Parks Canada Basic Impact Analysis

1. PROJECT TITLE & LOCATION

Horseshoe Lake Dam Replacement
Trent-Severn Waterway
Horseshoe Lake, 1902 Horseshoe Lake Road, Minden Hills

2. PROPONENT INFORMATION

Parks Canada, Trent-Severn Waterway National Historic Site
P.O. Box 567, 2155 Ashburnham Drive
Peterborough, ON K9J 6Z6

3. PROPOSED PROJECT DATES

Planned commencement:	Fall 2016
Planned completion:	Spring 2017
Duration:	estimated 40 weeks

4. INTERNAL PROJECT FILE # TSW-2016-005 (I)

5. PROJECT DESCRIPTION

BIA Determination Rational

This assessment is being conducted under Parks Canada's Environmental Impact Analysis Process (2015) as a means to meet Parks Canada's legal and mandated obligations to protect Canada's natural and cultural heritage. This Environmental Impact Assessment is not under s.67 of the *Canadian Environmental Assessment Act* (CEAA) 2012, as Parks Canada owns the dam structure and not the surrounding lands and waters. Horseshoe Lake Dam is not a cultural resource (NCR, formerly known as Other Cultural Resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015).

Dam Replacement

The project involves demolishing the existing structure to the level of the existing sill, and rebuilding the dam with the same configuration and in the same location as the existing dam. The new dam will have four, 6.1 m sluices with the same width and sill elevation as the original one, but with an elevated deck. The right and left wingwalls will be removed. An elevated access walkway at the same elevation as the deck will be constructed. Bank stabilization will be required to protect the banks as well as the nearby roadway. A small parking area will be constructed on the west side next to the county road, which is not currently PCA property. Because the dam will be built in the same location as the present structure, dewatering, demolition and construction will be staged such that water can continue to flow through part of the structure at all times during construction.

Construction Sequence

Project Phase	**Physical Works and Activities**
Mobilize	Clear vegetation in the proposed location of the reconstruction and construction staging area; Prepare and manage work zone, including storage of equipment and materials; Install construction limit signage and perimeter fencing; a parking/temporary laydown area will be constructed along County Road 20.
Install Dewatering Equipment	Dewatering and sediment control installed. As the dam is being constructed in place, both upstream and downstream cofferdams are required. A turbidity curtain will be installed upstream of the upstream cofferdam and downstream of the downstream cofferdam. The cofferdams will first be installed closest to the west bank, such that water is diverted away from the two west sluices and towards the eastern sluice. The cofferdams will be anchored on the west bank (upstream of the existing retaining wall/access) and to the fourth pier, as shown in construction staging drawings (attached). The design of the cofferdam will be the sole responsibility of the Contractor. The recommended cofferdam design is at least a 20 year return flood - 75 m^3s (AECOM, 2011).
Construction	The existing right wingwall/access and the rightmost pier will be removed. An upstream retaining wall and downstream wingwall that form the west abutment and support a temporary laydown area/future parking area will be constructed. This area will be back-filled and covered with a gravel surface. This area can then be used as a laydown area and the road may be partially or completely reopened. The west half of the deck, the remaining two piers and the underlying sill will be demolished. The new west sill, three new piers and the new west portion of the dam deck (including the upstream and downstream guardrails) will be constructed. The cofferdams will be moved from the west side of the dam to the east. The cofferdams will be anchored on the east bank and to the third pier from the right, as shown in the construction staging drawings. A turbidity curtain will be installed upstream of the upstream cofferdam and downstream of the downstream cofferdam. The existing left access will be removed. The left half of the deck, the two left piers and the underlying sill will be demolished. The east sill, two new piers and the new left portion of the dam deck (including the upstream and downstream guardrails) will be constructed. The selected operating equipment, gain covers, signage, fences and centre guardrail will be installed.

Project Phase	Physical Works and Activities
Demobilization	The cofferdams, the sediment control and monitoring measures and all construction equipment will be removed from site; restoration activities associated with the Dam construction.
Commissioning and Operation	Conduct operation of the Dam

6. VALUED COMPONENTS LIKELY OR POTENTIALLY AFFECTED

Fish Habitat

Increased amount of suspended sediments and other contaminants introduced to the water column through dewatering and pumping activities as well as installing and removing coffer dams and turbidity curtains. Suspended sediments can impact spawning, cause irritation or damage to fish gills and eyes, disrupt feeding and potentially reduce the health of fish.

Upstream of the dam in Horseshoe Lake, the Ontario Ministry of Natural Resources & Forestry (OMNRF) report the presence of Smallmouth Bass, Rainbow Trout, Lake Whitefish, Brown Trout, Lake Whitefish, Burbot, Yellow Perch, Rock Bass, White Sucker, Brown Bullhead, Rainbow Smelt. The areas immediately upstream of the sluices may be considered low quality habitat; the shoreline areas may be used by species of bass and potentially yellow perch.

Downstream of the dam, the potential species – as well as the actual use by fish – are less known. Fish species in Minden Lake >0.5 km downstream include Largemouth Bass, Smallmouth Bass, Rock Bass, Walleye, White Sucker, Shiner sp., Lake Herring (Cisco) , Burbot, Brown Bullhead, Yellow Perch, Logperch, Pumpkinseed, Bluegill, Crappie and Rainbow Smelt. Downstream of the dam the channel is modified for white-water recreation and likely has velocities too high in spring to permit utilization by most species. Walleye and rainbow trout may potentially spawn in riffle/pools > 100m downstream and, along with white sucker, may potentially inhabit areas below the spillways in periods of low flow.

Water Quality

Reduced water quality and clarity due to sedimentation and discharge of turbid water, equipment leaks and accidental spills.

Aquatic Invasive Species

The Early Detection and Distribution Mapping System for Ontario shows no aquatic invasive species records for most of the waters above Horseshoe Lake Dam. Species such as the spiny water flea and zebra mussel are reported for waters in the TSW and some reservoir lakes. If boats are used during the project, there is a risk of spreading these species to Horseshoe Lake and subsequently other lakes in the Haliburton region.

Soil & landforms

An upstream retaining wall and downstream wingwall that form the right abutment and support a temporary construction laydown area/future parking area will be built, resulting in a landscape change. This area will be back-filled and covered with a gravel surface.

Flora

Vegetation (tree and shrub including mature hardwoods, white pine and cedar saplings and sumac) removal will take place along the immediate shorelines upstream and downstream of the dam for access, coffer dam installation and dam construction.

Birds

Horseshoe Lake lies in the western portion of 10x10m UTM grid square 17PK88, used for the Atlas of the Breeding Birds of Ontario (http://www.birdsontario.org/atlas/index.jsp). The bird list contains 120 separate species. Because vegetation will be disturbed, however minor, there is potential to affect birds. For Environment Canada nesting zone C3, within which the project area lies, there are 84 species known to nest in forest habitats, the habitat type in the project area. The nesting period may be as early as April 2 and late as August 30, depending on species. For forest birds, which have the greatest potential to be disturbed, the primary nesting period (61-100% of species) falls between May 24 and July 22.

Reptiles/Amphibians

The *Ontario Reptile and Amphibian Atlas Program* lists 29 species and 408 records for grid square 17PK88. (http://www.ontarionature.org/protect/species/herpetofaunal_atlas.php). These species have potential to be in the area, but their presence at the immediate project site has not been confirmed.

Turtles	4 species and 37 records	Blanding's Turtle* (1) Eastern Musk Turtle* (2) Midland Painted Turtle (5) Snapping Turtle† (29)
Snakes	8 species and 52 records	Eastern Gartersnake (7) Eastern Hog-nosed Snake* (13) Eastern Milksnake† (8) Eastern Ribbonsnake† (3) Ring- necked Snake (8) Northern Watersnake (1) Red-bellied Snake (5) Smooth Greensnake (7)
Lizards	1 species and 4 records	Five-lined Skink† (4)
Salamanders	6 species and 26 records	Blue-spotted Salamander (5) Eastern Newt (2) Eastern Red-backed Salamander (6) Four-toed Salamander (2) Northern Two-lined Salamander (3) Spotted Salamander (8)
Frogs and Toads	10 species and 289 records	American Bullfrog (26) American Toad (23) Gray Tree frog (34). Green Frog (48) Mink Frog (2) Northern Leopard Frog (27) Pickerel Frog (3) Spring Peeper (96) Western Chorus Frog* (6) Wood Frog (24)

* SARA Status: Schedule 1, Threatened

† SARA Status: Schedule 1, Special Concern

Species at Risk

The Federal Species at Risk Act (SARA) provides protection to all species at risk (SAR) listed under Schedule 1 of the Act. The project area falls within the identified zone of critical habitat of the Golden-winged Warbler (*Vermivora chrysoptera*) a SARA *Threatened* species. Golden-winged Warblers prefer to nest in areas with young shrubs surrounded by mature forest – locations that have recently been disturbed, such as field edges, hydro or utility right-of-ways, or logged areas. Golden-winged Warblers arrive in southern Ontario during the first days of May, with the females following one or two weeks later. These small warblers remain in their breeding habitats until late August and early September.

The project site lies outside of land under the jurisdiction of Parks Canada. For this reason, The Ontario Endangered Species Act (2007) applies. SAR identified by the Ontario Ministry of Natural Resources and Forestry (OMNRF) for the Haliburton area are:

Bobolink (*Dolichonyx oryzivorus*); Status: threatened
Eastern Meadowlark (*Sturnella magna*); Status: threatened
Peregrine falcon (*Falco peregrinus*); Status: special concern
Whip-poor-will (*Caprimulgus vociferus*); Status: threatened
Pale-bellied Frost Lichen (*Physconia subpallida*); Status: endangered
Common Five-lined Skink (*Plestiodon fasciatus*); Status: special concern
Eastern Ribbonsnake (*Thamnophis sauritus*); Status: special concern
Milksnake (*Lampropeltis triangulum triangulum*); Status: special concern
Blanding's Turtle (*Emydoidea blandingii*); Status: threatened
Eastern Musk Turtle (Stinkpot) (*Sternotherus odoratus*); Status: threatened
Snapping Turtle (*Chelydra serpentina*); Status: special concern

Due to the nature and the location of the project and the environmental setting, the species identified as having the most potential to be in the vicinity of the project site and possibly affected by the work are Common Five-lined Skink, Blanding's Turtle, Snapping Turtle and Eastern Musk Turtle.

Air/Noise

Use of diesel-powered machinery may result in temporary, localized effects on air quality around the project site. Noise from construction may be disruptive for users of the local walking trail and the white-water course, as well as local cottage owners.

Cultural Resources/Archeology

Horseshoe Lake Dam was constructed in 1909 (**Attachment 4 – Section Historical Background**). The dam was last recapitalized circa 1948 when major concrete repairs were completed at the toe of the dam's piers and along the wing walls. The deck was also replaced prior to 1948. The submerged remnants of the historical dam – which has value to Parks Canada - are located upstream. (Photo #1, Appendix 2).

The proposed project involves a dam that is not a cultural resource (NRC, identified as "Other" in the former Cultural Resource Inventory prepared for the TSW in 1994-95). The designation "Other" was used to indicate that the resource was evaluated under the Cultural Resource Management (CRM) Policy, but was not considered at that time to meet the criteria to be recognized as a cultural resource for Parks Canada's management purposes. The CRM Policy does not apply to resources that are determined "not to be cultural resources" (NCR). According

to the CRM Policy (4.-b.), these resources should be managed under other policies, such as the management of materiel or real property and Parks Canada Asset Management Directive and Standards. Therefore, there is no cultural resource management obligations related to the Horseshoe Lake Dam. The dam is not subject to any requirements under the CRM Policy to maintain any heritage value or character-defining elements when it is rehabilitated, and "replacement in-kind" is not required for the purposes of cultural resource management.

However, recent historical research and preliminary investigation has demonstrated that the dams located in the Haliburton Sector have played an "important role in the early lumbering days, and later with the development of business, hydro development and recreational use by cottagers". In spite of the fact that the dams (with the exception of Coboconk Dam) in the Reservoir Lakes have not met the Parks Canada criteria for cultural resources, they nevertheless represent an important aspect of both the canal and the region's history. They are also an integral part of the Haliburton landscape. Moreover, they exemplify a form of innovative and adaptive water management technology used originally on the Trent-Severn Waterway. Therefore, Horseshoe Lake Dam is an asset that helps us to better understand the story behind the TSW. It contributes to the working assemblage of engineering structures that make the TSW an operational system of through-navigation. Since more than a hundred years, the dams in the Haliburton Sector remain essential elements in the landscape, creating landmarks in the Reservoir. For these reasons, although a cultural resource impact analysis won't be required for this project, a holistic approach in accordance with the Standards and Guidelines for the Conservation of Historic Places in Canada is warranted. Therefore, the replacement of the dam or any additions to the landscape with the new proposed design should be compatible with the style, era and character of the historic site for a continuing contemporary use, while protecting its heritage value and character-defining elements (See Attachment 4).

Public Safety/Visitor Use

Horseshoe Lake dam is located adjacent to private property, a county road and is immediately upstream of a white-water course. A hydropower generation facility is located 4 km downstream at the southern end of Minden Lake. The dam can be accessed by individuals from private property to the east, from the stairs and west wingwall and by watercraft such as a canoe or kayak. County Road 20 runs adjacent to the west of the dam and will need to be closed at least until the extended parking area/temporary laydown area is constructed.

7. EFFECTS ANALYSIS

Fish Habitat/Water Quality

Upstream – Horseshoe Lake

Upstream of the dam, in Horseshoe Lake, in areas immediately upstream of the sluices, use by fish would be temporal as at high flows/velocities the area would unlikely be utilized. At low flow, fish could potentially forage there, particularly at sluices with all stop logs in place. Habitat utilization by bass species has been confirmed, through a fish habitat survey, along upstream shorelines. Spring in-water work restrictions will be in place to protect bass spawning/rearing in these areas. Turbidity curtains will be used to mitigate effects of sedimentation and turbidity on fish in other periods.

The primary issue for Horseshoe Lake is for historic/standard lake levels not to be impacted after October 1, which would negatively affect littoral zone lake spawning species such as Lake Trout,

Whitefish and Cisco. Because the dam will be built in the same location as the present one, dewatering, demolition and construction are staged such that water can continue to flow through part of the structure at all times during construction. During initial construction, the water will continue to flow through the third sluice. When the first half of the dam is complete, the second half will be constructed and water will flow through the sluice(s) on the other side. Parks Canada intends to do this for all its projects - to protect lake levels, to facilitate construction and to maintain normal water flow and operations throughout. No changes in flow volume through the dam or water levels in Horseshoe Lake will occur as a result of the project.

Downstream – Riverine Environment

The river below the dam is a highly modified, artificial environment. In 1970 it was re-worked (with machinery) to create a white-water course. In 2000 further site development was undertaken and completed. The facility was again upgraded for the 2015 Pan Am Games.

The river's white-water section is 800 meters long and runs from a large eddy pool below the dam, through a small drop into a channel below. The middle of the river runs in through a number of bends, where it is fast and relatively shallow. Spring flows range from 25 to 50 m^3/s. Summer flows range from 10 to 18 m^3/s. Below 10 m^3/s the water is shallow and considered dangerous for white-water canoeing and kayaking.

WSP Engineering reported that a long-term (1962-2010) average flow of 4.0 m^3/s was estimated during the summer season at Horseshoe Lake Dam and was used as the sunny-day flow rate for their investigations. In summary: the volume of flow in spring freshet is quite high and drops to very low in summer months, but is subject to weather and operation of the dam.

Fish species that may temporally inhabit river sections below the dam are unknown. Species listed for Minden Lake to the south include Largemouth Bass, Smallmouth Bass, Rock Bass, Walleye, White Sucker, Shiner sp., Lake Herring, Burbot, Brown Bullhead, Yellow Perch, Logperch, Pumpkinseed, Bluegill, Crappie and Rainbow Smelt. All of these species are primarily warm/cool water, lake inhabitants that spawn in low velocity environments. All species are common throughout the province – i.e. there are no rare or endangered species.

The modified channel likely has velocities too high to permit utilization by slower swimmers. Walleye (and rainbow trout if present) may potentially spawn in riffles/pools farther downstream and potentially may utilize areas directly below the spillways in periods of low flow. These species favour water velocities anywhere between 0.30 to 1.0m/s, factoring in depth and river bed configuration. Velocities in the channel below the weir (outlet of the plunge pool) are high in spring due the nature of the system, the operation of the dam and due to the modifications (narrows and drops at various points for the white-water course). Fast spring flows would prohibit, or at least greatly reduce the spawning success of fish. A further unknown in this case would be emergent success/survival in April/May when flows are high. The most likely scenario is that the channel may be used for spawning - not near the dam - but much farther below, closer to Minden Lake.

*http://www.whitewaterontario.ca/rivers/index.php/Gull_River

Waters through the sluiceway/project area are important for water quality in areas downstream of the project area-in areas more suitable for fish. Activities at the project site may impact areas below if not mitigated properly. Turbidity curtains, followed by coffer dams will be deployed immediately upstream and downstream of the existing dam. The dam will be built in same location, with no change in footprint. The coffer dams are staged – one side for partial dam construction, the second side for the remainder. The initial coffer dam is scheduled to be constructed after October 1st. Removal would take place prior to March 15th. The second coffer dam is scheduled to be constructed before March 15th. If coffer dam installation (or removal) is delayed beyond March 15, a review by Parks Canada is required. If the contractor can demonstrate that environmental mitigation is effective, such that downstream fish species and water quality are not, or will not be, impacted, then PCA may grant an approval. In-water work is restricted, without exception for the period May 1 to July 15 to protect bass spawning in shoreline areas upstream of the dam. Sediment control for protection of the downstream riverine environment is planned. For areas inside de-watered coffer dams – the construction zone – if there is build-up of sediment or fine particle material due to construction activities, these will be removed or the area capped with clean rock to prevent sediment entry into the waterway upon coffer dam removal.

In summary, the project is considered one that poses a low risk of serious harm to fish. While in-water work restrictions are planned, there is no sensitive habitat in the immediate vicinity of the current dam that would be directly, negatively affected by placement of turbidity curtains, coffer dams or building of the new dam. Parks Canada intends to keep base flows the same during the construction project as to not affect water levels, waterway operations, or negatively affect spawning beds further downstream in the river.

Soil & landforms

Activities including the storage of materials, excavation, grading, backfilling, use of machinery, use of chemicals, set up of temporary facilities and vehicle traffic, all have the potential to negatively affect soils in the project area. Identifying and keeping work activities within areas identified in approved site plans and to previously disturbed areas, in addition to employing best practices and monitoring, will minimize this impact.

Flora

Tree and shrub removal will take place along the immediate shorelines upstream and downstream of the dam for access and dam construction. This involves clearing of very little vegetation and no real disturbance to a forest area. Single tree removal of cedar trees and white pine saplings make up most of the clearing activity. With the exception of an approximately 5 x 15m area for the new west side parking lot, disturbed areas will be restored and trees planted as part of site restoration. Natural regeneration will follow. Therefore, effects on flora are temporary and considered negligible.

Birds

Migratory birds, their nests and eggs are protected under the *Migratory Birds Convention Act (1994).* Project works or activities are potentially disruptive activities to nesting birds and should be avoided during periods of high use. Environment Canada recommends rescheduling activities to minimize risks to migratory birds and their habitats – no tree/brush clearing in the period of April 8th to August 28th. However, nest surveys can be used in certain circumstances where

nests are easily detectable, in order to meet regulatory requirements with respect to migratory birds, including SARA-listed species and other species of concern. Where possible, site clearing/commencement of construction should be planned to occur outside of sensitive nesting times - April 8th to August 28th and particularly outside of the primary nesting (61-100% of species) period between May 24th and July 22nd. If this is not feasible, then the site must be inspected by a biologist prior to clearing, to identify any potential for nests.

Because the extent of vegetation removal is minimal – primarily individual tree selection - effects on bird (and other wildlife) are also expected to be minor. Vegetation removal to prepare for project start-up is scheduled to occur outside of the nesting season. Construction activities (with the exception of site restoration) will be largely completed prior to the subsequent year nesting season. Therefore, effects on birds are considered minor.

Reptiles/Amphibians

All work around water needs to consider the potential for both turtle habitat at the project site (overwintering, nesting, thermoregulation and foraging) and their potential movement through it. Snapping Turtles, which nest from late May to late June use sand and gravel banks along waterways, including artificial dam and railway embankments, road shoulders, fissures in rocky shorelines, sawdust heaps, and freshly dug gravel/soil. Blanding's turtles nest the last week of May to the first week of July, with peak activity throughout June. They use open areas such as beaches, shorelines, meadows, rocky outcrops and forest clearings; human-altered sites such as gardens, power line rights-of-way, fields, gravel roads, road shoulders and sand/gravel quarries.

It is reasonable to conclude that the area already provides suitable habitat for several species of turtle, regardless of whether their presence can be confirmed. It is further expected that soil excavation, stock piling of materials and other forms of landscape disturbance has the potential to attract turtles to the area for nesting. Therefore, project mitigations will consider all turtles, (which include at risk species) in terms of protection.

The construction timing (fall/winter) will avoid most potential negative impacts to turtles and amphibians. Temporary reptile fencing, such as polythene/woven geotextile secured with timber stakes, or material of a similar nature/function, shall be installed completely around gravel stockpiles and other disturbed areas, in order to prevent turtle nesting in the project area the following spring.

Species at Risk

The project area falls within the identified critical habitat of the Golden-winged Warbler. In their breeding areas, Golden-winged Warblers utilize regeneration zones where young shrubs grow, surrounded by mature forest and characterized by tree succession of 10 to 30 years. These warblers frequent clusters of herbaceous plants and low bushes (where they nest on the ground). The species shows a preference for environments where the trees are spread out, as well as the forest edge, public utility (hydro-electric) rights-of-way, the edges of fields, areas where logging has recently occurred, beaver ponds and burned-out or intermittently cultivated areas.

The project takes place within a bounding polygon of critical habitat for Golden-winged warbler; however, project activities do not take place in, or otherwise impact, critical habitat. There is no chance of project activities affecting critical habitat. (See Critical Habitat Analysis, Appendix 5).

The project site lies outside of land under the jurisdiction of Parks Canada. For this reason, The Ontario Endangered Species Act S.O. 2007, c. 6 applies. However, according to that legislation, if work can be conducted in a manner that avoids adverse effects on protected species and habitats, an authorization under the *ESA* is not required. Activities undertaken in relation to the project shall be in compliance with the *SARA* and the *ESA*. Parks Canada intends to fully protect SAR species and mitigations in place will result in no negative effects on them.

Cultural Resources/Archeology

Although the Horseshoe Lake Dam and landscape have not been designated as cultural resources (NCR), and the project involves a full dam replacement, is not anticipated that it will negatively impact the site if appropriate mitigation measures are employed. In principle, the proposed replacement conforms to the Standards and Guidelines for the Conservation of Historic Places in Canada by preserving the character-defining elements of the site. These include: materials, forms, location, spatial configurations, uses and cultural associations or meanings that embody the heritage value. This will ensure that the historic site retains its heritage value and that the structure's physical life will be extended.

The primary conservation approach, based on the Standards and Guidelines, is "Rehabilitation" with an emphasis on minimal intervention. Minimal intervention has different meanings for Preservation, Rehabilitation and Restoration. In the context of Rehabilitation, it 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. Given the heritage value of the Horseshoe Lake Dam, recommendations and mitigation measures were considered, incorporated and a replacement in kind was chosen for the proposed project design.

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) (see Attachment 4 – Section Historical Background). 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).

The installation of guardrails, handrails, fences and other barriers may affect the landscape and the heritage integrity of the Horseshoe Lake Dam site. There is therefore a need to balance accessibility and safety with heritage value, to enhance the public's use and appreciation of the Trent-Severn Waterway National Historic Site and the Haliburton Sector. Therefore, designs need to consider public and operator safety whilst safeguarding the character-defining elements of the Trent-Severn Waterway historic place. Parks Canada's CRM professionals have developed guidelines to design the site-specific concept layout and configuration of guardrails and other safety barriers. These are detailed in Attachment 4 - Preliminary Cultural Resource Impact Assessment of Horseshoe Lake Dam. The positioning of guardrails/handrails and safety measures will be assessed and further defined once construction is complete and additional mitigation measures may be required.

To ensure that the project is based on a thorough understanding of the heritage value of the engineering work that will be rehabilitated, the Standards and Guidelines recommend documenting and assessing the asset and its character-defining elements before any intervention and subsequent work, including:

- Understanding the constructed element and how it contributes to the heritage value of the engineering work and the TSW;
- Understanding the construction history, theory, functional basis and design behind the constructed element;
- Documenting the form, materials and condition of the constructed element before undertaking an intervention;
- Documenting the operation and maintenance of constructed elements in sufficient detail to fully understand their operational characteristics. This can include obtaining an oral history of operation procedures, recording the machinery in operation or preserving records associated with the engineering work, and making these available for future research.

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 recognised conservation methods, appropriate level of intervention and quality control for the rehabilitation works on the engineering structure."

An Archaeological Overview Assessment (**Attachment 3**) 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. A Stage 2 archaeological assessment did not recover any archaeological resources during survey activities. As archaeological testing is by nature sampling (not 100 percent coverage) there could be a chance, however low, that features or artifact concentrations are encountered. 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.

Air/Noise

The project is expected to employ well-maintained heavy equipment and machinery, fitted with emission control systems/muffler/exhaust baffles, engine covers, etc. All on-site vehicles are expected to have a Drive Clean Emissions Report in compliance with O. Reg. 361/98: Motor Vehicles under the Environmental Protection Act, R.S.O. 1990, c. E.19. Parks Canada will monitor public complaints and address any issues raised by the public.

Public Safety/Visitor Use

Horseshoe Lake Road will be closed for a temporary duration during construction to facilitate the rebuild. Post construction this area will continue to be used as a parking spot for staff working at the dam. Additionally, along the toe of the west embankment, within the river basin, a rubble stone path will be placed to provide a safe walking and portage route to the dam from the parking area on Horseshoe Lake Dam downstream.

A pedestrian crossing for kayakers will be implemented to restore the legacy river crossing access the public had prior to dam being closed to the public in 2014. The crossing will be made separate from the operations deck to eliminate risks to public and asset that were concerns prior to 2014.

While visitor use of the dam site will be interrupted during construction, visitor use/public safety should be improved by the project.

Other Environmental Considerations

Extreme weather events, which have the potential to impact the project schedule, will be planned for and factored into project mitigation. Extreme daily snowfall between 30 and 50 cm has been recorded at Minden in the period from November to March. End of month extreme snow depth (cm) for the same period is: 37 (Nov), 60 (Dec), 67 (Jan), 72 (Feb) and 82 (Mar). Extreme daily rainfall recorded in the period from October to May is 56 mm.

River freeze-up generally occurs at the end of December, whereas ice break-up usually occurs in mid-March (OMNRF). The freeze-up and break-up dates are approximate and will vary according to ambient temperature, channel width and orientation and water flow. March, April and May are critical months for melting snow and rain. Both heavy rainfall and prolonged warm temperatures will cause rivers and lakes to rise suddenly. The historical record shows this often results in more than one peak during spring freshet. Greatest flow occurs during the spring freshet in April.

8. MITIGATION MEASURES

A complete list of project mitigation, that addresses valued components likely or potentially affected, is found in **Appendix 3**.

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

Parks Canada has met with the White-water paddling group - Minden Wild Water Preserve - that uses the downstream water and whose land abuts the dam on the Eastern shore. In addition, PCA has spoken to representatives of the two lake associations (Horseshoe and Mountain) that are immediately upstream. Finally, a bulletin outlining proposed work has been provided to the Municipality of Minden Hills, the lake associations and the white water group to share broadly with their members.

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

On 3 April 2016, a letter was sent to the 7 Williams Treaties First Nations Chiefs advising them of the TSW Federal Infrastructure Projects and their status. Parks Canada sent a follow up letter specifically addressing the project at Horseshoe Lake dam. The project was also presented and discussed during meetings with the First Nations on 31 August and September 21st 2016.

To date, the Williams Treaties First Nations consultation officers have identified that consultation is not required as the proposed project activities do not appear to impact Aboriginal or Treaty Rights. However, this BIA and project scope will be shared with community members to ensure all potential impacts have been assessed. Continued information, engagement and monitoring of project activities will occur to ensure the accuracy of proposed mitigation measures and to ensure that no impacts occur to the communities Aboriginal or Treaty Rights. Should such an impact arise, formal consultation to address the impact would be undertaken.

10. SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

With implementation of mitigation, residual adverse effects are not expected.

11. SURVEILLANCE

☐ Surveillance is not required
☒ Surveillance is required

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

Department/Agency/Institution: Parks Canada Agency	
Expert's Name & Contact Information: Scott Gauthier	Title: Project Engineer, Ontario Waterways Unit, Trent-Severn Waterway
Expertise Requested: Complete Project Description	

Department/Agency/Institution: Parks Canada Agency	
Expert's Name & Contact Information: Greg Cooper	Title: Haliburton Water Management Manager
Expertise Requested: Water flow and ice formation/break up around the dam	
Response: winter water flow through the dam typically prevents ice formation below	

Department/Agency/Institution: Ontario Ministry of Natural Resources, Bancroft District	
Expert's Name & Contact Information: David D. Flowers, Minden Field Office	Title: Management Biologist
Expertise Requested: advice on fish timing windows/fish species protection	
Response: historic/standard lake levels upstream should not be impacted after Oct 1/no concerns raised re down stream	

Department/Agency/Institution: Niblett Environmental Associates	
Expert's Name & Contact Information: Amanda Smith	Title: Fisheries and Aquatic Biologist
Expertise Requested: Fish Habitat Mapping/Waterbody Information	
Response: Fish habitat mapping at the project site; determination of the presence of suitable habitat for Ontario fish by comparing the habitat preferences of species whose range encompass the area to the current biophysical conditions at the site; Incidental observations of fish observed in the project area.	

Department/Agency/Institution: Parks Canada Agency	
Expert's Name & Contact Information: Joanne Tuckwell	Title: Species Conservation Specialist
Expertise Requested: Critical Habitat Mapping	
Response: SAR Critical Habitat GIS Layer	

Department/Agency/Institution: Parks Canada Agency	
Expert's Name & Contact Information: Nathalie Desrosiers	Title: Policy Advisor, Cultural Resource Management (CRM)
Expertise Requested: Cultural Resource Impact Assessment	
Response: Preliminary CRIA and mitigation measures provided	

Department/Agency/Institution: Parks Canada Agency	
Expert's Name & Contact Information: Barbara Leskovec	Title: Federal Infrastructure Investments Archaeologist
Expertise Requested: Archaeological assessment of the work area at	
Response: AOA provided	

15. DECISION

Taking into account implementation of mitigation measures the project is:

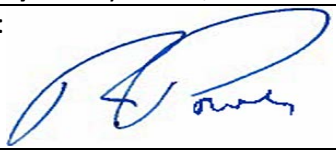
☒ Not likely to cause significant adverse environmental effects.

☐ Likely to cause significant adverse environmental effects.

FOR SARA REQUIREMENTS:

☒ There are no residual adverse effects to species at risk and therefore the SARA-Compliant Authorization Decision Tool was not required

16. RECOMMENDATION AND APPROVAL

Prepared by: Randy Power, EA Officer	
Signature: 	Date: Sept. 27, 2016
Recommended by: Valerie Minelga, EA Team Leader	
Signature:	Date:
Approved by: Jewel Cunningham, Director, Ontario Waterways	
Signature: 	Date: **Date:** Sept 29/16

17. ATTACHMENTS

1 Construction staging drawings
2 Fish Habitat Survey Information
3 Archaeological Overview Assessment
4 Preliminary Cultural Resource Impact Assessment

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*.

*****Ensure that all required mitigation measures and conditions (e.g. follow-up monitoring requirements) are included in project permits and authorizations*****

APPENDIX 1 EFFECTS IDENTIFICATION MATRIX

A. Direct Effects								
			Valued components potentially directly affected by the proposed project					
			Natural Resources					Cultural Resources
			Water (surface, fish habitat)	Fauna (turtles, birds)	Soil & landforms	Flora (riparian vegetation)	**Air/Noise**	Dam/landscape
	Phase	Activities						
Project Components	Preparation / Construction / Operation / Decommissioning	Supply and storage of materials	☒	☐	☐	☒	☐	☒
		Set up Use/Removal of temporary facilities	☐	☐	☒	☒	☐	☐
		Clearing	☒	☐	☐	☒	☐	☐
		Coffer Dam	☒	☐	☐	☐	☐	☐
		Dewatering	☒	☐	☐	☐	☐	☐
		Excavation/ Grading/Backfilling	☒	☒	☒	☒	☐	☐
		Construction	☒	☐	☐	☐	☐	☐
		Use of machinery	☒	☐	☐	☐	☒	☐
		Demolition	☒	☐	☐	☐	☐	☐
		Transport of materials/ equipment	☐	☐	☒	☒	☐	☐
		Disposal of waste	☐	☐	☐	☐	☐	☐
		Use of Chemicals	☒	☐	☒	☒	☐	☐
		Commissioning	☒	☐	☐	☐	☐	☐
		Use	☐	☐	☐	☐	☐	☐
		Maintenance	☐	☐	☐	☐	☐	☐

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…	☐	☐	☐	☐	☐	☐
	Could impacts to <u>soils and landforms</u> lead to adverse effects on…	☐	☐	☐	☐	☐	☐
	Could impacts to <u>water</u> (e.g. surface, ground water and water crossings) lead to adverse effects on…	☐	☐	☐	☒	☒	☐
	Could impacts to <u>flora</u> (including SAR) lead to adverse effects on…	☐	☐	☐	☐	☐	☐
	Could impacts to <u>fauna</u> (including SAR) lead to adverse effects on…	☐	☐	☐	☐	☐	☐
	Other…	☐	☐	☐	☐	☐	☐

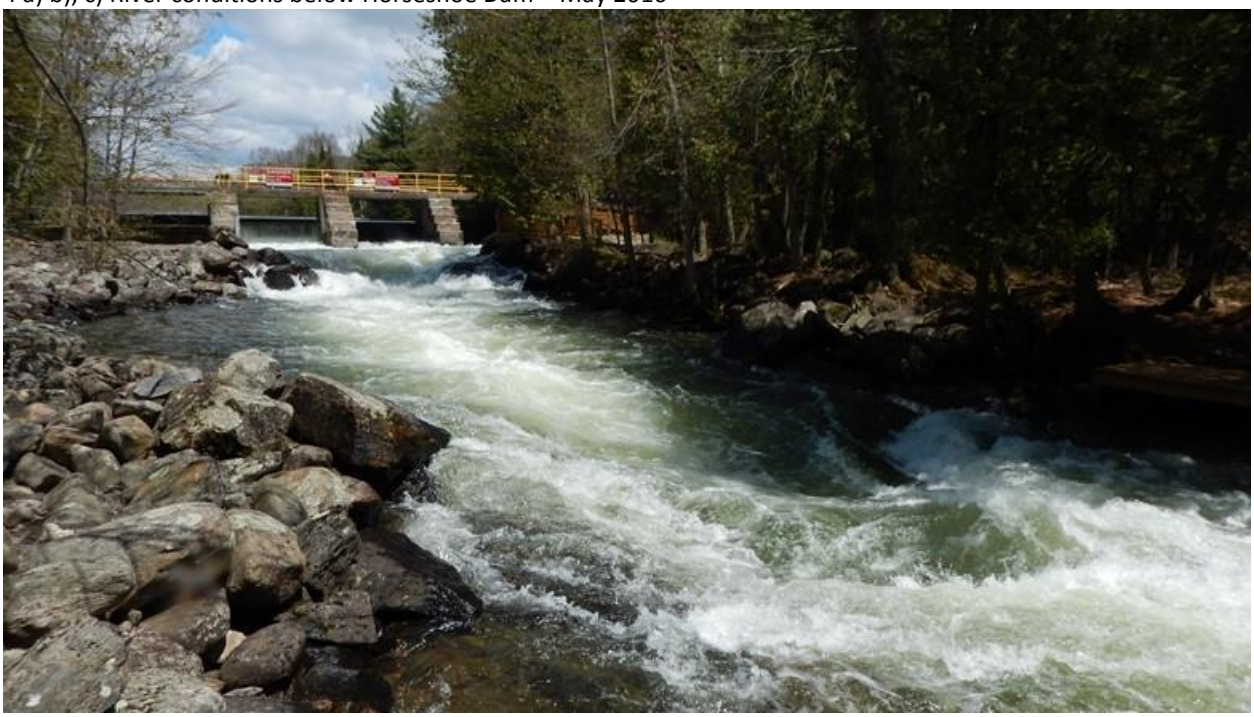
APPENDIX 2 SITE PHOTOGRAPHS

1 Airplane view of the dam looking downstream/south. Remnants of the old timber dam are in the foreground.

2 Upstream of Horseshoe lake dam, looking southeast.

3 Tailrace of Horseshoe lake dam

4 a) b), c) River conditions below Horseshoe Dam – May 2016



APPENDIX 3 PROJECT MITIGATION

General

1. Inform the Environmental Officer, Trent-Severn Waterway in Peterborough 705-750-4931 regarding any changes to project plans and/or scheduling. Any changes not assessed under this Basic Impact Analysis will require approval from PCA and may require further mitigation measures.
2. Project commencement only upon submission and **Parks Canada approval** of an Environmental Management Plan (EMP) – including a dam commissioning plan - that outlines all the measures to be implemented by the contractor on the project site to eliminate or reduce environmental effects.
3. The Parks Canada Project Manager and Environmental Officer, Trent-Severn Waterway will outline all the following mitigation measures in a construction start-up meeting with the contractor, to ensure awareness and understanding of these measures.
4. Ensure that all on-site personnel are aware of, and comply with, these mitigation measures.
5. All machinery and equipment shall be clean, free of leaks, in optimal working condition.
6. 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.
7. Spill control and emergency plans will be in place prior to initiation of construction.
8. An emergency spill kit shall be kept on-site and employed immediately should a spill occur.
9. In the event of a spill, Parks Canada and the Ontario Spill Action Centre (1-800-268-6060) shall be notified immediately.
10. In the event of a spill, remediation will be conducted immediately contain and clean up in accordance with provincial regulatory requirements AND **to the satisfaction of Parks Canada**; documentation of remediation, testing and results will be provided to Parks Canada.
11. Store all oils, lubricants, fuels and chemicals in secure areas on impermeable pads.
12. Refuelling of equipment and maintenance shall be conducted off slopes and away from water bodies on impermeable pads to allow full containment of spills.
13. A designated re-fueling depot will minimize the potential for extensive impacts at the site due to accidental releases of substances; proper spill management equipment shall be in place for fueling.
14. Drip trays shall be placed under fuel-powered equipment.
15. 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.
16. 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.

17. Staging areas, access routes and/or temporary structures will only be located in designated areas approved by the Departmental Representive.

Sediment and erosion control

18. Mandatory submission – **and approval by Parks Canada** – of an Erosion and Sediment Control Plan, as stand along or part of the EMP, demonstrating:

- 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;
- 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;
- How clean storm run-on will be diverted around the site and away from exposed areas;
- Channels that are designed and constructed to the necessary design discharge;
- Temporary and permanent erosion control needs for all drainage channels;
- 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.

19. 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.

20. All sediment and erosion control measures shall be inspected daily to ensure they are functioning properly and are maintained and/or upgraded as required to prevent entry of sediment into the water.

21. If sediment and erosion control measures are not functioning properly, no further work shall occur until the sediment and/or erosion problem is addressed **to the satisfaction of Parks Canada.**

22. Environmental protection measures shall be checked after each extreme weather event.

23. Sediment and erosion control measures shall be left in place until all areas of the work site have been stabilized.

24. 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.

Fish & fish habitat

25. Only clean material free of fine particulate matter shall be placed in or near water where it has been previously planned and authorized.

26. No acid-generating rock (containing sulphides) will be used.

27. Sediment control measures shall be implemented during any in-water work to control turbidity levels. Silt curtains, or other appropriate measures, shall be implemented prior to any in-water work that may result in sedimentation. These shall remain in place until all suspended sediments have settled.

28. 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.

29. Dewatering, demolition and construction is staged such that water can continue to flow through part of the structure at all times during construction. No changes in flow or lake levels will occur as a result of the project.

30. Stage 2 coffer dam removal and installation is scheduled to occur before March 15; if coffer dam installation is delayed beyond March 15, a request for changes to timing windows must be submitted to, and approved by, Parks Canada. If the contractor can demonstrate that environmental mitigation is sufficient, such that downstream fish species and water quality are not being impacted, then PCA may grant an exception.

31. In-water work restrictions are in place for the period May 1 to July 15 to protect bass spawning in shoreline areas upstream of the dam;

32. Any fish found within the upstream dewatered area – i.e. within the upstream coffer dam - will be removed and placed upstream.

33. Any fish found within the downstream dewatered area – i.e. within the downstream coffer dam - will be removed and placed downstream.

34. Monitor water quality for unacceptable suspended sediment levels during in water activities.

35. CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life will form the baseline for water and streambed quality monitoring and assessment.

36. Maximum increase of 8 NTU from background levels for a short-term exposure (e.g., 24-h period). Maximum average increase of 2 NTU from background levels for a longer term exposure (e.g., 30-d period). If elevated turbidity beyond 8 NTU from background levels for a short-term exposure (e.g., 24-h period) is observed Parks Canada will assess potential impact to the aquatic environment. Additional mitigation measures may be required.

37. Maximum increase of suspended sediment concentrations by more than 25 mg/L over background levels during any short-term exposure period (e.g., 24-h). For longer term exposure (e.g., 30 d or more), average suspended sediment concentrations shall not be increased by more than 5 mg/L over background levels. If elevated turbidity beyond 25 mg/L from background levels for a short-term exposure (e.g., 24-h period) is observed Parks Canada will assess potential impact to the aquatic environment. Additional mitigation measures may be required.

38. Should conditions at the work site indicate that there are unforeseen create negative impacts to fish or their habitat, all work shall cease until the problem has been corrected and Parks Canada EA staff 705-750-4931 has been consulted.

Invasive Species

39. If boats are used, inspect hulls for any aquatic plants, animals and mud that was not removed after previous use; remove and dispose of on land away from water; before leaving a waterbody, clean any visible mud, vegetation, mussels, or anything else suspicious from boat, motor, trailers or any other equipment.

40. Follow the Ontario *Clean Equipment Protocol for Industry - Inspecting and cleaning equipment for the purposes of invasive species prevention*.

Vegetation removal

41. Disturbance of vegetation along the shoreline must be limited to what is required for allowing reasonable completion of the project with minimal environmental impact.

42. Where practical, the branches of the large trees should be trimmed back as the first option rather than cutting the entire tree.

43. 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.

44. If there is insufficient time (at least four weeks) in the growing season remaining for the seeds to germinate, or at risk of germinating and being damaged by frost, the site shall be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring. Frost can occur as early as August 31st and late as June 25th.

Birds

45. Where possible, site clearing/commencement of construction should be planned to occur outside of sensitive nesting times - April 2nd to August 30th . If this is not feasible, then the site must be inspected by a biologist prior to clearing, to identify any potential for nests.

Species at Risk

46. The EMP must detail procedures (e.g. exclusion fencing) for preventing turtle entry/nesting within disturbed project gravels/soils during all stages of project activity.

47. The EMP must demonstrate procedures for avoiding disturbance/harm to wildlife.

48. If applicable (spring to early summer), the EMP must demonstrate procedures for avoiding disturbance/harm to nesting birds.

49. Temporary reptile fencing, such as polythene/ woven geotextile secured with timber stakes, or material of a similar nature/function, should be installed completely around gravel stockpiles to prevent turtle nesting in the project area.

50. Should any suspected species at risk be encountered or if there is potential to negatively impact SAR (or wildlife generally), contact Parks EA staff (705) 750-4931 for guidelines on how to proceed.

51. Minimize the disturbed area; clearly mark the work space.

52. Park on roads or disturbed areas only.

Noise /Air

53. Adhere to local noise by-laws. Notify residents of planned activities that may cause disturbance and schedule them to avoid sensitive time periods.

54. Monitor and mitigate public complaints by keeping a record of complaints and addressing any issues raised by the public.

55. All on-site vehicles are expected to have a Drive Clean Emissions Report in compliance with O. Reg. 361/98: Motor Vehicles under the Environmental Protection Act, R.S.O. 1990, c. E.19. EA Officers 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.

56. Use well-maintained heavy equipment and machinery, fitted with fully functional emission control systems/muffler/exhaust baffles, engine covers, etc.

57. Machines shall not be left to unnecessarily idle in order to avoid emissions.

Cultural Resources

58. Allow PCA to conduct a heritage recording of the dam and landscape prior to construction. Additional recordings of the submerged components may be required once dewatering occurs but prior to demolition. 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.

59. Inform the CRM Officer, Trent-Severn Waterway in Peterborough regarding any changes to project plans and/or scheduling. Any changes not assessed under this Basic Impact Analysis will require approval from PCA and may require further mitigation measures.

60. The remnants of the historical dam, upstream from Horseshoe Lake Dam, have historical value. This historical dam is not to be removed during the Project. As per the Concept Design (WSP 2016a), the historical value should also be accounted for in the future hydraulic modelling of water flows through this section to minimize impacts to the resource.

61. Should the historical dam be exposed during de-watering activities, it is recommended that archaeological recording of the historical feature be undertaken, in conjunction with provincial archaeological requirements (if applicable). Archaeological recording of the feature will include documenting the location and physical characteristics of the feature, and recording the construction techniques in an attempt to determine the age of the feature and to contribute to the knowledge of the site.

62. If unrecorded archaeological resources (i.e. structural remains and/or artifact concentrations) or any other cultural resource be encountered, work shall cease until

the item can be reviewed by a PCA or PCA appointed archaeologist, the situation reviewed and direction for mitigation measures is provided to the Environmental Assessment Coordinator and Project Manager. Ensure that all exposed underwater cultural materials are kept submerged and/or wet while waiting for direction.

Waste Disposal

63. 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.

64. Waste generated will be disposed according to regulations (i.e., O. Reg. 102/94 and O. Reg. 558/00, R.R.O. 1990, 347).

Concrete

65. Concrete leachate is alkaline and highly toxic to fish and aquatic life. Measures must be taken to prevent any incidence of concrete or concrete leachate from entering the watercourse. 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 or until significantly cured to allow the pH to reach neutral levels.

66. Ensure that all works involving the use of concrete will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse.

67. Wash equipment away from water and provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment.

68. Filter fabric material will consider the grain size characteristics of concrete sediment and shall be designed around the principals of maintaining sufficient hydraulic flow and prevention of particle movement through the material.

69. Concrete debris shall be placed into an enclosed container daily, or more frequently if required.

Machinery around water

70. Operate machinery from stable location.

71. 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.

Dam Commissioning

72. A commissioning plan for the dam shall be included in the EMP and must be approved by Parks Canada.

73. Turbidity curtains shall be in place during coffer dam removal.

74. Stop logs will be placed to reduce flows through the sluices during demolition/removal of coffer dams.

75. If elevated turbidity beyond 8 NTU from background levels for a short-term exposure (e.g., 24-h period) is observed Parks Canada will assess potential impact to the aquatic environment. A determination will be made by Parks Canada as to whether subsequent flushing is permitted. If not, additional mitigation measures may be required.

76. The area inside of the coffer dams, if necessary, will be cleaned or alternately capped with clean rock, in order to mitigate turbidity from the former construction area as it is re-flooded.

Floods/Extreme or inclement weather/Ice formation

77. Undertake construction under normal weather conditions, to the extent possible, and design the project worksite to withstand variable weather conditions.

78. Apply wet weather restrictions on construction activities to reduce surface run-off from exposed work areas and to minimize the risk of inundation.

79. The work area shall be stabilized against the impacts of high flow/heavy rainfall events at the end of each workday.

80. Work shall be suspended and the work area stabilized when there is a high probability of a rainfall event.

APPENDIX 4 WILLIAMS TREATIES FIRST NATIONS CONSULTATION LETTER

Parks Canada Parcs Canada

Ontario Waterways Directors Office
P.O. Box 567, 2155 Ashburnham Drive
Peterborough Ontario K9J 6Z6

June 24th, 2016

Dear Chief Roland Maxwell Monague,

On April 3, 2016 I sent a letter to your community highlighting the Federal Infrastructure Program. Ten projects which we hope to move forward with in the coming months where specifically highlighted. One of these projects is in the process of being developed and we are now in a position to seek your specific comments and interests.

The rebuild of the current dam at Horseshoe Lake, is expected to begin later this year. This dam is located at the southern end of Horseshoe Lake along the Gull River in the Haliburton Region. It is part of the reservoir system which is used to manage water levels within the Trent-Severn Waterway during the operational period. The current dam was built in 1909 to replace the original timber crib dam constructed in the late 1800s. A recent field analysis showed significant deterioration of the structure. A determination was made that only a complete rebuild would be economically and structurally feasible on this dam. In addition to the building of the new dam, a small area on the west side along the embankment of Horseshoe Lake Road will be used as a construction staging area. Horseshoe Lake Road will also be closed for a temporary duration during construction to facilitate the rebuild. Post construction this area will continue to be used as a parking spot for staff working at the dam. Additionally along the toe of the west embankment, within the river basin, a rubble stone path will be placed to provide a safe walking and portage route to the dam from the parking area on Horseshoe Lake Dam downstream. Remaining areas will be rehabilitated to a natural state.

The purpose of this letter is to seek your input on both the process and activities that we will be undertaking for the rebuild. I would like to offer for you to meet with Nicole Weber, project lead for this dam replacement in the coming weeks to provide a short presentation on the project as well as what next steps you believe would be necessary to meet your community's consultation requirements on this project. In addition they will be joined by Peter Lariviere, Manager of Indigenous Relations for the Ontario Waterways, and together they will be available to respond to any questions or concerns you may have.

I look forward to speaking with you in the coming days. In the meantime if you have any specific questions or concerns on this proposed project please feel free to contact me.

Regards,

Jewel Cunningham
Director of Ontario Waterways
Parks Canada
705-750-4919

Canada

APPENDIX 5 Critical Habitat Destruction Analysis
For Horseshoe Lake Dam Replacement
Golden-winged Warbler

Part A - General Information					
Date	**Where this activity will occur:**	**SAR implicated by this activity:**	**Project**	**Author**	**Collaborators**
April 2016	*TSW NHS*	*Golden-winged Warbler (Vermivora chrysoptera)* Threatened Schedule 1	*Horseshoe lake Dam Replacement*	*R. Power*	*V. Minelga*

Part B – Determining whether the proposed activitiy(ies) affects critical habitat

1. For the implicated SAR listed in Part A, does the proposed activity(ies) affect habitat within a bounding polygon of critical habitat identified in a recovery strategy or action plan?

☒ **No.** The proposed activity(ies) will not affect habitat within a bounding polygon of critical habitat. Critical habitat is not affected. No need to continue with analysis. **Check the first box in Part D and attach this analysis form to your assessment document.**

☐ **Yes.** The proposed activity(ies) will affect habitat within a bounding polygon of critical habitat for one or more SAR. **Continue to Question 2.**

2. Does the habitat meet the biophysical attributes of critical habitat for the implicated SAR listed in Part A, as described in the recovery strategy or action plan for the species?

- A site survey may be required to determine the biophysical attributes of the affected habitat.

☐ **No.** The habitat does not meet the biophysical attributes of critical habitat for any of the implicated SAR; the affected habitat is not critical habitat. No need to continue with analysis. **Check the first box in Part D and attach this analysis form to your assessment document.**

- *Use this space to describe, for each implicated SAR, how the habitat DOES NOT meet the biophysical attributes.*

☐ **Yes.** The habitat meets the biophysical attributes of critical habitat. The affected habitat IS critical habitat for one or more SAR. **For each affected SAR describe the biophysical attributes that are affected and continue to Part C of this analysis when completing the *Residual Adverse Effects* section of your assessment.**

Use this space to describe, for each implicated SAR, how the habitat DOES meet the biophysical attributes.

☐ **Uncertain.** The habitat may meet the biophysical attributes of critical habitat. The affected habitat MAY BE critical habitat for one or more SAR. **For each affected SAR describe the biophysical attributes that may be affected and continue to Part C of this analysis when completing the *Residual Adverse Effects* section of your assessment.**

- *Use this space to describe, for each implicated SAR, how the habitat MAY meet the biophysical attributes.*

Part C – Determining whether the proposed activity(ies) is/are likely to <u>destroy</u> critical habitat

3. For each implicated SAR, what is the *ecologically relevant area* (ERA) for assessing destruction of critical habitat for the species?

- Destruction determinations will be conducted at a spatial scale that is ecologically relevant for the species (e.g. local population unit, average home range size) and that is appropriate based on the information available and the biology/ecology of the species. The approach used to describe critical habitat in the recovery strategy or action plan should be considered when determining the ERA. The population and distribution objective listed in the recovery strategy for the species may also be helpful in determining the ERA.
- Once a species' ERA has been determined for your protected heritage place, it must remain the same for each project, unless new ecological information leads to an updated ERA determination.

- *Use this space to describe the ERA for each implicated SAR*

4. For each implicated SAR, what percentage/amount of critical habitat within the ERA is affected by the proposed activity(ies)?

- *Use this space to list the percentage/amount of critical habitat affected for each implicated SAR*

5. What are the components of the species' life process(es) that the affected critical habitat supports?

- *Use this space to describe, for each implicated SAR, their life process(es) supported by the affected critical habitat. Use the checklist below, as applicable, for each species. Also refer to the species' recovery strategy/action plan as critical habitat is often identified specifically for certain life processes/stages)*

☐ *Nesting/oviposition/birth*
☐ *Foraging*
☐ *Movement*
☐ *Mating*
☐ *Hibernation/over-wintering*
☐ *Thermoregulation/basking*
☐ *Summer Inactivity*
☐ *Other*

6. Does the project impact the ability of critical habitat in the ERA to support those life processes listed in Question 5?

- *Use this space to explain, for each affected SAR, why the remaining critical habitat **will** OR **will not** support the species life process(es) when needed.*
- *Be sure to list and directly address any "Activities Likely to Destroy Critical Habitat" (as described in the species recovery strategy or action plan or other activity specific to the situation) and their specific effect on the species.*

Part D – Critical Habitat Destruction Decision

☒ **Project activities do not take place in, or otherwise impact, critical habitat.** There is likely no chance of project activities affecting critical habitat. **Attach this form to your assessment document.**

☐ **No destruction of critical habitat.** Although a small amount of critical habitat is degraded by this activity, the habitat function being impacted is still supported by the critical habitat at the relevant spatial scale for the implicated SAR. Therefore this activity will not destroy critical habitat. **Attach this form to your assessment document.**

☐ **Destruction of critical habitat.** Due to this activity, the function of the habitat being impacted is not supported at the relevant spatial scale for one or more SAR. Therefore this activity will destroy the critical habitat. **SARA Authorization will be required for your proposed project. Complete the SARA-Compliant Authorization Decision Form[1], checking off the "Yes" box in Question 1, Part A of the form. Attach this form to your assessment document.**

Definition of Destruction of Critical Habitat[2]

Destruction is determined on a case by case basis. Destruction would result if a portion of the critical habitat were degraded, either permanently or temporarily, by activities occurring either internal or external to the critical habitat, such that the habitat function provided by the degraded portion is no longer available to the species when needed. Destruction may result from a single or multiple activities at one point in time or from cumulative effects of one or more activities over time.

1.

[1] http://intranet2/our-work/natural-resource-conservation-branch-test/species-at-risk-program/sara-authorizations/

[2] Based on: Government of Canada. 2009. *Species at Risk Act* Policies, Overarching Policy Framework. SARA Policies and Guidelines Series. Draft.

DETAILED BIOPHYSICAL ATTRIBUTES OF SUITABLE BREEDING HABITAT FOR THE GOLDEN-WINGED WARBLER

<table>
<tr><th colspan="3">Open/Shrub</th></tr>
<tr><td>Habitat Type</td><td>Characteristics</td><td>Species/Components, as examples[25]</td></tr>
<tr><td rowspan="4">• Regenerating forest (e.g., cut or burned)
• Grassland
• Alvar
• Bog
• Fen
• Meadow (wet or dry)
• Pasture
• Abandoned field
• Thicket
• Any other thematic mapping polygon[26] that contains more than 50% representation of the habitat characteristics listed here</td><td>>10% herbaceous ground cover</td><td>• Goldenrod (Solidago spp.)
• Bracken Fern (Pteridium aquilinum)
• Common Milkweed (Asclepias syriaca)
• Wild Strawberry (Fragaria virginiana)
• Nettle (Urtica spp.)
• Yarrow (Achillea millefolium)
• Timothy Grass (Phleum pratense)
• Panic Grass (Panicum virgatum)
• Canada Wild Rye (Elymus canadensis)</td></tr>
<tr><td>>15% sapling and shrub cover</td><td>• Raspberry (Rubus spp.)
• Viburnum spp.
• Dogwood (Cornus spp.)
• Rose (Rosa spp.)
• Willow (Salix spp.)
• Alder (Alnus spp.)
• Aspen or maple (Populus spp. or Acer spp.)</td></tr>
<tr><td><30% bare ground</td><td>• Exposed soils
• Mudflats
• Rocky outcrops (i.e., bedrock)
• Cutbacks
• Railway surfaces
• Burned areas</td></tr>
<tr><td>Presence of natural levels of prey items</td><td>• Tortricid moths (leaf-rollers) and their larvae
• Other moths and their pupae
• Winged insects
• Spiders</td></tr>
<tr><th colspan="3">Forest</th></tr>
<tr><td>Habitat Type</td><td>Characteristics</td><td>Species/Components, as examples[25]</td></tr>
<tr><td>• Deciduous forest
• Mixed forest
• Woodland
• Savannah
• Any other thematic mapping polygon that contains more than 50% representation of the habitat characteristics listed</td><td>Forest cover primarily (>50%) deciduous (or mixed) and less than 30% coniferous. Tree cover may be sparse, dense or open with canopy closure ranging between 10 and 100%. When canopy</td><td>• Poplar/aspen
• Oak (Quercus spp.)
• Maple
• American Beech (Fagus grandifolia)
• Birch (Betula spp.)
• Tamarack (Larix laricina)
• Balsam Fir (Abies balsamea)
• Pine (Pinus spp.)</td></tr>
</table>

[25] Species are provided as examples, based on habitats known to be occupied by Golden-winged Warblers in Canada. As limited habitat inventories are available, this is not an exhaustive list.

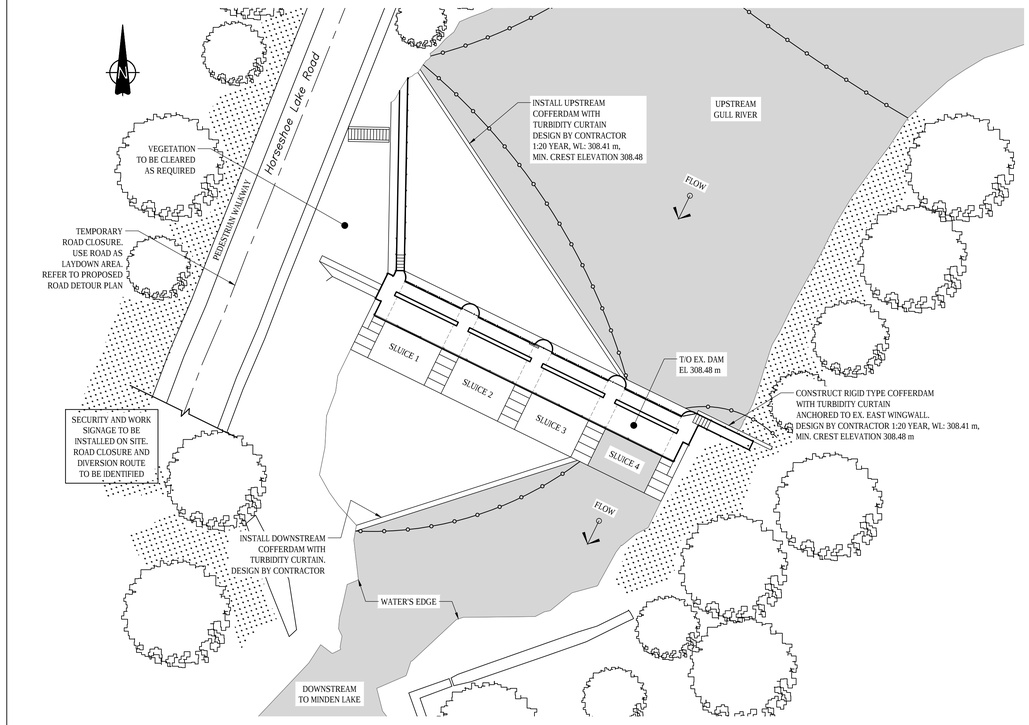
[26] A thematic mapping polygon is a representation of a group features with similar values (e.g., deciduous forest).

here	closure is <100%, interspersing areas may contain a combination of the open/shrub suitable habitat types described above. Presence of song perches.	
	Presence of natural levels of prey items	• Tortricid moths (leaf-rollers) and their larvae • Other moths and their pupae • Winged insects • Spiders

ATTACHMENTS

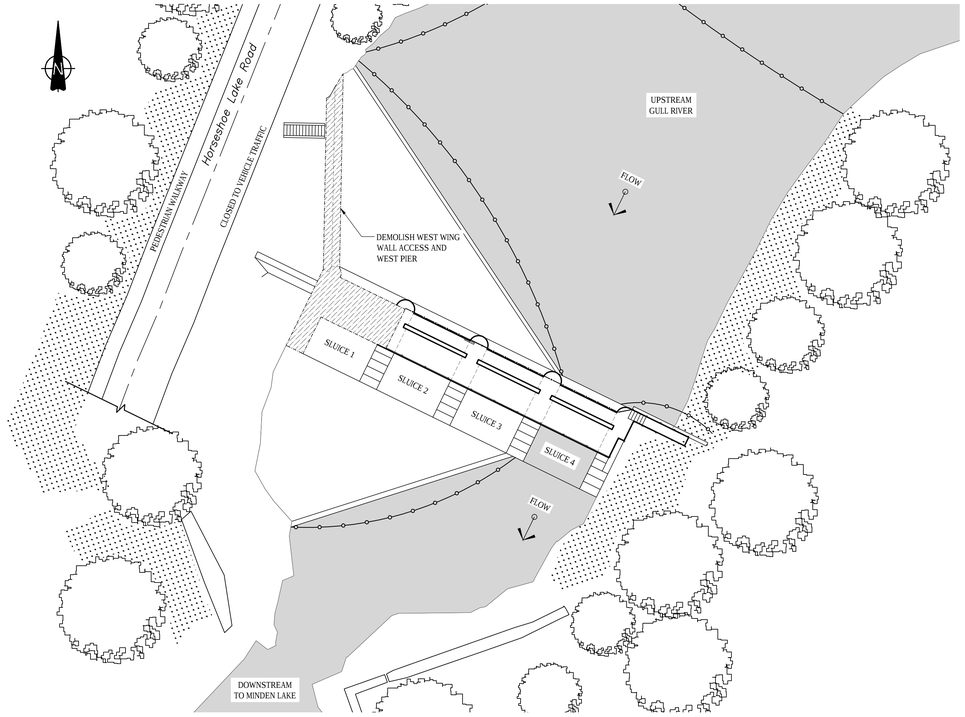
1 Construction staging drawings
2 Fish Habitat Survey
3 Archaeological Overview Assessment
4 Preliminary Cultural Resource Impact Assessment

ATTACHMENT 1 Construction staging drawings



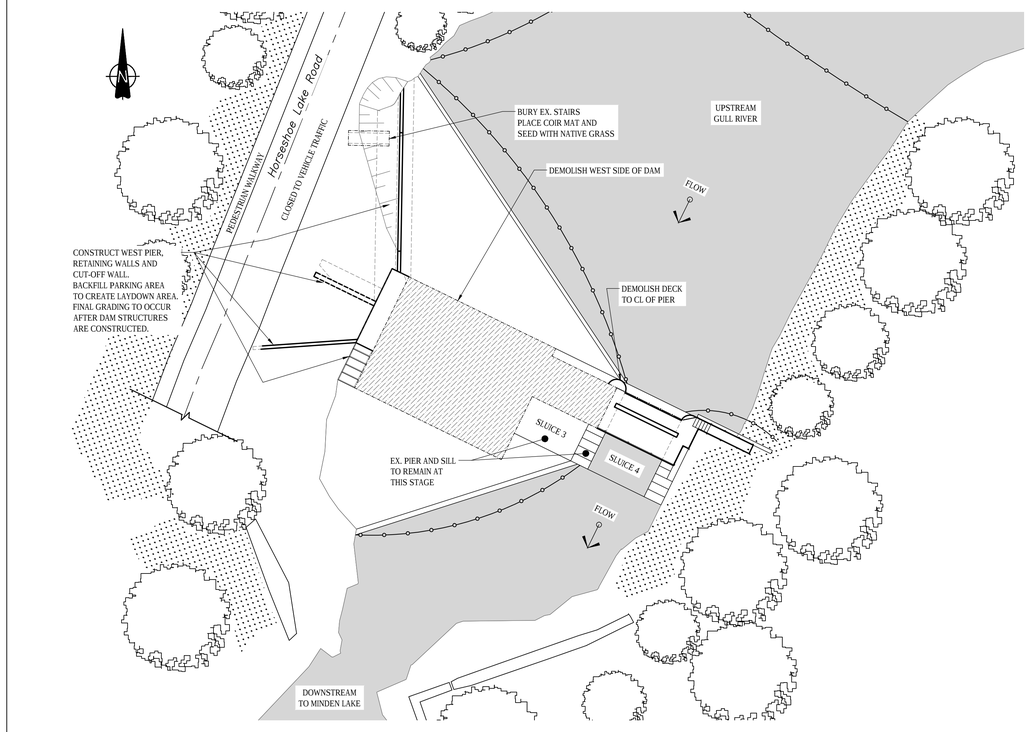
STAGE 1 - MOBILIZATION AND DEWATERING PHASE

1:250



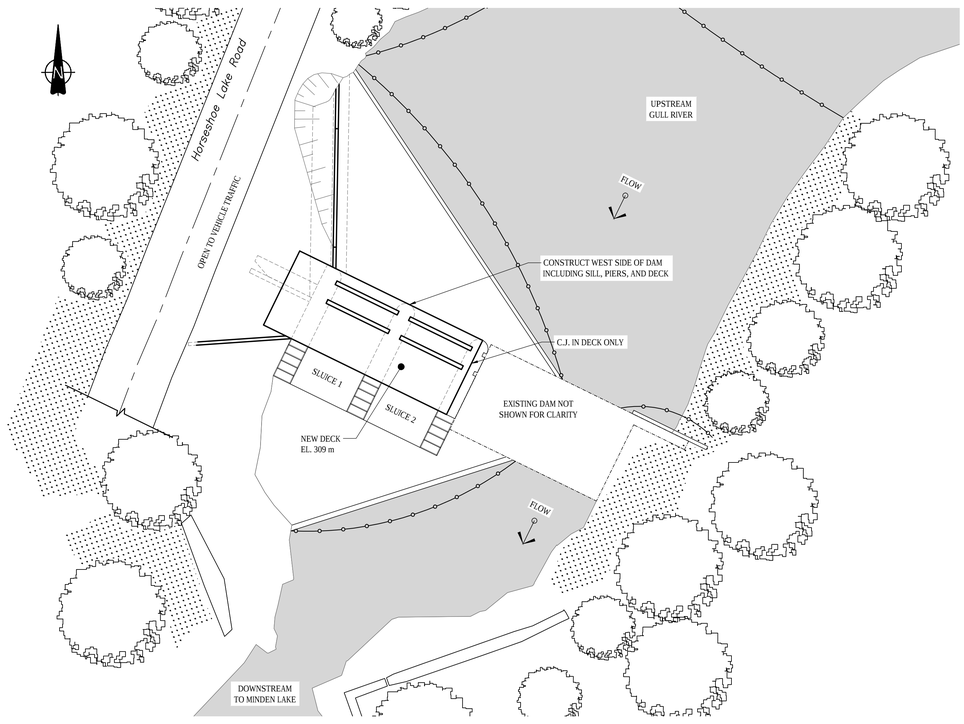
STAGE 2 - DEMOLITION - WEST ABUTMENT

1:250



STAGE 3 - CONSTRUCTION OF WEST ABUTMENT & DEMOLITION OF WEST SIDE OF DAM

1:250



STAGE 4 - CONSTRUCTION WEST SIDE OF DAM

1:250

Parcs Canada Parks Canada

Canadä

NOTE:

1. THE PROPOSED STAGING AND COFFERDAM CONFIGURATION IS FOR PLANNING AND PERMITTING PURPOSES ONLY. CONTRACTOR TO PROVIDE FINAL STAGING AND COFFERDAM DESIGN TO DEPARTMENTAL REPRESENTATIVE FOR APPROVAL AT LEAST 7 DAYS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

LICENSED PROFESSIONAL ENGINEER
J. VILORIA
100139980
2016/09/14
PROVINCE OF ONTARIO

LEGEND:

- DIRECTION OF WATER FLOW
- TREES
- BRUSH (PLAN VIEW)
- EARTH (SECTION)
- ROCK (SECTION)
- WATER
- REMOVALS

No.	Description	Dwn.By Des.Par	Date
D	ISSUED FOR TENDER	F.Z.	SEP-14-2016
C	ISSUED FOR 100% REVIEW	F.Z.	SEP-02-2016
B	ISSUED FOR 95% REVIEW	F.Z.	AUG-05-2016
A	ISSUED FOR 80%	F.Z.	MAY-27-2016

Revision / Révision

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the Departmental Representative of all discrepancies.

A Detail number / Numéro du détail
B Location dwg. number / Numéro sur dessin

WSP

Project title / Titre du projet

HORSESHOE LAKE DAM REPLACEMENT

Drawing title / Titre du dessin

PROPOSED CONSTRUCTION STAGING PLAN STAGE 1 TO 4

Drawn by / Dessiné par	Designed by / Conçu par
FELIPE ZULUAGA	KARINA SETO
Approved by / Approuvé par	Drawing Date / Date du dessin
JAVIER VILORIA	SEPTEMBER 2016

Project manager / Administrateur de projet: JOHN JUFFS

HCEW Number / Numéro de CHTI: 30025849

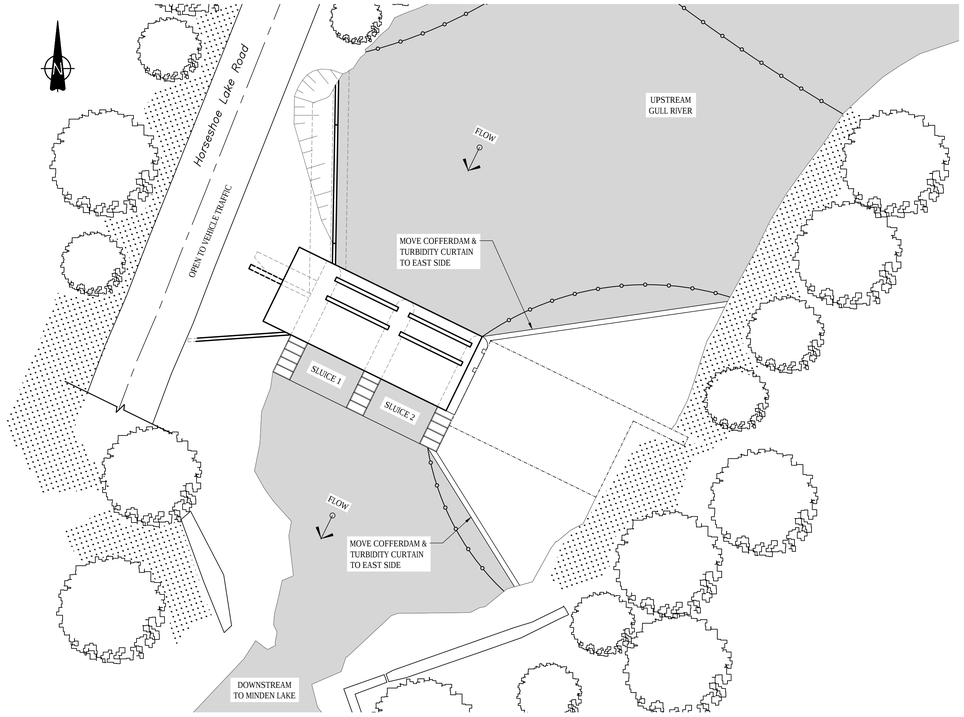
Project Number / Numéro du projet: 121-15275-51

Drawing Number / Numéro du Dessin: 104

Sheet / Feuille 1 of / du 1

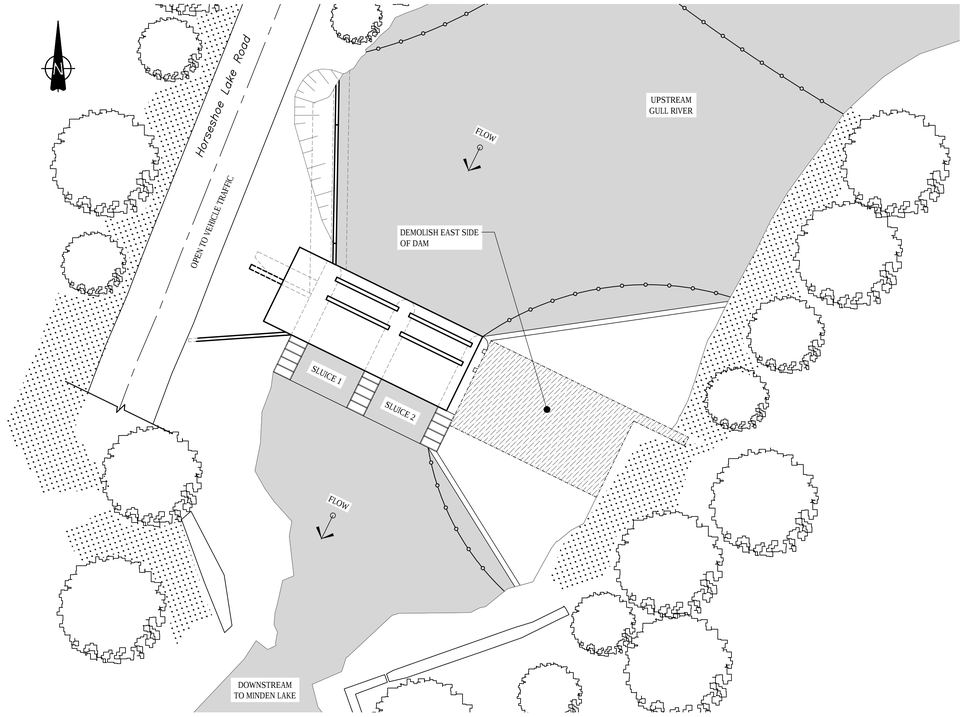
04.11

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres



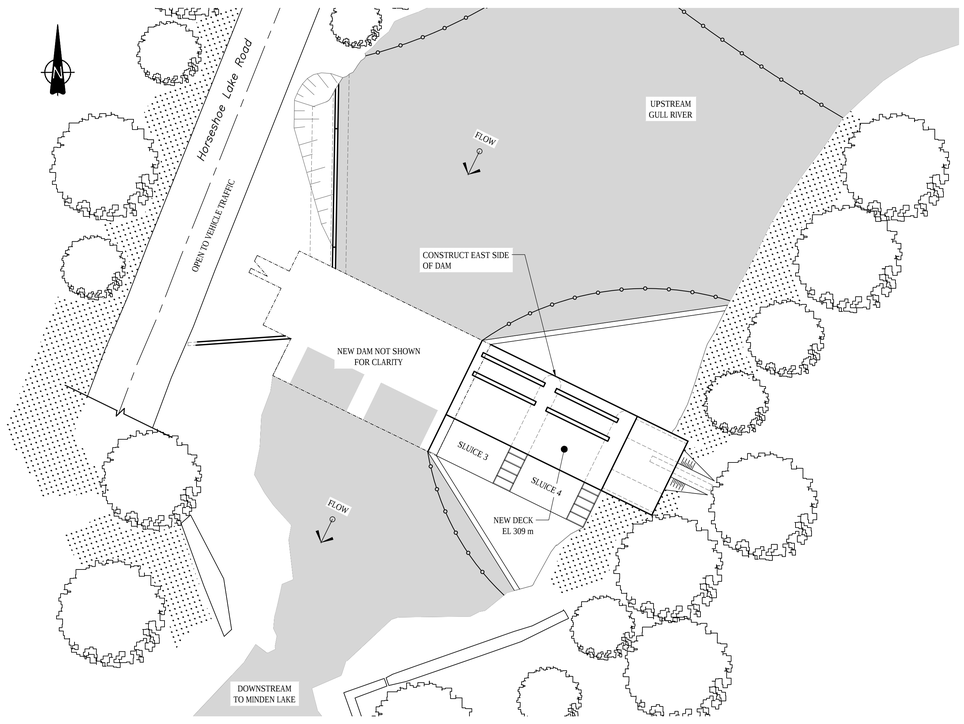
STAGE 5 - DEWATERING PHASE 2

1:250



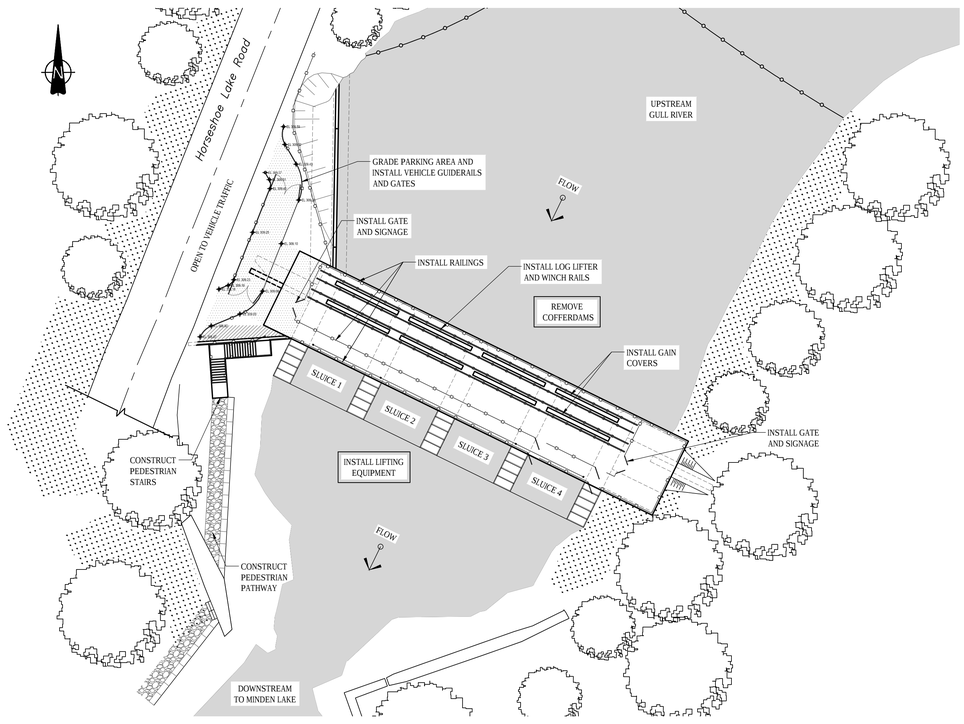
STAGE 6 - DEMOLITION - EAST SIDE OF DAM

1:250



STAGE 7 - CONSTRUCTION - EAST SIDE OF DAM

1:250



STAGE 8 - FINAL STAGE

1:250

Parcs Canada Parks Canada

Canadä

NOTE:

1. THE PROPOSED STAGING AND COFFERDAM CONFIGURATION IS FOR PLANNING AND PERMITTING PURPOSES ONLY. CONTRACTOR TO PROVIDE FINAL STAGING AND COFFERDAM DESIGN TO DEPARTMENTAL REPRESENTATIVE FOR APPROVAL AT LEAST 7 DAYS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

LICENSED PROFESSIONAL ENGINEER
J. VILORIA
100139980
2016/09/14
PROVINCE OF ONTARIO

LEGEND:

- DIRECTION OF WATER FLOW
- TREES
- BRUSH (PLAN VIEW)
- EARTH (SECTION)
- ROCK (SECTION)
- WATER
- REMOVALS

No.	Description	Dwn.By Des.Par	Date
D	ISSUED FOR TENDER	F.Z.	SEP-14-2016
C	ISSUED FOR 100% REVIEW	F.Z.	SEP-02-2016
B	ISSUED FOR 95% REVIEW	F.Z.	AUG-05-2016
A	ISSUED FOR 80%	F.Z.	MAY-27-2016

Revision / Révision

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the Departmental Representative of all discrepancies.

A Detail number / Numéro du détail
B Location dwg. number / Numéro sur dessin

WSP

Project title / Titre du projet

HORSESHOE LAKE DAM REPLACEMENT

Drawing title / Titre du dessin

PROPOSED CONSTRUCTION STAGING PLAN STAGE 5 TO 8

Drawn by / Dessiné par	Designed by / Conçu par
FELIPE ZULUAGA	KARINA SETO
Approved by / Approuvé par	Drawing Date / Date du dessin
JAVIER VILORIA	SEPTEMBER 2016

Project manager / Administrateur de projet: JOHN JUFFS

HCEW Number / Numéro de CHTI: 30025849

Project Number / Numéro du projet: 121-15275-51

Drawing Number / Numéro du Dessin: 105

Sheet / Feuille 1 of / du 1

GSC-B1 PLOTTED BY: FELIPE ZULUAGA DATE PLOTTED: Sep 14, 2016 FILE NAME: Horseshoe Lake Dam_RevD.dwg LAYOUT NAME: 105

ATTACHMENT 2 Fish Habitat Survey

Appendix IX: Horseshoe Lake Dam

Table 1: Horseshoe Lake fish species list, fish habitat preference and potential fish habitat located upstream of Horseshoe Lake Dam.

Spawning Habitat Preference Information			General Habitat Preferences	Potential Fish Habitat in Upstream Study Area	
Fish Species Common (Scientific Name)	**Time of Spawning**	**Spawning/Nesting Description**		**Habitat Potential on Site**	**Likelihood of Occurrence near the Site**
Brown Bullhead (*Ameiurus nebulosus)*	May-July Water temperature 4.5°C -11°C.	Spawning typically occurs in lake and river habitats. Shallow nests within macrophyte roots, hollow stumps or excavates cavities in streambanks.	Low gradient streams and vegetated shallows with sand, rock, mud and silt substrate.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat.
Burbot *(Lota lota)*	January to March Water temperature 1°C-4°C.	Spawn in water depths of 0.3- 1.2m over sand or gravel typically in lakes, but they have been known to move to rivers to spawn.	Moderate to deep waters (0.90m) of large cool rivers, lakes, and streams. They are often found under rocks, among roots or in holes along the banks. Cold lakes, large rivers and stream up to 90m deep under rocks, in roots or in holes along the banks. Coldwater species preferred temperature range is 7°C -18°C.	Low potential for habitat in the study area.	Low likelihood of species occurrence within study area due to water thermal regime (see site habitat description and surface water quality results).
Lake Whitefish *(Coregonus clupeaformis)*	November-December Water temperature 1°C-8°C.	Shallow water over stony or hard substrate in lakes and streams.	Clear and cold water in the Great Lakes and deep inland lakes. Coldwater species preferred temperature range is 8°C -14°C.	Low potential for habitat in the study area.	Low likelihood of species occurrence within study area due to water thermal regime (see site habitat description and surface water quality results).
Rainbow Smelt (*Osmerus mordax*)	March-May Water temperature 4.5°C -11°C	No nest constructed, eggs and milt are broadcast over substrate in rivers and lakes.	Mesopelagic region of lakes. Coldwater species preferred temperature range is 7°C -16°C.	Low potential for habitat in the study area.	Low likelihood of species occurrence within study area due to water thermal regime (see site habitat description and surface water quality results).
Rainbow Trout (*Oncorhynchus mykiss)*	March-May Water temperature 10.0°C-15.5°C.	Pit nest excavated in fine gravel over riffles.	Cold clear streams with gravel substrate, 1:1 riffle to pool ratio. Coldwater species preferred temperature range is 12°C -18°C.	Low potential for habitat in the study area.	Low likelihood of species occurrence within study area due to water thermal regime (see site habitat description and surface water quality results).
Rock Bass (*Ambloplites rupestris)*	May-June Water temperature 15.6°C-21.1°C.	Male excavates shallow pit nest up to 0.6m in diameter in river pool and lake habitats.	Vegetated or rocky shallows of lakes and pools of creeks and small to medium sized rivers.	High potential for habitat in the study area along right shoreline habitat.	High likelihood of species occurrence in the study area, due to presence of suitable habitat. Inactive centrarchid species nest observed along right shoreline in the detailed assessment zone (refer to habitat mapping and watercourse field forms).

					Potential spawning, nursery and feeding habitat in the study area (refer to habitat mapping and watercourse field forms).
Smallmouth Bass (*Micropterus dolomieu*)	May-June Water temperature 12.8°C-20.0°C.	Pit nest with a diameter twice the length of the male in low velocity lake and stream habitats.	Cool and clear mid-order streams >10.5 metres wide with gravel and rock substrate.	High potential for habitat in the study area along right shoreline habitat.	High likelihood of species occurrence in the study area, due to presence of suitable habitat. Inactive centrarchid species nest observed along right shoreline in the detailed assessment zone (refer to habitat mapping and watercourse field forms). Potential spawning, nursery and feeding habitat in the study area (refer to habitat mapping and watercourse field forms).
White Sucker (*Catostomus commersonii)*	April-June Water temperature 10.0°C-20.0°C.	No nest, broadcasts eggs over gravel substrate in riffles and rapids.	Warm shallows of lakes and large river pools and riffles with water depths of 6-9 m.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat.
Yellow Perch (*Perca flavescens)*	April-May Water temperature 6.7°C-12.2°C.	Gelatinous egg strands are deposited on aquatic vegetation or submerged terrestrial vegetation and sometimes on bottom substrate in river pools and lake habitats.	Vegetated shallows of lakes in clear to slightly turbid waters with sand, gravel, mud, and silt substrate.	Moderate potential for habitat in the study area.	Moderate likelihood of species occurrence in the study area due to presence of suitable habitat.
Species at Risk identified by OMNRF within 1km of the dam; Snapping Turtle (*Chelydra serpentina*), Blandings Turtle (*Emydoidea blandingii*), Eastern Ribbonsnake (*Thamnophis sauritus sauritus*) and Eastern Hog-nosed Snake (*Heterodon platirhinos*) (OMNRF, 2016)**.**					

Note. Data for fish species list from Ontario Ministry of Natural Resources (2016).

Table 2: Gull River fish species list, fish habitat preference and potential fish habitat located downstream of Horseshoe Lake Dam.

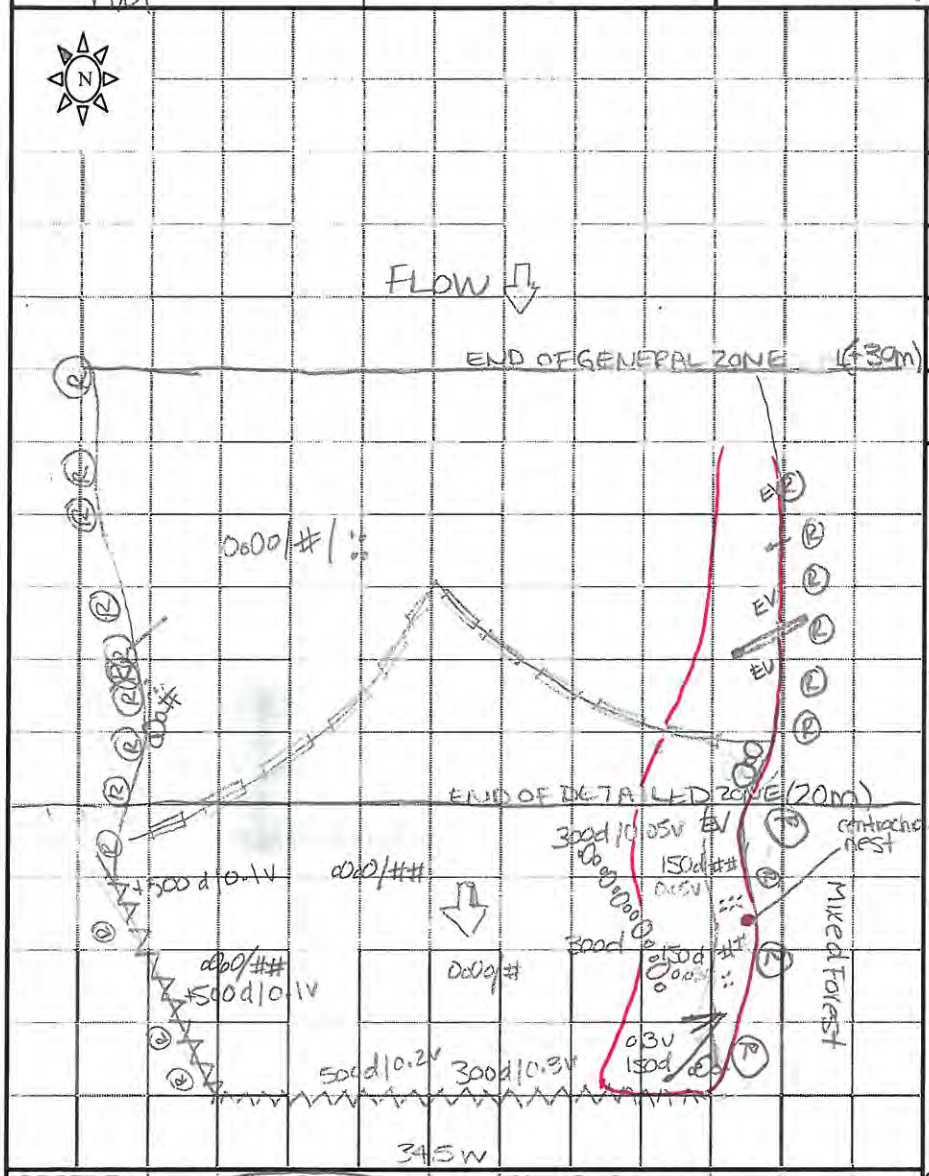
Fish Species Common (Scientific Name)	Spawning Habitat Preference Information		General Habitat Preferences	Potential Fish Habitat in Downstream Study Area	
	Time of Spawning	Spawning/Nesting Description		Habitat Potential on Site	Likelihood of Occurrence near the Site
Black Crappie (*Pomoxis nigromaculatus*)	May-June Water temperature 14°C-22°C.	Male excavates pit nest approximately 0.20-0.23 m in diameter. Eggs are deposited in depression, some may adhere to macrophytes in pools and lakes.	Large clear ponds, small lakes, bays and shallow areas of larger lakes and areas of low velocity in large rivers. Substrate consists of abundant vegetation, mud or sand.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat, specifically high velocity. However, marginal habitat may be suitable along the banks in lower velocity pockets and pools.
Bluegill (*Lepomis macrochirus*)	June-August Water temperature 19°C -26°C.	A shallow depression 0.05-0.15 m deep and 0.30 m in diameter is excavated by a male in pools and lakes.	Shallow weedy bays of larger lakes, vegetated small lakes, ponds and pools of creeks and small to large rivers. Substrate typically consists of sand, gravel, cobble and silt.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat, specifically high velocity. However, marginal habitat may be suitable along the banks in lower velocity pockets and pools.
Golden Shiner (*Notemigonus crysoleucas*)	June-August Water temperature 20°C-27°C.	Spawning occurs in lacustrine habitats.	Clear large lakes with aquatic vegetation and ponds, reservoirs, and rivers with mud substrate.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat, specifically a lack of aquatic vegetation and high velocities.
Lake Herring (*Coregonus artedi)*	November-December Water temperature 1°C-5°C.	Spawning occurs in small inland lakes, approximately 1-2m of water where there is no vegetation in or out of the water. The eggs are somewhat adhesive so they will stick to rocks, debris, etc. Spawning occurs during the night when water temperatures decline.	Shallow inland lakes with depths of 1-3m. Coldwater species preferred temperature range is 7°C -10°C.	Low potential for habitat in the study area.	Low likelihood of species occurrence within study area due to water thermal regime (see site habitat description and surface water quality results).
Largemouth Bass (*Micropterus salmoides*)	May-June Water temperature 16.7-18.3°C.	Pit nest amongst macrophytes 0.6-0.91m in diameter in low velocity lake and stream habitats.	Shallow areas with macrophyte growth and soft mud, gravel, sand substrate amongst exposed macrophyte roots.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat, specifically high velocity. However, marginal habitat may be suitable along the banks in lower velocity pockets and pools.
Logperch (*Percina caprodes*)	May-June Water temperature 10°C -18°C.	Spawning occurs in lacustrine and river habitats near shore/shoals in 0.10-0.2m of water in runs or riffles.	Sand, gravel and rocky beaches in lakes and creek and rivers with similar habitat.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat, specifically high velocities and lack of suitable substrate.
Mimic Shiner (*Notropis volucellus*)	June-August Water temperature data unknown.	Eggs are broadcast over aquatic vegetation at depths of 4-6m during the evening.	Lacustrine macrophyte littoral habitat.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat, specifically a lack of aquatic vegetation and high velocities.

Muskellunge (*Esox masquinongy*)	May-June Water temperature 16.7°C -18.3°C.	No nest constructed, eggs and milt are broadcasted over flooded areas in pools and lakes.	Heavily vegetated flooded areas of shallow bays that are 0.3-0.5m deep.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat, including high velocities and lack of vegetation.
Pumpkinseed (*Lepomis gibbosus)*	May-August Water temperature 17°C -26°C.	Pit nest 0.10-0.40m in diameter are excavated by males in pools and lakes.	Shallow water (0.15-0.31m deep) of lakes, ponds or low velocity stream with substrate that consists of clay, sand, gravel and rock.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat. However, marginal habitat may be suitable along the banks in lower velocity pockets and pools.
Rainbow Smelt (*Osmerus mordax*)	March-May Water temperature 4.5°C -11°C	No nest constructed, eggs and milt are broadcast over substrate in rivers and lakes.	Mesopelagic region of lakes. Coldwater species preferred temperature range is 7°C -16°C.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat.
Rock Bass (*Ambloplites rupestris)*	May-June Water temperature 15.6°C-21.1°C.	Male excavates shallow pit nest up to 0.6m in diameter in river pool and lake habitats.	Vegetated or rocky shallows of lakes and pools of creeks and small to medium sized rivers.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat. However, marginal habitat may be suitable along the banks in lower velocity pockets and pools.
Smallmouth Bass (*Micropterus dolomieu*)	May-June Water temperature 12.8°C-20.0°C.	Pit nest with a diameter twice the length of the male in low velocity lake and stream habitats.	Cool and clear mid-order streams >10.5 m wide with gravel and rock substrate.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat. However, marginal habitat may be suitable along the banks in lower velocity pockets and pools.
Spottail Shiner (*Notropis hudsonius*)	May-June Water temperature 15°C-22°C.	Spawning occurs in lacustrine and river habitats.	Lakes, river and streams with moderate velocity and sand, gravel silt or mud substrate.	Moderate potential for habitat in the general study area.	Moderate likelihood of species occurrence in the study area due to presence of suitable habitat, although high local velocities may limit the occurrence.
Walleye (*Sander vitreus*)	Spring or early summer Water temperature 5.6°C to 11.1°C.	Do not construct nests but rely on the interstitial space between substrate particles in lake and whitewater habitats to provide protection for developing eggs. Walleye require some form of water movement (e.g. current, wave action) to maintain dissolved oxygen levels suitable for egg development. Walleye do not provide any form of parental care for the eggs or fry post-spawn.	Below unpassable barriers in streams and lake shoals with sufficient wave action with rock, coarse gravel and boulder substrate.	High potential for habitat in the study area.	High likelihood of species occurrence in the study area due to presence of suitable habitat.
White Sucker (*Catostomus commersonii)*	April-June Water temperature 10.0°C-20.0°C.	No nest, broadcasts eggs over gravel substrate in riffles and rapids.	Warm shallows of lakes and large river pools and riffles with water depths of 6-9 m.	High potential for habitat in the study area.	High likelihood of species occurrence in the study area due to presence of suitable habitat.

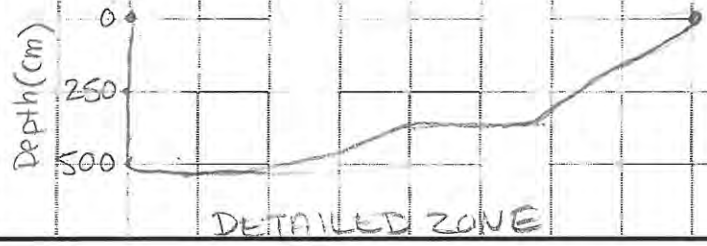
Yellow Perch (*Perca flavescens)*	April-May Water temperature 6.7°C-12.2°C.	Gelatinous egg strands are deposited on aquatic vegetation or submerged terrestrial vegetation and sometimes on bottom substrate in river pools and lake habitats.	Vegetated shallows of lakes in clear to slightly turbid waters with sand, gravel, mud, and silt substrate.	Low potential for habitat in the study area.	Low likelihood of species occurrence in the study area due to the lack of suitable habitat.

Note. Data for fish species list from Ontario Ministry of Natural Resources Minden and Bancroft District (2016) and DFO and Carlton University Fish Sampling Records (2010).

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
n/a	U/S Detailed+General	20D / +30G	1cm = 5m



PROFILE: **Horz. Scale** 1cm = 5m **Vert. Scale**



PROJECT #: (16-049-IVEA) SP30M-15-5862

MAPPER: A.SMITH

NAME OF WATERBODY: HORSESHOE LAKE

CROSSING #: n/a

STATION #: n/a

DATE: DD-MMM-YY 09-JUN-16

LEGEND

V velocity (m/s)
10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree
● Nest
├► Seep/Spring
-------- Undercut Bank

▬ Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert
SPAWNING/NURSERY

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
SP3M-15-5862	Fish Habitat Assessments	09	June	2016

Is STREAM REALIGNMENT required for this section:

O Yes O No ● Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
A.Smith/S.Zwiers	10% cloud cover, warm, slight breeze	16:01	16:38

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
19.2°C @ 16:34	18.8°C @ 16:34	57.6 @ 16.34

PHOTO NUMBERS AND DESCRIPTIONS:
Start: 1317 End: 1343

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Horseshoe Lake	Gull Watershed	n/a	n/a

LOCATION OF CROSSING:
Upstream of Horseshoe Lake dam

GPS COORDINATES:	MTO CHAINAGE:
682706 E, 4981978 N	n/a
TOWNSHIP: Municipality of Minden Hills	**MNR DISTRICT:** Bancroft

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Minden Hills public park/bridge u/s of dam. Residental area w recreational boating u/s	Potential for litter from park use, boating (oils, gas etc), Road salt/sand

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other ● Describe: Horseshoe Lake Dam Size (w x h) m^2 n/a

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
n/a	U/S detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	●	●	●	O	O	n/a

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
20m	less than 1 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	●	O	Dam
Percentage of area	n/a	n/a	n/a	90%	n/a	10%
Mean depth wetted (m)	↓	↓	↓	~5m	↓	~5m
Mean width wetted (m)	↓	↓	↓	34.5	↓	~32
Mean bankfull width (m)	↓	↓	↓	n/a	↓	n/a
Mean bankfull depth(m)	↓	↓	↓	n/a	↓	n/a
Substrate	↓	↓	↓	Gr 10% Bs 40% Co 50%	↓	Concrete 100%

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	●	O	O	O
Right Upstream Bank	O	●	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	5% along right bank	2%	10%	Instream 2% Overhanging 2%	2%	Instream Ø Overhanging Ø	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	●	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	Ø	Ø	Ø	100%
Predominant Species				

MIGRATORY OBSTRUCTIONS:	None	Seasonal none observed while onsite	Permanent Dam
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning none identified by OMNRF	Evidence of Groundwater No	Other old tentacid nest uls (~10m) of dam

POTENTIAL ENHANCEMENT OPPORTUNITIES:

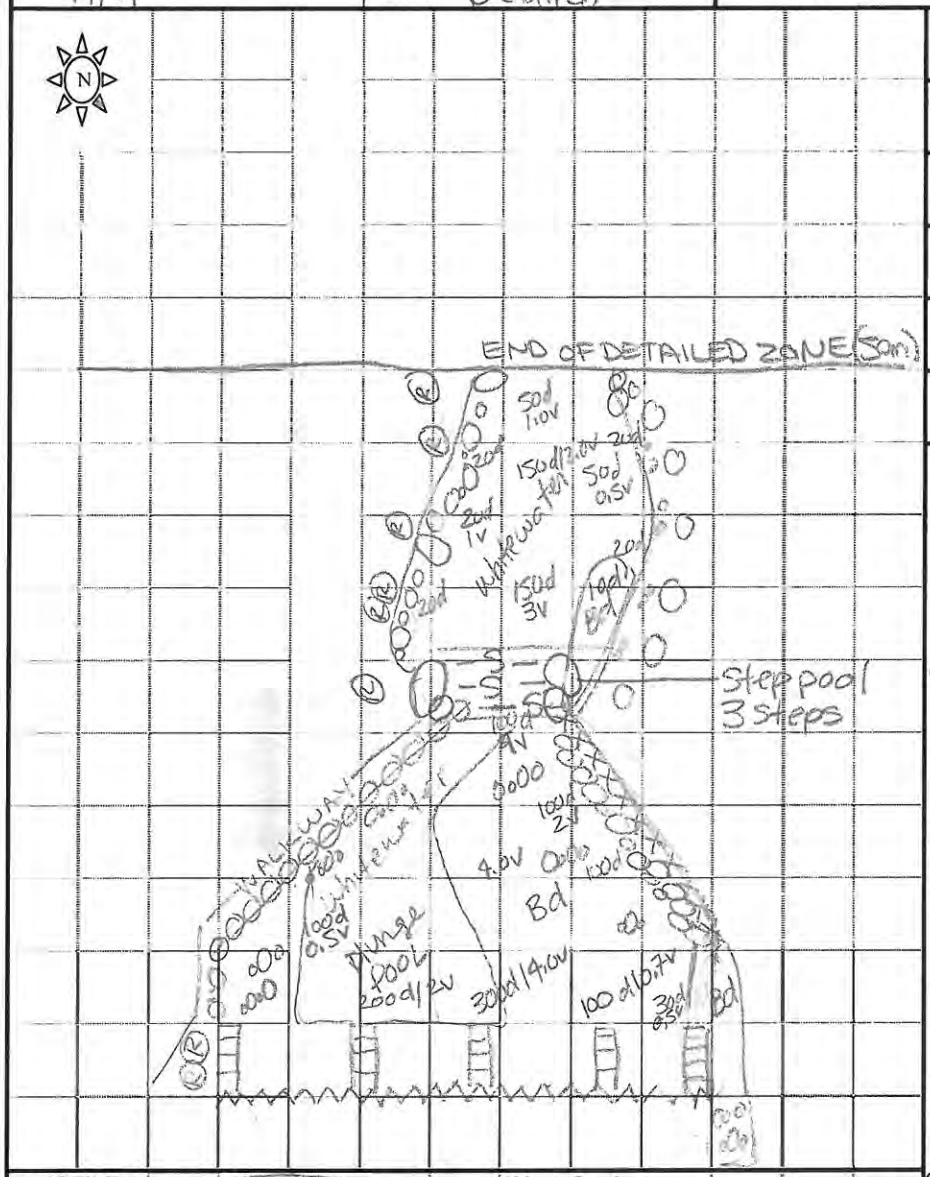
N/A

COMMENTS:

- Water Quality (taken from middle of dam)
  - D.O (mg/L) = 9.8
  - TDS (mg/L) = 42.5
  - pH = 6.7
  - Salinity (ppt) = 0.0
  - Turbidity (vial #1) = 0.64 NTU
- Note: Due to H&S concerns depth/velocity were visually estimated directly uls of dam
- Bank Stability - left bank, majority of left bank hardened w/ concrete wall (see photos) Past boom bank is slightly unstable Right Bank - bank slightly unstable, gentle slope towards watercourse, abundant veg. on bank.

Additional Notes Appended? ● No O Yes **number of pages** 1 (front & back)

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
n/a	d/s Detailed	50	1 = 5



PROJECT #: (16-049-MEA)
5P300-15-5862

MAPPER:
A. Smith

NAME OF WATERBODY:
Gull River

CROSSING #:
n/a

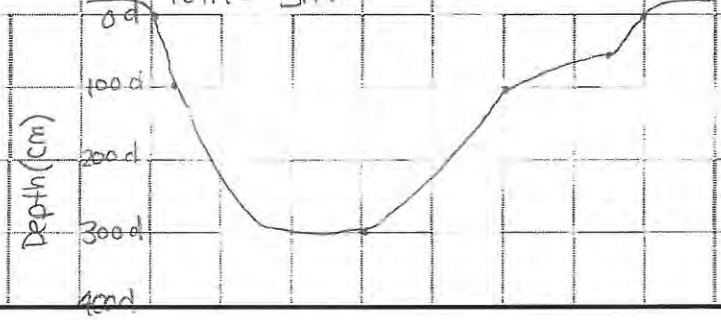
STATION #:
n/a

DATE: DD-MMM-YY
09-JUN-16

LEGEND

Bd = Bedrock smooth
10d depth (cm)
6w width
V Velocity (m/s)
➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar
Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** * *** Debris
CT Cattail
SV/FV Submerg/Float Veg
EV Emergent Vegetation
W Watercress
Fe Iron Staining
/////// Eroded Bank
XXX Riprap / Other Stabilization
Instream Log/Tree
^^^ Dam/Weir/Obstruction
® Riparian Tree
Seep/Spring
-------- Undercut Bank
— Barrier to Fish Movement
-S- Seasonal Barrier
-x--x- Fence line
Culvert

PROFILE: **Horz. Scale** 1cm = 5m **Vert. Scale**



GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
(16-049-NEA) SP300-15-5862	Fish Habitat Assessment	09	June	2016

Is STREAM REALIGNMENT required for this section:

O Yes O No ● Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
A Smith/S. Zuniers	clear w some cloud cover 10% sunny, BS 2	16:40	17:15

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
19.2@17:00	18.5@17:07	69.8

PHOTO NUMBERS AND DESCRIPTIONS:
1344 - 1365

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Gull River	Gull Watershed	n/a	n/a

LOCATION OF CROSSING:
d/s of Horseshoe Lk Dam

GPS COORDINATES:	MTO CHAINAGE:
682691E, 4981981N GPS at 683 on left bank d/s of dam.	n/a

TOWNSHIP:	MNR DISTRICT:
Municipality of Minden Hills	Bancroft District

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
-same as Station #3 public walking/white water rafting park, major highway, cottages/houses	-same as Station #3 -potential contaminants from boats/houses -litter from public park.

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP O	N/A O

Other ● Describe: Dam, Horseshoe Lake Dam Size (w x h) m^2 n/a

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
n/a	d/s of Horseshoe Lake Dam

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	●	●	●	O	O	n/a

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50m	greater than 4 m/s max, average 2.5 m/s

SUB-SECTION(S)	Run O	Plunge Pool ●	Riffle O	Flats O	Inside culvert O	Other	
Percentage of area	n/a	20%	n/a	n/a	n/a	Rapids 70%	Dam 10%
Mean depth wetted (m)	↓	~3m	↓	↓	↓	0.5-1.5 m	~4 m
Mean width wetted (m)	↓	15m	↓	↓	↓	15-20	35
Mean bankfull width (m)	↓	n/a	↓	↓	↓	n/a	n/a
Mean bankfull depth(m)	↓	n/a	↓	↓	↓	n/a	n/a
Substrate	↓	Bo 60% Co 40%	↓	↓	↓	Br 10 Co 30 Bo 30 Gr 30	Concrete 100%

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
~~Upstream~~ Left Upstream Bank	~~O~~	O	O	O
~~Downstream~~ Right Upstream Bank	~~O~~	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	30%	5%	Instream 1% Overhanging 0	0	Instream ~~0~~ Overhanging ~~0~~	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	~~O~~	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	~~0~~	~~0~~	~~0~~	
Predominant Species				100%

MIGRATORY OBSTRUCTIONS:	None	Seasonal none observed while on site.	Permanent Yes Horseshoe Lk Dam
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning none identified by OMNRF	Evidence of Groundwater No	Other possibility that Rainbow or Smelt could use DS area to spawn

POTENTIAL ENHANCEMENT OPPORTUNITIES:

n/a

COMMENTS:

Bank Stability- both left & right banks hardened w boulders.
* See photos for section, White water rapids to plunge pools beneath.

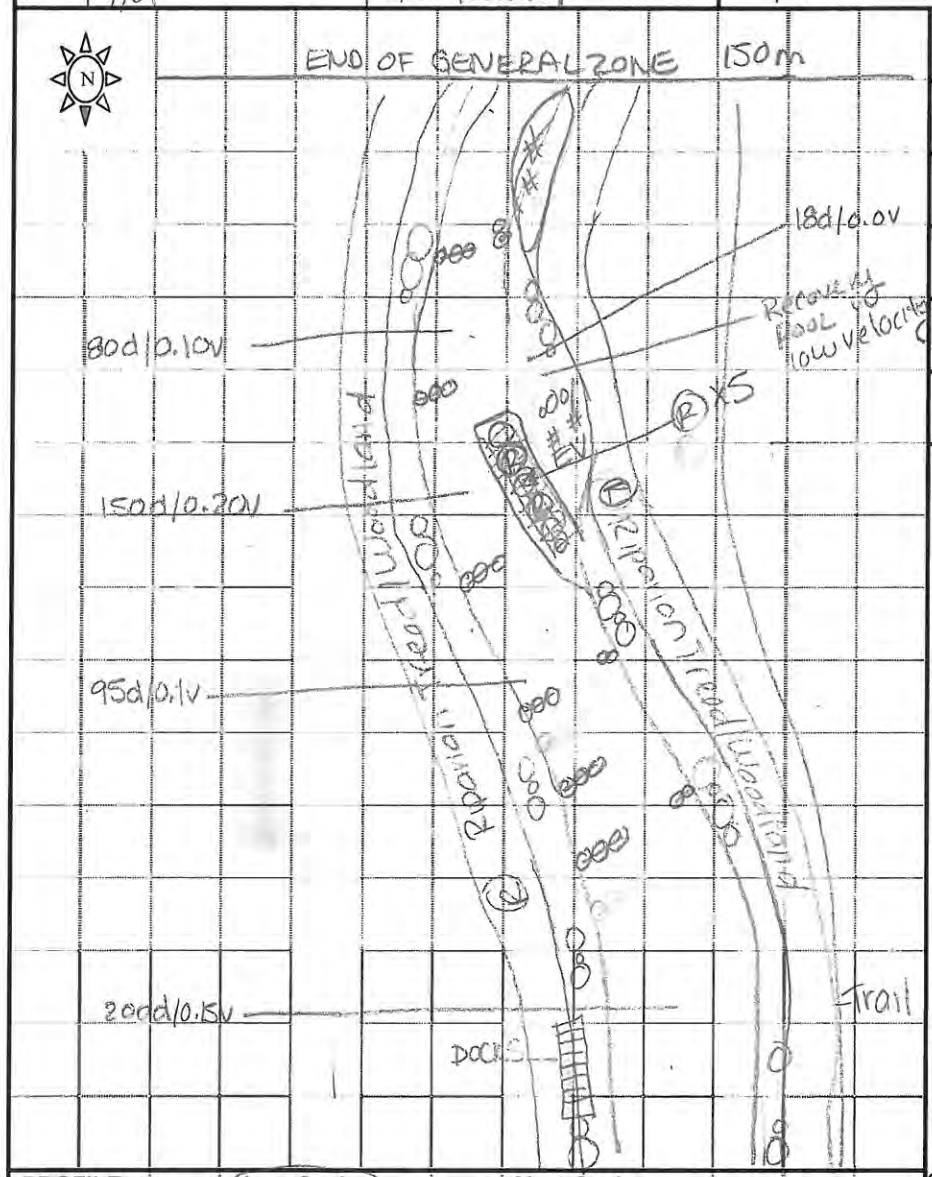
Water Quality (GPS #663)
- D.O (mg/L) = 10.6
- TDS (mg/L) = 51.8
- Salinity (ppt) = 0.0
- pH = 6.5
- Turbidity (via #4) = 1.31 NTU

#Incidentals - abundant caddisflies that have hatched recently

* note that due to H&S concerns & access velocity was estimated

Additional Notes Appended? ~~O~~ No O Yes number of pages 1 (front & back)

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
n/a	d/s General	150	1cm = 10m



PROJECT #: (16-049-NEA) 5.P.300-15-5862

MAPPER: A.SMITH

NAME OF WATERBODY: Gull River

CROSSING #: n/a

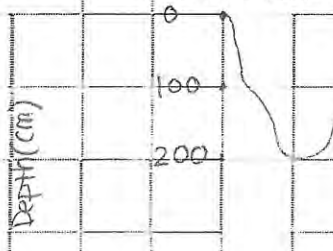
STATION #: n/a

DATE: DD-MMM-YY 09-JUN-16

LEGEND

- Groyne (manmade)
- **10d** depth (cm)
- **6w** width
- V Velocity (m/s)
- ➡ Riffle
- ⇨ Run/Glide
- Pool
- Island/Bar
- Fine Substrate
- **###** Gravel Substrate
- **oOooO** Cobble /Boulder
- *** * *** Debris
- **CT** Cattail
- **SV/FV** Submerg/Float Veg
- **EV** Emergent Vegetation
- **W** Watercress
- **Fe** Iron Staining
- **///////** Eroded Bank
- **XXX** Riprap / Other Stabilization
- Instream Log/Tree
- **^^^** Dam/Weir/Obstruction
- **®** Riparian Tree
- Seep/Spring
- **--------** Undercut Bank
- **—** Barrier to Fish Movement
- **-S-** Seasonal Barrier
- **-x--x-** Fence line
- Culvert

PROFILE: **Horz. Scale** 1cm = 10m **Vert. Scale**



- Channel modified for whitewater rafting, shoals/pools/groynes.

ATTACHMENT 3 Archaeological Overview Assessment

PARKS CANADA AGENCY
ARCHAEOLOGY AND HISTORY BRANCH
INDIGENOUS AFFAIRS AND CULTURAL HERITAGE DIRECTORATE

ARCHAEOLOGICAL OVERVIEW ASSESSMENT
TRENT-SEVERN WATERWAY NATIONAL HISTORIC SITE
HORSESHOE LAKE DAM REHABILITATION – BUDGET 2014 PROJECT RPA nº 352

Barbara LESKOVEC, Stacey TAYLOR and Fillipo RONCA
Terrestrial/Underwater Archaeologists, IAHCD
National Office, Gatineau/Cornwall/Walkley

ABSTRACT

Parks Canada Agency has proposed to rehabilitate Horseshoe Lake dam on the Trent-Severn waterway. This Archaeological Overview Assessment (AOA) will evaluate the archaeological potential of the Project Area and the potential impacts of the proposed work on archaeological resources, if present. This AOA will determine if an Archaeological Impact Assessment and/or mitigation measures are required.

PROJECT INTRODUCTION

Horseshoe Lake Dam is situated approximately 7 km northeast of Minden on Lot 10, Concession 5, former geographic township of Minden, Haliburton County. The dam is a a four-bay stop log sluice control structure, approximately 58 m long and 9.1 m high (Figure 1). The dam controls the water level in Horseshoe Lake upstream, as well as Mountain Lake at high water levels.

Horseshoe Lake Dam is located on the edge of the Algonquin Highlands physiographic region, an area characterized by shallow soils overlying igneous bedrock. There is glacial overburden on both the steep left and right banks of the river (Figures 2 and 3).

Parks Canada Agency (PCA) has proposed to replace Horseshoe Lake Dam inkind, with a slightly enlarged footprint (Figure 4). For dewatering and diverting water flow, upstream and downstream coffer dams will be installed. The first cofferdam will be anchored on the right bank (upstream of the existing retaining wall/access) and extend to the fourth pier from the right (Figure 5). The second coffer dam will anchored on the left bank and extend to the third pier from the right (Figure 6). A turbidity curtain will be installed upstream of the upstream cofferdam and downstream of the downstream cofferdam.

The dam in nestled between privately owned lands. County Road 20 runs quite close to the river at the dam location on the right side and will act as an access point for the Project. A retaining wall has been proposed in order to extend the right bank and create a working area for the Contractor (Figure 1). Proposed laydown/staging areas include County Road 20 (temporarily) and the right bank. Additional laydown areas proposed include the left bank and the right riverbank near the Bethel Road Bridge.

ASSESSMENT METHODOLOGY

This assessment is based on the review of the Horseshoe Lake Dam Rehabilitation, Preliminary Design Report prepared by WSP (2016b); Horseshoe Lake Dam Rehabilitation, Concept Design Report prepared by WSP (2016a); the Old Dam Ruins Project 2009: A Collection of 35 Sites with Remnants of Mostly Old Timber-Crib Dams from the 19th and 20th Century (Luning 2009); additional information provided by Scott Gauthier, Project Manager, Ontario Waterways, PCA; and online resources.

PREVIOUS ARCHAEOLOGICAL SURVEY

No known archaeological assessment has been carried out within the Project Area by PCA. In 2009, a survey was completed of the old dams along the reservoir lakes in the Haliburton Highlands (Luning 2009). Remains of a historical timber dam were recorded 46 m upstream of the present-day concrete dam (Figure 7; Luning 2009:55). Identified as Horseshoe Lake Dam, the dam consisted of rock-filled timber cribs and three planked outflows. The dam extended across the entire width of the waterway with a separate crib running upstream along the left shore. This dam "represents an interesting and representative feature that was designed to provide control over water levels, so critical for unencumbered navigation through the system." (Carter-Edwards 2016). Current construction plans indicate that the historical dam will not be impacted by Project activities.

HISTORICAL BACKGROUND (EXCERPTED FROM CARTER-EDWARDS 2016)

Horseshoe Lake Dam, like many of the reservoir lake dams that were transferred from the Ontario Government to the Department of Railways and Canals, was a typical wooden crib dam that helped control flow along the Gull River. In the fall of 1903, R.B. Rogers, Superintendent of the Trent Canal, performed an inspection of the key watersheds along the Trent, and noted that "the dam at Horseshoe Lake might be raised if necessary to raise/serve both mountain, 123 Mile & Boskunk Lakes, which would make all these navigable…The Gull River from the dam at [the] foot of Horseshoe Lake to still water [and] above [the] Village of Minden has high shores… There is a mill saw & grist which has a head of about 16 to 20 feet. The river from Minden through Gull Lake to Moores Falls is navigable & I understand there are only two small portages to Coboconk."

As part of his survey work, Rogers prepared a plan and profile of the dams he examined. His sketch of the dam at Horseshoe Lake provides detail on the original timber crib dam that was situated at the southern entrance of the lake. Rogers did not indicate the origin of this dam but most likely, it was constructed as were many in this region to support the lumber industry.

Rogers' recommendation was implemented and by Order in Council 1906 the dams transferred by the province were formally accepted by the federal government. Shortly after the transfer, repairs to these dams began to appear in the annual report on maintenance and new construction work for the Trent Canal. In 1908, under the section for the Gull River, Horseshoe Lake dam was described as follows: "The platform on the dam, which is 75 feet in length was repaired by having some new stringers provided and also new planks. A new windlass was also provided." The following year, the condition of the dam appears to have continued to deteriorate despite the repairs. The superintendent noted, "Horseshoe Lake Dam is in poor state of repair and will have to be renewed shortly. The platform was temporarily repaired and other minor repairs carried out."

These repairs proved to be only stop gap measures as the dam needed major improvements. In 1909 the department undertook more extensive work by erecting a new dam. The report by the superintendent in May 1911 highlighted the scope of work. "Horseshoe Lake dam – the dam at this point, which was commenced last year was completed by putting on a reinforced concrete platform and winches for operating the stop logs." It is not clear from the reference to "reinforced" to know if this actually meant metal rods embedded in the concrete to serve as reinforcing. Moreover, the plan of the "Concrete Dam Built 1909" is puzzling as it appears to show a concrete moonlight rather than a concrete cap on top of a wooden crib.

The concrete held up well with likely very little maintenance or repairs as work on the reservoir dams during the Depression and the Great War was spotty at best. In 1948 there was a proposal to repair the disintegrating concrete.

ASSESSMENT OF PROPOSED DEVELOPMENT IMPACT ON POTENTIAL ARCHAEOLOGICAL RESOURCES

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**.

ARCHAEOLOGICAL REQUIREMENTS

Impacts to archaeological resources from construction activities have the potential to be significant unless the following mitigation measures are employed for the Project:

1. Forward all additional information and construction drawings for the Project to Parks Canada's Terrestrial and Underwater Archaeology sections for further review.

2. As per the *Ontario Heritage Act* and the Ministry of Tourism, Culture and Sport, a **Stage 1 Archaeological Assessment is required for all Project lands not under federal jurisdiction**. The recommendations from the Stage 1 Archaeological Assessment, or subsequent assessments, are to be complied with in conjunction with this AOA.

3. Coffer dams should not be installed on top of any submerged cultural resources, wherever possible.

4. The remnants of the historical dam, upstream from Horseshoe Lake Dam, have historical value. This historical dam is not to be removed during the Project. As per the Concept Design (WSP 2016a), the historical value should also be accounted for in the future hydraulic modelling of water flows through this section to minimize impacts to the resource.

5. Should any historical dam(s) be exposed during de-watering activities, it is recommended that archaeological recording of the historical feature(s) be undertaken, in conjunction with provincial and federal archaeological requirements (when applicable). Archaeological recording of the feature(s) will include documenting the location and physical characteristics of the feature(s), and recording the construction techniques through scaled drawings, photographs and an archaeological site plan, in an attempt to determine the age of the feature(s) and to contribute to the knowledge of the site.

6. If unrecorded archaeological resources (i.e., structural remains and/or artifact concentrations) are encountered during construction activities, development work should cease in the immediate area, the archaeological findings and the work area in relation to the findings should be photo documented, and the Parks Canada project manager informed. The project manager should contact Parks Canada's Archaeology Representatives for advice and assessment of significance that will in turn determine what will be required to mitigate the chance find. Ensure that all exposed underwater cultural materials are kept submerged and/or wet.

REFERENCES

Carter-Edwards, Dennis. 2016. *Reservoir Lake Dams: Horseshoe Lake Dam*. On file at Parks Canada Trent-Severn Waterway Office, Peterborough, Ontario.

Crysler and Lathem. 1971. *Reservoir Constraints, Trent Canal System*. On file at Parks Canada Trent-Severn Waterway Office, Peterborough, Ontario.

Luning Sabine. 2009. *Old Dam Ruins Project 2009: A Collection of 35 Sites with Remnants of Mostly Old Timber-Crib Dams from the 19th and 20th Century*. On file at Parks Canada Trent-Severn Waterway Office, Peterborough, Ontario.

WSP. 2016a. *Horseshoe Lake Dam Rehabilitation, Concept Design Report*. February 2016. On file at Parks Canada Trent-Severn Waterway Office, Peterborough, Ontario.

-2016b. *Horseshoe Lake Dam Rehabilitation, Preliminary Design Report*. April 8, 2016. On file at Parks Canada Trent-Severn Waterway Office, Peterborough, Ontario.

Figure 1. Horseshoe Lake Dam (PCA Digital Files)

Figure 2. Steep banks adjacent to Horseshoe Lake Dam (PCA Digital Files).

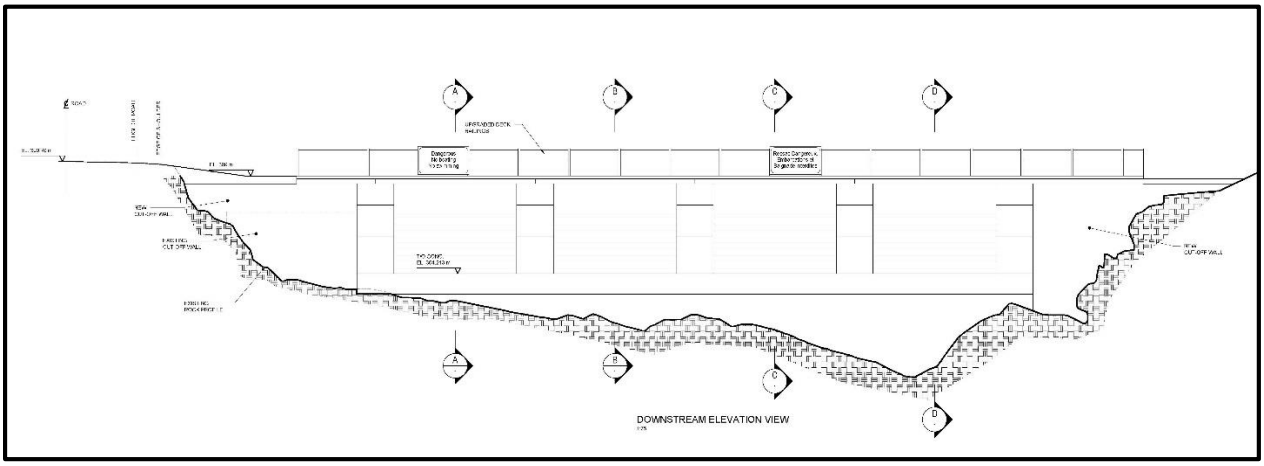


Figure 3. Downstream Elevations, Horseshoe Lake Dam (WSP 2016b).

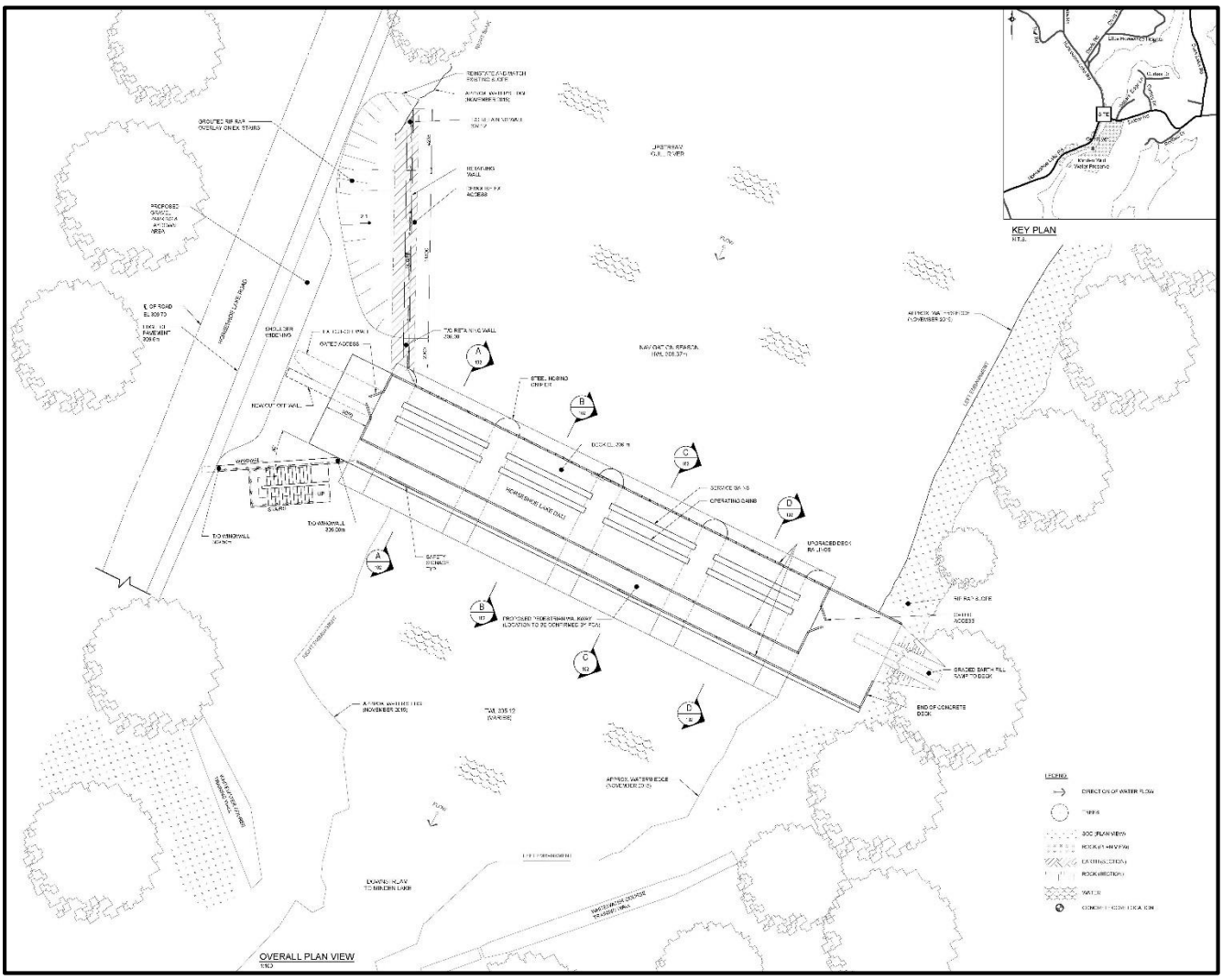


Figure 4. Horseshoe Lake Dam Replacement Project (WSP 2016b). Locations of proposed retaining wall, gravel parking lot and lay down areas shown.

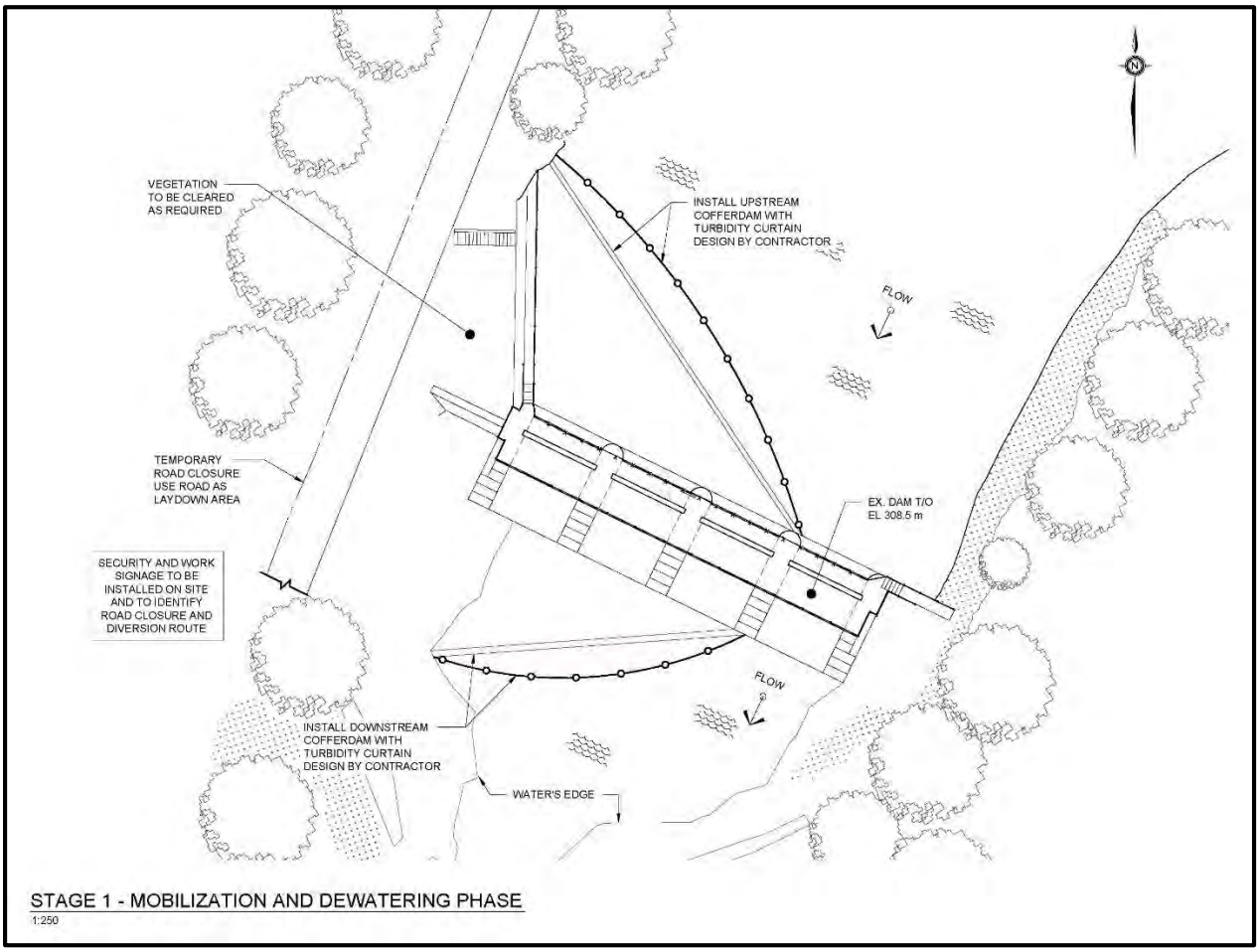


Figure 5. Phase 1 Dewatering, Horseshoe Lake Dam (WSP 2016b). Location of cofferdam shown.

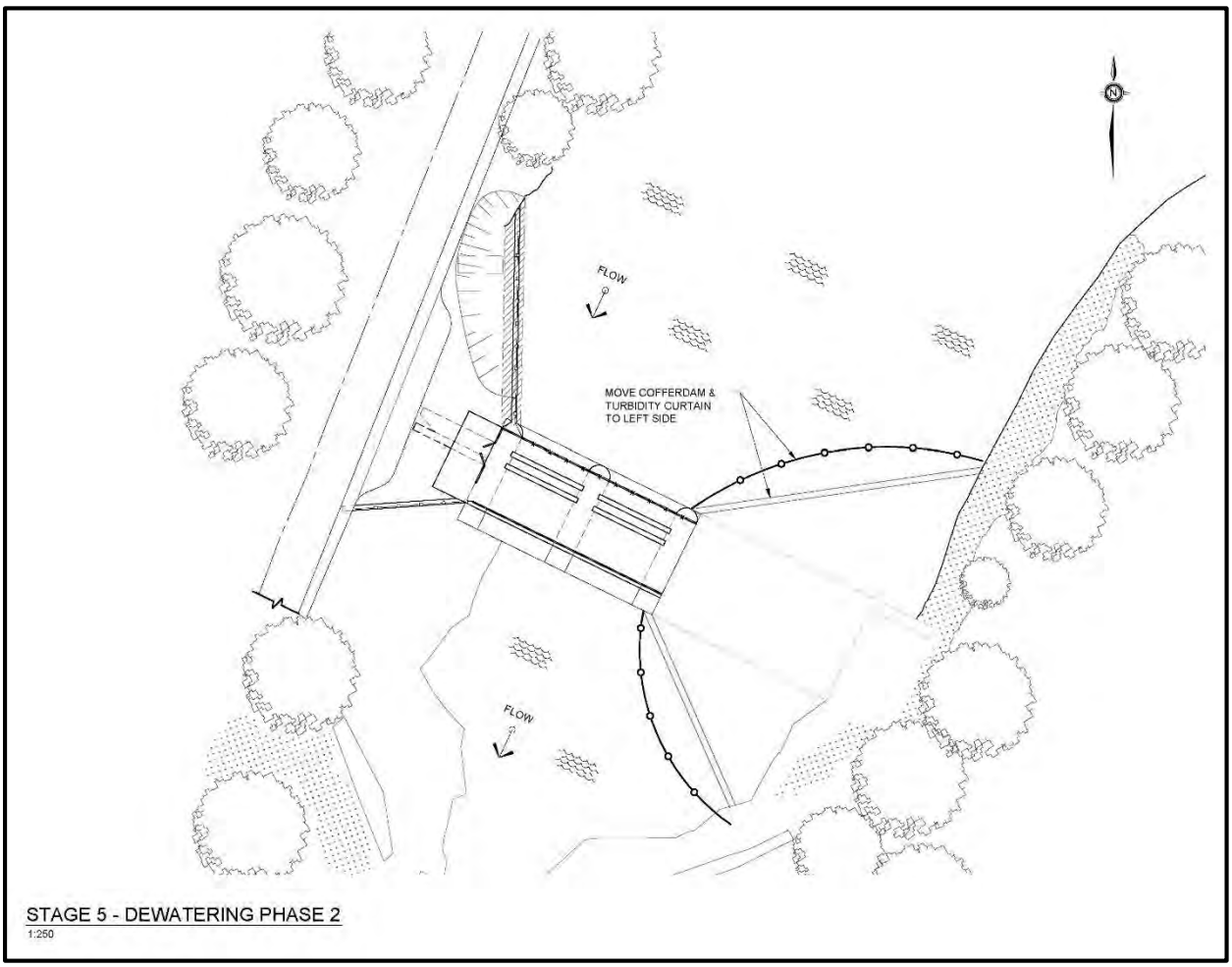


Figure 6. Phase 2 Dewatering, Horseshoe Lake Dam (WSP 2016b). Location of cofferdam shown.

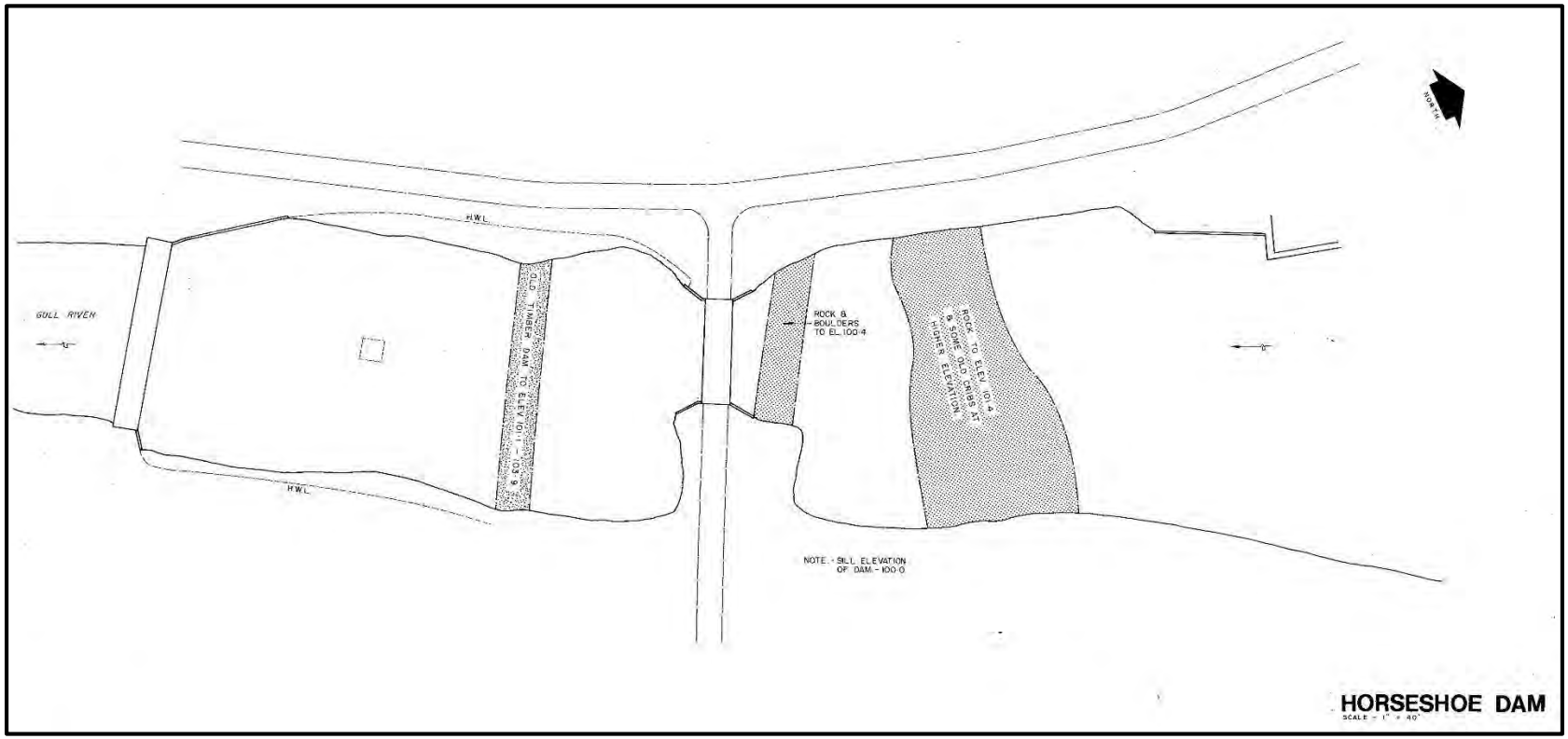


Figure 7. Location of historical timber dam on Mississauga Lake (Crysler and Lathem 1971).

Figure 8. Historical timber dam on Horseshoe Lake (Luning 2009:55).

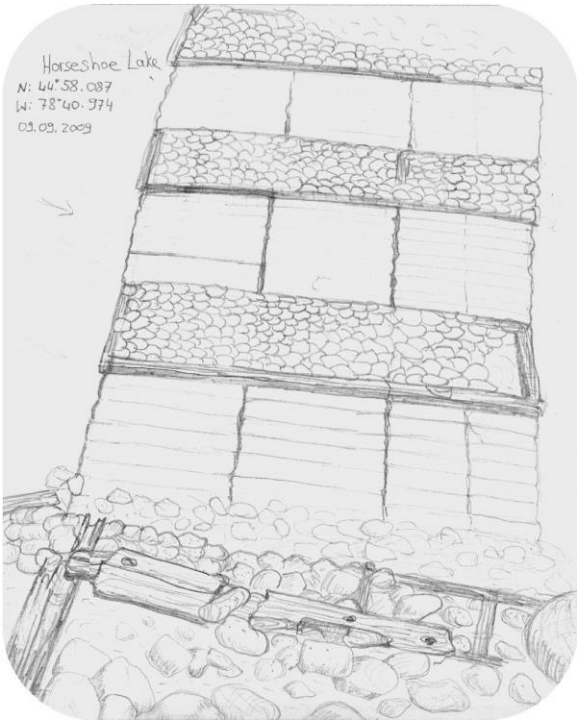


Figure 9. Historical timber dam on Horseshoe Lake (Luning 2009:56).

Figure 10. Historical timber dam on Horseshoe Lake (Luning 2009:56).

ATTACHMENT 4 Cultural Resource Impact Assessment

HORSESHOE LAKE DAM REPLACEMENT – PRELIMINARY CULTURAL RESOURCE IMPACT ASSESSMENT

CULTURAL HERITAGE POLICIES BRANCH

INDIGENOUS AFFAIRS AND CULTURAL HERITAGE DIRECTORATE

PRELIMINARY CULTURAL RESOURCE IMPACT ASSESSMENT
HORSESHOE LAKE DAM, HALIBURTON SECTOR
RPA nº 352

Nathalie Desrosiers
Policy Advisor
Cultural Resources Management

ABSTRACT

Parks Canada Agency has proposed to replace Horseshoe Lake Dam located in the Haliburton Sector. This preliminary Cultural Resource Impact Assessment will provide a description, a summary history of the cultural resource, its potential heritage value (why it is important), and its character-defining elements (aspects of the resource that express its potential heritage value). The preliminary Cultural Resource Impact Assessment *is designed to support decision-making about management of a cultural resource* (NS, OHV or NCR). Decision-making about an intervention on the cultural resource remains with the Field Unit Superintendent.

Description

Horseshoe Lake Dam is located in the Gull River watershed, approximately 7 km north-east of the Town of Minden. The reservoir is capable of storing 35 million cubic metres of water. The head retained is 7.4 m at average operating level, which creates a reservoir with an area of 556 ha. The Horseshoe Lake reservoir supports navigation, generation of electricity and moderates downstream flows. The Horseshoe Lake Dam was constructed in 1909 and is one of the 45 dams in the Trent River Watershed – Reservoir Lakes. The dam is a concrete gravity structure of 9.10 metres in height and 58 metres in length. The dam has four (4) stop logs controlled sluices. Two channel restrictions upstream of the dam, the old dam and the roadway with bridge, restrict extreme flows through the dam. From the Department of Railways and Canals annual reports, the wooden decks were simply repaired or renewed in wood. At Horseshoe Lake, the platform on the dam which extended for about 75 feet, was repaired in 1907/8 by having "some new stringers and planks provided." In addition, new hardware was added - a new windlass in the case of Horseshoe Dam. In other instances, the old wooden dam was replaced with a new concrete dam - concrete sluices and a concrete deck. The use of reinforcing metal to strengthen the concrete decking was used on the major dams.

Historical Background (by the historian Dennis Carter-Edwards, 2016)

"*This dam, like many of the reservoir lake dams that were transferred from the Ontario Government to the Department of Railways and Canals, was a typical wooden crib dam that helped control flow along the Gull River. The need for a co-ordinated approach to managing water levels was frequently highlighted by R.B. Rogers, Superintendent of the Trent Canal in his annual reports D. Carter-Edwards, "Water Control on the Trent-Severn," manuscript on file, TSW archives, 2016. During the fall of 1903, Rogers undertook a personal examination and survey of the key watersheds that could help supply the canal with sufficient flow for navigation during the dry summer months. He noted in his diary for November 1903, "the dam at Horseshoe Lake might be raised if necessary to raise/serve both mountain, 123 Mile & Boskunk Lakes, which would make all these navigable. This would make a long navigable stretch. The Gull River from the dam at foot of Horseshoe Lake to still water above Village of Minden has high shores & could not be better for the purpose of making a channel for navigation. A number of good water [powe3rs] could be developed along this stretch. There is a mill saw & grist which has a head of about 16 to 20 feet. The river from Minden through Gull Lake to Moores Falls is navigable & I understand there are only two small portages to Coboconk" Trent University Archives, Gaele Rogers papers, on line version of the R.B. Rogers diary for 1903.*

As part of his survey work, Rogers prepared a plan and profile of the dams he examined. His sketch of the dam at Horseshoe Lake provides detail on the original timber crib dam that was situated at the southern entrance of the lake. (Figure 1) Rogers did not indicate the origin of this dam but most likely, it was constructed as were many in this region to support the lumber industry. Rogers' recommendation was implemented and by Order in Council 1906 the dams transferred by the province were formally accepted by the federal government. Shortly after the transfer, repairs to these dams began to appear in the annual report on maintenance and new construction work for the Trent Canal. In 1908. Under the section for the Gull River, Horseshoe Lake dam was described as follows: "The platform on the dam, which is 75 feet in length was repaired by having some new stringers provided and also new planks. A new windlass was also provided." Annual Report for the Department of Railways and Canals, 1908, p.175. The following year, the condition of the dam appears to have continued to deteriorate despite the repairs. The superintendent noted, "Horseshoe Lake Dam is in poor state of repair and will have to be renewed shortly. The platform was temporarily repaired and other minor repairs carried out." Ibid., 1909. p.184.

These repairs proved to be only stop gap measures as the dam needed major improvements. In 1909 the department undertook more extensive work by providing a concrete cap. The report by the superintendent in May 1911 highlighted the scope of work. "Horseshoe Lake dam – the dam at this point, which was commenced last year was completed by putting on a reinforced concrete platform and winches for operating the stop logs." Ibid., 1911, p.44 (Figures 2 & 3) It is not clear from the reference to "reinforced" to know if this actually meant metal rods embedded in the concrete to serve as reinforcing. Moreover, the plan of the "Concrete Dam Built 1909 referenced in Figure 2 is puzzling as it appears to show a concrete moonlight rather than a concrete cap on top of a wooden crib.

From the Department of Railways and Canals annual reports, the wooden decks where required were simply repaired or renewed in wood. At Horseshoe Lake, the platform on the dam which extended for about 75 feet, was repaired in 1907/8 by having "some new stringers and planks provided." In addition, new hardware was added - a new windlass in the case of Horseshoe Dam. In other instances, the old

wooden dam was replaced with a new concrete dam - concrete sluices and a concrete deck. The use of reinforcing metal to strengthen the concrete decking was used on the major dams.

In 1924, guard rails were apparently added to the dam. This is difficult to confirm as the reference to this modification is the research notes compiled by J. Witham which cite the TSW card index, the location of which has not yet been verified for this report.

The concrete held up well with likely very little maintenance or repairs as work on the reservoir dams during the Depression and the Great War was spotty at best. In 1948 there was a proposal to repair the disintegrating concrete as shown on a plan and profile of the dam. (Figure 4) It is worth noting that this illustration does not show the guard rails that were allegedly added in the 1920s. This discrepancy is worth noting for there was a plan to add guard rails to the dam in 1978. (Figure 5)

This dam was included in the 2009 Old Dam Ruin project which documented both existing and where evident, remnant dams in the Haliburton. (Figures 6 & 7) There is a delightful image of the historic timber dam, sketch of the remains and current photos of the existing features. The dam thus represents an interesting and representative feature that was designed to provide control over water levels, so critical for unencumbered navigation through the system."

Heritage Value

The proposed project involves a dam that is not a cultural resource (identified as "Other" in the former Cultural Resource Inventory prepared for the TSW in 1994-95). The designation "Other" was used to indicate that the resource was evaluated under the Cultural Resource Management Policy, but was not considered to meet the criteria to be recognized as a cultural resource for Parks Canada's management purposes. The CRM Policy does not apply to resources that are determined "not to be cultural resources" (NCR). According to the CRM Policy (4.-b.), these resources should be managed under other policies, such as the management of materiel or real property and Parks Canada Asset Management Directive and Standards. Therefore, there is no cultural resource management obligations related to the Horseshoe Lake Dam. The dam is not subject to any requirements under the CRM Policy to maintain any heritage value or character-defining elements when it is rehabilitated, and "replacement in-kind" is not required for the purposes of cultural resource management.

However, recent historical research and preliminary investigation have demonstrated that the dams located in the Haliburton Sector have played an "important role in the early lumbering days, and later with the development of business, hydro development, and recreational use by cottagers". In spite of the fact that the dams (with the exception of Coboconk Dam) in the Reservoir Lakes of the Haliburton Highlands have not met the Parks Canada criteria for determining if they are cultural resources, they nevertheless represent an important aspect of both the canal and the region history. They are also an integral part of the Haliburton landscape evolution and structuration. Moreover, they exemplify a form of innovative and adaptive water management technology used originally on the Trent-Severn Waterway. More specifically, Horseshoe Lake Dam is an asset that helps us to better understand the story behind the TSW. It contributes to the working assemblage of engineering structures that make the TSW an operational system of through-navigation. Today, the dams in the Haliburton Sector remain

essential elements in the landscape, creating landmarks in the Reservoir. For these reasons, although a cultural resource impact analysis won't be required for this project, we would recommend a holistic approach that would be in accordance with the Standards and Guidelines for the Conservation of Historic Places in Canada.

Similar to the engineering structures on the Trent-Severn Waterway that are cultural resources, Horseshoe Lake Dam is valued for:

- Its historic association with Canada's national canal system, the evolutionary construction and operation of the Waterway and, aspects of local/community development;
- Its design and/or functional qualities including the integrity of its original form, fabric and function and;
- Its environmental qualities which include landmark status and the integrity of the historic character of the landscape.

Character-Defining Elements:

Key elements contributing to the heritage value of the Horseshoe Lake Dam include:

- its in-situ location in the Haliburton Sector:
- its continued functional use:
- its overall form, design and massing;
- its manual mode of operation:
- its contribution to the cultural landscape as a large, prominent landmark in community and a component of the working assemblage of engineering structures.

Recommendations and Mitigation Measures

Although the Horseshoe Lake Dam and landscape have not been designated as cultural resources (NCR), it is not anticipated that the project of replacing the dam will impact negatively the site if appropriate mitigation measures are employed. In principle, the proposed interventions for the replacement of the dam are recommended as they conform to the Standards and Guidelines for the Conservation of Historic Places in Canada. Furthermore, the project aims at safeguarding the character-defining elements (materials, forms, location, spatial configurations, uses and cultural associations or meanings that embody the heritage value) of the historic site to retain its heritage value and extend its physical life.

As such, the primary treatment is that of "Rehabilitation" and Standards 1-12 are applicable along with the relevant Guidelines on Cultural Landscapes (Section 4.1), Engineering Structures (Section 4.4) and Materials (Section 4.5). Further, the proposed interventions are based on the surveys and investigations of the existing condition, an approach promoted by the Standards and Guidelines (Standard 7).

To ensure that the project is based on a thorough understanding of the heritage value of the engineering work that will be rehabilitated, the Guidelines recommend documenting and assessing the asset and its character-defining elements before any intervention, decision and subsequent work. For the Horseshoe Lake Dam, we recommend:

- Understanding the constructed element and how it contributes to the heritage value of the engineering work and the TSW;
- Understanding the construction history, theory, functional basis and design behind the constructed element;
- Documenting the form, materials and condition of the constructed element before undertaking an intervention;
- Documenting the operation and maintenance of constructed elements in sufficient detail to fully understand their operational characteristics. This can include obtaining an oral history of operation procedures, recording the machinery in operation or preserving records associated with the engineering work, and making these available for future research.

Also, the primary recommended conservation approach based on the Standards and Guidelines is rehabilitation with an emphasis on minimal intervention. Minimal intervention in the context of heritage conservation means doing what is required to arrest and correct deterioration or meet necessary codes while protecting heritage value as much as possible. Given the potential identified heritage value of the Horseshoe Lake Dam, the following recommendations and mitigation measures – based on the Standards and Guidelines - should be considered and implemented:

- Rehabilitate deteriorated parts of constructed elements in a manner that is physically and visually compatible with the engineering work;
- Preserve the heritage value and character-defining elements when creating any new additions to an historic place or any related new construction. Make the new work physically and visually compatible with, subordinate to and distinguishable from the historic place;
- Balance the need to alter constructed elements to meet current safety codes and standards with the need to preserve the heritage value of the work's functionality and operation;
- Design and install new mechanical or electrical systems or equipment when required for the continued use, in a manner that minimizes adverse effects on the cultural resource;
- Add new features to meet health, safety or security requirements, in a manner that conserves the constructed elements and minimizes impact on the heritage value of the engineering work;
- Design addition, modification and extension to a constructed element in a manner compatible with the engineering work and respects its heritage value.

Specific recommendations and required mitigations – based on heritage value and character-defining elements - should be incorporated throughout the phases of the projects. If an opportunity arises to address or correct past repairs that are no longer considered best conservation practices or that seriously impacted heritage value, CRM advice should be sought to determine whether it makes sense to address this as a part of this project. 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 recognised conservation methods, appropriate level of intervention and quality control for the repair works on the engineering structures.

Specific Recommendations on The Guardrails and Other Safety Measures for The Horseshoe Lake Dam

Installation of guardrails, handrails, fences and other barriers will affect the landscape and the heritage integrity of the Horseshoe Lake Dam site. There is therefore a need to balance accessibility, safety and heritage value, to enhance the public's use and appreciation of the Trent-Severn Waterway National Historic Site and Haliburton Sector. Though there is no such thing as an absolute "zero-risk" physical installation, a reasonable person can expect that safety legislation has been followed, that they are being warned of dangerous conditions ahead, and that they are being prohibited from access to highly dangerous locations. That said, a reasonable person must also realize that Parks Canada cannot design-out all possibility for foolhardy and extreme risk-taking behaviour. From a visitor safety perspective, a combination of factors must be used to determine risk, including potential and past occurrences, and the physical safety consequences of breaching the barrier.

- Parks Canada understands that there is no legislation or regulation that specifies public safety mitigation measures and requirements for federal dams. When accessible to the public, a dam deck functions as a pedestrian bridge and/or viewing platform. In this case, a link can be made to the requirements of the Canadian Highway Bridge Design Code for pedestrian bridge guardrails. Further, in trying to determine safety requirements, Parks Canada also looks to other codes or guidelines, including the Ontario Ministry of Natural Resources Public Safety Around Dams Best Management Practises, and the Canadian Dam Association Public Safety Around Dams Guidelines, for guidance.
- CRM recommends that the Design Consultants develop schemes that offer public and operator safety whilst safeguarding the character-defining elements of the Trent-Severn Waterway historic place and associated sectors. Design Consultants should bear in mind that at national historic sites, the normally recommended practice is a minimal intervention approach, as defined in the Standards and Guidelines for the Conservation of Historic Places in Canada.
- CRM seeks to reinforce the notion that each dam and lock site is but part of the greater Trent-Severn Waterway National Historic Site through use of common design features all along the waterway.
- CRM suggests that the following guidelines be used to design the site-specific concept layout and configuration of guardrails and other safety barriers. The layout will be refined through discussion and values-negotiation with stakeholders, most notably designers, project managers and the PCA Field Unit in the design process:

General Recommendations

- All operational equipment should be secured with locks, or in a secured container.
- On the upstream edge of a dam deck, a seamless public type railing (1070mm high, vertical pickets at 102mm spacing) should be present.
- On the downstream edge of a stoplog spillway dam deck, a seamless public type railing (1525mm high, vertical pickets at 102mm spacing) should be present.
- When a pedestrian walkway is downstream of the operational area, the operational area should be delineated with a seamless public type railing (1070mm high, vertical pickets at 102mm spacing).
- On the downstream edge of all other dam decks, a seamless public type (1070mm high, vertical pickets at 102mm spacing.) railing should be present.

- Railing is not required in instances where equipment or another type of structure creates a similar barricade.
- On the downstream shoreline, a seamless public type railing (1070mm high, vertical pickets at 102mm spacing) is required for constructed vertical surfaces (greater than 30° slope and 610mm) up to the shoreline safety boom anchor.
- On the upstream shoreline, a seamless public type railing (1070mm high, vertical pickets at 102mm spacing) is required for naturalized and constructed vertical surfaces (greater than 30° slope and 610mm) up to the shoreline safety boom anchor.
- Between the safety boom anchors, shoreline with a slope less than 30° or vertical surface shorter than 610mm, vegetation or a sign is required where the water current is affected by the dam.
- A seamless public type railing (1070mm high, vertical pickets at 102mm spacing) and handrail should be present on both sides where a set of stairs (higher than 610mm) is located to access the dam deck or on immediate downstream or upstream shoreline.

Along the Trent-Severn Waterway and in the Haliburton Sector, there is presently a mix – in terms of design, material, colour and finish - of guardrail, lamp standard, and signpost types. Under the 2016-2021 capital works program, CRM recommends to implement a new standardized design and colour scheme for secondary metal components that is not only more acceptable from a conservation point-of-view, but also more sustainable in terms of operations and maintenance. Therefore, CRM recommends that:

- All new guardrail/handrail metal to be hot-dip galvanized steel, painted/powder-coated black.
- All new flagpoles to be black-painted steel or spun-aluminum powder coated black.
- All new lamp standards to be hot-dip galvanized finish painted black or spun-aluminum powder coated black.
- All new signposts to be either hot-dip galvanized steel painted black, or aluminum powder coated black.
- As much as reasonably possible, all equipment cabinets, switchboxes, etc. shall be in the black or dark grey colour range.
- All fasteners and accessories for components to be stainless steel, with (where required) caps to cover threaded bolt-ends.
- All new hardware (knobs, levers, lockets, hinges etc.) shall as much as reasonably possible be in similar tone and finish, in the dark grey metal range.
- In all cases of new project or addition to a site, we recommend that a visual assessment should be completed.
- At each site, we recommend that the positioning of each guardrail / handrail / safety measure – when risk is high - should be assessed and disciplined by the landscape features, scale, height, massing, character-defining elements and materials of adjoining structures.
- We recommend that all alteration or addition of barriers on any site should respect the heritage values by limiting the overall dimensions (height and length) of fences, the type and size of railing heads, finials and other individual features, the type / method of construction and fixing, the width of the railing bars, standards, the dimensions, shape and all of their other design characteristics. Uniformity and consistency of all safety measures should be encourage along the Trent-Severn Waterway and Haliburton Sector.

- We recommend that all safety measures should be added in a manner that is compatible with the constructed element and respects the heritage value of the engineering work.

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The new project of replacing Horseshoe Lake Dam should be planned and designed bearing in mind that the whole Trent Severn Waterway and the areas that support the canal are a cultural landscape. Therefore, all new work is meant to tie together, protect and promote the Trent-Severn Waterway National Historic Site, so that to future generations the 2016-2021 work will be seen as an illustration of 21st Century excellence in cultural resource management.

In summary, Parks Canada recognizes:

- that the Trent-Severn Waterway is designated as a National Historic Site and that its commemorative integrity should be maintained;
- that the Trent-Severn Waterway has a long history that illustrates the depth and diversity of the peoples that have lived by, worked on, and traveled the waterway;
- that the Trent-Severn Waterway has a long history as a working waterway;
- that the Trent-Severn Waterway has evolved in response to changes in technology and community needs;
- that the Trent-Severn Waterway will continue to evolve; and
- that the current Trent-Severn Waterway program, while rooted in its history, is but a new layer of history that should celebrate this evolution - past, present and future.

As part of the process and guidelines for cultural resources, an archaeological assessment (AOA) should be done for the project area, including vehicular access routes, staging areas and areas proposed for signage and fencing. Based on the results of the AOA, an Archaeological Impact Assessment and/or additional mitigation measures may be required, prior to construction activities.