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Deconstruction of the Existing Champlain Bridge

Targeted Environmental Analysis

Preliminary Report

Volume 2, sections 4 to 10

Assessment of Effects and Mitigation Measures



April 2019

Contract No 62555



**DECONSTRUCTION OF THE EXISTING CHAMPLAIN BRIDGE
(2016-2017)**

Contract No. 62555

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Executive summary

The 2013 environmental assessment (EA) for the New Bridge includes the deconstruction of the Existing Champlain Bridge, and this targeted environmental analysis (TEA) is being conducted to update the 2013 EA. This report represents volume 2 of the TEA of the Existing Champlain Bridge deconstruction project and features a description of the project's environmental effects and proposed mitigation measures. Volume 1 presented a description of both the project and its environment.

In order to determine the project's potential effects, correlations between the project's various phases and environmental components were identified. Each effect's significance were assessed using three parameters: intensity, duration and extent. Mitigation measures were identified to reduce the significance of those effects and ensure that residual effects are negligible under the *Canadian Environmental Assessment Act*, S.C. 1992, ch.37 (CEAA). The mitigation measures presented in the 2013 EA have been reviewed, adapted and enhanced to specifically reflect the effects of deconstruction, as well as to take into account the best practices in 2019 and the lessons learned during the New Bridge's construction work.

The main effects on physical environment components pertain to soil, groundwater and surface water quality. The presence of lightly contaminated soil, sediments and groundwater means that measures must be implemented to avoid spreading pollutants in the environment. Since a large part of the construction work will take place in or near water, many mitigation measures must be implemented to limit the dispersion of suspended matter and pollutants in the water. Water quality will be monitored throughout the construction period to ensure compliance with all requirements. Lastly, due to the presence of contaminants on the bridge, several mitigation measures must be implemented to minimize effects. Overall, the effects on the physical environment were deemed negligible in light of the proposed mitigation measures. Moreover, measures will be taken to mitigate air quality and greenhouse gas effects throughout the construction period.

The installation of jetties runs the risk of disrupting wetlands along the river's shore. Measures must be taken to limit this disruption, and an ecological function compensation project must be developed. Effects are also expected on the fish habitats, migratory birds and endangered species during the construction period. The project could lead to the disruption, deterioration or loss of fragile fish habitats. A compensation program will be required to mitigate those effects. Migratory bird nesting could also be disrupted during the construction period. Restriction periods will be implemented to minimize such disruptions. Endangered species (Peregrine Falcon and American Eel) could also be affected during the project. The Peregrine Falcon's nesting sites must be moved and the river currents near the jetties must not impede the migration of the American Eel and other fish species. Species with provincial status are also present. Specific measures must be taken to mitigate effects on the Brown Snake, Lake Sturgeon, American Shad, Chain Pickerel and Rosyface Shiner. In light of the mitigation measures and compensation projects, the effects on the biological environment are deemed negligible.

With regard to the human environment, the main effects will be noise pollution due to deconstruction work and material transportation. Mitigation measures are planned within sensitive areas during both phases. A noise management program must be implemented as soon as construction work begins to ensure compliance to all requirements. Some recreational activities may also be disrupted, but measures will be implemented to ensure user safety and minimize any inconvenience. Effects on human environments were deemed negligible and will be addressed with the proper mitigation measures.

The analysis of the project's cumulative and environmental effects also revealed that the project did not feature significant residual effects.

To comply with environmental requirements, JCCBI will require the selected contractor to implement an environmental management system. This system will enable the tracking and monitoring of the mitigation measures and performance objectives set during the EA, as well as reporting when needed.

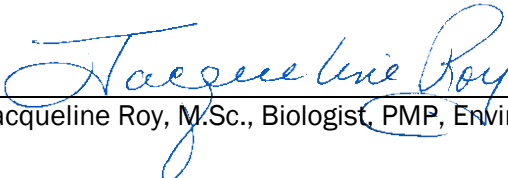
Lastly, JCCBI will also provide community benefits such as material recovery, asset enhancement (a shoreline development project for recreational and commemorative purposes), Envision certification and an R&D programme using materials or components taken from the deconstructed bridge.

Project team

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Appendix 13 – Hydraulic simulations methodology

List of Acronyms

ABBREVIATIONS	FULL NAME
AADT	Annual average daily traffic
AARQ	Atlas of Amphibians and Reptiles of Québec
AB	As built
AMQ	Association maritime du Québec
AONQ	Québec Breeding Bird Atlas (Atlas des oiseaux nicheurs du Québec)
ARCDW	Act Respecting the Conservation and Development of Wildlife
ARTVS	Act Respecting Threatened or Vulnerable Species
BAnQ	Bibliothèque et Archives nationales du Québec
BCA	Breeding conservation area
CABIN	Canadian Aquatic Biomonitoring Network
CBC	Christmas Bird Count
CCDG	Cahier des charges et devis généraux of the MTQ (in French only)
CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers of the Environment
CDPNQ	Centre de données sur le patrimoine naturel du Québec
CEAA	Canadian Environmental Assessment Act
CIS	Canadian Ice Service
cm	Centimetre
CNESST	Commission des normes, de l'équité, de la santé et de la sécurité du travail
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Department of Fisheries and Oceans Canada
DNA	Deoxyribonucleic acid
DU	Ducks Unlimited
EA	Environmental assessment
ECCC	Environment and Climate Change Canada

ÉPOQ	Étude des populations d'oiseaux du Québec (study of Quebec bird populations)
EPT	Ephemeroptera-Plecoptera-Trichoptera
EQA	Environment Quality Act
FEL	Frequent effect level
GCQ	Groupe Chiroptères du Québec
GHG	Greenhouse gases
GPS	Global positioning system
ha	hectare
HBI	Hilsenhoff Biotic Index
HWM	High-water mark
IAS	Invasive alien species
IBA	Important Bird Areas Canada
IDS	L'Île-des-Soeurs (Nuns' Island)
INAC	Indigenous and Northern Affairs Canada
INFC	Infrastructure Canada
JCCBI	The Jacques Cartier and Champlain Bridges Incorporated
kg	Kilogram
km	Kilometre
km ²	Square kilometre
m	Metre
m ²	Square metre
m ³ /s	Cubic metres per second
MBCA	Migratory Birds Convention Act, 1994
MBS	Migratory bird sanctuary
MCK	Mohawk Council of Kahnawake
MDDEFP	Ministère du Développement durable, de l'Environnement, des Forêts et des Parcs
MDDEP	Ministère du Développement durable, de l'Environnement et des Parcs
MELCC	Ministère de l'Environnement et de la Lutte contre les changements climatiques
MFFP	Ministère de la Faune, des Forêts et des Parcs
mt	Metric tonne
MTQ	Ministère des Transports du Québec (Quebec Ministry of Transport)
NBSL	New bridge over the Saint Lawrence

NCC	Nature Conservancy of Canada
No.	Number
NOL	No effect level
OEL	Occasional effect level
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls
PEL	Probable effect level
PTA	Consortium of Parsons, Tetra Tech and Amec Foster Wheeler
RM	Residual materials
SARA	Species at Risk Act
SEG	Permit for scientific, educational and wildlife management purposes
SLSMC	St. Lawrence Seaway Management Corporation
sq. ft.	Square foot
SS	Suspended matter
SSL	Signature on the Saint Lawrence
TC	Transport Canada
TEA	Targeted Environmental Analysis
TOC	Total organic carbon
TP	Total phosphorus
TTC	Tetra Tech/Cima
µm	Micrometre
WGA	Waterfowl gathering area
ZIP	Zone d'intervention prioritaire (Priority intervention zone)

Glossary

Decking	Flat horizontal surface enabling vehicles to drive over; can be made of various materials such as steel, wood or concrete
Driven piles	Steel or concrete tube driven into the ground with a pile driver to reinforce a foundation when soil is of lower quality
Coffer dam	Temporary dam put in place to allow work activity below water level
Gantry crane	Steel structure on rails for lifting and moving loads
Corbelling	Bridge construction technique of adding or removing bridge sections sequentially
Asphalt surface	Surface course, bitumen
Paired truss girders	Steel truss beams assembled in triangular shape
Cantilever	Bridge whose main beams extend in cantilever and support a reduced span beam in return
Temporary pile group	Row of steel piles or supports driven into the ground, forming a rigid barrier so that one side of the barrier can be excavated
Leveling	Leveling of a land feature. With regard to piers, it refers to the level at which they are cut from their foundation
Floes	Any relatively flat fragment of ice 20 m or more across
Left bank and right bank	<p>Lateralization of the banks of a body of water (river, stream, torrent, creek) by an observer looking in the direction of flow; i.e., from upstream to downstream. The left bank is then located to the observer's left, and the right bank to his right.</p> <p>In this report, South Shore, right bank, and Brossard side are equivalent and identify the same geographic point, as do the notions of North Shore, left bank, and Nuns' Island side.</p>

4 INFORMATION SESSIONS

4.1 PUBLIC AND STAKEHOLDER INFORMATION

The information process implemented by JCCBI for the TEA provides several opportunities and means for the general public and stakeholders to access information about the project, as well as convey their interests and concerns. The initial phase will take place in spring 2019, as part of the development of the TEA and material recovery, enhancement and R&D programs. This phase features the following steps and activities:

DATES	ACTIVITY
From March 2019	Meetings with targeted stakeholders to outline the project, available documentation and the means at their disposal to convey their comments online or in person.
April 2019	Creation of an advisory committee composed of stakeholders representing a range of interests to produce opinions and recommendations to JCCBI with regard to the project's development, as well as the public and stakeholder information process.
May 1st 2019	Beginning of the public information period announced through a press conference and social media campaign, along with targeted invitations (emails, announcements, mailings).
May 8 2019	TEA and relevant documentation posted on JCCBI's website; integrated feedback modules (online questionnaires and discussion forum) to enable citizens and interest groups to submit their comments.
May 8 and 9 2019	Open house public consultations at the Centre for Sustainable Development in Montreal, including themed presentations. These meetings also aim to reach individuals and groups interested in the various environmental and sustainable development measures and programs. Feedback collection tools will also be available on site.
May 11 and 13 2019	Open house public consultations at L'Île-des-Soeurs (Verdun borough) and the City of Brossard. These activities specifically aim to reach citizens and companies that may be concerned by inconveniences related to the construction site. Feedback collection tools will also be available on site.
June 30 2019	Deadline to submit comments online.

Additional themed workshops and information sessions and tools are slated to begin in fall 2019 to provide more information about specific aspects of the project's implementation.

With regard to the TEA, JCCBI will seek feedback during the May meetings on the proposed mitigation measures for the deconstruction project, as well as on the analysis of cumulative effects, in order to improve the project.

4.2 FIRST NATIONS CONSULTATION

Consultations with the Mohawk Council of Kahnawake and Mohawk Council of Kanésatake were launched as part of the TEA and are ongoing.

During this process, JCCBI proposes meetings to discuss their concerns about the project's potential effects and their suggestions regarding possible compensation projects. JCCBI plans to continue these discussions throughout the project's development.

5 ENVIRONMENTAL EFFECTS ASSESSMENT METHOD

The method used to assess the environmental effects of the deconstruction of the Existing Champlain Bridge is the same as the one used in the 2013 EA. It is included in the sections below to make the document easier to read.

5.1 ASSESSMENT METHODOLOGY

5.1.1 IDENTIFICATION AND ASSESSMENT OF EFFECTS

The methodology used for the assessment of environmental effects consists of two main stages: 1) the identification of potential effects and 2) the assessment of potential effects.

The identification of potential effects consists in determining the components of the physical, biological and human environments likely to be affected by project activities. This is done using an interrelationships grid that presents valued ecosystem components on the vertical axis and project execution activities on the horizontal axis.

The assessment of potential effects then consists in defining the significance of the effects associated with the execution of the project. The significance of an effect on an environmental component is based on three parameters, i.e. its intensity, its duration and its extent.

The three parameters are assessed based on the definitions provided in section 5.1.2 and by using the multicriteria matrix in Table 47.

Lastly, the significance of residual effects is assessed while considering the application of mitigation measures.

5.1.2 DETERMINATION OF THE SIGNIFICANCE OF AN ENVIRONMENTAL EFFECT

5.1.2.1 Intensity of the effect

The intensity of the effect corresponds to the component's level of disturbance. Three levels have been defined:

- Low:** Little change to the component's characteristics. Difficult to quantify;
- Moderate:** Change to some of the component's characteristics. The change is quantifiable;
- High:** Change to all of the component's main characteristics. This change is quantifiable.

5.1.2.2 Duration of effect

Precise duration of the temporal dimension of the effect. The terms *permanent*, *temporary* and *momentary* are used to qualify this period of time:

Momentary: The effect disappears quickly;

Temporary: The effect is felt during a project activity or at most during the execution of the project;

Permanent: The effect has a permanent impact following deconstruction and restoration.

5.1.2.3 Extent of effect

The extent qualifies the spatial dimension of the effect that is generated by an action in the environment. It refers to the distance or surface area where the disturbance will be felt. The terms *regional*, *local* and *limited* are used to qualify the extent:

Limited: The extent is limited when the work only affects an environmental element near the project;

Local: The extent is local when the action affects the study area;

Regional: The extent is regional when the action goes beyond the study area.

5.1.2.4 Assessment of potential effect

These three parameters are integrated into a multicriteria matrix in order to assess the potential effect based on three categories:

Significant effect (S): Means that the effect is permanent and affects the integrity, diversity and longevity of the element. Such an effect significantly or irremediably alters the quality of the environment;

Non-significant effect (NS): Means that the effect is perceptible, temporary and/or has a low recurrence rate, has only a slight effect on the environmental component, and the latter is not irreversibly affected. Such an effect is of short duration and/or limited in scope;

Negligible effect (N): Means that there is no or almost no effect, the effect does not affect the environmental component in an observable or quantifiable manner, and it is similar to a natural effect that can occur randomly. Such an effect is generally of short duration and is limited in scope.

Table 47 – Multicriteria analysis to determine the potential effect

INTENSITY	DURATION EXTENT	MOMENTARY	TEMPORARY	PERMANENT
Low	Limited	N	N	NS
	Local	N	N	NS
	Regional	N	NS	S
Moderate	Limited	N	NS	NS
	Local	NS	NS	S
	Regional	NS	S	S
High	Limited	NS	S	S
	Local	NS	S	S
	Regional	S	S	S

N: Negligible; NS: Not significant; S: Significant

5.1.3 MITIGATION

Mitigation measures were assessed in the 2013 EA and are reviewed and updated as necessary.

The CEAA defines mitigation as:

The elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means (CEAA).

Once the environmental effects have been identified and assessed, mitigation measures are determined to reduce the magnitude of the significant and non-significant effects. These measures are designed to mitigate or correct the negative effects to allow the project to be better integrated into the environment.

5.1.4 RESIDUAL EFFECTS

After implementing mitigation measures, the magnitude of the environmental effects can then be re-assessed; these then become residual environmental effects, representing the effect that remains once the mitigation measures have been applied. Following the implementation of the mitigation measures, significant or non-significant residual effects may remain:

Non-significant residual effect: Means that the residual effect is temporary and/or has a low rate of recurrence and/or is of limited extent, or that it has little or no effect on the environmental component;

Significant residual effect: Means that despite the use of mitigation measures, the residual effect permanently affects the environmental component.

6 ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

6.1 IDENTIFICATION OF POTENTIAL EFFECTS RELATED TO THE PROJECT

The potential effects of the project have been identified based on the grid shown in Table 48. The grid shows, on the y-axis, the environmental components that were part of the description of the environment (in Volume 1, section 3), and on the x-axis, the sources of impact associated with the project execution stages. Table 49 presents the sources of the impacts and the relationship between them and the project components as identified below.

The project components are described in section 2 (Volume 1) of the TEA.

The identification of potential effects takes the following into account:

- The technical characteristics of the project and the planned work methods as known at this stage of the process;
- Knowledge of the environment;
- The lessons learned from similar projects, in particular the construction of the New Champlain Bridge;
- The community's concerns regarding the project.

6.2 ASSESSMENT OF POTENTIAL EFFECTS RELATED TO THE PROJECT

Table 74, Table 75 and Table 76 (presented in section 6.2.2) show the assessment of the potential environmental effects, the required mitigation measures, and an assessment of the residual effects that may remain after the measures have been applied for the Existing Champlain Bridge deconstruction project. Some components have been the subject of more detailed analyses, including hydraulics, traffic, sound environment, air quality, GHGs and navigation. In addition, since several impacts (traffic, sound environment, air quality) influence the effects on quality of life, a more detailed analysis has been developed. Detailed analysis of these effects is presented in section 6.2.1.

The mitigation measures identified in Table 74, Table 75 and Table 76 were grouped into four categories:

- Design criteria that will be considered and included when preparing the plans and specifications for the works, identified as “CC” in Table 74, Table 75 and Table 76. A discussion of these criteria is found in section 6.3.1;
- Current mitigation measures from industry standards and government guides, and the lessons learned during the New Champlain Bridge construction project. These measures are indicated by the acronyms “MPO,” “CCDG” and “NC” in Table 74, Table 75 and Table 76 and listed in section 6.3.2. DFO's measures are those recommended by the Department and reflect 2018 practices; the acronym MPO refers to these measures. The CCDG is the General Specifications and Specifications of the Ministère des Transports du Québec (MTQ). It is a contractual part of all construction contracts under the responsibility of the MTQ and contains several specific measures to protect the environment. NC is the acronym for the MTQ's construction standards. These standards consist of several volumes, one of which is specific to environmental aspects;

- Special mitigation measures identified by “P” in Table 74, Table 75 and Table 76 and listed in section 6.3.3;
- Performance criteria with a defined objective, identified as “CP” in Table 74, Table 75 and Table 76. The main lines of the monitoring program are presented in section 7.2.

The mitigation measures, taken from the 2013 EA, have been updated in this TEA to specifically reflect the effects associated with the deconstruction of the Existing Champlain Bridge. The update consisted of the following:

- Conducting workshops with Infrastructure Canada to benefit from the lessons learned during the construction of the New Champlain Bridge;
- Adding measures according to the specificities and issues identified during the updates of the various components of the environment;
- Adapting the measures according to the possible deconstruction methods;
- Adapting the measures according to the best practices in force in 2019;
- Removing measures that were not relevant to deconstruction.

All the mitigation measures will be included in the request for proposals sent out to select the contractor in charge of Existing Champlain Bridge deconstruction. This contractor will have to produce his own reference project by including all of the above measures in the design. JCCBI shall conduct a review and analysis to ensure that all the measures and objectives mentioned in this document have been fully integrated in the proposed work methods. Note that new measures may be required from DFO and TC when issuing their licenses.

Use of a monitoring protocol, the broad lines of which are presented in Chapter 7 of this document, will ensure that a) the mitigation measures are in fact in place and b) the performance objectives have been met.

The following sections present some of the anticipated effects in more detail. A summary of all effects and measures is provided in Chapter 8.

Table 48 – Interrelationships between the environmental components and the project

ENVIRONMENTAL COMPONENT	PRE-DECONSTRUCTION		DECONSTRUCTION							POST-DECONSTRUCTION	
	Work site mobilization and construction of temporary installations	Maintaining traffic and navigability and installation of signage	Soil stripping and tree clearing	Excavation, earthworks	Deconstruction of structures	Work in aquatic environments (creation of jetties and demolition of piers)	Management of waste and hazardous materials	Transport, use and maintenance of machinery	Temporary closure of work site	Work in aquatic environment (removal of jetties)	Work site demobilization and deconstruction of temporary installations
Physical Environment											
Soil and sediment quality	X		X	X		X	X	X		X	X
Surface water quality	X		X	X	X	X	X	X		X	X
Hydrology and hydraulics						X					
Groundwater quality	X			X		X	X	X			X
Air quality and GHG	X	X		X	X		X	X			
Biological Environment											
Vegetation:	terrestrial	X		X							
	aquatic					X					
	wetlands			X	X						
Fish and habitats			X	X	X	X		X	X	X	
Reptiles/amphibians and habitats	X		X		X						
Birds and habitats	X		X		X	X				X	
Mammals	X		X								
Special status species	X		X		X	X				X	
Human Environment											
Commercial shipping		X		X	X	X					
Recreational and tourism activities and pleasure boating	X	X	X		X	X		X		X	
Sound environment	X	X			X	X		X		X	
Traffic and infrastructures		X		X	X	X		X		X	
Archeology and heritage			X								
Land and buildings				X							

Table 49 – Relationships between the project components and the activities listed in the effects grid

ACTIVITIES	DESCRIPTION OF WORK
Pre-deconstruction phase	
Work site mobilization and construction of temporary installations	<ul style="list-style-type: none"> ▶ Installation of work site trailers, sanitary services and hookups ▶ Installation of work, materials storage and waste areas ▶ Installation of temporary production areas, if required ▶ Construction of temporary accesses to mobilization areas and parking
Maintaining traffic and navigability, installation of signage	<ul style="list-style-type: none"> ▶ Detour and closure of traffic lanes and bicycle paths (if required) ▶ Detour and closure of recreational waterways (if required) ▶ Installation of signage
Deconstruction phase	
Soil stripping and tree clearing	<ul style="list-style-type: none"> ▶ Site preparation ▶ Tree clearing ▶ Surface stripping ▶ Topsoil storage
Excavation, earthworks	<ul style="list-style-type: none"> ▶ Excavation, cut, fill and earthworks ▶ Segregation and management of contaminated soil and sediment ▶ Water segregation and contaminated water management
Deconstruction of structures	<ul style="list-style-type: none"> ▶ Deconstruction of various sections of the bridge (except for the piers and footings) ▶ Deconstruction of steel structures ▶ Deconstruction of concrete structures ▶ Debris crushing
Work in aquatic environments	<ul style="list-style-type: none"> ▶ Construction of temporary structures (e.g. cofferdams, jetties) ▶ Removal or cutting of piers ▶ Demolition of footings ▶ Saw slurry management
Management of waste and hazardous materials	<ul style="list-style-type: none"> ▶ Management of debris and waste, including the various materials from the deconstruction of the bridge ▶ Management of hazardous materials (lead, asbestos)
Machinery transport, operation and maintenance	<ul style="list-style-type: none"> ▶ Movement of machinery, vehicles and barges ▶ Vehicle and machinery maintenance ▶ Transportation of materials by land and river ▶ Lighting during the work
Temporary closure of the work site	<ul style="list-style-type: none"> ▶ Stabilization of work areas in the event of temporary closure in the winter
Post-deconstruction phase	
Work in aquatic environments	<ul style="list-style-type: none"> ▶ Dismantlement of temporary installations in aquatic environments (jetties)
Work site demobilization and dismantlement of temporary installations	<ul style="list-style-type: none"> ▶ Dismantlement of temporary installations ▶ Restoration of storage areas ▶ Site reclamation

6.2.1 DETAILED ANALYSIS OF THE EFFECTS

In order to properly assess some of the effects, detailed analyses were conducted. These detailed analyses include the hydraulic effects of the project (section 6.2.1.1.1), traffic (6.2.1.2), noise climate (6.2.1.3), air quality (6.2.1.4), GHGs (6.2.1.5), navigation (6.2.1.6) and quality of life (6.2.1.7).

6.2.1.1 Description of effects – Hydraulic simulations

The construction of jetties in a watercourse can impact several components of the environment and the analysis of effects requires the use of hydraulic simulation. The following section presents the hydraulic simulation performed as part of the AEC.

6.2.1.1.1 Impact of jetties for deconstruction

Deconstruction work may require the implementation of three jetties under the Existing Champlain Bridge, as shown in Figure 41. At this stage, the construction jetties for the New Champlain Bridge will have been fully deconstructed, with the exception of 30-cm-thick backfill left on the Brossard side due to previous contaminated bottom sediment.

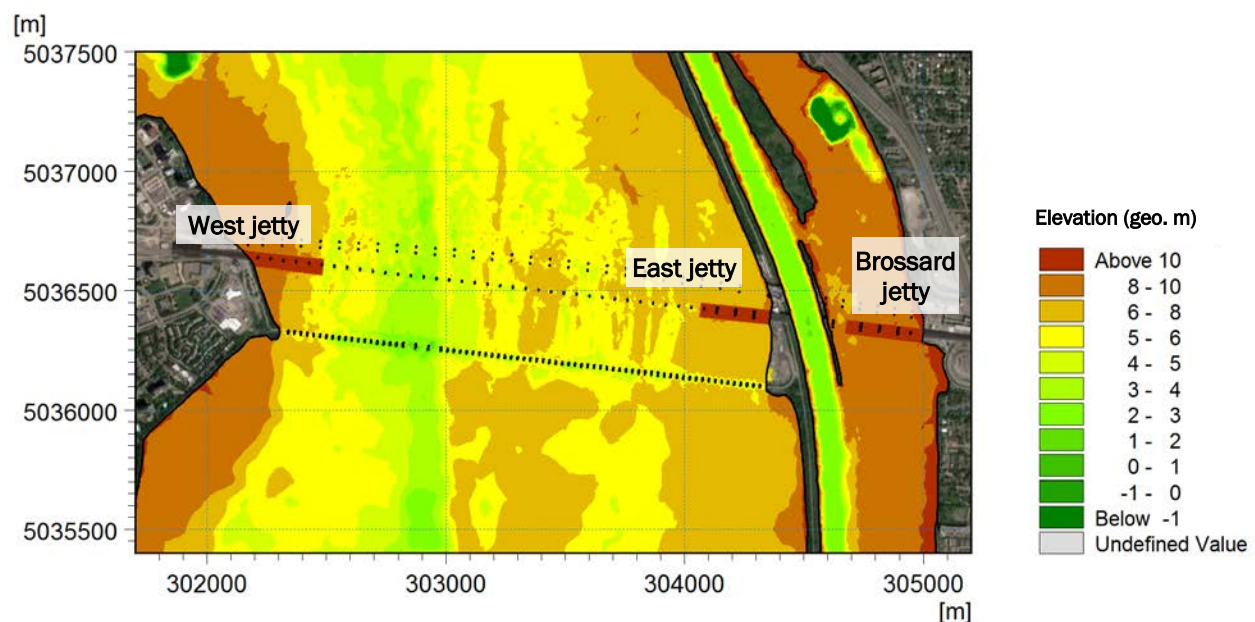


Figure 41 – Deconstruction jetties for the Existing Champlain Bridge

6.2.1.1.1.1 Configuration of deconstruction jetties

The jetties were included in the digital model (Appendix 13 presents more details on the methodology that was used). The preliminary jetty design includes the following elements:

- Crest width: 50 m;
- Crest height: 13.0 m;
- Side slope: 1V:1.5H.

6.2.1.1.1.2 Modelling scenarios

To assess the impact of the jetties on the hydrodynamic conditions of the St. Lawrence River, the two following states were compared:

1. Prior to deconstruction: construction jetties for the New Champlain Bridge levelled off and piers of the Existing Bridge and New Bridge Champlain in place;
2. Start of deconstruction: three deconstruction jetties and piers of the Existing Bridge and New Bridge in place.

The hydrodynamic conditions found with these two configurations were simulated for low flow $Q_{2.7}$ and flow rates for 1:2-year and 1:100-year floods (Table 50).

Table 50 –Modelling scenarios for assessing the impact of the deconstruction jetties

SCENARIO	DESCRIPTION	QT@LASALLE	QBRAS NORD*	QBRAS SUD**	HAVAL
		(M ³ /S)	(M ³ /S)	(M ³ /S)	(M)
1	Low flow $Q_{2.7}$	6,895	3,103	3,792	5.33
2	1:2-year flood	11,325	5,096	6,229	7.42
3	1:100-year flood	13,260	5,967	7,293	8.33

Note: QT: total flow at the station; Q: flow in the north or south arm; H: water level;

*North Arm: Bras of the St. Lawrence River north of Goat Island

**South Arm: Bras of the St. Lawrence River south of Heron Island

6.2.1.1.1.3 Results

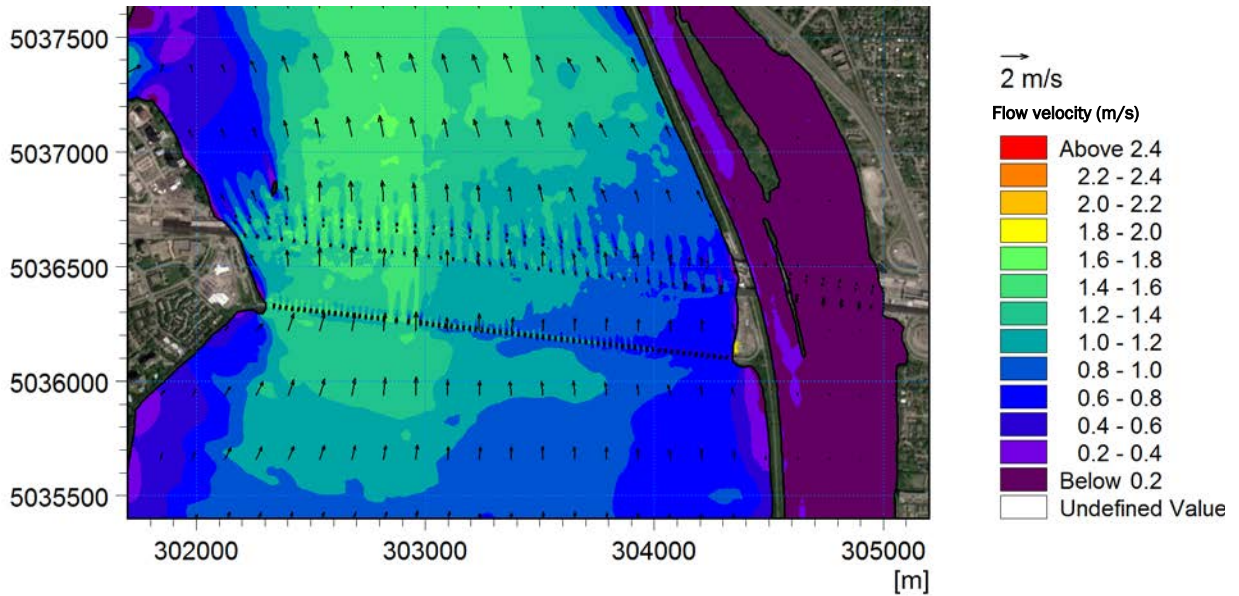
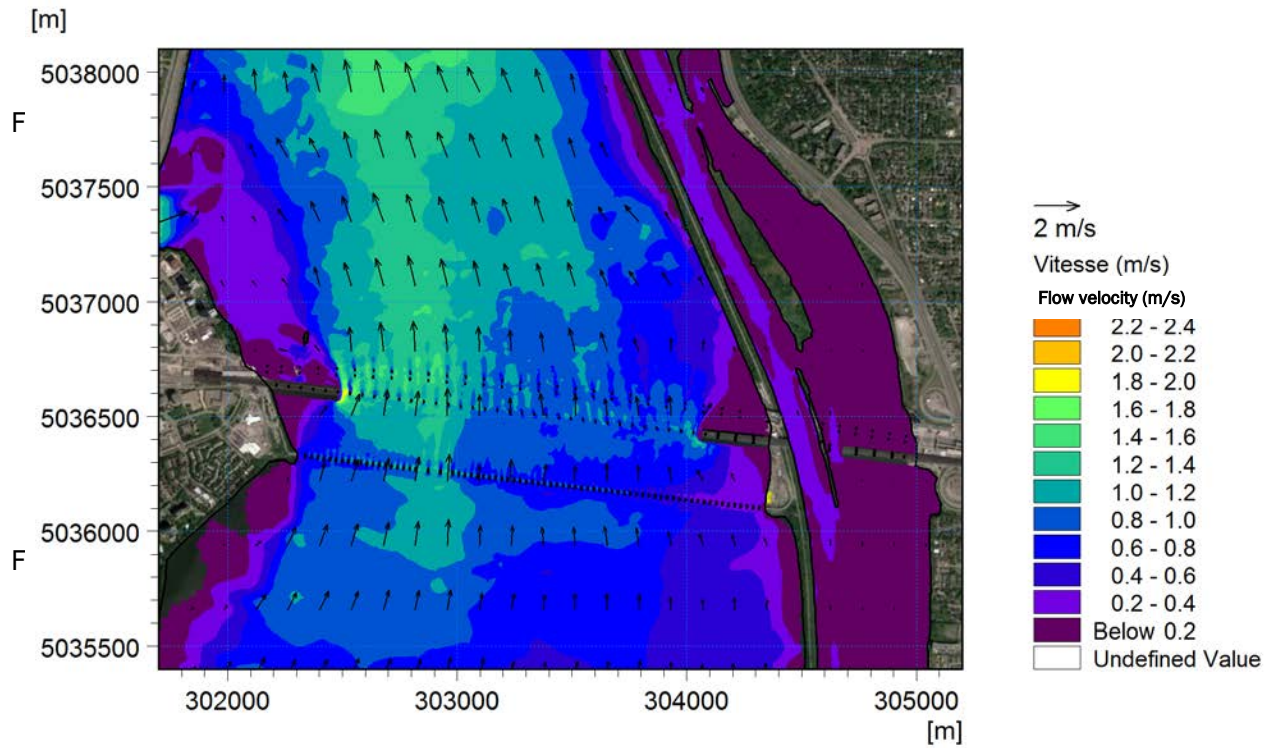
6.2.1.1.1.3.1 Flow velocities

The velocity fields obtained with and without the deconstruction jetties are presented in Figure 42, Figure 43 and Figure 44 for the three scenarios in Table 50.

In general, the jetties create a calmer area in their wake along with somewhat accelerated flow around their end point. This effect is more pronounced for the Nuns' Island jetty, which is located in a flow passage with a naturally higher velocity.

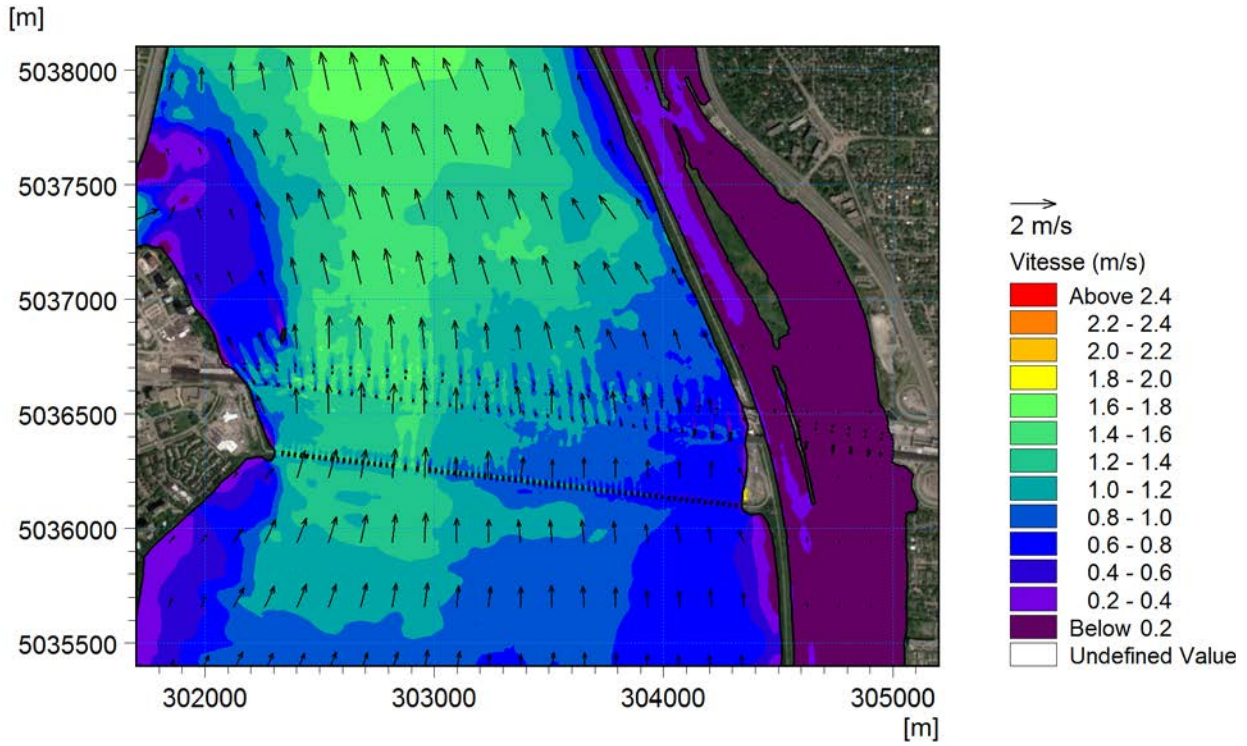
The narrowing of the flow section created by the Nuns' Island and St. Lawrence Seaway jetties has the effect of increasing velocity. However, this increase in velocity is limited to the bridge area and diminishes quickly. Downstream of Nuns' Island, the velocity fields with and without jetties are basically identical.

A) Without jetties

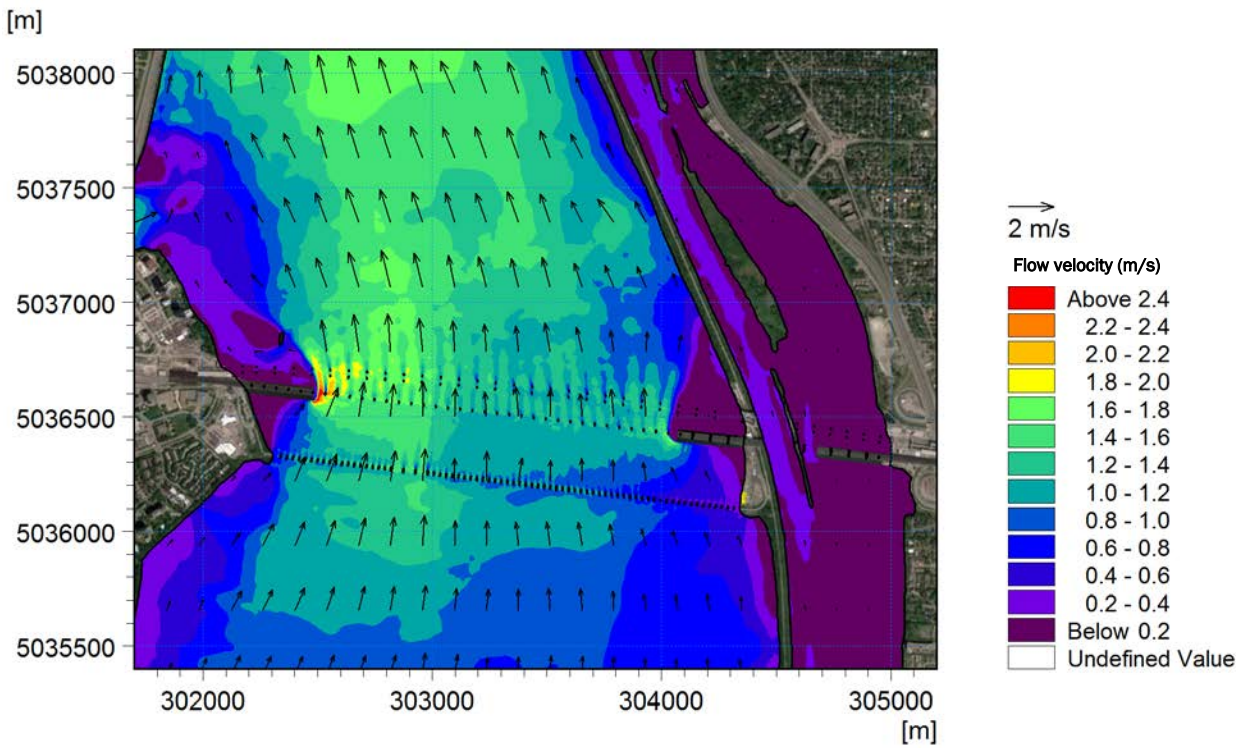


B) With jetties

Figure 42 – Velocity fields for the flow rate for a 1:100-year flood (13,260 m³/s)

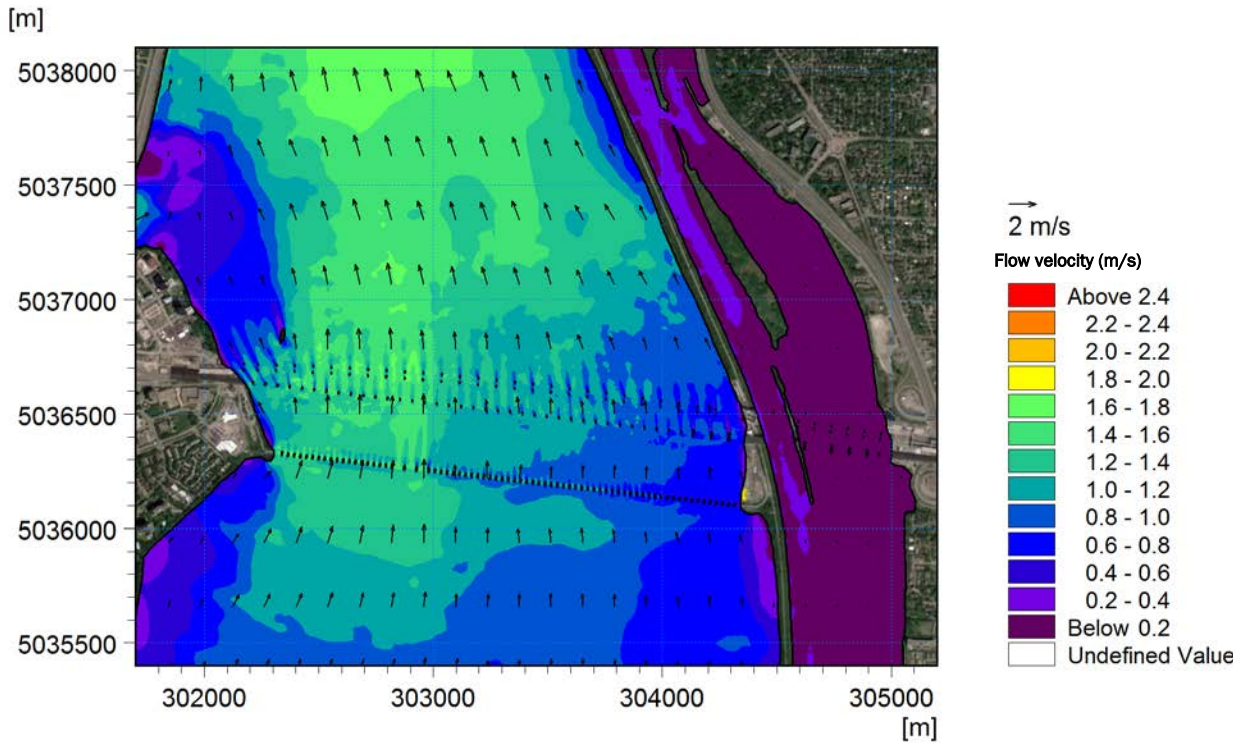


a) Without jetties

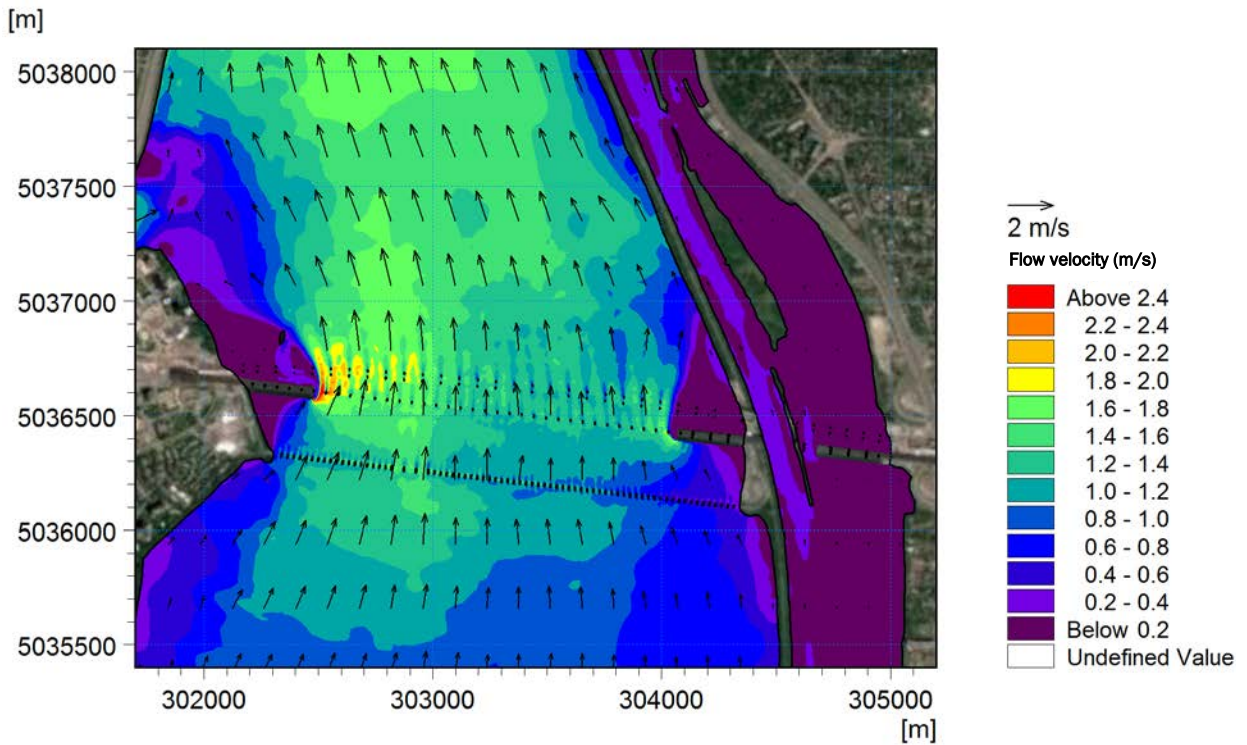


b) With jetties

Figure 43 – Velocity fields for the flow rate for a 1:2-year flood (11,325 m³/s)



a) Without jetties



b) With jetties

Figure 44 – Velocity fields for the flow rate for a 1:100-year flood (13,260 m³/s)

To better understand the changes brought by the deconstruction jetties on the site's hydrodynamic conditions, Figure 45 summarizes the results obtained in terms of differences in velocity. Positive differences (in blue) represent increased flow, while negative differences (in green) represent a decrease. Differences of ± 0.05 m/s are considered negligible and are not shown.

As previously noted, the effect of the jetties is no longer felt downstream of Nuns' Island. On the upstream side, a certain reduction in velocity can be noted along the shores of the Greater La Prairie Basin. However, the increase in velocity in the middle of the flow section, where the Ice Control Structure is located, is modest, with values below 0.10 m/s.

The Seaway channel is virtually unaffected by the jetty on the Brossard side. The nipping off of the flow section in the Lesser La Prairie Basin creates a slight increase in the water level upstream, which has the effect of directing the flow slightly more toward the Seaway. Based on the modelling results, the velocities in a narrow strip on the left bank increase by at most 0.07 m/s. Maximum velocities around the jetty are roughly 0.4 m/s.

6.2.1.1.1.3.2 Water levels

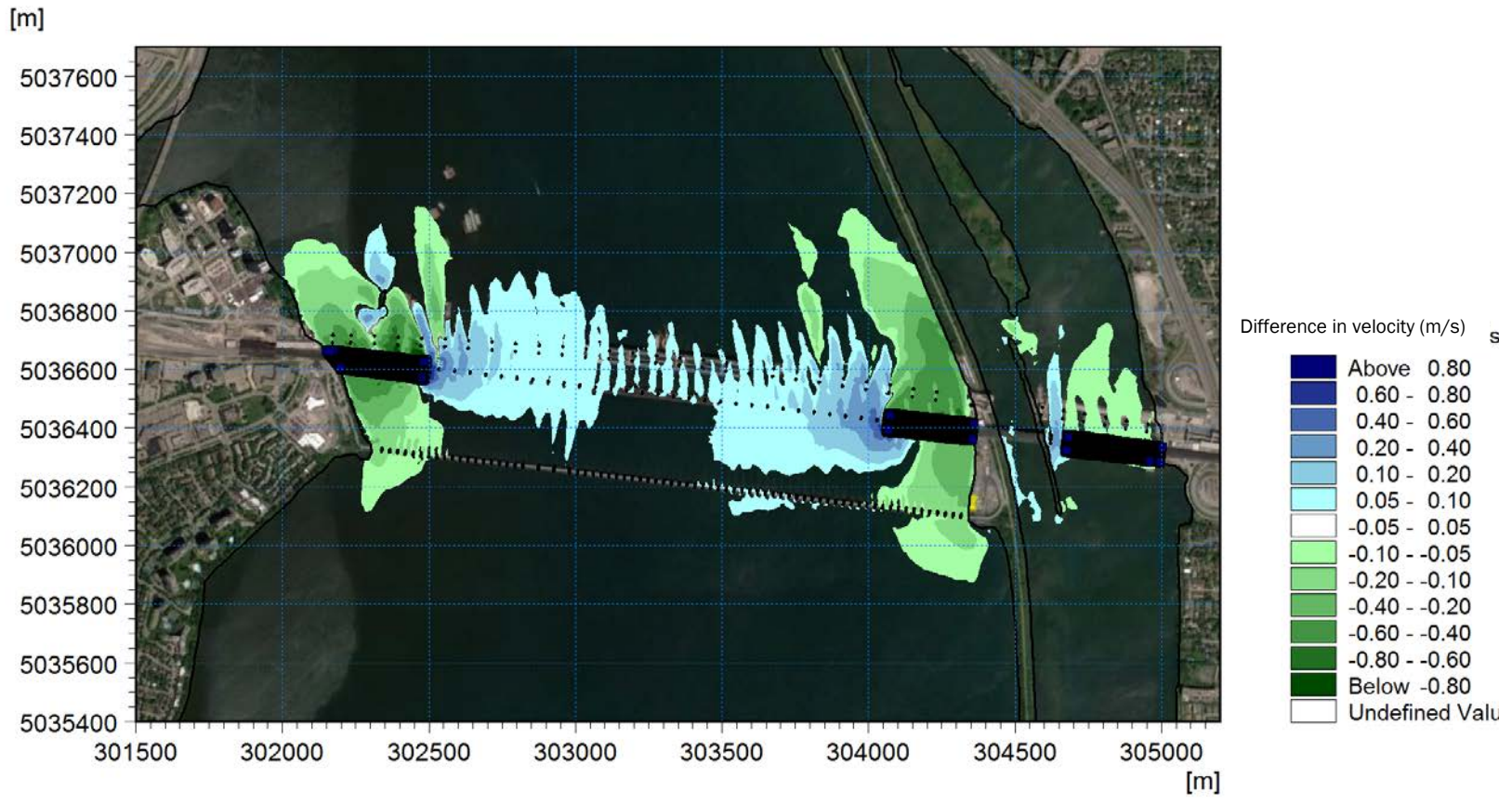
Figure 46 is presented similarly to Figure 45, but this time for water levels¹. Differences of ± 0.02 m are considered negligible and are not represented.

Downstream of the jetties, besides the areas located directly in the wake of the jetties, no changes can be seen in the three modelled scenarios. Upstream, the effect of the jetties on water levels increases with the flow rate. Hence, in low flow, the increases in level are localized and below 0.03 m upstream of the ice control structure. For the two flood flows, the increases in level extend across the Greater La Prairie Basin, but the maximum values that are attained are low, i.e. roughly 0.04 m and 0.06 m for the 1:2-year and 1:100-year floods, respectively. Given the natural variability of the levels recorded at hydrometric station O20A041 located in the study area (see Figure 2.6 in Appendix 13), these differences can be considered negligible.

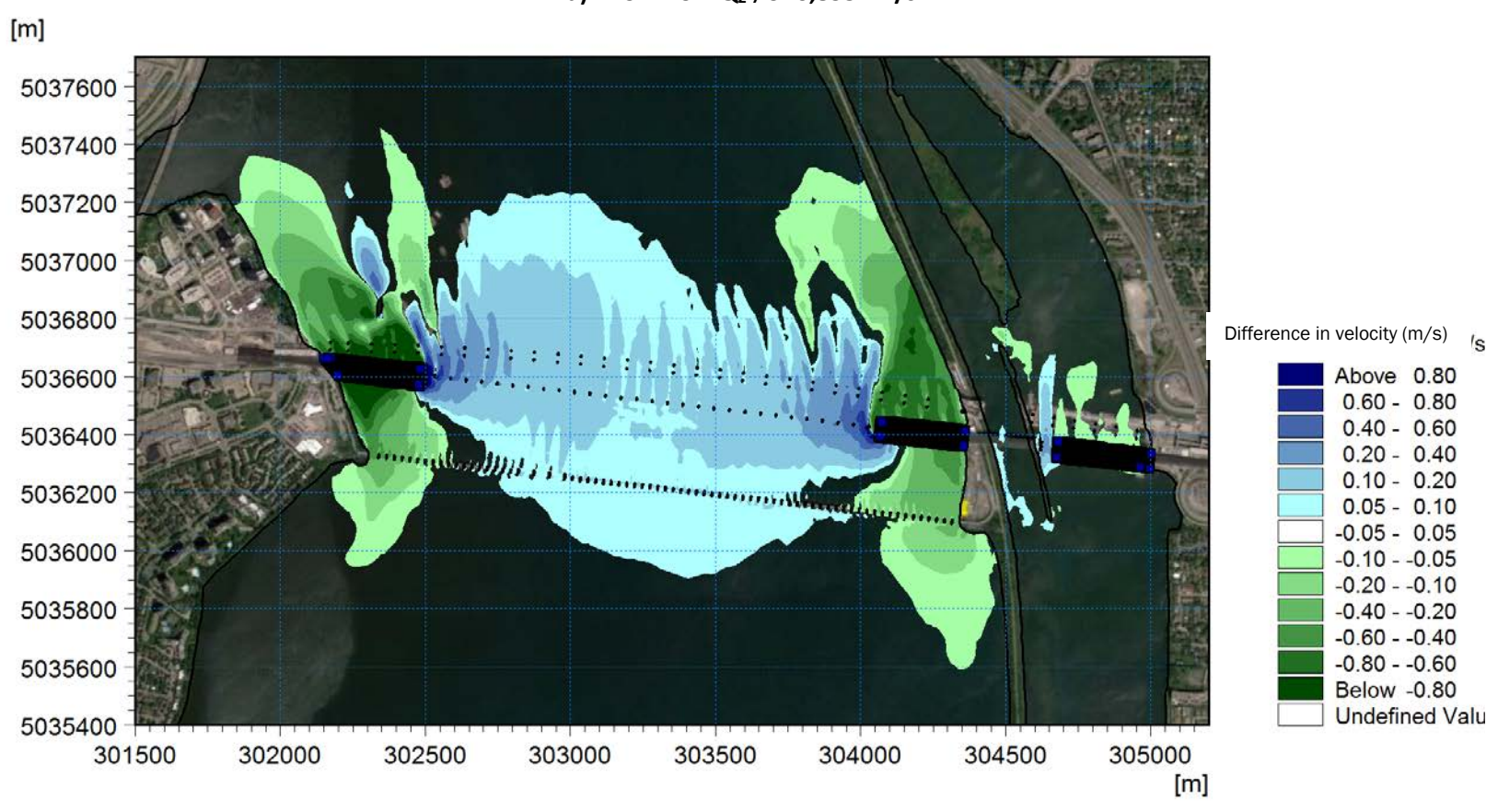
6.2.1.1.2 Hydraulic impact following deconstruction

Once the Existing Champlain Bridge has been deconstructed, some piers and footings could remain in place. The hydraulic simulations related to this situation are currently being conducted and will be included in the final version of the TEA.

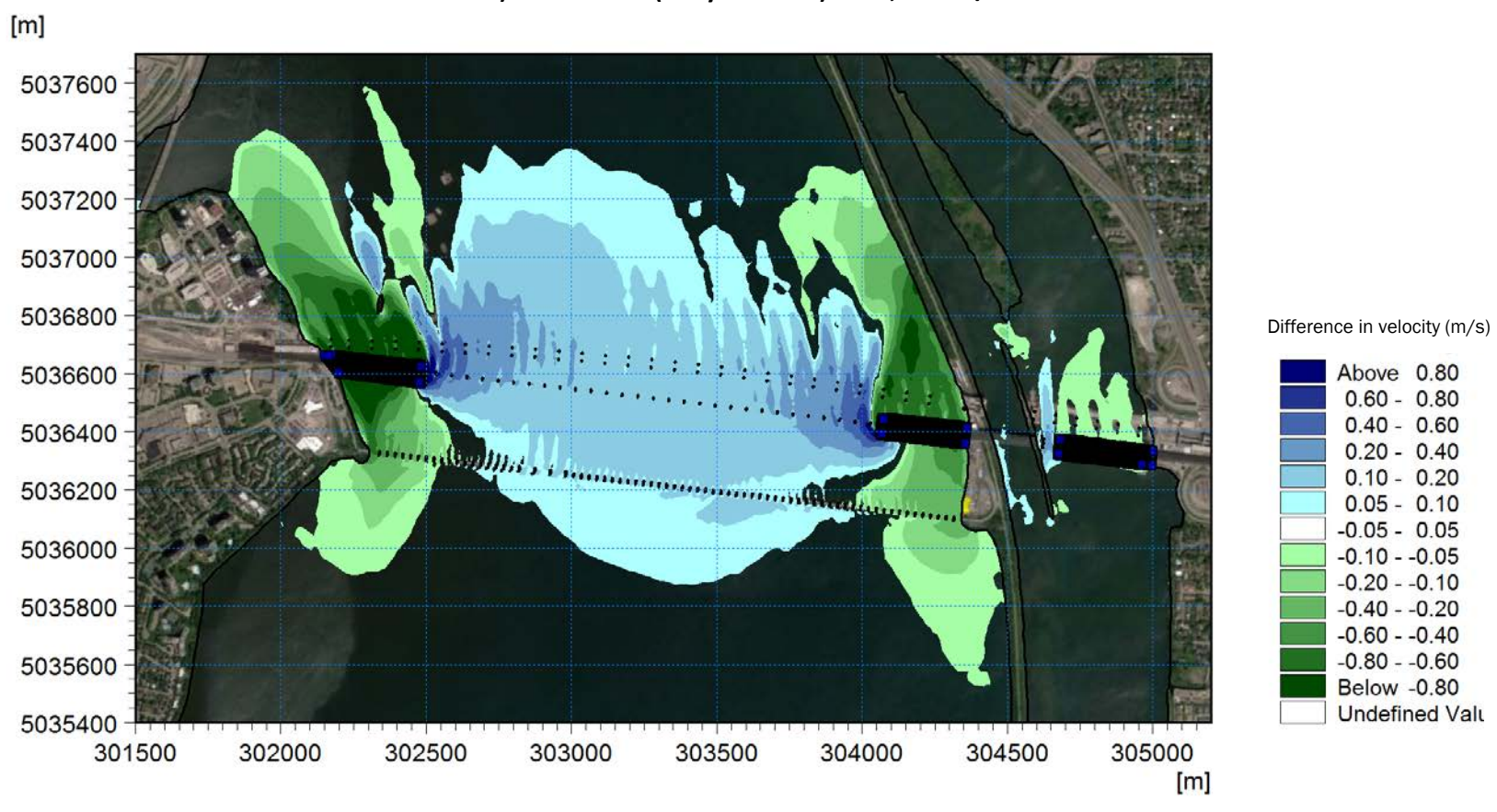
¹ Contrary to the velocities, a general view of the water levels is not presented because the changes created by the jetties are not quite visible.



a) Low flow $Q_{2.7}$ of 6,895 m^3/s

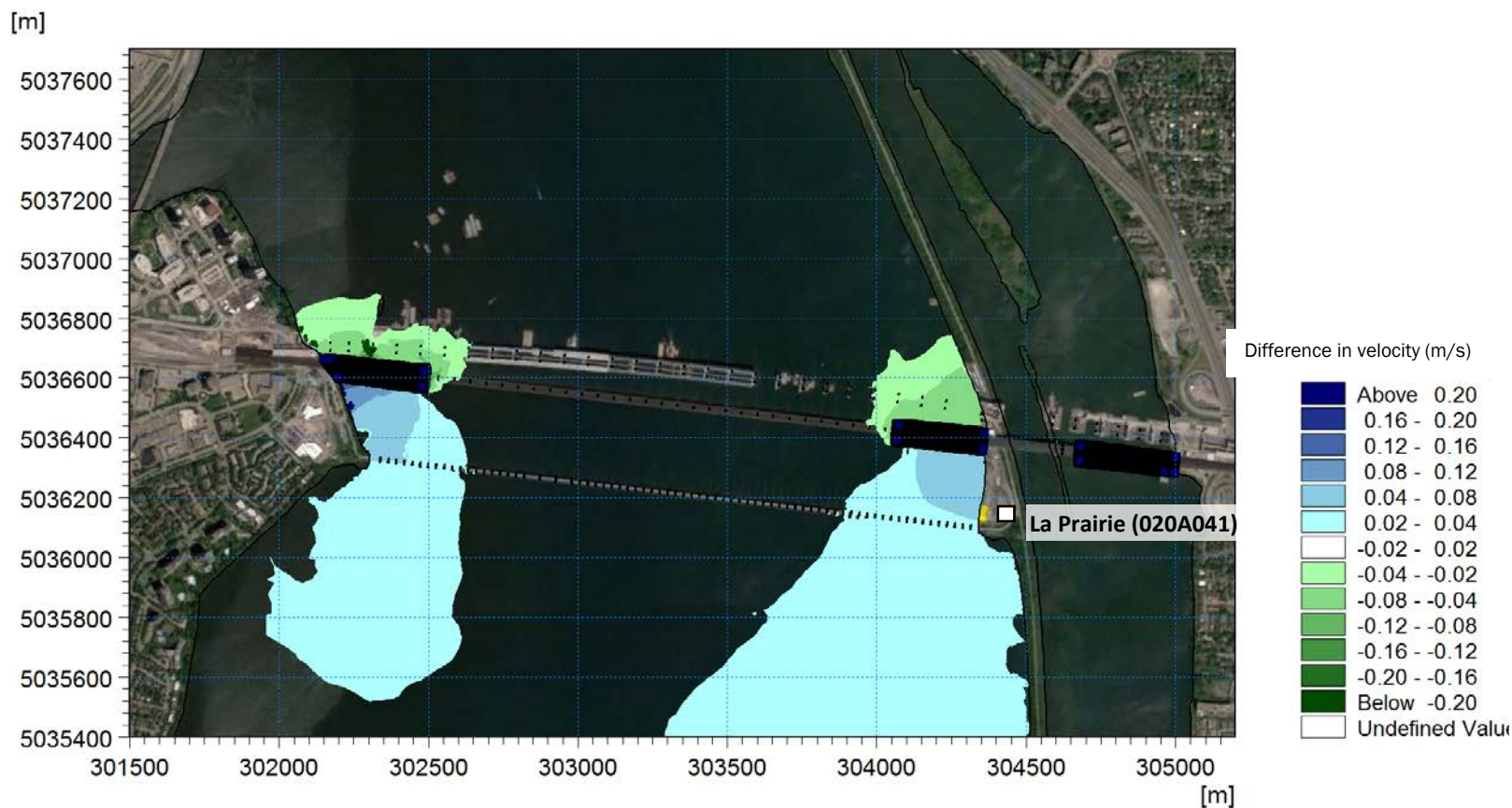


b) Flood flow (1:2-year flood) of 11,325 m^3/s

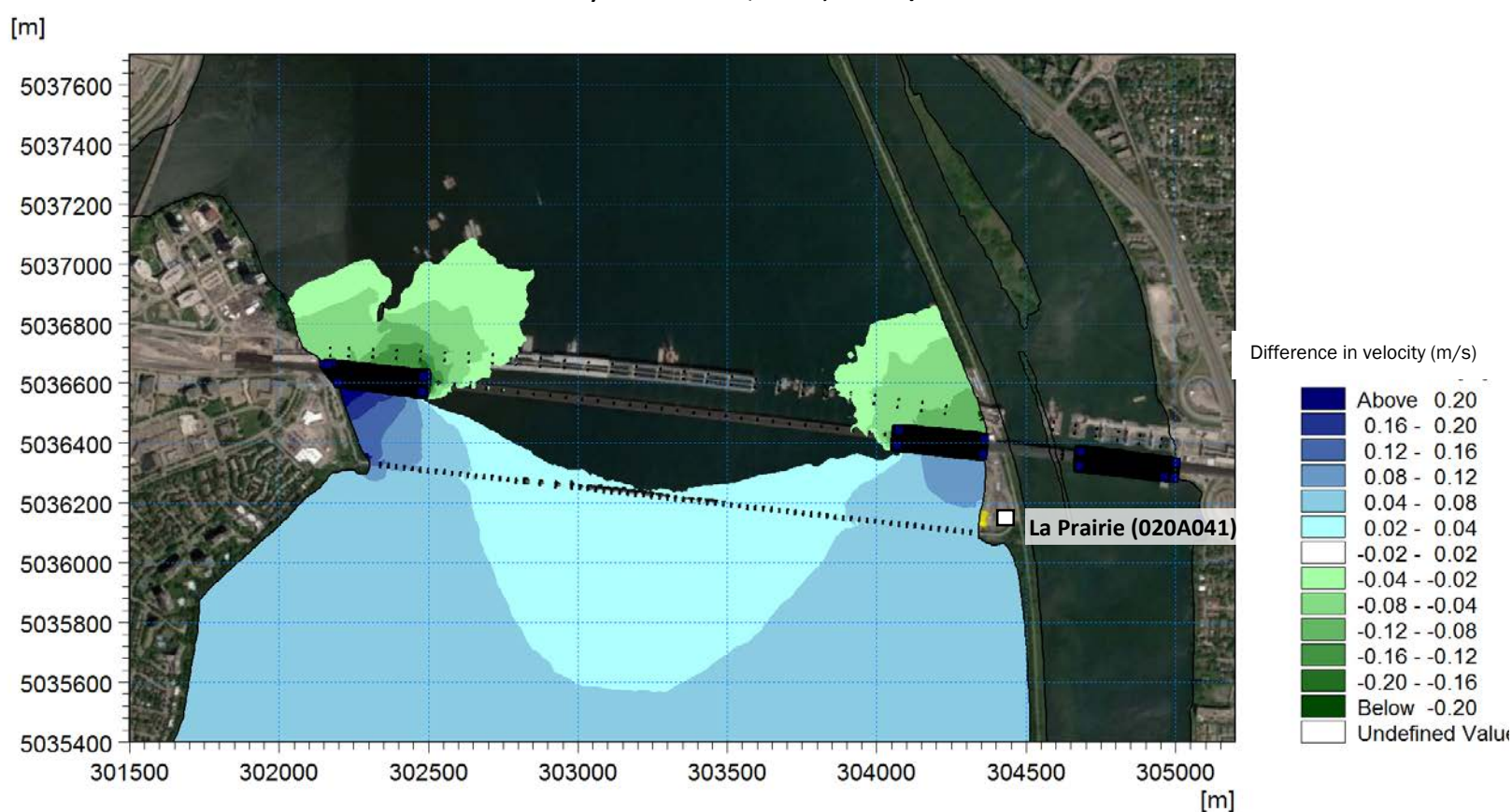


c) Flood flow (1:100-year flood) of 13,260 m^3/s

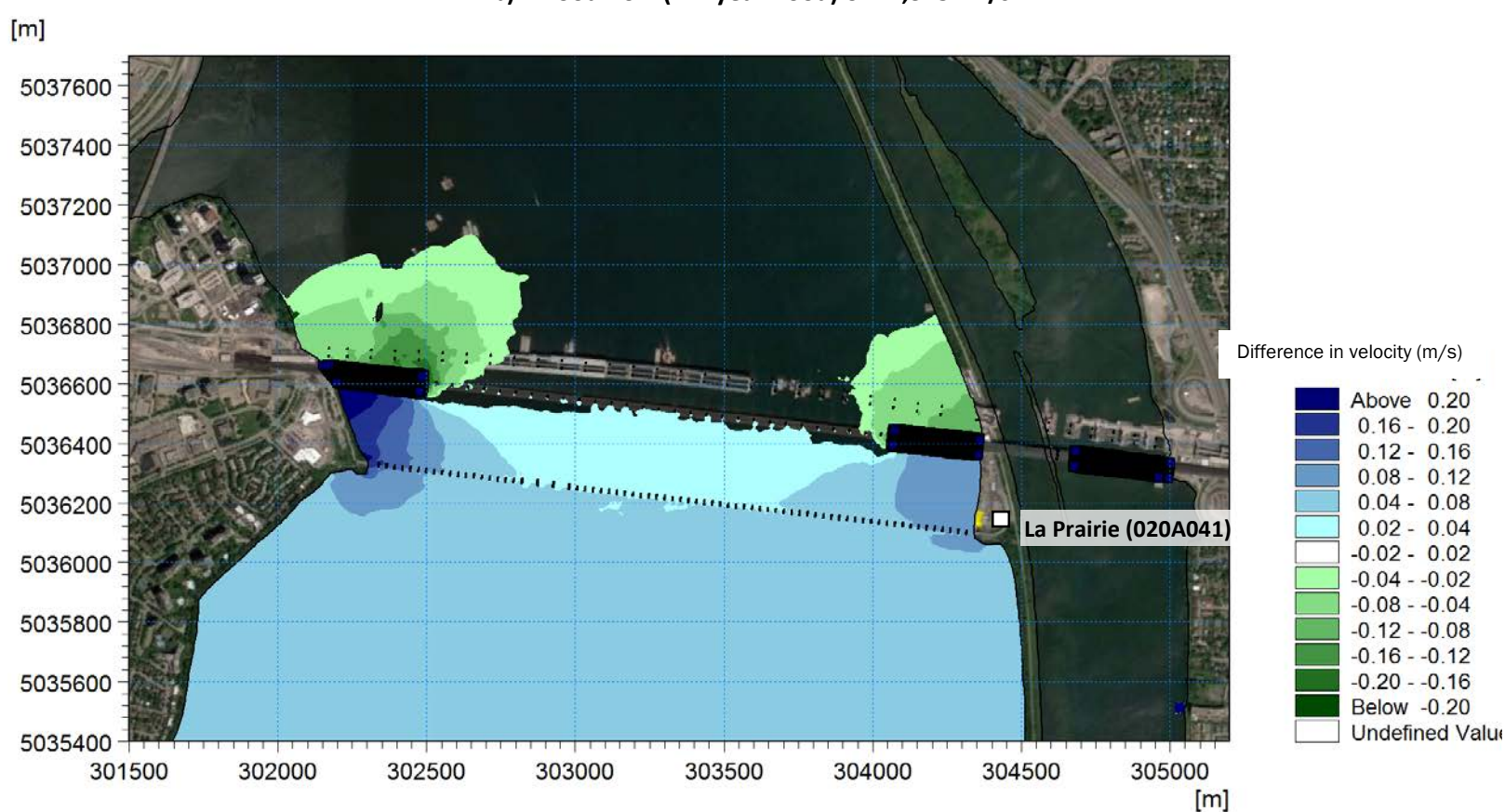
Figure 45 – Differences in velocity caused by the presence of deconstruction jetties



a) Low flow $Q_{2.7}$ of 6,895 m³/s



b) Flood flow (1:2-year flood) of 11,325 m³/s



c) Flood flow (1:100-year flood) of 13,260 m³/s

6.2.1.2 Description of effects - Traffic

Transportation of materials is a major activity in the deconstruction of the Existing Champlain Bridge and traffic effects are complex and require special analysis. Transport must be flexible and allow materials to be transported to reclamation sites with minimum disruption to residents and traffic.

The way the materials will be transported is subject to the methods and sequences that will be chosen for the deconstruction of the various sections of the Existing Champlain Bridge, the type of reclamation that will be favoured, and the destinations selected for materials recovery. Mobilization/demobilization of the three jetties must also be considered, since a large volume of materials is involved that must be moved over a short period of time.

The following points are therefore factors that will directly influence the method used for transporting the materials:

- The methods used for the deconstruction and removal of bridge components;
- Mobilization and demobilization of jetty materials;
- Possible access to the different parts of the bridge during demolition work;
- Type and location of materials reclamation (recovery, recycling);
- Disadvantages for nearby residents.

For the mobilization and demobilization of the three jetties, the origin and destination of the materials still needs to be determined. However, some of the materials from the jetties built for the New Champlain Bridge may be reused to minimize truck travel.

The following characteristics must be taken into account in relation to transportation:

- Size and weight of materials being transported;
- Location (work areas) required for handling the materials;
- The structural capacity of the ice control structure for materials transport;
- Load restrictions related to the road network and in particular the New Champlain Bridge, Ice Control Structure, and metropolitan area bridges;
- Limitations (size and load) of trucks;
- Capacity of road network to absorb an additional volume of trucks (congestion);
- The presence of major disruptions already present on the road network;
- Schedules to follow to avoid creating nuisances for residents;
- Location of intermediate processing sites.

For the purposes of the TEA, the highest impact scenario, i.e. 2 years of work, was used and the mode of transport used is truck (highest impact scenario). Note that scenarios are being studied for the duration of the deconstruction work, which should be 2 or 3 years. The duration of the work will have an impact on the rate at which the materials being transported are generated and incidentally on the generation of movement associated with truck traffic. For the purposes of the TEA, the scenario with the greatest impact, i.e. two years of work, was used. These trucks will travel from the deconstruction work sites to the reclamation/storage site and will come back empty.

6.2.1.2.1 Hypotheses

6.2.1.2.1.1 Materials being transported

As described in the draft design for the deconstruction of the Existing Champlain Bridge, the materials to be transported will mainly consist of the following:

- Steel from sections of the full structure, parts that have been deconstructed or cut, modular trusses and truss systems, the frame of concrete sections and prestressing cables in the deck;
- Concrete from girders, concrete covered with CFRP, pieces of concrete and crushed concrete from slabs and piers;
- Mobilization and demobilization materials from the three jetties on Nuns' Island (IDS), Brossard and the St. Lawrence Seaway dike;
- Other materials such as lamp posts, asphalt concrete, electrical boxes, the signaling system, wiring, the structural monitoring system, etc.

The assessment more specifically deals with transportation of the first three types, given their relative significance, in terms of quantity.

For the purposes of this assessment, the total quantity of materials to be transported originating from the bridge is determined based on a load of 275,000 t, including 250,000 t of concrete and 25,000 t of steel (metal spans, trusses, reinforcing steel).

In addition to this are the materials required to build the three jetties. The estimated quantities are roughly:

- 133,400 tonnes for the Nuns' Island jetty;
- 183,300 tonnes for the Seaway dike jetty;
- 133,100 tonnes for the Brossard jetty.

6.2.1.2.1.2 Road transport

Road transport consists in using various trailers based on the type of materials and their size. The use of road transport allows the materials to be removed from the deconstruction work area quickly and continuously based on the transportation infrastructure located near the site.

Transportation by truck has the advantage of being extremely flexible and of being able to reach virtually all the regional reclamation sites. It enables transport directly from the point of origin to the final destination without any change in method. It can also easily tailor supply (capacity) to demand. However, the use of trucks transfers a significant portion of the costs to the public since it uses subsidized public infrastructures at a low cost. The use of trucks can also cause certain inconveniences based on the level of traffic, such as noise, dust, and an impact on road surfaces. Special measures can be taken to mitigate them. More details in this respect can be found in sections 6.2.1.3 and 6.2.1.4.

The use of barges for some components could allow the number of trucks to be reduced. However, since the assessment deals with the scenario with the greater impact, it is presumed that all the transportation will be done by truck. Use of barges by the contractor would automatically reduce the impact described in this section.

6.2.1.2.1.3 Trucking network

Figure 47 presents the trucking network, which largely corresponds to the road network. The green sections represent the transit network, which trucks may use without any restrictions. Some restrictions may apply to Nuns' Island given the local network characteristics.

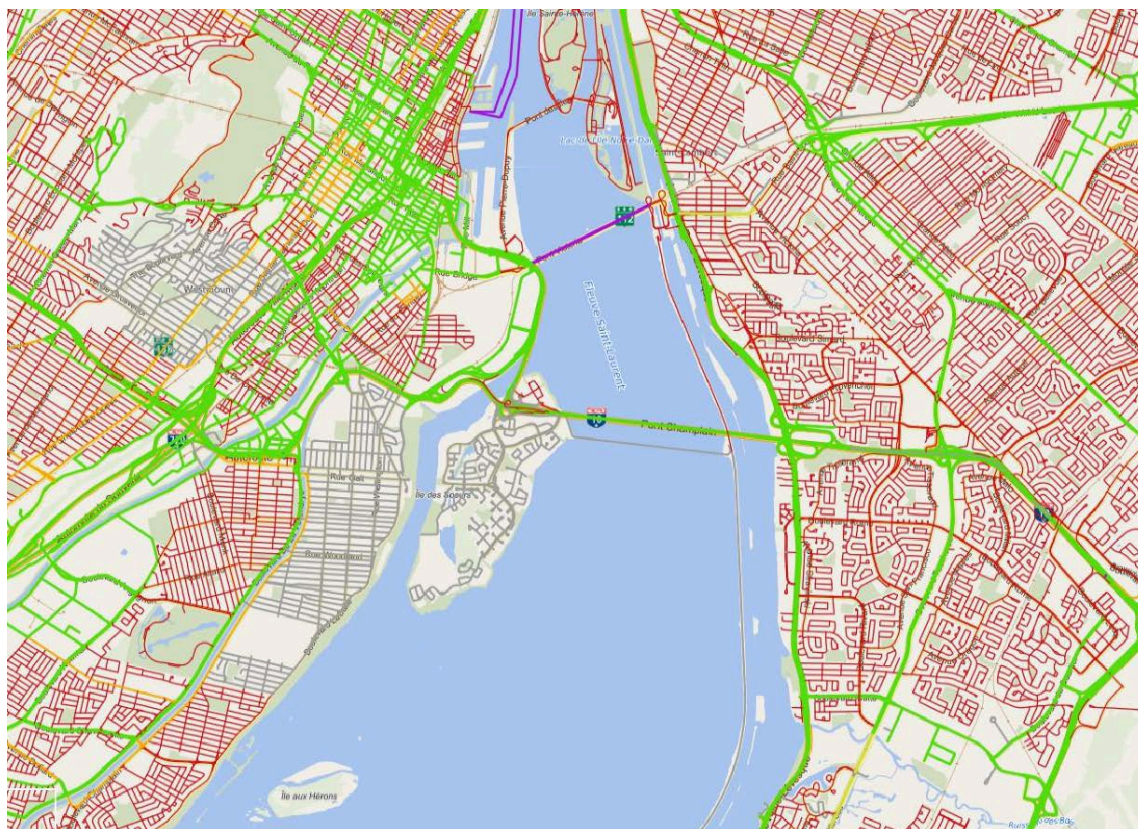


Figure 47 – Trucking network under the MTQ's jurisdiction

6.2.1.2.1.4 Road network capacity in the metropolitan area

The Existing Champlain Bridge is located in the middle of a road network characterized by high traffic. The metropolitan area thoroughfares represent constraints at rush hour, given the recurring congestion.

In fact, very high annual average daily traffic (AADT) can be observed on several sections of highway around the Existing Champlain Bridge. An overview of the AADT in 2017 is presented in Table 51. Trucks generally account for close to 10% of the traffic on these major thoroughfares.

In addition, during the period of time when deconstruction work will be done on the Existing Champlain Bridge, major work is being planned in the Louis-H.-La Fontaine Tunnel, which could have the effect of altering the traffic patterns that are currently observed. It will be more difficult to cross the St. Lawrence during this time. In addition, there may be other major work sites to contend with, including one at the Honoré-Mercier Bridge.

Table 51 – 2017 AADT

MAXIMUM TRAFFIC OBSERVED (2017)	
SECTION	AADT
A-40 (between the Décarie Expressway and Highway 15)	208,000
Décarie Expressway	188,000
A-20 (between the Turcot Interchange and St-Pierre)	139,000
A-15 (between Nuns' Island and the Turcot Interchange)	100,000
Louis-H.-Lafontaine Tunnel	124,000
Highway 132 (between the original Champlain Bridge and Victoria Bridge)	91,000
A-15 (south of the original Champlain Bridge)	68,000
A-10 (west of Highway 30)	81,000
A-30 (between Highway 10 and Highway 20)	81,000
Route 112-116 (between Highway 30 and Route 134)	75,000
A-20 (east of Highway 30)	91,000
A-15 (between Metropolitan Boulevard and Rivière des Prairies)	196,000
A-40 (between Décarie and Highway 25)	182,000
A-40 (between Highway 25 and the Charles-de-Gaulle Bridge)	143,000

The New Champlain Bridge will present an advantage for truck traffic compared to the current situation. In fact, the New Bridge will have three traffic lines in each direction operating at all times during business hours, which is not currently the case. Thus, the recurring congestion caused by the reserved bus lane both in the morning and the afternoon should be reduced, which should improve traffic conditions, depending on future actual demand.

If the trucks transporting deconstruction materials are stuck in traffic, transportation efficiency, costs and the environment will be significantly impacted. Note that the road networks in question are congested and that any added volume (especially heavy vehicles with low acceleration) automatically degrades the level of service, increases travel times for all users, and extends the rush hours at both ends. To make the transportation of the materials by truck as efficient as possible, transport needs to take place outside of the busiest times of the day while minimizing impacts on local residents.

Looking at the breakdown of hourly traffic in Figure 48 transportation would be easier between 7 p.m. and 5 a.m. However, it may be possible to have materials transported between 10 a.m. and 3 p.m. on certain thoroughfares. In fact, there is a decrease in hourly traffic between the morning and afternoon rush hours. Trucks could then travel on the road network during this time, under certain conditions and on certain routes.

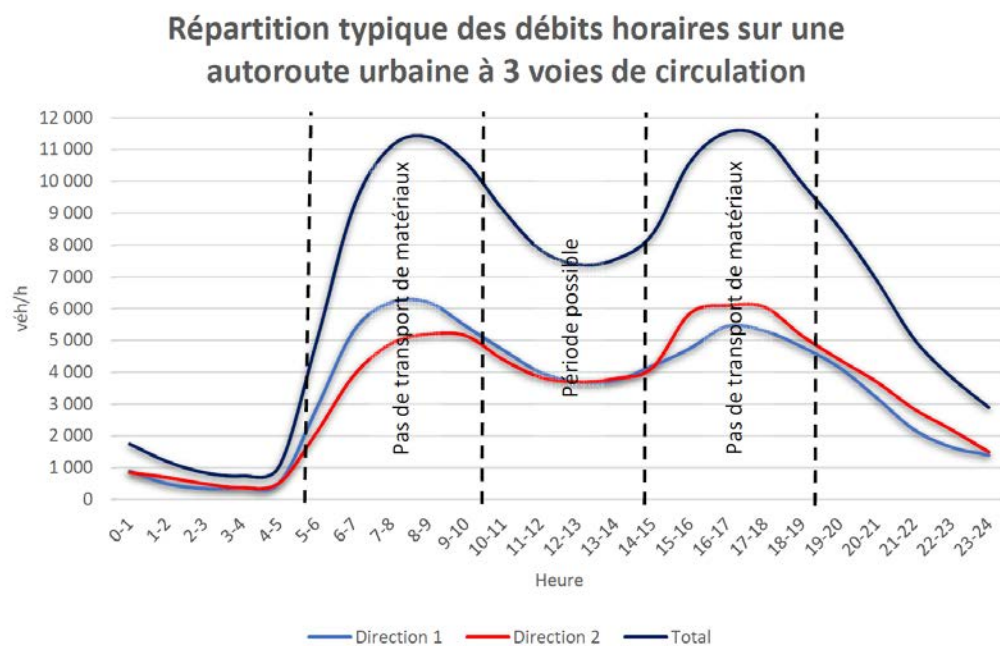
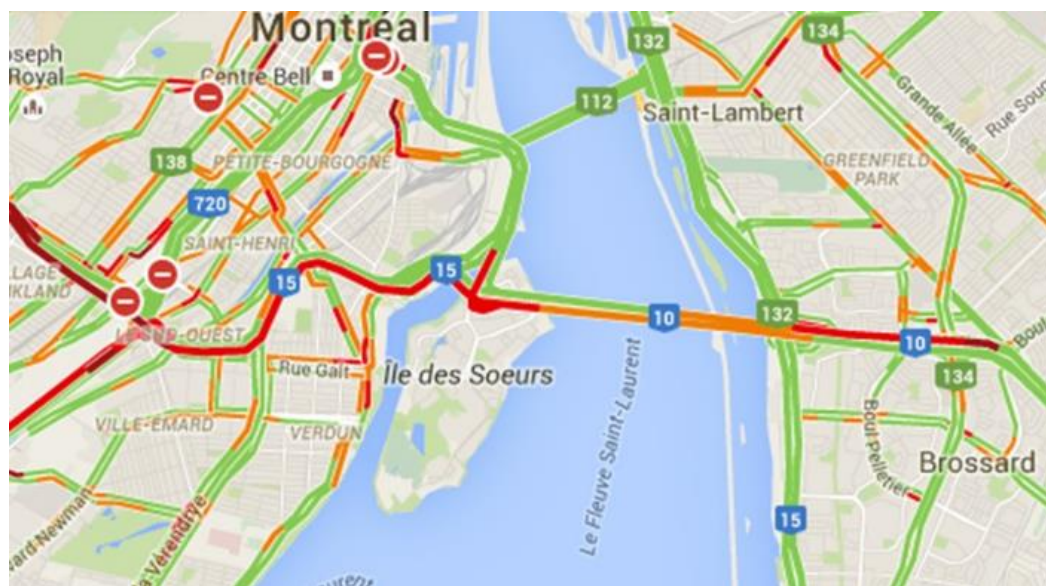


Figure 48 - Level of congestion in the afternoon – road network around the Existing Champlain Bridge

Figure 49 shows the typical level of congestion on a business day on the road network next to the Existing Champlain Bridge in late afternoon. The gradation level is from green to red. The approaches to the Existing Champlain Bridge are seen to be congestion, on both the south-bound and the north-bound sides. The congestion noted on the South Shore is caused by the reserved bus lane. However, as mentioned, with the New Champlain Bridge, this reserved lane will be separate from the traffic lanes.



Source: <https://www.toutmontreal.com/avoir/circulation.html>

Figure 49 – Level of congestion in the afternoon – road network around the original Champlain Bridge

In addition, it is important to take into account that deconstruction work on the Existing Champlain Bridge will take place at the same time as major repair work on the Louis-H.-La Fontaine Tunnel as well as possibly major work on the Honoré-Mercier Bridge, which may alter traffic patterns between Montreal and the South Shore.

6.2.1.2.1.5 Road transportation equipment

The types of trailers that are currently found can vary widely depending on the materials being transported. For bulk materials (concrete pieces or crushed concrete), dump trailers could be used. However, pieces and parts that will be dismantled into long or non-standard pieces, both steel and concrete, will require the use of flatbed trucks. Extendable trailers could be used to transport parts of a non-standard sizes.

Special vehicles will have to be used to transport very large pieces (Photo 19) Photo 19. This type of trailer requires a road escort and could justify disruptions or complete lane closures at specific times and for brief periods for safety reasons. In addition, these vehicles cannot travel on the road at any time of the day, and it is highly unlikely that such loads can use the New Champlain Bridge.



Photo 19 – Transporting large pieces

6.2.1.2.1.6 Bridge deconstruction work

The estimated number of trucks is based on the use of the following vehicles:

- Dump trucks (with a strap) with an index of 37 metric tonnes for the payload;
- Flatbed trucks with an index of 34 metric tonnes;
- Three-axle trailers that can normally carry a 30,900-kg and 26,400-kg load during the thaw season.

Given the volume of materials to be transported, the number of trucks required to make trips to the reclamation centres is estimated at about 7,500 using 37- and 34-tonne trucks (draft design report), and about 8,900 for 30.9-tonne three-axle trailers (new model being considered).

Table 52 – Number of trailers

TYPE OF TRAILER	PAYLOAD (TONNES)	PRODUCTS (TONNES)	NUMBER OF TRUCKS (ROUNDED OFF)
Dump trailer	37	250,000	7,500
Flatbed truck	34	25,000	
Three-axle trailer	30.9	275,000	8,900

The contractor will decide on the type of truck being used. For the purposes of this assessment, and to determine the maximum number of trucks per day, the following assumptions are used:

- Three-axle trailer with a capacity of 30.9 tonnes;
- Duration of work: 24 months (52x2 weeks);
- Four weeks off a year;
- Five days of transport per week;
- Number of days of transport: 96 weeks x 5: 480 days.

The average number of trucks per day would be $8,900 / 480 = 19$ trucks.

Given that transport will not be evenly spread out for the duration of the work (more intense during pier deconstruction), a 30% increase is applied to determine a maximum number of 25 trucks per day.

Given the materials to be transported based on the mobilization areas at the work site, the following breakdowns are obtained:

- 75% of materials will pass through Nuns' Island (IDS and dike areas): 19 trucks per day;
- 25% of materials will pass through Brossard: 6 trucks per day.

It must also be taken into account that the trucks will be making return trips and coming back empty from the reclamation site. Therefore, the total number of trips on public roads would be doubled. Table 53 presents a summary for the Nuns' Island and Brossard areas.

Table 53 – Number of trucks

TRAILER	TOTAL	IDS AREA	BROSSARD AREA
Average number of trailers per day	19	14	5
Average number of trips per day	38	28	10
Marked-up number of trailers (30%)	25	19	6
Marked-up number of trips per day	50	38	12

6.2.1.2.1.7 Jetty mobilization and demobilization

Similarly to the deconstruction of the bridge, the number of trucks for transporting jetty materials was estimated on the basis of three-axle tractor trailers with a capacity of 30.9 tonnes (Table 54). An assumption that work would last four months for mobilization and four months for demobilization was retained for the estimated number of trucks per day. During this period, work would be done on business days only, on the basis of 22 days per months.

The worst-case scenario is considered for the purposes of the TEA, namely that the contractor must bring in all the jetty materials and that no materials from the SSL jetties are recovered.

Table 54 – Number of trucks for jetty construction (4 months)

JETTY	TONNE	TOTAL NUMBER OF TRUCKS	NUMBER OF TRUCKS PER DAY (RETURN TRIP) (4 months)
Nuns' Island	133,400	4,318	99
Dike	183,300	5,933	135
Brossard	134,100	4,340	99
Total	450,800	8,657	333

The number of trucks per day is much higher than for bridge deconstruction because of the duration of these activities. In fact, jetty mobilization and demobilization activities have to be completed over a short period of time before and after bridge deconstruction work.

For the purposes of the study, it can be assumed that only trucks transporting materials from the Nuns' Island and dike jetties will partially use Nuns' Island on the local road network and the New Champlain Bridge. Assuming that the Nuns' Island and dike jetties are built at the same time, this represents about 234 trucks per day. The trucks used for work on the Brossard jetty should remain on the South Shore and will not be using the local road network (99 trucks per day).

The pace of jetty mobilization and demobilization work can be stepped up by increasing the number of trucks per day. However, the associated environmental impacts (noise, dust, etc.) must be taken into account. As comparison, construction work on the current Nuns' Island jetty (New Champlain Bridge) resulted in the use of 350 trucks per day for 3 to 4 months.

Various scenarios are also possible if the contractor does not carry out the mobilization and demobilization work on the different jetties at the same time. For the purposes of the study, the four-month scenario with simultaneous construction of the Nuns' Island and dike jetties is retained, with round-the-clock transport on business days. For the Brossard jetty, the transport of materials should not affect Nuns' Island and work can be done at the same time as the other jetties or not. Note that jetty demobilization will also last four months upon completion of bridge deconstruction work.

6.2.1.2.1.8 Routes and constraints

The previous section served to determine the number of trucks that will be required during jetty mobilization and demobilization as well as during bridge deconstruction work. Therefore, three situations need to be considered: more traffic over a short period of time (construction of the jetties), less traffic, but over a much longer period of time (bridge deconstruction) and more traffic for another short period (deconstruction of the jetties).

Locally, removal by truck of deconstruction-related debris and materials from the Existing Champlain Bridge will be done from both ends, i.e. Nuns' Island and Brossard. Transportation from the St. Lawrence Seaway dike will likely be done via the ice control structure.

It can also be assumed that the steel parts will be transported to the South Shore without returning to the Island of Montreal, given that the steel structure is located there.

6.2.1.2.1.8.1 Nuns' Island

Truck routes

As shown on Figure 50, there is a work and mobilization area near and on Nuns' Island. It includes the New Champlain Bridge work site (red hatching) as well as the work site for the deconstruction of the Existing Bridge (in blue).

For bridge deconstruction, the materials removed from the area will have to be transported using a route on the Island of Montreal or toward the South Shore. For jetty demobilization, trucks transporting materials will have to go to the South Shore. Note that work on the REM rapid transit system near the work site may have an impact on the situation. This is an additional work site that may affect work and that will have to be taken into account (cumulative effects).



Figure 50 – Nuns' Island work area

At the west exit of the ice control structure on the Nuns' Island side, the New Champlain Bridge can be accessed toward the South Shore or Highway 15 to the north.

To get to the South Shore, trucks must use the onramps to the New Champlain Bridge or Boulevard René-Lévesque and Boulevard de L'Île-des-Soeurs. The blue route on Figure 51 should be the preferred route. It corresponds to the onramp to the New Champlain Bridge. The other two routes in red should be reserved for exceptional cases (e.g. work on Boulevard René-Lévesque). In fact, both work on the REM rapid transit system and the deconstruction of the Existing Champlain Bridge could result in temporary closures of the onramp shown in blue.



Figure 51 – Truck routes on Nuns' Island, south sector

To access Highway 15 north, trucks will need to use the north side of Nuns' Island via Boulevard René-Lévesque and the traffic circle, as shown on Figure 52 (in yellow).

In the event that Boulevard René-Lévesque is closed under the Existing Bridge, other routes (in red) are available. One of these potential routes (red dotted line) is through a residential neighbourhood and should not be retained.



Figure 52 – Routes on Nuns' Island, north sector

The trucks should return (empty) using other routes, depending on where they came from: trucks coming from either the South Shore or Highway 15 that will be using the local road network to access the ice control structure.

Figure 53 and Figure 54 respectively show the routes for trucks coming from the north and south.



Figure 53 –Route on Nuns' Island for trucks coming from the North

Once again, for trucks coming from the north via Highway 15, the dotted line route should not be used.



Figure 54 –Routes on Nuns' Island for trucks coming from the South Shore

There are two possible routes for trucks coming from the South Shore. In fact, from the traffic circle, trucks can take Boulevard de la Pointe Nord and Rue Jacques-le-Ber, or head toward Boulevard de L'Île-des-Soeurs. The first route is much shorter and is preferred. However, the route with the solid red line may have to be taken when Boulevard René-Lévesque is closed under the Existing Champlain Bridge.

Disruptions and mitigation measures

During the deconstruction of the original bridge, the section of Boulevard René-Lévesque under the bridge will have to be temporarily closed. In addition, for work on the REM rapid transit system, the southbound onramp to the New Champlain Bridge from the eastern tip of Nuns' Island may have to be closed for a certain time.

The number and duration of these closures will have to be limited as much as possible, especially for Boulevard René-Lévesque, and a detour will have to be created. Ideally, the transportation of materials will have to be limited during these closures as the detour routes are much longer. These closures should ideally either take place at night or over one weekend. This should create minimal impacts on the transportation of materials.

Lastly, signalers should be present to manage truck traffic at the work site. Based on the type of truck used, the pavement should be widened at some locations. The trucks need enough room to enter and leave the ice control structure.

6.2.1.2.1.8.2 Brossard

On the Brossard side, there is already a work area for the construction of the New Champlain Bridge, which will be recovered in part for the deconstruction, as shown on Figure 55.

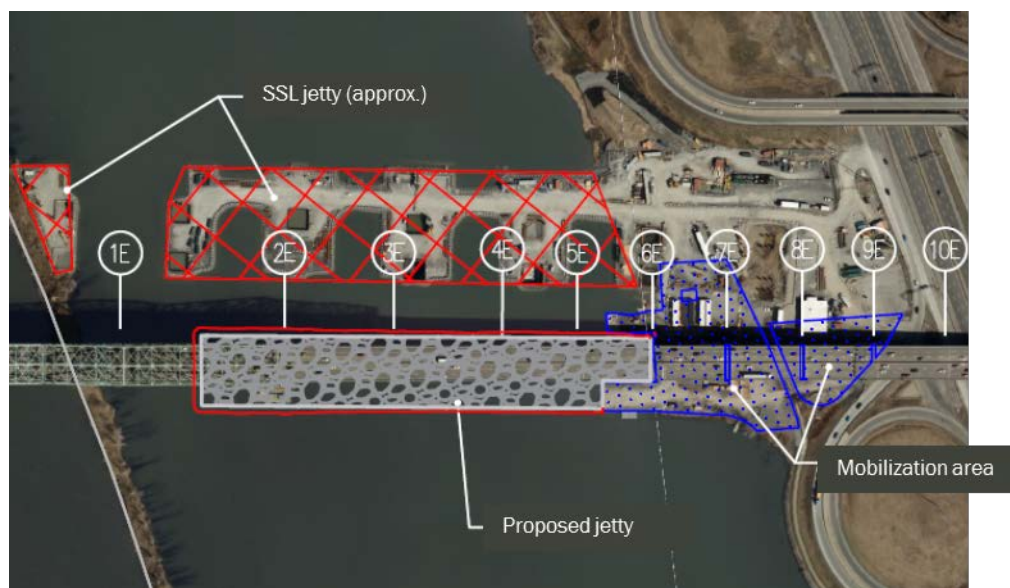


Figure 55 – Work area on the South Shore

For purposes of deconstruction work on the Existing Champlain Bridge, the work area is modified since the work space will need to be located under the Existing Bridge. The current access to the New Bridge work area could be used, as shown on Figure 56. It is located about mid-way from an onramp and an offramp on the Highway 132 West service road.

Truck routes

The only way to access the site is to take Highway 132 West and use the service road (Boulevard Marie-Victorin). Since the service road is one-way, access to the area is more complicated and involves much longer routes for trucks, depending on where they are coming from. From this work area, trucks will use the different highway onramps.



Figure 56 – Work area north of Highway 132

For this work area, trucks will not take any roads under municipal jurisdiction but rather highway ramps which trucks are already taking.

There is also a work area south of Highway 132 (in the Highway 10 corridor) for the deconstruction of the Champlain Bridge approaches (in blue on Figure 57). The main access is also through a one-way service road on Highway 132 East. The length of the trucks' return-trip routes can vary depending on where the trucks are coming from. Another possible access would be from the onramp to the New Champlain Bridge toward Highway 132 East from Montreal.

From this work area, trucks could travel to Highway 132 East (red route) or take the New Champlain Bridge (yellow route).



Figure 57 – Work area south of Highway 132

Similarly, for this work area, trucks will not take any roads under municipal jurisdiction but rather highway ramps which trucks are already taking.

Disruptions and mitigation measures

During the deconstruction of the Champlain Bridge, there will be Highway 132 and service road (Boulevard Marie-Victorin) closures. The number and duration of these closures will have to be limited as much as possible and detours will have to be created. However, given the importance of these thoroughfares, they cannot remain closed for very long (overnight or on the weekend).

During the closures, transportation of materials will have to be restricted. Since these are short-term closures, the impact on the transportation of materials should be minimal.

Long-term disruptions may be required for the deconstruction of the bridge piers. No lanes will be closed, although lane widths may be reduced.

Signalers should be present to manage truck traffic at work sites. Based on the type of truck used, the pavement should be widened at some locations.

Lastly, speeds should be reduced on service roads near the work site.

6.2.1.2.2 Potential impact on traffic

The road network around the Existing Champlain Bridge is heavily used. In fact, daily traffic volume is very high and high hourly volumes are also noted, as shown on Table 51. However, the number of potential trucks on the highway network in relation to total traffic remains low. This is in addition to existing truck traffic, which makes up 10% of total traffic.

On this road network, the potential impact on traffic is not so much the number of trucks per day but rather the trucks' characteristics (slow acceleration given their load), thereby slowing down traffic even more when there is congestion.

On Nuns' Island, not all of the municipal roads are capable of handling a large number of trucks. Some routes are preferable over others. In addition, inconveniences such as noise, dust and dirt on roads must be taken into account and mitigation measures implemented. This will especially apply during jetty mobilization and demobilization given that daily truck traffic will be higher than during bridge deconstruction work and that the trucks will be operating around the clock.

Given that not all of the parameters are known for the time being, the first action required by the contractor, depending on its projected work schedule and the time of year when it will begin building the jetties, will be to prepare a traffic management plan that shows the roads to take, disruptions, reduced speeds, etc. This plan must be prepared jointly with JCCBI and take into account the other work sites that will be operating at the same time in the area (e.g. REM, work on Boulevard René-Lévesque on Nuns' Island). The contractor will be responsible for updating the noise study with its deconstruction scenario and schedule in order to make sure to comply with noise levels limit.

In addition, it should be remembered that during deconstruction work on the Existing Champlain Bridge other major infrastructure projects will be under way at the same time, including the REM project on Nuns' Island and major repairs to the Louis-H.-La Fontaine Tunnel. These work sites will affect traffic patterns and complicate the crossing of the St. Lawrence.

In addition to the above management plan, the following mitigation measures will have to be observed:

- Bridge deconstruction materials: transport materials between 10 a.m. and 3 p.m. or between 7 p.m. and 11 p.m. to avoid the rush hour and nighttime;
- Transport materials only on business days (Monday to Friday) and avoid holidays;
- Limit the duration of closures on Boulevard René-Lévesque under the Existing Champlain Bridge during deconstruction and limit the closures to nights and weekends. During these closures, limit the transportation of bridge deconstruction materials;
- Limit the duration of closures on Highway 132 under the Existing Champlain Bridge during deconstruction and limit the closures to nights and weekends. During these closures, limit the transportation of bridge deconstruction materials;
- Use signalers to manage truck traffic at work sites;
- Reduce speed around the work area;
- Use the routes with the least impact shown on Figure 51 (blue route), Figure 52 (yellow route), Figure 53 (red route) and Figure 54 (yellow route), except in special cases.

6.2.1.3 Description of effects – Noise simulations

Considering the many assumptions to be taken into account in assessing changes in the sound environment during the work, a detailed analysis was carried out. This is based on sound simulations and makes it possible to establish the sound levels that will be generated in nearby sensitive areas. The following section presents the approach, assumptions and results of the simulations.

6.2.1.3.1 General Description of Approach

The deconstruction project is divided into three major stages:

- Construction of the jetty at Nun’s Island, the Seaway jetty and the Brossard jetty in preparation of the bridge deconstruction;
- Bridge deconstruction and materials handling and processing at the mobilization areas;
- Removal of the jetties.

Based on the information presented above, a series of staging sites (see Figure 58) has been established for modeling and is summarized in Table 55.

Table 55 – Mobilization areas for Modeling

SITE ID	SITE LOCATION	ACTIVITIES
A'	Nun’s Island	Jetty Construction/Removal
B'	Seaway Jetty	
C'	Brossard (North of Road 132)	
A	Nun’s Island	Bridge Deconstruction
B	Seaway Jetty	
C	Brossard Jetty (North of Road 132)	
D	Brossard Interchange (South of Road 132)	

It is assumed that each major staging site will be operating during the periods identified in Table 56. The activities have been split into two categories:

- Jetty construction/removal. During the periods of jetty construction (at the start of the project – 4 months) and removal (after conclusion of the project – 4 months), activities are expected to occur continuously (24-hours);
- Bridge deconstruction. During the period of bridge deconstruction (approximately 2-3 years), the mobilisation areas will be operating only during daytime (all activities) and evening (for transport of material only).

Table 56 – Summary of Proposed Schedule for Deconstruction of the Existing Champlain Bridge

ACTIVITY	SITE ID	PERIOD OF ACTIVITY		OPERATION HOURS
		START	END	
Jetty Construction/Removal	A'	Prior to/After Bridge Deconstruction ^A		24h
	B'			
	C'	Prior to/After Bridge Deconstruction		24h
Bridge Deconstruction	A	Month 13	Month 17	Daytime and Evening ^B
	B	Month 1	Month 25	Daytime and Evening ^B
	C&D	Month 2	Month 3	Daytime and Evening ^B
		Month 16	Month 22	Daytime and Evening ^B

A It is assumed that the construction (4 months)/removal (4 months) of the Nun’s Island jetty and Seaway jetty will be carried out at the same time. Dates according to the restriction periods for water works.

B Daytime: 0700-1900; Evening: 1900-2300.

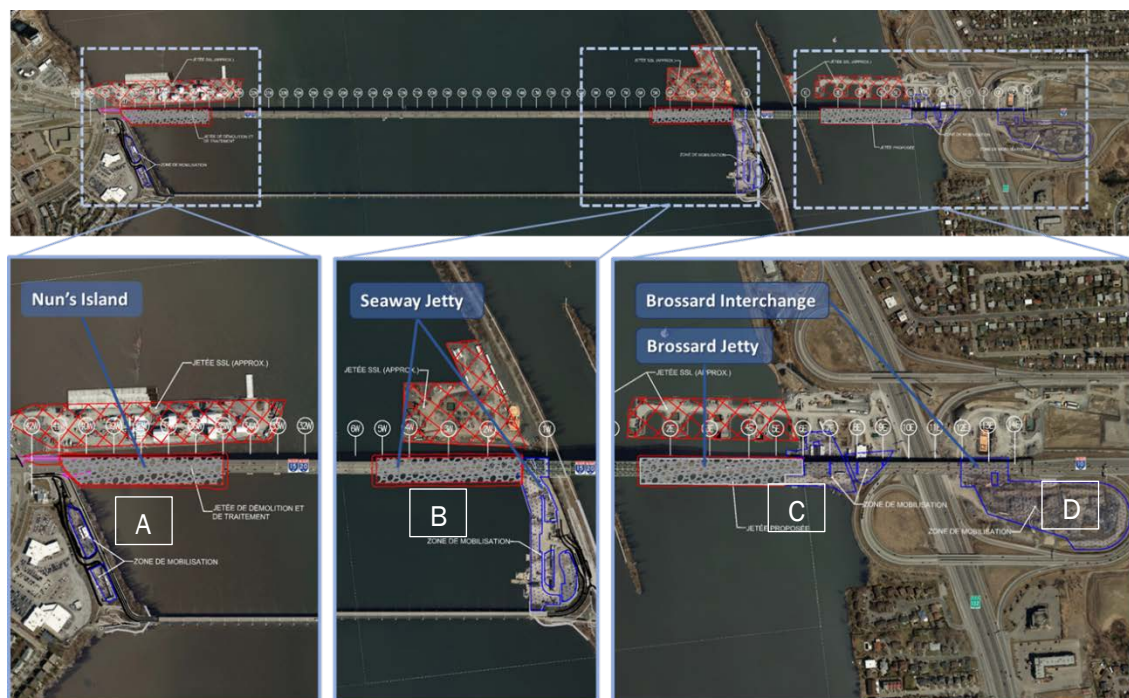


Figure 58 – Mobilization areas for Deconstruction of the Champlain Bridge

6.2.1.3.2 Sources of Noise

Noise from the deconstruction of the Existing Champlain bridge is expected to be from two major sources:

- Heavy equipment used on the main staging areas for deconstruction activities; and
- Traffic of heavy trucks in and out of the mobilization areas for removal of materials from deconstruction of the bridge.

6.2.1.3.2.1 Equipment

In order to conduct a noise assessment and based on the activities occurring in the mobilization areas, a list of what is considered to be the probably most used equipment on site has been prepared.

6.2.1.3.2.2 Jetty Construction and Removal

During the jetties construction and removal stages, it is expected that the main activities will be related to the transportation of material for constructing and removing the jetties.

Table 57 lists the types and quantities of equipment anticipated to be employed simultaneously for the stages of jetty construction or removal for a given jetty site.

Table 57 – Planned Equipment for Jetty Construction/Removal

EQUIPMENT	QUANTITY
Front-end Loaders	2
Compressors	2
Back-hoe	1
Generators	1
Bulldozer	2
Compactor / Vibratory Roller	2

6.2.1.3.2.3 Bridge Deconstruction

During the bridge deconstruction, large sections of the bridge will be moved to the mobilization areas and reduced to smaller pieces to be transported to upgrading sites.

Table 58 lists the types and quantities of equipment anticipated to be employed simultaneously in given mobilization area.

A summary of noise emission levels for the equipment used as input in the acoustical model is provided in Table 59.

Table 58 – Planned Equipment for Bridge Deconstruction

EQUIPMENT	QUANTITY
Hydraulic Breakers	3
Universal Crushers	3
Front-End Loaders	3
Compressors	2
Back-hoe	1
Generators	1
Bulldozer	1
Crane	2

Table 59 – Summary of Noise Emission Levels of Identified Sources

EQUIPMENT	NOISE EMISSION LEVEL ^A			ACOUSTICAL USAGE FACTOR [%] ^{B C}
	METRIC	LEVEL [DBA]	D _{REF} [M]	
Hydraulic Breakers	Leq, 30 s	85	15	10
Universal Crushers	Leq, 30 s	74	15	40
Front-end Loaders	Leq, 30 s	85	15	40
Compressors	Leq, 30 s	75	15	40
Back-hoe	Leq, 30 s	80	15	40
Generators	Leq, 30 s	75	15	50
Bulldozer	Leq, 30 s	85	15	40
Crane	Leq, 30 s	75	15	16
Compactor / Vibratory Roller	Leq, 30 s	80	15	20

A Source: MTQ, Table 9.9-1 of the Construction Standards, Chapter 9.

B Source: FHWA. RCNM.

C Acoustic usage factor is the percentage of time during a noise-generating operation that a piece of equipment is operating at full power.

6.2.1.3.2.3.1 Other Activities

There are some deconstruction activities that at this point cannot be modeled, either due to the non-standard nature of the equipment used or the large geographical variability of operations that the selected contractor will perform. These activities include, but are not limited to:

- Deconstruction on top of the bridge deck, such as removal of asphalt or other deconstruction activities;
- Deconstruction on the river, such as sawing of concrete piers;
- Movement of transport barges on the watercourse.

6.2.1.3.2.4 Traffic

Section 6.2.1.2 identify the truck traffic levels from the main activities: jetty construction and removal, and bridge deconstruction. This section as also identified the most likely routes of traffic from the staging sites through the local roads and into the highway network.

The truck routes are illustrated in Figure 59 and Figure 60 for the Nun’s Island area and in Figure 61 for the Brossard area. These routes are expected to be used for the entire project duration unless exceptional circumstances occur.

As can be seen in the Nun’s Island area (Figure 59 and Figure 60) the routes were divided into Inbound and Outbound. For each direction several potential routes were identified. These are the most likely routes based on potential constraints, as well as on the direction that the materials will travel, with routes accessing the highway toward the New Champlain Bridge and other Northbound routes towards Montreal.

The most likely routes were used for the simulations and are based on potential stresses, as well as the direction of material movement.

Routes located furthest from residential areas are favoured and should be used by the contractor. Other routes should only be used in exceptional cases.

The noise model took the potential routes identified in the traffic study and established for each the potential traffic using a peak hourly traffic for heavy vehicles. The effects of truck traffic were not evaluated after trucks merge into normal highway/roadway flow as part of the background environment (see truck routes in grey).

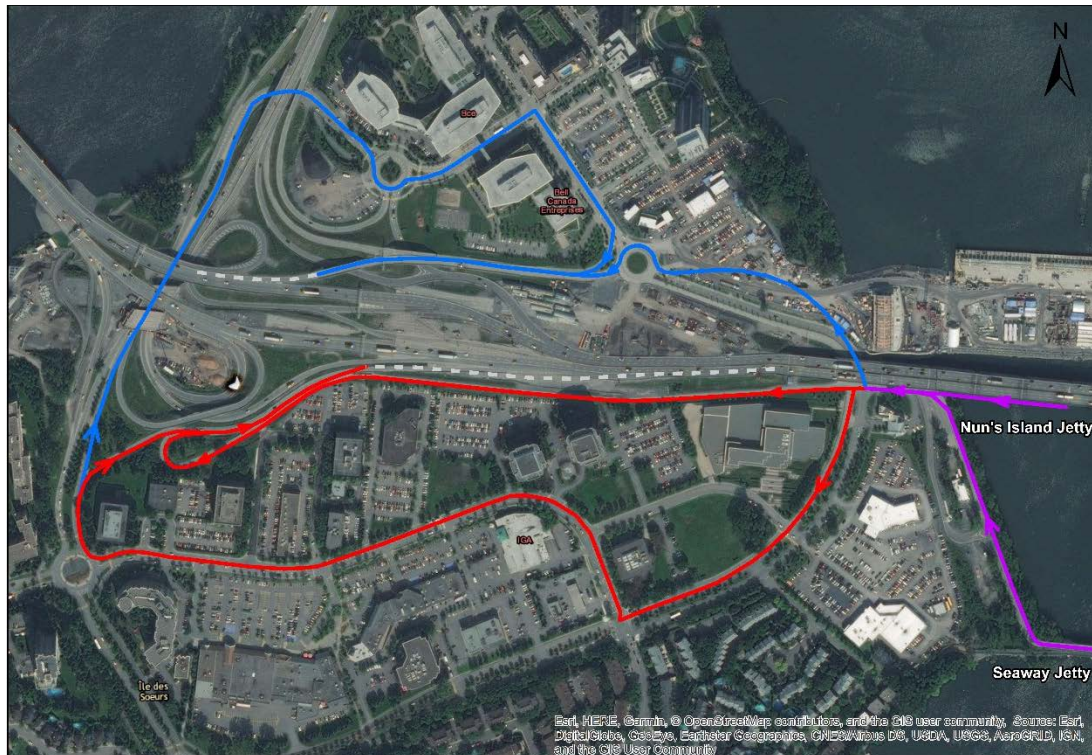


Figure 59 – Potential Truck Route in Nun's Island Area – Outbound

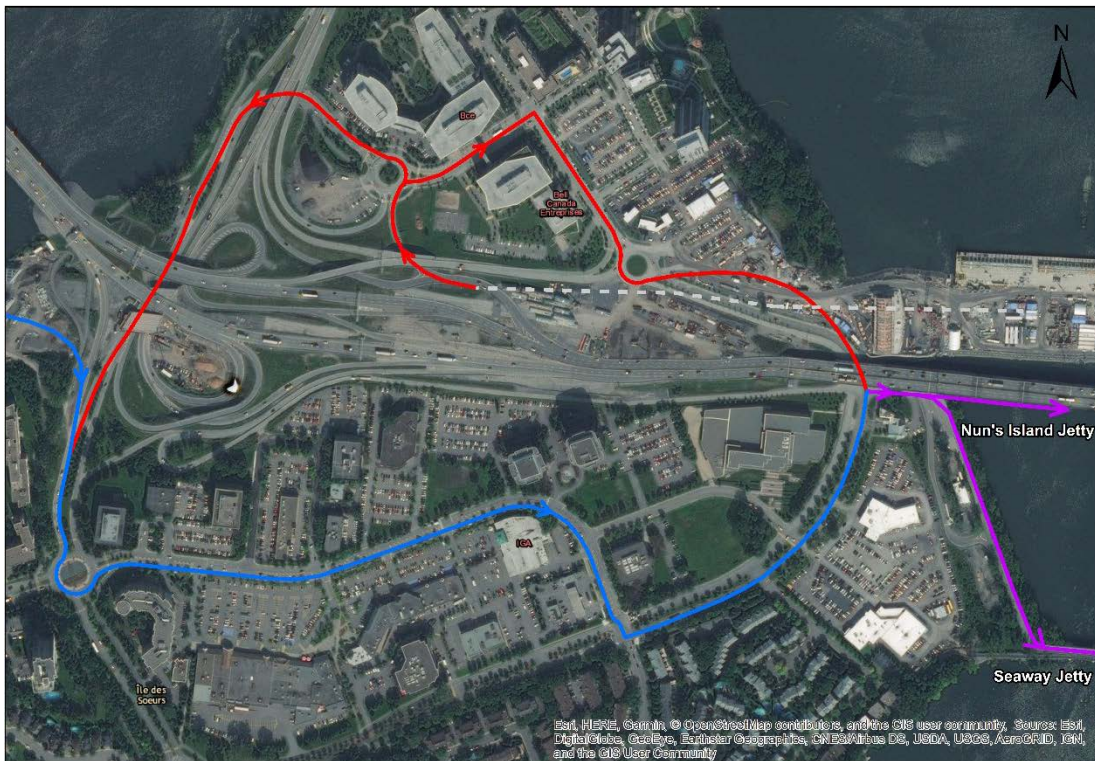


Figure 60 – Potential Truck Route in Nun's Island Area - Inbound



Figure 61 – Potential Truck Routes in the Brossard Area

6.2.1.3.2.5 Jetty Construction and Removal

During the jetty construction and removal, truck traffic is expected to occur 24 hours of the day. Based on the traffic study and the proposed schedule, the number of inbound and outbound trucks considered in the assessment for each mobilization area is summarized in Table 60. The peak hourly traffic is considered to occur with the values presented in Table 60.

Table 60 – Summary of Truck Traffic during Jetty Construction/Removal

SECTION	MODELED SPEED [KM/H]	TWO-WAY DAILY TRAFFIC ^A	NUMBER OF HOURS CONSIDERED FOR TRAFFIC	AVERAGE HOURLY TRAFFIC, PER DIRECTION	PEAK HOURLY TRAFFIC, PER DIRECTION ^B
Nun's Island	30	234	24	5	7
Nun's Island Jetty	15	99	24	2	3
Seaway Jetty	15	135	24	3	4
Brossard ^C	30	99	24	2	3

A Number of trucks per day, both-way.

B Peak hourly traffic assumed to be 1.5 times the average hourly truck count.

C Based on the roadway and site layout, truck traffic of the two sub-areas at Brossard was considered as one group.

6.2.1.3.2.6 Bridge Deconstruction

During the deconstruction of the bridge, traffic will not be lighter when compared to the work on the jetties.

Based on the traffic study and the proposed schedule, the number of inbound and outbound trucks considered in the assessment for each mobilization site is summarized in Table 61. The peak hourly traffic is considered to occur with the values presented in Table 61 for the daytime period (10am-3pm) and the nighttime period (7pm-11pm).

Table 61 – Summary of Truck Traffic during Bridge Deconstruction

SECTION	MODELED SPEED [KM/H]	TWO-WAY DAILY TRAFFIC ^A	NUMBER OF HOURS CONSIDERED FOR TRAFFIC	AVERAGE HOURLY TRAFFIC, PER DIRECTION	PEAK HOURLY TRAFFIC, PER DIRECTION ^B
Nun's Island	30	38	9	2	3
Seaway Jetty	15	38	9	2	3
Brossard ^C	30	12	9	1	1

A Number of trucks per day, both-way.

B Peak hourly traffic assumed to be 1.5 times the average hourly truck count.

C Based on the roadway and site layout, truck traffic of the two sub-areas at Brossard (C et D) was considered as one group.

6.2.1.3.3 Modelling and Assessment

6.2.1.3.3.1 Description of the Model

Noise levels were modeled by use of a noise prediction software package, Cadna/A². This software package allows the creation of a complex acoustical model with multiple sources of noise, either stationary, roads, rail and/or aircraft. The software package is equipped with the implementation of a multitude of acoustical models, which allow for the prediction of noise levels, due to sound emissions from a specific source(s). The modeling takes into account the following factors:

- Source sound power level and directivity;
- Distance attenuation;
- Source-receptor geometry, including heights and elevations;
- Barrier effects of the building and surrounding topography;
- Ground and air (atmospheric) attenuation.

6.2.1.3.3.2 Estimation of the L₁₀ Metric

The acoustical model provides prediction of noise levels in terms of L_{Aeq}³ values corresponding to the reference level in the road sector. In order to calculate the L_{A10} levels as required in the MTQ assessment criteria, a +3 dB adjustment factor was used. This method for estimation of L_{A10} (L_{Aeq} + 3 dB) is recognized and used in noise modelling for road construction projects.

6.2.1.3.3.3 Modeled Scenarios

Based on the proposed deconstruction schedule, six acoustic scenarios were identified and modeled. Different acoustic scenarios are considered, since not all of the mobilization areas are expected to be in operation at the same time. Acoustic scenarios take into consideration a potential set of sources from the deconstruction that may be active at any specific time according to the deconstruction schedule.

Due to the same assumptions of equipment usage and truck traffic, the stages of jetty construction and jetty removal were evaluated under one scenario.

Table 62 lists the deconstruction mobilization areas considered in each modeled scenario as well as the corresponding activities.

Peak hourly truck traffic was included in each scenario based on the type of deconstruction activity involved. As discussed in Section 6.2.1.3.2.2, multiple routes have been identified for inbound (and outbound) traffic at the Nun's Island side before (and after) trucks travel on the routes marked in purple in Figure 59 and Figure 60. Conservative estimates were made to assess worst-case noise levels by assuming trucks present on all possible inbound (and outbound) routes.

² Published by Datakustik GmbH.

³ Equivalent continuous sound pressure level. Since the sound level of a source varies over time, it is necessary to calculate the energy average over a given time period (Leq) in order to observe and compare different values. When this value is A-weighted, it is called LAeq.

In the case of shared (overlapping) roads segments in multiple routes, the traffic count on the overlapped segment was capped at the largest identified peak traffic number for any of the routes.

Table 62 – Modeled Scenarios for Noise Assessment

SCENARIO ID	STAGING SITE IN OPERATION	ACTIVITY	OPERATION HOURS
1	A' & B'	Jetty Construction/Removal	24h
2	C'	Jetty Construction/Removal	24h
3	B	Bridge Deconstruction	Daytime and Evening
4	B, C & D	Bridge Deconstruction	Daytime and Evening
5	A & B	Bridge Deconstruction	Daytime and Evening
6	A, B, C & D	Bridge Deconstruction	Daytime and Evening

6.2.1.3.4 Assessment Criteria

Table 63 provides the assessment criteria established for each identified receptor (see Figure 62 and Figure 63 for location). The baseline noise levels of the receptors have been determined based on the background information review presented in Section 3.3.7. Although there are municipal criteria for nuisances, the analysis is based on MTQ criteria since they are more standardized and widely used in the field of transportation.

In order to be conservative, the baseline values for the L_{A10} metric was used as the lowest of the available value based on:

- Proximity of the identified receptor to the measurement locations described in the 2013 EA;
- Proximity of the identified receptor to the measurement zones identified in the Construction Noise Reports⁴.

⁴ L_{A10} levels were estimated from the Construction Noise Reports as $L_{Aeq} + 3$ dB.



Figure 62 – Nun's Island Area Selected Representative Receptors

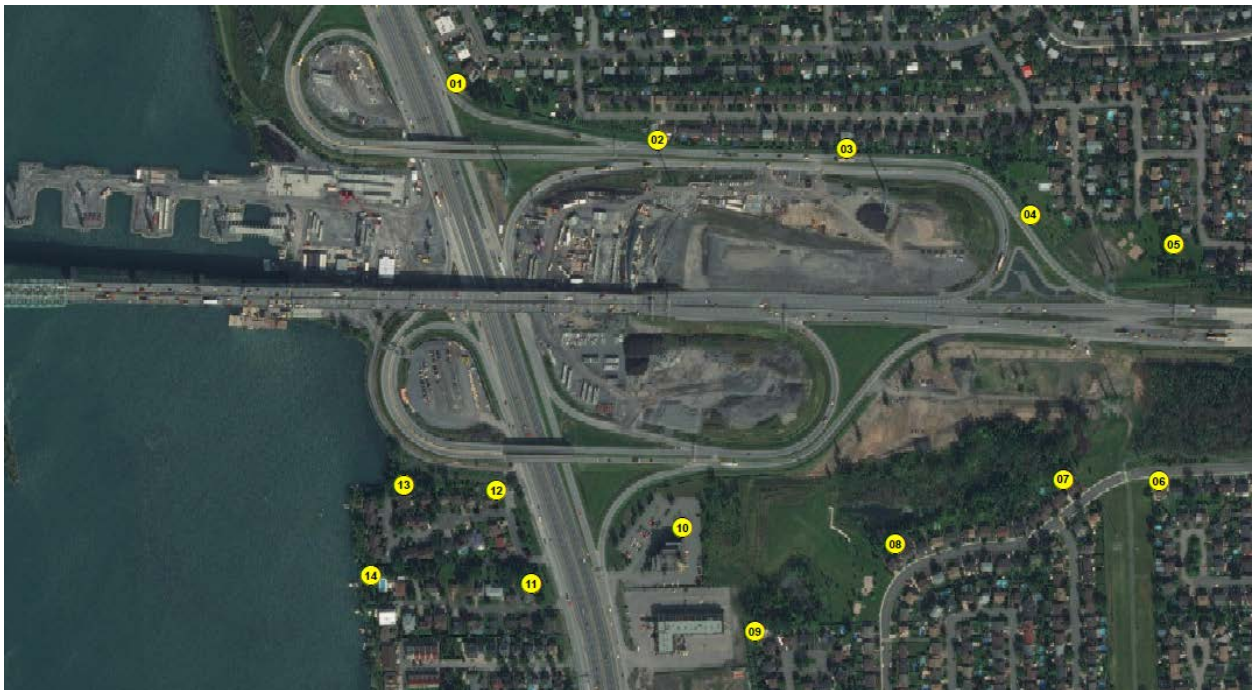


Figure 63 – Brossard Area Selected Representative Receptors

Table 64 – Noise limit for identified receptors

RECEIVING LOCATION			MEASUR E	DAY		EVENING		NIGHT	
AREA	ID NUMBER	TYPE		BASELINE DATA (DBA)	LIMIT (DBA)	BASELINE DATA (DBA)	LIMIT (DBA)	BASELINE DATA (DBA)	LIMIT (DBA)
Île-des-Sœurs	AR01	Residential	L ₁₀	67	75	62	67	60	65
	AC02	Commercial	L ₁₀	67	80	62	67	60	None ^A
	AC03	Commercial	L ₁₀	67	80	62	67	60	None ^A
	AC04	Commercial	L ₁₀	67	80	62	67	60	None ^A
	AC05	Commercial	L ₁₀	67	80	62	67	60	None ^A
	AR06	Residential	L ₁₀	60	75	55	60	55	60
	AR07	Residential	L ₁₀	60	75	55	60	55	60
	AR08	Residential	L ₁₀	60	75	55	60	55	60
	AR09	Residential	L ₁₀	60	75	55	60	55	60
	AR10	Residential	L ₁₀	60	75	55	60	55	60
	AR11	Residential	L ₁₀	60	75	56	61	57	62
	AR12	Residential	L ₁₀	60	75	56	61	57	62
	AC13	Commercial	L ₁₀	60	80	56	61	57	None ^A
Brossard	BR01	Residential	L ₁₀	65	75	65	70	61	66
	BR02	Residential	L ₁₀	65	75	64	69	60	65
	BR03	Residential	L ₁₀	65	75	64	69	60	65
	BR04	Residential	L ₁₀	65	75	65	70	61	66
	BR05	Residential	L ₁₀	64	75	65	70	61	66
	BR06	Residential	L ₁₀	55	75	60	65	58	63
	BR07	Residential	L ₁₀	55	75	60	65	58	63
	BR08	Residential	L ₁₀	55	75	60	65	58	63
	BR09	Residential	L ₁₀	55	75	60	65	58	63
	BR10	Residential	L ₁₀	55	75	60	65	58	63
	BR11	Residential	L ₁₀	63	75	60	65	60	65
	BR12	Residential	L ₁₀	63	75	60	65	60	65
	BR13	Residential	L ₁₀	63	75	60	65	60	65
	BR14	Residential	L ₁₀	63	75	60	65	60	65

A. No nighttime limit has been set for commercial sectors.

6.2.1.3.5 Assessment Results

6.2.1.3.6 Jetty Construction and Removal

The construction/removal of the jetties has been modeled in Scenarios 1 and 2, following the hypothesis Table 60. According to the assumptions, construction activities are anticipated to be present throughout 24 hours of the day, and the noise levels calculated at each receptor during the daytime, evening and nighttime are presented in Table 64.

Table 64 – Daytime, Evening, Nighttime Noise Levels from Modeled Scenarios of Jetty Construction/Removal

RECEPTOR			L _{A10} [DBA]		
AREA	ID	TYPE	SCENARIO 1	SCENARIO 2	MTQ BASED LIMITES
Nun's Island	AR01	Residential	57	.A	65
	AC02	Commercial	57	.A	67 ^c
	AC03	Commercial	57	.A	67 ^c
	AC04	Commercial	65	.A	67 ^c
	AC05	Commercial	64	.A	67 ^c
	AR06	Residential	57	.A	60
	AR07	Residential	56	.A	60
	AR08	Residential	59	.A	60
	AR09	Residential	47	.A	60
	AR10	Residential	57	.A	60
	AR11	Residential	54	.A	62
	AR12	Residential	51	.A	62
	AC13	Commercial	59	.A	61 ^c
Brossard	BR01	Residential	48	59	66
	BR02	Residential	46	55	65
	BR03	Residential	44	52	65
	BR04	Residential	36	43	66
	BR05	Residential	41	48	66
	BR06	Residential	41	47	63
	BR07	Residential	42	49	63
	BR08	Residential	44	50	63
	BR09	Residential	35	44	63
	BR10	Residential	46	54	63
	BR11	Residential	47	51	65
	BR12	Residential	48	58	65
	BR13	Residential	49	60	65
	BR14	Residential	49	57	65

Notes:

^A The resulting noise level is considered insignificant due to the distance of the sources to the receptors affected.

^B The limit is taken from the lowest of the limit identified for Daytime, Evening and Nighttime. Generally, and unless otherwise noted, the Nighttime limit was identified as the most stringent.

^C The limit identified for this receptor corresponds to the Evening period, since no limit is identified for Commercial receptors as per the MTQ's guidelines.

6.2.1.3.6.1 Bridge Deconstruction

Deconstruction of the bridge has been modeled in Scenarios 3 through 6 and as described in Table 65.

Table 65 – Deconstruction Phase Modeled Scenarios for Noise Assessment

SCENARIO ID ^A	STAGING AREAS IN OPERATION ^B	OPERATION HOURS
3	B	Daytime and Evening
4	B, C & D	Daytime and Evening
5	A & B	Daytime and Evening
6	A, B, C & D	Daytime and Evening

It is assumed that deconstruction activities should take place during the day and evening only and the calculated noise levels for each receiver are presented in Table 66, Table 67, Table 68 and Table 69.

6.2.1.3.7 Summary of Results

An assessment of the potential noise impacts due to the deconstruction of the Champlain bridge was conducted. The results are as follows:

- Based on the results of the assessment presented in Section 6.2.1.3.5.1, it is not expected that the construction and removal of the jetties will cause noise impacts to exceed the limits indicated in Section 6.2.1.3.4;
- Based on the results of the assessment presented in Section 6.2.1.3.5.2, the activities in the mobilization areas will not cause noise impacts to exceed the limits indicated in Section 6.2.1.3.4.

The selected contractor will have to take over the modelling according to its work planning. If noise limits are likely to be exceeded, mitigation measures will have to be put in place. These include reducing the pace of certain activities and installing temporary acoustic screens. More details are provided in sections 7.2.1 and 8.13 of this study.

Table 66 – Scenario 3 Noise Levels from Modeled Scenarios of Bridge Deconstruction

RECEPTOR			MODEL RESULTS L _{A10} [DBA]		MTQ BASED LIMITES	
AREA	ID	TYPE	DAYTIME	EVENING	DAYTIME	EVENING
Nun's Island	AR01	Residential	44	44	75	67
	AC02	Commercial	51	51	80	67
	AC03	Commercial	52	52	80	67
	AC04	Commercial	56	56	80	67
	AC05	Commercial	51	51	80	67
	AR06	Residential	45	45	75	60
	AR07	Residential	43	43	75	60
	AR08	Residential	50	50	75	60
	AR09	Residential	42	42	75	60
	AR10	Residential	51	51	75	60
	AR11	Residential	49	49	75	61
	AR12	Residential	48	48	75	61
	AC13	Commercial	55	55	80	61
Brossard	BR01	Residential	50	48	75	70
	BR02	Residential	48	45	75	69
	BR03	Residential	46	43	75	69
	BR04	Residential	37	34	75	70
	BR05	Residential	43	40	75	70
	BR06	Residential	43	41	75	65
	BR07	Residential	44	41	75	65
	BR08	Residential	45	43	75	65
	BR09	Residential	35	33	75	65
	BR10	Residential	48	46	75	65
	BR11	Residential	49	47	75	65
	BR12	Residential	50	48	75	65
	BR13	Residential	51	49	75	65
	BR14	Residential	51	50	75	65

Table 67 – Scenario 4 Noise Levels from Modeled Scenarios of Bridge Deconstruction

RECEPTOR			MODEL RESULTS L _{A10} [DBA]		MTQ BASED LIMITES	
AREA	DAYTIME	EVENING	DAYTIME	EVENING	DAYTIME	EVENING
Nun's Island	AR01	Residential	44	44	75	67
	AC02	Commercial	51	51	80	67
	AC03	Commercial	52	52	80	67
	AC04	Commercial	56	56	80	67
	AC05	Commercial	51	51	80	67
	AR06	Residential	45	45	75	60
	AR07	Residential	43	43	75	60
	AR08	Residential	50	50	75	60
	AR09	Residential	42	42	75	60
	AR10	Residential	51	51	75	60
	AR11	Residential	49	49	75	61
	AR12	Residential	48	48	75	61
	AC13	Commercial	55	55	80	61
Brossard	BR01	Residential	62	60	75	70
	BR02	Residential	59	56	75	69
	BR03	Residential	56	53	75	69
	BR04	Residential	47	44	75	70
	BR05	Residential	53	50	75	70
	BR06	Residential	53	49	75	65
	BR07	Residential	55	51	75	65
	BR08	Residential	58	54	75	65
	BR09	Residential	57	53	75	65
	BR10	Residential	62	59	75	65
	BR11	Residential	59	56	75	65
	BR12	Residential	62	59	75	65
	BR13	Residential	61	59	75	65
	BR14	Residential	56	53	75	65

Table 68 – Scenario 5 Noise Levels from Modeled Scenarios of Bridge Deconstruction

RECEPTOR			MODEL RESULTS L _{A10} [DBA]		MTQ BASED LIMITES	
AREA	DAYTIME	EVENING	DAYTIME	EVENING	DAYTIME	EVENING
Nun's Island	AR01	Residential	57	55	75	67
	AC02	Commercial	56	55	80	67
	AC03	Commercial	54	53	80	67
	AC04	Commercial	64	62	80	67
	AC05	Commercial	65	62		67
	AR06	Residential	58	56	75	60
	AR07	Residential	57	55	75	60
	AR08	Residential	58	56	75	60
	AR09	Residential	46	45	75	60
	AR10	Residential	56	54	75	60
	AR11	Residential	51	50	75	61
	AR12	Residential	48	48	75	61
	AC13	Commercial	56	56	80	61
Brossard	BR01	Residential	50	48	75	70
	BR02	Residential	48	45	75	69
	BR03	Residential	46	43	75	69
	BR04	Residential	37	34	75	70
	BR05	Residential	43	40	75	70
	BR06	Residential	43	41	75	65
	BR07	Residential	44	41	75	65
	BR08	Residential	45	43	75	65
	BR09	Residential	35	33	75	65
	BR10	Residential	48	46	75	65
	BR11	Residential	49	47	75	65
	BR12	Residential	50	48	75	65
	BR13	Residential	51	49	75	65
	BR14	Residential	51	50	75	65

Table 69 – Scenario 6 Noise Levels from Modeled Scenarios of Bridge Deconstruction

RECEPTOR			MODEL RESULTS L _{A10} [DBA]		MTQ BASED LIMITES	
AREA	DAYTIME	EVENING	DAYTIME	EVENING	DAYTIME	EVENING
Nun's Island	AR01	Residential	57	55	75	67
	AC02	Commercial	56	55	80	67
	AC03	Commercial	54	53	80	67
	AC04	Commercial	64	62	80	67
	AC05	Commercial	65	62	80	67
	AR06	Residential	58	56	75	60
	AR07	Residential	57	55	75	60
	AR08	Residential	58	56	75	60
	AR09	Residential	46	45	75	60
	AR10	Residential	56	54	75	60
	AR11	Residential	51	50	75	61
	AR12	Residential	48	48	75	61
	AC13	Commercial	56	56	80	61
Brossard	BR01	Residential	62	60	75	70
	BR02	Residential	59	56	75	69
	BR03	Residential	56	53	75	69
	BR04	Residential	47	44	75	70
	BR05	Residential	53	50	75	70
	BR06	Residential	53	49	75	65
	BR07	Residential	55	51	75	65
	BR08	Residential	58	54	75	65
	BR09	Residential	57	53	75	65
	BR10	Residential	62	59	75	65
	BR11	Residential	59	56	75	65
	BR12	Residential	62	59	75	65
	BR13	Residential	61	59	75	65
	BR14	Residential	56	53	75	65

6.2.1.4 Description of effects – Air quality

The types of emissions generated by the deconstruction of the bridge itself will depend on the methods and equipment used by the contractor, along with the approach he will use to access the bridge for deconstruction. Table 70 provides a summary of the bridge sections with the most probable type of deconstruction activity for each section (see Figure 1 in Volume 1, Section 2.1 for the bridge location sections).

Table 70 – Deconstruction Activities

SECTIONS	DESCRIPTION	LENGTH (M)	TYPE OF DECONSTRUCTION ACTIVITY
44 W to 35 W	Concrete spans over land	496	Conventional demolition with concrete crusher and shear jaws
40W à 35W	Concrete spans over projected jetty		
35 W to 5 W	Concrete spans over water	1,653	Lower spans on a barge by cranes on barges and reduction to pieces at mobilization areas (Nuns' Island or seaway dike)
5W à 1W	Metal portion over land or projected jetty	763.45	Lower suspended span (section 6) with jack. Lower spans with cranes on land and reduction to pieces at mobilization areas
1-E	Metal portion over water (estimated 40 days)		
2E à 5E	Concrete spans over projected jetty	528.07	Conventional demolition with concrete crusher and shear jaws
5E to 13 E	Concrete span over land		

The above activities will generate the following main types of emissions:

- NO_x, SO₂, CO and TPM emissions from the use of diesel-fired heavy-duty construction equipment;
- Particulate from the deconstruction activities.

Emissions from heavy equipment used in deconstruction work are similar in nature to those produced by road traffic on the New Bridge and other anthropogenic sources in the study area. Emissions from the vehicles that will use the New Bridge on a daily basis (approximately 110,000 to 137,000 vehicles/day) and from other anthropogenic sources in the study area are much higher than those from the addition of some 50 trucks and deconstruction equipment.

Considering this, the simulations do not take into account the emissions that will come from vehicles and deconstruction equipment.

It should be noted that ECCC determined that the impacts of the New Champlain Bridge construction project on these air quality parameters were negligible compared to regional conditions (Dessau-Cima+, 2013). Consequently, monitoring of these parameters was interrupted after the first year of construction of the New Bridge, which was carried out using equipment similar in size to that planned for the deconstruction of the original bridge. This supports the fact that emissions from vehicles and deconstruction equipment are not included in the simulations.

The assessment of impacts on air quality will focus on fine particles emitted during deconstruction activities. Table 71 summarizes the deconstruction activities, emissions from each and the potential impact on air quality in residential areas before mitigation measures are applied. The impact assessment is based on the experience of the specialists and takes into account the following factors:

- Climate information, including wind data;
- Emissions-generating source location and proximity to sensitive residential receptors; and
- Type and size of deconstruction activities at each source (based on current knowledge).

Table 71 – Emissions and Potential Impact to Sensitive Receptors

SECTIONS	DESCRIPTION	ACTIVITY	CONSIDERED EMISSIONS	POTENTIAL IMPACT ON RESIDENTIAL AREAS
Sections 5W to 44W	Demolition of concrete spans over water, ground and jetty	Sawing and cutting	Particulate (PM _{tot} and PM ₁₀), and silica	Minimal
		Hydraulic hammer		
		Concrete crusher and shear jaws		
Section 6	Metal portion over Seaway	Sawing and cutting	Particulate (PM _{tot} and PM ₁₀), and lead	Minimal
5E to 13E	Concrete span over land	Sawing and cutting	Particulate (PM _{tot} and PM ₁₀), and silica	High – Brossard Area
		Hydraulic hammer		
		Concrete crusher and shear jaws		

Activities in the mobilization areas are also likely to emit fine particles. Other emissions could also come from the handling of deconstruction materials such as lead found in the paint of certain steel components, and silica from concrete sawing.

Table 72 summarizes the types of activities at materials mobilization areas and possible emissions to be generated from the activities, along with an assessment of impact potential on neighboring residential areas.

Table 72 – Mobilization areas, considered emissions and potential to impact sensitive receptors

LOCATION	DESCRIPTION	ACTIVITY	CONSIDERED EMISSIONS	POTENTIAL IMPACT ON RESIDENTIAL AREAS
Nun's Island	Jetty near shore and on-shore section below the bridge on ramp area	Crushing concrete parts and cutting steel parts; loading trucks. 25,000 t of concrete and 500 t of steel are estimated to be processed.	Particulate (PM _{tot} and PM ₁₀), including silica	Medium impact potential to residential area on Nun's Island 250 m to the south of the jetty area
Seaway Dike	Barges and site on Seaway dike	Crushing concrete parts and cutting steel parts; loading trucks. 160,000 t of concrete and 10,000 t of steel are estimated to be processed.	Particulate (PM _{tot} and PM ₁₀), including silica	Minimal potential. Possible impacts to residential areas located 800 m to the east in Brossard on moderate to high wind days
Brossard North of Route 132	On-shore section below the bridge on ramp area	Crushing concrete parts and cutting steel parts; loading trucks. 53,000 t of concrete and 10,000 t of steel are estimated to be processed.	Particulate (PM _{tot} and PM ₁₀), including silica and lead particulate (estimated 40 days to remove steel structure)	Medium to High impact potential to residential areas located in Brossard 130 m to the southeast and 50 m to the south
Brossard South of Route 132	On-shore section in Brossard	Crushing concrete parts and cutting steel parts; loading trucks. 13,000 t of concrete and 100 t of steel are estimated to be processed. The area is not paved and significant potential for dust generation from vehicles traveling over unpaved areas. Note: It is possible this area may only be used for site facilities and storage.	Particulate (PM _{tot} and PM ₁₀), including silica	High impact potential to residential areas located in Brossard 200 m to the north and 150 m to the south

Based on an assessment of deconstruction source locations along with a review of prevailing winds, five key residential area receptors were identified that could potentially be impacted by emissions from deconstruction activities (Figure 64).

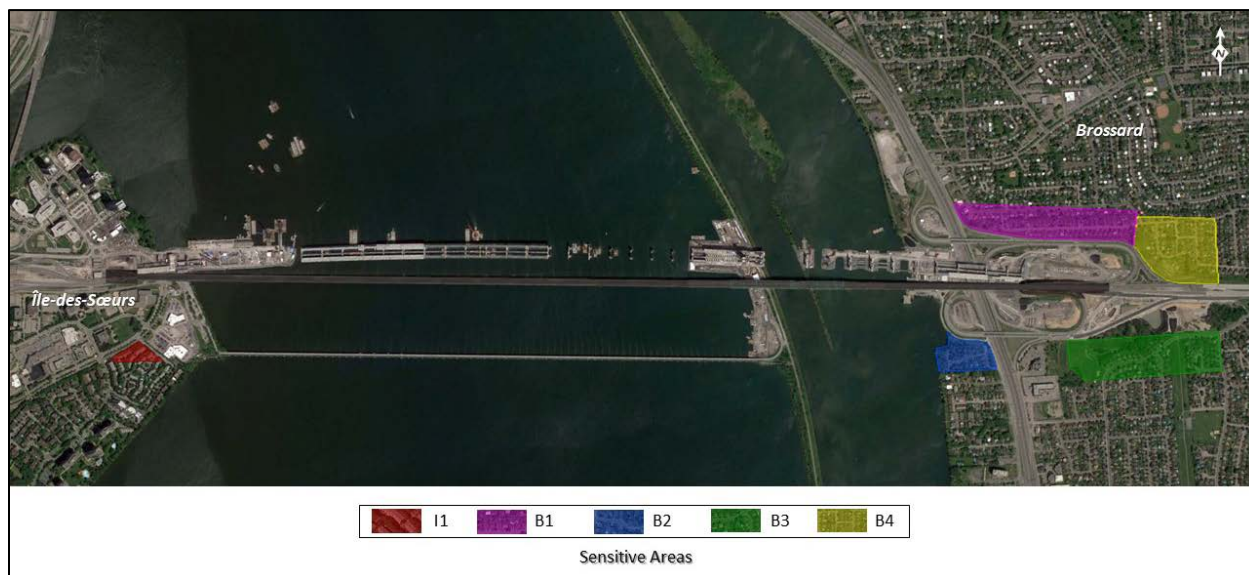


Figure 64 – Localisation of sensitive areas

The air quality monitoring program for these sensitive areas is presented in sections 6.3.1.6 and 7.2.3.

6.2.1.5 Description of effects – Greenhouse gases

The GHG emissions of the project will be assessed in accordance with the requirements of ISO 14064-2: *Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements*, and considers the following assumptions:

- Deconstruction of concrete using jaws for the aboveground sections of the bridge and the three jetties;
- Deconstruction of concrete for the bridge sections over water using sawing/depositing on a barge for deconstruction, followed by the use of jaws on the shoreline;
- Deposition of the central arch for dismantlement into transportable components on the shore;
- Reverse deconstruction of other metal sections with deconstruction into transportable components on the shore;
- Processing of materials mainly at the Seaway dike;
- Removal of all materials by truck;
- Reuse of materials from SSL jetties (with temporary storage within a radius of a few kilometres);
- Certain piers and footings of the Existing Bridge kept in place.

The scope of the assessment will include the following:

- Level 1 emissions – Direct GHG emissions from the company such as the combustion of hydrocarbons in its furnaces or vehicles (e.g. barges, cranes, jaws, saws, generators, materials processing, in-situ transport and to the temporary storage areas, dike construction);
- Level 2 emissions – Indirect GHG emissions attributable to purchased energy such as electricity or steam (e.g. electricity consumed by work site facilities);
- Level 3 emissions – Other indirect GHG emissions from sources such as the production of raw materials, delivery or shipping of materials, or employee movement (e.g. delivery of machinery, supply of materials for jetties, shipping of materials for reclamation, employee comings and goings). The scope of level 3 emissions is limited to routes directly associated with the project (first link in the chain).

The emission rates that are used are those usually prescribed for such calculations by the *Regulation respecting mandatory reporting of certain emissions of contaminants into the atmosphere*. The assessment is expressed in tonnes of CO₂ equivalent (t CO₂eq) and includes CO₂, CH₄ and N₂O gases that are the most representative of the emissions that will be generated at the work site (essentially vehicles and machinery powered by fossil fuels).

This approach makes it possible to evaluate the project's total GHG emissions for the three-year work period at 24 000 t.éq.CO₂. Nationally, those punctual emissions (3 years) are considered low when compared to the 704 Mt CO₂eq emitted in Canada in 2016 (ECCC, 2018). At the provincial scale, those emissions are also considered low compared to the 81.7 Mt CO₂eq emitted in Quebec in 2015 (MDDELCC, 2018).

In the draft *2019-2022 Federal Sustainable Development Strategy* (ECCC, 2018), the target of the first goal, *Effective action on climate change*, is to reduce Canada's total GHG emissions by 30% relative to 2005 emission levels. JCCBI is voluntarily complying with the above federal government strategy and is adopting the above target for the deconstruction of the Champlain Bridge.

6.2.1.6 Description of effects – Navigation

6.2.1.6.1 Commercial shipping

The St. Lawrence Seaway is the only navigable passage for transporting goods between the St. Lawrence River and the Great Lakes. For this reason, commercial shipping in the Seaway cannot be disturbed while the Existing Champlain Bridge is being deconstructed, other than exceptionally, and only after an arrangement between the stakeholders.

The St. Lawrence Seaway Management Corp. (SLSMC) is the agency responsible for the safe and efficient passage of ocean freight in the Canadian Seaway facilities. Consequently, it prohibits construction work within the limits of the St. Lawrence Seaway during the navigation period, which runs from March to December of each year. The prohibition covers all the bridge deconstruction activities that will take place within the SLSMC's limits of jurisdiction unless a technical construction protocol is first received and approved.

6.2.1.6.2 Pleasure boating

Given the shallow water depth and strength of the current, the Greater La Prairie Basin (river sector) has no marked (buoyed) channel for pleasure boating and recreational boating. However, Canadian Coast Guard (CCG) air cushion vehicles (ACV) and Saute-Moutons company jet boats and mechanically and non-mechanically powered boats sail in this part of the river from April to October. Since there are no CCG buoys in these river sectors and the Lesser La Prairie Basin, boats that originate in these sectors that sail under the Champlain Bridge do so mainly using local navigation knowledge.

A variety of options are currently being considered for leveling the Existing Champlain Bridge piers and footings. The option that should be preferred for most of the piers and footings is to level them down to at least two (2) meters below the 50-year low water mark. Some piers located near the banks could be preserved and serve as fauna habitat development or as added value as a part of the bank improvement project that will be decided upon. Transport Canada will have to issue approvals in virtue of the Navigation Protection Act for the work as a whole, as well as for the piers that will be preserved less than two (2) meters from the surface, at water level (fauna habitat development), or out of the water.

Recreational, pleasure, and sport fishing boating can be maintained in the Greater La Prairie Basin during construction. This will require implementation of an information campaign for users and agencies, in cooperation with the authorities concerned, application of strict navigation measures, and cooperation of supervisory and response organizations to ensure boater safety.

6.2.1.7 Description of effects – Quality of life

In order to assess the effects of the project on quality of life, a set of environmental effects must be considered. For this TEA, the main vectors used to assess the project's impact on the quality of life are noise environment, air quality, and traffic. The following analysis is based on individual analyses of these three components (see subsections 6.2.1.2, 6.2.1.3 and 6.2.1.4).

6.2.1.7.1 Noise environment

The main source of noise resulting from construction work are the use of heavy machinery in the mobilization areas and truck traffic carrying materials from those areas.

Based on the model of 13 sensitive receptors on Nuns' Island and 14 sensitive receptors in Brossard, project activities will increase the noise levels but they will be within the applicable criterias.

Some noise sources could not be incorporated into the model at this stage. Nevertheless, the activities in question will have to conform to the limits that apply to the sensitive receptors. The contractor will have to model noise levels of all activities before they are carried out, and evaluate their impacts on the sensitive receptors, in order to implement the mitigation measures required to ensure that operations are executed within the applicable limits.

6.2.1.7.2 Air quality

The work will cause emission of particles, including silica, and possibly lead. Some mobilization areas will be located near sensitive areas. In addition, some sections of the structure located near sensitive areas will be deconstructed in place.

The sensitive areas, one on Nuns' Island and four in Brossard, were identified on the basis of emission sources and meteorological data. A series of mitigation measures and monitoring measures was established to ensure that the emissions respect the defined criteria for air quality.

6.2.1.7.3 Traffic

Temporary bottlenecks associated with the work could affect traffic and consequently cause inconveniences for riverside residents and other users of the affected routes. Recourse to bottlenecks will be kept to a strict minimum and will be of short duration (nights or weekends).

The segment of René-Lévesque Blvd. on Nuns' Island that runs under the bridge will be closed periodically during bridge deck deconstruction (at night or on weekends). Similarly, during concurrent REM work, the Champlain Bridge on-ramp from the east end of Nuns' Island could be closed for some time. The number and duration of such closings will be minimized, especially for René-Lévesque Blvd., and detour roads will be put in place. Weekday closings will be done only as a last resort.

In Brossard, closings of Highway 132 and its service lanes (Marie-Victorin Blvd.) will be required. The number and duration of such closings will be minimized and detour roads will be put in place. Nevertheless, given the importance of these traffic lanes, they cannot be closed on weekdays; only at night or on weekends. Bottlenecks of long duration could be necessary for pier deconstruction; no lanes will be closed but lane widths may be reduced.

6.2.1.7.4 Assessment of project impact on quality of life

The criteria used to assess the project's potential impact on quality of life are the same as those applied for the other environmental components; they are defined in subsection 5.1.2.

6.2.1.7.4.1 Evaluation of project impact on quality of life on Nuns' Island

6.2.1.7.4.1.1 Intensity

- Noise environment: Noise impact intensity is considered medium since the noise levels will increase but not overshoot the applicable limits;
- Air quality: The intensity of the potential impact of particles emitted at the mobilization area is considered medium, given the location of the sensitive area in relation to the emitting source and meteorological data;
- Traffic: The bottleneck impact intensity is considered medium, taking into account occasional closures, detours put in place, and possible REM work altering movements of riverside residents and affected road users.

In light of the foregoing, the intensity of the potential project impacts on the quality of life on Nuns' Island is considered to be medium.

6.2.1.7.4.1.2 Extent

The extent of the impacts of the three vectors (noise environment, air quality, traffic) on the quality of life on Nuns' Island is considered local. While the impacts will not be perceived at the scale of the study area, one residential area has been identified as being sensitive to the potential impacts on air quality; in addition, 13 sensitive receptors were identified with regard to the noise environment. Lastly, traffic will be disturbed on a few highway segments.

6.2.1.7.4.1.3 Duration

- Noise environment: The duration of noise impacts is considered temporary, since their production will be continuous during certain activities;
- Air quality: Since particulates will be continuously emitted during certain activities, the duration is considered temporary;
- Traffic: Roadblock duration is considered temporary.

In light of the foregoing, the intensity of the potential project impacts on the quality of life on Nuns' Island is considered medium.

6.2.1.7.4.1.4 Potential impact evaluation

By integrating the evaluations of all the criteria in Table 47, the potential project impact on quality of life on Nuns' Island is considered insignificant. Several mitigation measures are planned (see Table 73, Table 74 and Table 75) to limit the effects on traffic, noise climate and air quality, thus reducing the effect on quality of life.

6.2.1.7.4.2 Evaluation of project impact on quality of life in Brossard

6.2.1.7.4.2.1 Intensity

- Noise environment: Noise impact intensity is considered medium since the noise levels will increase but not overshoot the applicable limits;
- Air quality: given the location of the sensitive area in relation to the emitting sources and meteorological data, the intensity of the potential impact of the particulates emitted at the mobilization areas is considered high given the location of some sensitive area in relation to the emitting sources and meteorological data;
- Traffic: Bottleneck impact intensity is considered low to medium. Some closings will occur but their number and duration will be minimized, and lane width reductions during deconstruction of the piers could contribute to traffic slowdowns. Consequently, movement by riverside residents and affected route users will be disturbed.

In light of the foregoing, the intensity of the potential project impacts on quality of life in Brossard is considered medium.

6.2.1.7.4.2.2 Extent

The extent of the impacts of the three vectors (noise environment, air quality, traffic) on the quality of life in Brossard is considered local.

6.2.1.7.4.2.3 Duration

- Noise environment: The noise level duration is considered temporary, since their production will be continuous during certain activities;
- Air quality: Since particulates will be continuously emitted during certain activities, their duration is considered temporary;
- Traffic: Bottleneck duration is considered temporary.

In light of the foregoing, the intensity of the potential project impacts on quality of life in Brossard is considered temporary.

6.2.1.7.4.2.4 Evaluation of potential impact

By integrating the evaluations of all criteria in Table 47, the potential project impact on quality of life in Brossard at certain times is considered high (e.g., during road closings or particularly dust or noise emitting activities). This is due, in part, to the estimate of potential impact on air quality in the two sensitive areas located to the south. However, the potential impact assessment does not take implementation of mitigation measures and monitoring into account in addition to performance criteria. In terms of air quality, a series of mitigation measures and monitoring, including real time monitoring, will help to reduce the project's impact significantly in the sensitive areas (measures presented in subsection 7.2.3). Some mitigation measures and monitoring are also designed to reduce project impacts on traffic (subsection 6.2.1.2) and the noise environment (subsections 6.2.1.3 and 7.2.1) as much as possible. Applying all these measures means that the project's residual impact on the quality of life is estimated to be insignificant.

6.2.2 EFFECTS ANALYSIS

Table 73, Table 74 and Table 75 present the potential effects of the project components on each of the valued environmental components, as identified in Table 48 at the beginning of Chapter 6. In Tables 73, 74 and 75, we find the project phase as well as the project component generating an effect, the affected environmental component, a description of the anticipated effect, and an assessment of the significance of the potential effect based on the three criteria (intensity, duration, extent). Subsequently, the mitigation measures required to reduce the effect are presented and an assessment of the residual effect is made. The reader is referred to the beginning of Section 6.2 for a description of the categories of mitigation measures (CC, MPO, CCDG, NC, P and CP).

Table 73 - Assessment of the environmental effects of the Champlain Bridge deconstruction project – Physical environment

NO	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURE	SIGNIFICANCE OF RESIDUAL EFFECTS
1	Pre-deconstruction	Work site mobilization and construction of temporary installations	Soil and sediment quality	When setting up the work site, accidental oil or fuel spills could affect the quality of soils and sediments.	Low	Temporary	Limited	Not significant	CCDG 10.4.2 P-9, P-11 and P-12	Not significant
2	Pre-deconstruction	Work site mobilization and construction of temporary installations	Soil and sediment quality	Earthworks and levelling carried out in an aquatic environment (dock, jetty, etc.) for the preparation of the work site could result in the dispersion of contaminated sediment.	High	Temporary	Limited	Significant	MPO-4 and MPO-5	Not significant
3	Pre-deconstruction	Work site mobilization and construction of temporary installations	Soil and sediment quality	Setting up the work site and the temporary installations could cause the soil to be stripped and thus increase erosion.	Low	Temporary	Limited	Not significant	MPO-6 and MPO-8 CCDG10.4.3.3.2 and CCDG 10.4.3.5 NC 9.4.3.1, NC 9.4.3.2 and NC 9.4.3.3 P-13	Not significant
4	Pre-deconstruction	Work site mobilization and construction of temporary installations	Surface water quality	Potential increase in suspended matter concentrations in surface water through the disturbance of sediment in the Greater and Lesser La Prairie Basin.	Moderate	Temporary	Regional	Significant	CP-3	Not significant
5	Pre-deconstruction	Work site mobilization and construction of temporary installations	Surface water quality	Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats.	Moderate	Temporary	Regional	Significant	MPO-4, MPO-5, MPO-6, MPO-7 and MPO-8	Not significant
6	Pre-deconstruction	Work site mobilization and construction of temporary installations	Surface water quality	Potential contamination of St. Lawrence River through the input of soils carried by runoff from disrupted surfaces. Potential increase in suspended matter concentrations in surface water. Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats.	Moderate	Temporary	Local	Not significant	MPO-4, MPO-5, MPO-6, MPO-7, MPO-8, MPO-11 and MPO-13 CCDG 10.4.3.1, CCDG 10.4.3.3.1, CCDG 10.4.3.3.2 and CCDG 10.4.3.3.3 NC 9.4.3.1 P-24 CP-3	Not significant
7	Pre-deconstruction	Work site mobilization and construction of temporary installations	Groundwater quality	When transporting construction materials and during work site preparation, accidental oil or fuel spills could affect the quality of groundwater.	Moderate	Permanent	Limited	Not significant	CCDG 10.4.2 P-9, P-10, P-34, P-67 and P-70	Not significant
8	Pre-deconstruction	Work site mobilization and construction of temporary installations	Air quality	The construction of temporary installations may result in a temporary degradation of air quality through fugitive dust emissions, some of which may contain contaminants.	Moderate	Temporary	Local	Not significant	P-19, P-100 and P-86 CCDG 12.4 CP-2, CP-5 and CP-8	Not significant
9	Deconstruction	Soil stripping and tree clearing	Soil and sediment quality	Stripping and clearing will result in bare soil, thus increasing erosion.	Moderate	Temporary	Limited	Not significant	MPO-6 and MPO-8 CCDG10.4.3.3.2 and CCDG 10.4.3.5 NC 9.4.3.1, NC 9.4.3.2 and NC 9.4.3.3 P-13, P-106 and P-109	Not significant
10	Deconstruction	Soil stripping and tree clearing	Soil and sediment quality	Stockpiling of contaminated soil may cause the contamination of soil and sediment found under or near the piles.	Moderate	Permanent	Limited	Not significant	NC 9.3.3.4	Not significant
11	Deconstruction	Soil stripping and tree clearing	Surface water quality	Potential contamination of St. Lawrence River through the input of soils carried by runoff from disrupted surfaces. Potential increase in suspended matter concentrations in surface water. Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats. Note: The Migratory Bird Sanctuary Regulations prohibit the introduction of toxic substances into migratory bird habitats.	Moderate	Temporary	Local	Not significant	MPO-4, MPO-5, MPO-6, MPO-7, MPO-8, MPO-11 and MPO-13 CCDG 10.4.3.1, CCDG 10.4.3.3.1, CCDG 10.4.3.3.2 and CCDG 10.4.3.3.3 NC 9.4.2 and NC 9.4.3.1 P-24 CP-3	Not significant
12	Deconstruction	Excavation, earthworks	Soil and sediment	Excavation work may expose waste.	Moderate	Temporary	Limited	Not significant	P-33	Not significant

Table 73 - Assessment of the environmental effects of the Champlain Bridge deconstruction project – Physical environment (cont'd)

NO	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURE	SIGNIFICANCE OF RESIDUAL EFFECTS
			quality							
13	Deconstruction	Excavation, earthworks	Soil and sediment quality	Excavation and stockpiling of contaminated soil may cause the contamination of soil and sediment found under or near excavation areas and piles.	Moderate	Permanent	Limited	Not significant	NC 9.3.3.4 P-35 and P-36 CC-3	Not significant
14	Deconstruction	Excavation, earthworks	Surface water quality	Pumping water from excavations may contaminate watercourses.	Low	Temporary	Limited	Negligible	MPO-16 CP-4	Not significant
15	Deconstruction	Excavation, earthworks	Surface water quality	Excavation and earthworks will modify the drainage pattern and may result in increased runoff and an inflow of suspended matter in watercourses. Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats. Note: The Migratory Bird Sanctuary Regulations prohibit the introduction of toxic substances into migratory bird habitats.	Low	Temporary	Limited	Negligible	MPO-4 CCDG 10.4.3.3.1, CCDG 10.4.3.3.2 and CCDG 10.4.3.3.3 NC 9.4.3.1, NC 9.4.3.2 and NC 9.4.3.3 CP-3	Not significant
16	Deconstruction	Excavation, earthworks	Groundwater quality	The excavation of contaminated soils or sediments below the level of the water table may cause groundwater to become contaminated.	Moderate	Temporary	Limited	Not significant	P-20, P-33 and P-34	Not significant
17	Deconstruction	Excavation, earthworks	Air quality	During excavation work, surfaces that have been stripped and piles of granular materials may generate dust that could affect air quality, especially in dry weather conditions.	Low	Temporary	Limited	Negligible	MPO-11 P-32, P-116 and P-118 CP-2, CP-5 and CP-8	Not significant
18	Deconstruction	Dismantlement of structures	Surface water quality	Debris or saw slurry from the dismantlement of the deck or structures is likely to end up in the St. Lawrence, thus affecting the quality of the surface water in the area. Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats.	Moderate	Temporary	Local	Not significant	MPO-4, MPO-5, MPO-14, MPO-15, MPO-16, MPO-17, MPO-18 and MPO-25 CP-3, CP-5, CP-6, CP-8 and CP-9	Not significant
19	Deconstruction	Dismantlement of structures	Surface water quality	The presence of lead and other contaminants in the structure is likely to contaminate surface water.	Moderate	Temporary	Local	Not significant	MPO-25	Not significant
20	Deconstruction	Dismantlement of structures	Air quality	Deconstruction work may result in the temporary degradation of air quality through fugitive dust emissions, some of which may contain contaminants.	Moderate	Temporary	Local	Not significant	P-19, P-90, P-91, P-92, P-100 and P-118 CP-2, CP-5, CP-6, CP-8 and CP-9	Not significant
21	Deconstruction	Dismantlement of structures	Air quality	Bridge – Sections with steel spans (Section 6 (2W to 2E)) Deconstruction may temporarily degrade air quality through fugitive dust emissions, which may contain lead particles.	Low	Temporary	Local	Not significant	P90, P91, P92, P114, P120 CP-2, CP-5, CP-7 and CP-8	Not significant
22	Deconstruction	Dismantlement of structures	Air quality	Concrete spans over land (5E to 13E) Unless mitigation measures are continuously applied, deconstruction work may result in a frequent degradation of air quality, including the emission of dust and certain contaminants.	High	Temporary	Local	Not significant	P90, P91, P92, P114, P115, P116, P117, P118, P119, P120 CP-2, CP-5, CP-6, CP-8 and CP-9	Not significant
23	Deconstruction	Dismantlement of structures	Air quality	Concrete spans over land (44W to 41W) Unless mitigation measures are continuously applied, deconstruction work may result in an occasional degradation of air quality, including the emission of dust and certain contaminants.	Moderate	Temporary	Local	Not significant	P90, P91, P92, P114, P115, P116, P117, P118, P119, 120 CP-2, CP-5, CP-6, CP-8 and CP-9	Not significant
24	Deconstruction	Dismantlement of structures	Air quality	Mobilization areas and temporary jetties – Brossard Unless mitigation measures are continuously applied, deconstruction work may result in a frequent degradation of air quality, including the emission of dust and certain contaminants.	High	Temporary	Local	Not significant	P90, P91, P92, P115, P116, P117, P118, P119, P120 CP-2, CP-5, CP-6, CP-7, CP-8 and CP-9	Not significant
25	Deconstruction	Dismantlement of structures	Air quality	Mobilization areas and temporary jetty – Nuns' Island Unless mitigation measures are continuously applied, deconstruction	Moderate	Temporary	Local	Not significant	P90, P91, P92, P115, P116, P117, P118, P119, P120	Not significant

Table 73 - Assessment of the environmental effects of the Champlain Bridge deconstruction project – Physical environment (cont'd)

NO	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURE	SIGNIFICANCE OF RESIDUAL EFFECTS
				work may result in an occasional degradation of air quality, including the emission of dust and certain contaminants.					CP-2, CP-5, CP-6, CP-8 and CP-9	
26	Deconstruction	Work in aquatic environments	Soil and sediment quality	In-water works for the creation of temporary jetties and cofferdams may result in the resuspension of contaminated sediments.	High	Temporary	Local	Significant	MPO-3, MPO-10 and MPO-11 P-20, P-54, P-55 and P-56	Not significant
27	Deconstruction	Work in aquatic environments	Soil and sediment quality	In-water works on the dike and on flood plains for the deconstruction of footings and foundations may result in the dispersion of contaminated sediments.	High	Temporary	Local	Significant	P-20 and P-53	Not significant
28	Deconstruction	Work in aquatic environments	Surface water quality	Potential increase in suspended matter concentrations in surface water through the disturbance of sediment in the La Prairie basins when creating the jetties and removing the piers. Potential increase in organic and inorganic contaminant levels in surface water through the disruption of sediment in the Greater and Lesser La Prairie Basins. Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats.	Moderate	Temporary	Local	Not significant	MPO-4, MPO-5, MPO-6, MPO-7 and MPO-8 P-20 CP-3	Not significant
29	Deconstruction	Work in aquatic environments	Surface water quality	Underwater sawing of existing bridge piers is likely to generate saw slurry that may end up in the St. Lawrence and affect water quality. Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats.	Moderate	Momentary	Local	Not significant	MPO-4, MPO-5, MPO-14, MPO-15, MPO-16, MPO-17 and MPO-18 CP-3	Not significant
30	Deconstruction	Work in aquatic environments	Surface water quality	Residue and waste may be released into the St. Lawrence and affect water quality.	Moderate	Momentary	Local	Negligible	MPO-5 and MPO-25 P-51	Not significant
31	Deconstruction	Work in aquatic environments	Hydrology and hydraulics	The creation of temporary jetties and gradual removal of the piers will modify water conditions	Low	Permanent	Limited	Not significant	P-110 CC-6	Not significant
32	Deconstruction	Work in aquatic environments	Groundwater quality	If excavations are required to remove footings and foundations on flood plains and the dike, the excavation of contaminated soil or sediment under the water level may result in groundwater contamination.	Moderate	Temporary	Limited	Not significant	P-20 and P-33	Not significant
33	Deconstruction	Management of waste and hazardous materials	Soil and sediment quality	The temporary storage and removal of concrete and steel debris at unauthorized locations could result in the degradation of the quality of native soils.	Moderate	Temporary	Limited	Negligible	CCDG 7.11, CCDG 11.4.7 and CCDG 11.4.7.2.1 NC 9.3.3.1, NC 9.3.3.2, NC 9.3.3.3 and NC 9.3.3.4 P-59, P-60 and P-95	Not significant
34	Deconstruction	Management of waste and hazardous materials	Soil and sediment quality	Debris containing asbestos and lead are likely to be found during deconstruction of the bridge structure.	Moderate	Temporary	Limited	Not significant	P-79	Not significant
35	Deconstruction	Management of waste and hazardous materials	Surface water quality	The accidental release of oil, other hazardous products or waste into the St. Lawrence is likely to affect surface-water quality. Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats.	Moderate	Momentary	Limited	Negligible	CCDG 7.11, CCDG 10.4.2 and CCDG 10.4.3.1 P-9, P-58, P-59, P-67 and P-81	Not significant
36	Deconstruction	Management of waste and hazardous materials	Groundwater quality	The storage and removal of concrete and steel debris at unauthorized locations could result in the degradation of groundwater quality.	Moderate	Permanent	Limited	Not significant	CCDG 7.11, CCDG 10.4.3.3.2, CCDG 11.4.7 and CCDG 11.4.7.2.1 NC 9.3.3.1, NC 9.3.3.2, NC 9.3.3.3 and NC 9.3.3.4 P-34, P-59 and P-60	Not significant
37	Deconstruction	Management of waste and hazardous materials	Air quality	Poor management of volatile waste may cause emissions of contaminants into the atmosphere.	Moderate	Temporary	Limited	Negligible	CCDG 11.4.7, CCGD 11.4.7.2.1 and CCDG 11.4.7.3.1	Not significant

Table 73 - Assessment of the environmental effects of the Champlain Bridge deconstruction project – Physical environment (cont'd)

NO	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURE	SIGNIFICANCE OF RESIDUAL EFFECTS
									P-57	
38	Deconstruction	Management of waste and hazardous materials	Air quality	Debris containing asbestos and lead are likely to be found during deconstruction of the bridge structures.	Moderate	Temporary	Local	Not significant	P-79 and P-114 CC-24	Not significant
39	Deconstruction	Machinery transport, operation and maintenance	Soil and sediment quality	Truck traffic outside contaminated areas may cause a contamination of soils adjacent to the work area. Accidental spills could occur during machinery maintenance at the work site.	Moderate	Permanent	Local	Not significant	CCDG 11.4.7 NC 9.3.2 P-69	Not significant
40	Deconstruction	Machinery transport, operation and maintenance	Soil and sediment quality	When transporting materials (by land and water), accidental oil or fuel spills could affect the quality of work site soils and of St. Lawrence sediment.	Low	Permanent	Limited	Not significant	CCDG 10.4.2 P-9, P-10 and P-67	Not significant
41	Deconstruction	Machinery transport, operation and maintenance	Soil and sediment quality	When transporting construction materials (by land and water), accidental oil or fuel spills could affect the quality of work site soils and of St. Lawrence sediment.	Moderate	Temporary	Limited	Not significant	CCDG 7.11, CCDG 10.4.3.1 and CCDG 10.4.3.3.1 P-9, P-10, P-58, P-67 and P-80	Not significant
42	Deconstruction	Machinery transport, operation and maintenance	Surface water quality	Leaks from machinery and vehicles used near or on water and from equipment used for in-water works are likely to contaminate surface water. During machinery maintenance, accidental oil or fuel spills could affect surface water quality. Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats.	Moderate	Temporary	Local	Not significant	CCDG 7.11, CCDG 10.4.2 and CCDG 10.4.3.1 P-9, P-10, P-58, P-59, P-61, P-67 and P-68	Not significant
43	Deconstruction	Machinery transport, operation and maintenance	Surface water quality	The use of barges and other equipment on water could affect water quality. Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats.	Low	Permanent	Local	Not significant	CCDG 10.4.3.1, CCDG 7.11 and CCDG 10.4.2 P-9, P-10, P-58, P-67 and P-68	Not significant
44	Deconstruction	Machinery transport, operation and maintenance	Groundwater quality	When transporting deconstruction materials and during machinery operation and maintenance, accidental oil or fuel spills could affect groundwater quality.	Moderate	Permanent	Local	Not significant	CCDG 7.11, CCDG 10.4.2 and CCDG 10.4.3.1 P-9, P-10, P-34, P-58, P-67 and P-70	Not significant
45	Deconstruction	Machinery transport, operation and maintenance	Air quality	Vehicular and machinery traffic on temporary roads is likely to generate dust at the work site and nearby areas.	Moderate	Temporary	Local	Not significant	CCDG 12.4, CCDG 12.4.1.1 and CCDG 12.4.1.2 P-8, P-9, P-10, P-11, P-12, P-63, P-64, P-65, P-66, P-104, P-115 and P-117 CP-2, CP-5 and CP-8	Not significant
46	Deconstruction	Machinery transport, operation and maintenance	Air quality	The lighting required for the works will create light pollution along the work sites	Moderate	Temporary	Local	Not significant	P-111	Not significant
47	Deconstruction	Machinery transport, operation and maintenance	Air quality	Transporting debris by truck over the road network will disperse atmospheric contaminants.	Moderate	Temporary	Regional	Not significant	P-64, P-65, P-115 and P-117	Not significant
48	Deconstruction	Machinery transport, operation and maintenance	Air quality	Use of machinery and equipment as well as truck transport will generate greenhouse gases	Low	Temporary	Regional	Not significant	P-66	Not significant
49	Post-deconstruction	Work in aquatic environments	Soil and sediment quality	In-water works involving the removal of temporary jetties may result in the excavation of contaminated sediments that will have to be managed by the contractor	Moderate	Permanent	Local	Significant	MPO-3, MPO-10 and MPO-11 P-20, P-54, P-55 and P-56	Not significant
50	Post-deconstruction	Work in aquatic environments	Surface water quality	Removal of temporary structures is likely to result in sediment resuspension and the release of debris into the St. Lawrence, which will affect water quality.	Moderate	Temporary	Local	Not significant	MPO-4, MPO-5, MPO-14, MPO-15, MPO-16, MPO-17 and MPO-18 P-24	Not significant

Table 73 - Assessment of the environmental effects of the Champlain Bridge deconstruction project – Physical environment (cont'd)

NO	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURE	SIGNIFICANCE OF RESIDUAL EFFECTS
				Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats.					CP-3	
51	Post-deconstruction	Work site demobilization and dismantlement of temporary installations	Soil and sediment quality	The contaminants at the work site may degrade soil quality.	Low	Permanent	Limited	Not significant	CCDG 7.11 P-70	Not significant
52	Post-deconstruction	Work site demobilization and dismantlement of temporary installations	Surface water quality	Site restoration is likely to generate sediment resuspension affecting water quality. Changes in water quality may cause a degradation in fish, migratory bird, wildlife and special-status species habitats.	Low	Temporary	Local	Negligible	MPO-9, MPO-10, MPO-11, MPO-12 and MPO-13 CCDG 10.4.3.3.1, CCDG 10.4.3.3.2 and CCDG 10.4.3.4 NC 9.4.3.3 P-105 CP-3	Not significant
53	Post-deconstruction	Work site demobilization and dismantlement of temporary installations	Groundwater quality	Contaminated work site soils may degrade groundwater quality.	Moderate	Permanent	Limited	Not significant	CCDG 7.11 NC 9.3.3.4 P-9, P-10, P-34, P-67 and P-70	Not significant

Table 74 – Assessment of the environmental effects of the deconstruction of the original Champlain Bridge – Biological environment

NO.	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
54	Pre-deconstruction	Work site mobilization and construction of temporary installations	Terrestrial vegetation	Possible loss of terrestrial and riparian vegetation due to the creation of storage areas for materials and access roads. The surface area will vary based on the work methods proposed by the private partner.	Moderate	Temporary	Limited	Not significant	CCDG 11.2.5, CCDG 11.2.6.1, CCDG 11.2.7.1 and CCDG 11.2.7.1.1 NC 9.3.1	Not significant
55	Pre-deconstruction	Work site mobilization and construction of temporary installations	Herpetofauna and habitats	Potential mortality of herpetofauna individuals and disruption of habitat during the construction of temporary installations in the Nuns' Island Bridge and Seaway dike areas.	Moderate	Temporary	Limited	Not significant	NC 9.5.3 P-5, P-7 and P-23	Not significant
56	Pre-deconstruction	Work site mobilization and construction of temporary installations	Birds and habitats	Disruption of bird habitat during the construction of temporary installations (St. Lawrence shoreline and Seaway dike).	Moderate	Temporary	Local	Not significant	P-3A and P-3B	Not significant
57	Pre-deconstruction	Work site mobilization and construction of temporary installations	Mammals	Disruption of mammals in the work right-of-way.	Low	Temporary	Local	Negligible	No special measures given the species that are present and that the disturbed individuals should be able to leave the affected areas.	Not significant
58	Pre-deconstruction	Work site mobilization and construction of temporary installations	Special status species of plants and wildlife	Potential mortality of individuals and disruption of brown snake habitat on the Island of Montreal, Nuns' Island and the Seaway dike.	High	Temporary	Limited	Significant	P-5 and P-6	Not significant
59	Deconstruction	Soil stripping and tree clearing	Terrestrial vegetation	Loss of terrestrial and riparian vegetation following the clearing required for certain jetties and mobilization areas	Moderate	Permanent	Limited	Not significant	CCDG 11.2.5, CCDG 11.2.6.1, CCDG 11.2.7.1, CCDG 11.2.7.1.1, CCDG 11.2.7.1.2 and CCDG 11.2.7.1.3 NC 9.4.2 P-106 and P-107	Not significant
60	Deconstruction	Soil stripping and tree clearing	Wetlands	Loss of wetlands following clearing and stripping of the right-of-way needed to install the jetty on the Nuns' Island side: 1,041 m ² of emergent marsh.	High	Permanent	Limited	Significant	MPO-3, MPO-4, MPO-11 and MPO-16 CCDG 10.4.3.3.1, CCDG 10.4.3.3.2, CCDG 10.4.3.3.3 and 10.4.3.4 CC-1	Not significant
61	Deconstruction	Soil stripping and tree clearing	Fish and habitats	Sediment runoff from shoreline work may disrupt fish habitats downstream of the work, especially in lentic flow zones	High	Temporary	Local	Significant	MPO-4, MPO-7, MPO-8, MPO-30A, MPO-31A and MPO-36 NC 9.3.1 and NC 9.4.2	Not significant
62	Deconstruction	Soil stripping and tree clearing	Fish and habitats	Contaminant leaching from contaminated shoreline sites could affect fish health.	High	Temporary	Regional	Significant	MPO-8 NC 9.4.2 P-24	Not significant
63	Deconstruction	Soil stripping and tree clearing	Herpetofauna and habitats	Potential mortality of herpetofauna individuals and disruption of habitat during the construction of temporary installations in the Nuns' Island Bridge and Seaway dike areas.	Moderate	Permanent	Limited	Not significant	P-5, P-7 and P-23 NC 9.5.3	Not significant
64	Deconstruction	Soil stripping and tree clearing	Birds and habitats	Potential disruption of bird habitat and possible accidental destruction of nests, eggs or birds.	High	Temporary	Local	Significant	CCDG 11.2.7.1 P-3A, P-3B and P-21	Not significant
65	Deconstruction	Soil stripping and tree clearing	Mammals	Temporary loss of habitat.	Low	Temporary	Limited	Negligible	No special measure	Not significant
66	Deconstruction	Soil stripping and tree clearing	Special status species of plants and wildlife	Potential mortality of individuals and loss of potential water-horehound habitat on the South Shore side and for the brown snake on Nuns' Island and the Seaway dike.	High	Permanent	Limited	Significant	P-5, P-6, P-22 and P-23	Not significant
67	Deconstruction	Excavation, earthworks	Wetlands	Excavation and earthworks will modify the drainage pattern near wetlands, which may decrease their quality and result in	Moderate	Permanent	Limited	Not significant	MPO-8 CCDG 10.4.3.3.1, CCDG 10.4.3.3.2 and CCDG	Not significant

Table 74 – Assessment of the environmental effects of the Champlain Bridge deconstruction project – Biological environment (cont'd)

NO.	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
				potential losses.					10.4.3.3.3	
68	Deconstruction	Excavation and earthworks	Terrestrial vegetation (invasive alien species – IAS)	Excavation work is likely to be carried out in areas contaminated with IAS and cause them to spread	Moderate	Permanent	Local	Not significant	P-119	Not significant
69	Deconstruction	Excavation, earthworks	Fish and habitats	Sediment runoff from shoreline work may disrupt fish habitats downstream of the work, especially in flow zones	High	Temporary	Local	Significant	MPO-4, MPO-5, MPO-6, MPO-7, MPO-8, MPO-12, MPO-32 and MPO-36 CCDG 10.4.3.1, CCDG 10.4.3.3.1, CCDG 10.4.3.3.2, CCDG 10.4.3.3.3, CCDG 10.4.3.4 and CCDG 10.4.3.5 NC 9.4.3.1 and NC 9.4.3.3	Not significant
70	Deconstruction	Excavation, earthworks	Fish and habitats	The excavation of contaminated fill may result in leaching and/or surface runoff of contaminants originating from contaminated sites on the shoreline. These may affect fish health.	High	Temporary	Regional	Significant	MPO-4, MPO-5, MPO-6, MPO-7 and MPO-8 P-24	Not significant
71	Deconstruction	Dismantlement of structures	Fish and habitats	Deconstruction of the Champlain Bridge may generate waste that could alter fish habitat.	Moderate	Permanent	Local	Significant	MPO-1 and MPO-25	Not significant
72	Deconstruction	Dismantlement of structures	Herpetofauna and habitats	Herpetofauna habitats under the bridge structure will be disrupted and destroyed during deconstruction work.	Moderate	Permanent	Limited	Not significant	CCDG 7.11 P-7-52	Not significant
73	Deconstruction	Dismantlement of structures	Birds and habitats	Bird habitats, primarily that of the Cliff Swallow, located on the bridge structure will be disrupted and destroyed during deconstruction work.	High	Permanent	Limited	Significant	P-3A and P-3B	Not significant
74	Deconstruction	Dismantlement of structures	Special status species of plants and wildlife	Peregrine falcon nesting on the Champlain Bridge may be disrupted during work.	High	Temporary	Local	Significant	P-71 and P-72	Not significant
75	Deconstruction	Dismantlement of structures	Special status species of plants and wildlife	Deconstruction of the Champlain Bridge will affect Peregrine Falcon artificial nesting boxes and could affect rough water-horehound habitat on the banks of the South Shore as well as brown snake habitat on Nuns' Island and the Seaway dike.	High	Permanent	Limited	Significant	P-6, P-23, P-71 and P-72	Not significant
76	Deconstruction	Work in aquatic environments	Aquatic vegetation	Jetty construction is likely to destroy aquatic vegetation, including grass beds, which serve as fish and bird habitats.	Moderate	Permanent	Limited	Not significant	MPO-1 P-3B	Not significant
77	Deconstruction	Work in aquatic environments	Aquatic vegetation	Aquatic vegetation attached to the piers will be destroyed.	Moderate	Permanent	Limited	Not significant	P-77 and P-78	Not significant
78	Deconstruction	Work in aquatic environments	Fish and habitats	Sediment resuspension may disrupt fish habitats downstream of the work	High	Temporary	Regional	Significant	MPO-1, MPO-3, MPO-4, MPO-5, MPO-9, MPO-11, MPO-14, MPO-16, MPO-22, MPO-23, MPO-24, MPO-25, MPO-33, MPO-34 and MPO-35 CCDG 10.4.1	Not significant
79	Deconstruction	Work in aquatic environments	Fish and habitats	Pier demolition and the presence of jetties could possibly alter fish habitat through changes in flow velocities.	Moderate	Temporary	Local	Not significant	MPO-1, MPO-2, MPO-3, MPO-10, MPO-38 and MPO-43 CC-6 and CC-6b	Not significant
80	Deconstruction	Work in aquatic environments	Fish and habitats	In-water works may disturb fish habitat, in particular during spawning and migration periods.	Moderate	Temporary	Regional	Significant	MPO-1, MO-2, MPO-3 and MPO-10	Not significant
81	Deconstruction	Work in aquatic environments	Fish and habitats	Work that causes vibrations in water may disturb fish and even result in fish mortality during blasting.	Moderate	Temporary	Local	Not significant	MPO-1, MPO-2 and MPO-3 P-42 and P-43	Not significant
82	Deconstruction	Work in aquatic	Fish and habitats	The construction of temporary jetties could possibly cause a	Moderate	Temporary	Local	Not significant	MPO-1, MPO-2, MPO-3, MPO-10, MPO-13,	Not significant

Table 74 – Assessment of the environmental effects of the Champlain Bridge deconstruction project – Biological environment (cont'd)

NO.	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECTS
		environments		temporary deterioration and disruption of fish habitat, namely loss of habitat and impeded migration (estimation based on the scenario with the most encroachment: 64,484 m ²)					MPO-30, MPO-31, MPO-37 and MPO-39 CC-6b	
83	Deconstruction	Work in aquatic environments	Birds and habitats	In-water works may disrupt aquatic birds that use the study area, especially in and around the Couvée Islands migratory bird sanctuary and the La Prairie Basin waterfowl gathering area (Nuns' Island).	Moderate	Temporary	Local	Not significant	P-3B, P-21 and P-108	Not significant
84	Deconstruction	Work in aquatic environments	Special status species of plants and wildlife	Pier demolition could affect potential habitats for special-status fish by setting up temporary structures, namely cofferdams and jetties, as well as grass beds serving as habitats, feeding areas and shelter for some special-status migratory birds.	Moderate	Temporary	Local	Not significant	MPO-1, MPO-2, MPO-3, MPO-4, MPO-5, MPO-10, MPO-14, MPO-15, MPO-16, MPO-17, MPO-18, MPO-19, MPO-20, MPO-21, MPO-22, MPO-23, MPO-24, MPO-33, MPO-34, MPO-35 and MPO-39 P-3B	Not significant
85	Deconstruction	Work in aquatic environments	Special status species of plants and wildlife	Pier demolition could destroy Laurentian water-horehound plants on the Nuns' Island side.	High	Permanent	Limited	Significant	P-22 and P-23	Not significant
86	Deconstruction	Machinery transport, operation and maintenance	Fish and habitats	Potential accidental spills of hydrocarbons and other products may be harmful to fish and fish habitat.	Moderate	Momentary	Local	Not significant	CCDG 10.4.2, CCDG 10.4.3.1 and CCDG 11.4.7 NC 9.3.2 P-9, P-10, P-61 and P-67	Not significant
87	Deconstruction	Temporary closure of work site	Fish and habitats	Erosion and inflow of sediment in the surrounding environment if temporary stabilization measures are not implemented before the work site is temporarily closed	Moderate	Temporary	Local	Not significant	MPO-40, MPO-41 and MPO-42	Not significant
88	Post-deconstruction	Work in aquatic environments	Fish and habitats	Jetty removal may affect aquatic habitats and fish due to the suspended matter generated during the works.	Moderate	Temporary	Local	Not significant	MPO-1, MPO-2, MPO-3, MPO-4, MPO-5, MPO-10, MPO-37 and MPO-39 P-42 and P-43	Not significant
89	Post-deconstruction	Work in aquatic environments	Fish and habitats	In-water works may disturb fish, in particular during spawning and migration periods.	Moderate	Temporary	Regional	Significant	MPO-1, MPO-10 and MPO-25	Not significant
90	Post-deconstruction	Work in aquatic environments	Birds and habitats	In-water works for jetty removal may disrupt aquatic birds that use the study area, especially in and around the Couvée Islands migratory bird sanctuary and the La Prairie Basin waterfowl gathering area (Nuns' Island).	Moderate	Temporary	Local	Not significant	P-3B and P-21	Not significant
91	Post-deconstruction	Work in aquatic environments	Special status species of plants and wildlife	Jetty removal may affect potential habitats for status fish due to the suspended matter generated during the works.	Moderate	Permanent	Limited	Not significant	MPO-1, MPO-2, MPO-3, MPO-4, MPO-5 and MPO-10 P-3B	Not significant

Table 75 – Assessment of the environmental effects of the deconstruction of the original Champlain Bridge – Human environment

NO	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURE	SIGNIFICANCE OF RESIDUAL EFFECTS
92	Pre-deconstruction	Work site mobilization and construction of temporary installations	Recreational and tourism activities and pleasure boating	Continued use of the same bike path right-of-ways to carry out the activities, as well as certain riverside areas used to practice recreational activities (e.g. wading, windsurfing, kayaking).	High	Temporary	Local	Significant	P-1 and P-2 CC-9 and CC-10	Not significant
93	Pre-deconstruction	Work site mobilization and construction of temporary installations	Sound environment	Work site mobilization activities could increase noise levels in sensitive areas	Moderate	Temporary	Local	Not significant	P-4, P-98 and P-99 CCDG 10.4.4.1, CCDG 10.4.4.2 and CCDG 10.4.4.3 NC 9.9.1.3, NC 9.9.1.4, NC 9.9.2, NC 9.9.2.1, NC 9.9.2.2, NC 9.9.3.1, NC 9.9.3.2 and NC 9.9.3.3 CP-1	Not significant
94	Pre-deconstruction	Maintaining traffic, navigability and installation of signage	Commercial shipping	Disruption of commercial shipping on the St. Lawrence Seaway	High	Temporary	Regional	Significant	P-18 and P-89	Not significant
95	Pre-deconstruction	Maintaining traffic, navigability and installation of signage	Recreational and tourism activities and pleasure boating	Rerouting, closure and temporary changes to recreational boating lanes and bicycle paths.	Moderate	Temporary	Local	Not significant	P-15	Not significant
96	Pre-deconstruction	Maintaining traffic and installing signage	Sound environment	Traffic detours may possibly affect noise levels in residential neighbourhoods near roads used by trucks	High	Temporary	Local	Significant	P-98 and P-99 CCDG 10.4.4.1, CCDG 10.4.4.2 and CCDG 10.4.4.3 NC 9.9.1.3, NC 9.9.1.4, NC 9.9.2, NC 9.9.2.1, NC 9.9.2.2, NC 9.9.3.1, NC 9.9.3.2 and NC 9.9.3.3 CP-1	Not significant
97	Pre-deconstruction	Maintaining traffic and installing signage	Traffic and infrastructures	Possible partial closure of some accesses.	High	Temporary	Regional	Significant	CCDG 10.3.1 and CCDG 10.3.4.3 P-16, P-17, P-101, P-102, P-121	Not significant
98	Deconstruction	Soil stripping and tree clearing	Recreational and tourism activities and pleasure boating	Continued use of the same bike path right-of-ways to carry out the activities, as well as certain riverside areas used to practice recreational activities (e.g. wading, windsurfing, kayaking).	Low	Temporary	Local	Negligible	P-1 and P-2 CC-9 and CC-10	Not significant
99	Deconstruction	Soil stripping and tree clearing	Archeology and heritage	Stripping could affect archeological remains that are incidentally discovered	High	Permanent	Local	Significant	P-26 and P-40	Not significant
100	Deconstruction	Excavation, earthworks	Commercial shipping	Possibility of Seaway dike watertightness being compromised.	High	Temporary	Regional	Significant	P-18	Not significant
101	Deconstruction	Excavation, earthworks	Traffic and infrastructures	Work may damage the local and regional infrastructures, including the road network.	Low	Temporary	Limited	Negligible	CCDG 7.11 P-27 and P-28	Not significant
102	Deconstruction	Excavation, earthworks	Land and buildings	Possibility of damage on land adjacent to the work footprint.	Low	Temporary	Limited	Negligible	CCDG 7.11 P-14 and P-38	Not significant
103	Deconstruction	Dismantlement of structures	Commercial shipping	Bridge deconstruction work over the Seaway could affect commercial shipping.	High	Temporary	Regional	Significant	P-18, P-73 and P-89	Not significant
104	Deconstruction	Dismantlement of structures	Recreational and tourism activities and pleasure boating	The deconstruction of bridge structures could result in the partial or complete closure of bicycle paths under the bridge, including access to certain riverside areas used for recreational activities (e.g. wading, windsurfing,	High	Temporary	Local	Significant	P-1 and P-2	Not significant

Table 75 – Assessment of the environmental effects of the Champlain Bridge deconstruction project – Human environment (cont'd)

NO	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURE	SIGNIFICANCE OF RESIDUAL EFFECTS
				kayaking).						
105	Deconstruction	Dismantlement of structures	Recreational and tourism activities and pleasure boating	Access to riverside areas near the bridge will be restricted, limiting or preventing recreational activities, in particular during the dismantling of bridge structures.	Low	Temporary	Limited	Negligible	P-1 and P-2	Not significant
106	Deconstruction	Dismantlement of structures	Sound environment	Operation of machinery for the deconstruction of bridge structures will increase noise levels and vibrations near the work.	High	Temporary	Limited	Significant	P-98 and P-99 CCDG 10.4.4.1, CCDG 10.4.4.2, CCDG 10.4.4.3 and CCDG 11.4.4.1.1 NC 9.9.1.3, NC 9.9.1.4, NC 9.9.2, NC 9.9.2.1, NC 9.9.2.2, NC 9.9.3.1, NC 9.9.3.2 and NC 9.9.3.3 CP-1	Not significant
107	Deconstruction	Dismantlement of structures	Traffic and infrastructures	Bridge deconstruction will require temporary road closures or detours (Boul. René-Lévesque, Highway 132 and onramps).	Low	Temporary	Regional	Significant	CCDG 10.3.1 and CCDG 10.3.4.3 P-16, P-17 and P-121	Not significant
108	Deconstruction	Work in aquatic environments	Commercial shipping	Dismantling the footings, foundations and piers near the Seaway could adversely affect commercial shipping.	High	Temporary	Regional	Significant	P-18, P-44 and P-89	Not significant
109	Deconstruction	Work in aquatic environments	Recreational and tourism activities and pleasure boating	The dismantlement of the footings, foundations and piers, including the creation and presence of jetties or cofferdams, could adversely affect pleasure boating.	High	Temporary	Local	Not significant	P-2 and P-74	Not significant
110	Deconstruction	Work in aquatic environments	Sound environment	Machinery operation and traffic related to jetty construction could increase noise levels near the work.	High	Temporary	Limited	Significant	P-4, P-99 and P-98 NC 9.9.3.1, NC 9.9.3.2 and NC 9.9.3.3 CP-1	Not significant
111	Deconstruction	Work in aquatic environments	Traffic and infrastructures	The transport of materials for the creation of temporary jetties and the transport by truck of materials and structures resulting from the dismantlement of the bridge could affect traffic on certain roads	High	Temporary	Local or regional	Not significant (regional network) and significant (local network)	CCDG 10.3.1 and CCDG 10.3.4.3 P-16, P-17, P-101, P-102 and P-121	Not significant
112	Deconstruction	Machinery transport, operation and maintenance	Recreational and tourism activities and pleasure boating	The waterway transport of materials removed from the bridge could adversely affect pleasure boat traffic.	Moderate	Temporary	Local	Not significant	P-2, P-96 and P-97	Not significant
113	Deconstruction	Machinery transport, operation and maintenance	Sound environment	Vehicular and machinery traffic will increase noise levels near work areas.	High	Temporary	Limited	Significant	P-98 and P-99 CCDG 10.4.4.1, CCDG 10.4.4.2 and CCDG 10.4.4.3 NC 9.9.1.3, NC 9.9.1.4, NC 9.9.2, NC 9.9.2.1, NC 9.9.2.2, NC 9.9.3.1, NC 9.9.3.2 and NC 9.9.3.3 CP-1	Not significant
114	Deconstruction	Machinery transport, operation and maintenance	Traffic and infrastructures	Work-related traffic, in particular on Nuns' Island, will increase congestion on the local network.	High	Temporary	Local	Significant	P-62, P-63, P-101, P-102 and P-121	Not significant
115	Deconstruction	Machinery transport, operation and maintenance	Traffic and infrastructures	The transport of materials may damage surrounding roads as well as soil local roads during the work.	Moderate	Temporary	Local	Not significant	CCDG 7.11 P-8 and P-27	Not significant
116	Post-deconstruction	Work in aquatic environments	Recreational and tourism activities and pleasure boating	Remnants of the Champlain Bridge piers may present a hazard for pleasure boating.	Low	Permanent	Limited	Not significant	P-74 and P-75	Not significant

Table 75 – Assessment of the environmental effects of the Champlain Bridge deconstruction project – Human environment (cont'd)

NO	PROJECT PHASE	PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS	DESCRIPTION OF ENVIRONMENTAL EFFECTS	INTENSITY	DURATION	EXTENT	ASSESSMENT OF POTENTIAL EFFECT	REQUIRED MITIGATION MEASURE	SIGNIFICANCE OF RESIDUAL EFFECTS
117	Post-deconstruction	Work in aquatic environments	Recreational and tourism activities and pleasure boating	Temporary disruption of recreational boating lanes during in-water works for the removal of the temporary jetties.	Moderate	Temporary	Local	Not significant	P-2	Not significant
118	Post-deconstruction	Work in aquatic environments	Sound environment	Machinery operation and traffic related to the removal of the temporary jetties will increase noise levels near the work and on roads used to transport the materials off site.	High	Temporary	Limited	Significant	P-98 and P-99 NC 9.9.3.1, NC 9.9.3.2 and NC 9.9.3.3 CP-1	Not significant
119	Post-deconstruction	Work in aquatic environments	Traffic and infrastructures	The transport of materials when removing the temporary jetties will affect traffic on some roads	High	Temporary	Local	Significant	CCDG 10.3.1 and CCDG 10.3.4.3 P-16, P-17 and P-121	Not significant

6.3 TABLE OF IMPACTS, MITIGATION MEASURES (DESIGN CRITERIA, ONGOING MEASURES, SPECIAL MEASURES), AND IMPACT SIGNIFICANCE

6.3.1 ENVIRONMENTAL DESIGN CRITERIA

The environment inventory and impact analysis identified some constraints that will have to be taken into account when developing methods for the deconstruction of the Existing Champlain Bridge (Table 73, Table 74 and Table 75). Design criteria (CC) (Table 76) were developed for this purpose to guide the incorporation of environmental constraints from the outset of the deconstruction method design process, thereby helping to optimize and choose the best solution. Some of these measures requiring more detail are detailed in the following sections.

Note that, as mentioned in subsection 6.2, these measures stem from those of the 2013 EA for the New Champlain Bridge (Dessau-CIMA+, 2013), but they have been updated in accordance with 2019 good practices, and workshops held with Infrastructure Canada to take into account lessons learned during construction of the New Bridge. Thus, Tables 76 through 82 present the 2013 EA measure in the left-hand column and the update measure for the deconstruction project in the right. A colour code is added to facilitate the analysis (green: measure unchanged with respect to the 2013 EA; yellow: modified measure; red: measure to be removed since it no longer applies to deconstruction; blue: new measure).

6.3.1.1 Soil quality, sediment and groundwater (CC-3)

6.3.1.1.1 Soil quality and sediment

Prior studies identified the presence of contaminated soil and sediment in the work zone. Excavation material generated by the work will have to be managed in accordance with existing regulations. Management of excavated soil will prioritize re-use on site to the extent contamination levels allow. Excess soil and sediment that cannot be re-used on site will be disposed of in sites authorized by the MELCC. A traceability system for contaminated soil and sediment disposed of offsite will also be required. The traceability system must include, as a minimum, a register of quantities and trips, identification of carriers, transport manifests, and dump tickets. Preventive measures will have to be adopted to limit risks of soil and sediment contamination, including:

- Maintaining equipment in good condition and inspecting it regularly;
- Prohibiting leaking equipment access to worksites;
- Preparing response procedures in the event of a spill.

6.3.1.1.2 Groundwater quality

Prior studies we consulted revealed the presence of groundwater with manganese and chloride concentrations exceeding the reference concentration criteria in 10 out of 13 observation wells. It is also likely that other overshoots will be detected in the course of the project. Depending on the depth of the excavations for removing the land-based piers, groundwater may have to be extracted from the trenches. If this is the case, the process will be managed in conformance with existing regulations. Contaminated water will have to be treated on site or given to a specialized contractor for treatment off site. Pumped water cannot be discharged into the environment if its quality does not meet the reference criteria. Groundwater management must be documented, including results of chemical analyses, quantities, disposal site, authorizations, etc. Traceability of the disposed contaminated water must be assured, including keeping of a register and use of transport manifests and dump tickets.

The use of machinery and refuelling of equipment are apt to generate hydrocarbon spills that could harm groundwater quality. Preventive measures will need to be adopted to limit risks of groundwater contamination, including:

- Maintaining equipment in good condition and inspecting them on a regular basis;
- Prohibiting equipment showing leakage from accessing the worksite;
- Preparing response procedures in the event of a spill.

6.3.1.2 Managing material contaminants (CC-24)

If the presence of materials containing asbestos, lead or other contaminants (e.g., silica, droppings) is confirmed as the result of ongoing sampling, the general measures to be applied during construction, to manage the environmental risks posed by any contaminants on the bridge, include the following:

- Specific control / disposal measures to be defined;
- Materials containing asbestos or lead-based paint will have to be removed in accordance with typical industry standards that will be defined in the request for proposals;
- Additional air quality monitoring will be required for the identified parameters;
- All friable or deteriorated materials containing asbestos and all loose and scaled lead-based paint will have to be removed before deconstruction begins;
- If appropriate handling and transport techniques are used to minimize dust emissions, any paint that adheres well to the bridge materials to be removed may be left in place. Such materials will have to be disposed of in conformance with regulatory requirements.

Table 76 Design and performance Criteria

Design Criteria (CC-x)

TOPIC	TYPE OF CHANGE	NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
Protection of wetlands and water quality	None	CC-1	Design civil-engineering structures to comply with the Federal Policy on Wetland Conservation by favouring, in order of importance, loss avoidance, minimization and compensation. If necessary, draw up a compensation plan that includes the creation, development or conservation of a wetland of equivalent ecological function.	Protection of wetlands and water quality – CC-1 : Design civil-engineering structures to comply with the Federal Policy on Wetland Conservation by favouring, in order of importance, loss avoidance, minimization and compensation. If necessary, draw up a compensation plan that includes the creation, development or conservation of a wetland of equivalent ecological function.	
Contaminated soil management	Not applicable to deconstruction	CC-2	Abutments will be sited in compliance with MDDEFP’s policy on the protection of riverbanks, coastlines and flood plains. This will limit, for instance, work in the contaminated sector of the Island of Montreal near the St. Lawrence.	N/A	
Soil and sediment quality	None	CC-3	The project’s preliminary design must identify excavation locations so that these areas can be characterized and an environmental management plan for excavated materials can be developed.	Soil and sediment quality – CC-3 : The project’s preliminary design must identify excavation locations so that these areas can be characterized and an environmental management plan for excavated materials can be developed.	
Archeology and heritage	Not applicable to deconstruction	CC-4	Bridge design (components D1a and C) must minimize encroachment of permanent (abutment and boulevard) and temporary (detours) structures on the Le Ber archeological site (BiFJ-1).	N/A	
Protection of fish habitat	Not applicable to deconstruction	CC-5	Pier design should seek to avoid type 22 zones near the shores of Nuns’ Island.	N/A	
Work in aquatic environments	Change	CC-6	CC-6 Following or during the structural design stage (but before start of construction work), conduct flow and ice regime modelling in order to predict potential effects. Additional measures may be required. Changes to flow conditions should not significantly affect flow patterns and velocities in the principal fish migration routes (Greater La Prairie Basin and the Nuns’ Island channel).	Work in aquatic environments – CC-6 : Carry out hydraulic modelling based on the reference project with temporary facilities (2 flows: average 2-year flow and low flow Q ₂₋₇) and post-work modelling (2 flows: average 2-year flow and low flow Q ₂₋₇) – Request from DFO at the meeting held on January 15, 2019	Request from DFO at the meeting held on January 15, 2019
Work in aquatic environments	Change	CC 6b	CC-6b – Clarification: For the jetty located on the west bank of the Greater La Prairie Basin, the flow velocity in the migration corridors must be between 0.8 and 1.2 m/s during high-water periods. The water depth must be between 0.6 and 1 m during the same periods. Furthermore, rocks and boulders, sills, groins or deflectors will be installed to increase roughness in the migration corridors and thus reduce velocities during high-energy flow conditions. However, care must be taken to ensure that those structures do not impede fish passage during lower-energy flow conditions. Lastly, a minimum depth of 40 cm in the migration corridors is required during low-water periods; there is no minimum velocity. The flow in the migration corridors will be maintained at all times to create a downstream attraction flow.	Work in aquatic environments – CC-6b : Depending on jetty size, include migration corridors integrated into the jetty. For the jetty located on the west bank of the Greater La Prairie Basin, the flow velocity in the migration corridors must be between 0.8 and 1.2 m/s during high-water periods. The water depth must be between 0.6 and 1 m during the same periods. Furthermore, rocks and boulders, sills, groins or deflectors must be installed to increase roughness in the migration corridors and thus reduce velocities during high-energy flow conditions. However, care must be taken to ensure that those structures do not impede fish passage during lower-energy flow conditions. Lastly, a minimum depth of 40 cm in the migration corridors is required during low-water periods; there is no minimum velocity. The flow in the migration corridors must be maintained at all times to create a downstream attraction flow.	Measure revised to include migratory corridors in the new jetties based on their size, where applicable.
Aesthetic and visual aspects	Not applicable to	CC-7	The New Bridge for the St. Lawrence should reflect the predominant role it plays in the Montreal landscape and enhance its value as a regional landmark with appropriate aesthetics. The views of the city and the river from the bridge will be maintained.	N/A	

Table 76 Design and performance Criteria

TOPIC	TYPE OF CHANGE	NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
	deconstruction				
Aesthetic and visual aspects	Not applicable to deconstruction	CC-8	The design should promote integration of the project into the urban environment so that existing strengths are maintained and weaknesses minimized during execution of this major infrastructure project.	N/A	
Integration of project into the environment	None	CC-9	Residual spaces will be given high-quality landscaping using native vegetation.	Integration of project into the environment – CC-9 – Residual spaces will be given high-quality landscaping using native vegetation.	
Integration of project into the environment	None	CC-10	The project should improve and consolidate the existing bike path network and enhance the views from the paths.	Integration of project into the environment – CC-10 – The project must enhance and consolidate the existing bike network as well as its scenic views.	
Aesthetic and visual aspects	Not applicable to deconstruction	CC-11	Montreal's horizontal links could be enhanced by considering the quality and sizing of the engineering structures (viaducts) at the Atwater, Wellington and LaSalle intersections to improve connectivity between the Sud-Ouest and Verdun boroughs.	N/A	
Aesthetic and visual aspects	Not applicable to deconstruction	CC-12	Consider the possibility of a horizontal link between the Sud-Ouest and Verdun boroughs.	N/A	
Aesthetic and visual aspects	Not applicable to deconstruction	CC-13	Construction of the New Bridge for the St. Lawrence will not interfere with <input type="checkbox"/> revitalization projects for the banks of the St. Lawrence.	N/A	
Aesthetic and visual aspects	Not applicable to deconstruction	CC-14	Study the possibility of a pedestrian path on both sides of Highway A-10 over Nuns' Island.	N/A	
Birds	Not applicable to deconstruction	CC-15	Low-intensity, short-wavelength lights should be considered rather than red and yellow lights. LED lighting is favoured. Lighting should be directed toward the ground.	N/A	
Birds	Not applicable to deconstruction	CC-16	If obstruction lighting is required, flashing lights should be used.	N/A	
Sound environment	Not applicable to	CC-17	Infrastructure design will need to include anti-noise measures where the impact is major in noise-sensitive areas (see Figure 84). The impact noise level is presented in Table 63. Sound mitigation measures should reduce the LAeq (24-hour) residual noise level to an acceptable noise level of 60 dBA. Design criteria are presented in Section 7.3.6.	N/A	

Table 76 Design and performance Criteria

TOPIC	TYPE OF CHANGE	NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
	deconstruction				
Archeology	Not applicable to deconstruction	CC-18	The bridge design should enhance the historical character of the site when planning landscaping near the abutment.	N/A	
Protection of wetlands and water quality	Not applicable to deconstruction	CC-19	The design must prevent meltwater from being discharged directly into sensitive areas (wetlands, MBS, fish habitats), and that an approach for treating meltwater will be studied.	N/A	
Protection of wetlands and water quality	Not applicable to deconstruction	CC-20	The design must include collection and settling basins for runoff along the land sections of the route.	N/A	
Protection of wetlands and water quality	Not applicable to deconstruction	CC-21	The structural geometry should limit accumulations of snow and ice on the infrastructures in order to reduce the need for de-icing.	N/A	
Groundwater quality	Not applicable to deconstruction	CC-22	Where necessary, the bridge design must take into account the geometry of the containment system in the western sector.	N/A	
Air quality	Not applicable to deconstruction	CC-23	The design of the structures should consider integrating an intelligent traffic-control system linked to sensors that will analyze local air quality.	N/A	
Contaminant on the bridge materials	New measure	CC-24		<p>If the presence of materials containing asbestos, lead or other contaminants (e.g., silica, droppings) is confirmed as the result of ongoing sampling, the general measures to be applied during construction, to manage the environmental risks posed by any contaminants on the bridge, include the following:</p> <ul style="list-style-type: none"> • Specific control / disposal measures will be defined (see next paragraph); • Materials containing asbestos or lead-based paint will have to be removed in accordance with typical industry standards that will be defined in the request for proposals; • Additional air quality monitoring will be required for the identified parameters; • All friable or deteriorated materials containing asbestos and all loose and scaled lead-based paint will have to be removed before dismantlement begins; 	Addition to mitigate the effects of potential contaminants on bridge materials

Table 76 Design and performance Criteria

TOPIC	TYPE OF CHANGE	NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
				<ul style="list-style-type: none"> If appropriate handling and transport techniques are used to minimize dust emissions, any paint that adheres well to the bridge materials to be removed may be left in place. Such materials will have to be disposed of in conformance with regulatory requirements. 	

Table 76 Design and performance Criteria

PERFORMANCE CRITERIA (CP-X)

TOPIC	TYPE OF CHANGE	NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE																		
Sound environment	Change	PC-1	PC-1 Noise levels associated with site mobilization activities must comply with the following: L _{10%} = 75 dbA during the day and ambient noise without work +5 dbA in the evening and at night (measured 5 m from sensitive areas). If the limits are not observed, mitigation measures must be implemented as defined in sections 9.9.3.1 and 9.9.3.2	<p>Sound environment – PC-1: Noise levels must comply with MTQ levels (Volume II, Chapter 9, Section 9.9.1.4 and Table 9.9–1) also presented in the EEE (Table 1). For noise-sensitive areas: houses, hospitals and schools, parks, hotels, etc., the limits are:</p> <table border="1"> <thead> <tr> <th colspan="2">Day [7:00 am – 7:00 pm]</th> <th colspan="2">Evening [7:00 pm - 11:00 pm]</th> <th colspan="2">Night [11:00 pm - 7:00 am]</th> </tr> <tr> <th>L10</th> <th>Lmax</th> <th>L10</th> <th>Lmax</th> <th>L10</th> <th>Lmax</th> </tr> </thead> <tbody> <tr> <td>75 or Ambient noise +5*</td> <td>85 or 90 for impact noise**</td> <td>Ambient noise +5</td> <td>85</td> <td>Ambient noise +5 (if ambient noise <70) or Ambient noise +3 (if ambient noise >70)</td> <td>80</td> </tr> </tbody> </table> <p>* The highest of the two should be the noise level not to exceed ** Impact noise is intermittent noise that gets loud quickly</p>	Day [7:00 am – 7:00 pm]		Evening [7:00 pm - 11:00 pm]		Night [11:00 pm - 7:00 am]		L10	Lmax	L10	Lmax	L10	Lmax	75 or Ambient noise +5*	85 or 90 for impact noise**	Ambient noise +5	85	Ambient noise +5 (if ambient noise <70) or Ambient noise +3 (if ambient noise >70)	80	The change allows the EEE and MTQ limits for road work to be taken into account. Addition of criteria for evening and night
Day [7:00 am – 7:00 pm]		Evening [7:00 pm - 11:00 pm]		Night [11:00 pm - 7:00 am]																			
L10	Lmax	L10	Lmax	L10	Lmax																		
75 or Ambient noise +5*	85 or 90 for impact noise**	Ambient noise +5	85	Ambient noise +5 (if ambient noise <70) or Ambient noise +3 (if ambient noise >70)	80																		
Air quality	Change	PC-2	<p>PC-2 Do not exceed a threshold of 30 µg/m³ for fine airborne particulate matter less than 2.5 microns in diameter over a 24-hour average (PM_{2.5} 24 hr. average) and an average concentration of total particulate matter over 24 hours of 120 µg/m³ at 50 metres from the footprint. If the limit is not observed, mitigation measures must be implemented such as:</p> <ul style="list-style-type: none"> • Use equipment fitted with a dust collection system; • Use tarpaulins during dust-producing work; • Cover piled materials with geotextile. • Encourage the use of wet-spray dust control equipment. 	<p>Air quality – CP-2: Airborne fine particles less than 2.5 micrometers in diameter (PM_{2.5}) shall not exceed a threshold of 30 ug/m³ on average over a 24-hour period; airborne fine particulate matter less than 10 micrometers in diameter (PM₁₀) shall not exceed a threshold of 50 ug/m³ on average over a 24-hour period; in addition, an average concentration of total particulate matter after 24 hours shall not exceed 120 ug/m³ at ambient air quality monitoring stations based in the communities of the deconstruction project. If the limit is not observed, mitigation measures must be implemented such as:</p> <ul style="list-style-type: none"> • Use equipment fitted with a dust collection system; • Temporarily stop work while waiting for mitigation measures to be put in place; • Use tarpaulins during dust-producing work; • Cover piled materials with geotextile. • Encourage the use of wet-spray dust control equipment. 	Addition of a performance criterion for P ₁₀																		
Water quality	Change	PC-3	<p>PC-3 The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations. If these concentrations are exceeded, additional mitigation measures must be implemented, such as:</p> <ul style="list-style-type: none"> • Install a turbidity curtain; • Adjust work methods; • Identify and control sources of SS emissions. 	<p>Water quality – PC-3: The work must not produce concentrations of SS in the river in excess of 25 mg/l of existing concentrations at 100 m and 5 mg/l at 300 m. If these concentrations are exceeded, additional mitigation measures must be implemented, such as:</p> <ul style="list-style-type: none"> • Install a turbidity curtain; • Adjust work methods; • Identify and control sources of SS emissions. 	Clarification on distances to simplify field measurements and monitoring of this measurement																		
Water quality	Change	PC-4	<p>CP-4 Pumped water must meet the criteria for discharge in natural environments for all contaminants. Monitoring must be increased in contaminated sectors (Island of Montreal). Where criteria are exceeded, water must be treated or disposed of at an authorized centre.</p>	<p>Water quality – PC-4: Pumped water must meet the criteria for discharge in natural environments for all contaminants. Monitoring must be increased in sectors. Where criteria are exceeded, water must be treated or disposed of at an authorized centre.</p>	Removal of “Island of Montreal.”																		
Air quality	New measure	CP-5		<p>Fine airborne particulate matter less than 2.5 micrometres in diameter shall not exceed a threshold of 35 ug/m³ averaged over a 3-hour period; airborne</p>	Adding criteria for others																		

Table 76 Design and performance Criteria

TOPIC	TYPE OF CHANGE	NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
				particulate less than 10 micrometres in diameter shall not exceed a threshold of 88 ug/m3 averaged over a 1-hour period; and an average concentration of total particulate matter after 1 hour shall not exceed 300 ug/m3 at the deconstruction project community-based ambient air monitoring stations at the Site boundary.	periods in order to simplify the follow-up of measurements in time and by the contractor
Air quality	New measure	CP-6		Concentrations of silica (cristabolite, quartz or tridymite) based on a <10 micrometres in diameter sample in air shall not exceed a threshold of 23 ug/m3 averaged over 1 hour and threshold of 5 ug/m3 averaged over a 24-hour period. Concentrations of silica (cristabolite, quartz or tridymite) based on a <4 micrometres in diameter sample in air shall not exceed a threshold of 0.07 ug/m3 averaged over a 1-year period at the bridge deconstruction community-based ambient air monitoring stations.	Adding criteria for silica
Air quality	New measure	CP-7		Concentrations of lead (in PMtot) in air shall not exceed a threshold of 0.5 ug/m3 at the bridge deconstruction community-based ambient air monitoring stations.	Adding criteria for lead
Air quality	New measure	CP-8		Fugitive dust shall be limited to an opacity of 20% or less on site, and 10% or less at the property boundary. Opacity is a measurement of how much visibility is obscured by a plume of dust. For example, if a plume of dust obscures 20% of the view of the background, the visible emissions from the dust plume is 20% opacity. The Private Partner shall use adequate signage and impose appropriate maximum speeds for vehicles to reduce dust emissions on access roads and work surfaces and shall apply a dust suppressant (which shall be of a type approved by the Bureau de normalisation du Quebec, (BNQ), within 1 hour of the quantity of dust being raised when a vehicle passes exceeding 40 mg/m3 within 2 metres downwind of the vehicle.	Adding criteria for dust plumes
Air quality	New measure	CP-9		Concentrations of silica (cristabolite and/or quartz) based on a <4 micrometres in diameter sample in air shall not exceed a threshold of 0.025 mg/m3 averaged over an 8-hour workday; concentrations of lead in air shall not exceed a threshold of 0.05 mg/m3 averaged over an 8-hour workday; concentrations of respirable particulate (<4 micrometres in diameter) shall not exceed a threshold of 3 mg/m3 over an 8-hour workday in the breathing zone of workers located on the worksite.	Addition of criteria for silica on the work site

6.3.1.3 Protection of wetlands (CC-1)

Some wetlands were identified around the edge of Nuns' Island in the place where the jetty is to be built. Since this sector is federal property, JCCBI will have to make sure that federal policy requirements with respect to wetland conservation (EC, 1991) are respected in the design. One federal policy strategy is:

*“The Federal Government will develop exemplary practices in support of wetland conservation and sustainable wetland use to be incorporated in the design and implementation of federal programs and in the management of federal lands and waters.”
(EC, 1991)*

The design will have to consider the following response sequence:

1. Avoid impacts (by moving structures outside the wetlands);
2. Minimize encroachment on these environments;
3. Compensate for unavoidable impacts by adopting an approach based on the principle of no net loss of function.

Since the jetty will have to be constructed under the bridge to access the structures and piers to be deconstructed, and given the shallow draft making the sector inaccessible to barges, it will be hard to avoid or minimize this impact. In the worst case scenario, losses are estimated at approximately 1,000 m² and a compensation project will be put in place by JCCBI.

6.3.1.4 Protection of fish habitat and water quality (CC-6, CC-6b, CP-3 et CP-4)

6.3.1.4.1 Jetty design

As with wetland protection, the design approach for temporary structures (jetties, for example) in water must be based on intervention in the following order: avoidance, minimization, and loss compensation. A compensation plan is being prepared to make up for serious damage to fish caused by the jetties extending over a maximum of 6.5 ha (worst case scenario).

Depending on the size of the jetties, some migration corridors will have to be designed into the jetty (for reference: three corridors were built into the jetty on the Nuns' Island side for construction of the New Bridge). Flow velocities inside the jetty corridors must be between 0.8 and 1.2 m/s in flood flow. Blocks of shelters, thresholds, groynes and deflectors should be created to generate more roughness in the migration corridors, thereby helping to reduce velocities in heavy flow periods, but such additions must not impede the passage of fish in the slowest flow periods. No minimum flow velocity is required in low-water season. The water depth should be between 0.6 and 1.0 m in flood season and a minimum depth of 0.4 m is required in the corridors in low-water season. Flow must be maintained in the corridors at all times to produce a downstream water draw.

6.3.1.4.2 Hydraulic model

In order to size the jetties and fish passages, a hydraulic model will be needed to assess the impacts associated with the jetties, and to evaluate the passage of fish. Two flow rates will have to be simulated:

1. Average two-year flood;
2. Average summer flow equal to two-year recurrence flow for seven (7) consecutive days (Q_{2-7}).

The model will be built to include the SSL jetties (for construction of the New Bridge) if the Existing Champlain Bridge deconstruction jetties are in place at the same time. If not, the model will be built without the SSL jetties. In either case, the model must include the New Bridge piers.

A second model will be needed to evaluate sector hydrology when the work is completed, and for the same two flow rates indicated above.

6.3.1.4.3 Water quality monitoring during construction

The work must not generate suspended solids in the river water in concentrations that exceed the existing concentrations at 100 m by 25 mg/l or more, or 5 mg/l at 300 m. In the event of overshoots, additional mitigation measures will have to be put in place such as:

- Installing a containment curtain;
- Modifying work methods;
- Identifying and reducing suspended solids at the source of emission.

Work may have to be interrupted temporarily until the situation returns to normal. Penalties will be provided for in the event of criteria overshoots.

Pumped water will have to meet the criteria for discharge into the natural environment for all contaminants. Additional monitoring will have to be put in place in at-risk sectors. In the event of a criteria overshoot, the water will have to be treated or disposed of in an authorized location. A system of traceability will be put in place for such water.

6.3.1.5 Noise environment (CP-1)

Noise-sensitive locations have been identified in proximity to the site, both in the Nun's Island and Brossard areas. Noise from deconstruction activities will affect those sensitive locations, particularly residential areas.

The noise limits for construction activities determined by the MTQ indicated in the Road Works, Volume II, Chapter 9 (MTQ, 2018) must be respected. For Noise Sensitive Areas corresponding to: homes, hospitals and schools, parks, hotels, etc., the limits are presented in Table 77.

Table 77 – Noise Limits as per MTQ

AREA AND LAND USE	NOISE LIMIT			
	METRIC	DAYTIME (0700-1900)	EVENING (1900-2300)	NIGHTTIME (2300-0700)
Noise-sensitive areas: homes, hospitals and schools, parks, hotels, etc.	L ₁₀	75 or Baseline Level + 5 ^A	Baseline Level + 5	Baseline Level + 5 (if Baseline Level <70) or Baseline Level + 3 (if Baseline Level >70)
	L _{max}	85 or 90 for Impact Noise ^B	85	80
Commercial areas: office buildings, shops, etc.	L ₁₀	80 or Baseline Level + 5 ^A	Baseline Level + 5 ^C	None
	L _{max}	None	None	None
Industrial zones: factories, workshops, etc.	L ₁₀	85 or Baseline Level + 5 ^A	None	None
	L _{max}	None	None	None

A Higher of the two limits.

B Impact noise refers to intermittent noise with a rapid onset.

C If applicable, operation hours open to the public.

In order to avoid exceedances of the limits identified, and once specific methods, equipment and schedules of work are established by the contractor, the project should implement the following steps:

- Conduct modeling of noise emissions from site activities to neighbouring NSAs;
- Manage change in activities or equipment used on site by record-keeping. A change may entail re-running the model;
- Ensure all equipment on site is operating in normal conditions with the recommended manufacturer noise mitigation measures; and
- Monitor noise levels as work on site progresses or significantly changes in methods or equipment.

6.3.1.6 Air quality (CP-2)

The performance requirements listed in Table 78 will be used to control particulate emissions from the project. Typically, the community-based fixed station results will be located upwind of each specific sensitive area in a safe place where power is available.

Table 78 – Proposed Performance Requirements for Air Quality

ITEM	PERFORMANCE REQUIREMENTS
CP-2	Fine airborne particulate matter less than 2.5 micrometres in diameter shall not exceed a threshold of 30 ug/m ³ averaged over a 24-hour period; airborne particulate less than 10 micrometres in diameter shall not exceed a threshold of 50 ug/m ³ averaged over a 24-hour period; and an average concentration of total particulate matter after 24 hours shall not exceed 120 ug/m ³ at the CBDP community-based ambient air monitoring stations (fixed stations).
CP-5	Concentrations of silica (cristabolite, quartz or tridymite) based on a <10 micrometres in diameter sample in air shall not exceed a threshold of 23 ug/m ³ averaged over 1 hour and threshold of 5 ug/m ³ averaged over a 24-hour period. Concentrations of silica (cristabolite, quartz or tridymite) based on a <4 micrometres in diameter sample in air shall not exceed a threshold of 0.07 ug/m ³ averaged over a 1-year period at the CBDP community-based ambient air monitoring stations.
CP-6	Concentrations of lead (in PM ₁₀) in air shall not exceed a threshold of 0.5 ug/m ³ at the CBDP community-based ambient air monitoring stations.
CP-7	Fine airborne particulate matter less than 2.5 micrometres in diameter shall not exceed a threshold of 35 ug/m ³ averaged over a 3-hour period; airborne particulate less than 10 micrometres in diameter shall not exceed a threshold of 88 ug/m ³ averaged over a 1-hour period; and an average concentration of total particulate matter after 1 hour shall not exceed 300 ug/m ³ at the CBDP community-based ambient at the Site boundary.
CP-8	Fugitive dust shall be limited to an opacity of 20% or less on site, and 10% or less at the property boundary. Opacity is a measurement of how much visibility is obscured by a plume of dust. For example, if a plume of dust obscures 20% of the view of the background, the visible emissions from the dust plume is 20% opacity. The Private Partner shall use adequate signage and impose appropriate maximum speeds for vehicles to reduce dust emissions on access roads and work surfaces and shall apply a dust suppressant (which shall be of a type approved by the Bureau de normalisation du Quebec, (BNQ), within 1 hour of the quantity of dust being raised when a vehicle passes exceeding 40 mg/m ³ within 2 metres downwind of the vehicle
CP-9	Concentrations of silica (cristabolite and/or quartz) based on a <4 micrometres in diameter sample in air shall not exceed a threshold of 0.025 mg/m ³ averaged over an 8-hour workday; concentrations of lead in air shall not exceed a threshold of 0.05 mg/m ³ averaged over an 8-hour workday; concentrations of respirable particulate (<4 micrometres in diameter) shall not exceed a threshold of 3 mg/m ³ over an 8-hour workday in the breathing zone of workers located on the worksite.

6.3.1.7 Current aboriginal traditional use of land and resources

To determine the impacts, including on aboriginal fishing activities, JCCBI is currently holding consultations with the Kahnawake and Kanesatake Mohawk Band Councils regarding the TEA and compensation plans. When their comments are received by JCCBI, they will be reviewed and included in the TEA.

6.3.2 CURRENT MEASURES

The current measures consist of proven mitigation measures that come, for instance, from publications of recognized environmental assessment bodies. Three sources of current measures were used for this TEA:

- The current measures proposed by DFO for projects involving in-water works (Table 79);
- The MTQ's "Cahier de charges et devis généraux" (2018; Tablea80);
- MTQ standards for road works (Volume II, 2018; Table 81).

The last two were chosen for reference purposes only, since they are recognized in the Quebec construction industry. The current measures from these last two documents are written from a provincial regulatory standpoint; therefore, they will be adjusted to the federal context (names of government departments, legislation and other similar elements).

Table 79 Standard DFO mitigation measures for work carried out in fish habitats

TOPIC	TYPE OF CHANGE ¹	NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
General	Change	MPO-1	Perform work outside sensitive periods for fish species present in watercourses.	General – MPO-1 : The restriction periods to be observed for the various types of habitat are as follows: <ul style="list-style-type: none"> - 2, 4, 8: April 1 to August 1 - 12, 13, 16, 22: April 1 to July 1 - Other habitats: none 	Dates sent by DFO on February 5, 2019
Temporary structures	Change	MPO-2	Maintain the free flow of water at all times as well as a sufficient inflow of water to preserve fish habitat functions (feeding, rearing, spawning) downstream of the work area. Take the necessary measures to prevent impacts such as flooding, water recession, suspended matter and erosion upstream and downstream of the work area.	Temporary structures – MPO-2 : Maintain sufficient flow of water and inflow of water at all times to preserve fish habitat functions (feeding, rearing, spawning) downstream of the work area. Take the necessary measures to prevent impacts upstream and downstream of the work area (e.g. flooding, water recession, suspended matter and erosion).	Updated based on the DFO's 2018 list
	Not relevant to deconstruction	MPO-2b	Clarification: The design of the jetty east of Nuns' Island must take into account that there is an upstream jetty built by JCCBI. Structures are planned between the two jetties to ensure there is a continuous current and to avoid creating "dead" zones.		
	None	MPO-3	Temporary structures must be protected from erosion by stabilization, such as by using a suitable geotextile membrane or riprap. Furthermore, these structures must be designed to withstand any flooding that may occur during construction.	Temporary structures – MPO-3 : Temporary structures must be protected from erosion by stabilization, such as by using a suitable geotextile membrane or riprap. Furthermore, these structures must be designed to withstand any flooding that may occur during construction.	
	New measure	MPO-38		Temporary structures – MPO-38 : Limit the cumulative encroachment of temporary structures to one-third of the width of the watercourse, measured from the NHWM, in order to restrict increases in current speed by restricting the water flow and thus not obstructing the free passage of fish or causing erosion problems. In the present case, the Small La Prairie Basin and the Greater La Prairie Basin are considered to be two separate bodies of water. The cumulative encroachment of temporary structures may thus reach up to one-third of the width of each basin, unless an agreement has been reached with DFO.	Added: 2018 measures sent by DFO
	New measure	MPO-43		Temporary structures – MPO-43 : Design and stabilize the temporary structures so that they are capable of withstanding floods likely to occur during the construction phase and to prevent shoreline and riverbed erosion.	Added: 2018 measures sent by DFO
Erosion control and resuspension of sediments	None	MPO-4	Take all necessary precautions to prevent fine particulate matter from being deposited into the aquatic environment beyond the immediate work area.	Erosion control and resuspension of sediments – MPO-4 : Take all necessary precautions to prevent fine particulate matter from being deposited into the aquatic environment beyond the immediate work area.	
	Change	MPO-5	Favour the use of turbidity curtains to prevent sediment transport in water.	Erosion control and resuspension of sediments – MPO-5 : Favour the use of turbidity curtains to encircle the work area in order to confine suspended sediments in it. Deploy the curtain to minimize the number of fish caught inside the enclosure.	Updated based on the DFO's 2018 list
	None	MPO-6	Dispose of excavated material at a site designated for that purpose.	Erosion control and resuspension of sediments – MPO-6 : Dispose of excavated material at a site designated for that purpose.	
	None	MPO-7	Do not carry out earthwork or excavation work close to water during floods or heavy rain.	Erosion control and resuspension of sediments – MPO-7 : Do not carry out earthwork or excavation work close to water during floods or heavy rain.	
	None	MPO-8	Divert drainage ditches towards stable vegetated areas, located more than 20 m from the natural high water mark. If it is impossible to divert the ditch, potential sediment loading from the structures must be controlled by means of a suitable and effective system to prevent leaching.	Erosion control and resuspension of sediments – MPO-8 : Divert drainage ditches towards stable vegetated areas, located more than 20 m from the natural high water mark. If it is impossible to divert the ditch, potential sediment loading from the structures must be controlled by means of a suitable and effective system to prevent leaching.	

Table 79 Standard DFO mitigation measures for work carried out in fish habitats

TOPIC	TYPE OF CHANGE ¹	NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
	New measure	MPO-31A		Erosion control and resuspension of sediments – MPO-31A : Limit topsoil stripping, clearing and grading of work areas to the extent strictly necessary.	Added: 2018 measures sent by DFO
	New measure	MPO-35		Erosion control and resuspension of sediments – MPO-35 : Implement effective measures to limit the influx of sediments from the work site to the aquatic environment and ensure their maintenance (e.g. sediment barriers, berms, sediment traps, sedimentation pond, temporary slope stabilization, diverting water towards vegetated areas). The measures must remain effective during high-water periods, heavy rain and freeze-up periods.	Mitigation measure added along with the indication to use deflectors as needed.
	New measure	MPO-32		Erosion control and resuspension of sediments – MPO-32 : Dispose of excavated material outside of the high-water mark. If required, contain or stabilize the materials (e.g. impermeable lining, sediment barrier) to prevent the influx of sediments into the aquatic environment.	Added: 2018 measures sent by DFO
	New measure	MPO-33		Erosion control and resuspension of sediments – MPO-33 : When work has to be carried out in water, favour isolating the work area so as to work on dry land or limit the influx of sediment into the aquatic environment (e.g. cofferdams, diking and pumping, temporary diversion, turbidity curtain).	Mitigation measure added along with the term “favour” to provide some leeway.
	New measure	MPO-34		Erosion control and resuspension of sediments – MPO-34 : Favour the use of turbidity curtains to encircle the work area in order to confine suspended sediments in it. Deploy the curtain to minimize the number of fish caught inside the enclosure. Use deflectors if required to help maintain the turbidity curtains	Mitigation measure added along with the indication to use deflectors as needed.
	New measure	MPO-30A		Erosion control and resuspension of sediments – MPO-30A : Limit clearing on either side of the high-water mark to the required minimum and maintain the vegetation cover as long as possible before starting work.	Added: 2018 measures sent by DFO
Machinery	None	MPO-9	Prohibit stream fording by machinery.	Machinery – MPO-9 : Prohibit stream fording by machinery.	
Site reclamation	None	MPO-10	Restore the banks and beds of watercourses affected by the work to their original condition (e.g. grain size, streambed profile) once the temporary structures have been dismantled at all disturbed sites.	Site reclamation – MPO-10 : Restore the banks and beds of watercourses affected by the work to their original condition (e.g. grain size, streambed profile) once the temporary structures have been dismantled at all disturbed sites.	
	None	MPO-11	Stabilize all reworked areas, particularly on side slopes, as the work is completed. If more time is needed for permanent stabilization, erosion control measures must remain in place to prevent erosion and capture any eroded material.	Site reclamation MPO-11 : Stabilize all reworked areas, particularly on side slopes, as the work is completed. If more time is needed for permanent stabilization, erosion control measures must remain in place to prevent erosion and capture any eroded material.	
	None	MPO-12	Restore ditches damaged by machinery (e.g. damage to gradient, embankment shoulders).	Site reclamation – MPO-12 : Restore ditches damaged by machinery (e.g. damage to gradient, embankment shoulders).	
	None	MPO-13	Limit the use of riprap on the banks of watercourses up to the natural high water mark (two-year return period), and replant the riparian strip from the edge of the riprap using recognized vegetation engineering techniques that encourage overhanging shrub and grass. Replanting must be done as soon as possible after grading work is complete, with preference given to indigenous species.	Site reclamation – MPO-13 : Limit the use of riprap on the banks of watercourses up to the natural high water mark (two-year return period), and replant the riparian strip from the edge of the riprap using recognized vegetation engineering techniques that encourage overhanging shrub and grass. Replanting must be done as soon as possible after grading work is complete, with preference given to indigenous species.	
Cofferdam installation	Change	MPO-14	Favour types of cofferdams that minimize encroachment on fish habitat.	Cofferdam installation – MPO-14 : Favour types of cofferdams that minimize encroachment on fish habitat (e.g. sheet piles, concrete blocks, sand bags).	Updated based on the DFO’s 2018 list
	Change	MPO-15	If the use of stone cofferdams is justified, they must be constructed using clean granular material and a membrane must be installed to ensure that the structure is watertight.	Cofferdam installation – MPO-15 : If the use of stone cofferdams is justified, they must be constructed using clean granular material and a membrane must be installed to ensure that the structure is watertight, in order to keep the amount of water to be managed to a minimum.	Updated based on the DFO’s 2018 list
	Change	MPO-16	Before being returned to the river, water pumped outside the cofferdams must first be decanted or pumped into vegetation located over 15 metres from the river.	Cofferdam installation – MPO-16 : Treat water from inside the cofferdam enclosure before it returns to the aquatic environment in order to limit sediment	To ensure better water quality

Table 79 Standard DFO mitigation measures for work carried out in fish habitats

TOPIC	TYPE OF CHANGE ¹	NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
				inflow (e.g. buffer vegetation area more than 15 m from the St. Lawrence, settling pond, trench filter, Envirobags, weir container, combination of several methods)	Updated based on the DFO's 2018 list
	None	MPO-17	Restrict encroachment to no more than one-third the width of the river, calculated from the natural high water mark.	Cofferdam installation – MPO-17 : Restrict encroachment to no more than one-third the width of the river, calculated from the natural high water mark.	
	Change	MPO-18	Recover any fish trapped in the cofferdams and immediately return them to the aquatic environment to prevent fish mortality.	Cofferdam installation – MPO-18 : Carefully recover any fish trapped in the confined or isolated sections of the work site and immediately return them to the aquatic environment to prevent fish mortality. If any species at risk are likely to be found in the work area, the transfer of fish may require a permit under the Species at Risk Act. In such a case, contact the Fisheries Protection Division at 1-877-722-4828 or by e-mail at habitat-qc@dfo-mpo.gc.ca	Updated based on the DFO's 2018 list
	New measure	MPO-36		Cofferdam installation – MPO-36 : Favour the use of work methods that improve the quality of the water to be managed (e.g. macadamize the bottom of excavations, trenches and resurgences, install a blinding slab)	Added: 2018 measures sent by DFO
	New measure	MPO-39		Cofferdam installation – MPO-39 : Take the necessary measures to seal the cofferdams and thus minimize the quantity of water to manage	Added: 2018 measures sent by DFO
Installation of temporary jetties	None	MPO-19	Clean material must be used for the construction of a temporary jetty (including the surface of the jetty).	Installation of temporary jetties – MPO-19 : Clean material must be used for the construction of a temporary jetty (including the surface of the jetty).	
	None	MPO-20	Encroachment by the base of the temporary jetties must be limited to no more than one third of the width of the stream, calculated from the natural high water mark (HWM).	Installation of temporary jetties – MPO-20 : Encroachment by the base of the temporary jetties must be limited to no more than one third of the width of the stream, calculated from the natural high water mark (HWM).	
	None	MPO-21	Install a sediment collection mechanism on the downstream side of the temporary jetties during their installation and dismantling. The approaches must take into account the stream flow of affected watercourses during the dismantling work.	Installation of temporary jetties – MPO-21 : Install a sediment collection mechanism on the downstream side of the temporary jetties during their installation and dismantling. The approaches must take into account the stream flow of affected watercourses during the dismantling work.	
	New measure	MPO-37		Installation of temporary jetties – MPO-37 : Favour jetties that minimize encroachment on fish habitat.	Added: 2018 measures sent by DFO
	Change	MPO-30	Compensate surface areas that sustained severe damage at a ratio of 1:1.	Installation of temporary jetties – MPO-30 – Compensate surface areas that sustained severe damage	No ratio will be required for this project. The compensation project must allow severe damage to be offset.
	None	MPO-31	Carry out 2D hydraulic modelling to assess conditions (speed, depth and direction of flow) at the entry, inside and at the exit of each projected migration corridor during the operation of the temporary jetties	Installation of temporary jetties – MPO-31 – Carry out 2D hydraulic modelling to assess conditions (speed, depth and direction of flow) at the entry, inside and at the exit of each projected migration corridor during the operation of the temporary jetties	No change required (AEC measure from 2015)
Diking and pumping water from upstream to downstream	Change	MPO-22	Before being returned to the river, dike water pumped from upstream to downstream must be decanted or pumped into vegetation more than 15 metres from the watercourse.	Diking and pumping water from upstream to downstream – MPO-22 : Before being returned to the river, the pumped water must be decanted or pumped into vegetation more than 15 metres from the river or into a settling pond.	Text modified to better reflect the project
	None	MPO-23	Install a structure (e.g. screen) at the pumping hose inlet to prevent the intake of fish.	Diking and pumping water from upstream to downstream – MPO-23 : Install a structure (e.g. screen) at the pumping hose inlet to prevent the intake of fish.	
	Change	MPO-24	Direct the pumping hose outlet downstream to limit the risk of causing pockets of erosion to form along the shoreline.	Diking and pumping water from upstream to downstream – MPO-24 : Direct the pumping hose outlet to limit the risk of causing pockets of erosion to form along the shoreline.	Text modified to better reflect the project

Table 79 Standard DFO mitigation measures for work carried out in fish habitats

TOPIC	TYPE OF CHANGE ¹	NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
Dismantling of existing works and debris management	None	MPO-25	Do not release any debris, concrete residues or damp mortar into the aquatic environment. Any debris that accidentally enters the water must be removed as quickly as possible.	Dismantling of existing works – MPO-25: Do not release any debris, concrete residues or damp mortar into the aquatic environment. Any debris that accidentally enters the water must be removed as quickly as possible.	
Temporary diversion of a watercourse	Not relevant to deconstruction	MPO-26	The free passage of fish must be maintained in the temporary watercourse diversion channel.		No watercourses will be diverted in relation to the works.
	Not relevant to deconstruction	MPO-27	Construct a minimum-flow channel in the temporary diversion to allow preferential flow during low-flow periods.		No watercourses will be diverted in relation to the works.
	Not relevant to deconstruction	MPO-28	Ensure even, continuous placement of riprap on the banks and bed of the temporary stream diversion channel to properly seal the substrate and minimize interstitial flow through the rock.		No watercourses will be diverted in relation to the works.
	Not relevant to deconstruction	MPO-29	Ensure a smooth connection between the downstream end of the temporary diversion channel and the natural stream to limit the risk of causing pockets of erosion to form in the opposite bank.		No watercourses will be diverted in relation to the works.
Temporary closure of the work site	New measure	MPO-40		Temporary closure of the work site – MPO-40: Temporarily stabilize and protect the disrupted sites at risk of erosion and of transporting sediment to the aquatic environment using methods suited to the site, the duration of the work site closure, and the time of year.	Added: 2018 measures sent by DFO
	New measure	MPO-41		Temporary closure of the work site – MPO-41: Divert runoff before it reaches disturbed land (e.g. intercepting ditch and dissipation trench toward vegetation areas).	Added: 2018 measures sent by DFO
	New measure	MPO-42		Temporary closure of the work site – MPO-42: Make sure that the measures set up to limit the influx of sediment from the work site to the aquatic environment are working properly and that their maintenance is done before the work site is shut down each day.	Added: 2018 measures sent by DFO

1 – No change, new measure, change to measure, not relevant to deconstruction

Table 80 Standard mitigation measures from MTQ General Specifications and Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
Clean-up and site reclamation	None	7.11	When the work is completed, the contractor must: remove from the footprint not only its own equipment and material but all unused materials, scrap, waste, gravel, whole or crushed stone, wood, stumps and roots; clean up the equipment and materials sites; restore obstructed ditches and watercourses; repair or rebuild demolished or damaged fences and other necessary structures; and dispose of all materials without degrading the site around the work or related structures. Lastly, the contractor must repair any damage to the work site, to public or private property affected by the work, to bodies of water, to camp sites, equipment storage sites, materials storage and supply sites, to the environment, and to forest or agricultural land. The contractor must also restore the forest cover on forest lands in the public domain.	Clean-up and site reclamation – CCDG 7.1.1: When the work is completed, the contractor must: remove from the footprint not only its own equipment and material but all unused materials, scrap, waste, gravel, whole or crushed stone, wood, stumps and roots; clean up the equipment and materials sites; restore obstructed ditches and watercourses; repair or rebuild demolished or damaged fences and other necessary structures; and dispose of all materials without degrading the site around the work or related structures. Lastly, the contractor must repair any damage to the work site, to public or private property affected by the work, to bodies of water, to camp sites, equipment storage sites, materials storage and supply sites, to the environment, and to forest or agricultural land. The contractor must also restore the forest cover on forest lands in the public domain.	
Traffic management	None	10.3.1	<p>Before and during the work, the contractor must take the necessary measures to facilitate and direct the movement of vehicles on the road under construction and on detour roads made necessary by the construction work.</p> <p>Work signage must be maintained anywhere where there is a risk of accident or damage to structures under construction, either directly or indirectly because of the work. For the duration of the work, the contractor must install along the route signage that complies with the Ministère des Transports du Québec's <i>Tome V – Signalisation routière</i> part of the “Normes – Ouvrages routiers” series. In addition, the contractor must use the “Traffic Control Person Ahead” sign (T-60) whenever a signal person is directing traffic.</p> <p>The contractor must maintain location and guidance signage at all times. If the configuration of the work site requires this type of signage to be removed or relocated, the contractor must indicate the equipment to be used in the signage plans.</p> <p>The contractor must always ensure safe passage for road users.</p> <p>When traffic must be maintained on the road under construction, the contractor must maintain access to adjacent properties and provide regular road maintenance within the work area.</p> <p>During an authorized extended work suspension period, the contractor is released from performing regular road maintenance where traffic is maintained; however, the contractor is not released from responsibility for its works or for any structure damaged during previous work or damage that may result from such work.</p>	<p>Traffic management – CCDG 10.3.1: Before and during the work, the contractor must take the necessary measures to facilitate and direct the movement of vehicles on the road under construction and on detour roads made necessary by the construction work.</p> <p>Work signage must be maintained anywhere where there is a risk of accident or damage to structures under construction, either directly or indirectly because of the work. For the duration of the work, the contractor must install along the route signage that complies with the Ministère des Transports du Québec's “Tome V – Signalisation routière” part of the “Normes – Ouvrages routiers” series. In addition, the contractor must use the “Traffic Control Person Ahead” sign (T-60) whenever a signal person is directing traffic.</p> <p>The contractor must maintain location and guidance signage at all times. If the configuration of the work site requires this type of signage to be removed or relocated, the contractor must indicate the equipment to be used in the signage plans.</p> <p>The contractor must always ensure safe passage for road users.</p> <p>When traffic must be maintained on the road under construction, the contractor must maintain access to adjacent properties and provide regular road maintenance within the work area.</p> <p>During an authorized extended work suspension period, the contractor is released from performing regular road maintenance where traffic is maintained; however, the contractor is not released from responsibility for its works or for any structure damaged during previous work or damage that may result from such work.</p>	
	None	10.3.4.3	Mobile variable message signs (VMS) must be functional throughout the construction period and keep users informed of real-time traffic conditions and obstructions.	Traffic management – CCDG 10.3.4.3: Mobile variable message signs (VMS) must be functional throughout the construction period and keep users informed of real-time traffic conditions and obstructions.	
Environmental protection	None	10.4.1	Granular material used in construction of the works must not come from the bed of a body of water or its shores, or from any source situated within 75 m of the aquatic environment (stream, river, lake or ocean).	Environmental protection – CCDG 10.4.1: Granular material used in construction of the works must not come from the bed of a body of water or its shores, or from any source situated within 75 m of the aquatic environment (stream, river, lake or ocean).	

Table 80 Standard mitigation measures from MTQ General Specifications and Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
	Change	10.4.2	<p>An emergency spill kit must be available at all times and must include confinement sausages, absorbent rolls, sphagnum and the related containers and material (gloves, etc.) essential to address minor, accidental spills and ensure recovery and storage of contaminated material, as well as the management of contaminated soil and equipment. The kit must include a sufficient number of absorbent rolls to be able to cover the width of the body of water or to contain the petroleum products within a perimeter around the affected machinery. The kit must be easily accessible at all times for rapid response.</p>	<p>Environmental protection – CCDG 10.4.2: The contractor shall permanently have on hand an emergency kit for the recovery of petroleum products that includes, without being limited to:</p> <ul style="list-style-type: none"> • Suitable absorbent materials, including sphagnum, granular absorbents, confinement sausages, absorbent rolls, absorbent pads, booms and equipment for emergency response on water; • Recovery containers; • Recovery bags; • Related accessories, including gloves, safety goggles, masks, a shovel, labels; • Any other items essential for dealing with small-scale accidental spills and ensuring the recovery, storage of soiled materials and management of contaminated soils and materials. <p>If other hazardous materials in liquid form, as defined in the Regulation Respecting Hazardous Materials (CQLR, c. Q-2, r. 32), are used at the work site, the contractor must also have the appropriate materials, including specialized absorbents and neutralizers, to efficiently recover such materials.</p> <p>The kit must include a sufficient number of absorbent rolls to be able to cover the width of the lake, watercourse or wetland, or to contain the spilled products. The contractor must have additional kits for all work carried out alongside lakes, watercourses or wetlands so that they are available at all times for a quick response. A kit must be found at each of these locations if the contractor decides to carry out work simultaneously.</p> <p>Following partial or complete use of a kit, the contractor must take immediate measures to quickly replace the items that were used so that the kit is complete and ready for use.</p>	Update to CCDG 2018; booms and on-water response equipment added
	Change	10.4.3.1	<p>Release into a body of water of waste, oil, chemicals or other similar contaminants originating from a construction site is prohibited. The contractor must dispose of all such waste and scrap, of whatever nature, in compliance with prevailing laws and regulations. Work site access roads, parking and storage areas, and other temporary facilities must be located at least 60 metres from a water environment. The only land clearing permitted is that necessary for performance of the work.</p> <p>Refuelling and mechanical inspection of automotive equipment must not be performed within 15 metres of a body of water. The contractor must prevent all environmental contamination.</p> <p>During the work, the free flow of water must be assured without producing negative hydraulic or environmental impacts. No watercourse may be permanently reduced in width by more than 20%, as measured from the natural high water mark. A watercourse may not be widened when installing parallel culverts.</p>	<p>Environmental protection – CCDG 10.4.3.1: Release into a lake, body of water or wetland of waste, oil, chemicals or other contaminants originating from a construction site is prohibited. The contractor must dispose of such waste and contaminants in accordance with prevailing laws and regulations based on the type of contaminant involved.</p> <p>Work site access roads, parking and storage areas, and other temporary facilities must be located at least 60 metres from the above environments. The only land clearing permitted is that necessary for performance of the work.</p> <p>Refuelling and mechanical inspection of automotive equipment must not be performed within 15 metres of a lake, watercourse or wetland. The contractor must prevent all environmental contamination.</p>	Update of mitigation measure in accordance with CCDG 2018 and removal of last two sentences that were not relevant.

Table 80 Standard mitigation measures from MTQ General Specifications and Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
	Change	10.4.3.2.1	Work performed by the contractor must not damage nearby lakes and watercourses, including public and private ditches. To minimize the flow of sediment into lakes and watercourses, during the work the contractor must build and maintain, where required, berm filters and sediment traps upstream from these environments. Furthermore, the contractor must build and maintain, at the start of work, berm filters and sediment traps in a ditch that drains the work area, in compliance with the provisions of Chapter 9 “Mesures d’atténuation environnementales temporaires,” in the Ministère des Transports du Québec’s <i>Tome II – Construction routière</i> part of the “Normes – Ouvrages routiers” series. Temporary berm filters and sediment traps must be dismantled when work is completed, and the area they occupy must be rehabilitated.	Environmental protection – CCDG 10.4.3.3.1: Work performed by the contractor must not damage nearby lakes and watercourses, including public and private ditches. To minimize the flow of sediment into lakes and watercourses, during the work the contractor must build and maintain, where required, berm filters and sediment traps upstream from these environments. Furthermore, the contractor must build and maintain, at the start of work, berm filters and sediment traps in a ditch that drains the work area, in compliance with the provisions of Chapter 9 “Mesures d’atténuation environnementales temporaires,” in the Ministère des Transports du Québec’s <i>Tome II – Construction routière</i> part of the “Normes – Ouvrages routiers” series. Temporary berm filters and sediment traps must be dismantled when work is completed, and the area they occupy must be rehabilitated.	CCDG 2018 updated for the section number
	Change	10.4.3.2.2	To limit sediment influx into bodies of water, the contractor must install geotextile sediment barriers in compliance with the provisions of Chapter 9 “Mesures d’atténuation environnementales temporaires,” in the Ministère des Transports du Québec’s <i>Tome II – Construction routière</i> part of the “Normes – Ouvrages routiers” series. The geotextile must be tight and well-anchored and conform to the topography of the ground. Periodic maintenance must be performed on the barriers, including removal of sediment accumulated against the membrane wall. Sediment barriers must be removed and recovered once stripped surfaces have been permanently stabilized. When barriers are removed, areas of sediment accumulation must also be cleaned and permanently stabilized.	Environmental protection – CCDG 10.4.3.3.2: To limit sediment influx into bodies of water, the contractor must install geotextile sediment barriers in compliance with the provisions of Chapter 9 “Mesures d’atténuation environnementales temporaires,” in the Ministère des Transports du Québec’s <i>Tome II – Construction routière</i> part of the “Normes – Ouvrages routiers” series. The geotextile must be tight and well-anchored and conform to the topography of the ground. Periodic maintenance must be performed on the barriers, including removal of sediment accumulated against the membrane wall. Sediment barriers must be removed and recovered once stripped surfaces have been permanently stabilized. When barriers are removed, areas of sediment accumulation must also be cleaned and permanently stabilized.	CCDG 2018 updated for the section number
	Change	10.4.3.2.3	Water from dewatering excavations and cofferdams must be discharged into a settling basin or a natural filter, such as an area of vegetation, in accordance with the following requirements: <ul style="list-style-type: none"> • The settling basin must be designed based on the entry and exit flow; • When the settling basin is 50% full, it must be cleaned; • The natural filter must be located in a grassy field, in a bog or in forest litter; • The contractor must obtain prior authorization from the owner of the land and must move the outlet regularly to distribute sedimentary deposits widely and to avoid destroying vegetation; • In all areas where there is a risk of erosion, the soil must be stabilized; if necessary, a pipe could be laid, a geotextile membrane installed, or riprap laid down; • Temporary settling basins must be dismantled at the end of the work, and the area they occupied must be rehabilitated. 	Environmental protection – CCDG 10.4.3.3.3: Water from dewatering excavations and cofferdams must be discharged into a settling basin or a natural filter, such as an area of vegetation, in accordance with the following requirements: <ul style="list-style-type: none"> • The settling basin must be designed based on the entry and exit flow; • When the settling basin is 50% full, it must be cleaned; • The natural filter must be located in a grassy field, in a bog or in forest litter; • The contractor must obtain prior authorization from the owner of the land and must move the outlet regularly to distribute sedimentary deposits widely and to avoid destroying vegetation; • In all areas where there is a risk of erosion, the soil must be stabilized; if necessary, a pipe could be laid, a geotextile membrane installed, or riprap laid down; • Temporary settling basins must be dismantled at the end of the work, and the area they occupied must be rehabilitated. 	CCDG 2018 updated for the section number

Table 80 Standard mitigation measures from MTQ General Specifications and Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
		10.4.3.3	<p>The entry and exit points for equipment at a body of water must be situated so as to minimize the impact on banks, soil and plant cover. They must be clearly identified and have proper signage. The contractor must avoid areas where the slope requires vehicles to brake hard.</p> <p>When dismantling temporary access points, granular materials used in the construction of ramps must not be placed close to the body of water. If the ground is damaged, it must be restored to prevent erosion.</p>	<p>Environmental protection – CCDG 10.4.3.4: The entry and exit points for equipment at a body of water must be situated so as to minimize the impact on banks, soil and plant cover. They must be clearly identified and have proper signage. The contractor must avoid areas where the slope requires vehicles to brake hard. The supervisor must be notified prior to the use of each temporary access to the shore.</p> <p>The contractor may not do any work on the shore or the littoral of a lake or watercourse outside of the planned and authorized work areas.</p> <p>When dismantling temporary access points, granular materials used in the construction of ramps must not be placed close to the body of water. If the ground is damaged, it must be restored to prevent erosion.</p>	Update to CCDG 2018
		10.4.3.5	<p>Environmental protection – CCDG 10.4.3.5: The soil must be stabilized in all areas of the work site where there is a risk of erosion.</p> <p>To prevent erosion on the construction site:</p> <ul style="list-style-type: none"> • Cleared land left exposed to the elements must be kept to a strict minimum in terms of both area and duration. Land clearing must be limited to the road section under construction. Before the start of work, the contractor must inform the government of the exposure time and the road section to be cleared or stripped; • Runoff from outside the construction site must be intercepted and directed off-site into stabilized locations for the entire construction period; • Slopes must be properly stabilized in compliance with the plans and specifications. <p>If work is suspended during the winter, preventive soil stabilization must be completed in compliance with the plans and specifications.</p>	<p>Environmental protection – CCDG 10.4.3.5: The soil must be stabilized in all areas of the work site where there is a risk of erosion.</p> <p>To prevent erosion on the construction site:</p> <ul style="list-style-type: none"> • Cleared land left exposed to the elements must be kept to a strict minimum in terms of both area and duration. Land clearing must be limited to the road section under construction. Before the start of work, the contractor must inform the government of the exposure time and the road section to be cleared or stripped; • Runoff from outside the construction site must be intercepted and directed off-site into stabilized locations for the entire construction period; • Slopes must be properly stabilized in compliance with the plans and specifications. <p>The contractor must prepare a sketch and description of the temporary and permanent works it intends to carry out to prevent erosion, and give them to the government.</p> <p>If work is suspended during the winter, preventive soil stabilization must be completed in compliance with the plans and specifications.</p>	Update to CCDG 2018
Noise management	None	10.4.4.1 and 10.4.4.2	<p>Activities at the construction site that produce noise levels above the level of ambient noise after work will be covered by a noise management program when performed near noise-sensitive areas. A noise-sensitive area is defined as an area where the noise environment is an essential element to the performance of human activities. This is usually associated with residential, institutional and recreational uses.</p>	<p>Noise management – CCDG 10.4.4.1 and 10.4.4.2: Activities at the construction site that produce noise levels above the level of ambient noise after work will be covered by a noise management program when performed near noise-sensitive areas. A noise-sensitive area is defined as an area where the noise environment is an essential element to the performance of human activities. This is usually associated with residential, institutional and recreational uses.</p>	
	None	10.4.4.3	<p>When a noise management program is required, the Contractor must appoint a noise management manager and forward the name to the government before the first site meeting.</p>	<p>Noise management – CCDG 10.4.4.3: When a noise management program is required, the Contractor must appoint a noise management manager and forward the name to the government before the first site meeting.</p>	
Tree clearing	None	11.2.5	<p>Trees to be cut down are selected and marked by the supervisor. The Contractor must receive the supervisor’s authorization prior to tree felling.</p> <p>Grubbing consists in uprooting stumps to a minimum depth of 300 mm underground. The Contractor must avoid damaging the land or the root zones of trees and shrubs that have been retained and must restore the damaged area.</p>	<p>Tree clearing – CCDG 11.2.5: Trees to be cut down are selected and marked by the supervisor. The Contractor must receive the supervisor’s authorization prior to tree felling.</p> <p>Grubbing consists in uprooting stumps to a minimum depth of 300 mm underground. The Contractor must avoid damaging the land or the root zones of trees and shrubs that have been retained and must restore the damaged area.</p>	

Table 80 Standard mitigation measures from MTQ General Specifications and Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
	Change	11.2.6	<p>All branches on trees in the work area that interfere with the movement of equipment are to be removed in order to prevent damage to equipment.</p> <p>Branches are considered to interfere when there is no practical alternative to removal at the site. For trees located outside the right-of-way with interfering branches that must be pruned, written permission of the owner must be obtained before tree pruning or treatment is started.</p> <p>The contractor must submit its work plan to the government prior to starting the work.</p> <p>Pruning of interfering branches must comply with BNQ standard NQ 0605-200 "Entretien arboricole et horticole – Partie IV: Élagage des arbres."</p> <p>If damage occurs during pruning, the supervisor must be notified and will recommend appropriate tree treatments.</p>	<p>Tree clearing – CCDG 11.2.6.1: All branches on trees in the work area that interfere with the movement of equipment are to be removed in order to prevent damage to equipment.</p> <p>Branches are considered to interfere when there is no practical alternative to removal at the site. For trees located outside the right-of-way with interfering branches that must be pruned, written permission of the owner must be obtained before the start of pruning or tree treatment.</p> <p>The contractor must submit its work plan to the government prior to starting the work.</p> <p>Pruning of interfering branches must comply with BNQ standard NQ 0605-200 "Entretien arboricole et horticole – Partie IV: Élagage des arbres."</p> <p>If damage occurs during pruning, the supervisor must be notified and will recommend appropriate tree treatments.</p>	Change in section number in CCDG 2018
Protection of trees and shrubs	None	11.2.7.1	<p>Protection work concerns trees and shrubs whose projected leaf area is affected during performance of the work.</p> <p>The contractor must take all necessary measures to protect all trees and shrubs that are to be conserved as per the plans and specifications from damage or mutilation.</p>	<p>Protection of trees and shrubs – CCDG 11.2.7.1: Protection work concerns trees and shrubs whose projected leaf area is affected during performance of the work.</p> <p>The contractor must take all necessary measures to protect all trees and shrubs that are to be conserved as per the plans and specifications from damage or mutilation.</p>	
	Change	11.2.7.1.1	<p>All heavy equipment movement, storage of materials, excavation and backfill work as well as grubbing must occur at least 2 m from tree trunks and shrubs and at least 3 m from the edge of a wooded area. Only ground-level cutting is permitted within these buffers.</p> <p>At the start of work, a fence must be installed along the protection area and must be kept in place and in good condition throughout the work.</p> <p>The material used for the fence must provide an effective and unbroken boundary. It must be new and weather and tear resistant. Permitted colours are red and orange.</p>	<p>Protection of trees and shrubs – CCDG 11.2.7.1.1: At the start of work, the contractor must establish a protection area around the trees, shrubs and wooded areas to be conserved, as per the requirements in Chapter 10, "Arboriculture" in "Tome IV – Abords de route de la collection Normes – Ouvrages routiers."</p> <p>A protective fence must be installed along the protection area and must be kept in place and in good condition throughout the work.</p> <p>The material used for the fence must provide an effective and unbroken boundary. It must be new and weather and tear resistant. Permitted colours are red and orange.</p> <p>No heavy equipment may travel or materials stored inside the protection areas that are set up. The trees and shrubs to be removed in the protection area of a wooded area must be cut to the ground.</p> <p>The contractor must remove the fences around the protection areas once all the work indicated in the plans and specifications has been completed.</p>	Update to CCDG 2018
	None	11.2.7.1.2	<p>Along excavations, damaged roots with a diameter of at least 10 mm of retained trees must be cleanly cut.</p> <p>For trees outside the right-of-way with roots that require cutting, written permission of the owner must first be obtained.</p>	<p>Protection of trees and shrubs – CCDG 11.2.7.1.1: Along excavations, damaged roots with a diameter of at least 10 mm of retained trees must be cleanly cut.</p> <p>For trees outside the right-of-way with roots that require cutting, written permission of the owner must first be obtained.</p>	
	None	11.2.7.1.3	<p>Watering of the rooting zone of retained trees is to be done if weather conditions contribute to rapid drying of the topsoil.</p> <p>Watering is to be done in the projected leaf area of trees to a penetration of at least 150 mm into the topsoil. Watering must be phased to facilitate ground penetration and prevent runoff of surface water.</p> <p>There are to be two waterings per week until the excavation is closed or for the duration of the dry spell in the growing season. Each tree needs an average of 1,000 L of water per watering.</p>	<p>Protection of trees and shrubs – CCDG 11.2.7.1.3: Watering of the rooting zone of retained trees is to be done if weather conditions contribute to rapid drying of the topsoil.</p> <p>Watering is to be done in the projected leaf area of trees to a penetration of at least 150 mm into the topsoil. Watering must be phased to facilitate ground penetration and prevent runoff of surface water.</p> <p>There are to be two waterings per week until the excavation is closed or for the duration of the dry spell in the growing season. Each tree needs an average of 1,000 L of water per watering.</p>	

Table 80 Standard mitigation measures from MTQ General Specifications and Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
Vibration control	Change	11.4.4.1.1	<p>Particle speed, measured in any of the three wave components (transverse, longitudinal or vertical), must not exceed:</p> <ul style="list-style-type: none"> • 25 mm/s for residential, commercial and other buildings; • 50 mm/s for water wells. <p>Near fresh concrete, the limits are:</p> <ul style="list-style-type: none"> • 5 mm/s during concreting and for a 24-hour period following concreting; • 25 mm/s for 48 hours following the end of the 5 mm/s particle velocity period; • 50 mm/s for 72 hours following the end of the 25 mm/s particle velocity period. 	<p>Vibration control – CCDG 11.4.4.1.1: Particle speed, measured in any of the three wave components (transverse, longitudinal or vertical), must comply with the defined limits based on frequency and depicted in the graph in Figure 2.6.2 of Schedule 2.6 of the Safety Code for the Construction Industry (CQLR, c. S-2.1, r. 4), without exceeding:</p> <ul style="list-style-type: none"> • 25 mm/s for residential, commercial and other buildings; • 50 mm/s for water wells; • 50 mm/s at existing concrete elements <p>Near fresh concrete, the limits are:</p> <ul style="list-style-type: none"> • 5 mm/s during concreting and for a 24-hour period following concreting; • 25 mm/s for 48 hours following the end of the 5 mm/s particle velocity period; • 50 mm/s for 72 hours following the end of the 25 mm/s particle velocity period. 	Update to CCDG 2018
Waste material	Change	11.4.7.2.1 and 11.4.7	<p>Waste disposal outside the right-of-way must be done in compliance with the Environment Quality Act (R.S.Q., c. Q-2) and corresponding regulations.</p> <p>Excess concrete and water used to clean concrete mixers must be disposed of in an area provided for this purpose and in such a way as to avoid environmental contamination. The site must first be approved by the government.</p>	<p>Waste material – CCDG 11.4.7 and 11.4.7.2.1: Waste disposal outside the right-of-way must be done in compliance with the Environment Quality Act (R.S.Q., c. Q-2) and corresponding regulations.</p> <p>Excess concrete and water used to clean concrete mixers must be disposed of in an area provided for this purpose and in such a way as to avoid environmental contamination. The site must first be approved by the government.</p>	Update to CCDG 2018 (excess concrete in 11.4.7)
	None	11.4.7.3.1	<p>Waste disposal must be done in compliance with the <i>Regulation Respecting Hazardous Materials</i> and the <i>Environment Quality Act</i> (R.S.Q., c. Q-2).</p>	<p>Waste material – CCDG 11.4.7.3.1: Waste disposal must be done in compliance with the <i>Regulation Respecting Hazardous Materials</i> and the <i>Environment Quality Act</i> (R.S.Q., c. Q-2).</p>	
Dust suppressant	None	12.4	<p>When vehicles travel over a granular surface and weather conditions generate excessive dust harmful to traffic and the environment (quantity of dust raised in excess of 40 mg/m³ when a vehicle passes by), the surface must be treated with water or a certified dust suppressant.</p> <p>Dust suppression must be carried out near weigh stations and detour roads and on private roads used to transport borrow fill.</p> <p>Dust suppression on foundation materials is to be done with water only, until granulometric analysis results confirm that these materials comply with prevailing regulations. A contractor applying a dust suppressant other than water before receipt of the granulometric results waives all right of recourse, unless samples are taken prior to application of the dust suppressant and in accordance with the procedure specified.</p> <p>A dust suppressant is to be applied on a level surface that has been prepared as per granular surface requirements.</p>	<p>Dust suppressant – CCDG 12.4: When vehicles travel over a granular surface and weather conditions generate excessive dust harmful to traffic and the environment (quantity of dust raised in excess of 40 mg/m³ when a vehicle passes by), the surface must be treated with water or a certified dust suppressant.</p> <p>Dust suppression must be carried out near weigh stations and detour roads and on private roads used to transport borrow fill.</p> <p>Dust suppression on foundation materials is to be done with water only, until granulometric analysis results confirm that these materials comply with prevailing regulations. A contractor applying a dust suppressant other than water before receipt of the granulometric results waives all right of recourse, unless samples are taken prior to application of the dust suppressant and in accordance with the procedure specified.</p>	
	None	12.4.1.1	<p>Products used for dust control must be composed of hygroscopic chloride salts such as calcium chloride or magnesium chloride. They must also meet the requirements of BNQ standard 2410-300□</p> <p>“Products Used as Dust Control Agents for Non-Asphalted Roads and Other Similar Surfaces” and be certified by the Quebec Standardization Office (BNQ).</p>	<p>Dust suppressant – CCDG 12.4.1.1: Products used for dust control must be composed of hygroscopic chloride salts such as calcium chloride or magnesium chloride. They must also meet the requirements of BNQ standard 2410-300□</p> <p>“Products Used as Dust Control Agents for Non-Asphalted Roads and Other Similar Surfaces” and be certified by the Quebec Standardization Office (BNQ).</p>	
	None	12.4.1.2	<p>Water used for dust suppression must be free of waste and organic matter.</p>	<p>Dust suppressant – CCDG 12.4.1.2: Water used for dust suppression must be free of waste and organic matter.</p>	

Table 81 Standard Mitigation Measures – From MTQ Road Work Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
Work site development	Change	9.31	<p>Areas set aside for work site development should, where possible, be located on previously cleared or disturbed sites. Such areas must fulfil the following conditions:</p> <ul style="list-style-type: none"> Work site access roads, parking and storage areas, camps, work site offices and other temporary facilities must be located at least 60 m from a permanent watercourse or lake, and at least 30 m from an intermittent watercourse. <p>During construction, all stripped areas must be stabilized, and an adequate drainage system must be designed in order to minimize the flow of sediment into nearby lakes, watercourses and wetlands.</p> <p>Granular material used for construction must come from a source (borrow pit) located more than 75 m from a body of water.</p> <p>Elsewhere on Crown land, in addition to complying with prevailing laws and regulations, authorizations for work outside the government department's right-of-way must be obtained, including the signed approval of affected landowners.</p> <p>The location of temporary-use sites related to work site operations (e.g. storage areas for surplus materials) require special attention in order to minimize environmental impacts.</p>	<p>Work site development – NC.3.1: Areas set aside for work site development should, where possible, be located on previously cleared or disturbed sites. Such areas must fulfil the following conditions:</p> <ul style="list-style-type: none"> Work site access roads, parking and storage areas, camps, work site offices and other temporary facilities must be located at least 60 m from a permanent watercourse or lake, and at least 30 m from an intermittent watercourse. The main protection provisions apply to public forests, in accordance with the <i>Sustainable Forest Development Act</i> (CQLR, Chapter A-18.1) and the <i>Regulation Respecting Standards of Forest Management for Forests in the Domain of the State</i> (CQLR, Chapter A-18.1, r. 7). None of the following elements may be placed within 10 metres of the 20-metre wooded strip to be preserved along lakes and watercourses, within 30 metres of an intermittent watercourse, or within wooded strips to be preserved: <ul style="list-style-type: none"> Materials to be stored; Contractor's materials; Camp sites, work site offices, and weigh station; Delimiting, cutting and stacking areas; Disposal sites for materials to be recovered or reused; Detour roads and access roads (except for river crossings). <p>During construction, all stripped areas must be stabilized, and erosion and sediment control measures must be set up to reduce the influx of sediment into nearby lakes, watercourses and wetlands. Several methods are presented in section 9.4, "Protection of the aquatic environment."</p> <p>Granular material used for construction must come from a source (borrow pit) located more than 75 m from a body of water.</p> <p>Elsewhere on Crown land, in addition to complying with prevailing laws and regulations, authorizations for work outside the government department's right-of-way must be obtained, including the signed approval of affected landowners.</p>	Measure updated based on the 2018 version of Chapter 9, Volume 2 (2018-01-30).
Maintenance and movement of machinery	Change	9.32	<p>Maintenance of machinery and vehicles as well as refuelling and oil replacement must be performed at least 15 m from a watercourse or lake (based on the natural high water mark). Contamination of the aquatic environment must be prevented and emergency measures for accidental spills must be developed.</p> <p>Where work is performed on Crown land, machinery maintenance may not be performed within 60 m of a watercourse. Refuelling and mechanical inspections of pumps, generators and fixed equipment may not be done within 15 m of a watercourse. Where necessary, fuel tanks must be installed on a waterproof structure with a minimum volume of 150% of the capacity of the tank as a safety margin.</p> <p>Surplus concrete and water used to clean concrete mixers must be stored in an area provided for that purpose so as to avoid environmental contamination. The site must have first been approved by the work site supervisor.</p>	<p>Maintenance and movement of machinery – NC 9.3.2: Maintenance of machinery and vehicles as well as refuelling and oil replacement must be performed at least 15 m from a watercourse or lake (based on the natural high water mark). Where work is performed on Crown land, machinery and vehicle maintenance may not be performed within 60 m of a watercourse. Refuelling and mechanical inspections of pumps, generators and fixed equipment may not be done within 15 m of a watercourse. Where necessary, fuel tanks must be installed on a waterproof structure with a minimum volume of 110% of the capacity of the tank as a safety margin.</p> <p>Excess concrete and water used to clean concrete mixers must be stored in an area provided for that purpose so as to avoid environmental contamination. The site must have first been approved by the work site supervisor.</p>	Measure updated based on the 2018 version of Chapter 9, Volume 2 (2018-01-30). Addition of reference to CCDG 2018 (section 11.4.7) for surplus concrete
Waste management	None	9.3.3.1	<p>Excess natural materials include excavated material composed of clay, silt, sand, gravel, rock and organic soil, as well as plant debris from land clearing, etc.</p> <p>Before disposing of excess materials outside the MTQ's right-of-way, it is critical to verify whether such material can be used for project-related works such as reuse as backfill,</p>	<p>Waste management – NC 9.3.3.1: Excess natural materials include excavated material composed of clay, silt, sand, gravel, rock and organic soil, as well as plant debris from land clearing, etc.</p>	

Table 81 Standard Mitigation Measures – From MTQ Road Work Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
			<p>slope reduction, constructing a visual screen or a noise mound, restoring borrow pits or a former road corridor, and creating a wildlife habitat. Reuse of natural materials has the added advantage of reducing transportation costs and project budget costs.</p> <p>Where appropriate, disposal of excess materials must comply with municipal regulations, the <i>Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains</i> (R.R.Q., c. Q-2, r. 35) and the <i>Act Respecting the Preservation of Agricultural Land and Agricultural Activities</i> (R.S.Q., c. S-41.1). Before transporting excess materials to a location outside the right-of-way, authorization must be obtained from the owners of the site or the necessary land must be acquired.</p>	<p>Before disposing of excess materials outside the MTQ's right-of-way, it is critical to verify whether such material can be used for project-related works such as reuse as backfill, slope reduction, constructing a visual screen or a noise mound, restoring borrow pits or a former road corridor, and creating a wildlife habitat. Reuse of natural materials has the added advantage of reducing transportation costs and project budget costs.</p> <p>Where appropriate, disposal of excess materials must comply with municipal regulations, the <i>Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains</i> (R.R.Q., c. Q-2, r. 35) and the <i>Act Respecting the Preservation of Agricultural Land and Agricultural Activities</i> (R.S.Q., c. S-41.1). Before transporting excess materials to a location outside the right-of-way, authorization must be obtained from the owners of the site or the necessary land must be acquired.</p>	
	Change	9.3.3.2	<p>Materials resulting from the demolition of structures, such as concrete, asphalt, wood and steel, can be: reused in the project as backfill; or recycled (steel and wood).</p> <p>If these materials are neither reusable nor recyclable within the right-of-ways, they must be taken to a disposal site that complies with the <i>Environment Quality Act</i> (R.S.Q., c. Q-2) and the <i>Regulation Respecting the Land Incineration of Residual Materials</i> (R.R.Q., c. Q-2, r. 19).</p> <p>The MTQ encourages the reuse of waste asphalt and concrete.</p> <p>Asphalt can be recycled in road embankments after being broken up into fragments smaller than 300 mm. The fragments must be completely covered with a minimum 300-mm-thick layer of compactable soil.</p> <p>In any road rehabilitation project, whether the road is asphalt-paved or not, excess materials from excavation or from removal of the pavement structure that are transported outside the right-of-way must be checked for contamination.</p> <p>The <i>Soil Protection and Contaminated Sites Rehabilitation Policy</i> and related regulations set out the procedure to follow.</p> <p>For fragmentation of asphalt mixes containing asbestos fibres, the applicable protective measures are found in Section 51 of the <i>Act Respecting Occupational Health and Safety</i> (R.R.Q., c. S-2.1), <i>Regulation Respecting Occupational Health and Safety</i> (R.R.Q., c. S-2.1, r. 19.01) and the provisions of the <i>Safety Code for the Construction Industry</i> (R.R.Q., c. S-2.1, r. 6).</p> <p>Concrete can be recycled in embankments provided it is broken into fragments not exceeding 300 mm. Fragments must be homogeneous, and any reinforcing steel must not exceed the size of the fragment. The fragments must be completely covered with a minimum 300-mm-thick layer of compactable soil.</p> <p>Only concrete and untreated wood may be recycled at a privately owned site. However, the site must receive prior approval from the MDDEFP and comply with municipal by-laws. Disposal outside of the MTQ's right-of-way must be carried out in accordance with the <i>Environment Quality Act</i> (R.S.Q., c. Q-2), the <i>Regulation Respecting the Land Incineration of Residual Materials</i> (R.R.Q., c. Q-2, r. 19) and at an MDDEFP-approved site.</p> <p>MDDEFP also considers it acceptable to integrate concrete and asphalt aggregates into the production cycle as raw materials.</p> <p>Therefore, concrete aggregate can be recycled into the composition of new concrete, and recycled asphalt can be used for road surfaces and shoulders.</p>	<p>Waste management – NC 9.3.3.2 Materials resulting from the demolition of structures include concrete, asphalt, wood, steel, etc. They can be reused or reclaimed for work as various materials that make up, for instance, fill under paving, bases, subbases and noise mounds, according to their contaminant levels and leaching potential, and in accordance with MELCC's guidelines for managing concrete, brick and asphalt from construction and demolition work and residue from the free stone sector.</p> <p>Steel and wood can also be recovered. If these materials are neither reusable nor recyclable within the right-of-ways, they must be taken to a disposal site that complies with the <i>Environment Quality Act</i> (CQLR, c. Q-2) and the <i>Regulation Respecting the Land Incineration of Residual Materials</i> (CQLR, c. Q-2, r. 19).</p> <p>The MTQ encourages the reuse of waste asphalt and concrete. Asphalt can be recycled in road embankments after being broken up into fragments smaller than 300 mm. Furthermore, the fragments must be completely covered with a minimum 300-mm-thick layer of compactable soil.</p> <p>In any road rehabilitation project, whether the road is asphalt-paved or not, excess materials from excavation or from removal of the pavement structure that are transported outside the right-of-way must be checked for contamination. The <i>Soil Protection and Contaminated Sites Rehabilitation Policy</i> and related regulations set out the procedure to follow.</p> <p>For fragmentation of asphalt mixes containing asbestos fibres, the applicable protective measures are found in Section 51 of the <i>Act Respecting Occupational Health and Safety</i> (CQLR, chapter S-2.1), the <i>Regulation Respecting Occupational Health and Safety</i> (CQLR, chapter S-2.1, r. 19.01) and the provisions of the <i>Safety Code for the Construction Industry</i> (CQLR, chapter S-2.1, r. 6).</p> <p>The measures concern worker training and notification, disposal and transport of residue from the fragmentation of asphalt mixes containing asbestos fibres, work area cleanup, protective devices and clothing, and work area signage.</p> <p>Concrete can be recycled in embankments provided it is broken into fragments not exceeding 300 mm. Fragments must be homogeneous, and any reinforcing steel must not exceed the size of the fragment. The fragments must be completely covered with a minimum 300-mm-thick layer of compactable soil.</p> <p>Only concrete and untreated wood may be recycled at a privately owned site. However, the site must receive prior approval from the MELCC and comply with</p>	<p>Updated based on 2018 standards</p> <p>Change in certain references to regulations and the guidelines</p> <p>Replace MDDELCC with MELCC</p>

Table 81 Standard Mitigation Measures – From MTQ Road Work Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
			<p>Asphalt and concrete can also be temporarily stored in a quarry or sand pit for use in the near future on a road project, subject to compliance with applicable rules and the <i>Regulation Respecting Pits and Quarries</i> (R.R.Q., c. Q-2, r. 7). The regulation specifies that only concrete and asphalt may be stored, that a time limit must be set, that the waste must not interfere with site operations, that the land must be restored to its original condition and that permission must be obtained from MRNF or from the private owner.</p>	<p>municipal by-laws. Disposal outside of the MTQ's right-of-way must be carried out at an MELCC-approved site in accordance with the Environment Quality Act (CQLR, chapter Q-2) and the Regulation Respecting the Land Incineration of Residual Materials (CQLR, chapter Q-2, r. 19). Concrete aggregate and asphalt aggregates can be integrated into a production cycle as raw material if the conditions specified in MELCC's guidelines for managing concrete, brick and asphalt from construction and demolition work and residue from the free stone sector (<i>Lignes directrices relatives à la gestion de béton, de brique et d'asphalte issus des travaux de construction et de démolition et des résidus du secteur de la pierre de taille</i>) are observed. Therefore, concrete aggregate can be recycled into the composition of new concrete, and recycled asphalt can be used for road surfaces and shoulders. Asphalt and concrete can also be temporarily stored in view of being reused over the short term for a road project, provided that the provisions related to the MELCC's guidelines for managing concrete, brick and asphalt from construction and demolition work and residue from the free stone sector (<i>Lignes directrices relatives à la gestion de béton, de brique et d'asphalte issus des travaux de construction et de démolition et des résidus du secteur de la pierre de taille</i>) are observed.</p>	
	None	9.3.3.3	<p>Hazardous materials include chemical waste, hydrocarbons, paint and contaminated soil, as indicated in the Regulation Respecting Hazardous Materials (R.R.Q., c. Q-2, r. 32). Examples of hazardous materials used in construction work include asphalt, gasoline, diesel, oil and grease, as well as any empty containers and waste associated with these materials. These materials must be managed in accordance with the <i>Regulation Respecting Hazardous Materials</i> (R.R.Q., c. Q-2, r. 32) and the <i>Environment Quality Act</i> (R.S.Q., c. Q-2).</p>	<p>Waste management – NC 9.3.3.3: Hazardous materials include chemical waste, hydrocarbons, paint and contaminated soil, as indicated in the Regulation Respecting Hazardous Materials (R.R.Q., c. Q-2, r. 32). Examples of hazardous materials used in construction work include asphalt, gasoline, diesel, oil and grease, as well as any empty containers and waste associated with these materials. These materials must be managed in accordance with the Regulation Respecting Hazardous Materials (R.R.Q., c. Q-2, r. 32) and the Environment Quality Act (R.S.Q., c. Q-2).</p>	
	Change	9.3.3.4	<p>If contaminated soil is discovered during construction work, the excavated soil must be temporarily placed on an impermeable membrane (e.g. a geotextile membrane). The soil must be covered with an impermeable membrane to prevent leaching and contamination of nearby soil and evaporation of volatile substances (if present in the soil). Contaminated soil must be taken to an MDDEFP-approved site or treatment centre.</p>	<p>Waste management – NC 9.3.3.4: If contaminated soil is discovered during construction work, the excavated soil must be temporarily placed on an impermeable membrane (e.g. a geotextile membrane). The soil must be covered with an impermeable membrane to prevent leaching and contamination of nearby soil and evaporation of volatile substances (if present in the soil). Contaminated soil is not considered to be a hazardous material under the Regulation Respecting Hazardous Materials. Contaminated soil must therefore be managed in keeping with the Soil Protection and Contaminated Sites Rehabilitation Policy and related regulations, mainly the Land Protection and Rehabilitation Regulation (CQLR, chapter Q-2, r. 37). However, under the Regulation Respecting Contaminated Soil Storage and Contaminated Soil Transfer Stations (CQLR, Chapter Q-2, r. 46), soil can only be stored temporarily at the original site. In the event that contaminated soil is accidentally discovered along a linear project (e.g. road project) where it cannot be stored at the original site, a notice must be sent to the MDDELCC no later than 10 days after the soil has been excavated, and the storage period must not exceed 180 days. Storage conditions must be such that the contaminated soil cannot be the source of contamination of water, air or underlying soil.</p>	Measure updated based on the 2018 version of Chapter 9, Volume 2

Table 81 Standard Mitigation Measures – From MTQ Road Work Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
				Contaminated soil must be taken to an MDDELCC-approved site.	
Protection of aquatic environment	Change	9.4.2	<p>Grubbing near a watercourse or a lake must be treated as a potential source of silting that could affect the quality of the aquatic environment. The steeper the slope, the greater the risk of silting. Therefore, grubbing in right-of-ways must not take place within 20 metres of the natural high water mark (HWM). The purpose of this standard, from the <i>Regulation Respecting Standards of Forest Management for Forests in the Public Domain</i> (R.R.Q., c. F-4.1, r. 7) (Crown lands) and the Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains is to minimize the risk of shoreline erosion by limiting exposure to the elements of shorelines that have been stripped of stabilizing vegetation. Clearing must be kept to a minimum within the 20-metre riparian strip. Only ground-level cutting is permitted, and plant cover must be preserved as long as possible before carrying out earthwork.</p> <p>Within 5 metres of the natural high water mark, the contractor may cut merchantable stems only (those with a diameter greater than 100 mm) and dispose of or recover for commercial or other purposes all trees and burnt or fallen trees. Shrubs and bushes less than 1.5 metres in height at maturity must be preserved.</p> <p>Within the next 15 metres, the contractor may cut all stems to ground level.</p> <p>Heavy machinery may not operate within the 20-metre riparian strip as measured from the HWM, with the exception of areas authorized for the project. Lastly, the limits of the protection zones can be delineated with tape of different colours, especially during winter land clearing.</p>	<p>Protection of aquatic environment – NC 9.4.2: Grubbing near a watercourse or a lake must be treated as a potential source of silting that could affect the quality of the aquatic environment. The steeper the slope, the greater the risk of silting. Therefore, grubbing in right-of-ways must not take place within 20 metres of the natural high water mark (HWM). The purpose of this standard from the Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains (CQLR, c. F-2, r. 35) (Crown lands) is to minimize the risk of shoreline erosion by limiting exposure to the elements of shorelines that have been stripped of stabilizing vegetation. Clearing must be kept to a minimum within the 20-metre riparian strip. Only ground-level cutting is permitted, and plant cover must be preserved as long as possible before carrying out earthwork.</p> <p>Only merchantable stems may be cut within the first five metres of the NHWM (those with a diameter greater than 100 mm). The disposal or recovery for commercial or other purposes of all trees and burnt or fallen trees is required. Shrubs and bushes less than 1.5 metres in height at maturity must be preserved. Within the next 15 metres, all stems must be cut to the ground. Heavy machinery may not operate within the 20-metre riparian strip as measured from the HWM, with the exception of areas authorized for the project. Lastly, the limits of the protection zones can be delineated with tape of different colours, especially during winter land clearing.</p>	Removal of the indication “RNI,” which is outdated. Measured updated (2018-01-30). Since the RADF came into force on April 1, 2018, it will be replaced with the 2019 version of Chapter 9, Volume 2.
	Change	9.4.3.1	<p>There are several simple measures that can be implemented for effective erosion control on disturbed surfaces and earthwork, whether this involves excavation or backfill. Small protected channels in the transverse sections of slopes, at the base of slopes and in other affected areas will make it possible to collect and control runoff in slopes that are susceptible to erosion. These channels are especially effective in clay materials. However, in mountainous regions, at the start of work, interceptor ditches should be created at the top of excavation slopes. The ditch will collect mountain runoff and direct it towards a stable location. The interceptor ditch will keep runoff from eroding soil from excavated material and prevent gullyng on the new slope.</p> <p>In addition, notching the slope by means of crawler tracks compacts the soil and creates microstructures which minimize erosion. The furrows created by notching must follow the contour of the slope, i.e. they should be perpendicular to the incline in order to reduce erosion. This method works well in clay soil but not in sandy soil, which does not hold the furrow as long, or in ground that is too steep and inaccessible to the machinery.</p>	<p>Protection of aquatic environment – NC 9.4.3.1: There are several simple measures that can be implemented for effective erosion control on disturbed surfaces and earthwork, whether this involves excavation or backfill. Small protected channels in the transverse sections of slopes, at the base of slopes and in other affected areas will make it possible to collect and control runoff in slopes that are susceptible to erosion. These channels are especially effective in clay materials. However, at the start of work, interceptor ditches should be created at the top of excavation slopes. The ditch will collect mountain runoff and direct it towards a stable location. The interceptor ditch will keep runoff from eroding soil from excavated material and prevent gullyng on the new slope.</p> <p>In addition, notching the slope by means of crawler tracks compacts the soil and creates microstructures which minimize erosion. The furrows created by notching must follow the contour of the slope, i.e. they should be perpendicular to the incline in order to reduce erosion. This method works well in clay soil but not in sandy soil, which does not hold the furrow as long, or in ground that is too steep and inaccessible to the machinery.</p>	Measure updated based on the 2018 version of Chapter 9, Volume 2 (2018-01-30), and removal of “in mountainous regions.”
	None	9.4.3.2	<p>Temporary stabilization requires an erosion and sediment control plan. The plan must describe the protective work required to minimize erosion and the structures to be protected. Compacted surfaces must be scarified or harrowed before seeding.</p> <p>On Crown lands, regeneration of these areas with commercial species must be done within two years of the end of use.</p> <p>When runoff from ditches approaches a forest watercourse, the runoff must be diverted to an area of vegetation or into settling basins. This diversion must be done at least 20 metres from the watercourse to prevent runoff from flowing directly into the watercourse</p>	<p>Protection of aquatic environment – NC 9.4.3.2: Temporary stabilization requires an erosion and sediment control plan. The plan must describe the protective work required to minimize erosion and the structures to be protected. Compacted surfaces must be scarified or harrowed before seeding.</p> <p>On Crown lands, regeneration of these areas with commercial species must be done within two years of the end of use.</p> <p>When runoff from ditches approaches a forest watercourse, the runoff must be diverted to an area of vegetation or into settling basins. This diversion must be</p>	

Table 81 Standard Mitigation Measures – From MTQ Road Work Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
			<p>due to the flow velocity of the runoff. Between the watercourse and this first diversion, the water from the ditches must also be diverted before entering the watercourse. The purpose of these measures is to prevent sediment being deposited in the watercourse (see <i>Tome I – Conception routière</i>, Chapter 2, “Cadre environnemental”; see also <i>Tome IV – Abords de route</i>, Chapter 6. “Mesures d’atténuation environnementales permanentes”).</p>	<p>done at least 20 metres from the watercourse to prevent runoff from flowing directly into the watercourse due to the flow velocity of the runoff. Between the watercourse and this first diversion, the water from the ditches must also be diverted before entering the watercourse. The purpose of these measures is to prevent sediment being deposited in the watercourse (see <i>Tome I – Conception routière</i>, Chapter 2, “Cadre environnemental”; see also <i>Tome IV – Abords de route</i>, Chapter 6. “Mesures d’atténuation environnementales permanentes”).</p>	
	None	9.4.3.3	<p>Sediment barriers: Straw bale filters: at the base of a slope, the receiving trench for the straw bales is dug along the contour so as to intercept runoff. The bales must be carefully wedged into the trench for a proper fit. If the cords around the bales are made of rope or string, they must be placed horizontally to avoid contact with the ground. Anchor posts for the straw bales must be flush with the top of the bale so that they do not pose a danger to workers. The anchor post can be made of wood or metal, though wooden stakes are more common. Bales must be inspected frequently, and damaged bales must be promptly repaired or replaced. Accumulated sediment must also be removed to allow the barrier to function properly. Lastly, the bales must be removed when they are no longer needed, and the trench must be filled, levelled and stabilized. Geotextile barrier: periodic maintenance must include sediment removal. The geotextile barrier is removed and recovered once stripped surfaces have been permanently stabilized. On a construction site, sediment barriers may be erected at the following locations: At the base of excavation on the outer side of the ditch; At the mid-point on slopes over 20 metres in length (every 10 metres for long, steep slopes); At the base of an embankment where there is a watercourse or a ditch; At the base of a slope where a source of water causes erosion (e.g. water seepage); Around a temporary accumulation of unstabilized soil located within 60 metres of a watercourse or a lake; Across pits, perpendicular to the flow (with slight gradients and low-water flows). Sediment traps and berm filters: the berm filter must be built across the ditch and high enough to allow the water to flow through. The material used is 70-20 gauge riprap containing no more than 5% of fine material able to pass through a 80 µm sieve. For maximum efficiency, maintenance should be performed frequently on each of these structures. When the sediment trap is 50% full, the accumulated sediment must be removed and, when required, the filter material must be cleaned or replaced. To limit sediment transport into bodies of water or watercourses, at the start of work, one or more berm filters and sediment traps, depending on the length of the pits, the incline, type of soil, etc., must be installed in pits draining the work area. Settling basin: frequent settling basin maintenance is required to ensure maximum efficiency. When the basin is 50% full, sediment must be removed and, when required, the filter material must be cleaned or replaced. Turbidity curtain: at times, it may be necessary to pump disturbed water into vegetation (over 30 metres from the HWL) to minimize sediment suspension during construction and before removing the curtain. To be completely effective, the curtain must be located at least 5 metres from the base of the embankment slope. Prior to installation, a bathymetric profile should be carried out at the installation site so that the height of the curtain can be properly adjusted.</p>	<p>Protection of aquatic environment – NC 9.4.3.3: Sediment barriers: Straw bale filters: at the base of a slope, the receiving trench for the straw bales is dug along the contour so as to intercept runoff. The bales must be carefully wedged into the trench for a proper fit. If the cords around the bales are made of rope or string, they must be placed horizontally to avoid contact with the ground. Anchor posts for the straw bales must be flush with the top of the bale so that they do not pose a danger to workers. The anchor post can be made of wood or metal, though wooden stakes are more common. Bales must be inspected frequently, and damaged bales must be promptly repaired or replaced. Accumulated sediment must also be removed to allow the barrier to function properly. Lastly, the bales must be removed when they are no longer needed, and the trench must be filled, levelled and stabilized. Geotextile barrier: periodic maintenance must include sediment removal. The geotextile barrier is removed and recovered once stripped surfaces have been permanently stabilized. On a construction site, sediment barriers may be erected at the following locations:</p> <ul style="list-style-type: none"> • At the base of excavation on the outer side of the ditch; • At the mid-point on slopes over 20 metres in length (every 10 metres for long, steep slopes); • At the base of an embankment where there is a watercourse or a ditch; • At the base of a slope where a source of water causes erosion (e.g. water seepage); • Around a temporary accumulation of unstabilized soil located within 60 metres of a watercourse or a lake; • Across pits, perpendicular to the flow (with slight gradients and low-water flows). • Sediment traps and berm filters: the berm filter must be built across the ditch and high enough to allow the water to flow through. The material used is 70-20 gauge riprap containing no more than 5% of fine material able to pass through a 80 µm sieve. <p>For maximum efficiency, maintenance should be performed frequently on each of these structures. When the sediment trap is 50% full, the accumulated sediment must be removed and, when required, the filter material must be cleaned or replaced. To limit sediment transport into bodies of water or watercourses, at the start of work, one or more berm filters and sediment traps, depending on the length of</p>	

Table 81 Standard Mitigation Measures – From MTQ Road Work Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
			There should an allowance of 1 metre to 2 metres over the height of the water column to compensate for fluctuations in water levels and for waves.	the pits, the incline, type of soil, etc., must be installed in pits draining the work area. Settling basin: frequent settling basin maintenance is required to ensure maximum efficiency. When the basin is 50% full, sediment must be removed and, when required, the filter material must be cleaned or replaced. Turbidity curtain: at times, it may be necessary to pump disturbed water into vegetation (over 30 metres from the HWL) to minimize sediment suspension during construction and before removing the curtain. To be completely effective, the curtain must be located at least 5 metres from the base of the embankment slope. Prior to installation, a bathymetric profile should be carried out at the installation site so that the height of the curtain can be properly adjusted. There should an allowance of 1 metre to 2 metres over the height of the water column to compensate for fluctuations in water levels and for waves.	
Protection of wetlands	None	9.5.3	Temporary construction in wetlands is prohibited, whether for storage, parking, bypass roads or work areas. Such structures are to be located on stable land. Where it is impossible to do otherwise, precise studies by environmental specialists must be conducted with respect to the location, working method for construction of the sites, and dismantling and redevelopment of temporary sites in wetlands. The redevelopment plan must provide for the complete rehabilitation of disturbed areas, including removal of all materials and restoration of ground and drainage conditions to allow for recolonization of the site by vegetation.	Protection of wetlands – NC 9.5.3: Temporary construction in wetlands is prohibited, whether for storage, parking, bypass roads or work areas. Such structures are to be located on stable land. Where it is impossible to do otherwise, precise studies by environmental specialists must be conducted with respect to the location, working method for construction of the sites, and dismantling and redevelopment of temporary sites in wetlands. The redevelopment plan must provide for the complete rehabilitation of disturbed areas, including removal of all materials and restoration of ground and drainage conditions to allow for recolonization of the site by vegetation.	
Protection of sound environment	None	9.9.1.3	The SAE Standard J1075, Sound Measurement – Construction Site must be used for the measurement of construction site noise. Measurement of sound levels produced by a particular piece of equipment on a construction site must be done in accordance with the measurement method described in Measurement of Highway-Related Noise, Final Report FHWA-PD-96-046, Federal Highway Administration (May 1996). This method stipulates that the sound sampling be made at a distance of 15 metres from equipment. In addition, given the range of operations performed by a piece of equipment, measurements should be taken for the different operating modes (up to four possible modes): <ul style="list-style-type: none"> • Stationary in passive mode (e.g. a truck at idle); • Stationary in active mode (e.g. a bulldozer lifting materials); • Mobile in passive mode (e.g. equipment moving to another area within a site); • Mobile in active mode (e.g. bulldozer moving while pushing debris). 	Protection of sound environment – NC 9.9.1.3: The SAE Standard J1075, Sound Measurement – Construction Site must be used for the measurement of construction site noise. Measurement of sound levels produced by a particular piece of equipment on a construction site must be done in accordance with the measurement method described in Measurement of Highway-Related Noise, Final Report FHWA-PD-96-046, Federal Highway Administration (May 1996). This method stipulates that the sound sampling be made at a distance of 15 metres from equipment. In addition, given the range of operations performed by a piece of equipment, measurements should be taken for the different operating modes (up to four possible modes): <ul style="list-style-type: none"> • Stationary in passive mode (e.g. a truck at idle); • Stationary in active mode (e.g. a bulldozer lifting materials); • Mobile in passive mode (e.g. equipment moving to another area within a site); • Mobile in active mode (e.g. bulldozer moving while pushing debris). 	
	Change	9.9.1.4	Ambient noise must be determined before the start of work with at least two non-consecutive 24-hour noise samplings conducted in one week, at representative locations along the work area. Ambient noise must be assessed for the daytime (7 a.m. to 7.p.m.), evening (7.p.m. to 11 p.m.) and night (11 p.m. to 7 a.m.). Note that ambient noise is not to be measured within the right-of-way required by the work.	Protection of sound environment – NC 9.9.1.4: The maximum recommended noise levels are found in two categories: “overall” noise levels established along the areas to be protected, and “at source” noise levels associated with each equipment used at the work site. If required, the noise management specifications associated with a work site must indicate two types of maximum recommended noise levels, namely, an overall maximum level established along the areas to be protected, and a maximum noise level at source associated with certain equipment. The contractor is required to comply with these maximum levels at all times.	Measure updated based on the 2018 version of Chapter 9, Volume 2

Table 81 Standard Mitigation Measures – From MTQ Road Work Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
				<p>Table 9.9–1 presents the maximum recommended noise levels based on the type of land use. These consist of overall noise levels, namely L10 levels which generally cannot exceed the ambient noise level established before the start of construction by more than 3 to 5 dBA. The Lmax noise level is also used specifically for intermittent noise that gets loud quickly, mainly for impact noise (e.g. pile drilling). The maximum recommended noise levels represent the combination of ambient noise and the noise from the work site near the areas to be protected.</p> <p>Ambient noise must be determined before the start of work with at least two non-consecutive 24-hour noise samplings conducted in one week, at representative locations along the work area. Ambient noise must be assessed for the daytime (7 a.m. to 7.p.m.), evening (7.p.m. to 11 p.m.) and night (11 p.m. to 7 a.m.). Note that ambient noise is not to be measured within the right-of-way required by the work.</p>	
	None	9.9.2	When it is necessary to mitigate the noise impact of a road construction project, a noise management program must be developed. The importance of the program is proportional to the duration of the work planned and consists of one or several comprehensive noise control programs and an acoustic monitoring plan.	Protection of sound environment – NC 9.9.2: When it is necessary to mitigate the noise impact of a road construction project, a noise management program must be developed. The importance of the program is proportional to the duration of the work planned and consists of one or several comprehensive noise control programs and an acoustic monitoring plan.	
	None	9.9.2.1	<p>The comprehensive program must explain the methodology used to perform one or more construction site activities in compliance with the noise levels permitted in a noise-sensitive area. Any construction site activity that might generate noise that exceeds the ambient noise level without work near sensitive areas must be preceded by the implementation of a comprehensive program.</p> <p>The comprehensive program must include:</p> <ul style="list-style-type: none"> • A description of the area where the activity takes place, including the location of noise-sensitive areas, housing types and number of floors, and the location of ambient noise measurement points; • An estimate of the noise levels produced by work in sensitive areas, in the form of tables showing current and projected noise levels, and an estimate of the time maximum noise levels will be exceeded; • Identification of mitigation measures, assessment of their effectiveness, implementation procedures for mitigation measures and time limits for installation; • Plans for mitigation measures (e.g. walls, enclosures), if required. 	<p>Protection of sound environment – NC 9.9.2.1: The comprehensive program must explain the methodology used to perform one or more construction site activities in compliance with the noise levels permitted in a noise-sensitive area. Any construction site activity that might generate noise that exceeds the ambient noise level without work near sensitive areas must be preceded by the implementation of a comprehensive program.</p> <p>The comprehensive program must include:</p> <ul style="list-style-type: none"> • A description of the area where the activity takes place, including the location of noise-sensitive areas, housing types and number of floors, and the location of ambient noise measurement points; • An estimate of the noise levels produced by work in sensitive areas, in the form of tables showing current and projected noise levels, and an estimate of the time maximum noise levels will be exceeded; • Identification of mitigation measures, assessment of their effectiveness, implementation procedures for mitigation measures and time limits for installation; • Plans for mitigation measures (e.g. walls, enclosures), if required. 	
	None	9.9.2.2	<p>Where required, acoustic monitoring must be implemented at the start of work in order to monitor noise levels in the vicinity of the construction site. The acoustic monitoring plan must include the following elements:</p> <ul style="list-style-type: none"> • Location of noise sampling sites (permanent or temporary sampling stations to be determined); • Type of equipment used for noise sampling; • Measurement methods and times. 	<p>Protection of sound environment – NC 9.9.2.2: Where required, acoustic monitoring must be implemented at the start of work in order to monitor noise levels in the vicinity of the construction site. The acoustic monitoring plan must include the following elements:</p> <ul style="list-style-type: none"> • Location of noise sampling sites (permanent or temporary sampling stations to be determined); • Type of equipment used for noise sampling; • Measurement methods and times. 	
	Change	9.9.3.1	<p>Here are some examples of mitigation measures that can be applied:</p> <ul style="list-style-type: none"> • Prohibit work at night; • Plan the noisiest work during less sensitive periods (e.g. daytime); 	<p>Protection of sound environment – NC 9.9.3.1:</p> <p>Here are some examples of mitigation measures that can be applied:</p> <ul style="list-style-type: none"> • Evening and night work will be planned to continue with the least noisy work; 	Change made to the first measure.

Table 81 Standard Mitigation Measures – From MTQ Road Work Standards (2018)

TOPIC	TYPE OF CHANGE	SECTION NO.	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
			<ul style="list-style-type: none"> Prohibit certain types of equipment near noise-sensitive areas; Favour quieter working methods and soundproofed or electric equipment where possible; Use equipment with good quality mufflers in working order; Ensure that equipment used on the site is in proper working order; Limit the power output of the equipment to what is required; Limit the amount of equipment on the site to what is necessary; Install variable-intensity reversing alarms (self-adjusting to ambient noise) and, if possible, install reversing alarms only on that equipment covered by the <i>Safety Code for the Construction Industry</i> (R.R.Q., c. S-2.1, r. 6) of <i>An Act Respecting Occupational Health and Safety</i> (R.S.Q., c S-2.1, s. 3.10.12). 	<ul style="list-style-type: none"> Plan the noisiest work during less sensitive periods (e.g. daytime); Prohibit certain types of equipment near noise-sensitive areas; Favour quieter working methods and soundproofed or electric equipment where possible; Use equipment with good quality mufflers in working order; Ensure that equipment used on the site is in proper working order; Limit the power output of the equipment to what is required; Limit the amount of equipment on the site to what is necessary; Install variable-intensity reversing alarms (self-adjusting to ambient noise) and, if possible, install reversing alarms only on that equipment covered by the <i>Safety Code for the Construction Industry</i> (R.R.Q., c. S-2.1, r. 6) of <i>An Act Respecting Occupational Health and Safety</i> (R.S.Q., c S-2.1, s. 3.10.12). 	
None	9.9.3.2		<p>Here are a few examples of mitigation measures that can be used to minimize noise propagation from a construction site:</p> <ul style="list-style-type: none"> Install temporary stationary noise barriers around the site, or mobile barriers around certain equipment; Install acoustic sheets or curtains; Arrange construction site trailers or heavy vehicles as noise barriers; Increase the distance between noisy equipment and noise-sensitive areas. 	<p>Protection of sound environment – NC 9.9.3.2:</p> <p>Here are a few examples of mitigation measures that can be used to minimize noise propagation from a construction site:</p> <ul style="list-style-type: none"> Install temporary stationary noise barriers around the site, or mobile barriers around certain equipment; Install acoustic sheets or curtains; Arrange construction site trailers or heavy vehicles as noise barriers; Increase the distance between noisy equipment and noise-sensitive areas. 	
None	9.9.3.3		<p>In the event of complaints about noise from the construction site, a complaint tracking system will enable the mediator to intervene promptly with both complainants and contractors in order to decide on the required corrective action.</p>	<p>Protection of sound environment – NC 9.9.3.3:</p> <p>In the event of complaints about noise from the construction site, a complaint tracking system will enable the mediator to intervene promptly with both complainants and contractors in order to decide on the required corrective action.</p>	

Since the MTQ's *Cahier de charges et devis généraux (CCDG)* and road works standards are frequently revised, the latest versions will be used during the works. The tables list the measures in effect in the CCDG and 2018 standards.

6.3.3 SPECIAL MEASURES

Table 82 lists the special mitigation measures that were identified during the TEA. These measures are largely based on those of the 2013 EA and have proven successful in the construction of the New Champlain Bridge.

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
P-1	Change	Unless there are exceptional circumstances, maintain, during the official opening period, a bike link between the South Shore and Montreal, including Nuns' Island. Bike links will be re-established on both sides of Highway 15 when the work is finished.	P-1 Unless there are exceptional circumstances, maintain, during the official opening period, a bike link between the South Shore and Montreal, including Nuns' Island. Ensure liaison with the necessary organizations, such as Vélo Québec. Bike links will be re-established on both sides of Highway 15 when the work is finished.	Add: "Ensure liaison with the necessary organizations, such as Vélo Québec."
P-2	Change	When possible, inform bike link users of safe detours and closure periods. For recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services.	P-2 Inform bike link users of safe detours and closure periods. For recreational boating, provide one or more marked channels to ensure safe passage and have the required notices to shipping issued through CCG's Marine Communications and Traffic Services.	Remove "when possible."
P-3A	None	Conduct work outside nesting times for birds whose nesting schedule normally ranges from mid-April to mid-August in the study area.	P-3A Conduct work outside nesting times for birds whose nesting schedule normally ranges from mid-April to mid-August in the study area.	
P-3B	None	Avoid carrying out potentially destructive or disruptive activities during sensitive periods and in sensitive locations in order to reduce the risk of impacting birds, their nests and eggs. If activities cannot be avoided, develop and implement appropriate preventive and mitigation measures to minimize the risk of bycatches and help maintain sustainable migratory bird populations. Bird nesting periods normally range from mid-April to mid-August in the study area.	P-3B Avoid carrying out potentially destructive or disruptive activities during sensitive periods and in sensitive locations in order to reduce the risk of impacting birds, their nests and eggs. If activities cannot be avoided, develop and implement appropriate preventive and mitigation measures to minimize the risk of bycatches and help maintain sustainable migratory bird populations. Bird nesting periods normally range from mid-April to mid-August in the study area.	
P-4	Not applicable to deconstruction	Where feasible, permanent noise barriers will be built before the start of work.	N/A	
P-5	None	In the spring, install a fence along the construction perimeter (enclosure) and maintain it for the duration of the work. The fence will be designed for the required functions and will be removed as soon as it is no longer needed. Regular inspections will be made along the fence.	P-5 In the spring, install a fence along the construction perimeter (enclosure) and maintain it for the duration of the work. The fence will be designed for the required functions and will be removed as soon as it is no longer needed. Regular inspections will be made along the fence.	
P-6	Change	At the end of summer and before start of work, capture brown snakes found on the enclosure and relocate them in suitable habitats outside the site. Relocation should be discussed with the appropriate authorities (MDDEFP).	P-6 At the end of summer and before start of work, capture brown snakes found in the enclosure and relocate them outside the site in suitable habitats. Relocation requires a SEG permit and should be discussed with the appropriate authorities (MFFP).	"SEG" added and name of government department changed.
P-7	None	Insofar as possible, avoid work in wetlands suitable for herpetofauna (Nuns' Island Bridge and Seaway Dike) or minimize work in these environments.	P-7 Insofar as possible, avoid work in wetlands suitable for herpetofauna (Nuns' Island Bridge and Seaway Dike) or minimize work in these environments.	
P-8	None	When working in urban areas, remove loose material and other debris on a daily basis from streets used by vehicles and machinery.	P-8 When working in urban areas, remove loose material and other debris on a daily basis from streets used by vehicles and machinery.	
P-9	None	Maintain transportation vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous emissions and noise.	P-9 Maintain transportation vehicles and construction equipment in good working order to prevent leaks of oil, fuel or other pollutants and to minimize gaseous emissions and noise.	
P-10	None	Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log.	P-10 Prohibit access to the site to any mobile equipment that leaks oil. Keep a vehicle maintenance log.	
P-11	None	Ensure that catalytic converters on all vehicles are in proper working order throughout the construction period.	P-11 Ensure that catalytic converters on all vehicles are in proper working order throughout the construction period.	
P-12	None	Ensure that contractors and subcontractors are made aware of environmental concerns, including air quality.	P-12 Ensure that contractors and subcontractors are made aware of environmental concerns, including air quality.	

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
P-13	None	Isolate and preserve the organic soil layer so that it may be reused in places where the topsoil has been stripped.	P-13 Isolate and preserve the organic soil layer so that it may be reused in places where the topsoil has been stripped.	
P-14	None	Minimize encroachment of detours on private land. The private partner must come to an agreement with property owners with respect to encroachment on private land.	P-14 Minimize encroachment of detours on private land. The private partner must come to an agreement with property owners with respect to encroachment on private land.	
P-15	Change	Install the materials required to mark boat lanes and bike path detours in order to ensure safe passage of cyclists and recreational boaters.	P-15 Install the materials required to mark boat lanes and bike path detours in order to ensure safe passage of cyclists and recreational boaters. Ensure liaison with the necessary organizations, such as Vélo Québec.	Add: "Ensure liaison with the necessary organizations, such as Vélo Québec."
P-16	None	The public will be informed of the work and planned detours. Alternate routes will be proposed.	P-16 The public will be informed of the work and planned detours. Alternate routes will be proposed.	
P-17	None	At least one, preferably two, accesses to the Nuns' Island local network will be maintained at all times on the local road and highway network.	P-17 At least one, preferably two, accesses to the Nuns' Island local network will be maintained at all times on the local road and highway network.	
P-18	None	Work is prohibited during periods when the seaway is open without a memorandum of understanding between TC, SLSMC and the private partner.	P-18 Work is prohibited during periods when the seaway is open without a memorandum of understanding between TC, SLSMC and the private partner.	
P-19	Change	Set up a system to monitor atmospheric contaminants in nearby residential areas (Verdun, Sud-Ouest, Nuns' Island and Brossard) during construction work.	P-19 Set up a system to monitor atmospheric contaminants in nearby residential areas (Nuns' Island and Brossard) during construction work.	Revised to take into account the areas affected by deconstruction
P-20	None	When dewatering excavations or confined areas, pump out water and discharge it in compliance with applicable federal, provincial and municipal regulations, or call a specialized firm for pumping and final disposal.	P-20 When required, pump out water from excavations or confined areas and discharge it in compliance with applicable federal, provincial and municipal regulations, or call a specialized firm for pumping and final disposal.	
P-21	Change	Work on and in the vicinity of the Couvée Islands migratory bird sanctuary must be performed in accordance with EC requirements.	P-21 No work must be carried out in the Couvée Islands migratory bird sanctuary and nearby work must be performed in accordance with EC requirements.	The work can be done without any encroachment. A restriction must be included in the measures.
P-22	None	Signpost areas where special-status plant species are present and prohibit access during construction work.	P-22 Signpost areas where special-status plant species are present and prohibit access during construction work.	
P-23	Change	Before the start of work, transplant flora specimens that could be affected by the work to an area that will remain undisturbed.	P-23 Before the start of work, transplant specimens (rough water-horehound) that could be affected by the work to an area that will remain undisturbed. If a brown snake hibernaculum is discovered during the winter, call an MFFP wildlife conservation officer.	After discussion with the Ecomuseum Zoo.
P-24	Change	Initiate contaminant monitoring in aquatic environments during construction work (see section 9.8.2 for details).	P-24 Continuously monitor sediment dispersion in aquatic environments during jetty mobilization and demobilization	Revised in accordance with DFO requirements
P-25	Not applicable to deconstruction	Conduct archaeological surveys in areas affected by the work (see Appendix 3).	N/A	
P-26	None	Any discovery of archaeological remains must immediately be communicated to the Ministère de la Culture et des Communications du Québec. The Mohawk community of Kahnawake must also be advised of any discovery of prehistoric or Aboriginal archaeological remains. Work at the discovery site should stop until an archeologist from the Ministry has completed a qualitative and quantitative assessment.	P-26 Any discovery of archaeological remains must immediately be communicated to the Ministère de la Culture et des Communications du Québec. The Mohawk community of Kahnawake must also be advised of any discovery of prehistoric or Aboriginal archaeological remains. Work at the discovery site should stop until an archeologist from the Ministry has completed a qualitative and quantitative assessment.	
P-27	None	Use the corridor footprint as the principal access to the construction areas and, whenever possible, limit the movement of machinery to the work areas located within this corridor.	P-27 Use the corridor footprint as the principal access to the construction areas and, whenever possible, limit the movement of machinery to the work areas located within this corridor.	
P-28	None	The private partner must ensure that underground infrastructure is clearly identified in the plans and protected at the site.	P-28 The private partner must ensure that underground infrastructure is clearly identified in the plans and protected at the site.	

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
P-29	Not applicable to deconstruction	In the sensitive area of the Le Ber site, if soil is excavated to construct the infrastructure base, backfill should be mechanically stripped down to the level of the ancient soil, and then a checkerboard dig of the areas affected should be conducted. Ancient soils are found at a depth of approximately 1 m in this sector. Exploratory stripping should be carried out under archeological supervision. If soil is not excavated for the construction of the new infrastructure, a protective layer could be spread over the existing soil to seal the site.	N/A	
P-30	Not applicable to deconstruction	An archeological inventory survey will have to be conducted in the P-1 area of archeological potential. Should archeological remains be discovered, a site assessment will be made and a recommendation issued on the measures to be taken to either protect the site or conduct a dig.	N/A	
P-31	Not applicable to deconstruction	The presence of an archeologist is recommended at the work site during excavation work in areas with archeological potential (see Appendix 3).	N/A	
P-32	None	Excavated materials must be kept wet or covered with geotextile.	P-32 Excavated materials must be kept wet or covered with geotextile.	
P-33	Change	During excavation work, special attention must be paid to the presence of waste in the northern section of the Nuns' Island Bridge (Montreal) and, if necessary, such waste must be removed for disposal (e.g. old barrels) to prevent it from becoming a source of contamination.	P-33 During excavation work, special attention must be paid to the presence of hazardous or non-hazardous residual materials and, if necessary, such materials must be suitably removed for disposal to prevent them from becoming a source of contamination.	Details
P-34	Change	Groundwater must be monitored for signs of work-related contamination. Periodic sampling will be conducted both upstream and downstream from construction zones on the Island of Montreal.	P-34 Groundwater must be monitored for signs of work-related contamination.	The Island of Montreal is not included in the study area.
P-35	None	Establish a contaminated soil management plan and ensure that contaminated soil is treated or disposed of in accordance with prevailing regulations.	P-35 Establish a contaminated soil management plan and ensure that contaminated soil is treated or disposed of in accordance with prevailing regulations.	
P-36	None	Contaminated soil must be piled on a waterproof surface and should be no higher than 2.5 m. The volume of each pile must not exceed 100 m ³ and piles must be covered with a waterproof membrane.	P-36 Contaminated soil must be piled on a waterproof surface and should be no higher than 2.5 m. The volume of each pile must not exceed 100 m ³ and piles must be covered with a waterproof membrane.	
P-37	Not applicable to deconstruction	The potential presence of methane in the soil must be taken into account in the design of the project's structures (temporary and permanent). Situations likely to cause methane to accumulate in an area (including <input type="checkbox"/> beneath ground-level infrastructure) or in an enclosed space where there is also an ignition source or in a space or premises even occasionally occupied by a worker or any other person must be avoided.	N/A	
P-38	None	Conduct an inspection before the start of construction of critical work likely to cause damage and adjust the working method accordingly.	P-38 Conduct an inspection before the start of construction of critical work likely to cause damage and adjust the working method accordingly.	
P-39	Not applicable to deconstruction	Manage, relocate and, if necessary, add falcon nesting boxes depending on the areas of activity. Retain the services of a bird of prey specialist to advise the private partner and encourage coexistence between workers and this species.	N/A	
P-40	None	Archeological remains found on the site during construction must be sent to MCCCCF. The Mohawk community of Kahnawake will be informed.	P-40 Archeological remains found on the site during construction must be sent to MCCCCF. The Mohawk community of Kahnawake will be informed.	
P-41	Not applicable to deconstruction	If work is required to temporarily divert the boulevard, a protective layer could be spread over the existing soil to seal the site.	N/A	
P-42	Change	Comply with DFO standards (1998) for the use of explosives near or in aquatic environments.	P-42 Favour the use of work methods other than blasting. In the event that blasting is absolutely required at some locations, meetings must be held with DFO to discuss the aspects to be taken into account.	Change to the mitigation measure favouring other methods

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
P-43	Change	If it is not possible to comply with DFO requirements regarding explosives, authorization to destroy fish by means other than fishing must be obtained from DFO.	P-43 Favour the use of work methods other than blasting. If blasting must be done in relation to the work and it is not possible to comply with DFO requirements regarding explosives, authorization to destroy fish by means other than fishing must be obtained from DFO (at present, no information is available on the required explosives and the planned charges).	Change to mitigation measure to include the possibility of no blasting.
P-44	None	Negotiate and sign a lease with SLSMC to occupy the space required for the work.	P-44 Negotiate and sign a lease with SLSMC to occupy the space required for the work.	
P-45	Not applicable to deconstruction	Isolate water affected by work in the littoral sector of the Aqueduct Canal from raw water needed to supply the filtration plant by a method that minimizes sediment suspension from the canal bed.	N/A	
P-46	Not applicable to deconstruction	The private partner must ensure that no contamination reaches the property of the Aqueduct Canal whether via storm sewers, contaminated soil, leachate from contaminated soil, or any other form of contamination.	N/A	
P-47	Not applicable to deconstruction	If work is required near the Aqueduct Canal, it must be performed within a contained enclosure in order to prevent suspended solids from spreading into the air and water.	N/A	
P-48	Not applicable to deconstruction	No access to Aqueduct Canal banks is allowed.	N/A	
P-49	Not applicable to deconstruction	If barges are used on the Aqueduct Canal, the following measures are required: - No combustion engine may be used in the waters of the canal; - Launching ramps are prohibited. Barges must be raised by crane.	N/A	
P-50	Not applicable to deconstruction	All work on or near the Aqueduct Canal must be approved by the City of Montreal. Additional measures may be identified at a later date.	N/A	
P-51	None	Debris is to be recovered by means of a tarpaulin placed under the work area and removed as soon as possible.	P-51 Debris is to be recovered by means of a tarpaulin placed under the work area and removed as soon as possible.	
P-52	None	During redevelopment, hibernacula for herpetofauna will be created.	P-52 During redevelopment, hibernacula for herpetofauna will be created.	
P-53	None	Establish a working method that limits resuspension of contaminated sediment when working in water (e.g. excavation performed inside a cofferdam or protective curtain).	P-53 Establish a working method that limits resuspension of contaminated sediment (e.g. excavation performed inside a cofferdam or protective curtain).	
P-54	None	Immediately remove excavated sediment with contaminant levels that exceed established criteria to approved sites.	P-54 Immediately remove excavated sediment with contaminant levels that exceed established criteria to approved sites.	
P-55	None	Excavated sediment that cannot be removed must be immediately placed for temporary storage on a waterproof surface and covered for protection from the elements (e.g. sediment from uncharacterized piers).	P-55 Excavated sediment that cannot be removed must be immediately placed for temporary storage on a waterproof surface and covered for protection from the elements (e.g. sediment from uncharacterized piers).	
P-56	None	Temporary structures in watercourses must be stabilized for protection against erosion with a geotextile membrane or riprap, for instance. Furthermore, these structures must be designed to withstand any flooding (and ice loading) that may occur during construction.	P-56 Temporary structures in watercourses must be stabilized for protection against erosion with a geotextile membrane or riprap, for instance. Furthermore, these structures must be designed to withstand any flooding (and ice loading) that may occur during construction.	
P-57	None	Fires and waste burning on or near the construction site are prohibited at all times.	P-57 Fires and waste burning on or near the construction site are prohibited at all times.	
P-58	None	No isolated machinery or gas-powered equipment is to remain on a cofferdam, a jetty or in the 60-metre riparian strip along watercourses and lakes during work site off-hours. If this requirement cannot be met, adapted environmental measures must be implemented (monitoring, etc.).	P-58 No isolated machinery or gas-powered equipment is to remain on a cofferdam, a jetty or in the 60-metre riparian strip along watercourses and lakes during work site off-hours. If this requirement cannot be met, adapted environmental measures must be implemented (monitoring, etc.).	

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
P-59	None	Do not accumulate work site waste within 30 metres of watercourses, or within 60 metres if it contains or may contain contaminants.	P-59 Do not accumulate work site waste within 30 metres of watercourses, or within 60 metres if it contains or may contain contaminants.	
P-60	None	The operations site must be free of waste at all times, including empty containers of any kind unless they are stored in a sealed repository designed for this purpose.	P-60 The operations site must be free of waste at all times, including empty containers of any kind unless they are stored in a sealed repository designed for this purpose.	
P-61	Change	<p>In the event of a spill in an aquatic environment, the emergency response plan will be implemented. This plan includes:</p> <ul style="list-style-type: none"> - Prompt notification of Environment Canada (1-866-283-2333) and Environnement Québec (1-866-694-5454) early warning networks and SLSMC's emergency response and shipping management teams, as well as the Mohawk community of Kahnawake; - Notification of municipalities downstream with water intakes that could be affected by the spill; - Elimination of the source of the spill; - Implementation of environmental protection measures (absorbent berms); - Clean-up of the affected area. 	<p>P-61 In the event of a spill in an aquatic environment, the emergency response plan will be implemented. This plan includes:</p> <ul style="list-style-type: none"> - Prompt notification of Environment Canada (1-866-283-2333) and Environnement Québec (1-866-694-5454) early warning networks and SLSMC's emergency response and shipping management teams, as well as the Mohawk community of Kahnawake; • Notification of municipalities downstream with water intakes that could be affected by the spill; • Elimination of the source of the spill; • Implementation of environmental protection measures (absorbent berms); <p>Clean-up of the affected area.</p> <p>Write up an incident report that minimally includes the following information:</p> <ul style="list-style-type: none"> • Name of company responsible for the spill; • Date and time of spill; • Type and quantity of spilled product (e.g. 20 litres of hydraulic oil, 5 litres of coolant); • Equipment involved (e.g. hydraulic shovel, bulldozer, light tower [S1][R2]); • Cause of spill (e.g. line break, human error); • Location of spill (e.g. east bank of the Cascapédia river, parking area); • Extent of spill on the ground (m²); • Type of soil (e.g. topsoil, blasted rock, sand) and quantity of recovered material (m³); • Quantity of absorbents used (e.g. 20 water-repellent absorbent sheets); • Distance from nearest watercourse (m) or wetland; • Any other information considered relevant. 	Added: write up spill report and the main points to be included in the report.
P-62	None	The private partner must establish an alternate transportation system and organize parking near the work site restricting access to the local network.	P-62 The private partner must establish an alternate transportation system and organize parking near the work site restricting access to the local network.	
P-63	None	Use adequate signage and appropriate maximum speeds to reduce dust emissions on access roads and work surfaces.	P-63 Use adequate signage and appropriate maximum speeds to reduce dust emissions on access roads and work surfaces.	
P-64	None	Place tarps on trucks.	P-64 Place tarps on trucks.	
P-65	None	Avoid transporting materials through residential neighbourhoods.	P-65 Avoid transporting materials through residential neighbourhoods.	
P-66	Change	GHG emissions generated by machinery during work will be offset to make this site "carbon neutral." Annual emissions will be calculated based on the number of kilometres travelled by machinery and	P-66 GHG emissions generated by machinery during work will be offset to make this site "carbon neutral." Annual emissions will be calculated based on the number of kilometres	Addition of incentives

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
		transportation of materials and excavations. Compensation may take the form of buying carbon credits or of carrying out independent projects.	travelled by machinery and transportation of materials and excavations. Compensation may take the form of buying carbon credits or of carrying out independent projects.	
P-67	Change	Before the start of work, develop and implement spill response procedures.	P-67 Before the start of work, when required, develop and implement spill response procedures.	Clarification added
P-68	None	Use vegetable oil in machinery that will be used for long periods on or near water.	P-68 Use vegetable oil in machinery that will be used for long periods on or near water.	
P-69	Change	When contamination levels exceed criterion B of the Quebec Soil Protection and Contaminated Sites Rehabilitation Policy, all trucks leaving the work site must pass through a vehicle wheel-washing station.	P-69 When contamination levels exceed criterion B in the <i>Guide d'intervention – Protection des sols et réhabilitation des terrains</i> , all trucks leaving the work site must pass through a vehicle wheel-washing station. The areas will be determined in later stages (Site Environmental Assessment, phases II and III).	<i>Guide d'intervention – Protection des sols et réhabilitation des terrains, July 2016</i>
P-70	Change	In the event of a spill on land, the emergency response plan will be implemented. This plan includes: - Prompt notification of Environment Canada (1-866-283-2333) and Environnement Québec (1-866-694-5454) early warning networks as well as SLSMC's emergency response team; - Elimination of the source of the spill; - Implementation of environmental protection measures (absorbent material); - Clean-up of affected area. - Disposal of contaminated soil.	P-70 In the event of a spill on land, the emergency response plan will be implemented. This plan includes: • - Prompt notification of Environment Canada (1-866-283-2333) and Environnement Québec (1-866-694-5454) early warning networks as well as SLSMC's emergency response team; • Elimination of the source of the spill; • Implementation of environmental protection measures (absorbent material, rolls, booms); • Clean-up of affected area. • Disposal of contaminated soil and materials .	Include all contaminated materials, not only soil.
P-71	Change	Check for peregrine falcon nesting on the bridge before the start of work. If there are nesting birds, set up a 250-metre exclusion zone around the nest until the end of the nesting period (approximately 75 days after egg-laying).	P-71 Check the nesting of the Peregrine falcon on the bridge before starting work. If birds nest, provide an exclusion zone varying according to the nesting stage with a radius of 250 m centred on the nest until the young leave permanently. Also check the nesting of the Cliff Swallow on structures before starting work. If birds are nesting, provide a 20 m radius zone centred on the nest from the time there is a presence in the nest until the end of the young's stay at the nest. When necessary, in order to ensure adequate planning of work during the nesting period in an area marked by the presence of nests, specific prior measures such as the installation of nets may be carried out, in collaboration with experts, to prevent the start of nesting of martins in the work areas.	Accuracy of the measurement for the Falcon. Addition of a similar measure for the Cliff swallow.
P-72	None	Work with Environment Canada's Peregrine Falcon Recovery Team on an appropriate way to install nesting boxes. As early as possible before demolition of the bridge, move the existing nesting boxes and install new artificial ones for peregrine falcons under the structure of the new bridge or at a suitable nearby site in order to limit potential conflicts between bridge maintenance and repair work and falcon nesting.	P-72 Work with Environment Canada's Peregrine Falcon Recovery Team on an appropriate way to install nesting boxes. As early as possible before demolition of the bridge, move the existing nesting boxes and install new artificial ones for peregrine falcons under the structure of the new bridge or at a suitable nearby site in order to limit potential conflicts between bridge maintenance and repair work and falcon nesting.	
P-73	None	Observe the current provisions of SLSMC's land use lease.	P-73 Observe the current provisions of SLSMC's land use lease.	
P-74	Change	Keep boaters informed through notices to shipping, and once the work of removing existing bridge piers is completed, carry out a bathymetric survey of these locations.	P-74 Keep boaters informed through notices to shipping, and once the work of removing (in whole or in part) existing bridge piers is completed, carry out a bathymetric survey of these locations.	Indicate the options concerning piers.
P-75	Change	Restore the bed of the watercourse to its original condition. In exceptional cases, piles must be reduced to at least 2 metres below the low-water level; reference zero on the nautical chart (ZC).	P-75 Restore the bed of the watercourse to its original condition. In exceptional cases, piles must be reduced to at least 2 metres below the low-water level; reference zero on the nautical chart (ZC). (see Map 2, Volume 1, for the demolition level of each pile)	Adjustment for the level of pile demolition Add" or leave above the flood level"

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
P-76	Not relevant	Perform work in water in an enclosed, dry area.	N/A	Measure not relevant, given that the option of working with cofferdams is already regulated with the measures listed in the previous tables.
P-77	None	Make sure there are no migratory bird nests or habitats of at-risk species in these locations. Should this be the case, act in compliance with prevailing laws and regulations.	P-77 Make sure there are no migratory bird nests or habitats of at-risk species in these locations. Should this be the case, act in compliance with prevailing laws and regulations.	
P-78	None	When restoring abandoned sections, promote renaturalization with a suitable substrate favouring the growth of natural vegetation. Native species will be planted or seeded where natural recovery is not possible.	P-78 When restoring abandoned sections, promote renaturalization with a suitable substrate favouring the growth of natural vegetation. Native species will be planted or seeded where natural recovery is not possible.	
P-79	Change	When developing deconstruction plans and specifications, materials characterizations must be conducted to identify and quantify those areas containing asbestos, lead or any other contaminant. In the event these substances are detected, actions must be devised to deal with the situation.	P-79 When developing deconstruction plans and specifications, materials characterizations must be conducted to identify and quantify those areas containing asbestos, lead or any other contaminant. In the event such substances are found, control/elimination measures must be defined and additional air quality monitoring for these parameters will be required.	Clarifications made
P-80	None	When critical work is being performed, personnel qualified to use the emergency kits will be permanently on site.	P-80 When critical work is being performed, personnel qualified to use the emergency kits will be permanently on site.	
P-81	None	Asphalt debris must not be reused in aquatic environments.	P-81 Asphalt debris must not be reused in aquatic environments.	
P-82	Not applicable to deconstruction	The bridge operator should consider switching off architectural lighting (abutments, piers, cable stays) or other appropriate measures during the spring and autumn migration periods, especially when visibility is poor, without compromising safety standards. Adjusting the lighting of the cable-stays could reduce the number of birds colliding with the stays; to this end, flexibility should be incorporated into the design of the lighting system to better adapt it to environmental needs (aesthetics, light pollution, bird collisions, navigational aids and air traffic).	N/A	
P-83	Not applicable to deconstruction	Develop the area around the new infrastructure so as to create a suitable habitat for the brown snake.	N/A	
P-84	Not applicable to deconstruction	Consider installing permanent barriers to prevent brown snake road fatalities in areas that are most at risk.	N/A	
P-85	Not applicable to deconstruction	Develop the area around the new abutments so as to create a suitable habitat for herpetofauna.	N/A	
P-86	Change	Before the start of work, set up an air sampling station on Nuns' Island.	P-86 Before the start of work, set up an air sampling station on Nuns' Island. The details related to GHG emission trends are presented in section 6.2.1.5.	Addition of GHGs
P-87	Not applicable to deconstruction	Implement a management program for de-icing salt that minimizes use and maintains safe driving conditions.	N/A	
P-88	Not applicable to deconstruction	The bridge operator will be responsible for informing the public of obstructions and alternate routes.	N/A	
P-89	None	Observe the requirements of SLSMC's land use lease during maintenance and coordinate work with SLSMC.	P-89 Observe the requirements of SLSMC's land use lease during maintenance and coordinate work with SLSMC.	
P-90	None	Where available, use equipment fitted with a dust collection system during maintenance.	P-90 Where available, use equipment fitted with a dust collection system during maintenance.	

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE																		
P-91	None	Use tarpaulins during dust-producing work.	P-91 Use tarpaulins during dust-producing work.																			
P-92	None	Comply with dust emission standards in Montreal Bylaw 90 (<i>Règlement 90 relatif à l'assainissement de l'air</i>) for work in the City of Montreal, and with those in the government of Quebec's clean air regulations for the City of Brossard.	P-92 Comply with dust emission standards in Montreal Bylaw 90 (<i>Règlement 90 relatif à l'assainissement de l'air</i>) for work in the City of Montreal, and with those in the government of Quebec's clean air regulations for the City of Brossard.																			
P-93	Not applicable to deconstruction	Since work will be carried out in the same location, the private partner will need to plan construction on the Island of Montreal in collaboration with the operator of the Western sector containment system in the Sud-Ouest Business Park.	N/A																			
P-94	Not applicable to deconstruction	Meltwater will not be directly discharged into sensitive areas such as wetlands.	N/A																			
P-95	Change	Consider MDDEFP's guidelines for managing concrete, brick and asphalt from construction and demolition work and residue from the free stone sector (<i>Lignes directrices relatives à la gestion de béton, de brique et d'asphalte issus des travaux de construction et de démolition et des résidus du secteur de la pierre de taille</i>).	P-95 Consider MELCC's guidelines for managing concrete, brick and asphalt from construction and demolition work and residue from the free stone sector (<i>Lignes directrices relatives à la gestion de béton, de brique et d'asphalte issus des travaux de construction et de démolition et des résidus du secteur de la pierre de taille</i>).	"MDDEFP" replaced with "MELCC."																		
P-96	None	Marine equipment used to carry out the work and the personnel working aboard such equipment must comply with the provisions of the Canada Shipping Act, 2001 (2001, c. 26) and its Regulations.	P-96 Marine equipment used to carry out the work and the personnel working aboard such equipment must comply with the provisions of the <i>Canada Shipping Act, 2001</i> (2001, c. 26) and its Regulations.																			
P-97	None	Contact CCG at 1-800-463-4393 or cell phone *16 to report any marine emergency.	P-97 Contact CCG at 1-800-463-4393 or cell phone *16 to report any marine emergency.																			
P-98	None	If possible, the noisiest activities (e.g. concrete crushing, heavy truck traffic) will not be located near noise-sensitive areas.	P-98 If possible, the noisiest activities (e.g. concrete crushing, heavy truck traffic) will not be located near noise-sensitive areas.																			
P-99	Change	Barring unusual circumstances, work between 7:00 a.m. and 7:00 p.m. from Monday to Sunday shall not exceed 75 dBA, or the ambient noise level without the work plus 5 dBA, and work between 7:01 p.m. and 6:59 a.m. shall not exceed the ambient noise level without the work plus 5 dBA. Also, barring exceptional situations, very noisy work* should be done during the day to avoid disturbing residents close to the work site whenever possible.	<p>P-99 Noise levels must comply with MTQ levels (Volume II, Chapter 9, Section 9.9.1.4 and Table 9.9-1) also presented in the EEE (Table 1). For noise-sensitive areas: houses, hospitals and schools, parks, hotels, etc., the limits are:</p> <table border="1"> <thead> <tr> <th colspan="2">Day [7:00 am - 7:00 pm]</th> <th colspan="2">Evening [7:00 pm - 11:00 pm]</th> <th colspan="2">Night [11:00 pm - 7:00 am]</th> </tr> <tr> <th>L10</th> <th>Lmax</th> <th>L10</th> <th>Lmax</th> <th>L10</th> <th>Lmax</th> </tr> </thead> <tbody> <tr> <td>75 or Ambient noise +5*</td> <td>85 or 90 for impact noise**</td> <td>Ambient noise +5</td> <td>85</td> <td>Ambient noise +5 (if ambient noise <70) or Ambient noise +3 (if ambient noise >70)</td> <td>80</td> </tr> </tbody> </table> <p>* The highest of the two should be the noise level not to exceed ** Impact noise is intermittent noise that gets loud quickly</p> <p>Also, barring exceptional situations, very noisy work* should be done during the day to avoid disturbing residents close to the work site whenever possible.</p>	Day [7:00 am - 7:00 pm]		Evening [7:00 pm - 11:00 pm]		Night [11:00 pm - 7:00 am]		L10	Lmax	L10	Lmax	L10	Lmax	75 or Ambient noise +5*	85 or 90 for impact noise**	Ambient noise +5	85	Ambient noise +5 (if ambient noise <70) or Ambient noise +3 (if ambient noise >70)	80	The change allows the EEE and MTQ limits for road work to be taken into account.
Day [7:00 am - 7:00 pm]		Evening [7:00 pm - 11:00 pm]		Night [11:00 pm - 7:00 am]																		
L10	Lmax	L10	Lmax	L10	Lmax																	
75 or Ambient noise +5*	85 or 90 for impact noise**	Ambient noise +5	85	Ambient noise +5 (if ambient noise <70) or Ambient noise +3 (if ambient noise >70)	80																	
P-100	None	Activities that create dust will be located so as to minimize the effect on the public.	P-100 Temporary project structures must not modify the ice regime in such a way as to cause flooding.																			
P-101	Change	Transport Canada and the private partner will work together to develop a transportation management plan in order to maintain a smooth traffic flow on the project's adjacent road network.	P-101 JCCBI and the private partner will work together to develop a transportation management plan in order to maintain a smooth traffic flow on the project's adjacent road network.	Replace "Transport Canada" with "JCCBI."																		
P-102	Change	Transport Canada and the private partner will work together to prepare a transportation management plan for trucking during the construction phase and around the project site.	P-102 JCCBI and the private partner will work together to prepare a transportation management plan for trucking during the deconstruction phase and around the project site.	Replace "construction" with "deconstruction" and "Transport Canada" with "JCCBI."																		
P-103	Not applicable to deconstruction	Keep the bus-only lane operational during the project.	N/A																			

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
P-104	None	Make sure that the pollution abatement systems on vehicles and equipment are operational and meet the regulatory requirements for air quality.	P-104 Make sure that the pollution abatement systems on vehicles and equipment are operational and meet the regulatory requirements for air quality.	
P-105	None	Where possible, restore demobilized areas to their natural state using native species and a natural slope. Where it is not possible to restore an area to its natural state, the demobilized area must be restored to a state equivalent to its state before the work began.	P-105 Where possible, restore demobilized areas to their natural state using native species and a natural slope. Where it is not possible to restore an area to its natural state, the demobilized area must be restored to a state equivalent to its state before the work began.	
P-106	None	Minimize the footprint occupied by the work.	P-106 Minimize the footprint occupied by the work.	
P-107	None	Replant native tree species within the footprint, consistent with safety requirements.	P-107 Replant native tree species within the footprint, consistent with safety requirements.	
P-108	Change	Special attention will be paid to protecting common tern breeding sites (small rocky islets near Nuns' Island) by establishing a buffer exclusion zone.	P-108 Special care will be given to protecting Common Tern breeding sites (small rocky islets near Nuns' Island, under the new bridge and further downstream) by establishing a buffer exclusion zone.	Clarification on location
P-109	None	Install geotextile at the base of fences at the time of installation.	P-109 Install geotextile at the base of fences at the time of installation.	
P-110	None	Temporary project structures must not modify the ice regime in such a way as to cause flooding.	P-110 Temporary project structures must not modify the ice regime in such a way as to cause flooding.	
P-111	None	Site lighting will be aimed at the work areas and avoid intrusive light outside the work site.	P-111 Site lighting will be aimed at the work areas and avoid intrusive light outside the work site.	
P-112	Not applicable to deconstruction	Implement retention and treatment measures respecting City of Montreal bylaw C-1.1 and the MDDEFP rainwater management guide.	N/A	
P-113	Not applicable to deconstruction	Area C of the prehistoric archaeological Site BiFj-49 where Aboriginal remains were found should be fenced outside the work areas.	N/A	
P-114	New measure		P-114 If materials such as asbestos and lead-based paint are found, remove the materials in accordance with industry standards, as defined in the specifications drawn up for the project. All friable or deteriorated asbestos-containing materials must be removed before proceeding with deconstruction work. Any lead-based paint that is peeling and flaking must be removed before deconstruction work. Properly bonded paint may be left on bridge materials to be removed, provided that proper handling and transport methods are used to minimize dust emissions and that said materials are disposed of in accordance with provincial regulatory requirements.	
P-115	New measure		P-115 <ul style="list-style-type: none"> • Use watering equipment during deconstruction activities to minimize dust generation • Control mud and dirt carried away or transported outside the enclosures • Minimize material loss at the transfer point • If necessary, use foam or water-based suppression systems. • Securing loads on transport trucks • Minimize handling operations to ensure that the number of times materials are unloaded and taken over is minimized • Use windscreens • Reduce some activities in windy weather • For concrete crushing operations, crushers should be located as far as possible from sensitive residential areas 	

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
			<ul style="list-style-type: none"> • Apply a dust suppressant (water or dust suppressant approved by the Bureau de normalisation du Québec) to the engraved tracks when the quantities of dust likely to be raised by vehicles exceed 40 mg/m³ • Dust covers should be spread near weighing stations and on detour roads used to transport materials • All piles of material should be covered with geotextiles if they are to remain in place for more than 48 hours • Carry out material handling (deposition and handling) in the piles downstream (depending on wind direction) of sensitive areas 	
P-116	New measure		<p>P-116</p> <ul style="list-style-type: none"> • Stacking for storage purposes should be carried out downwind • Use coverings for the storage piles • Use fences/windcreens for the storage piles (vegetation can also act as windscreen) • Properly form storage piles • Burning debris on or near mobilization areas is prohibited at all times 	
P-117	New measure		<p>P-117</p> <ul style="list-style-type: none"> • Establish restrictions regarding vehicles at the site. Use appropriate signage and speed limits to minimize dust lifting in mobilization areas or unpaved access. • Consider using a dust/dirt control mechanism (gravel platform, Grizzly, system for washing wheels or asphalted roads) that would be located at the intersection of a non-paved road and an asphalted road and that controls or prevents the transport of dust/dirt off-site by vehicles. • Ensure the improvement of unpaved road surfaces • Ensure the adequate maintenance of unpaved roads • Plan truck routes to avoid residential areas • Deconstruction activities that generate dust must be planned in such a way that it does not affect road users and the general public • Plan the work according to the weather conditions (rain to limit dust emissions, calm wind) 	
P-118	New measure		<p>P-118</p> <ul style="list-style-type: none"> • Minimize debris fall height • Use barriers to prevent dispersion • Avoid blasting work as much as possible • Vacuum up the debris daily • Draw up work practices for loading debris • Avoid prolonged debris storage 	
P-119	New measure		<p>P-119 During dust-generating activities, such as sawing concrete, breaking concrete and moving and loading materials, implement the use of misting water sprays sufficient to airborne dust from demolition work. In addition, in areas where demolition is being performed located in close proximity to residential areas (in particular the on-land bridge ramps), avoid dust-generating demolition work on high wind days. For demolition activities performed in close proximity to residential areas, water spraying must be carried out prior to and during demolition.</p>	
P-120	New measure		<p>P-120</p> <ul style="list-style-type: none"> • Maintain transport vehicles and construction equipment in good working order to prevent oil, fuel or other pollutant leaks and minimize gaseous emissions and noise. Ensure that the pollution control systems on vehicles are operational and meet the regulatory requirements for air quality 	

Table 82 Specific mitigation measures

NO.	TYPE OF CHANGE	ORIGINAL MEASURE	UPDATED MEASURE	NOTE
			<ul style="list-style-type: none"> • Ensure efficient use of catalytic convertors on equipment during construction • Engine idling shall be minimized (< 3 consecutive minutes unnecessary idling in a 60-minute period) • Truck-staging areas and internal combustion equipment shall be kept away from fresh air intakes, windows, etc., as much as practical • Prohibit access to the work site for any mobile equipment that leaks oil. Maintain vehicle maintenance records 	
P-121	Nouvelle mesure		<p>P-121 In order to limit the effects on traffic, the contractor shall apply the following measures:</p> <ul style="list-style-type: none"> • Bridge deconstruction materials (excluding piers): transport between 10 a.m. and 3 p.m. or between 7 p.m. and 11 p.m. to avoid peak and night periods; • Carry out transport only on working days (Monday to Friday) and avoid public holidays • Limit the duration of closures of boulevard René-Lévesque passing under the original Champlain Bridge when the bridge is deconstructed and carry out these closures only at night or on weekends. During these closures, limit the transport of materials from the bridge deconstruction; • Limit the duration of closures of Route 132 under the original Champlain Bridge when the bridge is deconstructed and only close at night or on weekends. During these closures, limit the transport of materials from the bridge deconstruction; • Use flagmen to manage truck entry and exit from work areas; • Lower the speed around the work area; • Use the lower impact roads identified in Figure 55 (blue path), Figure 56 (yellow path), Figure 57 (red path) and Figure 58 (yellow path), except in exceptional cases. 	

6.4 SUMMARY OF LOSSES AND THE COMPENSATION PROJECT

6.4.1 SUMMARY OF FISH HABITAT AND WETLAND LOSSES

Several deconstruction scenarios are currently under study with respect to both deconstruction methods and access to piers in shallow water. Only the access scenario with the greatest encroachment on fish habitat was considered for purposes of determining encroachment. This is the scenario that involves creating three jetties: one on the Nuns' Island side, one at the Seaway dike, and one on the Brossard side (Carte 12). The jetties will be in place for the duration of the works, i.e. for about three years. Elevation of the work surface of the jetties have an elevation fixed at 13 m for the calculation of encroachment areas, which corresponds to the water level of a 100-year flood.

6.4.1.1 Fish habitat

Based on the worst-case scenario, installing the jetties will significantly harm fish over a total area of 58,622 m² for the duration of the deconstruction work, i.e. for about three years. The maximum encroachment area is increased by 10% to ensure that the contractor that is selected will have a sufficiently large work area. The total fish habitat encroachment area, including the increase of 10%, is 64,486 m², corresponding to about 6,5 ha. The data shown in Table 83 are increased encroachment areas, whereas Map 12 presents the surface areas prior to the 10% increase.

Table 83 – Summary of encroachments by habitat type

TYPE OF HABITAT	SUMMARY OF ENCROACHMENTS					
	NUNS' ISLAND JETTY		BROSSARD JETTY		DIKE JETTY	
	2012 HABITAT (M ²)	2018 HABITAT (M ²)	2012 HABITAT (M ²)	2018 HABITAT (M ²)	2012 HABITAT (M ²)	2018 HABITAT (M ²)
Slow water						
2	89	2,690	--	--	--	--
3	--	14,823	--	--	--	--
4	--	--	902	964	--	--
5	--	--	--	1,194	--	--
8	--	--	--	8,236	--	--
9	--	--	18,579	9,579	--	--
Slow water subtotal	89	17,513	19,481	19,973	0	0
Fast water						
12	--	--	--	--	13,855	11,354
13	9,931	--	--	--	--	1,989
13a	--	1,874	--	--	--	--
16	--	--	--	--	5,743	4,335
17	4,949	4,491	--	--	--	--
20	--	--	--	--	--	2,957
22	7,516	--	--	--	--	--
Fast water subtotal	22,396	6,365	0	0	19,598	20,635
Undetermined	1,393	--	491	--	1,037	--
TOTAL	23,878 23,878		19,973 19,973		20,635 20,635	

In bold: Sensitive habitat

The calculation assumptions are based on the scenario with the greatest encroachment and on the following elements:

- Total encroachment corresponds to the aggregate of the surface areas affected by the creation of the jetties (Nuns' Island, dike and Brossard) for each type of habitat;
- Although the habitats characterized in 2012 are listed in Table 83, only the 2018 habitats (current status of the site) will be considered for purposes of determining losses;
- No temporary encroachment associated with installing cofferdams or other temporary measures has been considered;
- No gain in surface area associated with the complete removal of the Existing Bridge piers was determined;
- No permanent encroachment will result from the deconstruction of the Existing Champlain Bridge.

Habitat sensitivity may vary depending on the area and the species of fish inventoried in a specific system (e.g. presence of walleye or lake sturgeon). The following habitats are generally considered sensitive or not sensitive by DFO:

- Sensitive: 1, 2, 3, 4, 6, 8, 12, 13, 13a, 14, 16, 18, 21 and 22;
- Not sensitive: 5, 7, 9, 10, 11, 15, 17, 19, 20, 23 and 24.

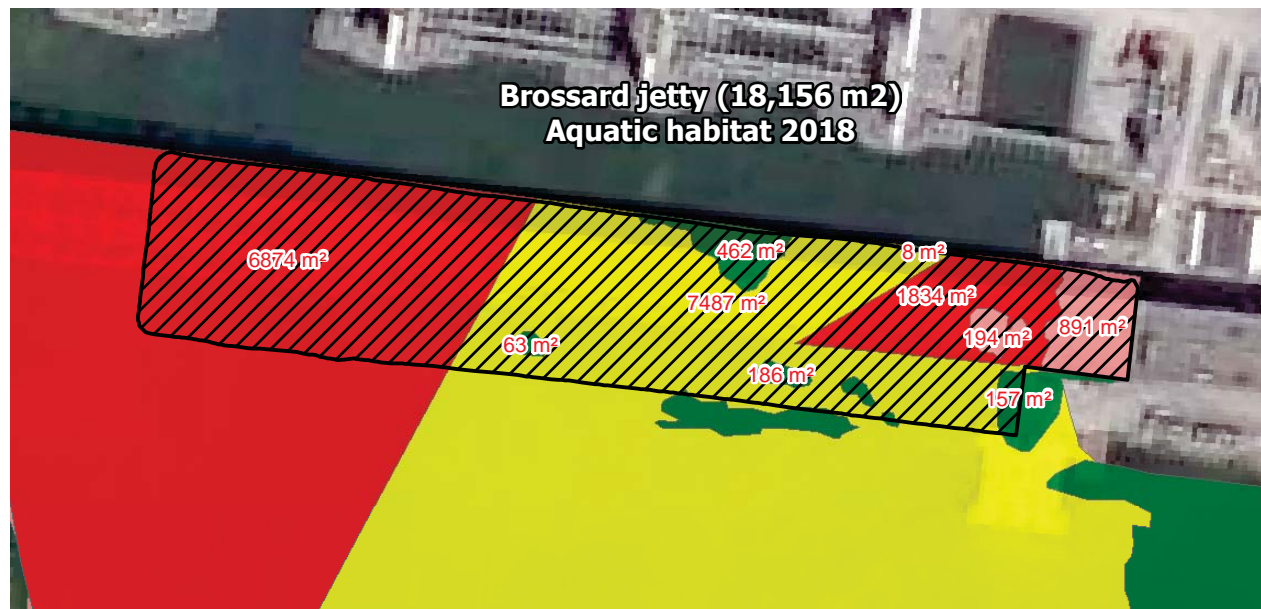
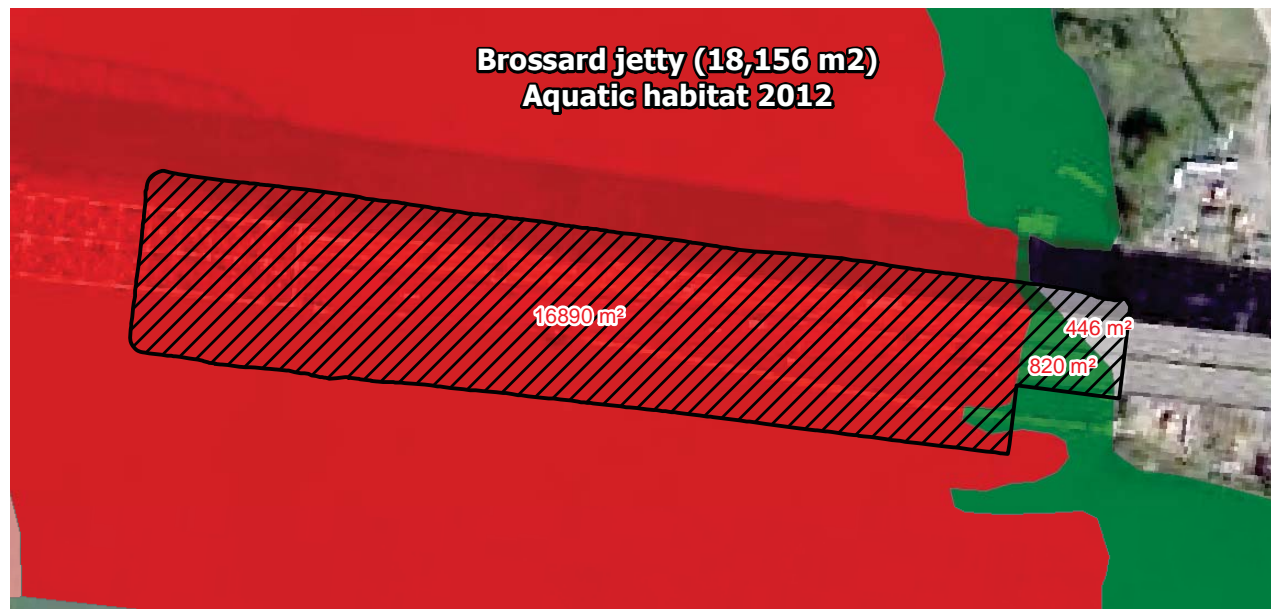
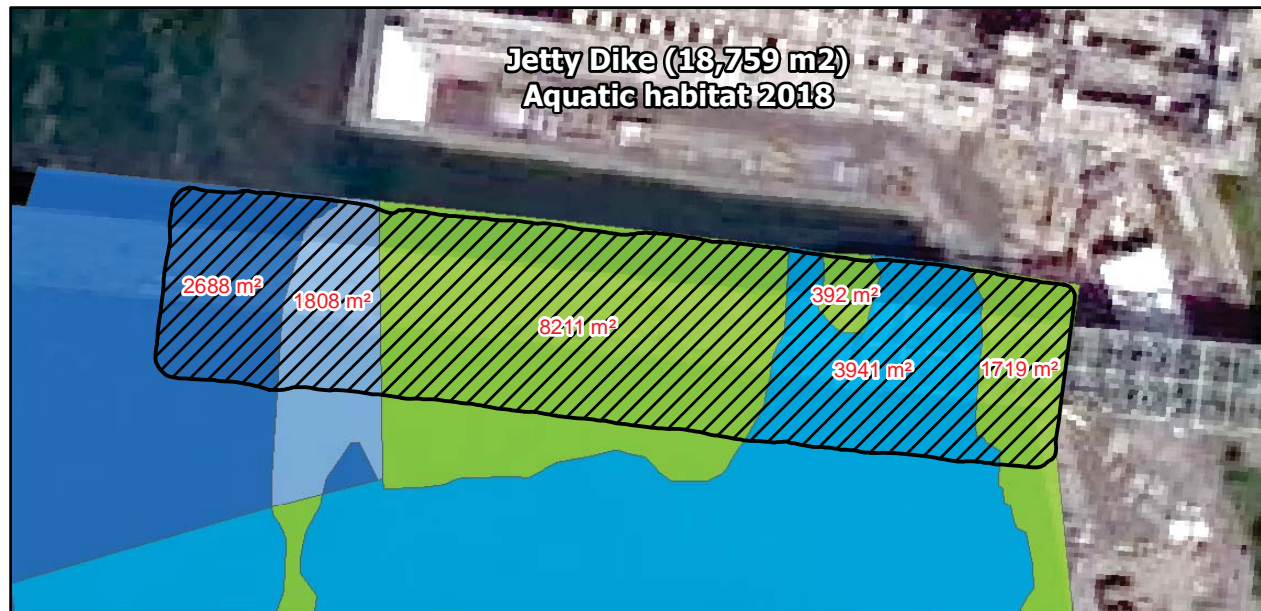
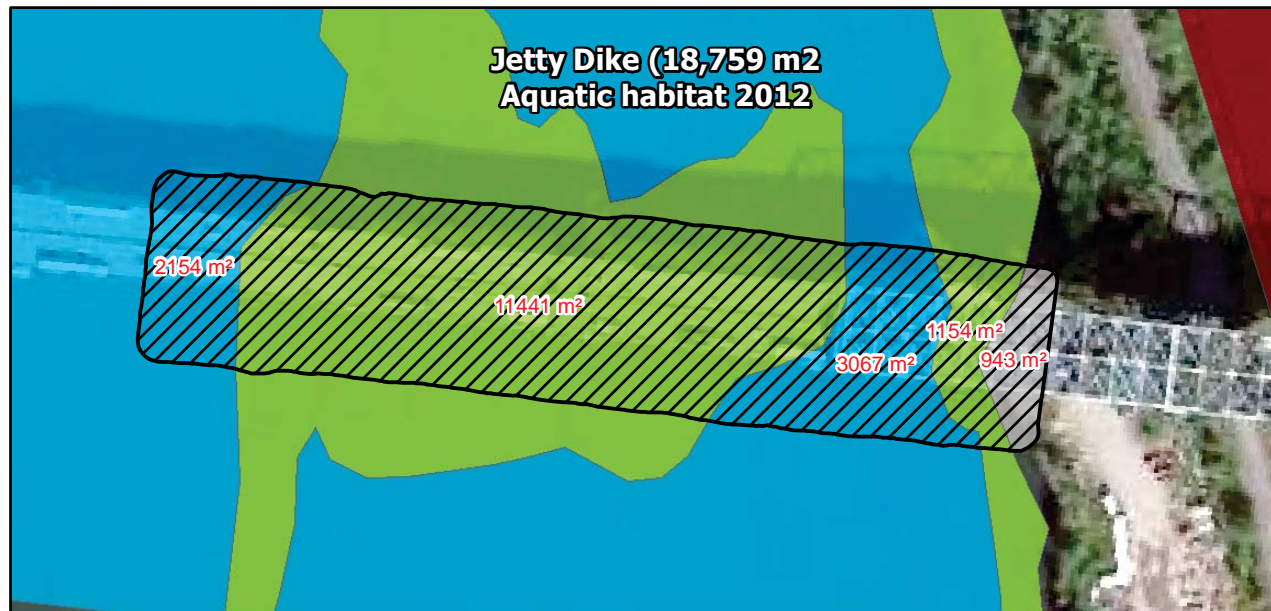
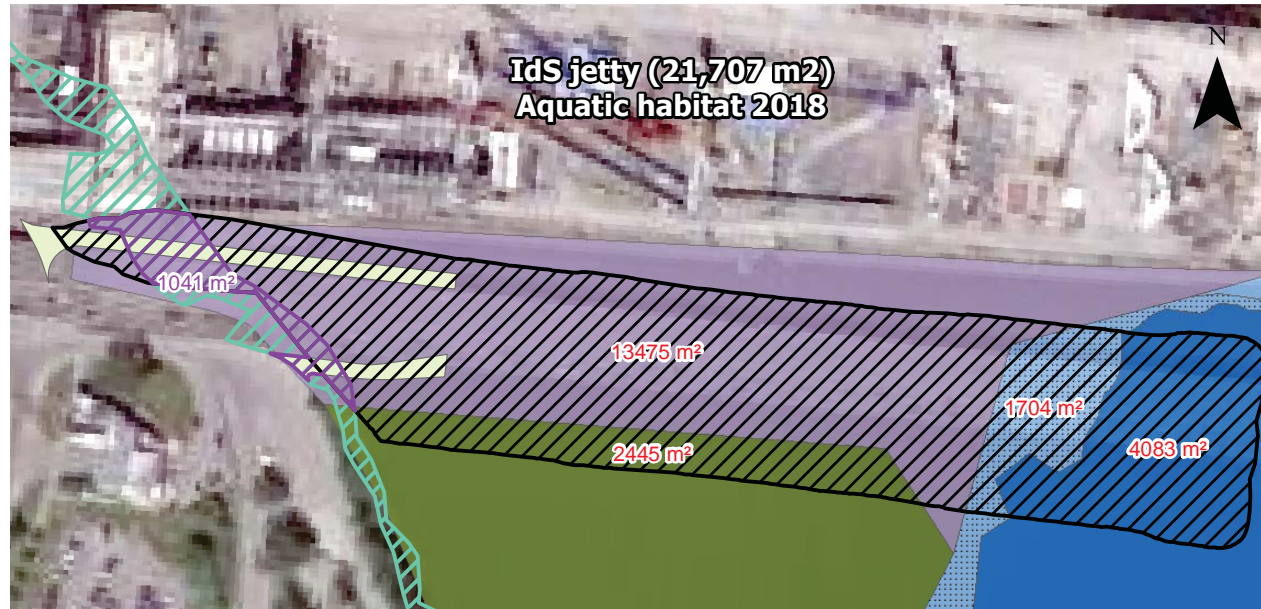
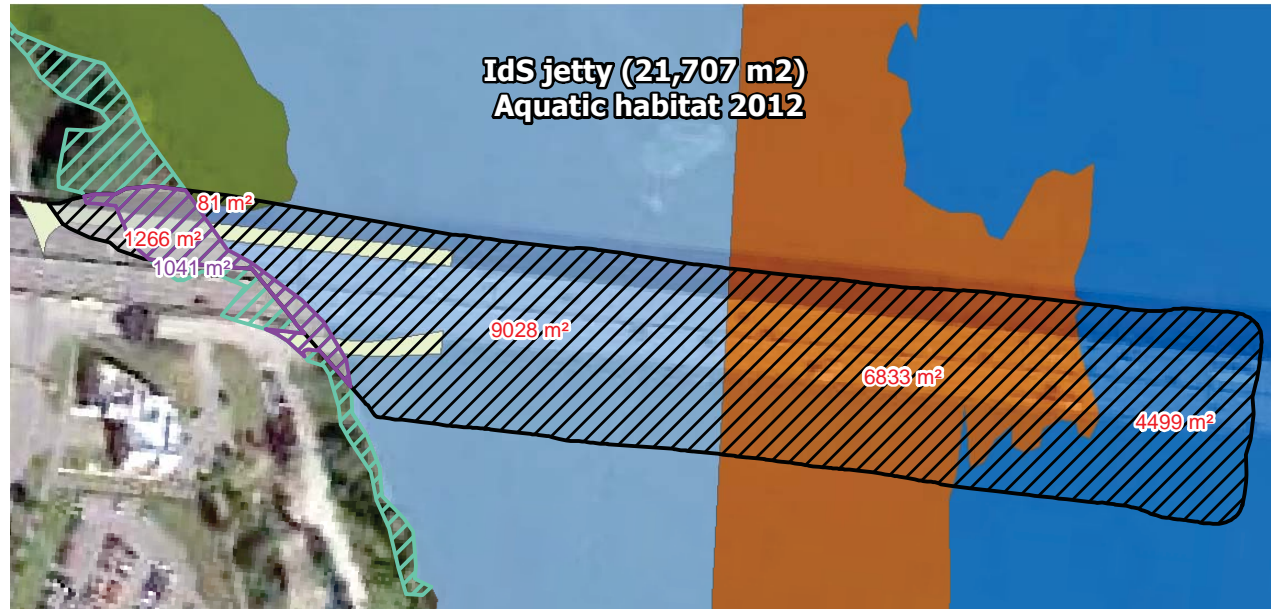
Habitats considered sensitive are those that contain aquatic vegetation (2, 4, 6, 8, 12, 14, 16 and 18), a habitat suitable for the spawning of lithophilous species (3, 13, 13a, 21 and 22) or an habitat corresponding to a floodplain habitat (1).

The jetty on the Nuns' Island side will mainly encroach on slow-water habitats, i.e. 17,513 m² entirely in sensitive habitats (types 2 and 3) and 6,365 m² in fast-water habitats. Encroachment in fast water will be in type 13a (sensitive) and 17 (non-sensitive) habitats.

The jetty on the dike side will fully encroach on fast-water habitats, including 17,678 m² in type 12, 13 and 16 sensitive habitats.

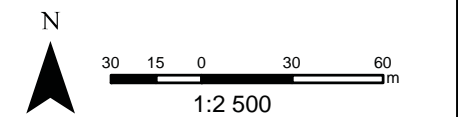
The jetty on the Brossard side will entirely encroach on slow-water habitats, including 9,200 m² in type 4 and 8 sensitive habitats.

It is important to recall that this assessment is exclusively based on the proposed deconstruction scenario (with jetties). The selected contractor may present different scenarios (e.g. deconstruction strategy, work method, access) than those being proposed. The encroachments presented here thus serve as a benchmark for the contractor, meaning he could use work methods with less encroachment, but not more than what is presented in the loss assessment.



Type of aquatic habitat	0 - 2 m	2 - 5 m	5 - 15 m	15 - 30 m	30 - 60 m	60 - 90 m	90 - 120 m	120 - 150 m	150 - 180 m	180 - 210 m	210 - 240 m	240 - 270 m	270 - 300 m	300 - 330 m	330 - 360 m	360 - 390 m	390 - 420 m	420 - 450 m	450 - 480 m	480 - 510 m	510 - 540 m	540 - 570 m	570 - 600 m	
Floodplain																								
Lentic																								
Laminar lotic																								
Lotic in fast water																								

- Proposed jetty
- Emergent nearshore marsh
- Marsh encroachment
- Projected IDS access ramps
- Non-characterized habitat



DECONSTRUCTION OF ORIGINAL
CHAMPLAIN BRIDGE (2017-2022)
CONTRACT No. 62555
MONTREAL, QUEBEC

**Encroachment of proposed
jetties in the 2012 and 2018
aquatic habitat
100-year flood**

march 2019
Coordinate system: NAD83 MTM 8
Base map: Google

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6.4.1.2 Wetlands

The study area is characterized by the presence of grass beds near the shore and riparian wetlands. The eastern shore of Nuns' island consists of a few emergent riparian marshes that are below the natural high water mark of the St. Lawrence River (Stantec, 2015). The plant composition of the marsh located in the immediate area of the Nuns' Island jetty and the accesses to it is presented in Table 84.

The jetty and access ramps to the Nuns' Island jetty will encroach on 1,041 m² of the wetland, which already appears to be impacted by the presence of the SSL jetty. Since the above wetland was not delineated during the field surveys in summer 2018, the wetland is considered to still be completely present and 2013 EA data are used.

Table 84 – Vegetation composition of wetlands impacted by the Nuns' Island jetty

STRATUM	DOMINANT PLANT SPECIES		SPECIES COVERAGE (%)	STATUS*
	COMMON NAME	LATIN NAME		
Shrub 15%	Eastern cottonwood	Populus deltoïde	1-2	FACW
	Riverbank grape	Vitis riparia	2-5	FACW
	Thicket creeper	Parthenocissus inserta	2-5	
Herbaceous 60%	Devil's beggarticks	Bidens frondosa	1-2	FACW
	Flowering rush	Butomus umbellatus	1-2	OBL
	Hedge false bindweed	Calystegia sepium subsp. americana	1-2	
	Black medick	Medicago Lupulina	1-2	
	Field mustard	Brassica sp.	2	
	Reed canary grass	Phalaris arundinacea	2-5	FACW
	Grass-leaved water-plantain	Alisma gramineum	2	OBL
	Cinquefoil	Potentilla sp.	1-2	Some FACW
	Common water 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-girdled woolsedge	Scirpus atrocinctus	1-2	FACW
	Narrow-leaved cattail	Typha angustifolia	2-5	OBL
Devil's beggarticks	Bidens frondosa	1-2	FACW	

*Status:

OBL: Obligate Wetland Plant for southern Quebec

FACW: Facultative Wetland Plant for southern Quebec

Source: Stantec, 2015.

This wetland area includes two emerging riverside marshes: vegetation units 36 and 35 (Dessau-Cima+, 2013) and is located at the end of a larger riverside complex in a completely anthropic zone.

Vegetation unit 35 is dominated by the common water reed (*Phragmites australis*), an invasive exotic species, and vegetation unit 36 is dominated by the broad-leaved cattail (*Typha angustifolia*).

The vegetation units form an aquatic plant strip at the base of a fill in an area of the river that is relatively shallow (between 0 and 2 m), hydrologically permanent, and with no retention capacity. It is an area of calm water with no water level variation during the greatest part of the year.

The productivity of both dominant plants in this marsh is very significant, which makes these marshes nutrient filtration and carbon sequestration zones.

The colonies formed by the common water reed and broad-leaved cattail are dense, making them habitats sought by ichthyofauna for reproduction, rest, or hiding from predators, but the aggressiveness of the common water reed harms local flora biodiversity.

The riverside functions of the marshes impacted by the work are shown in Table 85.

Table 85 – riverside functions of the marshes impacted by the work

FUNCTIONAL CATEGORY	FUNCTION	PRIMARY VALUES	VEGETATION UNIT			
			35 (COMMON WATER REED)		36 (BROAD-LEAVED CATTAIL)	
			Fonction present? (Yes or No)	Fonction affected by the work? (Yes or No)	Fonction present? (Yes or No)	Fonction affected by the work? (Yes or No)
Hydrologic	Flow regulation	Energy dissipation via reduced current velocity & eliminating suspended sediment	Yes	Yes	Yes	Yes
Biochemical cycle	Nutrient conversion	Natural water quality improvement	Yes	Yes	Yes	Yes
		Reduction of excess nutrients	Yes	Yes	Yes	Yes
	Biomass production	Sequestration of atmospheric carbon	Yes	Yes	Yes	Yes
Habitat	Productivity	Feeds and supports biodiversity	No	-	Yes	Yes
	Fauna support	Helps maintain certain animal populations (shelter, egg-laying, etc.)	Yes	Yes	Yes	Yes
	Biological diversity	Biodiversity (genetic resource)	No	-	Yes	Yes
Climatic	Carbon fixation & CO ₂ balance	Maintain existing climatic conditions for benefit of human activities & society	Yes	Yes	Yes	Yes
	Increased rainfall & humidity affecting microclimate	Maintain existing climatic conditions for benefit of human activities & society	Yes	Yes	Yes	Yes

6.4.2 FISH HABITAT AND WETLANDS COMPENSATION PLANS

JCCBI is committed to compensating serious damage to fish caused by the presence of temporary jetties for approximately three years.

The approach to seeking compensation plans focuses on two types of improvements. First, calm water improvements that will include part of the wetlands to compensate for both wetland and riverside losses and fish calm water habitat losses. Such improvements could then be used by fish as well as avifauna and herpetofauna. Second, running water improvements to compensate for fish habitat of this kind affected by the work will be realized.

The search began with a review of the literature and contacts with some 40 organizations (dedicated to fauna, protection, municipalities, departments, etc.). The search focus area was initially the Existing Champlain Bridge region, but very few projects with productivity problems were identified in this sector. The search area was therefore expanded and extended from Lac Saint-François, upstream, to Lac Saint-Pierre, downstream.

Several improvement concepts were analyzed and discussed with the DFO and other stakeholders, and the following plans exhibit characteristics that are in line with project needs.

6.4.2.1 Partial deconstruction of the estacade wharf

As an initial plan, JCCBI proposes to partially deconstruct the estacade wharf (belonging to JCCBI) (Figure 65). This is a net habitat gain by removing fill in the immediate sector of the Existing Champlain Bridge (Greater La Prairie Basin sector), and is therefore an excellent compensation plan. Depending on the flow conditions that will exist once the wharf is deconstructed, this plan would re-establish habitats in flowing water (> 0.3 m/s). Hydraulic simulations are in progress and the results will be included in the final version of EA. The area affected by this improvement is approximately one hectare, but the work cannot be completed until deconstruction of the Existing Champlain Bridge is completed since this sector is part of the mobilization areas that can be used by the contractor.

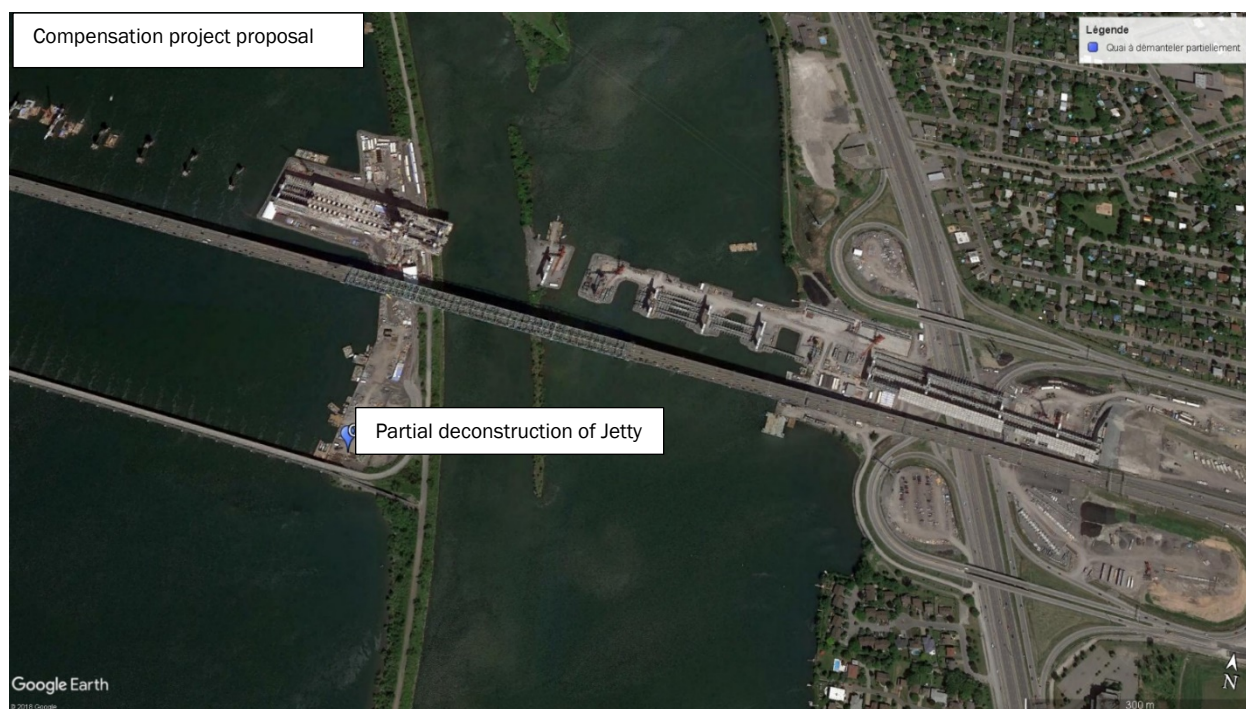


Figure 65 – Location of the Champlain bridge estacade wharf

6.4.2.2 Flood plain improvement plans

Several plans were identified for improving the flood plains in various sectors of the extended study area. These plans introduce an interesting compensation alternative. Simple improvements' could be carried out in sectors with flooding of significant breadth and duration (but by avoiding creation of fish channels that tend to fill in over the years).

6.4.2.3 Development of an aquatic-grass bed in farmland

One of the stakeholders contacted proposed a plan to create an aquatic-grass bed in former farmland. The plan involved converting agricultural land in a flood plain into an aquatic-grass bed that would serve, among other things, as yellow perch breeding area. According to the stakeholder, this plan would be developed in phases and it would be possible to develop five hectares in one of the project phases. This development targets a well-documented problem and a species (yellow perch) in decline. However, although this plan is located in the same watershed, it presents challenges of distance from the deconstruction site.

6.4.2.4 Redevelopment of a basin along the St. Lawrence River

A well-documented problem with regard to the free passage of fish between a basin and the St. Lawrence River in minimum flow season, and fish deaths when there is no connection between basin and river was raised by one of the contacted stakeholders. It involves a potentially high value project given the proximity to the deconstruction site, but there are some challenges associated with this project.

6.4.3 CLIFF SWALLOW

Although the Cliff Swallow does not have an endangered or at risk status, the group of insectivorous birds which this species is part of has been experiencing a significant decline for several decades. The reasons for this decline in populations have not yet been determined, and several species of Cliff Swallow have been given or are about to receive species at risk status. However, like most of Canada's migratory birds, Cliff Swallows are protected by the federal government under the *Migratory Birds Convention Act, 1994*.

JCCBI is developing an ecosystem-based management plan for the Cliff Swallow population on the project area infrastructure in order to determine the mitigation and compensation measures to be implemented in the deconstruction plan for the Existing Champlain Bridge and the Nuns' Island bypass bridge. The management plan will take into account the relocation potential of the population found on the Existing Champlain Bridge toward other nearby infrastructures in order to develop mitigation and compensation measures. As part of this management plan, JCCBI is currently conducting a study that will enable a compensation scenario to be drawn up in the summer of 2019.

6.5 CUMULATIVE EFFECTS

Cumulative effects are the effects on the environment that result from the combination of a project's direct or indirect impacts with those of other previous, current, planned, or eventually foreseeable projects.

Assessing cumulative effects requires accounting for certain concepts that differ from ‘direct’ impact assessment notions. For example, cumulative effects are assessed over a larger (regional) territory, for a longer time, past and future, taking into account interactions with other past, present or future actions, not only those caused solely by the action studied by the TEA. In addition to these differences, cumulative effect assessments are fundamentally similar to ‘direct’ environmental impact assessments, and often rely on established environmental impact assessment practices.

The objectives of cumulative effect analyses are:

- To determine whether the impact caused by the project under study accumulates progressively with the impacts of other past, present or future actions;
- To determine whether the project’s impact combined with other impacts is liable to cause significant current or future changes to valued ecosystem components following application of project mitigation measures.

The procedure employed is adapted to the one shown in the Cumulative Effects Assessment Practitioners' Guide published by the Canadian Environmental Assessment Agency (Hegmann *et al.*, 1999). The steps are:

1. Determine the regional challenges:
 - Identify valued environmental components (VEC) and their reference status;
 - Define the spatial and temporal extent;
 - Identify past, present and future projects.
2. Analyze cumulative effects:
 - Identify the interrelationships between this project, other projects and VECs;
 - Identify mitigation, monitoring and follow-up measures;
 - Evaluate the significance of the cumulative residual impacts.

6.5.1 DEFINE REGIONAL CHALLENGES

The Existing Champlain Bridge corridor has been the subject of numerous studies over the years. The current environment is well documented as indicated in Chapter 3 (volume 1) that describes the receiving environment. Public consultations held in 2013 as part of the 2013 EA allowed the public to raise their concerns with regard to construction of the New Champlain Bridge, and their comments contributed to identifying some regional challenges likely to be affected cumulatively by the project (Table 86). Public consultations to be held by JCCBI in spring of 2019 will verify whether these concerns apply to the deconstruction project and whether new ones need to be taken into account. Each challenge has a distinct spatial extent. The past temporal limit was set at 2008; the upper limit is 2030 except for traffic, which is limited to 2026 – the time horizon for the MTQ’s most recent transport plan.

Table 86 – Identification of regional challenges

CHALLENGE	VEC	INDICATOR	EXTENT
Water	Water quality Sediment Navigation	Suspended solids, metals, hydrocarbons, PAHs	St. Lawrence River from La Prairie to Boucherville Islands
			2008-2030
Quality of life	Traffic	Network congestion	Regional & local highway networks (Montreal and Montérégie)
			2008-2026
	Noise environment	Noise level	Local study area
			2008-2030
	Air quality	Suspended solids	Local study area
			2008-2030
Special status species	Habitat: <ul style="list-style-type: none"> • Migratory birds • Status species • Herpetofauna 	Loss of habitat (Brown snake, Peregrine falcon)	Species habitat
			2008-2030
Ichthyofauna	Fish habitat	Encroachment (serious damage to fish habitat)	St. Lawrence River from La Prairie Basin to Boucherville Islands
			2008-2030

6.5.1.1 Water

St. Lawrence River water quality has been monitored since the 1980s (Groupe-conseil Roche, 1982). The St. Lawrence River supplies several municipalities downstream from the project with water and much effort has been made over the years to improve the quality of this water. Deconstruction activities could affect areas where sediment presents some contamination and consequently result in mobilization of chemical contaminants in the river water. Furthermore, all work in and near the river can result in an increase in suspended solids.

6.5.1.2 Quality of life

Road congestion and its impact on the noise environment and air quality are aspects of concern to residents living nearby and regional roadway network users. A number of regional roadway structures require repairs since they are reaching their end of useful life, and will result in a rise in inconveniences. On the other hand, new infrastructure is now completed and in operation (A-50, A-30, A-25 and, shortly, the New Champlain Bridge). The project could generate nuisances during the deconstruction period (transport of materials for the jetties and bridge structures to be deconstructed).

6.5.1.3 Special status species

The study area contains habitat for a few special status species. The Brown snake and Peregrine falcon were selected as challenges for cumulative impact analysis. The Brown snake – a species that is threatened or vulnerable at the provincial level – is the rarest of the Quebec snakes, being found only in the Montreal region. The Peregrine falcon – a species designated as vulnerable by Quebec and of concern with regard to the *Endangered species act*, - can use anthropic structures, including the Existing Champlain Bridge and in a near future, the New Bridge, for nesting.

6.5.1.4 Ichthyofauna

The river is habitat to numerous ichthyofaunal species of interest or status. The existing habitats support several species at different stages of their life cycle (spawning, feeding, growth). The river is also used as a migration corridor by a number of species. The project will result in temporary losses of fish habitat due to the presence of jetties.

6.5.2 PAST, PRESENT AND FUTURE PROJECTS

Table 87 shows past, present and future projects reported in proximity to the study area that have an interrelationship with the issues under study. Only major projects were identified. Generally speaking, these mainly include highway projects and commercial and residential projects. The projects to be considered will be validated during the spring 2019 consultations, and the analysis will be revised in light of this information.

6.5.3 CUMULATIVE IMPACT ANALYSIS

The impacts of past, present and future projects were evaluated by considering the residual effects of the Existing Champlain Bridge deconstruction project to identify the cumulative impacts. Table 88 describes the cumulative impacts and specific proposed mitigation measures.

The cumulative impact analysis indicates that no significant cumulative impact is anticipated once the mitigation measures associated with the project are in place.

Tableau 87 - Identification of past, present and future projects

PROJET (PROMOTER) – YEAR	PAST	PRESENT	FUTURE	PROJECT IMPACTS ON VALUED ENVIRONMENTAL COMPONENTS			
				WATER QUALITY / SEDIMENT	SPECIAL STATUS SPECIES HABITAT	QUALITY OF LIFE INFRASTRUCTURE / NOISE ENVIRONMENT / AIR QUALITY	ICHTHYFAUNA
Atwater Plant Modernization (MTL) – 2008-2013	X			-	-	Increased circulation during construction (local system)	-
Pointe-Saint-Charles (GC) Industrial Park contaminant containment - Ongoing	X	X	X	-	-	Increased circulation during construction (local system)	-
Bonaventure Highway reconfiguration, misc. repairs, and major works, Phases I, II and III (PJCCI) – 2017-2030		X	X	-	-	Highway congestion due to detours and partial closings (regional network)	-
Work on Champlain Bridge ice boom – permanent reinforcement of pier 18, support apparatus, beams on bays 48-49 – (PJCCI) - 2017—2020 and ice boom repairs – 2022-2030	X	X	X	Increased SPMs in surface water	-	-	Increased SPMs capable of affecting fish and their habitat
Outfall work – Saint Lambert locks (CGVMSL) – 2008-2013	X			Surface water contaminant mobilization Increased SPMs in surface water	-	-	Contaminants in surface water capable of affecting fish and their habitat Increased SPMs capable of affecting fish and their habitat
New Port of Montreal wharfs (APM) – 2009-2011	X			Surface water contaminant mobilization Increased SPMs in surface water	-	-	Contaminants in surface water capable of affecting fish and their habitat Increased SPMs capable of affecting fish and their habitat
BCE Campus – Nuns’ Island (Private) – 2007-2009	X			Increased SPMs in surface water	-	Increased road traffic caused by arrival of 3,000 employees (local network)	Contaminants in surface water capable of affecting fish and their habitat Increased SPMs capable of affecting fish and their habitat
Griffintown development (Private) – 2012 ±	X			-	-	Increased road traffic caused by construction of over 3,000 housing units (local network)	-

Tableau 87 - Identification of past, present and future projects (continued)

PROJET (PROMOTER) – YEAR	PAST	PRESENT	FUTURE	PROJECT IMPACTS ON VALUED ENVIRONMENTAL COMPONENTS			
				WATER QUALITY / SEDIMENT	SPECIAL STATUS SPECIES HABITAT	QUALITY OF LIFE INFRASTRUCTURE / NOISE ENVIRONMENT / AIR QUALITY	ICHTHYFAUNA
Reconfiguration of highway 132, 20 and 25 junctions in Longueuil (MTQ) – 2008-2013	X			-	-	Road congestion due to detours and partial closings (regional network)	-
Pointe-Nord development – 2012-2016	X			Bank disturbance and increased SPMs in surface water	Disturbance of brown snake habitat along edge of river	Increased road traffic due to construction of over 600 housing units (Nuns' Island local network). Construction work will cause dust and noise.	Increased SPMs capable of affecting fish and their habitat
Mercier and Champlain Bridge repair work (PJCCI) – 2008-2018	X	X		Increased SPMs in surface water	Disturbance of peregrine falcon habitat	Road congestion due to detours and partial closings (regional network) Increased noise level during construction (Nuns' Island)	Increased SPMs capable of affecting fish and their habitat
Turcot Interchange reconstruction (MTQ) – 2017-2022	X	X	X	-	Disturbance of brown snake habitat (Saint-Jacques cliff)	Road congestion due to detours and partial closings (regional network) Increased noise level during construction	-
Major Mercier Bridge repairs (MTQ) - 2018-2020 and construction of Mercier Bridge upstream structure (MTQ) – 2023-2027		X	X	Increased SPMs in surface water	-	Road congestion due to detours and partial closings (regional network) Increased noise level during construction	Increased SPMs capable of affecting fish and their habitat
Drawbridges 19 and 5 in Saint Catherine and major repairs to Saint-Lambert locks (CGVMSL) – 2021-2025			X	Increased SPMs in surface water Surface water contaminant mobilization	-	-	Increased SPMs capable of affecting fish and their habitat Contaminants in surface water capable of affecting fish and their habitat

Tableau 87 - Identification of past, present and future projects (continued)

PROJET (PROMOTER) – YEAR	PAST	PRESENT	FUTURE	PROJECT IMPACTS ON VALUED ENVIRONMENTAL COMPONENTS			
				WATER QUALITY / SEDIMENT	SPECIAL STATUS SPECIES HABITAT	QUALITY OF LIFE INFRASTRUCTURE / NOISE ENVIRONMENT / AIR QUALITY	ICHTHYFAUNA
Construction of temporary Nuns' Island causeway (PJCCI) – 2013-2018	X			Surface water contaminant mobilization Increased SPMs in surface water	Loss of brown snake habitat (Montreal Island and Nuns' Island)	Road congestion due to detours and partial closings (regional network) Increased noise level during construction (Nuns' Island)	Contaminants in surface water capable of affecting fish and their habitat Increased SPMs capable of affecting fish and their habitat
Dismantlement of temporary Nuns' Island causeway (PJCCI) – 2023-2025			X	Increased SPMs in surface water	-	-	Increased SPMs capable of affecting fish and their habitat Habitat gain due to removal of structures in the water
Operation of public transport lanes on New Bridge over the Saint Lawrence (AMT) – 2021 ±			X	-	-	Intermodal transfer on the bridge Increased noise during operation, depending on mode of transport.	-
Replacement of rip-rap over Louis-Hippolyte-La Fontaine Bridge-Tunnel (MTQ) – 2013-2015 and major repair work (MTQ) – 2020-2024	X		X	Increased SPMs in surface water	-	Road congestion due to detours and partial closings (regional network) Increased noise level during construction -	Increased SPMs capable of affecting fish and their habitat
REM – Panama and Nuns' Island stations and route (REM) – 2017-2021	X	X	X	Increased SPMs in surface water	-	Road congestion due to detours and partial closings (regional network) Increased noise level during construction -	Temporary loss of habitat associated with jetty. Increased SPMs capable of affecting fish and their habitat
Construction of New Champlain Bridge, including widening of A15 and dismantlement of Nuns' Island Bridge (Infrastructure Canada) – 2015-2020	X	X	X	Surface water contaminant mobilization Increased SPMs in surface water	Loss of brown snake habitat (Montreal Island and Nuns' Island)	Road congestion due to detours and partial closings (regional network) Increased noise level during construction (Nuns' Island)	Contaminants in surface water capable of affecting fish and their habitat Increased SPMs capable of affecting fish and their habitat

Tableau 87 - Identification of past, present and future projects (continued)

PROJET (PROMOTER) – YEAR	PAST	PRESENT	FUTURE	PROJECT IMPACTS ON VALUED ENVIRONMENTAL COMPONENTS			
				WATER QUALITY / SEDIMENT	SPECIAL STATUS SPECIES HABITAT	QUALITY OF LIFE INFRASTRUCTURE / NOISE ENVIRONMENT / AIR QUALITY	ICHTYFAUNA
Construction raised lanes over Lachine Canal (City of Montreal) – 2017-2020	X	X	X	-	-	Road congestion due to detours and partial closings (regional network) Increased noise level during construction	-
Rehabilitation and steel structure paint and reinforcement on Jacques-Cartier Bridge (barge) (PJCCI) – 2018-2021	X	X	X	Increased SPMs in surface water	-	-	Increased SPMs capable of affecting fish and their habitat
Reconfiguration of René-Lévesque Blvd. in Nuns' Island – future			x	-	-	Road congestion due to detours and partial closings (regional network) Increased noise level during construction	-

Table 88 - Cumulative Effects Analysis

VALUED ENVIRONMENTAL COMPONENT	RESIDUAL EFFECTS OF THE ORIGINAL BRIDGE DECONSTRUCTION PROJECT	EFFECTS OF PAST, PRESENT AND FUTURE PROJECTS	CUMULATIVE EFFECT	ADDITIONAL MITIGATION MEASURES	CUMULATIVE RESIDUAL EFFECT ANALYSIS AND SIGNIFICANCE
Water quality	Deconstruction work could lead to an increase of suspended matters (SM) in the river. Deconstruction work could introduce contaminants in surface water, thereby affecting water quality.	Increased amount of SM in surface water. Introduction of contaminants in surface water.	Increased amount of particulates in the river. Introduction of chemical contaminants in surface water.	A performance objective was set with regard to water quality (25 mg/L at 100 m and 5 mg/L at 300 m) to mitigate the increase in SM in the river from the project. A baseline condition must be determined before work begins to have a comprehensive picture of the situation and adjust work methods, as needed.	All possible measures will be taken to ensure particulate amounts remain under standard levels throughout the deconstruction work. Consequently, in light of the mitigation measures, the cumulative effect on water quality is deemed negligible. That said, water quality will be monitored to confirm the implemented measures' effectiveness.
Quality of life – Traffic, air quality and soundscape	Traffic issues during the project (lane reductions, intermittent partial closures, truck transportation). Changes in sound levels and air quality near the deconstruction site, mobilization zones and roads used for transportation.	Increased traffic. Congestion during deconstruction work. Increase of noise sources. Changes in air quality	Congestion throughout the road network. Sound level increase in some sensitive areas. Higher dust concentrations during simultaneous work phases.	The contractor must develop a traffic management plan to determine which roads to use and the transportation schedule. This is then submitted to PJCCI. This plan must take into account any nearby construction work, including the REM project. An air quality and soundscape monitoring program will be implemented.	The anticipated cumulative effects on traffic, soundscape and air quality are deemed negligible in light of mitigation measures.
Special-status species - Brown snake	Temporary loss of habitat (L'Île-des-Sœurs).	Loss of habitat (including on L'Île-des-Sœurs).	Brown snake habitat reduced on L'Île-des-Sœurs.	The brown snake's movement patterns will be monitored to confirm that the displaced snakes have properly adapted to their new habitat.	This species is at the northernmost border of its North American range. While its population is broken down into isolated pockets, it's still considered significant. COSEWIC deems this species to be "not at risk" in Canada. The core projects will implement measures to protect this species.

Table 88 - Cumulative Effects Analysis (CONT.)

VALUED ENVIRONMENTAL COMPONENT	RESIDUAL EFFECTS OF THE ORIGINAL BRIDGE DECONSTRUCTION PROJECT	EFFECTS OF PAST, PRESENT AND FUTURE PROJECTS	CUMULATIVE EFFECT	ADDITIONAL MITIGATION MEASURES	CUMULATIVE RESIDUAL EFFECT ANALYSIS AND SIGNIFICANCE
					Consequently, in light of the mitigation measure, the cumulative effect is deemed negligible.
Special-status species - Peregrine falcon	Destruction of a potential nesting site on the existing bridge. Disruption of nesting on the existing bridge during deconstruction work.	Disruption of the species' nesting.	Disruption of nesting during consecutive work (original and new bridges).	The measures listed in chart 41 are deemed sufficient.	While the various projects could disrupt the peregrine falcon's nesting, this species is known to revisit nesting sites annually, even if they are disrupted. SSL and PJCCI will coordinate to open and close nesting sites. Consequently, in light of the mitigation measures, the cumulative effect is deemed negligible.
Fish habitat	Deconstruction work could lead to an increase of suspended matters (SM) in the river. Deconstruction work could introduce contaminants in surface water, which may affect fish and their habitats. The project will lead to the temporary loss of habitats due to the addition of jetties, which will be compensated through the implementation of a 6.5 ha project.	Increased amount of SM in surface water. Introduction of contaminants in surface water. Temporary and permanent loss of habitats due to the addition of temporary (jetties) or permanent (new bridge pylons) structures from other projects.	Increased amount of particulates in the river. Introduction of chemical contaminants in surface water. Temporary loss of habitats, either simultaneously or consecutively.	A performance objective was set with regard to water quality (25 mg/L at 100 m and 5 mg/L at 300 m) to mitigate the increase in SM in the river from the project. A baseline condition must be determined before work begins to gain a comprehensive picture of the situation and adjust work methods, as needed. This will be monitored to adapt work methods, if needed. Any temporary loss shall be compensated.	All possible measures will be taken to ensure particulate amounts remain under standard levels throughout the deconstruction work and any temporary loss of fish habitats shall be compensated. Consequently, in light of the mitigation measures, the cumulative effect on the fish habitat segment is deemed negligible. That said, water quality will be monitored to confirm the implemented measures' effectiveness. Moreover, compensatory developments shall also be monitored over five years.

7 ENVIRONMENTAL MANAGEMENT PLAN

7.1 GENERAL

The environmental management plan describes the minimum requirements that the deconstruction contractor must take into account to minimize the impacts his activities could have on the environment. In the Request for Proposals, JCCBI will require the contractor to develop an Environmental Management System (EMS) inspired by the ISO 14001:2015 standard. JCCBI will put in place a verification and audit system to ensure that the EMS meets the established objectives. The major themes of the EMS were described in the 2013 EA and will not be repeated here, except for the environmental monitoring and follow-up programs specific to deconstruct of the Existing Champlain Bridge.

7.2 ENVIRONMENTAL MONITORING

Environmental monitoring is a set of measures for keeping track of implementation of the mitigation measures identified in Chapter 6. These mitigation measures will be translated into contract clauses in the Request for Proposals and an audit program will be put in place by JCCBI to ensure that the selected contractor applies these clauses. Some of the mitigation measures were formulated based on performance criteria. In such cases, the contractor will be responsible for putting the appropriate measures in place to comply with them, and the contract will provide penalties for failure to comply. Specific audits will thus be required for such items. Table 89 briefly presents requirements for monitoring the performance criteria identified in the impact analysis. The principal items to be monitored are presented in the following section and are subject to adjustment once the deconstruction methods are confirmed.

7.2.1 NOISE ENVIRONMENT MONITORING

The main noise sensitive areas that may require monitoring of noise levels are identified in Figure 58. The monitoring program for noise will follow the MTQ's Protection de l'environnement durant les travaux, Tome II, Chapitre 9.9 recommendations at all times.

7.2.1.1 Site-Specific Deconstruction Noise and Vibration Management and Monitoring Plan

In order to protect the noise sensitive areas around the mobilization sites on both shores, the Contractor will have to implement a site-specific Deconstruction Noise and Vibration Management and Monitoring Plan (DNVMMP).

Table 89 - Recommended approach to track performance criteria

COMPONENT	INDICATOR	THRESHOLD VALUE	AT-RISK SECTOR	METHODOLOGY	FREQUENCY	HANDLING INSTANCES OF NON-COMPLIANCE
Air	PM _{2.5}	30 ug/m ³ 24-hr Averaging Period	Residential Areas 300 m from work areas	BAM 1020 unit: EPA Class III PM _{2.5} , PM ₁₀ , and PM _{10-2.5} Federal Equivalent Method	Continuously during deconstruction work	Additional mitigation measures and reduction at source. Examples: Properly maintain diesel equipment; cover piles of materials; use of dust control products; restriction during high wind.
	PM ₁₀	50 ug/m ³ 24-hr Averaging Period	Residential Areas 300 m from work areas	BAM 1020 unit: EPA Class III PM _{2.5} , PM ₁₀ , and PM _{10-2.5} Federal Equivalent Method	Continuously during deconstruction work	Additional mitigation measures and reduction at source.
		88 ug/m ³ 1-hr Averaging Period	Work Site Boundary	TSI DustTrak™ DRX Aerosol Monitor 8533 hand-held unit	Continuously during deconstruction work hours	Examples: Cover piles of materials; use of dust control products; restriction during high wind.
	PM _{Tot}	120 ug/m ³ 24-hr Averaging Period	Residential Areas 300 m from work areas	USEPA 40 CFR Appendix B_to_part_50	Every 6 days during deconstruction activities that include removing painted steel materials	
	Silica	5 ug/m ³ 24-hr Averaging Period	Residential Areas 300 m from work areas	NIOSH 7500 (Modified)	Every 6 days during deconstruction activities	
	Lead	0.5 ug/m ³ 24-hr Averaging Period	Residential Areas 300 m from work areas	USEPA 40 CFR Appendix B_to_part_50	Every 6 days during deconstruction activities that include removing painted steel materials	Additional mitigation measures and reduction at source. Examples: Remove loose paint prior to deconstruction, cover piles of materials; restriction during high

Table 89 - Recommended approach to track performance criteria

COMPONENT	INDICATOR	THRESHOLD VALUE	AT-RISK SECTOR	METHODOLOGY	FREQUENCY	HANDLING INSTANCES OF NON-COMPLIANCE
						wind.
Water quality	SS	25 mg/l at 100 m and 5 mg/l at 300 m beyond the upstream value	St. Lawrence River (La Prairie Basins) upstream and downstream from the site	Continuous turbidity sampling station and correlation between SMs and turbidity	Ongoing throughout in-water construction work	Additional mitigation measures and reduction at the source Example: Turbidity curtain
Soundscape	L ₁₀	MTQ Volume II, Chart 9.9-1 Day: 75 dBA or ambient noise without construction work plus 5 dB Evening: Ambient noise without construction work plus 5 dB Night: Ambient noise without construction work plus: 5 dB (if ambient noise < 70); or 3 dB (if ambient noise ≥ 70)	Sensitive areas	Method: MTQ Volume II, Chapter 9.9	Daily for work assessed at over 70 dBA near areas	Additional mitigation measures and reduction at the source Examples: Mufflers or acoustic chambers; Electric air compressors; Soundproof hydraulic hammers; Noise-proof concrete saw blade; Temporary sound barriers (portable or fixed).
Hydraulics	Current speed (m/s)	Current speed between 0.8 and 1.2 m/s and depth between 0.6 and 1 m in flood flow. Depth of 40 cm at low flow rate.	Fishways in jetties	Current measured using a current meter Depth measurement	At the flows and periods specified in mitigation measure CC-6b (flood and low water)	Modification to fishways to maintain target speeds and depths.

The DNVMMP must be an evolving document for the duration of the project and the contractor will have to revise it whenever changes occur that may affect its effectiveness. Below are some guidelines for the creation and revision of the DNVMMP:

- Prepared before start of deconstruction;
- Revised during deconstruction if traffic, types of equipment or the quantity of equipment change;
- Revised during deconstruction if adjustments to the deconstruction methods occur; and
- Revised during deconstruction if complaints from NSAs arise.

The DNVMMP will identify:

- Site-specific deconstruction methods and equipment;
- Schedule of activities and equipment on site;
- Traffic routes and traffic count for heaviest hours;
- Anticipated noise levels from materials handling sites at specific NSAs;
- Mitigation measures proposed to reduce impacts as required; and
- Complaint reception, how complaints are handled and investigation protocol.

7.2.1.2 Community noise monitoring activities

7.2.1.2.1 Monitoring of Baseline Environment

Before the start of any deconstruction activities on site and after commissioning of the New Bridge, baseline noise conditions must be monitored in all the noise sensitive areas.

7.2.1.2.2 Monitoring during Deconstruction

Monitoring during deconstruction in each of the noise sensitive area will be undertaken at the beginning of each major phase of the project:

- Construction of the jetties;
- Deconstruction of the bridge; and
- Removal of the jetties.

Monitoring will only be done when site conditions are representative of normal operating conditions at each stage. Follow-up monitoring is also recommended at a minimum each month or when changes to site and/or traffic significantly change the exposure of the NSAs to noise from the site.

7.2.1.2.3 Deconstruction Equipment Sound Emissions

At all times, equipment will have to be run with noise emission reduction options from the manufacturer and be kept in good working conditions.

Maximum recommended noise levels per type of equipment are specified in MTQ's Protection de l'environnement durant les travaux, Tome II, Chapitre 9, Tableau 9.9-2.

7.2.1.3 Measured metrics

All monitoring must be conducted in accordance to the MTQ's Protection de l'environnement durant les travaux, Tome II, Chapitre 9.9.

All monitored results for community monitoring must present at a minimum metrics taken in periods of 30 minutes (L_{Aeq} , L_{AF10} , L_{AFmax}).

7.2.1.4 Complaints

A Noise Complaint intake and disposition process will be created in the DNVMMMP. It is important to recognize that, although monitoring is being undertaken, it may not capture all or the worst-emissions scenarios from the activities on site.

The complaint capture and disposition process will be set up to correlate the time of the complaint and the activities on site and, if required, immediately take supplemental monitoring at the complaint location to measure noise levels from site.

7.2.1.5 Non-conformities

Whenever an exceedance of the limits identified in the MTQ's Protection de l'environnement durant les travaux, Tome II, Chapitre 9.9 is reported, this will be deemed as a non-conformity.

Due to the different objectives of the monitoring presented in Section 7.2.1.2 (except for baseline monitoring), there will have to be different thresholds for action, which are described in Table 90.

Table 90 – Systemic Approach to Non-Conformities

NON-CONFORMITY	TRIGGER	ACTION
Community Monitoring Limits	During Noise Monitoring	<p>Proceed to immediately continue (expand) noise monitoring to confirm exceedance of limits.</p> <p>Take immediate temporary measures to reduce noise levels until permanent mitigation measures are in place.</p> <p>Identify sources and verify why exceedance was not identified at design stage.</p> <p>Perform equipment emissions testing to confirm sources that caused an exceedance.</p> <p>Identify permanent mitigation measures to be implemented.</p> <p>Continue monitoring until exceedance is resolved.</p>
	Complaint	<p>Take immediate temporary measures to reduce noise levels (i.e., eliminate or reduce noise sources) until permanent mitigation measures are in place.</p> <p>Identify sources and verify why exceedance was not identified at design stage.</p> <p>Perform equipment emissions testing to confirm sources that caused an exceedance.</p> <p>Identify permanent mitigation measures to be implemented.</p> <p>Continue monitoring until exceedance is resolved.</p>
Equipment Emissions Limits	During Noise Monitoring	<p>Immediately verify by measurements if limits are exceeded at the closest noise sensitive receptor.</p> <p>If level is exceeded at noise sensitive receptor, remove equipment from operations until it is replaced with compliant equipment or mitigation measures are in place.</p>
	Complaint	<p>Immediately verify by measurements if limits are exceeded at the closest noise sensitive receptor.</p> <p>Take immediate administrative action to reduce noise levels (i.e., eliminate noise sources) until permanent mitigation measures are in place.</p>

7.2.2 WATER QUALITY MONITORING

During the deconstruction phase the contractor will carry out a surface water monitoring program under supervision of JCCBI. The goal of this program will be to control erosion and suspended solids based on turbidity, pH and suspended solids measurement. Metals, oils and greases can also be analyzed to determine whether the work is increasing contaminant mobilization in surface water. This program will also verify the effectiveness of the applied mitigation measures and adjust them if necessary in the event of overshoot.

The monitoring protocol will be based on the *Recommandations pour la gestion des matières en suspension (MES) lors des activités de dragage* (MDDELCC and ECCC, 2016). The performance objective of a maximum increase of 25 mg/L of suspended solids at 100 m and 5 mg/L at 300 m will be monitored and measured via a system of sampling stations, upstream and downstream from the sites, to split the background noise (river’s natural concentrations) from the site’s impacts.

During construction, water quality will be measured by an *in situ* method using turbidity as an indicator of suspended solid concentrations. The relation between turbidity and suspended solids will be established based on several measurements to define the relationship curve of both parameters in the work sectors (Lesser and Greater La Prairie Basins). Quality control and quality assurance will be ensured by laboratory measurements.

The monitoring plan will have to demonstrate compliance with the 100 m performance objective at all times. As specified in the MELCC and ECCC recommendations, the management criterion applicable 300 m from the work area, which corresponds to an increase of 5 mg/L over ambient concentrations, can be hard to verify accurately on site, given its small value with respect to measuring device margin of error. As a result, these ministries recommend using this criterion to verify the effect of suspended solid dispersion downstream from the worksite rather than as an alert threshold. In this case, only the management criterion applied 100 m from the work zone constitutes and alert threshold.

Turbidity will be monitored continuously in areas where work is in progress and in open water. Should the threshold of 25 mg/L at 100 m be exceeded, an alert system will be triggered and will enable the contractor to apply the appropriate corrective measures quickly. A sample will be taken in parallel and sent to the laboratory to validate the suspended solid concentration. The corrective actions applied will be tracked up to ensure they are working properly in the short, medium and long term.

The number of system stations, the distance between stations, their exact location, and reading frequency will be determined based on the work methods chosen by the contractor and the hydraulic conditions of the river in proximity to the work (higher flow velocity in the Greater La Prairie Basin than the Lesser Basin). The final monitoring protocol will be prepared at the final drawings and specifications stage and submitted to JCCBI for review.

7.2.3 AIR QUALITY MONITORING

In order to protect the residential areas of concern from potential impacts on air quality, an ambient air monitoring program (AAMP) will be put in place to measure concentrations at both the perimeter of work areas and the communities. The measurements at the perimeter work areas will be used to initiate measures by the contractor to control dust while performing deconstruction activities. The measurements at the community stations will be used to document impacts on air quality below regulatory guidelines.

The following provides a conceptual design for the AAMP.

7.2.3.1 Proposed Conceptual Ambient Air Monitoring Program

The following are key objectives of the AAMP:

- To monitor air quality to ensure activities are not adversely affecting the surrounding airshed and environment;
- To use monitoring data to ensure the contractor is adhering to best management practices with respect to controlling dust.

Two types of monitoring will be carried out under the PSAA:

- Fixed station :

- Monitoring conducted at sites near communities using reference sampling and equivalence methods; ○ The fixed station is located near the community that has been identified as sensitive to air quality effects from the deconstruction;
- Actions taken at the fixed station collect data on the community's air quality.
- Mobile station:
 - Real-time source monitoring;
 - Particulate Matter Specific (PM₁₀) and made with portable instruments that measure particulate concentrations and will be placed around the perimeters of work areas (e. g., mobilization area, jetty, access road, deconstruction activities), at a variable position depending on the prevailing winds of the day;
 - Measurements taken with these portable devices (e. g. DustTRAK) will be compared to action levels on an hourly basis to assess the air quality from the work areas. If an action level is exceeded, mitigation measures will be implemented to minimize on-site emissions. The particulate levels of the emitting source will then have to be controlled and care must be taken to ensure that measurements are put in place quickly enough to avoid exceedances at the location of fixed sampling stations.

7.2.3.2 AAMP Regulatory Framework

The regulatory context for ambient air quality monitoring is taken from the following documents:

- Règlement sur l'assainissement de l'atmosphère (provincial);
- Regulation 90 of the Communauté métropolitaine de Montréal (CMM) and its amendments;
- Ambient air quality criteria from the Ontario Ministry of Environment, Nature Conservation and Parks when the criteria or measurement periods for certain parameters that are not covered by provincial or municipal regulations, for example, silica for the 24-hour period.

It should be noted that the *Règlement sur l'assainissement de l'atmosphère* is equivalent to or more restrictive than MWC Regulation 90. The most restrictive criteria were used.

7.2.3.3 Fixed-Station Equivalency and Reference Method Sampling (in community)

The permanent community fixed-station located in Brossard at the edge of the community located to the northeast of the Champlain Bridge exit will be used. The station has been used until March 31, 2019 to monitor air quality for the New Bridge construction and contains an operating meteorological station. Two other fixed stations will be installed, one on Nuns' Island, south of the on-shore off-ramp, and the other in Brossard, south of the on-shore off-ramp and material handling area. In addition, the following areas are also considered for locating beta attenuation monitor BAM-1020 units to monitor dust:

- Brossard – community located west of the on-shore off-ramp; and
- Brossard – community located southeast of the second Brossard materials handling area.

The fixed station measures particulate, lead and silica.

Table 91 provides a summary of the potential parameters for the community-based sampling locations.

Table 91 – Potential Community Sampling Station Parameters

	NUN'S ISLAND AIR MONITORING LOCATION	BROSSARD NORTH AIR MONITORING LOCATION	BROSSARD SOUTH AIR MONITORING LOCATION	BROSSARD SOUTHEAST AIR MONITORING LOCATION	BROSSARD WEST AIR MONITORING LOCATION
Status	Required	Required	Required	Tentative ⁽¹⁾	Tentative ⁽¹⁾
TSP and Lead		♦			
PM _{tot}		♦			
PM ₁₀	♦	♦	♦	♦	♦
PM _{2.5}	♦	♦			
Silica		♦			

Note: (1) The recommendation for monitoring at these locations may change if it is determined less emissions-generating activities are identified for the onland staging locations.

7.2.3.4 Mobile Station - Perimeter Real-Time Monitoring

Perimeter real-time monitoring will be used to control atmospheric emissions from deconstruction activities in a timely manner. The perimeter will be defined for each source prior to measurements being performed in the field. Air quality will be measured at upwind and downwind perimeter or shoreline locations on a daily basis. Real-time data will be compared to site-specific, short-term action levels that have been developed, and this information will be used to assist site managers in their decisions to mitigate emissions from the site during activities.

The target parameter chosen for real-time monitoring is PM₁₀. PM₁₀ was chosen as the target parameter considering the following:

- Mobile dust-measuring technologies are limited in the upper-range of particle size that they can measure accurately. Measurements of TSP by these methods tend to be underestimated;
- PM_{2.5} measurements tend to be influenced by regional trends more than local works;
- The PM₁₀ size fraction is where health effects start to become more pronounced;
- The PM₁₀ size fraction includes enough of the typical construction dust particle size distribution to allow it to be used as an indicator for dust in general in these types of projects; and
- There are many established ratios of PM_{2.5} to PM₁₀ that would allow for the extrapolation of PM_{2.5} values if needed.

For the deconstruction activities, it is anticipated that perimeter monitoring locations will be placed along the materials handling areas on Nun’s Island and in Brossard and near the jetties and Seaway dike. On some days, monitoring may take place along the Brossard shore to the east of the Seaway dike and jetty areas. The perimeters have been developed based on: the location of the deconstruction activities; site features; community locations; terrain and meteorological conditions.

Table 92 provides a summary of action measures that will be implemented when intervention thresholds are exceeded at the site are exceeded.

Table 92 – Summary of Real-Time Action Levels and Action Measures

PARAMETER	INTERVENTION THRESHOLD	MONITORING LOCATION	AVERAGING PERIOD	ACTION REQUIRED AT ACTIVITY SITE IF THRESHOLD IS EXCEEDED
PM ₁₀	66 ug/m ³	Downwind near the area where deconstruction activities are being performed	1 hour	Site continues to operate. On-site Consultant notifies Contractor and JCCBI. Contractor will investigate potential source of air emissions. Visible dust plumes on-site and/or sensory detection of organic odours shall be an early indicator and immediate corrective measures may be warranted. First-line defence measures such as addition of water sprays to control airborne dust or changing activity locations may be implemented. Contractor will initiate appropriate measures to correct operations.
	88 ug/m ³	Downwind near the area where remedial activities are being performed	1 hour	Contractor, Consultant and JCCBI will evaluate work practices and determine the appropriate course of action. Temporary stop-work practices will be evaluated. If PM ₁₀ action level is reached or exceeded and exceedance is due to site work activities, site work will be temporarily suspended until proper techniques are identified and implemented or penalties will be incurred by the Contractor. Contractor is to initiate proper control measures. Work will resume within a short time period when corrective procedures are implemented.

¹ The basis for the intervention threshold is Ontario’s 24-hour criterion of 50 µg/m³, which is the same for other areas and organizations (e.g., Newfoundland and Labrador, British Columbia, World Health Organization). The intervention threshold value is calculated based on a 10-hour work day and accounts for an estimated background concentration of 23 µg/m³ for hours (14 hours) when work is not performed. It must be met for each hour of the work day. The background is based on an annual average value of 23 µg/m³ for 4240 rue Charleoi, Montreal for April to December 2013. The intervention threshold is prorated using the 24-hour criterion for work hours.

Real-time information concerning daily operations and exceedances will be provided directly to the contractor by JCCBI (verbal reports followed by written reports for exceedances) and mitigation measures will be implemented by the contractor.

Monitoring will occur continually to ensure there are no exceedances. If air quality approaches any exceedance level, it will require immediate investigation and corrective action to prevent any exceedance. All exceedances to the guidelines will be reviewed/investigated and reported to the surrounding community. If exceedances occur, an evaluation of deconstruction activities will be reviewed along with any other non-site related sources in the area. If exceedances are determined to be project-related, corrective measures will be implemented by the Contractor.

7.2.4 MONITORING THE FREE PASSAGE OF FISH THROUGH NUNS' ISLAND JETTY

As mentioned in subsection 3.2.2.1 of Volume 1, the Nuns' Island channel and west bank of the Greater La Prairie Basin are significant migratory routes for fish species that are highly valued by commercial fisheries, sports fishermen, and natives; these include the lake sturgeon and yellow walleye. The challenges associated with fish passage are very important. The design of the jetties in this sector will have to maintain optimal conditions to keep fish migratory paths open. As was done for the jetty built by SSL on Nuns' Island, migratory passes will be built into the jetty in the same sector to keep fish migratory paths open. The design requirements for these migratory lanes are shown in mitigation measure CC-6b (Table 76). When the jetties and migratory passes are in place, fish passage conditions and their respective effectiveness will be characterized in each structure.

The main objective of monitoring is to measure the effectiveness of the passages and validate if these temporary structures are being used by fish during the targeted migration periods. The targeted periods, namely spring migration for reproduction, is characterized by water temperature varying between 6°C and 10°C, which normally occurs in early May in the work sector. This moment is a period of great migratory activity, especially for fresh water species.

Fish passage monitoring will require collection of physical data in the migration corridors and biological data on the fish to make sure that the passage conditions are optimal. The physical parameters to be monitored are temperature and flow of the St. Lawrence River at the LaSalle gauging station (O20A016). Biological parameters will be obtained through fish counts using non-lethal fishing devices. Measurements and information will be taken for each individual captured (most accurate identification possible, total length, weight, stage of development, sexual maturity, etc.).

The monitoring approach, capture devices, and the monitoring effort will be defined based on these premises. A monitoring protocol will be prepared when the jetty and migratory passage designs are complete. The protocol will be submitted to the DFO for approval before being implemented.

7.2.5 EXCESS SOIL MONITORING

With regard to monitoring excess soil disposal, it is proposed that all soil scheduled for disposal offsite be placed in piles. The piled soil must be stored on a waterproof tarpaulin, covered by a waterproof tarpaulin, and have a maximum height of 3 m. The piles will then be sampled and disposed of in sites authorized by the MELCC in accordance with the results obtained. Excess soil management will be monitored continuously during the truck loading, transport manifest preparation, weigh ticket recovery stages. A system of traceability for contaminate soil disposed of offsite will also be required. The traceability system must include, as a minimum, regulatory requirements, a quantity and trip register, carrier identification, and use of transport manifests and dump tickets.

7.2.6 GROUNDWATER MONITORING

Groundwater will have to be monitored throughout the project period. Observation wells have to be installed in work zones to cover the upstream and downstream parts of the work zones. Groundwater will have to be sampled at least twice a year, in spring and fall, to verify the presence of hydrocarbons. The following parameters will need to be analyzed as a minimum:

- C₁₀ to C₅₀ petroleum hydrocarbons
- Polycyclic aromatic hydrocarbons;
- Monocyclic aromatic hydrocarbons.

Water will have to be extracted from the wells using existing best practices. The results obtained will be compared to existing regulations, and will be included in an annual monitoring report. If any criteria are exceeded, additional mitigation measures will have to be proposed, approved by JCCBI, and put in place to rectify the situation.

7.2.7 BROWN SNAKE MONITORING

The locations of the exclusion barriers on the Nuns' Island and Seaway dike for construction of the New Champlain Bridge will be reviewed and adjusted as needed to ensure adequate brown snake protection during deconstruction of the Existing Champlain Bridge. At a propitious time before the work begins, a capture campaign via the shingle stations will be carried out within the enclosures to extract all of the individuals found there. They will be relocated into similar habitats situated around the capture site but outside the enclosures. The barriers in question will be inspected regularly to make sure they maintain their tightness. A few shingle stations will be kept and monitored to verify exclusion measure effectiveness.

7.3 ENVIRONMENTAL MONITORING PROGRAMS

Environmental monitoring is a process for following the evolution of certain components affected by the project and verifying the accuracy of the predictions and environmental challenges identified. It is used to verify the effectiveness of the mitigation measures provided for in the TEA over the short, medium and long term – measures for which some uncertainty might persist. The elements to be monitored include:

- Fish habitat and wetland compensation;
- Brown snake movement and hibernation site creation;
- Peregrine falcon nesting;
- Cliff swallow nesting;
- Plant regrowth;
- Condition of habitat located around the temporary structure.

7.3.1 MONITORING FISH HABITAT AND WETLAND COMPENSATION

Fish habitat and wetland compensation projects are generally monitored over a five-year period. The exact methods of compensation monitoring will be spelled out in the compensation program. Monitoring elements, duration and extent depend on the type of project, chances of success, risk associated with stability of the developments and extent of the improvement project(s). All this information will be specified when the compensation program is finalized with the DFO. The program will be integrated with the authorizations to be issued by the DFO by virtue of the Fisheries Act.

The goal of the monitoring program is to determine whether the compensation plan objectives are being achieved (e.g., improvement of spawning ground, survival of wetlands). The program consists of verifying the physical integrity of the improvements and determining their use by fish. On-site measurements and visual inspections will be required in support of this monitoring. As-built drawings will be the reference state for the improvements. Any sign of degradation will be documented in writing and located precisely. Photos and videos will also be used to document improvement status over time.

To make sure that the improvements are being used by fish, visual observations, roe capture, or experimental fishing could be carried out depending on the type of improvement constructed. Non-lethal fishing methods will be preferentially employed so as not to harm the fish population using the new improvements. The physical and chemical characteristics of the water at the improvement site (e.g., pH, dissolved oxygen, water conductivity and temperature) will also be measured to verify that the water quality meets the requirements of the species in question.

If the project involves giving fish access to a habitat again, free passage of the fish will be monitored in the improved channel, culvert or structure to ensure it is effective.

Annual monitoring data will be compared to the reference state and between monitoring years. A monitoring report containing recommendations and any corrective measures will be produced after each monitoring phase. Should the improvements fail to achieve the objectives established by DFO, corrective actions will be identified and implemented by JCCBI, as needed.

7.3.2 MONITORING BROWN SNAKE MOVEMENT AND HIBERNATION SITE CREATION

The Brown snakes that were relocated during construction monitoring will be monitored biannually for four years to confirm their adaptation to the new habitat. More specifically, the intensity of use of the sites in question by the Brown snake will be examined in detail via active searches and shingle stations.

One specific mitigation measure proposes creation of hibernation sites during development work (P-52, Table 82). A hibernation site could be located on Seaway dike and be part of asset development work. The effectiveness of these improvements could be monitored by JCCBI using the method described for monitoring Brown snake movements or, if possible, via the MFFP program (Tessier and Veilleux, 2019) on acquisition of knowledge for hibernation site development.

7.3.3 MONITORING PEREGRINE FALCON NESTING

For several years, the Peregrine falcon occasionally nests on the Existing Champlain Bridge. Since 2002, the pair was incited to nest in one of the three nest boxes attached to the infrastructure – a measure allowing better nesting site management in line with maintenance work and eventual deconstruction of the bridge.

Given the current schedules (opening of the New Bridge in June, 2019; start of deconstruction in 2020), it is anticipated that the nesting boxes will have to be in place on the New Bridge no later than December, 2019. Each year during deconstruction, the location of the nesting boxes will be determined based on the work schedule, and coordination between JCCBI and SSL will take place so that the boxes are placed at sites beneficial to the Peregrine falcon. It will involve avoiding potentially disturbing work being done in proximity to an occupied nest. Nevertheless, if work has to be performed closer than 200 m from an active nest, a visual screen will have to be installed to minimize disturbing the birds and to protect workers from attacks. The species will be subject to behavioural monitoring throughout the work period (2020-2023). Monitoring will continue for three years (2023 to 2025) after the site closes to verify the local return of nesting bird species and measure their reproductive success (SEF, 2014a).

7.3.4 MONITORING CLIFF SWALLOW NESTING

JCCBI will conduct a monitoring campaign associated with the ecosystem management plan focusing on the Cliff swallow population found on project sector infrastructure to assess the effectiveness of the mitigation and compensatory measures put in place. Some additional actions could be taken to improve conditions favourable to the Cliff swallow population. Compensation plan application will be monitored over a period of at least five years.

7.3.5 MONITORING PLANT REGROWTH

The plantings made upon completion of the work, in particular in the mobilization areas and banks next to the deconstructed bridge, will be monitored to ensure plant recovery. This monitoring will be done in the spring following the plantings and 24 months thereafter. Plant survival rates will be assessed following a visual inspection. New plants will have to be planted if the survival rate is less than 90%.

7.3.6 MONITORING CONDITION OF HABITAT LOCATED AROUND JETTIES

Despite the hydraulic models, it is hard to predict the changes in velocity and flow rates with any accuracy in the parts of the river located downstream from the proposed jetties. A monitoring program (flow, sedimentation, erosion, bathymetry) for sectors located downstream from the jetties will help determine whether jetty installation will result in significant changes to these habitats. TEA data could be used as the reference state. Monitoring will have to be done for all jetties for the year following jetty construction and for the year preceding their deconstruction. The rehabilitation program will have to provide for work designed to correct the impacts associated with the presence of the jetties if applicable.

8 SUMMARY OF IMPACTS AND MITIGATION MEASURES

This section summarizes the project impacts on valued environment components. For each, sensitive areas are identified and impacts and primary mitigation measures are described.

It should be noted that some studies are still ongoing and could potentially result in the addition of certain mitigation measures or monitoring. These studies and their results will be incorporated in the final version of the TEA. They are listed below:

- Bathymetry survey in sections that are not covered upstream from the Existing Champlain Bridge near the planned location of the temporary jetty on the Nuns' Island side;
- Survey of contaminants on the Existing Champlain Bridge;
- Hydraulic simulations of the post-project situation (piers razed to some levels) and migratory passes through jetties;
- Fish habitat and wetland compensation project.

8.1 SOIL, SEDIMENT AND GROUNDWATER

8.1.1 SENSITIVE AREAS

The following zones are deemed to be sensitive for soil, sediment and groundwater components:

- Mobilization areas on Nuns' Island;
- Mobilization area near Seaway dike;
- Mobilization areas on South Shore in Brossard;
- Locations where piers, landings, jetties or other structures will require excavation or the use of heavy machinery;
- Lesser La Prairie Basin;
- Nuns' Island littoral zone.

8.1.2 IMPACT DESCRIPTION AND CONTEXT

In the course of the project, soil, sediment and groundwater will be affected during all phases of the work, and by the presence of prior contamination, erosion potential, and risk of spills.

The physical and chemical characteristics of the soil, sediment and groundwater could be affected during all project phases by the following activities:

- Site mobilization and construction of temporary facilities;
- Stripping and tree removal;
- Excavation, grading;
- Work in an aquatic environment;
- Waste and hazardous material management;

- Machinery transport, operation and maintenance;
- Site demobilization and dismantlement of temporary facilities.

Organic and inorganic contaminants are likely to be remobilized during the work, and some handling activities will facilitate their migration or dispersion. It is also possible that the use of heavy machinery could cause hydrocarbon spills and that the presence of lead or other contaminants during deconstruction work might affect the soil, sediment and groundwater.

Contaminated soil and sediment will have to be managed in accordance with CCME (1999a) or MELCC recommendations if such materials are sent offsite. A traceability system will be put in place.

8.1.3 MITIGATION MEASURES

8.1.3.1 Before work begins

Since the precise status of the soil and groundwater quality is not known in several locations at this stage, their level of contamination will have to be assessed once the details of the areas to be excavated are specified (e.g., extent, depth, slope profile, work beneath water table).

Sediment contamination status varies greatly depending on particle size. It is practically nil when the sediment is large and free of organic materials, which is the case for the fast-current areas. The fish habitat map will distinguish the particle size and current anticipated at each pier. This information will help anticipate the quality of the riverbed sediment in such places. Given the fragmentary state of the data, there is a lack of information on the environmental quality of the sediment around the piers. An additional characterization may need to be carried out once the details of the areas to be excavated are specified. Excavated sediment could potentially be stored in sealed containers and samples taken from the containers used for sampling to ensure proper management.

Creation of a plan for managing contaminated water at the preliminary engineering stage will ensure that the contaminated water is treated or disposed of in conformance with existing regulations. The contractor will also have to prepare a response plan in the event of a spill.

8.1.3.2 In the course of the work

- Minimize the footprint of the work area;
- Deconstruct the piers in a confined setting when their footings have to be removed under the riverbed (e.g., with coffer dams or within a temporary jetty);
- Treat contaminated water on site or send it off site in conformance with regulations;
- Do not overexcavate the riverbed when removing temporary jetties, and be sure to return the area to the original condition;
- Immediately evacuate excavated sediment with known contaminant concentrations to sites authorized by the MELCC;
- Immediately and temporarily store excavated soil and sediment on a watertight surface if they cannot be disposed of directly off site (e.g., uncharacterized excavated soil) and cover to protect them from inclement weather;

- When the contamination level exceeds the MELCC's Guide d'intervention - Protection des sols et réhabilitation des terrains B criteria, all trucks leaving the work area will have to pass through a vehicle wheel cleaning station;
- Temporarily store contaminated soil and sediment on the site and dispose of it in sites authorized by the MELCC, in compliance with applicable federal and provincial requirements;
- Keep the site free of waste materials at all times, such as empty containers of all types or other waste, unless they are put in watertight receptacles designed for the purpose;
- Maintain transport and site machinery vehicles in good condition to prevent leakage of oil, fuel or other pollutants;
- Prohibit mobile equipment showing hydrocarbon leaks from access the site. Keep a vehicle maintenance register;
- Have an emergency hydrocarbon spill kit on machinery at all times;
- Apply the emergency plan in the event of a spill on land, including:
 - Notifying the ECCC (1-866-283-2333) and MELCC (1-866-694-5454) alert system as well as the SLSMC's response and shipping management units, as soon as possible;
 - Control the spill area;
 - Put protective measures in place (absorbent material);
 - Clean the affected sector;
 - Dispose of contaminated soil.
- Monitor groundwater quality in all work areas within the system of observation wells created to characterize the water upstream and downstream from these areas.

8.1.3.3 After the work is completed

- Monitor groundwater quality in all work areas that are still accessible for a period of one year following completion of the work;
- If indications are that the deconstruction work affected groundwater quality beyond the applicable criteria, put a treatment system in place to rehabilitate the water in the affected areas.

8.2 SURFACE WATER QUALITY AND HYDROLOGY

8.2.1 SENSITIVE AREAS

The St. Lawrence River is separated into two flow sections in the work zone: the Greater La Prairie Basin (St. Lawrence River section) and the Lesser La Prairie Basin (Seaway section). While the two basins have different surface water and hydrology qualities, both are considered to be sensitive areas.

8.2.2 IMPACT DESCRIPTION AND CONTEXT

In the course of the project, water quality will be affected during the work phases by introducing primarily suspended solids and potentially contaminants (e.g., petroleum hydrocarbons) into the receiving environment.

Water quality will be affected in the pre-deconstruction, deconstruction and post-deconstruction phases by the following activities:

- Site mobilization and construction of temporary facilities (e.g., jetties);
- Stripping and tree removal;
- Excavation, grading;
- Work in an aquatic environment (deconstruction and post-deconstruction);
- Waste and hazardous material management (all phases);
- Machinery transport, operation and maintenance (all phases);
- Site demobilization and dismantlement of temporary facilities.

Work in an aquatic environment for jetty construction and deconstruction of piers and footings, among other things, is likely to result in re-suspension of sediment in the river water. Use of jetties in the river could carry soil particles and contaminants into surface water through runoff or pumping of water from excavations. Accidental petroleum hydrocarbon leaks from machinery could also result in surface water contamination.

The risk of potable water intake contamination was taken into account. The Royer Plant water intake is located in the main river channel upstream from Île Notre-Dame over two (2) km from the study area. Mitigation measure implementation, the mixing power of the river, channel flow, and the small amount of contaminated sediment in the sector (Greater La Prairie Basin) are such that no impact is anticipated on the intake.

8.2.3 MITIGATION MEASURES

The DFO has updated a list of mitigation measures applicable to the Existing Champlain Bridge deconstruction project. The following sections present the DFO's principal mitigation measures in addition to those introduced by Dessau-CIMA+ in the 2013 EA. Section 6.3 presents all the mitigation measures that will be put forward during each project phase.

8.2.3.1 Before the work begins

Temporary structures:

- Design temporary structures to withstand flooding likely to occur during the work period, and to prevent river bank and riverbed erosion problems.

Control erosion and sediment suspension:

- Minimize tree removal on both sides of the high water line as much as possible and preserve plant cover as long as possible before the work begins.

8.2.3.2 In the course of the work

Temporary structures:

- Limit the cumulative encroachment of temporary structures to one-third of the width of the river, measured from the MHWL to restrain the flow-restriction increase in current velocity, thereby avoiding erosion problems;
- In the present case, the Lesser La Prairie Basin and Greater La Prairie Basin are considered two separate bodies of water. Temporary structure cumulative encroachment can therefore be a maximum of one-third of the width of each basin, unless otherwise agreed with the DFO;
- Stabilize temporary structures so that they can withstand flooding likely to occur during the work period, and to prevent river bank and riverbed erosion;
- Give preference to work methods that improve the quality of the water to be managed (e.g., rock fill bottoms of excavations, pits and resurgences, put blinding slabs in place, etc.);
- Take the necessary steps to waterproof coffer dams and minimize the quantities of water to manage.

Control erosion and sediment re-suspension:

- Keep stripping, clearing, grading and leveling in work areas to a strict minimum;
- Put in place effective measures to limit sediment contribution from the site to the aquatic environment and maintain them (e.g., sediment barriers, berms, sediment traps, sedimentation basins, temporary talus stabilization, divert water toward vegetation areas). These measures must remain effective during periods of flooding, heavy rainfall, and freezing;
- Dispose of cut material beyond the high water line. Contain or stabilize this material (e.g., impermeable tarpaulin, sediment barrier) if required to prevent sediment from migrating into the aquatic environment;
- When work has to be done in the water, give preference to isolating the work area so work can be done dry or limit migration of sediment into the aquatic environment (e.g., coffer dams, diking and pumping, temporary diversion, turbidity curtain);

- Use turbidity curtains to enclose work area to contain sediment in suspension. Use deflectors, if necessary, to help maintain the turbidity curtains.

Temporary site closing:

- Temporarily stabilize and protect disturbed soil that presents a risk of erosion and sediment transport into the aquatic environment using methods adapted to the site, the duration of the site closing, and a period of one year;
- Divert runoff water before it reaches the disturbed soil (e.g., intercepting ditch and ditch to dissipate water toward vegetation zones);
- Ensure that the measures in place to limit transport of sediment from site into the aquatic environment are operating adequately, and that they are maintained before the daily site closing.

8.3 AIR QUALITY (LOCAL SCALE)

8.3.1 SENSITIVE AREA

The following residential areas (Figure 68 in Section 6.2.1.4) are considered to be sensitive to potential impacts on air quality based on the location of the sources of emissions and the direction of prevailing winds:

Nun's Island

- Residential area located approximately 250 m to the south of the on-land off-ramp and jetty areas (I1).

Brossard

- Residential area located approximately 200 m to the northeast of the westernmost on-land materials handling area in Brossard, 200 m to the north of the easternmost on-land materials handling area and 800 m to the northeast of the Seaway materials handling area (B1);
- Residential area located approximately 250 m to the south of the westernmost on-land materials handling area and 130 m to the southwest of the easternmost on-land materials handling area; and 600 m to the east of the Seaway materials handling area (B2);
- Residential area located approximately 150 m to the southeast of the easternmost on-land materials handling area (B3); and
- Residential area(s) located 385 m to the northeast of the easternmost on-land materials handling area (B4).

8.3.2 IMPACT DESCRIPTION AND CONTEXT

The deconstruction activities will result in particulate emissions, including silica and potentially lead. It is possible asbestos may have been used in some of the materials. If so, the materials in question will be removed before deconstruction. There will be a number of materials handling areas and some of these are located close to sensitive residential receptors.

8.3.3 MITIGATION MEASURES

Mitigation measures to control particulate emissions from the worksite are required to ensure ambient air quality is not compromised in neighboring communities. The key measures are listed below.

8.3.3.1 Before the work begin and during the course of the work

- Use of water sprays during deconstruction activities to minimize dust generation. Runoff will be managed to reduce TSS;
- Use of water and dust suppressants at materials handling facilities to control dust emissions from unpaved surfaces and stockpiles;
- Strategic siting of crushing facilities and stockpiles to minimize the potential for dust impacts in neighboring communities;
- Controlling dirt and mud track-out on paved public roads by using on-site control measures and by promptly removing loose materials from paved roads;
- Routing traffic exiting the site away from residential areas;
- Imposing appropriate maximum speeds to reduce dust emissions on access roads and work surfaces;
- Use of tarpaulins for loaded trucks leaving the site.

8.4 AIR QUALITY (GHG)

8.4.1 SENSITIVE AREA

The sensitive area is the province as a whole since any GHG emission will be in addition to those produced annually by Québec during the three years of construction.

8.4.2 IMPACT DESCRIPTION AND CONTEXT

GHGs will be emitted through the use of a variety of machinery and equipment, as well as by truck transport, collectively:

- Machinery transport, operation and maintenance.

It is understood that all activities employing machinery are apt to emit some GHGs.

8.4.3 MITIGATION MEASURES

8.4.3.1 In the course of the work

GHGs emitted in the course of the work will be compensated. An annual emissions balance will be calculated based on the number of kilometers covered by machinery, material transport, and cut operations. Compensation could be in the form of carbon credit purchases or independent projects. Some incentive measures will be included in the Request for Proposals.

8.5 VEGETATION (WETLANDS, AQUATIC GRASS BEDS, FLORAL STATUS SPECIES, EES)

8.5.1 SENSITIVE AREAS

The study area is occupied almost exclusively by anthropic environments such as highway infrastructure, buildings and construction sites for the New Champlain Bridge. The floral habitat area is therefore very limited. The most sensitive environments in the work sector are the riverside marshes located under the high water level on the east bank of Nuns' Island, and the aquatic grass beds.

8.5.2 IMPACT DESCRIPTION AND CONTEXT

Vegetation and wetlands will be affected in the pre-deconstruction, deconstruction and post-deconstruction phases by the following activities:

- Site mobilization and temporary facility construction;
- Stripping and tree removal;
- Excavation, grading;
- Work in an aquatic environment (deconstruction and post-deconstruction);
- Site demobilization and dismantlement of temporary facilities.

Jetty construction will result in the loss of a bit more than 1,000 m² in the riverside marshes (sensitive environment). The work will also lead to a very slight loss of vegetation in non-sensitive habitats. We noted some rough bugleweed near the location of the Brossard side jetty, and St. Lawrence bugleweed just north of the Nuns' Island jetty. The St. Lawrence bugleweed observed offshore from Nuns' Island were possibly affected by construction of the Seaway jetty.

Water quality degradation (e.g., significant increase in turbidity) could momentarily disturb the riverside marsh vegetation and aquatic grass beds.

8.5.3 MITIGATION MEASURES

The following subsections present the principal mitigation measures to be put in place to protect the vegetation.

8.5.3.1 Before the work begins

Protection of vegetation:

- The areas planned for worksite development must be located, on a priority bases, on sites already cleared or disturbed when such sites exist.

Protection of special status species:

- Cordon off the areas where special status plant species are present, and prohibit access to them in the course of the work;
- Prior to starting the work, transplant specimens that could be affected by the work to a sector that will not be disturbed.

Protection of wetlands:

- Design structures in compliance with federal policy on wetland conservation by following the order of priority: avoid, minimize, compensate for losses. If required, prepare a compensation plan including creation, improvement, or preservation of wetlands with equivalent ecological function;
- Temporary facilities are prohibited in wetlands for storage, parking, turnaround, or work areas. These facilities must be installed on solid ground. Should it be impossible to do otherwise, the location and work method for such sites, and the dismantlement and rehabilitation of the temporary sites in wetlands, must be subject to specific studies by environmental specialists. The rehabilitation plan must provide for comprehensive restoration of the disturbed surfaces, by removal of all materials and reestablishment of soil and drainage conditions to enable the sites to be re-colonized by the vegetation.

8.5.3.2 In the course of the work

Protection of vegetation:

- Cordon off a perimeter to protect the trees and bushes to be preserved;
- The contractor will have to take all necessary steps to preserve the trees and bushes whose preservation is provided for in the drawings and specifications from any damage or mutilation;
- The trees to be cut down will be selected by the supervisor. The contractor must receive authorization from the supervisor before proceeding with felling;
- Stump removal work consists of removing stumps to a depth of 300 mm below the surface. The contractor must avoid damaging the land or root areas of trees and bushes, and must restore the damaged surface;
- Clearing the work areas of interfering branches must be done on all trees with branches located in the equipment maneuvering area that risk being damaged during the work. Branches are considered interfering when there is no practical alternate solution applicable to the land to preserve them. In the case of trees situated outside the footprint with interfering branches that need to be pruned, written authorization must be obtained from their owners before commencing any pruning work or arboreal treatment.

Protection of wetlands:

- Spills of waste, oil, chemicals, or other contaminants from a construction site into a lake, river, stream or wetland are prohibited. The contractor must dispose of such waste and contaminants in accordance with existing laws and regulations based on the nature of the contaminant.

Site restoration:

- It will be important to emphasize indigenous flora species for re-naturalisation and to seed and plant quickly to prevent colonization by invasive species;
- When the project is complete, the work areas will be seeded and reforested with indigenous species (bushes, plants and trees), if safety permits. Special attention will be paid to river bank naturalization to recreate conducive habitats, including fauna among others;
- Limit encroachment on river banks up to the natural high water line (two-year return), and replant the riverside strip beginning at the encroachment boundary using recognized plant engineering techniques promoting overhanging bush and grass strata. Replanting will have to be done as quickly as possible after grading work is finished, using indigenous species by preference.

8.5.3.3 After the work is completed

Plant regrowth will be monitored for two years after the project is over. Survival ratios will be calculated and new vegetation will have to be planted if this ratio falls below 90%.

The fish habitat compensation projects currently under study plan to create one or more calm water habitat developments (flood plain or riverside marsh). Such developments will therefore include a wetland portion, which will help compensate the functions of the 1,041 m² of wetlands temporarily encroached upon by the jetties.

8.6 ICHTHYOFAUNA AND AQUATIC HABITATS

8.6.1 SENSITIVE AREAS

The entire sector of the St. Lawrence River in the work areas is considered fish habitat, and therefore a sensitive area. Habitat sensitivity varies depending on the species of fish inventoried in a particular system. The habitats that the DFO considers sensitive and non-sensitive in the work zone are as follows:

- Sensitive: 1, 2, 3, 4, 6, 8, 12, 13, 13a, 14, 16, 18, 21 and 22;
- Non-sensitive: 1a, 5, 7, 9, 10, 11, 15, 17, 19, 20, 23 and 24.

Habitats considered sensitive are those with aquatic vegetation (2, 4, 6, 8, 12, 14, 16 and 18), with habitat conducive to lithophilous species spawning (3, 13, 13a, 21 and 22) and with flood plain habitat (1). Encroachment areas in sensitive habitats are presented in subsection 6.4 of this study.

8.6.2 IMPACT DESCRIPTION AND CONTEXT

The project will cause serious damage to fish habitat that will be subject to the mitigation measures described in subsection 8.6.3. The impacts will mainly be caused by temporary jetty encroachment into the fish habitat deemed sensitive throughout the course of the work (approximately three years), by probable water quality degradation, and by potential alteration of water balances in the course of the work (e.g., impact on fish migration).

Fish habitat will be affected in the pre-deconstruction, deconstruction and post-deconstruction phases by the following activities:

- Site mobilization and temporary facility construction;
- Stripping and tree removal;
- Excavation, grading;
- Work in an aquatic environment (deconstruction and post-deconstruction);
- Waste and hazardous material management (all phases);
- Machinery transport, operation and maintenance (all phases);
- Site demobilization and dismantlement of temporary facilities.

According to the most pessimistic scenario, all the work planned in the context of this project (pre-deconstruction, deconstruction and post-deconstruction) will result in serious damage to fish habitat on the order of 6.5 ha.

The presence of jetties and other temporary structures is likely to alter flow velocities and affect fish migration in the study area. Work-related noise and vibration could result in fish avoiding the work areas that generate noise and vibration.

As described in subsection 3.2.2.1.4.8 of Volume 1 of this study, seven species of fish with special status were recently identified in the study area. They include the American shad, American eel, Striped bass, Cutlip minnow, Copper redhorse, Lake sturgeon and Rosyface shiner. These species could be affected in the same way as the others.

Work in an aquatic environment for jetty construction and deconstruction of piers and footings, among other things, is likely to result in re-suspension of sediment in the river water. Use of jetties in the river could carry soil particles and contaminants into surface water through runoff or pumping of water from excavations. Accidental petroleum hydrocarbon leaks from machinery could also result in surface water contamination and fish habitat disturbance.

8.6.3 MITIGATION MEASURES

Since they are closely linked, most of the mitigation measures that apply to surface water quality also apply to fish habitat. As in subsection 8.2, the following sections present the DFO's primary mitigation that are complementary to those presented by Dessau-CIMA+ in the 2013 EA. A few important measures specific to fish habitat are also added.

8.6.3.1 Before the work begins

Temporary structures:

- Design temporary structures to withstand flooding likely to occur during the work period, and to prevent river bank and riverbed erosion problems.

Control erosion and sediment suspension:

- Minimize tree removal on both sides of the high water line as much as possible and preserve plant cover as long as possible before the work begins.

Measures specific to ichthyofauna and aquatic habitats:

- Depending on the size of the jetties, provide built-in migration corridors. Flow velocities inside the Nuns' Island jetty corridors must be between 0.8 and 1.2 m/s in flood flow. Water depth must be between 0.6 m and 1.0 m for the same periods. Blocks of shelters, thresholds, groynes and deflectors should also be created to generate more roughness in the migration corridors thereby helping to reduce velocities in heavy flow periods, but such additions must not impede the passage of fish in the slowest flow periods. No minimum flow velocity is required in low-water season. Lastly, a minimum depth of 40 cm is required in the corridors during the minimum flow period; there is no minimum flow. Flow must be maintained in the corridors at all times to produce a downstream water draw.

8.6.3.2 In the course of the work

Temporary structures:

- Use jetties that minimize encroachment on fish habitat;
- Limit the cumulative encroachment of temporary structures to one-third of the width of the river, measured from the MHWL to restrain the flow-restriction increase in current velocity, thereby avoiding impeding the free passage of fish and erosion problems;
- In the present case, the Lesser La Prairie Basin and the Greater La Prairie Basin are considered two separate bodies of water. Temporary structure cumulative encroachment can therefore be a maximum of one-third of the width of each basin, unless otherwise agreed with the DFO;
- Stabilize temporary structures so that they can withstand flooding likely to occur during the work period, and to prevent river bank and riverbed erosion;
- Give preference to work methods that improve the quality of the water to be managed (e.g., rock fill bottoms of excavations, pits and resurgences, put blinding slabs in place, etc.);
- Take the necessary steps to waterproof coffer dams and minimize the quantities of water to manage.

Control erosion and sediment re-suspension:

- Keep stripping, clearing, grading and leveling in work areas to a strict minimum;
- Put in place effective measures to limit sediment contribution from the site to the aquatic environment and maintain them (e.g., sediment barriers, berms, sediment traps, sedimentation basins, temporary talus stabilization, divert water toward vegetation areas). These measures must remain effective during periods of flooding, heavy rainfall, and freezing;

- Dispose of cut material beyond the high water line. Contain or stabilize this material (e.g., impermeable tarpaulin, sediment barrier) if required to prevent sediment from migrating into the aquatic environment;
- When work has to be done in the water, give preference to isolating the work area so work can be done dry or limit migration of sediment into the aquatic environment (e.g., coffer dams, diking and pumping, temporary diversion, turbidity curtain);
- Use turbidity curtains to enclose the work area to contain sediment in suspension. Use deflectors, if necessary, to help maintain the turbidity curtains

Temporary site closing:

- Temporarily stabilize and protect disturbed soil that presents a risk of erosion and sediment transport into the aquatic environment using methods adapted to the site, the duration of the site closing, and a period of one year;
- Divert runoff water before it reaches the disturbed soil (e.g., intercepting ditch and ditch to dissipate water toward vegetation zones);
- Ensure that the measures in place to limit transport of sediment from site into the aquatic environment are operating adequately, and that they are maintained before the daily site closing.

Measures specific to ichthyofauna and aquatic habitats:

- Respect the work restriction period based on the type of sensitive habitat:
 - Type 2, 4 and 8 habitats: April 1 to August 1;
 - Types 12, 13, 16 and 22 habitats: April 1 to July 1;
 - Other habitats: No restriction period.
- Recover all captive fish in a coffer dam enclosure and release them immediately into the aquatic environment to prevent fish mortality;
- Put a structure (e.g., filter screen) in place at the pumping line inlet to prevent fish from being aspirated.

8.6.3.3 After the work is completed

To comply with the Fisheries Act, a compensation plan approved by Fisheries and Oceans Canada will be put in place to mitigate the serious damage cause to fish and their habitat, in particular by temporary jetty encroachment throughout the course of the work (approximately three years). A few compensation plans are currently under study. As soon as one or more of these projects is selected, development details will be prepared and will be included in the authorization requirements issued by the DFO by virtue of the Fisheries Act. The methods for monitoring these developments after the work is completed are presented in subsection 7.3.1 of this study.

8.7 HERPETOFAUNA

8.7.1 SENSITIVE AREAS

The following areas are deemed sensitive for herpetofauna:

- Seaway dike;
- Nuns' Island.

Both sectors are frequented by the Brown snake, a special status species. These sectors are terrestrial environments under the bridge structure and adjacent land, which will form part of the site area.

8.7.2 IMPACT DESCRIPTION AND CONTEXT

In the course of the project, herpetofauna will be affected by the work itself and by the loss of habitat during all phases of the following project activities:

- Site mobilization and temporary facility construction;
- Stripping and tree removal;
- Deconstruction of the Existing Champlain Bridge;
- Site demobilization and dismantlement of temporary facilities.

The habitat of the Brown snake – a species likely to be designated threatened or vulnerable in Québec – in the work area footprint will be disturbed. Furthermore, and there is a risk of mortality for this species as well as other herpetofauna species. Hibernations sites could be uncovered during the cold season.

8.7.3 MITIGATION MEASURES

8.7.3.1 Before the work begins

To minimize the risks of mortality, the Brown snake population will be relocated to a similar habitat nearby before the work begins. The work area perimeters will be protected by a barrier to prevent them from returning. The barriers will also be effective for some mammals and other herpetofauna species.

8.7.3.2 In the course of the work

The measures put in place before the work begins will prevent the major portion of the impacts on herpetofauna. The barriers will have to be maintained in the course of the work, and the personnel involved will have to be made aware. If a hibernation site becomes uncovered in the cold season, the competent authorities will have to be notified immediately.

When the project is completed, the work areas will be re-naturalized to recreate habitats conducive to herpetofauna, and their hibernation sites.

8.7.3.3 After the work is completed

The Brown snake relocation will have to be monitored over time. Biannual monitoring over a period of four years will confirm that the brown snakes are well adapted to their new habitat. This study should also include the hibernation sites designed as part of the New Bridge construction project.

8.8 AVIFAUNA

8.8.1 SENSITIVE AREAS

The following areas are deemed sensitive for avifauna:

- The migratory bird sanctuary on the Couvée Islands (*Migratory bird sanctuary regulations*, ECCC);
- The waterfowl concentration area on Nuns' Island (Act respecting the conservation and development of wildlife, MFFP);
- The Peregrine falcon nesting site on the Existing Champlain Bridge;
- The Cliff swallow colony on the Existing Champlain Bridge;
- The rocky islets near Nuns' Island.

The sensitive areas for the Peregrine falcon lie mainly around the sites chosen to install nesting boxes. Early in the season the sensitive area extends to a radius of 200 m around each falcon nesting box. Attention must also be paid to structural elements that could represent a potential nesting site, such as a platform protected from precipitation by a second structural element. Once the nest location is well established, the sensitive area will be limited to the active nesting site.

The sensitive areas for the Cliff swallow are primarily all the nesting sites habitually colonized under the deck of the Existing Champlain Bridge. As mentioned, JCCBI will prepare an ecosystem management plan that will be subject to monitoring over a period of five years.

8.8.2 IMPACT DESCRIPTION AND CONTEXT

In the course of the project, avifauna will be affected by the work itself and by the loss of habitat during all phases of the following project activities:

- Site mobilization and temporary facility construction;
- Stripping and tree removal;
- Deconstruction of the Existing Champlain Bridge;
- Loss of infrastructure;
- Site demobilization and dismantlement of temporary facilities.

Deconstruction work will result in the temporary or permanent loss of terrestrial and aquatic avifauna habitat. Birds frequenting the sector could also be disturbed during the nesting period, which extends from mid-April to mid-August. Note among other things that the peregrine falcon and swallow regularly nest on the Existing Champlain Bridge. Some rocky islets near Nuns' Island that could be used by the Common tern might also be disturbed during the work.

Furthermore, work in an aquatic environment could disturb the waterfowl who frequent the study area, in particular in the area of the Couvée Islands bird sanctuary and the waterfowl concentration area of the Greater La Prairie Basin. Such disturbances could also extend to the aquatic grass beds serving as habitats, feeding and shelter areas for bird migration – a critical time for these populations.

8.8.3 MITIGATION MEASURES

8.8.3.1 Before the work begins

Preliminary engineering will need to take into account the impacts on birds, in particular when the type of structure is chosen. For example, the following items should be considered:

- No terrestrial encroachment is permitted into the Couvée Islands migratory bird sanctuary (MBS);
- The presence of birds that could be nesting on the Existing Champlain Bridge and small rocky islets near Nuns' Island should be verified before work commence to avoid disturbance and incidental catches;
- Work with the ECCC Peregrine falcon reestablishment team to develop an appropriate approach to installing nesting boxes. As late as possible before deconstructing the bridge, relocate the existing nesting boxes and install new artificial nesting boxes for the peregrine falcon under the New Bridge structure or in a conducive site nearby to limit potential conflicts between bridge maintenance and repair work and species nesting. The choice of location should be coordinated between the parties to minimize the deconstruction impacts;
- Before mid-April of every year, in the sectors covered by deconstruction during the nesting period, remove the old nests and install nets covering the bottom of the deck and girders to prevent cliff swallows from building new nests.

8.8.3.2 In the course of the work

Some mitigation measures will be put in place at the outset of the work to avoid destruction or disturbance of nests, eggs and birds, namely:

- Avoiding undertaking potentially destructive or disturbing activities during sensitive times and locations (normally vary from mid-April to mid-August) to reduce the risk of impact on the birds, their nests and their eggs;
- Developing and implementing appropriate preventive and mitigation measures to minimize the risk of incidental catches, and to help maintain viable migratory bird populations;
- Work on or near the Couvée Islands bird sanctuary will have to be carried out in accordance with ECCC requirements. No terrestrial encroachment is permitted in the MBS;

- Special attention will have to be paid to the protection of Common tern reproduction sites (small rocky islets near Nuns' Island);
- Managing, relocating and adding falcon nesting boxes as needed, depending on the activity sectors. Retain the services of a bird of prey expert to advise the contractor, to promote cohabitation between workers and this species;
- Obtain a permit from the MFFP for work involving the peregrine falcon if necessary and comply with the conditions;
- Verify Peregrine falcon nesting on the bridge before beginning deconstruction. If there are birds nesting provide an exclusion zone, appropriate to the nesting stage, of 250 m centered on the nest until the young finally leave the nest;
- Special attention shall be paid to protecting Cliff swallow nests, and specific measures will have to be established to avoid disturbing nesting. When nesting is confirmed, provide an exclusion zone of 20 m radius centered on the nest until the young finally leave the nest. To provide for work scheduling during the nesting period in a sector marked by the presence of nests, specific anticipatory measures can be applied, such as installing nets, in cooperation with experts, to prevent the onset of cliff swallow nesting in work zones;
- Throughout the nesting season (2020 through 2023), conduct periodic behaviour monitoring of the Peregrine falcon pair and Cliff swallow colony to assess the effectiveness of the measures put in place for inducing their relocation to the New Bridge.

8.8.3.3 After the work is completed

Continue monitoring the behavior of to the Peregrine falcon pair and cliff swallow colony for at least two nesting seasons after the work is completed (2024 to 2025) to ensure the sustainability of the measures put in place to induce their nesting on the New Bridge.

8.9 BATS

No sensitive areas or significant impacts on bats were identified, so no special measures appear to be necessary for this component.

8.10 SPECIAL STATUS FAUNE SPECIES

The sensitive areas, impact description and mitigation measures for special status species were addressed in the sections on the various fauna species.

8.11 COMMERCIAL NAVIGATION

8.11.1 SENSITIVE AREAS

The following zone is deemed sensitive for commercial shipping:

- Seaway channel.

8.11.2 IMPACT DESCRIPTION AND CONTEXT

In the course of the project, the work could impinge on the Seaway channel and commercial shipping could be affected throughout all project phases by the following activities:

- Maintaining traffic and navigation, installation of signage;
- Excavation and grading;
- Deconstruction of structures;
- Work in an aquatic environment;
- Machinery transport, operation and maintenance.

Infringements caused by deconstruction could reduce the Seaway clearance. Work on and near the dike may reduce its watertightness.

8.11.3 MITIGATION MEASURES

8.11.3.1 Before the work begins

JCCBI and the SLSMC will need to negotiate a memorandum of understanding to define the terms and conditions associated with work on the dike and above the Seaway while maintaining safe commercial shipping.

8.11.3.2 In the course of the work

The terms and conditions agreed to will have to be implemented throughout the duration of the work, including maintaining navigation clearance.

8.12 RECREATIONAL ACTIVITIES, TOURISM & PLEASURE BOATING

8.12.1 SENSITIVE AREAS

The following areas are deemed sensitive for recreational activities, tourism and pleasure boating:

- Bicycle paths along the South Shore and Seaway dike;
- Lesser La Prairie Basin;
- Greater La Prairie Basin;
- Bicycle paths on Nuns' Island;
- The northeast Nuns' Island littoral.

8.12.2 IMPACT DESCRIPTION AND CONTEXT

Recreational activities, tourism and pleasure boating will be affected throughout the project phases by the following activities:

- Site mobilization and temporary facility construction;
- Maintaining traffic and navigation, installation of signage;
- Stripping and tree removal;
- Deconstruction of structures;
- Work in an aquatic environment;
- Machinery transport, operation and maintenance.
- Site demobilization and dismantlement of temporary facilities.

The work areas could continue to impinge on the bicycle paths that traverse the project footprint on Nuns' Island and in Brossard. Traffic on the Seaway dike bicycle path is also apt to be interrupted sporadically in the course of the work. Working in the water will result in limiting pleasure boating and fishing next to the bridge.

Blue Route itineraries (Lesser La Prairie Basin and Nuns' Island) and Saute-Moutons will be affected. Passage beneath the structures being deconstructed will be prohibited at certain times; as a result, the practice of terrestrial and aquatic recreational activities will be interrupted at such time in the sectors in question.

It is also highly likely that there will be a significant number of ships on the river during the work period, bringing materials, workers and barges, A navigation management plan will have to be put in place.

8.12.3 MITIGATION MEASURES

8.12.3.1 In the course of the work

Some mitigation measures will be implemented during the project, including:

- Advising bicycle path users of safe detours and closing periods via a Website that publishes news bulletins, and providing a link to concerned organization such as Vélo Québec. Providing one or more buoyed channels for safe passage of pleasure boats, and having the necessary shipping notices issued via the GCC's Communication and Maritime Traffic Services;
- Install the equipment needed to mark out navigation lanes and indicate bicycle path detours, to ensure safe traffic for cyclists and pleasure boaters;
- Issue notices to pleasure boaters with regard to temporary and permanent interferences;
- Remove bridge piers in a way that will not cause any obstacle to pleasure boating.

TC's Navigable Waters Protection Program will ensure compliance with the terms and conditions issued in authorizations by virtue of the Navigable Waters Protection Act. Site visits will be conducted to ascertain mitigation measure conformance and to required adjustments as needed to ensure safe navigation.

8.12.3.2 After the work is completed

After the piers are deconstructed, bathymetric surveys will be performed to make sure that traces of the piers are not causing obstacles to navigation. This information will be forwarded to GCC.

8.13 NOISE ENVIRONMENT

8.13.1 SENSITIVE AREA

In the area surrounding the project, multiple noise sensitive areas were identified, composed of either residential or mixed residential and commercial.

8.13.2 IMPACT DESCRIPTION AND CONTEXT

Noise will be generated during three activity periods:

- Construction of the jetties (Nuns' Island, Seaway and Brossard);
- Deconstruction of the bridge;
- Removal of the jetties (Nun's Island, Seaway and Brossard).

Noise generated from the construction and removal of the jetties is expected to occur 24 hours per day during a short period of time at the beginning (4 months) and end (4 months) of the deconstruction project. Heavy trucks will be working also 24 hours per day to either transport material to site or remove it from site.

Noise will also be generated from deconstruction activities that will involve conventional demolition, cranes on barges, on-land demolition in one of the four mobilization areas.

It is expected that noise from the mobilization areas will be due mainly to the use of heavy equipment on site for the deconstruction of larger sections during daytime, while loading of trucks and transportation of site is expected to occur during daytime and evening periods.

8.13.3 MITIGATION MEASURES

Mitigation measures may be required for certain activities in order to minimize noise impacts in the neighbouring communities. Noise mitigation measures must be designed by taking into consideration not only the performance criteria but also specific activities.

8.13.3.1 Before the work begins

Before proceeding with the deconstruction and after the New Bridge construction has been completed, a campaign of measurements must be undertaken in the noise sensitive areas identified in order to collect updated baseline noise levels. Before proceeding with the site- and activity-specific modeling of noise in the neighbourhoods affected, mitigation measures (administrative or physical) must be designed to minimize noise impacts. Administrative measures target the organization of the works, whereas physical measures involve such things as using barriers or quieter equipment.

8.13.3.2 In the course of the work

Here are some examples of generic mitigation measures that can be applied if necessary:

- Work during the evening and night periods will be planned to progress with the quieter work;
- Plan the noisiest work during the least sensitive periods (e. g. during the day);
- Prohibit noisier equipment near sensitive areas;
- Encourage quieter working methods or soundproof or electrical equipment, where possible;
- Ensure that the equipment used is equipped with a good quality silencer in working order;
- Ensure that the equipment used on the site is in good working order;
- Limit the power of the equipment used to what is necessary;
- Limit the number of equipment on the sites to what is necessary for the activities;
- Set up variable intensity back-up alarms (adjusting to ambient noise) and, if possible, provide a back-up alarm only for equipment covered by the Safety Code for Construction Work (R.R.Q., c. S-2.1, r. 6) of the Act respecting occupational health and safety (R.S.Q., chapter S-2.1, a. 3.10.12).

Here are some examples of mitigation measures that can be used to limit the propagation of noise from a construction site:

- Installation of temporary fixed noise barriers, at the edge of the site, or mobile on certain equipment;
- Installation of canvases or acoustic curtains;
- Use of construction site trailers or heavy vehicles as noise barriers;
- Increasing the distance between noisy equipment and noise-sensitive areas;
- Encourage traffic organization on the site to minimize the use of audible back-up alarms.

In the event of noise complaints, a complaint tracking system will allow the mediator to intervene as quickly as possible with the complainants and the contractor, and thus apply the necessary corrective measures.

8.14 TRAFFIC

8.14.1 SENSITIVE AREAS

The sensitive area in terms of traffic is primarily:

- Nuns' Island.

8.14.2 IMPACT DESCRIPTION AND CONTEXT

Roads that will be used by trucks to carry materials are already saturated. While the number of trucks per day is not relatively large with respect to the total vehicular flow on these roads, the fact that these trucks move at reduced speed can increase congestion, especially if they are traveling at peak hours. Traffic will be affected by the following project activities:

- Maintaining traffic and navigation, installation of signage;
- Excavation and grading;
- Deconstruction of structures;
- Work in an aquatic environment (jetty installation and pier deconstruction);
- Machinery transport, operation and maintenance;
- Work in an aquatic environment (jetty removal).

8.14.3 MITIGATION MEASURES

8.14.3.1 Before the work begins

Before the work begins, it will be especially important to implement measures aimed at setting up adequate signage to inform users of traffic obstructions:

- Before the work begins and in the course of the work, the contractor will have to take the necessary steps to facilitate and direct the movement of vehicles on the road and on the detour roads required in the course of the work;
- Mobile variable message signs (mobile VMS) will have to be operational throughout the duration of the work to inform users in real time about traffic conditions and bottlenecks;
- The public will be notified about the work and any occasional detours. Alternate routes will be proposed.

A truck movement management plan will also be prepared and implemented during the work:

- PJCCI and the contractor will work together to develop a traffic management plan to optimize traffic flow on the road network adjacent to the project; partners such as the boroughs and the MTQ will also be consulted;
- JCCBI and the contractor will work in cooperation to develop a traffic management plan in the sectors adjoining the project for trucks mobilized during the deconstruction phase. Measures that could be included in this plan are: transport outside peak periods (for example, between 10:00 a.m. and 3:00 p.m. or from 7:00 p.m. to 5:00 a.m.), avoiding local roads and use of predefined circuits to avoid residential quarters.

In addition to this management plan, the mitigation measures to be monitored are:

- Bridge deconstruction materials: transport between 10:00 a.m. and 3:00 p.m. or from 7:00 p.m. to 11:00 p.m. to avoid peak periods and nighttime;
- Transport only on working days (Monday to Friday) and avoid holidays;
- Limit the length of closures on René-Lévesque Blvd. under the Existing Champlain Bridge during bridge deconstruction, and implement these closures only at night or on weekends. Limit transport of bridge deconstruction materials during these closures;
- Limit the length of closings of Highway 132 under the Existing Champlain Bridge during bridge deconstruction, and implement these closures only at night or on weekends. Limit transport of bridge deconstruction materials during these closures;
- Use signalers to manage truck entrances and exits from work zones;
- Reduce the speed limit around the work area;
- Use the lower impact routes identified on the Figure 51 (trajectory in blue), the Figure 52 (trajectory in yellow), the Figure 53 (trajectory in red) and the Figure 54 (trajectory in yellow), other than in exceptional cases.

8.14.3.2 During construction

The same measures will continue or will be put in place during construction. A Good Neighbour Committee will be set up to monitor mitigation measure effectiveness.

9 PROJECT'S COMMUNITY BENEFITS

9.1 MATERIALS RECLAMATION

In the draft version of the *2019-2022 Federal Sustainable Development Strategy* (ECCC, 2018), one of the targets of the second goal of *Government greening* is to divert by 2030 at least 90% by weight of the construction and demolition waste from federal government projects. JCCBI is adopting the above target for the deconstruction of the Existing Champlain Bridge.

JCCBI's intention regarding the diversion of construction waste involves the recovery of materials in the following order:

- Maintain bridge components in place (in relation to the development of assets covered in 9.2);
- Maximize opportunities for integrating Existing Champlain Bridge components in artistic, cultural, research or infrastructure projects (reuse);
- Recovery of materials through local recycling;
- Recovery of materials through non-local recycling;
- Recovery of materials as part of daily recovery at engineering landfill sites (ELS);
- Disposal at an ELS.

This order is part of a logical process of GHG emission reduction by limiting the transformation and transportation of part of the construction debris.

It is estimated that the project will mainly generate the following waste:

- Concrete: 250,000 tonnes;
- Steel: 25,000 tonnes;
- Asphalt: 12,000 tonnes.

In addition, approximately 450,800 tonnes of material will be required for the construction of the three jetties.

Summary studies conducted in this respect suggest that almost all of the above waste can be recycled in Montreal, and that the 90% diversion target by weight can be attained. This diversion of materials from landfill sites is a major collective benefit by minimizing pressure on existing sites and thus deferring the need to expand existing sites or open new ones.

Furthermore, JCCBI intends to first offer certain bridge components to organizations that may use them for purposes of research, public or private infrastructure projects, or artistic projects. Following calls for interest, JCCBI intends to identify the components to be removed during the deconstruction work in order to temporarily store them. The final reuse of these components will be determined by way of open competition (e.g. research centres, artists, municipalities, private contractors). The proponents of the selected projects would then take delivery of the components at the temporary storage site.

Another form of material recovery would be to keep certain bridge components in place as a historical reminder or to be transformed for new uses. This form of recovery is covered in the next section on asset development.

9.2 ASSET DEVELOPMENT

The term “asset development” refers to the development of areas left vacant following the deconstruction of the Existing Champlain Bridge. It also covers the various options for keeping bridge components in place as a historical reminder or to be transformed for new public uses.

The principles guiding JCCBI for asset development are taken from the following goals and targets in the draft version of the *2019-2022 Federal Sustainable Development Strategy* (ECCC, 2018):

- Greening government:
 - Waste management (diversion of 90% of construction waste).
- Pristine lakes and rivers:
 - St. Lawrence Action Plan 2011–2026 (biodiversity conservation).
- Healthy wildlife population:
 - Protection of priority species and migratory birds.
- Connecting Canadians with nature:
 - Encouraging contact with nature.

Although the asset development project as such will be separate from the Existing Champlain Bridge deconstruction project, a close link is maintained between the two projects so that some components to be maintained for enhancement purposes are not deconstructed. For instance, note that some pier sections may have to be kept in place, as mentioned in Chapter 2, Volume 1.

Public consultation will help specify the nature of the structures to make sure they are harmoniously integrated into adjacent structures and uses. This initiative will create tangible benefits for neighbouring communities and the population in general by opening up new public spaces that are well integrated into the environment.

9.3 ENVISION CERTIFICATION

To have environmental protection efforts recognized by an independent third party as well as ensure economic and social benefits for communities, JCCBI intends to submit the Existing Champlain Bridge deconstruction project to the Envision sustainable development certification protocol. This protocol is particularly well suited to major infrastructure projects, as shown by the platinum certification awarded to the Existing Champlain Bridge, but its application to a deconstruction project is a first. By aiming for such certification, JCCBI intends to objectively demonstrate the “sustainable” results of its Existing Champlain Bridge deconstruction project.

9.4 RESEARCH AND DEVELOPMENT

JCCBI wishes to take advantage of the Existing Champlain Bridge's deconstruction phase to conduct an R&D project focused on specific elements of the existing bridge. As part of this initiative, JCCBI plans to submit certain bridge components to research entities for use in research projects that would directly benefit the improvement of JCCBI's structures. These research projects will also benefit Canada's infrastructure community.

The deconstruction of a major bridge that was affected by peculiar defects will also provide a unique opportunity to conduct experimental studies on actual-scale concrete and steel components that have already been exposed to real-life conditions and typical operations in a northern climate. This will enable R & D teams to analyze several deterioration and durability issues affecting infrastructures in general, and JCCBI's infrastructure in particular. Lastly, a range of innovative strengthening and rehabilitation techniques implemented in the Existing Champlain Bridge's components will also be analyzed as part of these research projects.

10 DFO AND TC CONSULTATIONS

The following federal authorities will be asked to comment on this targeted environmental analysis report:

- Fisheries and Oceans Canada;
- Transport Canada.

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