



Parks Canada Basic Impact Analysis

Environmental Impact Assessment Version Control

This section serves to control the development and distribution of revisions to the Environmental Assessment.

Revision Number	Amendment Number	Date	Brief Description of Change
0		2016-09-27	Original
1	1	2016-12-07	Revised Project Description to reflect revised scope. Removal of some mitigation measures because previously planned in-water work has been eliminated from the project scope.
2	2	2017-09-06	Revised Scope (to include only 60m excavated section of wall, references and mitigation measures added regarding contaminated sediment.
3	3	2018-06-18	Updated with a project description and associated information for a new geographic location slated for wall rehabilitation, referred to as the 'Echo Drive' location.
4	4	2019-07-15	Updated with a project description and associated information for a new geographic location slated for wall rehabilitation, referred to as the 'Clegg Street' location.



Basic Impact Analysis

Ottawa Walls Concrete Rehabilitation
Clegg Street Area (Interim Repairs)
Rideau Canal, Ottawa, ON



July 2019



1. PROJECT TITLE & LOCATION

The project title is Ottawa Walls Concrete Rehabilitation, Rideau Canal, Ottawa, ON.

The Clegg Street location is south of highway 417, slightly upstream of the construction zone for the Flora Footbridge that connects 5th Avenue and Clegg Street. This section of concrete wall rehabilitation is approximately 57 m in length. The upland portion of the site is a strip of land between the canal and Colonel By Drive on the east side of the canal. Parks Canada owns the first 10 ft of the upland but this is leased to the National Capital Commission (NCC). An asphalt multi-use pathway runs adjacent to the canal.



Figure 1. The extent of proposed work at the Clegg Street location is indicated by the red line.

2. PROPONENT INFORMATION

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3. PROPOSED PROJECT DATES

Planned commencement: **October 2019**
Planned completion: **May 2020**

4. INTERNAL PROJECT FILE

Ottawa Walls Concrete Rehabilitation is Project #343



5. PROJECT DESCRIPTION

This Basic Impact Analysis (BIA) is built upon a BIA completed for concrete wall rehabilitation projects between 2015-2016 and 2016-17 on different sections of the Rideau Canal walls in Ottawa. The BIA was updated in 2017 to include additional impact analysis that was required to address the potential effects of contamination for the Pig Island site. It was again updated in 2018 to focus on the construction of a new section of concrete wall in the Echo Drive area. This version of the BIA includes site-specific information for interim repairs at the Clegg Street project site. This BIA may be amended in upcoming years to address similar concrete wall rehabilitation projects on the Rideau Canal in Ottawa.

There are approximately 18 km of concrete walls on the Rideau Canal located within the City of Ottawa. These walls have undergone various phases of repairs and rehabilitation since original construction. Currently there are approximately 5 km of wall sections in very poor to poor condition that have been identified for future work.

The current phase of concrete wall rehabilitation is focused on the Clegg Street area (see Figure 1). This 57 m section of vertical concrete shorewall is between Clegg Street on the north side and Mutchmor Road on the south side (see Photos 1 and 2). The wall is rotating (leaning) towards the water from the top of the wall to the canal bed and this has caused significant issues with the adjacent multi-use pathway (see Photo 3). This area of the pathway was closed in 2018 due to safety concerns and the path re-routed closer to Colonel By Drive. The proposed project is to repair a 57 m section of wall, which will entail replacing the top 850mm portion of the wall with new concrete, together with an additional 1000 mm of wall re-facing below. This project is intended as interim repairs until a project for the replacement and rehabilitation of a longer 180 m section of wall at the Clegg Street site can be undertaken.

The project will include the following elements:

- Mobilization, placement of construction fencing, sediment and erosion control measures and site trailer, and preparation of the staging area located on the grassed section between the pathway and Colonel By Drive. A separate grassed area on the opposite side of Colonel By Drive will also be made available to the contractor for staging.
- Protection of all trees within the construction and staging zones.
- Installation of a turbidity curtain or silt curtain around the work pad, as appropriate (this area will be dry or with very minimal water in some areas; see Photo 4).
- The construction of a granular work pad located on the canal bed along the section of wall to be repaired. (Note: the work pad will allow the contractor to complete the work in the dry, above the winter water level). The pad will measure approximately 67 m x 3.6 m, or 241 m² in area. The work pad will be underlain with a layer of geo-membrane to create a barrier layer with potentially compromised sediment. It's expected that small to mid-sized equipment (e.g. a skid steer) will be lowered onto the work pad via use of a crane to facilitate the work. Activities that are not suitable for the work pad are storage of fuels and volatile material and re-fuelling (unless the equipment is stationary and appropriate protective measures are taken).



- Excavation of a trench along the base of the existing wall, between the wall and work pad, to allow for the concrete re-facing portion of the work.
- Excavation and removal of the asphalt pathway
- Excavation of the backside of the wall, limited to the top section of the wall. Due to the presence of a Hydro One 115kV transmission line buried behind the wall, precautionary measures will be necessary for working near/around the high voltage line.
- Capture of water infiltrating into the trench and/or groundwater seepage. Impacted water will need to be treated before discharge (see mitigations in Appendix 2).
- Capture and re-direction of water from the two storm drains located within the project site. It is expected that the contractor will either install drain extensions and direct the flow to the canal side of the work pad, or explore the feasibility of blocking the catch basin for a period of time.
- Removal of the railings and railing posts located in the area of the wall repairs.
- Demolition of the failed section of wall.
- Concrete excavation of the section of wall to be re-faced.
- Concrete work for the wall repair and wall re-facing.
- Backfill of the excavated area and re-instatement of the pathway granular base.
- Installation of new railings and concrete railing posts.
- Asphalt placement of the affected multi-use pathway section.
- Re-instatement of impacted grassed areas.
- Removal of the granular work pad and geo-membrane barrier during the spring drawdown. The geo-membrane and granular will be disposed of at a licensed facility for contaminated waste. It must be noted that the spring drawdown in the month of April is within the restriction period for in-water work in order to protect spawning fish and incubating eggs, therefore there will need to be strict turbidity controls in place for this activity, especially if there is any amount of water in the removal zone.
- Removal of temporary measures (turbidity curtain, tree protection, sediment and erosion control measures, etc).

Construction will be initiated after the canal operating season in October 2019 with wall repairs substantially complete by the end of January 2020, the work pad removed in April 2020 and landscaping completed in May 2020. During construction, the pedestrian pathway adjacent to the canal will be detoured to run along Echo Drive. The width of the work pad will extend into the canal approximately 5% of the canal's width at this location, which will impinge on, but not block the Rideau Canal Skateway during the winter months. One set of NCC stairs that allows access to the skateway will need to be relocated for the 2020 skating season. There will not be any impacts to vessel navigation as the work will be undertaken during the non-navigation season. Impacts to the floodplain are not anticipated as the work will be completed in the non-navigation season when the water levels in the Ottawa reach are lowered.



6. VALUED COMPONENTS LIKELY TO BE AFFECTED

Soil and Landforms

This section of the Rideau Canal passes through the Ottawa Clay Plain, which is a flat, glacial till plain. Soils and landforms surrounding the wall have been historically disturbed by development including residential, transportation, recreational trails and manicured parkland.

Aquatic Resources

During the Rideau River biodiversity project, conducted by the Canadian Museum of Nature, 59 species of aquatic plants were found in the Rideau River (Canadian Museum of Nature, 2001). The most common species found within the canal cut in Ottawa were Coontail (*Ceratophyllum demersum*), Common waterweed (*Elodea Canadensis*), Northern Water Milfoil (*Myriophyllum sibiricum*), Slender Water Nymph (*Najas flexilis*) and Eurasian Water Milfoil (*Myriophyllum spicatum*) (Canadian Museum of Nature, 2001). Eurasian Water Milfoil is a non-native invasive species that was introduced to North America in the 1800s and is one of the most widely distributed aquatic invasive species on the continent (Ontario Invasive Species Awareness Program, 2016).

The Rideau River has a thriving and diverse coolwater fish community. During the 1999-2000 fish community sampling as part of the Rideau River biodiversity project, 35 fish species were identified within the river (Canadian Museum of Nature, 2001). Species found in the reach from Hogs Back downstream to the Ottawa River include: Northern Pike (*Esox lucius*), Muskellunge (*Esox masquinongy*), Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass (*Micropterus dolomieu*), Common Carp (*Cyprinus carpio*) and Yellow Perch (*Perca flavescens*) (Canadian Museum of Nature, 2001).

The project site is within a zone where a timing restriction of January 1st to June 30th applies for in-water work. The reason that the timing restriction starts on January 1st is to protect Burbot (*Lota lota*) which spawn during the winter months. Further review of downstream conditions with an Ontario Ministry of Natural Resources Fisheries Biologist has revealed that key habitat requirements for Burbot do not exist downstream, and thus the timing restriction window of March 15th to June 30th will apply to this project. The closest upstream habitat for Burbot is likely the Long Reach (between Long Island and Burritts Rapids) and the closest downstream habitat is the Ottawa River.

A survey of aquatic invasive species has not been conducted however it is likely that Eurasian Watermilfoil (*Myriophyllum spicatum*) and Zebra Mussel (*Dreissena polymorpha*) occurs either within or in close proximity to the Work Area.

Contamination

Testing conducted in April 2016 confirmed the presence of contamination in both the sediment and the water column in sections of the Rideau Canal immediately upstream and downstream of the proposed work area for 2016 (EnGlobe, 2016). Additional testing was conducted in 2017 by Golder Associates Ltd. (Golder) along the length of the canal cut from Ottawa Locks to Dow's Lake. Exceedances were confirmed similar to Englobe's results along the length of this section, with higher values closest to the northern end of the canal. Results are detailed in Golder's *Sediment and Surface Water Assessment* –



Factual Report - Ottawa Wall Repairs Rideau Canal, Ottawa, Ontario (2017) in Figure 5. The current 57 m section of wall repairs is identified as part of Work Area 9.

As detailed in Golder's Factual Report:

“The primary contaminants of potential concern (COPCs) are metals and petroleum hydrocarbons (including polycyclic aromatic hydrocarbons [PAHs]). Sediment quality guideline (SQG) exceedances of up to one order of magnitude (i.e., 10 x) were observed for lead and mercury, and up to two to three orders of magnitude for individual PAHs such as benzo(a)anthracene, pyrene, and 2-methylnaphthalene. Based on total petroleum hydrocarbon (TPH) concentrations, there is potential for hydrocarbon sheens or vapours to occur when the canal sediments are disturbed.

The highest concentrations were generally in the upper 0.5 m of the sediment profile. In a subset of locations where sediment cores could be obtained, exceedances of SQGs were also observed as deep as 1.2 m for PAHs and 1.7 m for metals. The highest concentrations were also observed in samples collected from Work Areas 1, 2, and 3 at the north end of the Rideau Canal. Consequently, there is greater risk for effects to occur in this area should there be an accidental release of water from the Work Areas, and thus greater need for appropriate controls to be in place.

Non halogenated volatiles (e.g., benzene, toluene, ethylbenzene, xylene) and volatile organic compounds (VOCs; e.g., chlorobenzenes, chloromethanes, chloroethanes) were below or near method detection limits. These parameters were therefore not considered further in this assessment.”

In order to minimize the negative impacts from the disturbance of contaminated sediment during the course of construction activities, Golder also developed a set of environmental performance criteria and mitigation measures to protect human health and the surrounding environment. These criteria and mitigation measures are outlined in the report entitled Environmental Management Planning Considerations - Ottawa Wall Repairs Rideau Canal, Ottawa, Ontario (Golder 2017 – Appendix 5) and will form the basis of this assessment and amended mitigation measures.

There are no known studies of contaminants in soil from the Clegg Street Work Area, however there is a high chance that there are contaminants above guideline levels, based on studies conducted adjacent to the canal in other areas of downtown Ottawa.

Vegetation

The property surrounding the section of Ottawa walls that will be rehabilitated is not in a natural state – it was historically cleared of vegetation for construction and is now primarily asphalt roadway with a small section of lawn with four specimen trees. Of these four trees, three are American Elm (*Ulmus Americana*), and one is a cultivated Maple (*Acer sp.*).

There is a possibility that one or more shrubs growing on the edge of Echo Drive (the opposite side of Colonel By Drive) will be removed in order to accommodate the temporary pedestrian detour. The species and number of shrubs potentially affected is currently unknown. Removal of trees in this area will be avoided.



No critical habitat for at-risk plant species has been identified adjacent to the Ottawa walls.

No invasive species have been recorded on the project site, however Flowering Rush (*Butomus umbellatus*) has been identified nearby.

Wildlife

The area surrounding the Ottawa walls may be used by a variety of aquatic wildlife including frogs, beaver, muskrat, mink, Snapping Turtle and Midland Painted Turtle. Migratory birds also utilize the vegetation adjacent to the canal and waterfowl may use the canal.

Species at Risk

The study area for this project lies inside a zone identified as draft Critical Habitat for the Blanding's Turtle (*Emydoidea blandingii*), which is classified as Threatened under the Species at Risk Act.

Additional species at risk that may be found in the study area, both federally listed species and species listed under the Ontario Endangered Species Act (ESA), have been identified using the Natural Heritage Information Centre (NHIC) database, the Atlas of Breeding Birds of Ontario and the Ontario Reptile and Amphibian Atlas. These species can be found in Table 1.

Basic habitat characteristics for each species have been included in Table 1 and an assessment given as to the likelihood of that species using habitat within the study area.

A SARA compliant Basic Impact Analysis is not required because there will be no residual impact to species at risk (see the Effects Analysis).

Mitigation measures will be employed for species at risk to ensure that individuals and their habitat are protected.



Table 1. Species at Risk with potential to be found within the study area.

Common Name	Scientific Name	COSEWIC	SARA Status	ESA Status	Habitat Potential on Project Site	Preferred Habitat
BIRDS						
Bank Swallow ³	<i>Riparia riparia</i>	Threatened	Threatened	Threatened	Low	Bank swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable. The bank swallow migrates south for the winter, primarily to South America. Migration in U.S. and Canada peaks early-Aug/late-Sept. Spring return typically occurs between mid-March to June. Breeding activity typically occurs between April and August. Map: http://files.ontario.ca/environment-and-energy/species-at-risk/bank_swallow_map_eng.pdf
Barn Swallow ³	<i>Hirundo rustica</i>	Threatened	Threatened	Threatened	Moderate	Nest almost exclusively on man-made structures (bridges, culverts, barns). The species is attracted to open structures that include ledges where they can build their nests, which are often re-used from year to year. They prefer unpainted, rough-cut wood, since the mud does not adhere as well to smooth surfaces. Barn Swallows are long-distance migrants and fly from North American breeding grounds to wintering areas in Central and South America. Migration has been recorded third week of Jul, peaking mid-August, through early Oct, with stragglers through late Oct or early Nov. In southern Canada, adults start to return in the spring by the end of April and the first week of May, but the main influx occurs in mid-May, tailing off in early June. Breeding in Ontario typically takes place between May and August, with Nest construction starting in mid-May in Ontario.



Common Name	Scientific Name	COSEWIC	SARA Status	ESA Status	Habitat Potential on Project Site	Preferred Habitat
						Map (Figure 1): https://www.ontario.ca/page/barn-swallow-recovery-strategy
Bobolink ³	<i>Dolichonyx oryzivorus</i>	Threatened	Threatened	Threatened	None	Bobolink nest in tallgrass prairie and other open meadows, including hayfields. In Ontario, it is widely distributed throughout most of the province south of the boreal forest, although it may be found in the north where suitable habitat exists. Fall migration initiates Late July – early August; returning in spring around mid-May. Breeding in Ontario typically takes place between mid-May and mid-July. Map: http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_bblink_eo_map_eng.pdf
Canada Warbler	<i>Cardellina canadensis</i>	Threatened	Threatened	Special Concern	Low	The Canada Warbler breeds in a range of deciduous and coniferous, usually wet forest types, all with a well-developed, dense shrub layer. Dense shrub and understory vegetation help conceal Canada Warbler nests that are usually located on or near the ground on mossy logs or roots, along stream banks or on hummocks. In Ontario, it is most abundant along the Southern Shield. It winters in South America, departing Canada in August, to return in late-April/early-May for breeding. Breeding activity typically takes place between late-May and early-August. Map: https://wildlife-species.canada.ca/bird-status/dist-dist-eng.aspx?sY=2014&sL=e&sB=CAWA&sM=p1&sD=3240
Chimney Swift ³	<i>Chaetura pelagica</i>	Threatened	Threatened	Threatened	Low	Likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. They also tend to stay close to water as this is where the flying insects they eat congregate. Migrants move south in the late summer/early-fall (August – September), returning to Ontario in late-April, early-May.



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						Breeding activity typically takes place between May and August. Map: http://files.ontario.ca/environment-and-energy/species-at-risk/chimney_swift_map_eng.pdf
Common Nighthawk ³	<i>Chordeiles minor</i>	Special Concern	Threatened	Special Concern	Low	Open, vegetation-free habitats (dunes, beaches, recently harvested forests, burnt-over areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks). Although the species also nests in cultivated fields, orchards, urban parks, mine tailings and along gravel roads and railways, they tend to occupy natural sites. Fall departures initiate in July and continue into fall. Birds generally return in spring by May. Breeding activity typically occurs between May and late-August. Map: https://www.gbr.ca/our-environment/species-at-risk/birds/common-nighthawk/
Eastern Meadowlark ³	<i>Sturnella magna</i>	Threatened	Threatened	Threatened	None	Nest in moderately tall grasslands, such as pastures and hayfields, but also nest in alfalfa fields, weedy borders of croplands, roadsides, orchards, shrubby overgrown fields, or other open areas. Small trees, shrubs or fence posts are used as elevated song perches. In Ontario, the Eastern Meadowlark is primarily found south of the Canadian Shield but it also inhabits the Lake Nipissing, Timiskaming and Lake of the Woods areas. The peak period of fall migration extends from about 21 September through to about 10 November. In southern Ontario, spring migration extends from late March through much of May. Breeding activity typically occurs between May and August. Map: http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_es_me_lrk_map_en.pdf



Common Name	Scientific Name	COSEWIC	SARA Status	ESA Status	Habitat Potential on Project Site	Preferred Habitat
Eastern Wood-pewee ³	<i>Contopus virens</i>	Special Concern	Special Concern	Special Concern	Low	Edges of mixed or deciduous forests, intermediate-aged mature forests. It is most abundant in intermediate-age mature forest stands with little understory vegetation. The Eastern Wood-pewee is a long distance migrant, wintering in the tropics. Fall migration begins mid to late August and peaks in early to mid-September. Birds typically return to northern breeding grounds in mid-May. Breeding activity typically occurs between mid-May to September. Map (Figure 5): https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/eastern-wood-pewee-2012.html
Horned Grebe (Western population)	<i>Podiceps auritus</i>	Special Concern	Special Concern	Special Concern	Low	Horned Grebe breeds in moderate-sized, shallow freshwater pools in northwestern Canada. During the winter it can be found along North American coasts and on large bodies of water. https://birdsna.org/Species-Account/bna/species/horgre/introduction
Short-eared Owl	<i>Asio flammeus</i>	Special Concern	Special Concern	Special Concern	Low	The Short-eared Owl lives in open areas such as grasslands, marshes and tundra where it nests on the ground and hunts for small mammals, especially voles. In Ontario, the species has a scattered distribution, found along the James Bay and Hudson Bay coastlines, along the Ottawa River in eastern Ontario, in the far west of the Rainy River District, and elsewhere in southern Ontario, at places such as Wolfe and Amherst Islands near Kingston. This species is a partial migrant, as most of its breeding range overlaps with its overwintering range. Northern populations may migrate to southern Ontario. Breeding activity typically occurs between late-March through to June. Map: http://files.ontario.ca/environment-and-



Common Name	Scientific Name	COSEWIC	SARA Status	ESA Status	Habitat Potential on Project Site	Preferred Habitat
						energy/species-at-risk/short_eared_owl_map_eng.pdf
Wood Thrush ³	<i>Hylocichla mustelina</i>	Threatened	Threatened	Special Concern	Low	The wood thrush lives in mature deciduous and mixed (conifer-deciduous) forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing perches. These birds prefer large forests, but will also use smaller stands of trees. They build their nests in living saplings, trees or shrubs, usually in sugar maple or American beech. The Wood Thrush is a long-distance migrant, wintering in southern America and Mexico. Individuals depart northern breeding areas mid-Aug to mid-Sep. Spring migrants typically arrive mid to late May. Breeding Activity occurs between late-May and August.
Reptiles and Amphibians						
Blanding's Turtle ^{1,4}	<i>Emydoidea blandingii</i>	Endangered	Threatened	Threatened	Low	Blanding's Turtles can be found in several types of freshwater environments, including lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps. They will travel long distances overland (>410m) for basking and nesting sites. Blanding's Turtles are spring nesters, laying eggs anywhere from May to late June-early July. They may use sand and gravel banks along waterways, road shoulders, fissures in rocky shorelines and freshly dug gravel and soil. Eggs generally hatch between late August and late October. Overwintering sites are generally located within permanent wetlands (e.g., bogs, fens, marshes) and other habitats with unfrozen shallow water where turtles hibernate from late October until the end of April. This species may also overwinter within temporary wetlands adjacent to more permanent water bodies, graminoid shallow marsh areas of larger wetlands, non-vegetated vernal pools, roadside ditches or small excavated areas with standing water, and road-side borrow



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						pits. Individuals choose sites that are cold, thermally stable, and provide 7 to 50 cm of free water, along with a soft organic substrate in which they partially bury. Map: http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_bla_tur_map_eng.pdf
Eastern Milksnake ⁴	<i>Lampropeltis triangulum triangulum</i>	Special Concern	Special Concern	No Status	Low	Found in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types. Often in close proximity to water. The Milksnake hibernates communally underground, in rotting logs or in the foundations of old buildings from late-October/November to early-April. Females lay their eggs in late-June or early-July, with eggs hatching in late-August or early-September. Maps (Figure 4 and 6): https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/eastern-milksnake-2014.html
Eastern Musk Turtle ⁴	<i>Sternotherus odoratus</i>	Special Concern	Special Concern	Special Concern	Moderate	Eastern Musk Turtle require shallow water with little or no current, and soft earth to bury into when they hibernate. It nests from late May to early July, usually within 45 metres of water. Nesting habitat is variable, but it must be close to the water and exposed to direct sunlight. Eastern Musk Turtle prefer to lay eggs in rotting vegetation. Generally, the nests contain from two to five eggs and are quite shallow; sometimes the female lays her eggs under logs or on open ground. Hatchlings emerge in the fall and are approximately two centimetres in length. Hibernation takes place between October and April. Overwintering sites are typically located in shallow water up to 3 m deep where organic bottoms allow the turtles to bury themselves up to 30 cm deep in mud. They may also use burrows, Beaver and Muskrat lodges, as well as



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						stumps or rocks near water. This species has been known to overwinter communally in large numbers. Eastern Musk Turtles have been known to show site fidelity to their overwintering sites. Eastern Musk Turtles begin burrowing when the surrounding water temperature is below 10°C. Map: http://files.ontario.ca/environment-and-energy/species-at-risk/eastern_musk_turtle_map_eng.pdf
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	Special Concern	No Status	No Status	Moderate	Prefers slow moving rivers, streams, ponds, lakes, and marshes with muddy bottoms, lots of submerged vegetation and exposed rocks, logs and dead heads; utilized for basking. Females nest from late May to early July, digging their nest in loamy or sandy soil in sunny areas. The clutch contains from three to 14 eggs. Hatchlings may emerge in the fall but sometimes overwinter in the nest and emerge the following spring. Hibernation typically occurs between October to March in areas of shallow water with deep sediment. Map: https://en.wikipedia.org/wiki/Painted_turtle#/media/File:Painted Turtle Distribution alternate.svg
Northern Map Turtle ⁴	<i>Graptemys geographica</i>	Special Concern	Special Concern	Special Concern	Low	The Northern Map Turtle inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled. In winter, overwintering sites for the Northern Map Turtle are typically deep, oxygen-rich lake or river bottoms that are sheltered from ice, with sand or gravel substrate and varied bottom features, such as exposed ledges, boulders, and tree trunks Hibernation



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						<p>typically occurs between October and April. Northern Map Turtles are spring nesters, laying eggs anywhere from May to late June-early July. They may use sand and gravel banks along waterways, road shoulders, fissures in rocky shorelines and freshly dug gravel and soil. Eggs generally hatch between late August and late October. In some cases the hatchlings overwinter in the nest In southern Ontario, it lives primarily on the shores of Georgian Bay, Lake St. Clair, Lake Erie and Lake Ontario, and along larger rivers including the Thames, Grand and Ottawa. Map: http://files.ontario.ca/environment-and-energy/species-at-risk/northern_map_turtle_map_eng.pdf</p>
Snapping Turtle ⁴	<i>Chelydra serpentina</i>	Special Concern	Special Concern	Special Concern	Moderate	<p>Usually found in large bodies of water, but will sometimes inhabit small ponds. This species may inhabit surprisingly small wetlands, ponds and ditches. It hibernates in the mud or silt on the bottom of lakes and rivers, usually not too far from the shore. Hibernation typically occurs between October and April with preference to hibernate within 5 m of the shoreline, at a depth of less than 2 m. Rarely leave water except to nest and migrate to overwintering habitat. Snapping Turtles are spring nesters, laying eggs anywhere from May to late June-early July. They may use sand and gravel banks along waterways, road shoulders, fissures in rocky shorelines and freshly dug gravel and soil. Females will use almost any area they can excavate. A single clutch usually consists of between 40 and 50 egg. Eggs generally hatch between late August and late October. Map: http://files.ontario.ca/environment-and-energy/species-at-risk/snapping_turtle_map_eng.pdf</p>



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FISH						
American Eel	<i>Anguilla rostrata</i>	Threatened	No Status	Endangered	Moderate	In Canada, it is found in fresh water and salt water areas that are accessible from the Atlantic Ocean. The American Eel starts life in the Sargasso Sea in the North Atlantic Ocean and migrates along the east coast of North America. In Canada, it is found in fresh water and salt water areas that are accessible from the Atlantic Ocean. This area extends from Niagara Falls in the Great Lakes up to the mid-Labrador coast. In Ontario, American Eels can be found as far inland as Algonquin Park. Spawning migration begins in May from the Richelieu River (Québec). Emigration peaks between July and September in Lake Ontario and the St. Lawrence River waters and may continue into November. Once the eels mature (10-25 years) they return to the Sargasso Sea to spawn. Map (Figure 4): https://www.ontario.ca/page/american-eel-recovery-strategy
PLANTS						
American Ginseng	<i>Panax quinquefolius</i>	Endangered	Endangered	Endangered	None	In Ontario, American Ginseng typically grows in rich, moist, but well-drained, and relatively mature, deciduous woods dominated by Sugar Maple (<i>Acer saccharum</i>), White Ash (<i>Fraxinus americana</i>) and American Basswood (<i>Tilia americana</i>). It usually grows in deep, nutrient rich soil over limestone or marble bedrock. Map (Figure 1): https://www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=02167B6A-1&printfullpage=true
Butternut ²	<i>Juglans cinerea</i>	Endangered	Endangered	Endangered	None	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges. In Ontario, this species is found throughout



Common Name	Scientific Name	COSEWIC	SARA Status	ESA Status	Habitat Potential on Project Site	Preferred Habitat
						the southwest, north to the Bruce Peninsula, and south of the Canadian Shield. Map: http://files.ontario.ca/environment-and-energy/species-at-risk/butternut_map_eng.pdf
Mosses and Lichens						
Black-foam Lichen	<i>Anzia colpodes</i>	Threatened	No Status	No Status	Low	This lichen appears to be extirpated in Ontario, which is at the northern edge of its range. It occurs on sites dominated by mature deciduous trees with high humidity and moderate light. Maps (Figures 1 & 2): http://cossaroagency.ca/wp-content/uploads/2017/06/Accessible_COSSARO-evaluation-Black-foam-Lichen.pdf
Pale-bellied Frost Lichen	<i>Physconia subpallida</i>	Endangered	Endangered	Endangered	Low	Throughout its range, Pale-bellied frost lichen grows on the bark of hardwood trees such as White ash, Black walnut, and American elm. It can also be found growing on fence posts and boulders. In Ontario, Pale-bellied frost lichen grows on Hop Hornbeam (also known as Ironwood) trunks at a height of 0.5 to 2 metres in wooded areas. Pale-bellied frost lichen only occurs in eastern North America. In Canada, it is limited to southern Ontario where it is currently known from locations in Frontenac, Haliburton, Hastings, Peterborough, Lanark and Renfrew counties. Map: http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_pal_bel_fro_lic_map_en.pdf

COSEWIC Draft Critical Habitat Mapping

²NHIC

³Atlas of Breeding Birds of Ontario

⁴Ontario Reptile and Amphibian Atlas



Cultural Resources

A 'Statement of Cultural Resource Impact Analysis' (SCRIA) was developed for the original Ottawa Walls project but is not appended due to the sensitivity of the information. An update of the SCRIA was not created for the Clegg Street project.

The proposed project involves walls that are not a cultural resource but the channel which they delineate and the landscape are considered cultural resources of National Significance (NS, Rideau Canal, Cultural Resource Inventory, 1995-96) and are part of the Rideau Canal National Historic Site and World Heritage Site.

The Rideau Canal was designated a national historic site in 1924. The reasons for national significance are:

- the construction of the canal system;
- the survival of a high number of original canal structures including locks, blockhouses, dams, weirs and original lockmasters' houses plus the integrity of most lockstations, and;
- the unique historical environment of the canal system. (from the Rideau Canal and Merrickville Blockhouse NHSC Commemorative Integrity Statement, August 2000)

The landscapes and channel are fundamental resources of the canal system and integral to the Rideau's unique historical environment. The landscapes were evaluated in terms of the retention of historic circulation patterns, the spatial inter-relationships of buildings, engineering works, open spaces and other landscape features, plus the overall impact of new features on or near the stations.

Therefore, the landscapes of National Significance are valued for their:

- associative and physical connection with the construction and early operation of the canal;
- contribution to the unique historical environment of the canal system;
- visual and historic associations with heritage communities along the canal system such as Chaffeys Locks, Newboro, Merrickville, Burritts Rapids, and Ottawa;
- role as landmarks and providing a sense of continuity along the canal system;
- surviving historic layout and configuration including their open spaces and circulation patterns;
- surviving historic views both within and beyond the station boundaries; and,
- contextual and heritage settings for the stations' buildings and engineering works.

The heritage value ascribed to cultural resources guides conservation efforts and investments. Under the CRM Policy, conservation of heritage value must be a primary consideration in any intervention directed at a cultural resource.

Archeology

An Archaeological Overview Assessment (AOA) was developed for the original Ottawa Walls project but is not appended due to the sensitivity of the information. An update of the AOA was not created for the Clegg Street project.

As part of the nearby Flora Footbridge project, The City of Ottawa hired Golder Associates in September 2016 to prepare a Stage 1 and 2 Archaeological Assessment (AA) report which was sent to the the Algonquins of Ontario, Métis Nation of Ontario, Algonquins of Pikwakanagan and Kitigan Zibi for review. The Stage 2 AA report identified historic archaeological resources in the area that were deemed to be of no archaeological significance.



Archaeological excavation at several sites on the canal has resulted in an extensive collection of artifacts of National Significance related to canal construction, operation and maintenance as well as social and working life on the canal during the military period. The artifacts of National Significance are valued for:

- their association with canal construction;
- their association with working life on the canal;
- the detailed information they provide on working and social life;
- the detailed information they provide about construction techniques and tools;
- their presentation potential;
- their integrity as a collection.

Similar work was conducted in 2011 on the Rideau Canal walls near Patterson Creek inlet and in 2015 on the retaining walls near Bronson Ave and Dow's Lake. Excavation 2-3 meters inland from the canal wall and embankment revealed significant in situ wooden cribbing dating to the early 20th century.

7. EFFECTS ANALYSIS

Soil and Landforms

The proposed work will require soil excavation and the use of heavy machinery. Excavation and machine traffic has the potential to result in rutting and soil compaction, increasing the risk of soil erosion; however, this risk will be minimized through the implementation of appropriate erosion and sediment control mitigation measures.

The use of heavy machinery also increases the risk of soil contamination if there is a spill or leak of a hazardous material (i.e. fuels, hydraulic fluids); however, this risk will be minimized through the implementation of appropriate mitigation measures.

Aquatic Resources

The potential environmental effects of project activities on fish and fish habitat include interference with biological time periods (i.e., migration or spawning), the addition of suspended solids to the water column through erosion and sedimentation, and direct mortality of fish.

The work pad will be installed in October 2019 (during the fall drawdown period) and will be removed in April 2020 (during the spring drawdown period). The month of April falls within the Federal and Provincial restriction period for in-water work, however the work zone is predicted to be dry or close to dry during the spring drawdown, thus the removal activity is not anticipated to be in-water work and to be low risk in nature. However, because the removal activity will be completed during the in-water restriction period, it will be necessary to have robust sediment control measures in place as well as an appropriate water quality monitoring program to ensure there are no effects outside the turbidity curtain.

Erosion and sedimentation events may occur as a result of project activities, potentially increasing the amount of suspended solids in the water column. It should be noted that granular B, type II (which is specified as the work zone material) has a fine content that potentially create an issue with turbidity is not well controlled through use of the robust turbidity curtain. Erosion and sedimentation events can cause increased sediment loads potentially harming fish by altering foraging behaviour and causing



physical damage to gills and scales. Increased sediment loads can also smother benthic invertebrates (a primary food source for many fish species) and cover/infill coarse spawning habitat as silt settles.

Spills of fuels or hydraulic fluid from construction equipment could negatively impact surface water quality. The primary component of the proposed construction is concrete work immediately adjacent to the canal. Concrete leachate is alkaline and can quickly raise the pH level of water, causing it to be highly toxic to fish and other aquatic life. The proposed project could potentially introduce concrete into the aquatic environment through various pathways including debris from demolition, concrete dust from demolition, fresh concrete when pouring the new cap and through concrete wash-out water. Work will be carried out in the dry to prevent the risk of concrete, in any form, entering the watercourse. The implementation of appropriate mitigation measures will reduce the risk of concrete entering the aquatic environment.

Contamination

Contamination found in the sediment and water of the Rideau Canal in downtown Ottawa during testing conducted in April 2016 and May 2017 has the potential to have adverse effects on human health and the environment. As such, it is imperative that appropriate health and safety measures are taken to ensure the safety of workers (to be addressed in project specifications) and that additional measures are taken to ensure that contamination found in the sediment is minimally disturbed, is not introduced into the water column, and is not transferred off site.

The potential of contamination release, the verification of environmental thresholds and the rationale for applied mitigation measures are outlined in the report *Environmental Management Planning Considerations - Ottawa Wall Repairs Rideau Canal, Ottawa, Ontario* (Golder 2017 – Appendix 5). Typical environmental thresholds (e.g 8NTU/25 mg/l at the point of discharge) were examined and determined to be conservative thresholds capable of protecting the environment from the potential effects of disturbed contaminants. As typical environmental thresholds are set as a value above a site's background levels, Golder has identified a maximum absolute value to act as the upper action threshold to protect aquatic organisms. This value has been set at 75mg/l and will act as the action level at which a stop work order will be initiated regardless of discharge from or in consideration of concentrations in upstream ambient conditions that may be related to storm water, high water events and/or canal water being raised unexpectedly. **These values apply to the point of discharge, which is considered to be the point at which the contractor loses control over the discharge, such as: (1) the end of pipe for dewatering effluent from a cofferdam-enclosed area or (2) within 5 m downstream of an area enclosed with a turbidity curtain, or in the process of being enclosed with a turbidity curtain.**

Following removal of the work pad the bottom layer of granular and the geo-membrane will be disposed of at a licensed facility for handling contaminated waste. Should excavation of canal bed sediment be required likewise must be disposed of in an appropriate disposal facility.

Although the upland soil in this work zone has not undergone analysis it is likely that it contains contaminants above guideline levels. Any soil excavated from the upland should be disposed of at a licensed disposal facility as waste. The native silty-clay layer underlying the soil can be stockpiled and possibly re-used following contaminant testing (see Appendix 2, mitigation 33).

Although the upland soil in this work zone has not undergone analysis it is likely that it contains contaminants above guideline levels. If the soil is returned to the original location and capped with new,



clean topsoil, no additional testing is required. If the excavated soil is not put back in the original site, it should be temporarily stored, tested for chemical characteristics, and disposed of according to results and in a manner that meets provincial requirements. This applies only to upland soils, should excavation of canal bed sediment be required it must be disposed of in an appropriate disposal facility.

In order to address the potential of risk to workers within the construction site, minimum PPE requirements and input into a contractor's site specific health and safety plan by a qualified professional have been identified within the Golder reports. It would be prudent to follow the safety and mitigation measures outlined in these reports for both the sediment-based and soil-based portion of the project site. The Golder reports are provided to the contractor as Appendices 6-7 for their analysis of protective mitigations deemed necessary and for input into the contractor's Health & Safety Plan.

Despite the potential effects of project activities, with the proper implementation of mitigation measures to protect against sedimentation, to protect against spills, to reduce the risk of introducing contamination into the water column and to ensure work does not occur during sensitive timing windows, it is not anticipated that there will be residual negative impacts to aquatic resources.

Vegetation

There may be one or more shrubs adjacent to Echo Drive that will be removed to accommodate the temporary pedestrian pathway (species currently unknown). Should this be necessary a re-planting plan will be devised based on species and number of shrubs.

No rare or at risk vegetation species have been identified in the work area.

Wildlife

Migratory birds, their nests and eggs are protected under the Migratory Birds Convention Act (1994). Project works that are potentially disruptive activities to nesting birds, such as vegetation clearing, should be avoided during the nesting period. The Ottawa Walls project site is located within Environment Canada nesting zone C2. For open habitats within this zone, the nesting period may begin as early as the end of March and last as long as until the end of August. However, the majority of nesting takes place between early May and late July. This project will occur from October 2019 to May 2020, largely outside of the migratory bird nesting window. The plan is to protect the trees within the Work Area from damage. Should one or more trees need to be removed to facilitate the project they will be removed after August 28th and before April 1st

Because there are only four trees on site, it is anticipated that any disturbance of wildlife will be minor and short-term in nature and will be minimized through the implementation of appropriate mitigation measures.

Species at Risk

As identified in Table 1, a number of species at risk have moderate to low potential to be present in the project area, however only Blanding's Turtle has an identified zone of critical habitat (unofficial) around the project area. The species has a low likelihood of using the project site as the aquatic habitat does not provide the biophysical attributes necessary for most life cycle activities, specifically nesting (this area is not a permanent or seasonal wetland) and movement (this section of the canal does not have a littoral zone). Further, it's recognized that the installation of the work pad in October during the drawdown period



will prevent any possible negative effect to overwintering turtles. In terms of terrestrial habitat suitability, it is an urban environment with active roads and pathways immediately adjacent to the watercourse, which makes it unsuitable as critical habitat. Therefore, the site does not provide aquatic or terrestrial critical habitat for Blanding's Turtle.

It is possible that individual American Eel move upstream through the Ottawa Locks, however it's highly unlikely that one would be found in the Rideau system during the non-navigation season. As the installation of the work pad will occur during the fall drawdown period (along with a fish salvage operation if required), negative effects to American Eel are not anticipated.

For other species listed in Table 1, either the planned works will not impact individuals and /or habitat, or mitigation measures will be employed to protect individuals and their habitat.

Cultural Resources

An update to the Cultural Resources section is not included in this version of the BIA.

Although the landscape is a cultural resource of National Significance, it is not anticipated that the project will negatively impact the site if appropriate mitigation measures and conservation approach are followed. The primary recommended conservation approach based on the Standards and Guidelines for the Conservation of Historic Places in Canada is rehabilitation with an emphasis on minimal intervention. Minimal intervention in the context of rehabilitation involves the adaptation of an historic place or structure for a continuing or compatible contemporary use, while protecting its heritage value and character-defining elements (material, form, location, spatial configuration and cultural associations or meanings that embody the heritage value). As such, the application of Standards 1-12 from the Standards and Guidelines is recommended, including the relevant Guidelines on Cultural Landscapes (Section 4.1), Engineering Structures (Section 4.4) and Materials (Section 4.5).

In principle, the proposed rehabilitation of the Ottawa walls conforms to the Standards and Guidelines by preserving the character-defining elements of the site. Also, the proposed project is based on detailed surveys and investigations of the existing asset condition, an approach promoted by the Standards and Guidelines (Standard 7). If the recommendations and conservation approach provided in the SCRIA for a similar project in September 2015 are applied, the rehabilitation of the walls will help to reinforce the historical relationship and setting of the channel. Moreover, this will ensure that the Rideau Canal National Historic Site WHS site retains its heritage value and that the canal's physical life will be extended.

Continued involvement of CRM, Built Heritage and archaeology advisors in the different phases of the project is recommended. This approach will ensure the use of recognized conservation methods, appropriate level of intervention and quality control for the rehabilitation works on the engineering structure.

Archeology

An update to the Archaeology section is not included in this version of the BIA.

The Stage 1 and 2 Archaeological Assessment (AA) report prepared as part of the nearby Flora Footbridge project identified historic archaeological resources in the area that were deemed to be of no archaeological significance.



An Archaeological Overview Assessment was completed by Parks Canada archaeologists to determine the existing conditions in the proposed work areas. Impacts from construction activities, including staging areas and access roads, are deemed to be significant to adversely impact potential archaeological resources and archaeological mitigation measures are required for the Project.

If significant archeological resources (i.e., Indigenous artifacts, structural remains and/or high artifact concentrations) are encountered during construction, work should cease, the findings photographed and Parks Canada's Terrestrial Archaeology section contacted for advice and assessment of significance, which will in turn determine what will be required to mitigate impacts on the find.

8. MITIGATION MEASURES

See Appendix 2 for Mitigation Measures.

9. PUBLIC/STAKEHOLDER ENGAGEMENT & ABORIGINAL CONSULTATION

9 a) Indicate whether public/stakeholder engagement was undertaken in relation to potential adverse effects of the proposed project:

No

Yes (describe the process to involve relevant parties and indicate how comments were taken into consideration).

9 b) Indicate whether Aboriginal consultation was undertaken in relation to potential adverse effects of the proposed project:

No

Yes (describe the process to involve relevant parties and how the results were taken into consideration).

Public and Indigenous consultation was not undertaken for this project since it is considered to be routine concrete maintenance of existing canal walls.

10. SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

Given the proper implementation of mitigation measures, no significant adverse effects are anticipated.

11. SURVEILLANCE

Surveillance is not required

Surveillance is required (provide details such as the proposed schedule and the focus of inspections)



Parks Canada's Environmental Authority will visit the site regularly during construction to ensure that mitigation measures are in place, working as anticipated and are effective at preventing adverse effects to natural and cultural heritage features.

Surveillance by Cultural Resource Management Staff is also recommended to ensure effectiveness of proposed mitigation measures.

12. FOLLOW-UP MONITORING

Follow-up monitoring is:

- not required
- legally required (e.g. under the *Species at Risk Act* or *Fisheries Act*)
- required in accordance with the *Parks Canada Cultural Resource Management Policy*

13. SARA NOTIFICATION

Notification is:

- not required
- required under the *Species at Risk Act* (outline the nature of and response to any notification).

14. EXPERTS CONSULTED

Include Parks Canada experts. Add as many entries as necessary for the project.

Department/Agency/Institution: Parks Canada	Date of Request: 2016-07-27
Expert's Name & Contact Information: Nathalie Desrosiers Nathalie.desrosiers@canada.ca	Title: Cultural Resource Management Advisor
Expertise Requested: Statement of Cultural Resource Impact Analysis	
Response: Provided all CRM information included in this BIA	

Department/Agency/Institution: Parks Canada	Date of Request: 2016-07-12
Expert's Name & Contact Information: Barbara Leskovec barbara.leskovec@canada.ca	Title: Terrestrial Archaeologist, Indigenous Affairs Cultural Heritage Directorate
Expertise Requested: Terrestrial archaeological assessment	
Response: Provided an Archaeological Overview Assessment that is included as an appendix in the report.	

Department/Agency/Institution: Parks Canada	Date of Request: 2017-09-06
Expert's Name & Contact Information:	Title:



Brent O'Rae brent.oraе@canada.ca	Environmental Program Advisor Environmental Management & Security
Expertise Requested: Contaminated Sites Advice	
Response: Provided input into Englobe and Golder Assessments, reviewed mitigation measures included in the BIA, reviewed the NCC Phase II report	

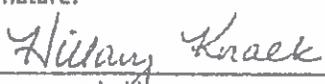
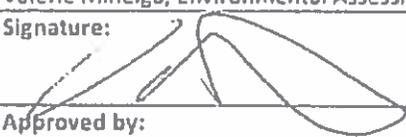
15. **DECISION**

Taking into account implementation of mitigation measures outlined in the analysis, the project is:

not likely to cause significant adverse environmental effects.

likely to cause significant adverse environmental effects.

16. **RECOMMENDATION AND APPROVAL**

Prepared by: Shaun McIntosh, Environmental Assessment Officer Amendment 2 by: Valerie Mineiga Amendment 3 by Hillary Knack Amendment 4 by Hillary Knack	Date: July 16, 2019
Signature: 	
Recommended by: Valerie Mineiga, Environmental Assessment Scientist	Date: 2019/07/16
Signature: 	
Approved by: Name & position: Jewel Cunningham, Director, Ontario Waterways	Date: July 22/19
Signature: 	

National Capital Commission:

Approved by: Name & position: Juan Galindez, Environment Officer, Capital Planning Branch	Date: July 15, 2019
Signature: 	



17. ATTACHMENTS

Appendix 1 - Environmental Impact Analysis Tool: Effects Identification Matrix

Appendix 2 – Mitigation Measures

Appendix 3 – Site Photos

Appendix 4 – *Sediment and Surface Water Assessment – Factual Report - Ottawa Wall Repairs Rideau Canal, Ottawa, Ontario*

Appendix 5 – *Environmental Management Planning Considerations - Ottawa Wall Repairs Rideau Canal, Ottawa, Ontario – Golder 2017*

18. NATIONAL IMPACT ASSESSMENT TRACKING SYSTEM

Project registered in [tracking system](#)

Not yet registered (*CEAA 2012 requires PCA submit a report to Parliament annually. EIAs must be entered in the tracking system **by the end of April** to enable reporting.*)



Appendix 1 - Environmental Impact Analysis Tools: Effects Identification Matrix

Section A focuses on direct effects of the project and **Section B** on indirect effects that are caused by changes to the environment.

A. Direct Effects									
		Valued components potentially directly affected by the proposed project							
		Natural Resources					Cultural Resources		
		Air	Soil & landforms	Water (surface, ground, crossings, etc.)	Flora (specify, including SAR)	Fauna (specify, including SAR)	Rideau Canal Landscape		
Phase	Examples of Associated Activities								
Project Components	Preparation / Construction / Operation / Decommissioning	Supply and storage of materials	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Burning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Clearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Demolition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Disposal of waste	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Blasting/ Drilling	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Dredging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Drainage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Excavation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Grading	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Backfilling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Use of machinery	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Transport of materials/ equipment	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Building of fire breaks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Use of Chemicals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Set up of temporary facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Other...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		



B. Indirect Effects (all phases)							
		Impacts as a result of changes to the environment					
		With respect to non-Aboriginal peoples:	With respect to Aboriginal peoples:			With respect to visitor experience	
		Health and socio-economic conditions	Health & socio-economic conditions	Current use of lands and resources for traditional purposes	Access & services	Recreation & accommod'n opportunities	Safety
Phase	Natural resource components affected by the project						
Preparation /construction operation/implementation/decommissioning	Could impacts to <u>air</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>soils and landforms</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Could impacts to <u>water</u> (e.g. surface, ground water and water crossings) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>flora</u> (including SAR) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>fauna</u> (including SAR) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Other...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Appendix 2: Mitigation Measures

General

1. Inform the Departmental Representative and PCA's Environmental Authority (Environmental Officer, Rideau Canal in Smiths Falls) regarding any changes to project plans and/or scheduling. Any changes not assessed under this BIA will require approval from PCA and may require further mitigation measures.
2. Contractor is required to submit an Environmental Management Plan (EMP) to the Department Representative and Parks Canada that outlines all the measures to be implemented by the contractor on the project site to eliminate or reduce environmental effects and address mitigation measures outlined in this BIA. In order to allow for the timely commencement of project activities, the EMP can be submitted as separate components as project details become available. The EMP, or its components, will be submitted in writing prior to implementation of project activities and must be accepted by Parks Canada and the Departmental Representative.
3. It is recommended that an environmental professional(s) (EP) prepare the EMP or its component plans incorporating guidance found in PCA's Environmental Standards and Guidelines - Ontario Waterways (2017). The EMP will detail frequency of monitoring and list high-risk construction activities where an environmental professional must be onsite. Monitoring and testing should be adaptable to changing site conditions and will capture any event/incident for the length and scope of that event.
4. Parks Canada Environmental Authority (Environmental Officer, Rideau Waterway) will outline all the prescribed mitigation measures, including those found in Best Management Practices (BMPs), in a construction start-up meeting with the project manager and the contractor, to ensure awareness and understanding of these measures.
5. The contractor is to ensure that all on-site personnel are aware of, and comply with the prescribed mitigation measures within this BIA and any measures outlined within subsequent amendments to this BIA.
6. Should conditions at the work site indicate that there are negative impacts to fish, fish habitat, wildlife, cultural or visitor experience resources, all works shall cease until the problem has been corrected and Parks Canada's Environmental Authority staff have been consulted. The Parks Canada has the right to require that work be altered or ceased immediately.
7. As per the Historic Canal Regulations (HCR) applicable to lands administered by the Rideau Canal National Historic Site of Canada, a permit signed by PCA's Ontario Waterways Director will be required to authorize the project work prior to commencement of the project.

Species at Risk

8. If a Species at Risk is observed or suspected on or near the worksite (this includes snakes, turtles and/or eggs), the species must not be harmed or harassed. If the species does not leave or cannot leave the site, the contractor must immediately stop the works and contact the Departmental Representative and PCA's EA staff on how to proceed. Additional measures to avoid impacts may be required before work can restart. Stand back and allow the animal to leave the site. **In the event that a species at risk is observed within the Work Area, please also**



notify the NCC EA officer (Juan Galindez, Environment Officer; juan.galindez@ncc-ccn.ca / (613)-239-5678 ext. 5523).

9. All workers shall be made aware for the potential of species at risk on site (namely Blanding's Turtle, Eastern Musk Turtle, **Midland Painted Turtle** and Snapping Turtle). Employees must be able to identify potential species at risk and know the proper procedures to follow when they encounter one on site.
10. If stockpiles of soil, granular material or wood chips are stored within the Work Area between May to July, they are to be surrounded by reptile exclusion fencing following the guidance in this document: https://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_tx_rptl_amp_fnc_en.pdf

All Species

11. Minimize the disturbed area; clearly mark the work space.
12. Park only on roads or disturbed areas as outlined in project plans and specifications, or as directed by the Departmental Representative.

Vegetation removal

13. Migratory birds, their nests and eggs are protected under the Migratory Birds Convention Act (1994). Project works or activities that are potentially disruptive activities to birds should be avoided during breeding times. No vegetation shall be removed from April 1st to August 28th to protect nesting birds. If vegetation must be removed during this period, an avian biologist must screen the area to be cleared for nests no more than two days prior to clearing. If active nests are found, a buffer shall be implemented and the vegetation cannot be removed until the nest is no longer active.

Invasive Species

14. To reduce the risk of introducing invasive species, all equipment must be thoroughly cleaned prior to coming to the site. Any machinery that appears to have not been cleaned will not be permitted on site. For additional information or guidance on how to properly clean equipment, see the *Clean Equipment Protocol for Industry* developed by the Ontario Invasive Plant Council and found here: http://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol_June2016_D3_WEB-1.pdf
15. Any equipment or vehicles which are to be used in water, should be thoroughly cleaned before and after use of any visible mud, vegetation, mussels, etc.:
 - a. Vessels/equipment should be drained of standing water.
 - b. Vessels/equipment should ideally be cleaned with hot water (> 50 °C) at high pressure water (> 250 psi).
 - c. Vessels/equipment should be dried for 2 - 7 days in sunlight before transported between waterbodies.
 - d. Cleaning of vessels/equipment should be conducted away from waterbodies at a recommended distance of at least 30 m from the shoreline.



16. Mud, dirt and vegetation should be cleaned from clothing and footwear prior to entering the work site, and prior to leaving the work site.
17. Should an invasive species be encountered (or at least suspected) not identified in this BIA, a photo and report of the specimen should be sent to Parks Canada's EA staff and the Invading Species Hotline at 1-800-563-7711 or online at EDDMaps Ontario, <https://www.eddmaps.org/ontario/>.
18. Use weed-free material (i.e. sand, gravel, etc.) for erosion control and stabilization.
19. Use weed-free seed and confirm that seed mix to be used for re-vegetation purposes does not (potentially) contain invasive plants.
20. Sod can be used at lock stations where areas are expected to be mowed. Any areas where plants will be left to go to seed, then Ontario native species must be used.
21. Seed purchased commercially should have a label that states the following:
 - e. Species;
 - f. Purity: Most seed should be no less than 75 % pure and preferably over 85 % pure. The rest is inert matter or other seed;
 - g. Weed seed content: The tag should state NO invasive plants are present. Only certified weed-free seed should be used; and
 - h. Germination of desired seed: Germination generally should not be less than 50 % for most species, although some shrubs and forbs will have lower percentages.
22. If removal of invasive species occurs during construction, individuals (e.g. plants, mussels) will be disposed of appropriately, offsite to ensure no further propagation.

Contamination

23. The EMP address the contaminants and issues identified in this BIA and those identified with regard to water and sediment quality in the Golder 2017 reports appended to this BIA.
24. Workers are expected to wear appropriate personal protective equipment (PPE) to minimize potential exposure to sediment, soil, groundwater and surface water in project area. Appropriate PPE is considered to include, at a minimum: gloves, long-sleeved shirts, long pants, water-proof/chemical-resistant footwear, safety glasses and hard hat. In the event that divers are used (e.g., to anchor turbidity curtains), the equipment used (e.g., wetsuit, face mask) should minimize bare skin exposure to the work zone. The Contractor must provide appropriate wash stations to remove adhered sediments from PPE, as well as hand-wash stations. The wash-off material must be contained and disposed of offsite. Wash water must not be allowed to enter the canal either directly or through a storm sewer. Contractors are also expected to be familiar with applicable health and safety requirements for workers in regards to the contaminants identified.
25. A means of containing suspended sediments within a given Work Area (e.g., with an impermeable turbidity curtain or other suitable method identified by the Contractor) such that a TSS concentration greater than 25 mg/L and 8NTU does not occur at the point of discharge. The method of containment selected by the Contractor must be suitable for containing fine particles (e.g., silt and clay).



26. In the event that the Contractor's selected methods for control of suspended particulates in discharge waters involves the use of flocculants, the contractor should provide a toxicity evaluation of the specific commercial formulation intended for use and shall use that flocculent in a manner that does not result in toxicity.
27. There is a potential for release of hydrocarbon sheens or vapours during the works, in such an event mitigation measures below must be applied:
 - a. Where sheens occur, they may be addressed in a similar manner as a spill of fuel. An appropriate spill kit (e.g., containing absorbent socks or pads) must be maintained on site and the Contractor's staff must be trained in the use of the kit. The Contractor must also prepare and post in an accessible location a spill response plan that includes contact information for the Departmental Representative responsible for the work and applicable spill response agencies. The Contractor must also have a plan in place to notify municipal authorities and the public for incidents above a pre-determined threshold, such as if a sheen is observed in the receiving environment and the sheen can be linked to the Work Area (i.e., via the dewatering effluent discharge or leakage outside the containment structure (e.g., the turbidity curtain or coffer dam).
 - b. The potential magnitude of vapours has not been assessed. Conditions as encountered at the time the project is implemented will need to be planned for, monitored, and managed. Because reliable predictions of vapours cannot be made with the current level of information available, the Contractor should test for the presence of vapours and other hydrocarbon-related hazards as encountered and appropriate measures taken to protect worker health and safety based on monitoring results).
28. The pumping system to transfer dewatering effluent from the enclosed Work Area to the canal will need to be situated in such a way that it does not resuspend sediment from the canal bed within the Work Area or otherwise pump water from which particulates have not been allowed to settle. The pumping system may need a pre-filtration step to further minimize the transfer of suspended sediments.
29. Discharges from the Work Area must be undertaken in such a way that scouring of the canal bed outside the Work Area does not occur.
30. An alternative means of treatment or disposal of impacted water must be identified prior to commencement of the work in the event the identified discharge requirements cannot be met or water in the enclosed Work Area is found to be acutely lethal to fish. This could include active water treatment (the Contractor is responsible for determining the specific treatment steps that may be required to meet the EPO), or other suitable method to be determined by the Contractor in the EMP.
31. During installation and removal of the **work pad**, care should be taken to minimize disturbance of substrate. Where a work pad is installed or removed, an impermeable turbidity curtain shall be placed around the structure to contained disturbed sediment. The turbidity curtain will be left in place until suspended particles have re-settled and the water quality requirements are met. The contractor may present alternative control methods to that of a turbidity curtain but such methods must prevent the distribution of sediment.



32. Material removed from the canal bed, will be disposed of at an off-site facility capable of handling identified contaminants. Do not stockpile onsite where contaminant escape is possible. Any temporary material removed must be placed in a contained facility to prevent contamination release. The Contractor will return the grade to the pre-work elevation. Material imported to the site for this purpose must be tested for potential contaminants of concern (e.g., metals, hydrocarbons) and confirmed to be "clean" (i.e., meets sediment quality guidelines). Care must be taken in the transport of construction equipment and material (e.g., turbidity curtains) out of the project area to prevent loss of adhered material from the equipment to sidewalks and streets. Where the material is rinsed or otherwise cleaned at the work site, the wash-off material must be contained and disposed of offsite. Wash water must not be allowed to enter the canal either directly or through a storm sewer.
33. Upland soil within the Work Area has not been tested for contaminants but there is a high risk that one or more contaminants are present above guideline levels. Excavated soil should be disposed of at a licensed disposal facility as waste. The native silty clay layer underlying the soil could be stockpiled and sampled under the supervision of a Qualified Person and following the minimum stockpile sampling frequency as defined by O.Reg. 153/04 Records of Site Condition. If the results of the stockpile sampling meet 2011 MOE Table 9 standards the soil could be reused either on-site or at a MOE approved Receiving Site (if it meets MOE Table 3). If re-use is not possible, the material would most likely be considered waste and will require disposal at a licensed waste disposal site. All materials to be removed from the Site as waste and to be disposed of at a landfill will require classification in accordance with Ontario Regulation 347 to confirm that it is a solid, non-hazardous waste prior to its removal.
34. The Contractor must engage an appropriately-qualified and independent Environmental Monitor to inspect the work site, collect water quality measurements and samples, and notify the Contractor where modifications to the work may be necessary to meet the environmental protection objectives for the project including a temporary stop work order in order to comply with EMP. The Contractor must inform the Departmental Representative and Parks Canada's Environmental Authority of recommendations provided. Minimum monitoring requirements are provided below.
35. **At the point of discharge into the watercourse** – a Maximum increase of 8 NTU caused by suspended sediment from background levels for a short-term exposure (< 24-h period). Maximum average increase of 2 NTU from background levels for a longer term exposure. If elevated turbidity is observed Parks Canada will stop work and assess potential impact to the aquatic environment. Additional mitigation measures may be required. **The point of discharge is defined as: (1) the end of pipe for dewatering effluent from a cofferdam-enclosed area; (2) Within 5 m downstream of an area enclosed with a turbidity curtain, or in the process of being enclosed in a turbidity curtain.**
36. **At the point of discharge into the watercourse**, a Maximum increase of suspended sediment concentrations by more than 25 mg/L over background levels during any short-term exposure period, with an absolute maximum of 75 mg/l irrespective of background levels (e.g., 24-h). For



longer term exposure (e.g., > 24 h), average suspended sediment concentrations shall not be increased by more than 5 mg/L over background levels.

37. In the event that the maximum TSS value of 75 mg/L (or 25 NTU) is **exceeded at the point of discharge** (irrespective of background), or TSS is <75 mg/L but more than 25 mg/L above background for >24 hours, the work should be stopped and the work site and methods reviewed to determine appropriate mitigations to reduce TSS. Once the mitigations are implemented, work can resume.
38. In the event that TSS is lower than 75 mg/L **at the point of discharge** (irrespective of background) but more than 25 mg/L above background for <24 hours, the work site and construction activities should be reviewed to determine appropriate mitigations to reduce TSS.
39. **For the receiving environment** (as defined in Golder 2017), for a >24-hour exceedance of 25 mg/L above background (with an absolute maximum TSS of 75 mg/L), the contractor should stop the work, inspect the work site, and review their work procedures to determine appropriate mitigation actions. Once the mitigations are implemented, work can resume.
40. **For the receiving environment**, for a <24-hour exceedance of 25 mg/L above background (with an absolute maximum TSS of 75 mg/L at the point of discharge has not been exceeded) the work site and construction activities should be reviewed to determine appropriate mitigations to manage TSS.
41. In the event that TSS in the receiving environment is on average >5 mg/L above background for >30 days (i.e., if the work in a given area requires more than 30 days), the contractor should inspect the work site and review their work procedures to determine appropriate mitigation actions.
42. It is expected that *in situ* turbidity measurements will be used for day-to-day monitoring and to inform the Contractor of the potential need to implement management actions:
 - a. For the point of discharge, turbidity should be measured on an hourly basis during periods of active discharge
 - b. For the receiving environment, turbidity measurements should be collected up and downstream of the Work Area:
 - i. If manual monitoring is the selected method, the frequency of monitoring can be varied based on the cloudiness of the discharge water and the receiving environment. When the discharge water is not visibly cloudy, spot measurements should be made a minimum of twice daily. When the discharge water is visibly cloudy, more frequent measurements should be made.
 - ii. Turbidity measurements can also be collected with a continuous recorder with a data logger, with one placed upstream and one downstream of the Work Area. The data logger should be downloaded weekly and supplemented with manual spot measurements.
43. Samples should be collected for laboratory analysis as follows:
 - a. In the event of an accidental release of sediment-laden water with a TSS concentration of 75 mg/L or greater, samples should be collected as follows:



- i. Samples of the discharge water should be submitted for concurrent chemical analysis of total and dissolved metals, PHCs, PAHs, pH, total organic carbon, TSS and turbidity; and toxicity testing following Environment Canada protocols for rainbow trout or fathead minnow (Environment Canada 1990, 2011).
- ii. Samples of water from Rideau Canal up and downstream of the Work Area should be submitted for chemical analysis of total and dissolved metals, PHCs, PAHs, pH, total organic carbon, TSS and turbidity.
- iii. It may also be necessary to collect other types of samples/parameters depending on the nature of the accidental release. Additional sampling requirements should be discussed with PCA and/or other agencies as necessary (e.g., the provincial Ministry of the Environment and Climate Change or ECCC).

In-water Work

44. No in-water work is permitted between March 15th and June 30th of any year to protect spawning fish.
45. A Dewatering Plan shall be submitted to the Departmental Representative for review and accepted by Parks Canada prior to any dewatering.
46. Fish (and reptiles/amphibians if encountered) shall be **rescued from the contained Work Area before installation of the granular work pad**. Rescued fish shall be released back into the Rideau Canal. The Departmental Representative shall be advised 24 hours prior to fish rescue and the commencement of dewatering.
 - a. Parks Canada's Environmental Authority shall be advised 24 hours prior to fish rescue.
 - b. Minimize the length of time fish are out of the water.
 - c. Use appropriate equipment to remove any stranded fish. If safe to do so, Seine nets or Dip nets can be operated by field staff to remove the fish.
 - d. Contact PCA EA staff should there be any issues with fish removal.
 - e. Any fish removed will be documented by species, counted and placed in the water outside the Work Area.
 - f. Round gobies or other invasive species found during dewatering activities shall be euthanized and not returned to the water system; this shall be reported to Parks Canada.
 - g. Sediment/turbidity curtains shall be deployed in a manner - e.g. moved in a direction from close to shore/structures outward - that prevent entrapment of fish inside the curtain.
47. Ontario Drinking Water Quality Guidelines cannot be exceeded (beyond parameters that currently exist) due to project activities.
48. Salt and other road chemicals should be properly stored in designated areas only, preferably in dry sheds to prevent infiltration of leachate to the water table and surface runoff.
49. Accumulated snow that may be contaminated with salt should be disposed of only at approved dumpsites or designated areas.
50. Snow containing salt or sand should never be dumped in, or allowed to melt and run off into watercourses.



51. Ice laden with sediment shall be removed from the project site or stored within an isolated area, with meltwater being treated for turbidity as necessary.
52. All debris on the water and bed of the canal (including unused aggregate/concrete rubble) shall be completely removed and area restored to original state upon completion of work.
53. All concrete, sealants, or other compounds used for this project shall be utilized according to the appropriate Product Technical Data Sheet, stating guidelines and methods for proper use, and provided by the manufacturer of the product.
54. Unless specified and approved in contract documents, ensure that all works involving the use of concrete, cement, mortars, grout and other Portland cement or lime-containing construction materials are not deposited, directly or indirectly into any watercourse. Concrete materials cast-in-place must remain inside the formed structure. Containment facilities shall be provided for the wash-down of concrete equipment including concrete delivery trucks, concrete pumping equipment and hand tools. All concrete wash water will be captured and disposed of off-site at a provincially-licensed disposal facility.. Water that contacts uncured or partly cured concrete shall be prevented from entering any watercourse or stormwater system. Maintain complete isolation of all cast-in-place concrete and grouting from fish-bearing waters for a minimum of 48 hours if ambient air temperature is above 0°C and for a minimum of 72 hours if ambient air temperature is below 0°C. Use only non-toxic biodegradable form stripping agents.
55. At the discharge point into the watercourse, pH will be maintained between 6.5 and 9.0. Water with pH > 9 cannot be released directly back into the watercourse, but must be treated prior to release. Water with a pH 12.5 is considered toxic and treated as a hazardous waste under Ontario Regulation 347 of the Environmental Protection Act and wastewater in this condition must be removed from the site.
56. Any water containing a high level of silt or sediment will be treated by discharging to settling basins, vegetated areas or sediment traps prior to release (to be identified in a Dewatering Plan). Water quality downstream of construction activities and turbidity curtain should not exceed recommended DFO and CCME guidelines on the protection of aquatic life.
57. Additional Environmental Mitigation Measures For Placement Of Tremie Concrete:
 - a. Ensure concrete forms are tight and no flow is occurring.
 - b. Isolate area with curtain or impermeable material specified for concrete particulates; ensure fish exclusion is followed.
 - c. Isolated area should be the minimum size required to complete task.
 - d. For tremie pours, CO₂ system must be installed and operating along the entire length of the isolated area. The tank shall be used to release carbon dioxide gas into an affected area to neutralize pH levels. Ensure sufficiently sized tanks for the concrete volumes used.
 - e. Workers shall be trained in the use of the system.
 - f. Use of neutralizing acids is not permitted.
 - g. pH monitoring conducted inside and outside the containment area.
58. Monitoring of downstream areas, well outside the project site, during potential rock fissure grout injection will be required throughout the entire operation.



59. In the event of a release of concrete or grout, Parks Canada, the Ontario Spills Action Centre (1-800-268-6060) and the **NCC Emergency line (613-239-5353)**; remediation will be conducted immediately contain and clean up in accordance with federal and provincial regulatory requirements AND to the satisfaction of Parks Canada. Documentation of remediation, testing and results will be provided to Parks Canada **and the NCC (Eric Soulard, NCC Environmental Projects Services, (613-239-5678 ext. 5418 / eric.soulard@ncc-ccn.ca).**

Erosion and Sediment Control

60. Mandatory submission - and acceptance by Parks Canada - of an Erosion and Sediment Control Plan, prepared by a qualified individual, as stand-alone or part of the EMP, demonstrating:
- A focus on erosion control primarily and sediment control secondary;
 - Erosion and sediment controls will be tailored to the type of sediment found onsite (e.g. if clay is present, additional controls are necessary).
 - The area to be controlled. In addition to the construction site, it is necessary to identify adjacent areas that could be negatively impacted by construction activities;
 - Drainage areas and patterns based on pre-construction topography and construction design;
 - The EMP will have, as a principal to reduce the amount of sediment laden water produced, a focus on separating offsite and infiltrating water into the construction site from construction activities and sediment sources.
 - How clean storm run-on will be diverted around the site and away from exposed areas;
 - How sediment-laden run-off will be directed to detention or retention facilities on-site. Large drainage areas can produce a significant amount of run-off, resulting in a need for large detention or retention structures;
 - Channels that are designed and constructed to the necessary design discharge;
 - Temporary and permanent erosion control needs for all drainage channels; and,
 - Consideration of project schedule in selecting, designing and laying out environmental controls.
 - Consideration of seasonal requirements (for longer-term projects); select and design controls and practices for controlling erosion and sedimentation including shutdown periods.
61. Sediment and erosion control measures shall be implemented prior to work and maintained during the work phase, to prevent entry of sediment into the water where site access or other activities cause exposed soil. The following principles should be considered:
- Diversions to limit run-on water;
 - Reduction of erosional forces by surface water velocity reduction;
 - Reduction of sediment development through sediment collection or anchoring;
 - Sedimentation of mobilized sediments;
 - Filtration of sediment-carrying flows;
 - Collection of captured or contained sediments;
 - Treatment of pH (hydronium and hydroxide).



62. The size of particles present in the sediment is a key consideration for selecting the appropriate sediment treatment option(s):
 - a. If the sediment consists primarily of gravel or sand, which are relatively large particles, a single treatment using a more basic technology, such as a sediment trap or sediment bag, may be adequate.
 - b. If the sediment consists of silt and/or clay, which are relatively small particles, the effluent will most likely need a more advanced technology, such as a filter press or chemical treatment with anionic flocculent and a filtration method.
 - c. If the sediment consists of a large spectrum of particle sizes, the water may need primary treatment to remove larger particles, followed by secondary treatment to remove finer particles.
63. Filter material will consider the grain size characteristics of the concrete sediment and shall be designed around the principals of maintaining sufficient hydraulic flow and prevention of particle movement through the material.
64. Eliminate unnecessary sources of sediment to the dewatering area to improve dewatering outcomes. This can be achieved by ensuring surface water flow is prevented from entering the project site.
65. Sediment and erosion control measures shall be implemented prior to work and maintained throughout the work phase, to prevent entry of sediment into the water where site access or other activities cause exposed soil.
66. All sediment and erosion control measures shall be inspected daily to ensure they are functioning properly and must be maintained and/or upgraded as required to prevent entry of sediment into the water.
67. Ensure that sediment settling basins are of adequate size to compensate for excess sediment run-off and erosion (i.e. storm water run-off, misdirected drainage).
68. Any stockpiled materials shall be stored and stabilized a safe distance away from any watercourse, drainage course or swales to prevent erosion and subsequent entry into the water body OR removed from the site, in accordance with all federal, municipal and provincial regulations.
69. If sediment and erosion control measures are not functioning properly, no further work shall occur until the sediment and/or erosion problem is addressed.
70. All disturbed areas of the work site shall be stabilized immediately with erosion protection. All exposed areas should be covered with erosion control blankets or other measures such as mulch to keep the soil in place and prevent erosion until vegetated in the spring.
71. Avoid activities that may lead to erosion during excessively wet weather conditions; monitor forecasts for heavy rainfall watches & warnings. Flow dissipaters and/or filter bags, or equivalent, shall be placed at water discharge points to prevent erosion and sediment release.
72. Fine materials such as limestone-based aggregates, unwashed rocks or materials that have the possibility of being suspended or transported downstream will not be used. Only washed and clean material free of fine particulate matter shall be placed in or near water where it has been previously planned and authorized.



73. No acid-generating rock (containing sulphides) will be used.
74. The contractor will provide a marine grade turbidity curtain across all areas where sediments can enter the watercourse. Turbidity curtain to be anchored or weighted down along its length to form a continuous seal on the river bed with adequate flotation at water surface to prevent over spills of turbid water.
75. Turbidity curtains should not be used as a primary or secondary settling area for dewatering activities. Supplementary sediment and erosion control measures should be installed prior to construction activities and should be added upon/reinforced as necessary.
76. In the event of a significant silting or debris caused by construction activities, the contractor will take appropriate measures to contain and mitigate the problem including the installation of additional downstream turbidity curtains.
77. The contractor will maintain a standby supply of pre-fabricated silt fence barrier, or an equivalent ready-to install sediment control device.

Staging/Work Area

78. Keep worksite clean; daily garbage (incl. cigarette butts) removal.
79. Maintain equipment to avoid leakage of fuels and liquids. Ensure measures are in place to minimize impacts of accidental spills.
80. Spill control and emergency plans will be in place prior to initiation of construction; an emergency spill kit shall be kept on-site and employed immediately should a spill occur.
81. The spills kit will be maintained on site and the contractor will ensure that adequate additional resources are available.
82. In the event of a spill, Parks Canada, the Ontario Spills Action Centre (1-800-268-6060) and the **NCC Emergency line (613-239-5353)** shall be notified immediately; remediation will be conducted immediately to contain and clean up in accordance with federal and provincial regulatory requirements AND to the satisfaction of Parks Canada; **documentation of remediation, testing and results will be provided to Parks Canada and the NCC (Eric Soulard, NCC Environmental Projects Services, (613-239-5678 ext. 5418 / eric.soulard@ncc-ccn.ca).**
83. Store all oils, lubricants, fuels and chemicals in a secure designated area on impermeable pads.
84. Refuelling of equipment and maintenance shall be conducted off slopes and away from water bodies on impermeable pads at least 30 meters away from any watercourse. In the event that the recommended distance from watercourses is not feasible or practical because of site conditions, proper storage/re-fuelling mats must be employed at the project site.
85. Drip trays shall be placed under all fuel-powered equipment.
86. There shall be no discharge of chemicals and cleaning agents in or near aquatic habitats, all such substances shall be disposed of at a facility licensed to receive them.
87. All materials and equipment used for the purpose of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substance (e.g. petroleum products, debris etc.) from entering the water.
88. Operate machinery from stable location.
89. Only the working end of machinery shall directly enter the water. The working end of machinery will be clean and maintained free of leaks. Complete the in-water activity as quickly as possible



to minimize the time equipment is in the water. Do not leave equipment in water during breaks in work activity.

90. No tools, equipment, temporary structures or parts thereof, used or maintained for the purpose of this project, shall be permitted to remain at the site after completion of the project.

Cultural Resources / Archeology

91. If required, allow Parks Canada to conduct a heritage recording of the walls and landscape prior to work. Such methods may include written descriptions and analyses, photographs (aerial or terrestrial), rectified photography, photogrammetry, geophysical survey, maps, measured plans, drawings and sketches, or other traditional and modern technologies.
92. Inform the Parks Canada Cultural Resource Specialist regarding any changes to project plans and/or scheduling. Any changes not assessed under this Basic Impact Analysis will require approval from Parks Canada and may require further mitigation measures.
93. If an archaeological or cultural resource is discovered, the Parks Canada project manager should be informed. The project manager should then contact Parks Canada's Archaeology Section or Cultural Resource Specialist for advice and an assessment to determine whether any mitigation is required. If the discovery is significant, it will be necessary to have time built into the construction schedule to allow for evaluation, mitigation, and recording.

Air/Noise

94. The Departmental Representative or a Parks Canada Environmental Assessment Officer may stop a vehicle if they believe the vehicle is emitting excessive exhaust smoke or suspect that emission control equipment has been tampered with or removed.
95. Monitor and mitigate public complaints by keeping a record of complaints and addressing any issues raised by the public.
96. Use well-maintained heavy equipment and machinery, preferably fitted with fully functional emission control systems/muffler/exhaust baffles, engine covers, etc.; machines shall not be left to unnecessarily idle in order to avoid emissions.

Waste Disposal

97. Recyclable material and waste shall be removed from the site, in accordance with all federal, provincial and municipal regulations, to disposal facilities licensed to receive them.
98. Waste generated will be disposed according to regulations (i.e., O. Reg. 102/94 and O. Reg. 558/00, R.R.O. 1990, 347).



Appendix 3 – Site Photos



Photo 1. View towards the south. Taken October 16, 2018.



Photo 2. View south. Two of the trees that will be protected within the construction zone are visible. Construction of the Flora Footbridge is in the background. Taken October 16, 2018.

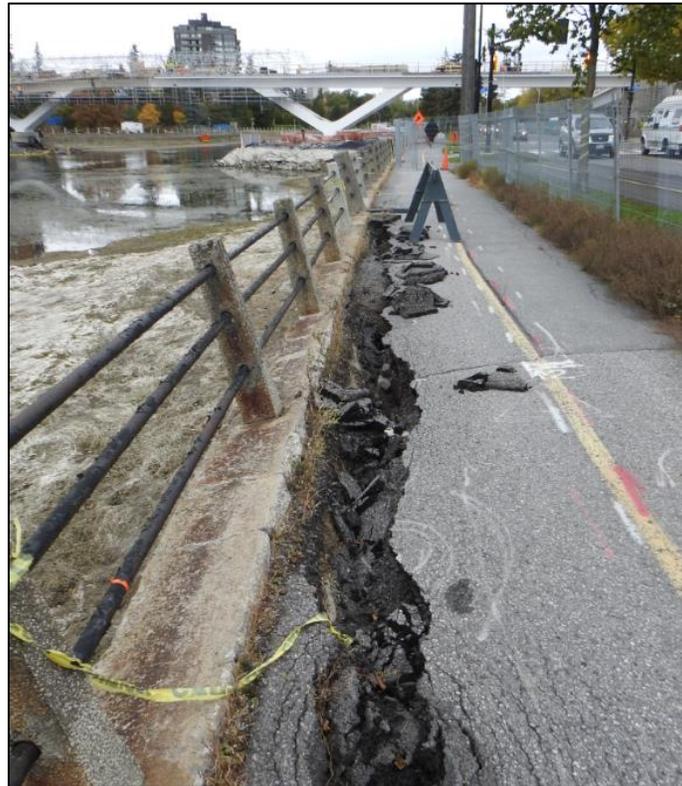


Photo 3. Issues created by the failing wall. Taken October 16, 2018.



Photo 4. Close-up of wall. Note the exposed canal bed during the fall drawdown period. Taken October 16, 2018.



Appendix 4 – Sediment and Surface Water Assessment – Factual Report - Ottawa Wall Repairs Rideau Canal, Ottawa, Ontario



**Appendix 5 – Environmental Management Planning Considerations - Ottawa
Wall Repairs Rideau Canal, Ottawa, Ontario – Golder 2017**