	0		
Hoary Redpoll	Acanthis hornemanni	3	1	1,00	0,000	0,24	0,002	0,0017	0,0017	0	0	0	0		
Pine Siskin	Spinus pinus	18	50	6,89	11 712	1,45	0,100	0,0719	0,0104	2	0	0	0		
American Goldfinch	Spinus tristis	550	100	6,77	9 121	44,21	2 993	21 577	0,3188	11	1	1	0		
Evening Grosbeak	Coccothraustes vespertinus	19	30	6,58	7 869	1,53	0,100	0,0724	0,0110	2	0	0	0		
House Sparrow	Passer domesticus	505	150	10,90	15 065	40,59	4 427	31 916	0,2927	11	0	1	0		

LDTV: Likely to be designated as threatened or vulnerable

Number of sheets considered: 1,244
Number of mentions considered: 22,268
Number of observation hours: 1,725.45
Number of species in this list: 254
Ferry Index: 0.02

Number of species with confirmed breeding: 12
Number of species with probable breeding: 20
Number of species with possible breeding: 24

Number of species at risk (Canada): 18
Number of species at risk (Québec): 18

The average number of individuals per mention is the average number of individuals observed at each mention of a species.
Average number of individuals per mention = Total number of individuals from a given species / Number of mentions of the species

Constancy is the rate of observation of a species expressed as a percentage.
Constancy = Number of mentions * 100 / Number of sheets

The abundance index is used to compare species based on their abundance.
Abundance index = Total number of individuals in a species / Number of sheets

The Ferry index is a measurement of the likelihood of discovering a new species during the next inventory in the area. Therefore, based on this index, there are 2 chances out of 100 that a species will be added to the list at the next field trip.
Ferry Index = number of species observed only once / Number of sheets

The species are presented based on the taxonomic order of the 52rd supplement to the American Ornithologists' Union (AOU) Checklist of North American Birds.

Summary of the selection criteria used for the sheets and mentions

Organization
Study of Bird Populations in Québec (ÉPOQ)

Consideration of observation date
Sheets with an observation date between 1981 01/01 and le 2010 12/31 are considered.

"sp" type species are excluded.
Hypothetical mentions are excluded.

Consideration of observation areas
Only the sheets from the following locations are considered:
--> Pont Champlain
--> Île des Soeurs (Montréal)
--> Île des Soeurs (Montréal), Lac des Battures

List produced on 07/20/2012 by Marie-France Julien.

Appendix 14 Inventory Data for Aquatic Birds Supplied by the MRNF and SCF

DESSAU | CIMA+

Data from bird inventories carried out on the ROM territory (Couvée Islands) supplied by the Canadian Wildlife Service

Colony_Name	Species_Name_En	Year	Date	CentroideX	CentroideY	Observations
Couvée Island	Ring-billed gull	1972		-73,5045	45,4757	
Couvée Island	Ring-billed gull	1974		-73,5045	45,4757	
Couvée Island	Common tern	1974		-73,5045	45,4757	
Couvée Island	Herring gull	1978	19/05	-73,5045	45,4757	No estimate
Couvée Island	Ring-billed gull	1978	19/05	-73,5045	45,4757	ET.REPROD.(.77J/NID)
Couvée Island	Common tern	1978	31/05	-73,5045	45,4757	No estimate
Couvée Island	Great black-backed gull	1979	/06	-73,5045	45,4757	No estimate - NID.PROB.
Couvée Island	Ring-billed gull	1979	08/05	-73,5045	45,4757	|3949 NESTS (95%)
Couvée Island	Ring-billed gull	1980	/05	-73,5045	45,4757	
Couvée Island	Ring-billed gull	1981	/05	-73,5045	45,4757	
Couvée Island	Ring-billed gull	1982	/05	-73,5045	45,4757	
Couvée Island	Ring-billed gull	1989	08/06	-73,5045	45,4757	CF.534:YOUNG BIRDS
Couvée Island	Ring-billed gull	1990	/05	-73,5045	45,4757	
Couvée Island	Common tern	1990	/05	-73,5045	45,4757	
Couvée Island	Great black-backed gull	1994	17/05	-73,5045	45,4757	
Couvée Island	Herring gull	1994	17/05	-73,5045	45,4757	CN(8)
Couvée Island	Ring-billed gull	1994	17/05	-73,5045	45,4757	CN(105)
Couvée Island	Ring-billed gull	1997	13/05	-73,5045	45,4757	CN(326);PRESENCE OF A FAMILY OF FOXES
Islet north of Champlain Bridge	Great black-backed gull	1998	25/07	-73,5313	45,4708	2 ADULTS AND 2 YOUNG
Islet north of Champlain Bridge	Common tern	1998	01/07	-73,5313	45,4708	20 TO 30 PAIRS NESTED EARLIER IN THE SEASON
Islet north of Champlain Bridge	Common tern	1999	09/06	-73,5313	45,4708	
Couvée Island	Ring-billed gull	2000	11/05	-73,5045	45,4757	PRESENCE OF A FAMILY OF FOXES
Islet north of Champlain Bridge	Great black-backed gull	2001		-73,5313	45,4708	
Couvée Island	Ring-billed gull	2003	13/05	-73,5045	45,4757	INC. TOWER:215C AND ISLET W 3484C; CN (181)
Couvée Island	Ring-billed gull	2004	/05	-73,5045	45,4757	COL. AB.
Islet north of Champlain Bridge	Common tern	2005		-73,5313	45,4708	
Couvée Island	Ring-billed gull	2006	11/05	-73,5045	45,4757	CN(171): I. West=5528c; Tower=23c
Couvée Island	Great black-backed gull	2006	11/05	-73,5045	45,4757	To the tower
Couvée Island	Herring gull	2006	11/05	-73,5045	45,4757	
Couvée Island	Common tern	2006	11/05	-73,5045	45,4757	
Islet north of Champlain Bridge	Common tern	2006		-73,5313	45,4708	
Islet north of Champlain Bridge	Common tern	2007		-73,5313	45,4708	
Islet north of Champlain Bridge	Great black-backed gull	2007		-73,5313	45,4708	4 nest attempts
Couvée Island	Ring-billed gull	2009	15/05	-73,5045	45,4757	Some predated nests on the West Islet
Couvée Island	Herring gull	2009	15/05	-73,5045	45,4757	To the tower
Couvée Island	Great black-backed gull	2009	15/05	-73,5045	45,4757	To the tower
Couvée Island	Common tern	2009	15/05	-73,5045	45,4757	
Couvée Island	Ring-billed gull	2010	18/03	-73,5045	45,4757	Presence of a fox; 60 ind. roosting

Informations sur un habitat

No de l'HABITAT 02-06-0167

TYPE AIRE CONC.D'OISEAUX AQUATIQUES

REGION Montréal

TOPONYME BASSIN DE LA PRAIRIE (ILE DES SOEURS)

Description de l'inventaire fait en 1981

Sections (Parcelles d'inventaire)
071506

Carte 31H05/200/0202

Mercator UTM 186140005034000 ***Mercator MLCP*** XF140340

Municipalité	**MRC**	**Région administrative**
MONTREAL	MONTREAL	Montréal

Bassin versant

BASSIN	**NOM**
0000	

COURS D'EAU

NO COURS D'EAU	**INDICATIF**
0000	C

Superficie 0 *km* ***2*** ***Longueur*** 3,2 *km* ***Largeur*** 0 *km*

Tenure ***PUBLIQUE*** 0 *km* ***2*** ***PRIVÉE*** 0 *km* ***2***

État ***NATUREL*** 0 ***ALTERE*** 0 ***AMENAGE*** 0

Utilisation du sol environnant REMPLISSAGE, JETES
ROUTE
VILLE, VILLAGE, VILLEGIATURE, ETC...

Type de milieux

MILIEU	**SUPERFICIE**	**POURCENTAGE**
FLUVIAL 30 M LARGE	0	0

Visites

Date	**Technique d'inventaire**	**Activité observée**
1981/04/22	INVENTAIRE AERIEN	MIGRATION

Recensement

DATE	***ESPECE***	***ABONDANCE***	***UNITE***
1981/04/22	Garrot à oeil d'or	200	INDIVIDU(S)

Description de l'inventaire fait en 1983

Sections (Parcelles d'inventaire)
071506

Carte 31H05/200/0202

Mercator UTM 186140005034000 ***Mercator MLCP*** XF140340

Municipalité	**MRC**	**Région administrative**
MONTREAL	MONTREAL	Montréal

Bassin versant

BASSIN	**NOM**
0000	

COURS D'EAU

NO COURS D'EAU	**INDICATIF**
0000	C

Superficie 0 *km* ***2*** ***Longueur*** 3,2 *km* ***Largeur*** 0 *km*

Tenure ***PUBLIQUE*** 0 *km* ***2*** ***PRIVÉE*** 0 *km* ***2***

État ***NATUREL*** 0 ***ALTERE*** 0 ***AMENAGE*** 0

Utilisation du sol environnant REMPLISSAGE, JETES
ROUTE

VILLE, VILLAGE, VILLEGIATURE, ETC...

Type de milieux

MILIEU	SUPERFICIE	POURCENTAGE
FLUVIAL 30 M LARGE	0	0

Visites

Date	Technique d'inventaire	Activité observée
1983/10/06	INVENTAIRE AERIEN	MIGRATION
1983/10/24	INVENTAIRE AERIEN	MIGRATION
1983/10/27	INVENTAIRE AERIEN	MIGRATION

Recensement

DATE	ESPECE	ABONDANCE	UNITE
1983/10/27	Morillon sp.	200	INDIVIDU(S)
1983/10/27	Garrot à oeil d'or	50	INDIVIDU(S)
1983/10/24	Canard barbotteur spp.	9	INDIVIDU(S)
1983/10/06	Canard barbotteur spp.	30	INDIVIDU(S)

Description de l'inventaire fait en 1988

Sections (Parcelles d'inventaire)
071506

Carte 31H05/200/0202

Mercator UTM 186140005034000 ***Mercator MLCP*** XF140340

Municipalité	MRC	Région administrative
MONTREAL	MONTREAL	Montréal

Bassin versant

BASSIN	NOM
0000	

COURS D'EAU

NO COURS D'EAU	INDICATIF
0000	C

Superficie 3,3 *km* ***2*** ***Longueur*** 3,8 *km* ***Largeur*** 0,9 *km*

Tenure TERRE PU ***PUBLIQUE*** 0 *km* ***2*** ***PRIVÉE*** 0 *km* ***2***

État ***NATUREL*** 0 ***ALTERE*** 0 ***AMENAGE*** 0

Utilisation du sol environnant REMPLISSAGE, JETES
ROUTE
VILLE, VILLAGE, VILLEGIATURE, ETC...

Type de milieux

MILIEU	SUPERFICIE	POURCENTAGE
FLUVIAL 30 M LARGE	0	0

Visites

Date	Technique d'inventaire	Activité observée
1988/09/13	INVENTAIRE AERIEN	MIGRATION
1988/09/27	INVENTAIRE AERIEN	MIGRATION
1988/10/13	INVENTAIRE AERIEN	MIGRATION

Recensement

DATE	ESPECE	ABONDANCE	UNITE
1988/10/13	Canard colvert	56	INDIVIDU(S)
1988/10/13	Canard noir	60	INDIVIDU(S)
1988/10/13	Canard chipeau	16	INDIVIDU(S)
1988/10/13	Canard siffleur d'Amérique	15	INDIVIDU(S)
1988/10/13	Canard pilet	17	INDIVIDU(S)
1988/10/13	Canard barbotteur spp.	12	INDIVIDU(S)
1988/10/13	Morillon sp.	40	INDIVIDU(S)
1988/10/13	Petit Morillon	60	INDIVIDU(S)

1988/10/13	Garrot à oeil d'or	1	INDIVIDU(S)
1988/10/13	Goéland à bec cerclé	10	INDIVIDU(S)
1988/10/13	Cormoran à aigrettes	5	INDIVIDU(S)
1988/09/27	Canard colvert	2	INDIVIDU(S)
1988/09/27	Goéland à bec cerclé	50	INDIVIDU(S)
1988/09/27	Cormoran à aigrettes	2	INDIVIDU(S)
1988/09/13	Canard pilet	92	INDIVIDU(S)
1988/09/13	Sarcelle à ailes bleues	17	INDIVIDU(S)
1988/09/13	Sarcelle à ailes vertes	2	INDIVIDU(S)
1988/09/13	Canard siffleur d'Amérique	314	INDIVIDU(S)
1988/09/13	Canard colvert	12	INDIVIDU(S)
1988/09/13	Grand Héron	1	INDIVIDU(S)

Description de l'inventaire fait en 1990

Sections (Parcelles d'inventaire)
071506

Carte 31H05/200/0202

Mercator UTM 186140005034000 ***Mercator MLCP*** XF140340

Municipalité	**MRC**	**Région administrative**
MONTREAL	MONTREAL	Montréal

Bassin versant **BASSIN** **NOM**
0000

COURS D'EAU **NO COURS D'EAU** **INDICATIF**
0000 C

Superficie 0 *km* ***2*** ***Longueur*** 3,2 *km* ***Largeur*** 0 *km*

Tenure ***PUBLIQUE*** 0 *km* ***2*** ***PRIVÉE*** 0 *km* ***2***

État ***NATUREL*** 0 ***ALTERE*** 0 ***AMENAGE*** 0

Utilisation du sol environnant
REMPLISSAGE, JETES
ROUTE
VILLE, VILLAGE, VILLEGIATURE, ETC...

Type de milieux

MILIEU	**SUPERFICIE**	**POURCENTAGE**
FLUVIAL 30 M LARGE	0	0

Visites

Date	**Technique d'inventaire**	**Activité observée**
1990/04/09	INVENTAIRE AERIEN	MIGRATION
1990/04/24	INVENTAIRE AERIEN	MIGRATION

Recensement

DATE	***ESPECE***	***ABONDANCE***	***UNITE***
1990/04/24	Canard colvert	2	INDIVIDU(S)
1990/04/24	Canard siffleur d'Amérique	4	INDIVIDU(S)
1990/04/24	Grand Morillon	3	INDIVIDU(S)
1990/04/24	Morillon sp.	10	INDIVIDU(S)
1990/04/24	Grand Bec-scie	5	INDIVIDU(S)
1990/04/09	Canard colvert	17	INDIVIDU(S)
1990/04/09	Canard noir	2	INDIVIDU(S)
1990/04/09	Canard siffleur d'Amérique	10	INDIVIDU(S)
1990/04/09	Morillon sp.	31	INDIVIDU(S)

1990/04/09	Garrot à oeil d'or	12	INDIVIDU(S)
1990/04/09	Grand Bec-scie	5	INDIVIDU(S)
1990/04/09	Bec-scie à poitrine rousse	2	INDIVIDU(S)

Description de l'inventaire fait en 1996

Sections (Parcelles d'inventaire)
071506

Carte 31H05/200/0202

Mercator UTM 186140005034000 ***Mercator MLCP*** XF140340

Municipalité	MRC	Région administrative
MONTREAL	MONTREAL	Montréal

Bassin versant **BASSIN** **NOM**
0000

COURS D'EAU **NO COURS D'EAU** **INDICATIF**
0000 C

Superficie 0 *km* **2** ***Longueur*** 3,2 *km* ***Largeur*** 0 *km*

Tenure ***PUBLIQUE*** 0 *km* **2** ***PRIVÉE*** 0 *km* **2**

État ***NATUREL*** 0 ***ALTERE*** 0 ***AMENAGE*** 0

Utilisation du sol environnant REMPLISSAGE, JETES
ROUTE
VILLE, VILLAGE, VILLEGIATURE, ETC...

Type de milieux

MILIEU	SUPERFICIE	POURCENTAGE
FLUVIAL 30 M LARGE	0	0

Visites

Date	Technique d'inventaire	Activité observée
1996/04/10	INVENTAIRE AERIEN	MIGRATION
1996/09/17	INVENTAIRE AERIEN	MIGRATION
1996/10/07	INVENTAIRE AERIEN	MIGRATION

Recensement

DATE	ESPECE	ABONDANCE	UNITE
1996/10/07	Goéland à bec cerclé	8	INDIVIDU(S)
1996/10/07	Cormoran sp.	18	INDIVIDU(S)
1996/10/07	Canard spp.	7	INDIVIDU(S)
1996/09/17	Goéland à bec cerclé	1	INDIVIDU(S)
1996/04/10	Goéland à bec cerclé	4	INDIVIDU(S)
1996/04/10	Grand Bec-scie	9	INDIVIDU(S)

Description de l'inventaire fait en 1997

Sections (Parcelles d'inventaire)
071506

Carte 31H05/200/0202

Mercator UTM 186140005034000 ***Mercator MLCP*** XF140340

Municipalité	MRC	Région administrative
MONTREAL	MONTREAL	Montréal

Bassin versant **BASSIN** **NOM**
0000

COURS D'EAU **NO COURS D'EAU** **INDICATIF**
0000 C

Superficie 0 *km* **2** ***Longueur*** 3,2 *km* ***Largeur*** 0 *km*

Tenure ***PUBLIQUE*** 0 *km* ***2*** ***PRIVÉE*** 0 *km* ***2***

État ***NATUREL*** 0 ***ALTERE*** 0 ***AMENAGE*** 0

Utilisation du sol environnant
REMPLISSAGE, JETES
ROUTE
VILLE, VILLAGE, VILLEGIATURE, ETC...

Type de milieux

MILIEU	**SUPERFICIE**	**POURCENTAGE**
FLUVIAL 30 M LARGE	0	0

Visites

Date	**Technique d'inventaire**	**Activité observée**
1997/04/21	INVENTAIRE AERIEN	MIGRATION
1997/04/30	INVENTAIRE AERIEN	MIGRATION

Recensement

DATE	**ESPECE**	**ABONDANCE**	**UNITE**
1997/04/30	Goéland à bec cerclé	4	INDIVIDU(S)
1997/04/30	Grand Héron	1	INDIVIDU(S)
1997/04/21	Goéland à bec cerclé	34	INDIVIDU(S)
1997/04/21	Grand Bec-scie	34	INDIVIDU(S)
1997/04/21	Canard spp.	4	INDIVIDU(S)

Results of aerial inventories carried out by the Canadian Wildlife Service

English Name	Scientific Name	Date	utm east	utm north	Number of specimens
Ring-necked Duck	Aythya collaris	2004-04-25	617600	5030900	2
Mallard	Anas platyrhynchos	2004-04-25	616900	5036900	1
Ring-necked duck	Aythya collaris	2004-04-25	617100	5030200	8
Double-crested cormorant	Phalacrocorax auritus	2004-04-25	617400	5033400	1
Mallard	Anas platyrhynchos	2004-04-25	616200	5037200	2
Ring-necked Duck	Aythya collaris	2004-04-25	617300	5030500	2
Mallard	Anas platyrhynchos	2004-04-25	617000	5035500	2
Mallard	Anas platyrhynchos	2004-04-25	617000	5035500	2
Mallard	Anas platyrhynchos	2004-04-25	617400	5035600	1
Mallard	Anas platyrhynchos	2004-04-25	617400	5035200	2
Mallard	Anas platyrhynchos	2004-04-25	617000	5035100	2
Ring-necked Duck	Aythya collaris	2004-04-25	617500	5032500	8
Bufflehead	Bucephala albeola	2004-04-25	617000	5030900	1
Mallard	Anas platyrhynchos	2004-04-25	617400	5035400	1
Ring-necked Duck	Aythya collaris	2004-04-25	617500	5032800	7
Ring-necked Duck	Aythya collaris	2004-04-25	617500	5032800	7
Ring-necked Duck	Aythya collaris	2004-04-25	617500	5033300	2
Ring-necked Duck	Aythya collaris	2004-04-25	617500	5033300	5
Ring-necked Duck	Aythya collaris	2004-04-25	617200	5034300	2
Ring-necked Duck	Aythya collaris	2004-04-25	617400	5035400	3
Common merganser	Mergus merganser	2004-04-25	617500	5033300	1
Common merganser	Mergus merganser	2004-04-25	617500	5033300	2
Common merganser	Mergus merganser	2004-04-25	617400	5033400	2
Common merganser	Mergus merganser	2004-04-25	617300	5034600	3
Black scoter	Melanitta nigra	2004-04-25	617100	5032700	2
Mallard	Anas platyrhynchos	2004-04-25	617000	5030900	2
Mallard	Anas platyrhynchos	2004-04-25	617400	5034800	2
Gull	Larus sp.	2004-04-25	616900	5036200	25000
American wigeon	Anas americana	2004-04-25	617000	5033200	2
Mallard	Anas platyrhynchos	2004-04-25	617200	5032000	2
Mallard	Anas platyrhynchos	2004-04-25	617000	5034600	1
American wigeon	Anas americana	2004-04-25	617000	5030900	2
American wigeon	Anas americana	2004-04-25	617100	5031600	2
American wigeon	Anas americana	2004-04-25	617200	5032000	2
American wigeon	Anas americana	2004-04-25	617200	5032000	2
American wigeon	Anas americana	2004-04-25	617000	5033200	2
American wigeon	Anas americana	2004-04-25	617200	5034300	2
American wigeon	Anas americana	2004-04-25	617000	5035500	2
American wigeon	Anas americana	2004-04-25	617000	5035500	4
American wigeon	Anas americana	2004-04-25	617000	5035500	2
American wigeon	Anas americana	2004-04-25	617000	5035500	4
Gadwall	Anas strepera	2004-04-25	617100	5034100	2
Mallard	Anas platyrhynchos	2004-04-25	617600	5032400	2
Mallard	Anas platyrhynchos	2004-04-25	617000	5034600	2
American wigeon	Anas americana	2004-04-25	617100	5032700	2
Gadwall	Anas strepera	2004-04-25	617000	5034600	2
Mallard	Anas platyrhynchos	2004-04-25	617500	5034200	2
Mallard	Anas platyrhynchos	2004-04-25	617000	5033200	1
Mallard	Anas platyrhynchos	2004-04-25	617000	5034600	1
Mallard	Anas platyrhynchos	2004-04-25	617700	5032400	1
Mallard	Anas platyrhynchos	2004-04-25	617200	5032000	2
American wigeon	Anas americana	2004-04-25	617000	5030900	1
Mallard	Anas platyrhynchos	2004-04-25	617100	5031600	2
Gadwall	Anas strepera	2004-04-25	617000	5035100	3

English Name	Scientific Name	Date	utm east	utm north	Number of specimens
Mallard	Anas platyrhynchos	2004-04-25	617000	5033200	2
Ring-billed gull	Larus delawarensis	2007-04-22	616800	5036800	1
Mallard	Anas platyrhynchos	2007-04-22	616800	5036500	4
Mallard	Anas platyrhynchos	2007-04-22	616300	5037000	2
Canada goose	Branta canadensis	2007-04-22	617400	5035000	2
Mallard	Anas platyrhynchos	2007-04-22	617400	5034900	2
Ring-necked Duck	Aythya collaris	2007-04-22	617500	5034200	2
Gadwall	Anas strepera	2007-04-22	617600	5034000	2
Mallard	Anas platyrhynchos	2007-04-22	617700	5032000	2
Mallard	Anas platyrhynchos	2007-04-22	617900	5031700	2
American black duck	Anas rubripes	2007-04-22	617600	5031200	10
Mallard	Anas platyrhynchos	2007-04-22	617400	5032600	2
Double-crested cormorant	Phalacrocorax auritus	2007-04-22	617200	5036200	1
Mallard	Anas platyrhynchos	2007-04-22	617600	5033800	2
Greater scaup or lesser scaup	Aythya marila or Aythya affinis	2007-04-22	617600	5031200	25
American wigeon	Anas americana	2007-04-22	617100	5032200	4
Gadwall	Anas strepera	2007-04-22	617200	5035300	2
Common merganser	Mergus merganser	2007-04-22	617500	5032300	1
Mallard	Anas platyrhynchos	2007-04-22	617000	5031700	2
American wigeon	Anas americana	2007-04-22	617100	5032500	2
Mallard	Anas platyrhynchos	2007-04-22	617000	5032600	2
Common loon	Gavia immer	2007-04-22	617000	5032800	1
American wigeon	Anas americana	2007-04-22	617000	5033200	2
American wigeon	Anas americana	2007-04-22	617000	5033200	2
Ring-necked Duck	Aythya collaris	2007-04-22	617000	5033800	2
American wigeon	Anas americana	2007-04-22	617000	5034100	2
Mallard	Anas platyrhynchos	2007-04-22	617200	5034600	1
Gadwall	Anas strepera	2007-04-22	617100	5032900	2
Gadwall	Anas strepera	2007-04-22	617000	5031700	2
Mallard	Anas platyrhynchos	2007-04-22	617100	5034700	2
Mallard	Anas platyrhynchos	2008-04-25	617200	5031700	2
Mallard	Anas platyrhynchos	2008-04-25	617200	5032300	2
Mallard	Anas platyrhynchos	2008-04-25	617300	5032000	4
Mallard	Anas platyrhynchos	2008-04-25	617200	5030300	2
Mallard	Anas platyrhynchos	2008-04-25	617300	5030500	2
Mallard	Anas platyrhynchos	2008-04-25	617300	5030800	2
Mallard	Anas platyrhynchos	2008-04-25	617100	5031200	1
Gadwall	Anas strepera	2008-04-25	617400	5032000	2
Mallard	Anas platyrhynchos	2008-04-25	617200	5032000	2
Gadwall	Anas strepera	2008-04-25	617100	5032400	2
American wigeon	Anas americana	2008-04-25	616800	5036400	2
Mallard	Anas platyrhynchos	2008-04-25	617200	5032300	2
American wigeon	Anas americana	2008-04-25	617200	5031400	1
American wigeon	Anas americana	2008-04-25	617200	5031700	2
American wigeon	Anas americana	2008-04-25	617200	5031900	2
Northern flicker	Colaptes auratus	2008-04-25	617800	5032800	1
Gadwall	Anas strepera	2008-04-25	617100	5032800	2
Great blue heron	Ardea herodias	2008-04-25	617900	5031900	1
Mallard	Anas platyrhynchos	2008-04-25	617100	5032600	2
Hooded Merganser	Lophodytes cucullatus	2008-04-25	617300	5032200	1
Mallard	Anas platyrhynchos	2008-04-25	617100	5032600	2
Gadwall	Anas strepera	2008-04-25	616200	5038600	2
Great blue heron	Ardea herodias	2008-04-25	617300	5036100	1
Ring-billed gull	Larus delawarensis	2008-04-25	0	0	1
Mallard	Anas platyrhynchos	2008-04-25	617000	5034300	3
Common merganser	Mergus merganser	2008-04-25	616600	5037000	2

English Name	Scientific Name	Date	utm east	utm north	Number of specimens
Common merganser	Mergus merganser	2008-04-25	617200	5034700	1
Mallard	Anas platyrhynchos	2008-04-25	617200	5032300	2
Mallard	Anas platyrhynchos	2008-04-25	617000	5034400	2
Mallard	Anas platyrhynchos	2008-04-25	617200	5033300	2
Common merganser	Mergus merganser	2008-04-25	617300	5034500	5
Common merganser	Mergus merganser	2008-04-25	617200	5034000	2
Common merganser	Mergus merganser	2008-04-25	617300	5033300	7
Great blue heron	Ardea herodias	2008-04-25	617300	5032000	1
Mallard	Anas platyrhynchos	2008-04-25	617300	5032300	4
Bufflehead	Bucephala albeola	2008-04-25	617200	5034400	2
Bufflehead	Bucephala albeola	2008-04-25	617400	5033200	2
Bufflehead	Bucephala albeola	2008-04-25	617300	5031400	2
Mallard	Anas platyrhynchos	2008-04-25	617100	5033000	1
Double-crested cormorant	Phalacrocorax auritus	2008-04-25	617200	5036200	35
Mallard	Anas platyrhynchos	2008-04-25	617000	5034400	2
Mallard	Anas platyrhynchos	2008-04-25	616200	5037400	2
Mallard	Anas platyrhynchos	2008-04-25	617100	5034600	2
American black duck	Anas rubripes	2008-04-25	617100	5034700	2
American black duck	Anas rubripes	2008-04-25	617000	5034000	2
Canada goose	Branta canadensis	2008-04-25	617200	5034600	2
Canada goose	Branta canadensis	2008-04-25	617100	5035700	2
Canada goose	Branta canadensis	2008-04-25	616700	5037200	2
Canada goose	Branta canadensis	2008-04-25	616300	5037200	2
Mallard	Anas platyrhynchos	2008-04-25	616100	5037500	2
American black duck	Anas rubripes	2008-04-25	616600	5037500	1
Great black-backed gull	Larus marinus	2008-04-25	617200	5036200	2
Mallard	Anas platyrhynchos	2008-04-25	616100	5037700	2
Mallard	Anas platyrhynchos	2008-04-25	617400	5035800	1
American black duck	Anas rubripes	2008-04-25	617600	5031400	1
American black duck	Anas rubripes	2008-04-25	617500	5031300	2
American black duck	Anas rubripes	2008-04-25	617500	5031200	2
American black duck	Anas rubripes	2008-04-25	617400	5031000	2
American black duck	Anas rubripes	2008-04-25	617400	5030900	7
Mallard	Anas platyrhynchos	2008-04-25	617400	5032000	2
Mallard	Anas platyrhynchos	2008-04-25	616700	5036600	2
Mallard	Anas platyrhynchos	2008-04-25	617200	5034600	2
Mallard	Anas platyrhynchos	2008-04-25	617000	5034000	2

Appendix 15 Results of Avifauna Inventories in the Study Area (number of individuals and nesting pairs)

DESSAU | CIMA+

		June 5, 2012												Total June 5, 2012	June 20, 2012												Total June 20, 2012	Best result
English name	**Latin name**	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**	**T10**	**T11**	**T12**		**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**	**T10**	**T11**	**T12**		
Canada Goose	*Branta canadensis*								3,5					**3,5**								0,0					**0**	**3,5**
Black-crowned Night-Heron	*Nycticorax nycticorax*									0,0				**0**		0,0		0,0									**0**	**0**
Song Sparrow	*Melospiza melodia*		3,0	3,0	4,0	3,0	4,0	2,0	3,0	6,0	6,0	4,0	4,0	**42**	3,0	1,0	1,0	1,5	3,5	6,0	1,0	2,0	3,0	3,0	7,0	2,0	**34**	**42**
Swamp Sparrow	*Melospiza georgiana*		1,0											**1**													**0**	**1**
Gadwall	*Anas strepera*		0,5							0,5				**1**										0,5			**0,5**	**1**
Mallard	*Anas platyrhynchos*	1,0	0,5						1,0	3,5				**6**								0,0	0,0	0,0			**0**	**6**
Northern Cardinal	*Cardinalis cardinalis*													**0**	1,0												**1**	**1**
Red-winged Blackbird	*Agelaius phoeniceus*	7,5	10,0	10,0	17,5	11,0	17,5	4,0	13,0	15,0	6,0	10,0	8,0	**129,5**	3,0	16,0	1,0	13,0	9,0	8,0	12,5	12,5	7,0	9,0	8,0	3,0	**102**	**129,5**
American Goldfinch	*Spinus tristis*	1,0								1,0				**2**	2,0		2,0			2,0	1,0		1,0	2,0	0,0	2,0	**12**	**12**
Spotted Sandpiper	*Actitis macularius*													**0**									0,5				**0,5**	**0,5**
Double-crested Cormorant	*Phalacrocorax auritus*								0,0					**0**							0,0						**0**	**0**
American Crow	*Corvus brachyrhynchos*		1,5		0,0		3,0	0,0		1,0				**5,5**					0,0	0,0							**0**	**5,5**
European Starling	*Sturnus vulgaris*			2,0	1,5		2,0		5,0					**10,5**			0,5	2,0	0,5	1,0			0,5	0,0			**4,5**	**10,5**
Peregrine Falcon	*Falco peregrinus anatum*			1,0										**1**													**0**	**1**
Ring-billed gull	*Larus delawarensis*		1,5	0,0	0,0		0,0	1,0	0,0	0,0	0,0			**2,5**				0,0	2,0	0,0	1,0	0,0	1,5	1,0			**5,5**	**5,5**
Herring Gull	*Larus argentatus*		0,5	0,0			0,0							**0,5**													**0**	**0,5**
Great Black-backed Gull	*Larus marinus*								0,0					**0**				0,0									**0**	**0**
Great Blue Heron	*Ardea herodias*				0,5		0,0			0,5			0,5	**1,5**										0,0	0,0		**0**	**1,5**
Great Egret	*Ardea alba*									0,0				**0**										0,0			**0**	**0**
Cliff Swallow	*Petrochelidon pyrrhonota*				0,0	0,0	0,0	2,5	0,0	1,0				**3,5**		1,0	1,0	1,0	0,0	2,0	7,5	1,0		0,5	2,5		**16,5**	**16,5**
Tree Swallow	*Tachycineta bicolor*						2,0		0,5	1,0	1,5			**5**				0,5		0,5		0,0	0,5		1,0		**2,5**	**5**
Cedar Waxwing	*Bombycilla cedrorum*	4,5		6,0	7,0	8,5	0,0			5,0	8,0	6,0	5,0	**50**		3,0		2,0	1,0	2,0						3,0	**11**	**50**
Chimney Swift	*Chaetura pelagica*											1,0		**1**													**0**	**1**
American Robin	*Turdus migratorius*	2,0						1,0	0,0		0,5	0,5		**4**					0,5			1,0			2,0	2,0	**5,5**	**5,5**
Gray Catbird	*Dumetella carolinensis*													**0**				1,0		1,0							**2**	**2**
Baltimore Oriole	*Icterus galbula*						1,0	1,0				0,5		**2,5**				1,0	0,5						0,5	1,0	**3**	**3**
Black-throated Blue Warbler	*Dendroica caerulescens*	0,5									2,0			**2,5**													**0**	**2,5**
American Redstart	*Setophaga ruticilla*													**0**												1,0	**1**	**1**
Hermit Warbler	*Dendroica petechia*	5,0	4,0	10,0	12,0	8,0	6,0	4,0	10,0	8,0	5,0	8,0	6,0	**86**	2,0		2,0	2,0	4,5	10,0	1,0	6,0	2,0	6,0	12,0	6,0	**53,5**	**86**
Common Yellowthroat	*Geothlypis trichas*		1,0											**1**	1,0												**1**	**1**
Downy Woodpecker	*Picoides pubescens*								0,5					**0,5**											1,0	1,0	**2**	**2**
Rock Dove	*Columba livia*		2,0			1,5								**3,5**		1,5											**1,5**	**3,5**
Killdeer	*Charadrius vociferus*	1,5												**1,5**													**0**	**1,5**
Common Grackle	*Quiscalus quiscula*									2,0				**2**											1,0	0,5	**1,5**	**2**
House Finch	*Carpodacus mexicanus*													**0**											0,5		**0,5**	**0,5**
Common Tern	*Sterna hirundo*								0,0					**0**						0,0		0,0					**0**	**0**
Mourning Dove	*Zenaida macroura*								0,5			1,0		**1,5**													**0**	**1,5**
Eastern Kingbird	*Tyrannus tyrannus*		0,5			0,5	1,0						0,5	**2,5**					0,5				0,5		0,5		**1,5**	**2,5**
Brown-headed Cowbird	*Molothrus ater*									1,0			1,0	**2**													**0**	**2**
Red-eyed Vireo	*Vireo olivaceus*	1,0									1,0			**2**	1,0				1,0								**2**	**2**
Warbling Vireo	*Vireo gilvus*	1,0			1,0	1,0		1,0	1,0		2,0	1,0	2,0	**10**		1,0		2,5	3,0	1,0	1,0		1,0	1,0	1,0	3,0	**14,5**	**14,5**
Total		**25**	**26**	**32**	**43,5**	**33,5**	**36,5**	**16,5**	**38**	**45,5**	**32**	**32**	**27**	**387,5**	**13**	**23,5**	**7,5**	**26,5**	**26**	**33,5**	**25**	**22,5**	**17,5**	**23**	**37**	**24,5**	**279,5**	**426,5**

Brossard Shore	Nuns' Island (East)
Îles de la Couvée	Nuns' Island (West)
Seaway dyke	Island of Montreal

		June 5, 2012												Total June 5, 2012	June 20, 2012												Total June 20, 2012	Best result
English name	Latin name	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12		
Canada Goose	*Branta canadensis*								7					7								40					40	40
Black-crowned Night-Heron	*Nycticorax nycticorax*									1				1		1		2									3	3
Song Sparrow	*Melospiza melodia*		3	4	4	3	4	2	5	6	6	4	4	45	3	1	1	3	4	6	1	2	3	3	8	2	37	45
Swamp Sparrow	*Melospiza georgiana*		1											1													0	1
Gadwall	*Anas strepera*		1							1				2										1			1	2
Mallard	*Anas platyrhynchos*	2	1						2	7				12								35	12	12			59	59
Northern Cardinal	*Cardinalis cardinalis*													0	1												1	1
Red-winged Blackbird	*Agelaius phoeniceus*	9	10	10	20	12	20	4	25	15	6	10	8	149	3	20	2	16	12	8	15	15	7	9	8	3	118	149
American Goldfinch	*Spinus tristis*	1								1				2	2		2			2	1		1	2	1	2	13	13
Spotted Sandpiper	*Actitis macularius*													0									1				1	1
Double-crested Cormorant	*Phalacrocorax auritus*								1					1							1						1	1
American Crow	*Corvus brachyrhynchos*		3		2		3	2		1				11					1	1							2	11
European Starling	*Sturnus vulgaris*			4	3		2		20					29			1	4	1	2			1	150			159	159
Peregrine Falcon	*Falco peregrinus anatum*			1										1													0	1
Ring-billed Gull	*Larus delawarensis*		3	30	7		20	2	25	7	4			98				10	4	8	2	40	3	2			69	98
Herring Gull	*Larus argentatus*		1	5			3							9													0	9
Great Black-backed Gull	*Larus marinus*								2					2				1									1	2
Great Blue Heron	*Ardea herodias*				1		1			1			1	4										1	1		2	4
Great Egret	*Ardea alba*									1				1										1			1	1
Cliff Swallow	*Petrochelidon pyrrhonota*				25	15	15	5	15	2				77		2	2	2	6	4	15	2		1	5		39	77
Tree Swallow	*Tachycineta bicolor*						2		1	2	3			8				1		1		8	1		2		13	13
Cedar Waxwing	*Bombycilla cedrorum*	6		8	9	11	15			5	8	6	6	74		3		2	2	2						3	12	74
Chimney Swift	*Chaetura pelagica*											2		2													0	2
American Robin	*Turdus migratorius*	3						1	4		1	1		10					1			2			2	2	7	10
Gray Catbird	*Dumetella carolinensis*													0				1		1							2	2
Baltimore Oriole	*Icterus galbula*						1	1				1		3				1	1						1	2	5	5
Black-throated Blue Warbler	*Dendroica caerulescens*	1									2			3													0	3
American Redstart	*Setophaga ruticilla*													0												1	1	1
Hermit Warbler	*Dendroica petechia*	5	4	10	12	9	6	4	10	8	5	8	6	87	2		2	2	5	10	1	6	2	6	12	6	54	87
Common Yellowthroat	*Geothlypis trichas*		1											1	1												1	1
Downy Woodpecker	*Picoides pubescens*								1					1											1	1	2	2
Rock Dove	*Columba livia*		4			3								7		3											3	7
Killdeer	*Charadrius vociferus*	1												1													0	1
Common Grackle	*Quiscalus quiscula*									2				2											2	1	3	3
House Finch	*Carpodacus mexicanus*													0											1		1	1
Common Tern	*Sterna hirundo*								10					10						2		10					12	12
Mourning Dove	*Zenaida macroura*								1			1		2													0	2
Eastern Kingbird	*Tyrannus tyrannus*		1			1	1						1	4					1				1		1		3	4
Brown-headed Cowbird	*Molothrus ater*									1			1	2													0	2
Red-eyed Vireo	*Vireo olivaceus*	1									1			2	1				1								2	2
Warbling Vireo	*Vireo gilvus*	1			1	1		1	1		2	1	2	10		1		3	3	1	1		1	1	1	3	15	15
Total		**30**	**33**	**72**	**84**	**55**	**93**	**22**	**130**	**61**	**38**	**34**	**29**	681	**13**	**31**	**10**	**48**	**42**	**48**	**37**	**160**	**33**	**189**	**46**	**26**	683	926

Brossard shore	Nuns' Island (East)
Îles de la Couvée	Nuns' Island (West)
Seaway dyke	Island of Montreal

Appendix 16 Photographs of Avifauna Transects

DESSAU | CIMA+

Photo 1: Avifauna transect 1.

Photo 2: Avifauna transect 2.

Photo 3: Avifauna transect 3.

Photo 4: Avifauna transect 3 – Peregrine Falcon.

Photo 5: Avifauna transect 4.

Photo 6: Avifauna transect 5.

Photo 7: Avifauna transect 6.

Photo 8: Avifauna transect 7.

Photo 9: Avifauna transect 8.

Photo 10: Avifauna transect 9.

Photo 11: Avifauna transect 10.

Photo 12: Avifauna transect 11.

Photo 13: Avifauna transect 12.

Photo 14: Brown Snake.

Photo 15: Brown Snake.

Photo 16: Common Garter Snake.

Photo 17: Redbelly Snake.

Photo 18: Installation of turtle hoop net.

Photo 19: Inventory station using snake shingles.

Appendix 17 CDPNQ Fauna Data

6376 CDPNQ rayon 8km

1 – Nombre total d'occurences pour cette requête : 48

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

FAUNE

Pseudacris triseriata - (17148)

Montérégie, LaPrairie: Occurrence située entre le Chemin Saint-Joseph et le Chemin de Saint-Jean (route 104). / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'occurrence est aujourd'hui considérée comme disparue (extirpated), la modification de l'habitat, associée à l'étalement urbain est responsable de la disparition de ce site. Habitat: milieu urbain.
Présence d'une emprise électrique.

45,401930 - -73,4725	Seconde (150 m.)	-	Non	2003-04-28

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Blais Philippe (1994).; Bouthillier Lyne (2003).; Bouthillier Lyne, Déry-Bouthillier Rafaëlle (2002).; Bouthillier Lyne, Dubois Sylvain (2000).; Bouthillier Lyne, Dubois Sylvain (2001).

Pseudacris triseriata - (17147)

Montérégie, LaPrairie: Occurrence située dans le secteur du ruisseau des bois, à environ 1,8km au nord-ouest de l'intersection entre le Chemin Saint-Jean et l'autoroute 30. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. En 1993, la cote de chant était égale à 2. Habitat: milieu péri-urbain.

45,419750 - -73,460420	Minute (1,5 km.)	-	Non	1993-04-25

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Dubé Cécile, Blanchard Alain, Trépannier Annie (1993).

Pseudacris triseriata - (17145)

Montérégie, La Prairie : Occurrence située en bordure de l'autoroute 15, tout près du Bassin de La Prairie du Fleuve St-Laurent. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'occurrence est aujourd'hui considérée comme disparue (extirpated), la raison de sa disparition n'a pas été identifiée. La modification de l'habitat, associée à l'étalement urbain est une cause probable.
Habitat: milieu urbain, en bordure d'autoroute.

45,416630 - -73,4999	Général (8 km.)	-	Non	1993-05-04

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Blais Philippe (1993).

Pseudacris triseriata - (17140)

Montérégie, Longueuil: Occurrence située de part et autre du Boul. Maricourt, à environ 1,4km à l'ouest de l'intersection avec l'autoroute 30. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'occurrence est aujourd'hui considérée comme disparue (extirpated), la modification de l'habitat, associée à l'étalement urbain est responsable de la disparition du site. Habitat: milieu urbain.

45,4766 - -73,407160	Seconde (150 m.)	-	Non	2003-04-28

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Bouthillier Lyne (2002).; Bouthillier Lyne (2003).; Bouthillier Lyne, Dubois Sylvain (2000).; Bouthillier Lyne, Dubois Sylvain (2001).

Pseudacris triseriata - (17135)

Montérégie, Longueuil: Occurrence située à environ 2km au nord-est de l'intersection entre la route 134 et du Boul. Curé-Poirier. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'occurrence est aujourd'hui considérée comme disparue (extirpated). La modification de l'habitat, associée à l'étalement urbain est responsable de sa disparition. Habitat: milieu urbain.

45,523620 - -73,478130	Général (8 km.)	-	Non	1991-04-27

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Markovic Mary L., Markovic Paul (1991).

Pseudacris triseriata - (17134)

Montérégie, Longueuil: Occurrence située à environ 1,6km au nord-est de l'intersection entre la route 134 et l'autoroute 20. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'occurrence est aujourd'hui considérée comme disparue (extirpated). La modification de l'habitat, associée à l'étalement urbain est la cause de la disparition. Habitat: milieu urbain.

45,533450 - -73,500380	Général (8 km.)	-	Non	1999-05-06

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Henri Denis (1993).; Henri Denis, Marchildon Jeanne, Deshaies Stéphane (1993).

Pseudacris triseriata - (17111)

Montérégie, LaPrairie: Occurrence située entre le Chemin Saint-José et le Chemin de Saint-Jean (route 104). / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'espèce y a été entendue et vue , la cote de chant y a variée de 1 à 3. Habitat (REF carte 1 :20000): milieu urbain situé sur un plateau (24m alt.) Présence d'une zone humide.

45,400340 - -73,483880	Seconde (150 m.)	B5.04	Non	2003-04-28

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Bouthillier Lyne (2003).; Bouthillier Lyne, Déry-Bouthillier Rafaëlle (2002).; Bouthillier Lyne, Dubois Sylvain (2000).; Bouthillier Lyne, Dubois Sylvain (2001).

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Pseudacris triseriata - (17098)

Montérégie, Longueuil: Boisé du Tremblay. Grande occurrence s'étendant à l'Est du Chemin-du-Tremblay depuis le Chemin de Chambly au sud jusqu'à environ la rue Montarville. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'espèce y a été entendue et vue , la cote de chant y a variée de 1 à 3. Habitat (REF carte 1 :20000): milieu urbain situé sur un plateau (31m alt.) irrigué par de nombreux cours d'eau intermittents. Présence d'une zone humide et d'une mare. Le territoire est occupé par de nombreux bâtiments. Présence de routes locales dans les limites de l'occurrence.

45,541780 - -73,428460	Seconde (150 m.)	B5.04	Non	2003-05-05

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Anonyme (1999).; Bouthillier Lyne (1999).; Bouthillier Lyne (2002).; Bouthillier Lyne (2003).; Bouthillier Lyne, Cormier Gislaine (2002).; Bouthillier Lyne, Dubois Sylvain (2000).; Bouthillier Lyne, Dubois Sylvain (2001).; Bouthillier Lyne, Dubois Sylvain (2003).; Bouthillier Lyne, Gauthier Marc (2003).; Daigle Claude (1993).; Markovic Paul (1992).; Markovic Paul (1995).

Pseudacris triseriata - (17093)

Montérégie, Longueuil: Occurrence située sur l'Avenue Victoria, face au Country Club de Montréal. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'occurrence est aujourd'hui considérée comme disparue (extirpated), la raison de sa disparition n'a pas été identifiée. La destruction de l'habitat, associée à l'étalement urbain en est probablement la cause.
Habitat: milieu urbain.

45,482830 - -73,483230	Minute (1,5 km.)	B5.04	Non	1959-04-10

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Denman Norris S. (1959). Musée canadien de la nature

Pseudacris triseriata - (16465)

Montérégie, Longueuil: Occurrence située dans le Parc de la Cité, au nord et au sud du Boul. Maricourt et à l'est du Boul. Gaëtan Boucher. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'espèce y a été entendue et vue, la cote de chant était égale à 1. Habitat (REF carte 1 :20000): milieu urbain situé sur un plateau (34m alt.) irrigué par de nombreux cours d'eau intermittents. Présence d'un lac artificiel. Présence d'une route locale dans les limites de l'occurrence.

45,480010 - -73,411690	Seconde (150 m.)	B5.04	Non	2003-05-06

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Bouthillier Lyne (2002).; Bouthillier Lyne (2003).; Bouthillier Lyne, Dubois Sylvain (2000).; Bouthillier Lyne, Dubois Sylvain (2001).; Bouthillier Lyne, Dubois Sylvain (2003).

Pseudacris triseriata - (16463)

Montérégie, LaPrairie: Occurrence située de part et autre du Chemin Fontarabie, à environ 2km au nord de l'intersection avec la route 104. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'espèce y a été entendue, la cote de chant était égale à 1. Habitat (REF carte 1 :20000): milieu péri-urbain situé sur un plateau (17m alt.) irrigué par un cours d'eau. Présence d'une route locale dans les limites de l'occurrence. Présence d'une emprise électrique.

45,412740 - -73,439720	Seconde (150 m.)	B5.04	Non	2001

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Dubé Cécile (1993).; Dubé Cécile, Blanchard Alain, Trépannier Annie (2001).

Pseudacris triseriata - (16363)

Montérégie, LaPrairie. Occurrence délimitée par (au nord), le Chemin Saint-Jean, (à l'ouest) par le Boulevard Taschereau et le Chemin Saint-José et, (au sud comme à l'est) par l'autoroute 30. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'espèce y a été entendue et vue , la cote de chant y a variée de 1 à 3. Habitat (REF carte 1 :20000): milieu urbain situé sur un plateau (26m alt.) irrigué par un cours d'eau. Présence d'une zone humide. Présence d'une emprise électrique.Grande occurrence où de nombreuses observations ont été faites dans le passé. Selon les observatuers: petites mares, terrain inondé, saules.

45,394130 - -73,4770	Seconde (150 m.)	B5.04	Non	2003-04-28

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Blais Philippe (1993).; Bouthillier Lyne (2003).; Bouthillier Lyne, Déry-Bouthillier Rafaëlle (2002).; Bouthillier Lyne, Dubois Sylvain (2000).; Bouthillier Lyne, Dubois Sylvain (2001).; Veillette Lucie (2000).

Pseudacris triseriata - (16299)

*Montérégie, La Prairie: Occurrence située à l'ouest de l'autoroute 30, à environ 1,3km au nord de l'intersection entre l'autoroute 30 et le Chemin Saint-Jean.. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. Habitat: milieu urbain.
Présence d'une emprise électrique.*

45,414220 - -73,4570	Seconde (150 m.)	B5.04	Non	2004

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. .

Pseudacris triseriata - (16298)

Montérégie, La Prairie: Occurrence située à environ 1km au sud-est de l'intersection: autoroute 30 et Boul. Matte. Occurrence située dans le secteur des emprises électriques. Au nord-est du chemin de fer. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. Habitat (REF carte 1 :20000): milieu péri-urbain situé sur un plateau (16m alt.) irrigué par un cours d'eau et un cours d'eau intermittent. Présence d'une emprise électrique.

45,419710 - -73,436040	Seconde (150 m.)	B5.04	Non	2004

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. .

Pseudacris triseriata - (16296)

Montérégie, Saint-Hubert: Portion nord du Parc de la Cité. Occurrence à l'est du Boul. Gaëtan-Boucher. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'espèce y a été entendue, la cote de chant était égale à 1. Habitat (REF carte 1 :20000): milieu urbain situé sur un plateau (23m alt.) irrigué par un cours d'eau intermittents. Présence d'un lac artificiel. Présence d'une route locale dans les limites de l'occurrence.

45,487990 - -73,409730	Seconde (150 m.)	B5.04	Non	1997-04-21

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . MacIntyre Mabel, Markovic Paul (1997).

Pseudacris triseriata - (16295)

Montérégie, Longueuil : Occurrence située à environ 1,3km au nord de l'intersection autoroute 30 et Grande-Allée. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. Habitat (REF carte 1 :20000): milieu urbain situé sur un plateau (23m alt.) irrigué par un cours d'eau intermittent. Présence d'une zone humide. Présence de routes locales dans les limites de l'occurrence.

45,466630 - -73,406830	Seconde (150 m.)	B5.04	Non	2004

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. .

Pseudacris triseriata - (16283)

Montérégie, Longueuil: Occurrence située à environ 1,6km à l'ouest de l'intersection entre le Chemin de Chambly et la route 116/112. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'espèce y a été entendue et vue, la cote de chant y a variée de 1 à 2. Habitat (REF carte 1 :20000): milieu urbain situé sur un plateau (30m alt.) irrigué par un cours d'eau intermittent. Le territoire est occupé par de nombreux bâtiments. Présence d'une route locale dans les limites de l'occurrence.

45,5090 - -73,446370	Seconde (150 m.)	B5.04	Non	2003-04-28

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Bouthillier Lyne (2002).; Bouthillier Lyne (2003).; Bouthillier Lyne, Dubois Sylvain (2001).

Pseudacris triseriata - (267)

Montréal, Longueuil: Occurrence située à la base du pont Jacques-Cartier, sur la rive sud de Montréal. / Site utilisé pour la reproduction. L'occurrence a été créée à partir des polygones régionaux transmis par le MRNF-Montérégie en janvier 2007. L'occurrence est aujourd'hui considérée comme disparue (extirpated). La modification de l'habitat, associée à l'étalement urbain est la cause probable. Habitat: milieu urbain.

Une observation "classique" de S. Bleakney, faite quelques années avant 1958 et qui décrivait une importante chorale.

45,522220 - -73,525160	Minute (1,5 km.)	B5.04	Non	1958

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. .

Lithobates palustris - (567)

Longueuil, base de plein-air et grand marais. / 1991-05-10 : 1 individu. HABITAT : grand marais, présence de quenouilles.

45,523370 - -73,475830	Général (8 km.)	B5.04	Non	1991-05-10

MEILLEURE SOURCE :

Ixobrychus exilis - (18158)

Région de la Montérégie, à Longueil. Site SOS-POP: PB-099 (Longueil - secteur Saint-Lambert). / Présence de l'espèce à ce site notée en 1933. 1 jeune âgé de 4 semaines y a été observé lors de cette visite. Habitat : Marécage.

45,499990 - -73,511120	Général (8 km.)	-	Non	1933-07

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. . Mousley Henri (1933)

Ixobrychus exilis - (18157)

Région de Montréal, sur l'Île des Soeurs. Site SOS-POP : PB-022 (Île des Soeurs - Lac des Battures). / Présence de l'espèce à ce site en 1951, 1963, 1965, 1966, 1973, 1974, 1976, 1981, 1984, 1985, 1993, 1994, 2000, 2001, 2002 et 2009. Jusqu'à 5 individus y ont été observés. Présence de jeunes observée à plusieurs reprises. Aucune observation de l'espèce lors des visites effectuées en 1996, 1998, 1999 et 2004. Habitat: Étang bordé de typhas et de phragmites avec des chicots dans l'eau. Entouré d'un sentier.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,454220 - -73,554450	Seconde (150 m.)	B5.04	Non	2009-08-31

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. . Bannon Pierre (1998); Bannon Pierre (2000); Bannon Pierre (2001); Bannon Pierre (2002); Bannon Pierre (2004); Bannon Pierre (2009); Bannon Pierre, Buteau Régis (2009); Bannon Pierre, Cyr Gérard (2000); Bannon Pierre, Zenatis Guy (2001); Belhumeur Raymond (1993); Brongo Marcelo (2000); Brongo Marcelo (2001); Denault Samuel (2000); Denault Samuel (2001); Fogerty Ethel (1984); Fogerty Ethel (1985); Fradette Pierre, Gauthier Yves (1996); Gauthier Jacques (2000); Gauthier Yves (1985); Gauthier Yves (1994); Gilles François (1999); Guillet Richard (2000); Inconnu (1951); Inconnu (1963); Inconnu (1965); Inconnu (1966); Inconnu (1973); Inconnu (1974); Inconnu (1976); Inconnu (1981); Inconnu (1993); Inconnu (2002); Inconnu (2009); Leduc Yves (2001); Mathieu Sylvain (2000); Mathieu Sylvain (2001); Ménard Charles (2000); Ostigny Pierre (2000); Pratte Jean-Pierre, Bourque Hermel (2009); Thibault André (2002); Vachon Charles (1985)

Ixobrychus exilis - (18156)

Région de la Montérégie. Site SOS-POP: PB-100 (Rivière St-Jacques). / Présence de l'espèce à ce site en 1985, 2004, 2005 et 2006. Jusqu'à 2 individus y ont été observés. Habitat: typhaie bordant la rivière. Rivière naviguable et soumise au batillage des embarcations à moteur.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,430660 - -73,482160	Seconde (150 m.)	B5.01	Non	2006-06-04

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. . Duquette Gaétan (1985); Fradette Pierre (2004); Robillard Luc (2005); Robillard Luc (2006)

Haliaeetus leucocephalus - (20340)

Dans la région de Montréal, sur l'Île aux Hérons. L'occurrence compte 1 emplacement de nid au site SOS-POP: PT-361 (Île aux Hérons). / Le nid a été découvert en 2010, alors qu'il était actif. Il était également utilisé lors de son dernier suivi en 2011.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,420950 - -73,583080	Minute (1,5 km.)	B5.04	Non	2011-04-24

MEILLEURE SOURCE :

Notropis bifrenatus - (20460)

Située dans le fleuve Saint-Laurent, plus précisément sur la rive sud du Canal de la Rive-Sud, cette occurrence est localisée à environ 5km au sud-ouest de Brossard. / La seule observation relative à la création de cette occurrence provient d'un inventaire à la seine, permettant la capture d'un nombre indéterminé de spécimens, en mai 1941.

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation
45,434710 - -73,4950	Minute (1,5 km.)	B5.04	Non	1941-05-20

MEILLEURE SOURCE :

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Apalone spinifera - (3008)

Dans la région de Montréal et Laval: Île-Perrot, Sainte-Anne-de-Bellevue et Pointe-du-Moulin. Baie de l'Île-Perrot, petite baie en aval de Pointe de Brucy. Senneville, à la jonction de la route 40 et du Lac des Deux Montagnes. Entre Baie-d'Urfé et Sainte-Anne-de-Bellevue. Melocheville, parc de la Pointe du Buisson. Lasalle, parc des rapides de Lasalle. Pointe-à-Caillère. En avant du collège Macdonald, sur le campus. / La première mention au site remonte 1760, alors que 6 vestiges ont été retrouvés. D'autres mention ont été recensées en à 1962, en 1965 et en 1968. En 1982, un individu a été capturé et gardé à l'aquarium de Montréal. En 1985, un individu de 6 po a été observé sur le campus, en avant du collège Macdonald. Le site a été utilisé en 1987. En 2003, un individu a été potentiellementvu se chauffant sur un tronc, mais il n'y a pas eu de confirmation, mention douteuse, probablement une relâche d'un animal en captivité. Habitat: ?

45,388870 - -73,809230	Seconde (150 m.)	B5.04	Non	1987

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Bider Jean Roger (1985).; Courtemanche Michelle ().; Courtemanche Michelle (1760).; Dixon Sarah (2003).; Gaudette André (1982).; Hoek Wyb (1987).; Lovrity Joseph E. (1962).; Lovrity Joseph E. (1965).; Lovrity Joseph E., Hoek Wyb (1968).

Diadophis punctatus - (15687)

Montréal, Parc du Mont-Royal, chemin Camilien-Houde, du côté sud, à environ 100m du stationnement. / Un ou des individu(s) auraient été observés en 1985 et un autre en juin 2003. En 2004, au moins 21 individus auraient été inventoriés et 3 adultes en avril 2008. Habitat : forêt feuillue.

45,506180 - -73,585560	Seconde (150 m.)	B5.04	Non	2008-04-25

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Gravel Réjean (1985).; Lamoureux Hugo-Paul (2008).; Lamoureux Hugo-Paul, Lavigne Patrice (2008).; Lavigne Patrice (2003).; Ouellet Martin, Galois Patrick, Pétel Roxane, Marquis Sarah, Morin Marie-Josée (2004).

Lampropeltis triangulum - (15227)

Brossard, près des autoroutes 30 et 10. / Un individu a été observé en 1991. Habitat : route désaffectée.

45,446390 - -73,428890	Général (8 km.)	B5.04	Non	1991

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Desroches Jean-François (1991).

Storeria dekayi - (19579)

Aux Rapides de LaChine, sur le sentier près de l'ancien barrage. / En 2009, un individu a été vu. Habitat: sentier.

45,426330 - -73,591530	Seconde (150 m.)	B5.04	Non	2009-10-17

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Lacoste Jean-Marc (2009).

Storeria dekayi - (18875)

Sur l'île de Montréal, près d'une autoroute et de l'école secondaire Monseigneur Richard, à Verdun. / Les mentions datent de 2008, alors qu'un mâle adulte et deux juvéniles ont été recensés. Habitat: friche et sentier avec roche.

45,471090 - -73,556140	Seconde (150 m.)	B5.04	Non	2008-09-18

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Lamoureux Hugo-Paul (2008).

Falco peregrinus anatum - (20367)

Dans la région de la Montréal, à l'échangeur Turcot. L'occurrence compte 1 emplacement de nid au site SOS-POP: FP-176 (échangeur Turcot). / Le site a été découvert en 2011, alors qu'il était actif.

45,465880 - -73,596610	Seconde (150 m.)	B5.04	Non	2011-06

MEILLEURE SOURCE :

Falco peregrinus anatum - (18851)

Dans la ville de Montréal, sur la tour Scotia au 1002 rue Sherbrooke O. L'occurrence compte un nid au site SOS-POP: FP-126 (Tour Scotia). / Le site a été découvert en 2008, alors qu'il était actif. En 2010 (dernier suivi), le site était vide. Habitat: nid sur une corniche au 29ième étage d'un édifice.

45,502230 - -73,575850	Seconde (150 m.)	B5.04	Non	2008-05

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. . Baril Franklin (2010); Inconnu (2010); Léveillé Martin (2008)

Falco peregrinus anatum - (18816)

En Montérégie, à la Carrière à La Prairie. L'occurrence compte un emplacement de nid au site SOS-POP: FP-121 (Carrière et tour de télécommunication / La Prairie). / Le site a été découvert en 2007, alors qu'il était actif. En 2008 et 2010 (dernier suivi), le site était inactif, mais un adulte a été observé en 2010. Habitat: Carrière d'aggrégats avec machinerie bruillante. Assèchement pour exploitation en 2008.

45,411150 - -73,486820	Seconde (150 m.)	B5.04	Non	2010-05-02

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. . Baril Franklin (2008); Brachaud Alain (2007); Léveillé Martin, Bourgeois Lyne (2010); Trudel Chantal (2010); Trudel Chantal, Lamoureux Sylvain (2010)

Falco peregrinus anatum - (18224)

Sur l'île de Montréal, sur l'édifice de la Maison Radio-Canada. L'occurrence compte 1 site SOS-POP: FP-120 (Maison Radio-Canada). L'édifice est situé au 1400 blv René-Lévesque. / Le site a été découvert en 2005, alors que des jeunes y ont été observés. En 2008 et 2010 (dernier suivi), le nid était vide, mais des adultes ont été vus en 2010 près de l'Église Notre-Dame du Bon Secours. Habitat: Édifice, enseigne de la face sud.

45,5180 - -73,551120	Seconde (150 m.)	B5.04	Non	2010-05-19

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. . Baril Franklin (2008); Baril Franklin (2010); Bouthillier Lyne (2010); Fortin Paul (2005); Fortin Paul (2010); Thibault François (2008)

Falco peregrinus anatum - (15922)

Dans la région de la Montérégie sur le Pont Jacques-Cartier, nichoir visible de la piste cyclable (pilier 10). L'occurrence compte un emplacement de nid au site SOS-POP: FP-094 (Pont Jacques-Cartier). / Le site a été découvert en 2004, alosr que deux individus ont été observés. Le couple a eu du succès à ce site en 2005 avec quatre fauconneux emplumés. En 2006, seul un adulte a été vu. En 2007 et 2008, le nid était inactif. En mars 2009, un adulte a été observé, alors qu'en 2010 (dernier suivi) des jeunes ont été vus au nid. Habitat: Nichoir dans le haut d'un pilier à l'E du pont. Pilier sud.

45,5216 - -73,525630	Seconde (150 m.)	B5.04	Non	2010-06-14

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. . Baril Franklin, Lebrun L. (2010); Bélisle Éve (2010); Bélisle Éve, Dupuis Richard (2010); Bird David (2005); Bisson Jean-Luc (2008); Denault Samuel (2005); Denault Samuel, Guénette Jean-Sébastien (2009); Fontaine Trefflé (2007); Fradette Pierre (2005); Gahbauer Marcel (2004); Inconnu (2005); Léveillé Martin (2005); Noulin Jean-François (2005); Robert Alain (2006); Simard Louise (2005); Simard Richard (2010); Trudel Chantal (2010)

Falco peregrinus anatum - (14311)

Dans la région de la Montérégie sur le Pont-Champlain. Le site compte un emplacement de nid au site SOS-POP: FP-068 (Pont Champlain). / Le site a été découvert en 2002, alors que le couple à donner naissance à trois oisillons cette année là. Deux adultes perchés sur les lampadaires du pont ont été régulièrement observés en 2003. L'année suivante, seul un individu perché a été aperçu. Des travaux de réfection non loin du nichoir sont survenus en 2005. Bien qu'un faucon pèlerin n'ait été vu en avril, le nichoir est inutilisé par l'espèce mais par des pigeons. En 2006, un adulte a été vu, mais en 2007, 2008, 2009 et 2010 (dernier suivi), le nid a été utilisé. Habitat: Structure d'un pont. Pose d'une boîte de nidification.

45,466780 - -73,497750	Seconde (150 m.)	B5.04	Non	2010-07-14

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. . Auger Normand (2010); Baril Franklin (2010); Beaupré Philippe, Baillargeon Bruno, Molina Pierre (2009); Beaupré Philippe, Fontaine Trefflé (2009); Bélisle Éve, Dupuis Richard (2010); Bélisle Éve, Dupuis Richard, Cusson Sylvain (2010); Bertrand Michel (2002); Bird David (2005); Cournoyer Michel (2010); Denault Samuel (2002); Dupuis Richard (2010); Duteau Denis (2002); Duval Simon (2010); Éthier Gilles (2006); Éthier Gilles (2008); Fitzgérald Guy (2007); Fontaine Trefflé (2009); Fradette Pierre (2005); Guillet Richard (2002); Lalande Claude (2009); Léger Lise (2009); Léveillé Martin (2005); Mathieu Sylvain (2004); Noulin Jean-François (2005); Rousselles Roger (2009); Simard Louise (2003); Simard Louise (2005); Simard Richard (2008); Simard Richard (2010); Trudel Chantal (2010); Turgeon Louise (2003)

Falco peregrinus anatum - (1138)

Dans le Centre-ville de Montréal . L'occurrence compte quatre emplacements de nid aux sites SOS-POP: FP-003: Nid 1 : Place Ville-Marie (360 St-Jacques; immeuble Trizec; Banque Royale), Nid 2 : 800 Place Victoria (tour de la Bourse) Nid 3 : Édifice Sun Life et nid 4: un nichoir a été aménagé au 32 ième étage de la Tour de la Bourse. / Le nid 3 (FP-003) sur l'édifice Sun Life a été découvert en 1936. Il a été actif de 1936 à 1947. En 1948 et 1949, seul les oeufs ont été observés. En 1950, six jeunes étaient au nid, en 1951 quatre oeufs étaient au nid mais ils auraient disparus après la ponte et en 1952 cinq fauconneaux ont été observés. En 2002, il y avait un jeune au nid. Le nid 2 à Place Victoria a été découvert en 1985 alors qu'il était utilisé. Il a été actif de 1989 à 1993 et en 1997, 1999 et 2006. Le nid 1 à la Place Ville-Marie a été utilisé au moins une fois en 1994. Le nid 4, le nichoir au 32 ième étage de la Tour de la Bourse a été utilisé en 1992 et 1995. Le couple a niché en 1996 et, en 1998 et 2000, au moins un jeune était au nid. En 2007, le nid était actif. En 2008, un adulte a été aperçu. Plusieurs observations ont été faites alors que le nid n'a pas été précisé : soit pour l'année 1982 où le couple a été dérangé par un Grand-Duc. En 1984, il y a eu production de jeune et en 1986, le nid a également été abandonné pour cause de dérangement humain. Une femelle a été observée en 1987 et au moins un jeune a été vu au nid en 1988, 2003 et 2005. En 2009, des jeunes ont été observés. En 2010 (dernier suivi), seul deux adultes ont pu être observés. Habitat: Nids alternatifs se trouvant sur 3 édifices au centre-ville de Montréal, près du fleuve Saint-Laurent. Également, un nichoir a été aménagé au 32 ième étage de la Tour de la Bourse.

45,500820 - -73,561390	Seconde (150 m.)	B5.04	Non	2010-06-14

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. . Adams Marc (1993); Adams Marc (1995); Auger Normand (2006); Auger Normand (2007); Baril Franklin (2010); Bird David (1989); Bird David (1991); Bird David (1992); Bird David (1993); Bird David (1994); Bird David (2000); Bird David (2005); Blais Bruno (1990); Dalpé Marc-André (2002); Duteau Denis (2002); Fradette Pierre (1998); Franche Patrice (1996); Gagnon Josée (1999); Gahbauer Marcel (2002); Gahbauer Marcel (2003); Grenon François (2002); Guillet Richard (1996); Guillet Richard (1997); Guillet Richard (1998); Guillet Richard (1999); Hall George Harper (1940); Hall George Harper (1941); Hall George Harper (1942); Hall George Harper (1943); Hall George Harper (1944); Hall George Harper (1945); Hall George Harper (1946); Hall George Harper (1947); Hall George Harper (1948); Hall George Harper (1949); Hall George Harper (1950); Hall George Harper (1951); Hall George Harper (1952); Inconnu (1936); Inconnu (1937); Inconnu (1938); Inconnu (1939); Lauzon Denis (2007); Lepage Michel (1982); Lepage Michel (1984); Lepage Michel (1985); Lepage Michel (1986); Lepage Michel (1987); Lepage Michel (1988); Masson Jean (2009); Roy Manon (2008)

Coturnicops noveboracensis - (20396)

Région de la Montérégie. Cette occurrence est composée du site SOS-POP RJ-023 (Ruisseau St-Claude). / Présence de l'espèce à ce site en 1992. 1 individu a été observé. L'espèce n'a pas été observée à ce site en 1994. Habitat : Marais peu profond à typha avec une zone de carex en périphérie.

45,423110 - -73,449170	Seconde (150 m.)	-	Non	1992-05-13

MEILLEURE SOURCE :

Melanerpes erythrocephalus - (1653)

Montréal, immédiatement au nord-ouest du centre-ville. Mont-Royal, près du chalet qui se trouve au sud du sommet. L'étang est situé entre le chalet et le stationnement. Site BDOMQ : PR-19. / 1964-05-20 : 1 adulte et 1 nid ; 1967-06-03 : 1 adulte ; 1968-06-03 : 1 adulte ; 1968-07-12 ; 1 adulte ; 1970-06-10 : 1 adulte ; 1970-07-18 : 1 adulte ; 1971-06-03 : 1 adulte ; 1972-05-17 : 2 adultes ; 1972-06-04 : 2 adultes ; 1981-05-10 : 1 adulte ; 1990-05 : 1 adulte ; 1990-05-20 : 1 adulte ; 1996-1997 : l'oiseau n'est pas revu. Habitat : parc urbain, forêt mature. Cuvette humide entourée de diverses essences feuillues et de plantations de conifères.

45,5041 - -73,587720	Minute (1,5 km.)	-	Non	1990-05-20

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. . Brabant Francis (1972); Cyr André (1967); Cyr André (1968); David Normand (1970); Gui L (1981); Guillet Richard (1996); Guillet Richard (1997); Inconnu (1971); Robert Michel (1990); Robinson Jack (1964); Samson Evelyne (1990)

Ammodramus savannarum - (2074)

Région de la Montérégie. Site SOS-POP: BS-041 (Brossard). Site situé au Sud de l'autoroute 10 et à l'Est de la voie ferrée. / Présence de l'espèce à ce site en 1983 et 1998. Jusqu'à 2 individus ont été observés à ce site. Aucune observation de l'espèce lors des visites effectuées en 1996, 1999, 2003 et 2004. Habitat : champ en friche. Une partie du site a été perturbé en 1996 par la construction d'un développement domiciliaire. Champs cultivés en 2004.

45,448190 - -73,442020	Seconde (150 m.)	B5.04	Non	1998-05-26

MEILLEURE SOURCE : SOS-POP. 1994. Banque de données sur le suivi de l'occupation des stations de nidification des populations d'oiseaux en péril du Québec, active depuis 1994. Regroupement QuébecOiseaux et Service canadien de la faune d'Environnement Canada, région du Québec. .

Acipenser fulvescens - (11074)

Fleuve Saint-Laurent, rapides de Lachine (en aval des infrastructures de l'ancienne centrale hydroélectrique. / 1984-06-04 : 3 femelles de stade VI. Habitat : offre une grande étendue de conditions susceptibles de satisfaire aux exigences de l'esturgeon pour le frai.

45,420280 - -73,579710	Minute (1,5 km.)	B5.04	Non	1984-06-04

MEILLEURE SOURCE : Dumont, P. et G. Desjardins. 1984. L'esturgeon jaune Acipenser fulvescens : biologie et exploitation dans les eaux du fleuve St-Laurent et de l'archipel de Montréal. Ministère du Loisir, de la Chasse et de la Pêche, Direction régionale de Montréal, Service de l'aménagement et de l'exploitation de la faune. Université du Québec à Montréal, Département des Sciences Biologiques. Montréal. 78 p..

Moxostoma carinatum - (2159)

Fleuve St-Laurent, lac St-Louis. / 1941-04-21: 2 individus observés ; 1941-10-30 : 1 individu observé ; 1941-11-20 : 1 individu observé ; 1941-12-02 : 2 individus observés ; 1942-02-19 : 2 individus observés ; 1942-02-25 : 4 individus observés ; 1942-03-03 : 1 individu observé ; 1942-04-27 : 1 individu observé ; 1942-04-28 : 2 individus observés ; 1942-04-29 : 1 individu observé ; 1942-06-22 : 1 individu observé ; 1943-05-05 : 12 individus observés ; 1943-05-06 : 2 individus observés ; 1943-05-07 : 3 individus observés ; 1943-05-08 : 14 individus observés ; 1943-05-10 : 38 individus observés ; 1943-05-11 : 118 individus observés ; 1943-05-12 : 6 individus observés ; 1943-05-14 : 4 individus observés ; 1943-05-19 : 3 individus observés ; 1943-05-20 : 18 individus observés ; 1943-05-24 : 30 individus observés ; 1943-05-30 : 3 individus observés ; 1943-05-31 : 8 individus observés ; 1943-06-01 : 4 individus observés ; 1943-06-02 : 1 individu observé ; 1943-06-04 : 1 individu observé ; 1943-06-05 : 2 individus observés ; 1943-06-07 : 5 individus observés ; 1943-06-08 : 3 individus observés ; 1943-06-09 : 1 individu observé ; 1943-06-10 : 1 individu observé ; 1943-06-11: 2 individus observés ; 1948-02-12 : 4 individus observés ; 1948-02-16 : 8 individus observés ; 1948-02-18 : 3 individus observés ; 1948-02-19 : 1 individu observé ; 1948-02-23 : 4 individus observés ; 1948-02-24 : 3 individus observés ; 1948-02-27 : 2 individus observés ; 1948-02-28 : 1 individu observé ; 1948-03-01: 1 individu observé ; 1948-03-04 : 1 individu observé ; 1948-04-17 : 4 individus observés ; 1968-06-18 : 1 individu observé ; 1982-04-28 : 1 individu observé ; 1982-05-02 : 10 individus observés ; 1984-05-04 : 1 individu observé. 1984-05-12 : 1 individu observé.

45,419310 - -73,750350	Seconde (150 m.)	B5.04	Non	1984-05-12

MEILLEURE SOURCE : Faune et Parcs Québec. 1999. Fichier informatisé des relevés fauniques en milieu aquatique et riparien. (en date du 24 août 1999) Longueuil, Direction régionale de la Montérégie .

***Moxostoma hubbsi* - (2161)**

Cette occurrence est divisée en quatre secteurs du Fleuve St-Laurent, entre Vaudreuil et le Lac St-Pierre. Le premier secteur couvre le lac St-Pierre entre Sorel-Tracy et Pointe-du-Lac. Le 2e tronçon va de Lanoraie à Longueuil, le 3e couvre la Rivière des Mille-Îles et le N-E de la Rivière des Prairies et le 4e secteur englobe le Lac des Deux Montagnes jusqu'au Lac St-Louis. / La première mention dans le Secteur 1 remonte à juin 1944 alors que 3 adultes et 1 juvénile ont été capturés. En avril 1946 et en mai 1947, 1 juvénile a été recensé à chacune des années. En 1971, 4 individus ont été capturés et la dernière observation pour ce secteur date de 2004, lors du suivi télémétrique, un adulte y a été enregistré. La première mention au Secteur 2 date de juillet 1942, alors qu'un adulte a été capturé. En 1973, 3 adultes et 1 juvénile ont été recensés. De avril à octobre 1999, 95 adultes et 21 juvéniles ont été recensés, alors que pour les mêmes mois de l'année 2000, 96 adultes ont été dénombrés. De mai à octobre 2001, 40 adultes ont été capturés, alors qu'en 2002, 26 adultes ont été comptés entre avril et novembre. En 2003, 52 adultes ont été recensés, alors qu'en 2004, 23 adultes ont été comptés et, lors du suivi télémétrique, 11 adultes sur 20 suivis ont été enregistrés dans ce secteur. En 2005, 8 adultes ont été dénombrés.
La première mention au Secteur 3 date de septembre 1971, alors que 9 adultes avaient été capturés. En septembre 1973, 3 adultes ont été capturés, en juin 1980, 1 adulte et en septembre 1996, 2 adultes ont été recensés. Un adulte a été capturé en 2004 et lors du suivi télémétrique, 2 adultes ont été enregistrés dans ce secteur. La première mention au site 4 remonte à 1942 alors que 2 adultes ont été capturés en mai et 2 autres en juin. Les seules autres mentions pour ce secteur remontent à 2004, où 2 adultes ont été enregistrés dans ce secteur au cours de l'automne lors du suivi télémétrique. Aucune observation n'a été mentionnée dans les années 1950 et 1960 dans aucun des secteurs. Habitat: ?

46,084250 - -72,9887	Seconde (150 m.)	B2.01	Non	2005-07-29

MEILLEURE SOURCE : Comité Zone d'Intervention Prioritaire (ZIP) des Seigneiries 2006. Atlas des habitats du chevalier cuivré (Moxostoma hubbsi) du Saint-Laurent et de ses tributaires. Comité Zone d'Intervention Prioritaire (ZIP) des Seigneiries 67 pages..

***Noturus flavus* - (11323)**

Fleuve Saint-Laurent, Saint-Lambert, près du Pont Victoria. / En 1941, un individu a été vu. Habitat : Profondeur 0,3 m.

45,491410 - -73,524530	Seconde (150 m.)	B5.04	Non	1941-05-28

MEILLEURE SOURCE : Faune et Parcs Québec. 2002. Fichier informatisé des relevés fauniques en milieu aquatique et riparien (En date de mars 2002). Longueuil, Direction régionale de la Montérégie. .

***Percina copelandi* - (2241)**

Fleuve St-Laurent, entre l'île aux Hérons et l'île aux Chèvres, jusqu'aux Rapides de Lachine. / Au moins 2 individus ont été capturés durant les 2 échantillonnages relatifs à cette occurrence, ayant eu lieu les 4 et 5 août 1941.

45,425460 - -73,577680	Minute (1,5 km.)	B5.04	Non	1941-08-05

MEILLEURE SOURCE : Faune et Parcs Québec. 1999. Fichier informatisé des relevés fauniques en milieu aquatique et riparien. (en date du 24 août 1999) Longueuil, Direction régionale de la Montérégie .

***Graptemys geographica* - (2946)**

Fleuve Saint-Laurent, Lac Saint-Louis, Lac des Deux-Montagnes, rivière des Prairies, rivière des Mille-Îles. / Le site a été utilisé en 1968. Une étude capture-recapture démontre que le site a été utilisé en 1977, 1978 et 1979. Au moins quatre individus ont été observé en 1980 et un individu en 1985. En 1988, le site a également été utilisé et au moins un individu a été observé en 1989 dans un site de nidification. Le site a été utilisé en 1990 et au moins trois observations ont été faites dans un site de nidification. Plusieurs individus ont été observés en 1994 pendant les mois de juin et juillet, soit 190 individus. En 1995, quinze individus ont été observés sur le site. En 1996, trois individus ont été observés et deux en 2001. Le site a également été utilisé en 2003 (mai et juin).

45,341380 - -73,859240	Seconde (150 m.)	B3.11	Non	2003

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Anonyme (1990).; Anonyme (1994).; Bélanger Dominic (2003).; Bider Jean Roger (1988).; Bider Jean Roger, Weil Greg (1980).; Bisson Robert, Lalonde Stéphane (1996).; Blouin-Demers Gabriel, Rodrigue David, Bider J. Roger (1995).; Bonin Joël (1995).; Brisson M. (1990).; Daigle Claude (1994).; De Grandmont Jean (1985).; De Grandmont Jean (1989).; De Grandmont Jean (1990).; Desroches Jean-François (2001).; Flaherty, Bider Jean Roger (1980).; Galois Patrick, Azar Christian (1996).; Gordon D.M.M., MacCulloch Ross D. (1977).; Gordon David M. (0).; Hackney Alison (1988).; Hoek Wyb, Lovrity Joseph E. (1968).; Laurion Isabelle (2001).; Leclerc François (1994).; Lovrity Joseph E. (0).; Rodrigue David, Bider Jean Roger, Casgrain Nicolas (1996).; Smar Matt (1988).

Nom latin - (no. d'occurence)

Localisation / Description

Latitude - Longitude	Qualité (Précision)	Indice de biodiversité	Cible de conservation	Dernière observation

Opheodrys vernalis - (15553)

Saint-Lambert, rail de chemin de fer entre la rue Notre-Dame et Oak, près du terrain de golf, Montérégie. / Un individu a été observé en juillet 1977. Habitat : milieu modifié, rail de chemin de fer.

45,501660 - -73,504440	Minute (1,5 km.)	B5.04	Non	1977-07-01

MEILLEURE SOURCE : AARQ. 1988 -. Atlas des amphibiens et reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent et ministère des Ressources naturelles et de la Faune du Québec. . Jolin Christian (1977).

Elliptio dilatata - (15387)

Fleuve Saint-Laurent, Montréal. /

45,500030 - -73,5333	Minute (1,5 km.)	B5.04	Non	1994-07

MEILLEURE SOURCE : MULETTES. 2000 -. Banque de données sur les mulettes du Québec, active depuis 2000. Gouvernement du Québec, ministère des Ressources naturelles et de la Faune, Direction de l'expertise sur la faune et ses habitats. Québec, Québec. .

Elliptio crassidens - (15386)

Fleuve Saint-Laurent, Montréal. Port de Montréal. /

45,500030 - -73,533280	Minute (1,5 km.)	B5.04	Non	1994-07-06

MEILLEURE SOURCE : MULETTES. 2000 -. Banque de données sur les mulettes du Québec, active depuis 2000. Gouvernement du Québec, ministère des Ressources naturelles et de la Faune, Direction de l'expertise sur la faune et ses habitats. Québec, Québec. .

2 – Nombre total d'espèces pour cette requête : 22

Nom latin	Rangs de priorité			Statut	Nombre d'occurrences dans votre sélection											Nombre au Québec
Nom commun	G	N	S		Total	A	B	C	D	X	H	F	E	I	Autre	
FAUNE																
Pseudacris triseriata	G5	N5	S2	vulnérable	18	0	0	0	0	6	2	0	10	0	0	239
rainette faux-grillon de l'Ouest																
Lithobates palustris	G5	N5	S3	susceptible	1	0	0	0	0	0	1	0	0	0	0	173
grenouille des marais																
Ixobrychus exilis	G5	N3	S2	vulnérable	3	0	0	1	0	1	0	0	1	0	0	87
petit blongios																
Haliaeetus leucocephalus	G5	N5	S3	vulnérable	1	0	0	0	0	0	0	0	1	0	0	225
pygargue à tête blanche																
Notropis bifrenatus	G3	N3	S3	vulnérable	1	0	0	0	0	0	0	0	1	0	0	51
méné d'herbe																
Apalone spinifera	G5	N2	S1	menacée	1	0	0	0	0	0	1	0	0	0	0	8
tortue-molle à épines																
Diadophis punctatus	G5	N5	S3	susceptible	1	0	0	0	0	0	0	0	1	0	0	91
couleuvre à collier																
Lampropeltis triangulum	G5	N5	S3	susceptible	1	0	0	0	0	0	1	0	0	0	0	115
couleuvre tachetée																
Storeria dekayi	G5	N5	S2	susceptible	2	0	0	0	0	0	0	0	2	0	0	86
couleuvre brune																
Falco peregrinus anatum	G4	N3	S3	vulnérable	7	0	0	0	0	0	0	0	7	0	0	161
faucon pèlerin anatum																

Nom latin	Rangs de priorité			Statut					Nombre d'occurrences dans votre sélection							Nombre
Nom commun	G	N	S		Total	A	B	C	D	X	H	F	E	I	Autre	au Québec
Coturnicops noveboracensis râle jaune	G4	N4	S2	menacée	1	0	0	0	0	1	0	0	0	0	0	48
Melanerpes erythrocephalus pic à tête rouge	G5	N3	ZZ	menacée	1	0	0	0	0	0	1	0	0	0	0	26
Ammodramus savannarum bruant sauterelle	G5	N4	S2	susceptible	1	0	0	0	0	0	0	0	1	0	0	44
Acipenser fulvescens esturgeon jaune	G3	N3	S3	susceptible	1	0	0	0	0	0	1	0	0	0	0	17
Moxostoma carinatum chevalier de rivière	G4	N2	S2	vulnérable	1	0	0	0	0	0	1	0	0	0	0	9
Moxostoma hubbsi chevalier cuivré	G1	N1	S1	menacée	1	0	0	1	0	0	0	0	0	0	0	6
Noturus flavus chat-fou des rapides	G5	N4	S2	susceptible	1	0	0	0	0	0	1	0	0	0	0	59
Percina copelandi fouille-roche gris	G4	N3	S2	vulnérable	1	0	0	0	0	0	1	0	0	0	0	57
Graptemys geographica tortue géographique	G5	N4	S2	vulnérable	1	0	1	0	0	0	0	0	0	0	0	12
Opheodrys vernalis couleuvre verte	G5	N5	S3	susceptible	1	0	0	0	0	0	1	0	0	0	0	124
Elliptio dilatata elliptio pointu	G5	N5	S2	susceptible	1	0	0	0	0	0	0	0	1	0	0	19

Nom latin	Rangs de priorité			Statut	Nombre d'occurrences dans votre sélection											Nombre
Nom commun	G	N	S		Total	A	B	C	D	X	H	F	E	I	Autre	au Québec
Elliptio crassidens elliptio à dents fortes	G5	ZZ	S2	susceptible	1	0	0	0	0	0	0	0	1	0	0	22
				Totaux:	48	0	1	2	0	8	11	0	26	0	0	

Signification des termes et symboles utilisés

Rang de priorité : Rang décroissant de priorité pour la conservation (de 1 à 5), déterminé selon trois échelles : G (globale; l'aire de répartition totale) N (nationale; le pays) et S (subnationale; la province ou l'État) en tenant compte principalement de la fréquence et de l'abondance de l'élément. Seuls les rangs 1 à 3 traduisent un certain degré de précarité. Dans certains cas, les rangs numériques sont remplacés ou nuancés par les cotes suivantes :
B : population animale reproductrice (breeding); H : historique, non observé au cours des 20 dernières années (sud du Québec) ou des 40 dernières années (nord du Québec); M : population animale migratrice; N : population animale non reproductrice; NA : présence accidentelle / exotique / hybride / présence potentielle / présence rapportée mais non caractérisée / présence rapportée mais douteuse / présence signalée par erreur / synonymie de la nomenclature / existant, sans occurrence répertoriée; NR : rang non attribué; Q : statut taxinomique douteux; T : taxon infra-spécifique ou population isolée; U : rang impossible à déterminer; X : éteint ou extirpé; ? : indique une incertitude

Qualité des occurrences : A : excellente; B : bonne; C : passable; D : faible; E : à caractériser; F : non retrouvée; H : historique; X : disparue; I : introduite

Précision des occurrences : S : 150 m de rayon; M : 1,5 km de rayon; G : 8 km de rayon; U : > 8 km de rayon

Indice de biodiversité : 1: Exceptionnel; 2: Très élevé; 3: Élevé; 4: Modéré; 5: Marginal; 6: Indéterminé (pour plus de détails, voir à la page suivante)

Cible de conservation : L'étiquette " cible de conservation " identifie les occurrences d'espèces légalement protégées pour lesquelles des actions prioritaires sont définies au plan de conservation.

Acronymes des herbiers : BL : MARCEL BLONDEAU; BM : Natural history museum; CAN : Musées nationaux; CCO : Université de Carleton; DAO : Agriculture Canada; DS : California academy of sciences; F : Field museum of natural history; GH : Gray; GR : Christian Grenier; ILL : University of Illinois; JEPS : Jepson herbarium; K : kew; LG : Université de Liège; MI : Université du Michigan; MO : Missouri; MT : MLCP (fusionné à MT); MT : Marie-Victorin; MTMG : Université McGill; NB : University of New Brunswick; NY : New York; OSC : Oregon state university; PM : Pierre Morisset; QFA : Louis-Marie; QFB-E : Forêts Canada; QFS : Université Laval; QK : Fowler; QSF : SCF; QUE : Québec; SFS : Rolland-Germain; TRTE : Toronto; UC : University of California; UQTA : Université du Québec; US : Smithsonian; V : Royal British Columbia museum; WAT : Waterloo university; WS : Washington state

Appendix 18 Emergency Response Guidelines (SLSMC)

DESSAU | CIMA+

EMERGENCY
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COLLISION BETWEEN SHIPS

(TCC Manual Section F-1)

Immediate Questions to BOTH ships:

1. Position?
2. Need any assistance? (casualties/fire/ambulance/police)
3. Any ingress of water? Any risk of sinking? If so, suggest trying to position the ship so as not to obstruct navigation.
4. Soundings in the tanks? in cargo holds?
5. Pollution?
6. Obstructing the channel?
7. Has the anchor been dropped?

Immediate Actions:

- ***IF POSSIBLE, have ship proceed to anchor, wharf, or wall.***
- ***Take the first steps to suspend or restrict navigation.***
- ***Wait for assessment of damages before permitting vessels to transit bridge / lock / channel.***
- ***Take note of weather conditions.***
- ***Close weirs as required.***

****

Info required / as soon as possible

- ➔ Condition of ship - damages?
- ➔ Cause of accident (breakdown? human error?)
- ➔ Exact position (long./lat. if on lakes)
- ➔ New vessel drafts
- ➔ Buoys off position?
- ➔ Statement from Master

PRIORITY NOTIFICATION LIST	TCC MANUAL
➢ Notify Shift Supervisor	F-1.3
➢ Notify Regional Ship Inspector(s) if requested by Shift Supervisor	F-1.3
➢ Notify the V.P. delegate if requested by the Shift Supervisor	F-1.3
➢ Notify / fax report of Accident / Incident to Cornwall	F-3
➢ Notify / fax report of Accident / Incident to CCG Sarnia	F- 2.1
➢ Notify the Agent or Owner of the vessel if requested by Master of vessel	

COLLISION SHIP / LOCK

(TCC Manual Section F-1, Locks Manual Section I-1)

Immediate Questions:

1. Need any assistance? (casualties/fire/ambulance/police)
2. Any ingress of water?
3. Soundings - in the tanks, in cargo holds?
4. Pollution?
5. Obstructing the channel?
6. Has the anchor been dropped?

Immediate Actions:

- ***If necessary, suspend navigation for inquiry purposes.***
- ***Ask Master to check damages.***
- ***Have Shift Supervisor make preliminary investigation of damages.***
- ***If equipment was struck, remind lock crew not to activate machinery.***
- ***Take note of weather conditions.***
- ***Close weirs as required.***

****

Info required / as soon as possible

➔ Condition of ship - If damages are serious, secure ship away from traffic
➔ Cause of accident (breakdown? human error?)
➔ New vessel drafts
➔ Statement from Master

PRIORITY NOTIFICATION LIST	TCC MANUAL
➢ Notify Shift Supervisor	F-1.3
➢ Notify Regional Ship Inspector(s) if requested by Shift Supervisor	F-1.3
➢ Notify the V.P. delegate if requested by the Shift Supervisor	F-1.3
➢ Notify / fax report of Accident / Incident to Cornwall	F-3
➢ Notify / fax report of Accident / Incident to CCG Sarnia	F- 2.1
➢ Notify the Agent or Owner of the vessel if requested by Master of vessel	
➢ Note all SLSMC damage reported by lock crew and supervisor	
➢ Notify Maintenance if requested by Shift Supervisor	

COLLISION SHIP / BRIDGE

(TCC Manual Section F-1, Bridge Manual Section H-1)

Immediate Questions:

1. Need any assistance? (casualties/fire/ambulance/police)
2. Any ingress of water? Any risk of sinking? If so, suggest that he tries to position the ship so as not to obstruct navigation.
3. Soundings - in the tanks, in cargo holds?
4. Pollution?
5. Obstructing the channel?
6. Has the anchor been dropped?

Immediate Actions:

- ***Inform Bridge Operator NOT to activate machinery.***
- ***If necessary, suspend navigation for inquiry purposes.***
- ***Have Bridge Operator make preliminary investigation of damages.***
- ***Note weather conditions.***
- ***Close weirs as required.***

****

Info required / as soon as possible

- ➔ Condition of ship - damages?
- ➔ Did you collide with a pier? a cell?
- ➔ Cause of accident (breakdown? human error?)
- ➔ New drafts
- ➔ Statement

	PRIORITY NOTIFICATION LIST	TCC MANUAL
➢	Notify Shift Supervisor	F-1.3
➢	Notify Regional Ship Inspector(s) if requested by Shift Supervisor	F-1.3
➢	Notify the V.P. delegate if requested by the Shift Supervisor	F-1.3
➢	Notify / fax report of Accident / Incident to Cornwall	F-3
➢	Notify / fax report of Accident / Incident to CCG Sarnia	F- 2.1
➢	Notify the Agent or Owner of the vessel if requested by Master of vessel	
➢	Note all SLSMC damage reported by lock crew, bridge operator & supervisor	
➢	Notify engineer to check bridge if requested by Shift Supervisor	

GROUNDING

TCC Manual Section F-1. Bridge Manual Section H-1)

Immediate Questions:

1. Position? (approx.)
2. Need any assistance? (casualties/fire/ambulance/police)
3. Any ingress of water?
4. Soundings - in the tanks, in cargo holds?
5. Pollution?
6. Obstructing the channel?
7. Has the anchor been dropped?

Immediate Actions:

- ***Advise vessel to remain in position - NO re-floating attempts.***
- ***Take first steps to suspend or restrict navigation.***
- ***Take note of weather conditions (especially wind direction & speed).***

****

Info required / as soon as possible

- ➔ Condition of ship - any damages?
- ➔ Cause of accident (breakdown? human error?)
- ➔ Exact position (longitude / latitude)
- ➔ New drafts (ext soundings)
- ➔ Buoys off position?
- ➔ Statement
- ➔ Exact water level

PRIORITY NOTIFICATION LIST	TCC MANUAL
➢ Notify Shift Supervisor	F-1.3
➢ Notify Regional Ship Inspector(s) if requested by Shift Supervisor	F-1.3
➢ Notify the V.P. delegate if requested by the Shift Supervisor	F-1.3
➢ Notify / fax report of Accident / Incident to Cornwall	F-3
➢ Notify / fax report of Accident / Incident to CCG Sarnia	F- 2.1
➢ Notify the Agent or Owner of the vessel if requested by Master of vessel	

POLLUTION LOCKS / CANALS

(Source: Ship)

(TCC Manual Section F- 4)

Immediate Questions:

1. Need any assistance? Crew in danger?
2. Major spill? Medium?
3. Where does spill originate from? From which tank? Nature of cargo?
4. Quantity spilled?
5. Cause of pollution?

Immediate Actions:

- ***Take initial steps to restrict /suspend navigation if necessary.***
- ***IF POSSIBLE, take action to control flow of water in area of spill.***
- ***IF POSSIBLE, have ship proceed to anchor, wharf or wall.***
- ***Note PRECISE wind direction / speed. Double-check with other ships, bridge operators or lock personnel.***
- ***Advise vessel master to activate on board contingency plan.***

	PRIORITY NOTIFICATION LIST	TCC MANUAL
➢	Notify Shift Supervisor	F-1.3
➢	Notify CANUTEC, refer to the vessel load plan and MSDS, if necessary	F - 4.3
➢	Notify lock crew, if necessary, of any known dangers from the spill and take any necessary steps including closing gates, shutting down the weir, evacuation, etc.	
➢	Notify the Ministry of Environment of Ontario (Shift Supervisor)	F - 4.3
➢	Notify Regional Ship Inspector(s) if requested by Shift Supervisor	F-1.3
➢	Notify the V.P. delegate if requested by the Shift Supervisor	F-1.3
➢	Notify police agency / fire department if necessary	F - 4.3
➢	Notify / fax report of Accident / Incident to Cornwall	F-3
➢	Notify / fax report of Accident / Incident to CCG Sarnia	F- 2.1
➢	Notify the Agent or Owner of the vessel if requested by Master of vessel	
➢	Notify all utilities/companies with downstream intakes	F - 4.3

POLLUTION LOCKS / CANALS

(Source: Land)

(TCC Manual Section F- 4)

<u>**Immediate** Questions</u>:

1. Location?
2. Major spill? Medium?
3. Where is spill originating from? Storage tank / drums? Pipe? Vehicle / equipment? Other?
4. Nature of spilled substance?
5. Quantity spilled?
6. Cause of pollution?

Immediate Actions:

- ***Take initial steps to restrict /suspend navigation if necessary.***
- ***IF POSSIBLE, take action to control flow of water in area of spill.***
- ***Note PRECISE wind direction / speed. Double-check with other ships, bridge operators or lock personnel.***
- ***Spill in Townline Tunnel will flow into drains and be pumped into canal and must be dealt with accordingly.***

	PRIORITY NOTIFICATION LIST	TCC MANUAL
➢	Notify Shift Supervisor	F-1.3
➢	Notify CANUTEC, refer to the MSDS, if necessary	F - 4.3
➢	Notify SLSMC personnel, if necessary, of any known dangers from the spill and take any necessary steps including closing gates, shutting down the weir, evacuation, etc.	
➢	Notify all utilities/companies with downstream intakes	F - 4.3
➢	Notify the Ministry of Environment of Ontario (Shift Supervisor)	F - 4.3
➢	Notify police agency / fire department if necessary	F - 4.3
➢	Notify the V.P. delegate if requested by the Shift Supervisor	F-1.3
➢	Notify / fax report of Accident / Incident to Cornwall	F-3
➢	Notify / fax report of Accident / Incident to CCG Sarnia	F- 2.1

POLLUTION IN OPEN WATERS

(Source: Ship)

(TCC Manual Section F- 4)

Immediate Questions:

1. Position?
2. Need any assistance? Crew in danger?
3. Major spill? Medium?
4. Where does spill originate from? From which tank? Nature of cargo?
5. Quantity spilled?
6. Is the spill contained? Need assistance to contain pollution?
7. Cause of pollution?

Immediate Actions:

- ***Have vessel proceed to safe anchorage as soon as possible.***
- ***Notify vessels and suspend navigation near spill area.***
- ***Note PRECISE wind direction / speed.***

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➔ In open waters, gather as much information as possible to classify the spill. Ask Captain for statement.

PRIORITY NOTIFICATION LIST	TCC MANUAL
➢ Notify Shift Supervisor	F-1.3
➢ Notify CANUTEC, refer to the vessel load plan and MSDS, if necessary	F - 4.3
➢ Notify the Canadian Coast Guard if in Canadian waters, U.S. Coast Guard if in U.S. waters	F - 4.3
➢ Notify the Ministry of Environment of Ontario if in Canadian Waters (Shift Supervisor)	F - 4.3
➢ Notify the V.P. delegate if requested by the Shift Supervisor	F-1.3
➢ Notify / fax report of Accident / Incident to CCG Sarnia	F- 2.1
➢ Notify the Agent or Owner of the vessel if requested by Master of vessel	

BOMB THREAT INCIDENT

(TCC Manual Section A-3, Locks Manual Section A-3.7)

Immediate Questions to caller:

1. Location of bomb?
2. Time of detonation?
3. Description of bomb?
4. Type of explosive?
5. Why was bomb placed?

Immediate Actions:

- ***Advise Lock crew / Shift Supervisor / Vessels by phone not to use VHF radios!!***
- ***Evacuate all unnecessary personnel from area immediately and secure area!***
- ***Complete lock / bridge operations and move vessels from area if time permits.***
- ***IF POSSIBLE have Lock crew / Shift Supervisor determine existence / exact location of suspicious device.***
- ***Evacuate everyone from area 15 minutes prior to threatened detonation.***
- ***Take first steps to suspend or restrict navigation.***

PRIORITY NOTIFICATION LIST	TCC MANUAL
➢ Notify Shift Supervisor	A 3.4
➢ Notify Transport Canada	A 3.4
➢ Notify SLSMC Security officer	
➢ Notify Police	A 3.4
➢ Notify Operations Manager / V.P. delegate (if requested by Shift Supervisor)	A 3.4
➢ Notify / instruct locks as instructed by Ops Shift Supervisor	
➢ Notify C.N. Railway if applicable	
➢ Notify M.T.O. if applicable	
➢ Notify / fax report of Accident / Incident to CCG Sarnia	F- 2.1
➢ Notify municipalities if applicable	

BOMB EXPLOSION INCIDENT

(TCC Manual Section A-3)

Immediate Questions to caller:

1. Location of explosion?
2. Injuries?
3. Area impacted by explosion – magnitude of blast?
4. Collateral damage (i.e., other structures affected such as gates, bridge, weir, etc.)?
5. Vessels, vehicles, public affected?
6. Is there a fire?

Immediate Actions:

- ***Evacuate all unnecessary personnel from area immediately and secure area!***
- ***Complete lock / bridge operations and move vessels from area if time permits.***
- ***Notify vessels by phone, not VHF radio!***
- ***Have Lock crew / Shift Supervisor determine extent of damage.***
- ***Take first steps to suspend or restrict navigation.***

	PRIORITY NOTIFICATION LIST	TCC MANUAL
➢	Notify Police, Fire and Emergency Medical Services	A 3.4
➢	Notify Shift Supervisor	A 3.4
➢	Notify Transport Canada	A 3.4
➢	Notify SLSMC Security officer	
➢	Notify Operations Manager / V.P. delegate (if requested by Shift Supervisor)	A 3.4
➢	Notify / instruct locks as instructed by Ops Shift Supervisor	
➢	Notify C.N. Railway if applicable	
➢	Notify M.T.O. if applicable	
➢	Notify / fax report of Accident / Incident to CCG Sarnia	F- 2.1
➢	Notify municipalities if required	

SEARCH AND RESCUE

(TCC Manual Section I-1)

Vessel in distress <u>or</u>
Vessel reports crew member missing <u>or</u>
Vessel requests assistance (sick crew member)

<u>**Immediate** Questions to vessel</u>:
1. Exact location
2. Nature and urgency of problem
3. Type of assistance required

Pleasure craft missing or overdue at destination
<u>**Immediate** Questions to caller</u>:
1. Name, length, colour and type of vessel
2. Number of persons on board
3. Port of departure, departure time, destination and ETA at destination

	PRIORITY NOTIFICATION LIST	TCC MANUAL
➢	Notify Shift Supervisor	A 3.4
➢	Notify other agencies as required (SLSDC, U. S. Coast Guard, CCG Sarnia)	I 1.1
➢	Notify RCC Trenton as required if incident occurs in Zone 1 or Zone 2 control sectors	I 1.1
➢	Notify Canadian Coast Guard in Pt. Weller if required	I 1.1
➢	Notify Operations Manager / V.P. delegate (if requested by Shift Supervisor)	
➢	Notify / fax report of Accident / Incident to CCG Sarnia as required	F- 2.1