

Basic Impact Analysis

Talbot Canal Earth Dams Rehabilitation



August 2017

Environmental Impact Assessment Version Control

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

Revision Number	Amendment Number	Date	Brief Description of Change
0		2017-08-28	Original

1. PROJECT TITLE & LOCATION

Northern Sector Earth Berm Repairs – Talbot Canal, Trent Severn Waterway, ON

Earth Dams Located between Portage Lock 39 and Gamebridge Lock 41, Talbot Canal, Trent-Severn Waterway. The earth dams/berms are located along the eastern outlet of the Talbot Canal of the TSW towards Lake Simcoe, between the towns of Gamebridge and Talbot (Figure 1).

Primary Location: The dams and embankments of this project are located on the Talbot river which flows from Mitchell Lake to Lake Simcoe and forms the border between Simcoe County (Ramara township) to the north and the Regional Municipality of Durham (Brock township) to the south from the river mouth to the edge of their border with the City of Kawartha Lakes at the east.

2. PROPONENT INFORMATION

Parks Canada, Trent-Severn Waterway
2155 Ashburnham Dr., P.O. Box 567
Peterborough, ON K9J 6Z6

Nicole Weber, Project Manager
Phone: (705) 750-4943
E-mail: nicole.weber@pc.gc.ca

3. PROPOSED PROJECT DATES

Planned commencement: September 2017
Planned completion: March 2020

4. INTERNAL PROJECT FILE #

EA # TSW-2016-017 (I); I/O # 30025847

5. PROJECT DESCRIPTION

Background

The Talbot River structures are part of the TSW which meanders 386 km along Central Ontario and consists of many locks, bridges and dams. Constructed between 1833 and 1920, the TSW was declared a National Historic Site (NHS) in 1929. As a national historic site, the waterway must be managed for the protection and presentation of nationally significant cultural resources.

The Talbot Canal and Locks 39, 40 and 41 were constructed between 1901 and 1914. The locks are navigational locks with two closure gates. Lock 39 is located approximately 1.4 km downstream from the Talbot River Dam. The gates are manually operated and water levels are controlled by manually operated butterfly valves. Locks 39, 40 and 41 are considered a Parks Canada resource of national significance (Level 1 Cultural Resource).

Water management and the requirement to satisfy the Parks Canada Agency (PCA) Directive for Dam Safety are a part of Parks Canada's mandate. The implementation of these projects will support the achievement of these requirements and will upgrade the overall asset condition of the Talbot Canal.

All work will be undertaken on Federal Lands under the jurisdiction of Parks Canada Agency - Trent-Severn Waterway.



Figure 1: Location of earth dams along the Talbot Canal cut

Project objective

The earthfill embankment located to the south of the Talbot Dam consists of earth with a concrete core measuring 114 m long and an additional 14 m long end section with a sheet pile core. There are two embankments from the Talbot Dam to Lock 39 Portage that are referred to as the North-West and South-East embankments. The North-West embankment is 1400 m long in total with the first 12 m from the concrete dam consisting of a concrete core and the remainder a clay core puddle up to the Lock. The South-East Embankment is 1400 m long with a clay core puddle starting from the entrance of the canal to Lock 39. There is a low area at the end of the South-East embankment that may be a concern for water impoundment of this reach. The shoreline of the canal is lined with gabion baskets that were installed in approximately 1959. Today many of these have rotated or their wire baskets have broken that prompted the TSW to install steel sheet piling along the crest of the embankments. The primary objective for the Talbot Earth Dams is to rectify specific deficiencies identified in the 2015 DSR and the rehabilitation of the existing embankment by raising the concrete core walls and modification of the slopes to establish the crest elevation from the Talbot River to Lock 39 to an Inflow Design Flood (IDF) level with 0.3 meter of freeboard.

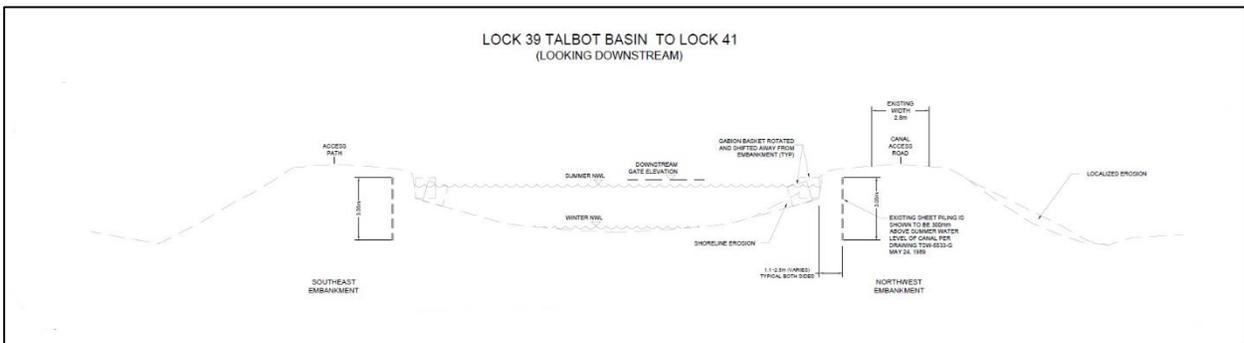


Figure 2. Typical canal cross-section looking downstream (existing condition)

Project rationale

The DSR for the Talbot Dam included an assessment of the earthfill embankments along the canal. The performance of the Talbot Dam earth fill embankments are not satisfactory under the Inflow Design Flood (IDF) condition for the following reasons:

- The IDF water level is higher than the top of the concrete core wall and therefore during IDF conditions significant damage/wash out of the embankment fill may occur;
- The estimated slope stability factors-of-safety do not meet the Canadian Dam Association (CDA) requirements;
- At the IDF the concrete core wall of the north and south embankments will likely be overtopped by approximately 180 mm.
- The downstream slopes of the dam's north and the canal's southeast earth fill embankments do not meet the stability requirements for the "normal" loading.

There are potential safety hazards not only with the height and condition of the dams, but also issues associated with the presence of vegetation. These include:

- Fully grown trees with deep root systems can provide potential seepage pathways through an earthfill dam. Over time, even minor seepage may develop into major 'piping' by gradually eroding soil particles from within the embankment or foundation, which may lead to failure;



- The safety hazards associated with the presence of root systems in an earthfill dam worsens as trees die, leaving their roots to rot. Cavities left by decaying roots may form a network of channels that can both facilitate and accelerate seepage and piping processes;
- Fully grown trees can be suddenly blown over and uprooted by severe weather, leaving behind large ‘pits’ where trees have been windblown. The displacement of earthen material in this manner may support seepage or worse, it may initiate a breach in the dam structure; and
- Dense vegetation can hinder observation of structural deficiencies, and consequently does not allow comprehensive visual inspections of earthfill dams to be undertaken.

Although in general, any vegetation protects embankments against surface erosion, the consensus is that only low height vegetation with shallow roots is in fact beneficial for water retaining structures.

The earth embankment dams have been identified for rehabilitation or upgrades that include: repairs to washouts, removal of vegetation undermining dam strength, height increases, sheet pile extensions, and slope protection. The intent of the design is to provide the least intrusive intervention to the existing landscape and still meet code requirements.

The embankments will need to be protected against structural damage – erosion, disturbance by wave action, ice or by impact of floating debris. The following design options are being developed:

1. Armourstone;
2. Rip-rap;
3. Vegetation; and
4. Combinations of these installations.

There is a culvert that runs under the canal about halfway between Lock 39 and entrance at the Talbot River (Figure 1 and 3). The condition of the culvert at the interface between the wing wall and the entrance arch at the north end is poor with a large area of deteriorated concrete at and above the water level. The section with the concrete arch is generally in good condition with some minor cracking and calcite deposits. The galvanized arch is generally in good condition with the concrete support wall in fair to poor condition. The project will include stabilization of this culvert and the concrete embankment walls, as well as shoreline protection adjacent to the walls.



Figure 3. Old Kane’s Culvert (under the canal)

There is an access road along the North-West Embankment along the entire canal cut. There is a smaller, less maintained access path along the South-East Embankment. Reaches above and below the project sites during construction will be maintained at a water level within the annual winter drawdown levels specified for the location. There will be no increase in structure footprints below the high water mark.



There will be no residual change in bed composition or structure below the high water mark. Trees will be protected where possible and surfaces will be restored upon removal of access routes and staging areas. Property acquisition or leasing may be required to access or complete works along the Talbot Canal Earth Embankments. Also, permits from the local Conservation Authority may also be required for upland work.

Project phases and activities

The Talbot Earth Dams include the following components:

1. South Embankment, located between Talbot Dam and Talbot Canal entrance.
 - i. Crest elevation of the embankments vary between 231.15 and 231.33 m.
 - ii. Depth of embankment fill estimated from crest test holes varied from 5.5 to 6.4 m
 - iii. Erosion damage at edge of crest.
 - iv. Concrete core wall height inadequate.
 - v. Slope protection inadequate.
2. North Embankment, located North of Talbot Dam.
 - i. Crest elevation of the embankments vary between 231.15 and 231.33 m.
 - ii. Depth of embankment fill estimated from crest test holes varied from 5.5 to 6.4m.
 - iii. Slope at exposed concrete core wall on northern most side.
 - iv. Concrete wall height inadequate.
 - v. Slope protection inadequate.
3. Lock 39 U/S Canal embankments, starting from Lock 39 to the entrance of Talbot Canal
 - i. Crest elevation of the embankments vary between 231.33 and 231.40 m.
 - ii. Depth of embankment fill estimated from crest test holes to be 9.5 m.
 - iii. Southeast and northwest canal embankment has loss of slope material and rotated gabion baskets.
 - iv. Slope protection inadequate.
4. Lock 40 U/S Canal embankments, between Lock 39 and Lock 40
 - i. Embankment has loss of slope material and rotated gabion baskets.
 - ii. Slope protection inadequate.
5. Lock 41 U/S Canal embankments, between Lock 40 and 41
 - i. Embankment has loss of slope material and rotated gabion baskets.
 - ii. Slope protection inadequate.

Construction activities, methods, materials, equipment to be used

Vegetation and tree removal equipment will be used to clear the work area mainly along the slopes of the embankments. The equipment used such as Feller Buncher, Tigercat Cherry Picker, chiver and excavator with a thumb will be tasked with tree removals, bush hogging and trenching if necessary (Figure 4).



Figure 4. Feller-buncher (top left), Cherry Picker (right) and chipper (bottom)

After vegetation is cleared, grubbing of the backslope and ditching of the toe of slope will be carried out on the cleared areas. There will be no in water works during this stage.

The removals will follow a linear staging, with vegetation cleared in sections, proceeding along the earth dam, followed by an excavator which grub and ditch to control water within and at the toe of the berms. These earthworks will take place at only the top and backslope of the earth dams.

At the end of the navigation season, the water in the canal is lowered to within one to two feet of standing water (winter levels). The concrete core within the earth dams will be exposed through excavation and increased in height by 300mm via addition of concrete, poured around and over the sheet pile. In some areas, existing sheet pile will be extended where it doesn't presently exist. This sheet pile will increase the height of the protected wall by 300mm (will be higher than existing sheet wall). In these places, sheet pile will be used to heighten the berm and no concrete is required.

Canal side works will start thereafter and consists of removal of gabion baskets and associated rock material, shaping of the slopes and placement of armour stone and rip rap material.

Finally, earth berms will be re-vegetated and maintained with grass, herb and shrubs and will be managed to prevent large tree growth.

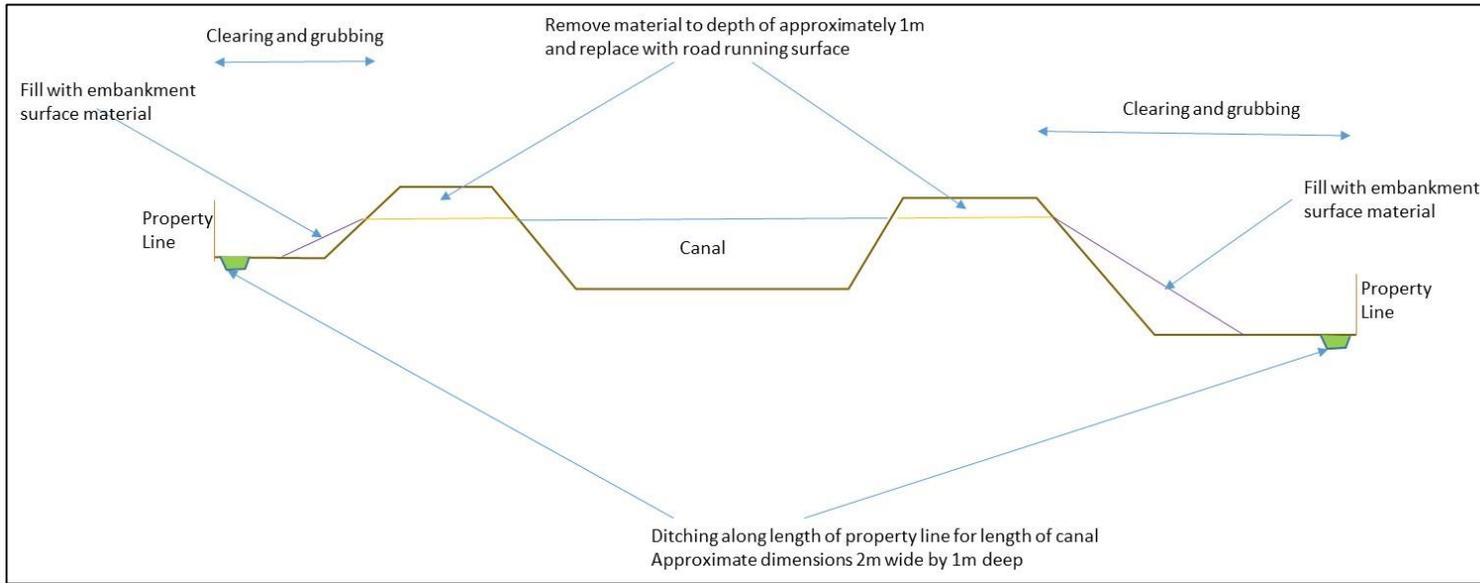


Figure 5. Schematic of canal profile depicting the work extents for vegetation clearing and grubbing

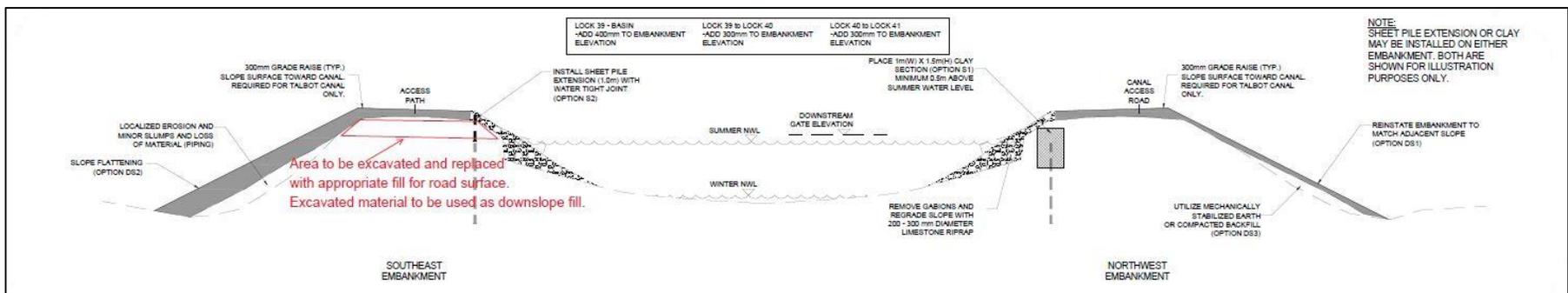


Figure 6. Drawing depicting proposed works/changes to canal walls and extent of excavation in road repair areas



Construction Area Map: Earth Dams North/South of Talbot Dam; red delineates work area



Construction Area Map: Canal Lake to Culvert Site; red delineates work area, green is access



Construction Area Map: Culvert Site southwest to Lock 39



Construction Area Map: Lock 39 to Lock 40



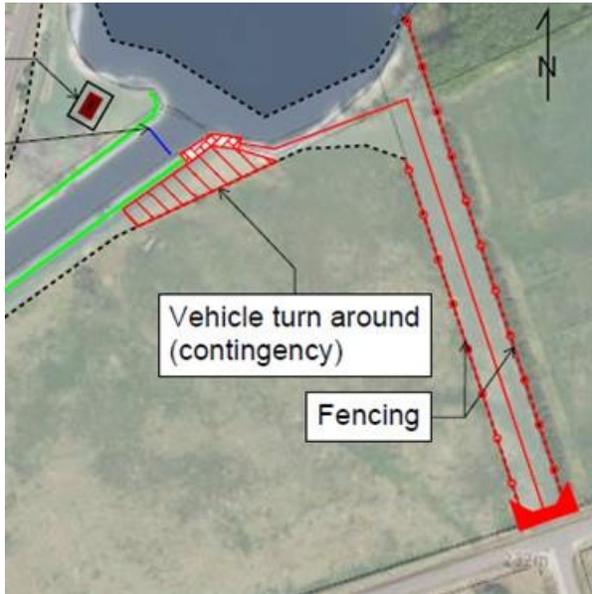
Construction Area Map: Project area at Lock 40 southwest



Construction Area Map: Project area at Lock 41



Associated project work



An access road will be prepared using pre-approved gravel material which will be laid and compacted such that loads from heavy machinery can be accommodated. A temporary access road will be constructed to proceed from Concession Road 11 to the beginning of the canal cut. When water levels are lowered in the fall, a modification of the shoreline may be required to accommodate the road. This work will not be in water and the shoreline restored post-construction.

Changes to utilities, capacity or demand, new lines

No changes to utilities, capacity or demand have been identified as part of the scope of work.

Toxic or hazardous materials

The Construction Renovation and Demolition (CRD) waste management practices will be carried out in line with industry standards to support Federal Sustainable Development Strategy, and will seek to reuse and/or recycle all possible materials where local services and markets exist, and should ensure that CRD waste management practices meet any provincial regulations, city and/or municipal bylaws concerning CRD waste. A waste management program will be prepared to comply with applicable provincial regulations and federal policies.

Site modifications, structure removals, site reclamation activities

Scope of work will involve tree and vegetation removal on the earth dams and re-establishing non-tree vegetation for effectiveness of the dams. Thereafter the rehabilitation of access roads and staging areas.

Modification to existing vegetation will include spraying and other necessary treatment of present invasive species at the site.

Navigability and Public Safety

The Talbot Canal and River is a managed and regulated by Parks Canada as part of the TSW in accordance with the *Navigation Protection Act (NPA)* and the *Historic Canals Regulations (HCR)*. No effects to navigation will occur during the earth dam rehabilitation works. Work is not being undertaken within operable hours of the navigation season of the TSW. No effects to the navigability of the Talbot Canal are predicted post-construction; repairs to this asset ensure that safe navigation continues on the TSW.

Schedule

Vegetation clearing will begin mid- to late summer. There will be no in water works during this stage. The canal closes to navigation on October 10th, 2017. Following closure, the water at the site is lowered to within one to two feet of standing water (winter levels). Canal side works, sheet pile extensions and



concrete pours for height increase will start thereafter and will be completed before the next year before the navigation season starts. The total projected project timeframe is from July 2017 to March 2020.

6. VALUED COMPONENTS LIKELY TO BE AFFECTED.

Vegetation

The vegetation on the earth dams is a combination of grasses, herbs, shrubs and clusters of trees or individual trees. The riparian area is moderately wide, open, consisting of 50% grasses/50% open and provides marginal to poor streamside habitat. The plants are all common to the area and are mostly native species with the exception of those identified in Table 1.

The most commonly occurring trees are Cedar (*Thuja occidentalis*), Tamarack (*Larix laricina*), White Spruce (*Picea glauca*), and hardwoods - Manitoba Maple (*Acer negundo*), White Ash (*Fraxinus americana*), elm (*Ulmus Americana*), basswood (*Tilia Americana*), Poplars (*Populus balsamifera*, *Populus deltoids*, *Populus grandidentata* and *Populus tremuloides*), Willows (*Salix* sp.) and Pin cherry (*Prunus pensylvanica*).

Common plants along the earth berm include Goldenrod (*Solidago*), Asters (*Aster* sp.), Milkweed (*Asclepias tuberosa*), Virginia creeper (*Parthenocissus* sp.), Wild grape (*Vitis* sp.), Plantains (*Plantago* sp), Vetch (*Vicia cracca*) and various grasses.

Lands south of, and adjacent to the canal earth berms form part of the Ontario Greenbelt Plan and belong to the category of *Protected Countryside*. The goals of this designation include protection of important agriculture areas, of the environment, and of local culture, recreation and tourism.

There is one area south of the canal between Lock 39 and west to Highway 12 that is a provincially recognized wetland, part of the Talbot Rivermouth Wetland Complex. This area is adjacent to, but not part of, Parks Canada property (Figure 7).





Figure 6. Photos depicting typical vegetation along the canal

The following invasive species have been recorded along the Canal system and/or within proximity of the project site locations:

Table 1: Invasive Species within the Project Site

Species	Location
Coltsfoot – <i>Tussilago farfara</i>	Talbot Earthdam – TSW Locks 39-41
Common barberry – <i>Berberis vulgaris</i>	Talbot Earthdam – TSW Locks 39-41
Common hawthorn – <i>Crataegus monogyna</i>	Talbot Earthdam – TSW Locks 39-41
Dog-strangling vine, - <i>Vincetoxicum rossicum</i>	Township of Brock, Ontario, Canada Talbot Earthdam – TSW Locks 39-41
European buckthorn - <i>Rhamnus cathartica</i> L.	Township of Brock, Ontario, Canada Talbot Earthdam – TSW Locks 39-41
European frog-bit - <i>Hydrocharis morsus-ranae</i> L.	Township of Brock, Ontario, Canada
European highbush cranberry, Cranberry viburnum – Viburnum opulus ssp. opulus	Talbot Earthdam – TSW Locks 39-41
Garlic Mustard – <i>Alliaria petiolata</i>	Talbot Earthdam – TSW Locks 39-41
Hybrid Cattail – <i>Typha x glauca</i>	Talbot Earthdam – TSW Locks 39-41
Japanese Barberry – <i>Berberis thunbergii</i>	Talbot Earthdam – TSW Locks 39-41
Japanese knotweed – <i>Reynoutria japonica</i>	Talbot Earthdam – TSW Locks 39-41
Purple crown-vetch, cow vetch – <i>Securigera varia</i>	Talbot Earthdam – TSW Locks 39-41
Tartarian honeysuckle – <i>Lonicera tatarica</i>	Talbot Earthdam – TSW Locks 39-41
Zebra Mussel - <i>Dreissena polymorpha</i> (Pallas)	Township of Brock, Ontario, Canada

See <https://www.eddmaps.org/ontario/> for further information on invasive species sightings



Figure 7. Areas in solid blue identify provincially recognized wetland south and adjacent to PCA lands along the Canal cut. Outlined blue depict other wetland vegetation on the north side.

Wildlife

Bird species such as Pileated Woodpecker (*Dryocopus pileatus*), Great Blue Heron (*Ardea herodias*), Osprey (*Pandion haliaetus*), Wild Turkey (*Meleagris gallopavo*), Belted Kingfisher (*Megaceryle alcyon*), Black-capped Chickadee (*Poecile atricapillus*), Golden-crowned Kinglet (*Regulus satrapa*), and Red-tailed Hawks (*Buteo jamaicensis*) have been observed in the area.

A Breeding Bird Survey was completed on 21 June 2017 and followed up in July 7 (**Appendix B**) starting at Lock 38 and downstream to Lock 41. These surveys were conducted in the early morning from approximately 06:30 – 10:00 following standards used by Bird Studies Canada. There was very little evidence of nesting on the earth dams themselves, as previous year fall/winter vegetation removal had reduced available habitat. The berms are largely Eurasian grasses with native goldenrod and asters, with low growing Eastern White Cedar, White Elm, and Green Ash. Ground cover is sparse which may have contributed to the lack of nesting at those locations. Nests of Eastern Kingbird and Common Grackle were being defended in two places. The most common species recorded included the latter, plus Song Sparrows, American Robin, Warbling Vireo, Yellow Warbler, Red-winged Blackbird and Canada Goose. No raptor nests (e.g., osprey) were observed.

There is a grassland bird community on the south side of the constructed canal downstream from Lock 38 to the farmstead, and then for a short interval just upstream and downstream of Lock 39 on the north side. The community included Bobolink, Eastern Meadowlark, Savannah Sparrow and Field Sparrow. The berms would be included as part of the habitat of these SAR; however there were no observations of these birds nesting or foraging at the canal edge.



Wildlife such as Mink (*Neovison vison*), Map turtles (*Graptemys sp.*), Snapping Turtle (*Chelydra serpentina*), Black bear (*Ursus americanus*), Muskrat (*Ondatra zibethicus*), Painted turtle (*Chrysemys picta*), Leopard frogs (*Lithobates sp.*), crayfish (*Cambaridae*), American Toad (*Anaxyrus americanus*) and Water Snakes (*Nerodia sipedon*) have been seen.

Water Quality

Water quality through the Talbot River is good and water quality within ranges that support aquatic life. Turbidity is low, with a range of 0.83-4.99 NTU (median 0.76), dissolved oxygen (DO) range 7.89- 10.52 mg/L (median 9.0) and pH is 7.47-8.46 (median 8.22). As reference, ideal water quality parameters are DO of > 5 mg/L and pH between 6.5 and 9. Water with NTU less than 5 is considered clear.

Fish

The Talbot River and Canal is a warmwater fish community environment; however, the areas impacted by the planned works are considered to be low-quality fish habitat. The Talbot Canal is more-or-less utilized as a passage/migration route, while spawning is more-so exclusive to the Talbot River area, and downstream of the Talbot Riverside Dam and the Dam at Lock 38. Warm-water fish species such as Rock Bass (*Ambloplites rupestris*), Carp (*Cyprinidae*), Perch (*Perca sp.*), and Pike (*Esox sp.*) have been observed passing through the locks. Based on interviews with the Lock Master(s) of Locks 39-41 conducted in August 2016, a limited amount of fishing activity has been observed at Locks 40 and 41, and virtually no fishing activity has been observed at Lock 39.

There is still potential for fish to be present upstream of lock 39 and become stranded in the dewatered areas. Specifically, within mud pits located upstream of the lock chamber area. For work at Lock 39 in early 2017, a fish rescue took place on March 13, 2017. There were 732 fish captured and released. Species of fish captured included Rock Bass, Black Crappie, Johnny Darter, Pumpkinseed, Bluntnose Minnow, Emerald Shiner, Banded Killifish and Brown Bullhead. A second rescue was conducted on April 5 as ice conditions hindered the first rescue. An additional 455 fish captured and released upstream of the work area.

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. Species at risk which may be found within the project areas, both federally listed species and species listed under the *Ontario Endangered Species Act* (ESA), have been identified using the Natural Heritage Information Centre (NHIC) database, the Atlas of Breeding Birds of Ontario and the Ontario Reptile and Amphibian Atlas. These species can be found in Table 2.

Basic habitat characteristics for each species have been included in Table 2 and an assessment given as to the likelihood of that species using habitat within the study area. For species at risk that do not have critical habitat described in a recovery strategy, mitigation measures will be employed to ensure that individuals and their habitat are protected.

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 Eastern Whip-poor-will (*Antrostomus vociferous*). Lock 39 is outside of, but within proximity to (approximately 1.75 km), the boundary of designated critical habitat for Eastern Whip-poor-will.

Recent multiple site visits (Parks Canada staff and SLR Consulting) have indicated no obvious nesting activities for turtles, although snapping turtle and map turtle have been seen.

Bats have been recently listed as Endangered, attributed to species declines as a result of a fungal disease: white-nose syndrome, which has accounted for at least 90% mortality rates (COSEWIC 2013). Little Brown Bats are especially susceptible to this fungus. Winter hibernation habitats do not occur on site however,

August 2017



summer roost sites can be under the loose bark of dead trees, the hollows of trees or man-made structures. The Northern Myotis and Tri-coloured bats primarily prefers forested, natural cavities or loose leaves for roosting as opposed to constructed features primarily preferred by the Little Brown Myotis. Importantly, all bats will use forested habitats beneath the canopy and will forage on the forest floor. Proximity to water is also an important habitat requirement.

Table 2: Species at Risk with Potential to be found within the Project Area

Common Name	Scientific Name	COSEWIC	SARA Status	ESA Status	Preferred Habitat	Habitat Potential on Project Site
Birds						
Golden-winged Warbler ³	<i>Vermivora chrysoptera</i>	Threatened	Threatened	Special Concern	Regeneration areas (old fields, hydro right-of-ways) surrounded by mature forest	No
Eastern Whip-poor-will ¹	<i>Caprimulgus vociferus</i>	Threatened	Threatened	Threatened	Semi-open forests or patchy forests with clearings, such as barrens or forests that are regenerating following major disturbances	No – But within 2 km radius of Critical Habitat- no whip-poor-will recorded at the site in summer 2017
Red-shouldered Hawk ³	<i>Buteo lineatus</i>	Not at Risk	Special Concern	Not at Risk	Deciduous or mixed-wood forests containing shade-tolerant hardwood trees close to wetland areas. Large woodlots (10 to 100 hectares) can sustain viable Red-shouldered Hawk populations.	No
Black Tern ³	<i>Chlidonias niger</i>	Not at Risk	No Status	Special Concern	Shallow marshes, generally comprised of cattails.	No
Common Nighthawk ³	<i>Chordeiles minor</i>	Threatened	Threatened	Special Concern	Open, vegetation-free habitats (dunes, beaches, recently harvested forests, burnt-over areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks)	Not likely
Barn Swallow ³	<i>Hirundo rustica</i>	Threatened	No Status	Threatened	Nest almost exclusively on man-made structures (bridges, culverts, barns)	No – but foraging in adjacent meadows
Eastern Wood-pewee ³	<i>Contopus virens</i>	Special Concern	No Status	Special Concern	Edges of mixed or deciduous forests, intermediate-aged mature forests	Not likely – recorded in nearby mature forested areas; not at the dams
Wood Thrush ³	<i>Hylocichla mustelina</i>	Threatened	No Status	Special Concern	Mature mixed or deciduous forests, often moist, well-developed undergrowth, large forest stands.	No
Bobolink ³	<i>Dolichonyx oryzivorus</i>	Threatened	No Status	Threatened	Bobolink nest in tallgrass prairie and other open meadows, including hayfields.	Potential - abutting canal berm trail to north



Common Name	Scientific Name	COSEWIC	SARA Status	ESA Status	Preferred Habitat	Habitat Potential on Project Site
Eastern Meadowlark ³	<i>Sturnella magna</i>	Threatened	No Status	Threatened	Nest in moderately tall grasslands, such as pastures and hayfields, but also nest in alfalfa fields, weedy borders of croplands, roadsides, orchards, shrubby overgrown fields, or other open areas.	Likely - dams part of the habitat however BBS did not observe nesting or foraging at the canal edge.
Grasshopper sparrow	<i>Ammodramus savannarum pratensis</i>	Special Concern	No Status	Special Concern	pastures and hayfields, natural prairies; low, sparse perennial herbaceous vegetation	Potential - abutting canal berm trail to north
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	Threatened	Threatened	Special Concern	Oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, beaver ponds and burns.	Potentially –mature individual trees and snag trees
Reptiles and Amphibians						
Eastern Musk Turtle ¹	<i>Sternotherus odoratus</i>	Special Concern	Threatened	Special Concern	Eastern Musk Turtle require shallow water with little or no current, and soft earth to bury into when they hibernate. Nesting habitat is variable, but it must be close to the water and exposed to direct sunlight.	Potentially
Blanding’s Turtle ⁴	<i>Emydoidea blandingii</i>	Threatened	Threatened	Threatened	Blanding’s Turtles can be found in several types of freshwater environments, including lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps. They will travel long distances overland (>410m) for basking and nesting sites.	Potentially
Northern Map Turtle	<i>Graptemys geographica</i>	Special Concern	Special Concern	Special Concern	lakes and rivers; preference for slow moving currents, muddy bottoms, abundant aquatic vegetation, suitable basking sites (such as rocks and logs)	Potentially
Snapping Turtle ²	<i>Chelydra serpentina</i>	Special Concern	Special Concern	Special Concern	Usually found in large bodies of water, but will sometimes inhabit small ponds. Rarely leave water except to nest and migrate to overwintering habitat.	Potentially



Common Name	Scientific Name	COSEWIC	SARA Status	ESA Status	Preferred Habitat	Habitat Potential on Project Site
Eastern Milksnake ⁴	<i>Lampropeltis triangulum triangulum</i>	Special Concern	Special Concern	Special Concern	Found in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types. Often in close proximity to water.	Potentially
Insects						
Monarch ⁵	<i>Danaus plexippus</i>	Special Concern	Special Concern	Special Concern	Monarchs can be found wherever milkweed and wildflowers grow. This includes abandoned farmland, along roadsides, and other open spaces.	Yes
Mammals						
Little Myotis, Tricoloured, Northern Myotis	<i>Myotis lucifugus</i> <i>Perimyotis subflavus</i> <i>Myotis septentrionalis</i>	Endangered	Endangered	Endangered	Little Brown Myotis hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing. In summer they forage at night and roost in trees and buildings during the day.	Potentially – mature individual trees and snag trees Possibly buildings (loose roof tiles etc.).
Northern Myotis ⁵	<i>Myotis septentrionalis</i>	Endangered	Endangered	Endangered	Similar habitat preferences to Little Brown Myotis - they bats hibernate from October or November to March or April, most often in caves or abandoned mines. Northern Myotis often roost under loose bark or in tree cavities.	No
Tri-coloured Bat ⁵	<i>Perimyotis subflavus</i>	Endangered	Endangered	Endangered	Often found hibernating in same locations as Little Brown Myotis and Northern Myotis – abandoned mines and caves. Relatively rare species in Canada.	No
Eastern Small-footed Bat ⁵	<i>Myotis leibii</i>	Not Assessed	Not Assessed	Endangered	Often found hibernating in same locations as Little Brown Myotis and Northern Myotis, but they tend to occupy cooler, drier areas of the cave. In summer they forage at night and roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees.	No



Common Name	Scientific Name	COSEWIC	SARA Status	ESA Status	Preferred Habitat	Habitat Potential on Project Site
Plants						
Butternut ⁵	Juglans cinerea	Endangered	Endangered	Endangered	Butternut is mainly encountered as a minor component of deciduous stands, but large pure populations exist on certain flood plains. It grows best in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldom, on dry, rocky and sterile soils.	Not likely Mention, although previously identified in the area, extensive vegetation surveys of the earthdams showed no individuals growing on the earthdams.

¹COSEWIC Draft Critical Habitat Mapping

²NHIC

³Atlas of Breeding Birds of Ontario

⁴Ontario Reptile and Amphibian Atlas

⁵Field Observation



Air Quality and Noise

The project site occurs in a rural, agricultural setting, where air quality would be considered high and noise levels generally low.

Cultural Resources

The proposed project involves canal cuts and landscapes that are cultural resources of national historic significance (formerly known as Level I cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015) located within the 1900-1907 Lake Simcoe – Balsam Lake section of the Waterway. These cultural resources are valued for their contribution to the integrity of the historic character of the lock stations and their role in in-land water transportation, water management and the evolutionary development of the Trent Severn Waterway. The locks and canal cuts contributes to the working assemblage of engineering structures that make the TSW an operational system of through-navigation.

The 1900-1907 Lake Simcoe – Balsam Lake section of the Waterway is considered of national significance for:

- The high number of surviving unmodified structures dating from the construction period 1900 to 1907 and because most of the lock stations in this section retain their integrity from the early 20th century period. In no other sector of the Waterway is there such a collection of unmodified canal works and lock station landscapes.
- The specific resources in the Simcoe-Balsam section which include: original locks, lockgate and valve operating mechanisms, dams, canal cuts, embankments, spoils, entrance piers, guard gates, culverts, bridges, bridge abutment remnants, associated machinery and lock station landscape features surviving from the construction era.

The Statement of Heritage Value (SoHV) on Locks 39, 40 and 41 provides further information on their heritage value and identifies the character-defining elements of the key structures that will be impacted by this project.

Parks Canada completed the Archaeological Impact Assessment (AIA) for the Talbot Area Earthen Dams Project, in areas deemed to possess archaeological potential along the earthen dams. No archaeological resources were uncovered during test pitting activities. Remains of Kane's Bridge and the former Hwy 12 bridge were archaeologically recorded (photo-documented and measured) as well as the various erosion control measures employed and the concrete tunnel/culvert running beneath the Talbot Canal.



7. EFFECTS ANALYSIS

Vegetation

Tree and shrub cutting will take place along the immediate shorelines and back slopes of the earth dams and later will be entirely removed for the construction. Therefore there will be a short-term total loss of vegetated habitat. These vegetated areas have been heavily influenced and maintained by human activity and would not be considered significant or specialized habitat. All areas will be re-vegetated after construction; however, for reasons stated in the project rationale (Page 3) trees will no longer be allowed to grow along the canal earth dams. As a result, there will be a permanent change in the nature of the cover on the earth dams from patchy forested and sparse treed/shrub habitat, to early successional grass/shrub habitat. A re-vegetation/planting plan will be developed by PCA.

There is potential to bring in new, or further spread presently existing invasive species as the contractor moves equipment into and out of the site and due to disturbance. Appropriate mitigation measures will need to be applied to reduce the risk of moving invasive species by means of proper identification and documentation of species, taking precaution when handling potentially contaminated/infested soils and vegetation, treatment of infested topsoil to prevent further spread and effective cleaning of clothing, equipment and vehicles.

Invasive species potentially present within the work site:

Coltsfoot: <http://www.eddmaps.org/ontario/Species/subject.cfm?sub=6564>

Common barberry: <http://www.eddmaps.org/ontario/Species/subject.cfm?sub=5181>

Common Hawthorn: <http://www.eddmaps.org/ontario/Species/subject.cfm?sub=5392>

Dog-strangling Vine: <https://www.ontario.ca/document/dog-strangling-vine>

European Buckthorn: <http://www.eddmaps.org/ontario/species/subject.cfm?sub=3070>

European Frog-bit: <http://www.eddmaps.org/ontario/species/subject.cfm?sub=12792>

European highbush cranberry: <http://www.eddmaps.org/ontario/Species/subject.cfm?sub=6608>

Garlic Mustard: <https://dr6j45jk9xcmk.cloudfront.net/documents/3242/stdprod-104388.pdf>

Japanese barberry: <http://www.eddmaps.org/ontario/Species/subject.cfm?sub=3010>

Japanese knotweed: <http://www.eddmaps.org/ontario/Species/subject.cfm?sub=19655>

Purple crown-vetch: <http://www.eddmaps.org/ontario/Species/subject.cfm?sub=3015>

Tartarian honeysuckle: <http://www.eddmaps.org/ontario/Species/subject.cfm?sub=3043>

Birds/Wildlife

Due to the fact that vegetation will be disturbed, however minor, there is potential to affect birds and other wildlife species, both aquatic and terrestrial. Vegetation removal to prepare for project start-up is scheduled to occur at the tail end of the nesting season. Therefore nesting birds may potentially be impacted. A breeding bird survey was conducted in June and July to determine habitat use by various birds. The earth dams were not being heavily utilized by many bird species for nesting. As previously stated, the most common species recorded included Kingbirds, Grackles, Song Sparrows, American Robin, Warbling Vireo, Yellow Warbler, Red-winged Blackbird and Canada Goose. While many of these species are using the habitat for nesting, the typical nest dates are from April 1 with most species finishing nesting



(young fledged) by the end of July. As the works will take place in mid-August at the earliest, there likely would be no impact on bird nesting.

However, if active nests are found, or nesting is suspected but cannot be ruled out, the area in question will be flagged and identified for clearing later when nesting is complete. Additionally, a qualified biologist will need to walk the construction area ahead of clearing to further identify potential for nesting birds. Using this mitigation adverse impacts to birds will be avoided. Construction activities will be largely completed prior to the subsequent year nesting season. Therefore, effects on birds should be negligible.

While the habitat at the project site is not rare, various wildlife – mink, muskrat, turtles and frogs - all may be found on site during the construction. Wildlife protection during construction involves the diligent implementation of mitigation measures and best practices.

The reconstruction of the canal walls will take place during the fall/winter/early spring, therefore impacts on amphibians and turtles will be negligible. The remaining shallow water in the de-watered canal freezes to the bottom and does not offer over wintering refuge sites for amphibians and turtles.

Foraging opportunities for other wildlife will be limited by the disturbance on site during construction, but this disturbance will be temporary. Bank dens and other crevices in the canal walls that provide shelter for mammals will be destroyed during the gabion basket removal and excavation. Due to the territorial nature of these animals, they will be displaced during the construction period. They should be able to re-inhabit the areas once construction is complete on each section. Monitoring and observation for animal activity will be required to ensure animals are not physically harmed during the bank alteration. Key mitigation that is recommended to be employed include the following:

- Conduct “Pre-stressing” activities within a few days prior to the onset of site preparation (vegetation clearing and grubbing) to encourage wildlife to move away from a site;
- If recommended by a qualified person and approved by PCA, exclusion zones or “no go” areas will be established to protect critical habitat or areas with known residences (e.g., hibernacula, dens, nests).
- On a daily basis, an inspection or “sweep” of the work area shall be performed prior to commencement of project works and activities to ensure wildlife are not present in the work area (include in site checklist).
- Field information regarding incidental encounters with wildlife shall be compiled and reported on a daily basis.
- For incidental encounters, the following information should be recorded in the field:
 - Locations, dates and time of day where the species were encountered;
 - the names of species encountered;
 - photographs of the species, if taken.
- If injured/dead wildlife are encountered report to PCA immediately. PCA may require retrieval and storage on ice of carcass for laboratory testing
- All vehicles and equipment used by project personnel will follow any construction zone speed limits to reduce the risk of hitting wildlife.

With the proper implementation of mitigation measures, there should be less likelihood of negative impact to wildlife.



Species at Risk

As identified in Table 1, a number of Species at Risk have the potential to be present within the project areas. For those species which do not have critical habitat identified through a recovery strategy, either the planned works will not impact their habitat of individuals, or mitigation measures will be employed to protect individuals. None-the-less, appropriate mitigation will be advised should SAR be observed in, or within proximity to, the project sites.

No turtle nests were observed at the earth dams in walk overs but the excavations would take place after emergence if they were there. Thus, there is a very low possibility to uncover overwintering turtle hatchlings. As excavation and earth works will make these areas suitable for nesting habitat, additional mitigations may be required if construction activities run into May (nesting season). Temporary reptile fencing, such as polythene/ woven geotextile secured with timber stakes, or material of a similar nature/function, may be required around earth/gravel stockpiles to prevent turtle nesting in the project area.

With respect to other SAR identified in Table 2, birds such as Whip-poor-will, Bobolink and Eastern Meadowlark, do not utilize the areas for nesting, but will be able to forage in the re-vegetated areas at the canal sides. To ensure Monarchs can continue to forage, post construction vegetation should include common milkweed.

A site visit and survey of the Talbot Earth dams in October 2016 has confirmed that no Butternut reside within the designated construction areas. However, should Butternut trees be found/identified within the vicinity of the designated construction areas, they are not to be removed and measures to protect the tree and roots using fencing will be implemented. The TSW Environmental Officer should also be notified immediately.

Within the study area, especially along the canal berms, habitat affinities are present for the three SAR bat species identified. The 2017 scoped emergence review and acoustic analysis confirmed habitat for these species (as well as other non-SAR bats) are present and using areas of the canal as well as the woodland at Lock 38 as foraging and potential roosting habitat. Habitat quality and quantity vary by Section and Lock Station. Significant potential roost areas have been identified. Although tree clearing is to take place only to the toe of the berms and within Parks Canada property, there is potential for some roosting trees to be removed. It is important to note that trees have not been assessed for roosting potential along the entire length of the canal. If necessary, removal of trees on Parks land may require a SAR permit.

Water Quality, Fish and Fish Habitat

There is no sensitive fish habitat at the project site as the area between Locks 39 to 41 are routinely dewatered every year for the non-navigation season; the stretch is not utilized as suitable over-wintering site for aquatic wildlife. Additionally, with a lack of perennial aquatic vegetation, the area would not be utilized for spawning in spring. There is potential for fish to be present and become stranded in the dewatered area. Any stranded fish in the dewatered area must be live captured and released. The planned work in this location can be conducted with the proper and efficient implementation of the appropriate BMPs and mitigation measures, such that there are minimal adverse impacts.

- Rock checks, vegetation plug (need to know particle size and velocity)
- Test out small section, re-assess the amount of disturbance and verify if the sediment control is working, before proceeding with the larger section of the work



- Possibility of a storm water management pond (catchment) to collect sediment (south) with back up in case it fails (Plan A and B). Rock checks/vegetation plug upstream leading to it. Consult geotech investigation results.



There is potential to bring in new, or further spread presently existing invasive species as the contractor moves equipment into and out of the site. Appropriate mitigation measures will need to be applied to reduce the risk of moving invasive species by means of proper identification and documentation of species and effective cleaning of clothing, equipment and vehicles.

Zebra mussel: <http://www.eddmaps.org/ontario/species/subject.cfm?sub=10567>

By this, there is potential for contamination of water from spills and/or leaks from equipment. Also, potential of reduced water quality and clarity due to increased erosion, sedimentation and transport of debris, (e.g. discharge of waters).

Air Quality and Noise

The use of diesel-powered machinery and concrete may result in temporary, localized effects on air quality around the project site. Noise from construction may be disruptive for property owners adjacent to the project sites, as well as recreational users of the surrounding walking trails.

The short-term use of machinery/equipment will generate exhaust and smoke emissions that could affect air quality. However, these types of disturbances are temporary and not foreseen to be a threat to local flora, fauna, and people with appropriate mitigation measures in place. Parks Canada will monitor public complaints and address any issues raised by the public.

Cultural Resources

Although the landscapes and canal cuts are considered as cultural resources of National Significance, it is not anticipated that the project will negatively impact the sites if appropriate mitigation measures and conservation approach are followed. The primary recommended conservation approach based on the Standards and Guidelines for the Conservation of Historic Places in Canada is rehabilitation with an



emphasis on minimal intervention. Minimal intervention in the context of rehabilitation (including replacement) involves the adaptation of an historic place or structure for a continuing or compatible contemporary use, while protecting its heritage value and character-defining elements (material, form, location, spatial configuration and cultural associations or meanings that embody the heritage value). As such, the application of Standards 1-12 from the Standards and Guidelines is recommended, including the relevant Guidelines on Cultural Landscapes (Section 4.1), Archeological Sites (4.2), Engineering Works (Section 4.4) and Materials (Section 4.5).

Cultural resource management requires knowledge and understanding of cultural resources, of their history (including interventions), current condition, and past and current importance to Canadians. Records and documentation preserve the information necessary for effective decision-making and for sharing the value of the resources with Canadians. Under the CRM Policy, cultural resources must be recorded and documented to preserve a public record. These records must be maintained, accessible and up-to-date and managed in accordance with the TB Directive on Recordkeeping.

Given the Talbot's Sector significance and heritage value, Parks Canada seeks to reinforce the notion that the area is part of the greater Trent-Severn Waterway National Historic Site through use of common design features all along the waterway. Therefore, Parks Canada seeks to ensure that the interventions it is making are physically and visually compatible with the historic place. There is therefore a need to balance accessibility and safety with heritage value, to enhance the public's use and appreciation of the TSW National Historic Site. Consequently, designs need to consider public and operator safety whilst safeguarding the character-defining elements of the cultural resources of national significance.

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

The AIA completed by Parks Canada archaeologists determined the existing conditions in the proposed work areas. 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.

Given that evidence of the construction and/or operation of the waterway may exist below surface, project activities are deemed significant to adversely impact potential archaeological resources. The mitigation measures provided in section 8 are required to minimize adverse impacts to archaeological resources.



8. MITIGATION MEASURES

To mitigate for the potential harmful effects of the project, the following measures shall be implemented:

General

1. Inform the Departmental Representative and the PCA Environmental Authority (Environmental Assessment Officer), regarding any changes to project plans and/or scheduling. Any changes not assessed under this BIA will require approval from PCA and may require further mitigation measures.
2. Project commencement only upon submission and **Parks Canada acceptance** of an Environmental Management Plan (EMP) that outlines all the measures to be implemented by the contractor on the project site to eliminate or reduce environmental effects. The EMP will be submitted in writing, at least five (5) working days prior to commencing work. The Contractor's plan will be required to be submitted to the Departmental Representative and Parks Canada's Environmental Authority (EA), reviewed and accepted by Parks Canada prior to the commencement of work and mobilization to site.
3. It is required that the qualified environmental professional(s) prepare the EMP or its component plans in accordance with PCA's Environmental Standards and Guidelines - Ontario Waterways (2017). The EMP will detail frequency of monitoring and list high-risk construction activities where a qualified environmental professional must be onsite. The EMP will include a list of key project activities and identify the actual and potential environmental impacts associated with each activity.
4. Parks Canada's Environmental Authority (EA), Trent-Severn Waterway will outline all the prescribed mitigation measures, including those found in BMPs, in a construction start-up meeting with the project manager and the contractor, to ensure that all on-site personnel are aware of these mitigation measures.
5. The contractor is to ensure that all on-site personnel are aware of, and comply with the prescribed mitigation measures within this BIA.
6. Should conditions at the work site indicate that there are unforeseen negative impacts to fish, wildlife, cultural or visitor experience resources, all works shall cease until the problem has been corrected and/or any required input can be obtained by Parks Canada or other relevant authorities. The Trent-Severn Waterway has the right to require that work be altered or ceased immediately.
7. As per the *Historic Canal Regulations* applicable to lands administered by the Trent-Severn Waterway National Historic Site of Canada, a permit signed by Parks Canada's Ontario Waterways Director will be required to authorize the project work prior to commencement of project activities and mobilization to site.
8. All materials and equipment used for the purpose of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substance (e.g. petroleum products, debris etc.) from entering the water. Ensure measures are in place to minimize impacts of accidental spills.
9. Store all oils, lubricants, fuels and chemicals in secure areas on impermeable pads.
10. All machinery and equipment shall be clean, free of leaks, in optimal working condition.



11. 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.
12. Vehicle and equipment re-fueling and/or maintenance shall be conducted off of slopes and away from the water at a recommended distance of 30 m if possible. If not possible this, fuelling sites will be as per Environmental Management Plan and mitigations to prevent substances from entering the water course applied.
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. Only the working part of a machine is to enter the water; any part of a machine or equipment entering the water shall be free of fluid leaks and externally degreased to prevent any deleterious substance from entering the water. 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.
15. Only clean material free of fine particulate matter shall be placed in the water.
16. Spill control and emergency plans will be in place prior to initiation of construction. A spills kit will be maintained on site and the contractor will ensure that adequate additional resources are available. The Ontario Ministry of Environment and Climate Change Spills Action Center, (1-800-268-6060) shall be immediately notified of any spills occurring on site. Spills should also be reported directly to the Parks Canada Environmental Officer on-file (705-750-4900).
17. In the event of a spill, remediation will be conducted immediately contain and clean up in accordance with federal regulatory requirements AND **to the satisfaction of Parks Canada**. Documentation of remediation, testing and results will be provided to Parks Canada.
18. 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.

Vegetation

19. Phase vegetation removal to reflect construction activity; grubbing should not be conducted too far ahead and too large an area to be properly mitigated with Erosion and Sediment controls.
20. 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.
21. Trees, shrubs and vegetation which are to remain throughout construction should be properly identified and delineated.
22. Where practical, the branches of the large trees should be trimmed back as the first option rather than cutting the entire tree.
23. Only cut trees using tools designed for tree cutting activities (eg chainsaw, brush saw).
24. Prune limbs close to the tree trunk. For a clean cut, make a shallow undercut first, then follow with the top cut. This prevents the limb from peeling bark off the tree as it falls. Do not use an axe for pruning.



25. If over half of a tree needs pruning, in most circumstances it will be best to cut it down instead of pruning. Cut trees off at ground level and do not leave pointed stumps.
26. Where it is necessary to remove mature vegetation at any time of year, an inventory of species to be removed, coupled with a replanting plan using native species shall be submitted to EA staff for approval.
27. In the event that the installation of root-protectant fencing is not possible and/or ideal, alternative measures, as approved by PCA, must then be implemented. Such measures must provide a sufficient amount of soil compaction prevention with regards to the highest level of activity to occur within the immediate area of protection.
28. Alternative methodology for soil-compaction prevention may be utilized (ex. blast mats), as reviewed and approved by PCA.
29. Clear vegetation from unstable or erodible banks by hand, and where possible, avoid the use of heavy machinery. Operate machinery on land and in a manner that minimizes disturbance to the banks of the water body.
30. Should any vegetation require chipping/mulching, the after product will be stored onsite for the duration of the project to supplement erosion and sediment control methods.
31. Whenever possible, vegetation should be trimmed in early spring, late fall or winter. Trimming when the plant is actively growing (i.e. late spring summer and early fall) can further stimulate growth, weakening the plant and making it susceptible to disease.
32. Delineate areas to be avoided with flagging tape.
33. Native species are to be used for ground cover/plantings with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should 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.
34. The success of all vegetative plantings shall be assessed through visual site inspections conducted at least once each spring and each fall for the first two growing seasons following planting. If at any time during the monitoring period any plantings are found dead or failing, mitigation measures shall be implemented to reduce the risk of future failure and the plants shall be replaced and monitored accordingly.
35. Native grasses, shrubs, etc. should be planted to match existing species growing on the sites. Common milkweed should be actively restored.
36. Cleared vegetation will be piled and extracted from a designated area, to be identified by PCA staff. Burning of cleared vegetation is not be permitted on site.

Invasive Species

37. Workers should familiarize themselves with invasive species identified in this BIA that are potentially present within the work sit areas. Conduct a site assessment for invasive plant infestations prior to carrying out field activities.



38. To reduce the risk of introducing invasive species, all equipment must be thoroughly cleaned prior to coming to the site. Any machinery that appears to have not been cleaned will not be permitted on site. For additional information or guidance on how to properly clean equipment, see the Clean Equipment Protocol for Industry developed by the Ontario Invasive Plant Council and found here: http://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol_June2016_D3_WEB-1.pdf.
39. Any equipment or vehicles which are to be used in water, should be thoroughly cleaned before and after use of any visible mud, vegetation, mussels, etc.:
 - Vessels/equipment should be drained of standing water.
 - Vessels/equipment should ideally be cleaned with hot water (>50 °C) at high pressure water (>250 psi).
 - Vessels/equipment should be dried for 2 – 7 days in sunlight before transported between waterbodies.
 - Cleaning of vessels/equipment should be conducted away from waterbodies at a recommended distance of at least 30 m from the shoreline.
40. Mud, dirt and vegetation should be cleaned from clothing and footwear prior to entering the work site, and prior to leaving the work site.
41. Use weed-free seed and confirm that seed mix to be used for revegetation purposes does not (potentially) contain invasive plants.
42. Seed purchased commercially should have a label that states the following:
 - Species;
 - Purity: Most seed should be no less than 75% pure and preferably over 85% pure. The rest is inert matter, weed seed, or other seed;
 - Weed seed content: The tag should state NO invasive plants are present. Only certified weed-free seed should be used; and
 - Germination of desired seed: Germination generally should not be less than 50% for most species, although some shrubs and forbs will have lower percentages.
43. Move only weed/contaminate-free materials into non-infested areas. Moving materials from one infested location to another within a particular zone may not cause contamination, but moving materials from infested to non-infested areas could lead to the introduction and spread of invasive plants.
44. If removal of invasive species occurs, individuals will be disposed of appropriately, offsite to ensure no further propagation.
45. Should an invasive species be encountered (or at least suspected) not identified in this BIA, a photo and report of the specimen should be sent to Parks Canada's EA staff and the Invading Species Hotline at 1-800-563-7711 or online at EDDMapS Ontario, <https://www.eddmaps.org/ontario/>.

Wildlife

46. Migratory birds, their nests and eggs are protected under the *Migratory Birds Convention Act* (1994). Project works or activities are potentially disruptive activities to birds and should be avoided during breeding times. No vegetation clearing work should occur from April 1 to August 31. If this is not feasible, then the site must be inspected by a biologist prior to clearing, to check for the presence of nests. These area will be flagged and avoided until nests are no longer active.



47. The Site Specific EMP must demonstrate procedures for avoiding disturbance/harm to wildlife.
48. If recommended by a qualified person and approved by PCA, exclusion zones or “no go” areas will be established to protect areas with known residences (e.g., hibernacula, dens, nests).
49. If recommended by a qualified person and approved by PCA, conduct “Pre-stressing” activities within a few days prior to the onset of site preparation (vegetation clearing and grubbing) to encourage wildlife to move away from a site.
50. On a daily basis, an inspection or “sweep” of the work area shall be performed prior to commencement of project works and activities to ensure wildlife are not present in the work area (include in site checklist).
51. Field information regarding incidental encounters with wildlife (non-SAR wildlife) shall be compiled and reported on a daily basis.
52. For incidental encounters, the following information should be recorded in the field:
 - a. Locations, dates and time of day where the species were encountered;
 - b. Names of species encountered;
 - c. Photographs of the species, if taken;
 - d. Condition of animal.
53. If injured/dead wildlife are encountered report to PCA immediately. PCA may require retrieval and storage on ice of carcass for laboratory testing
54. All vehicles and equipment used by project personnel will follow any construction zone speed limits to reduce the risk of hitting wildlife, as enforced by the site supervisor.
55. Work areas will be kept clean and free of potential hazards to wildlife such as wire, cable, tubing, plastic, antifreeze or other materials that wildlife may eat or become entangled in.
56. Waste will be stored, handled, and transported in accordance with the Waste Management Plan, including storage of all solid waste in sealed, bear-proof containers.
57. Feeding of wildlife is prohibited.

Species at Risk

58. 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.
59. Species at risk training shall be provided to all employees before they begin work on site (materials can be part of the Environmental Protection Plan). Employees must be able to identify potential species at risk and know the proper procedures to follow when they encounter a species at risk.
60. Should any suspected species at risk – snakes or turtles and/or eggs be encountered during construction - project staging, implementation or demobilization - work would halt immediately and Parks Environmental Assessment Staff would be notified. The species must not be harmed or harassed. Stand back and allow the animal to leave the site. If the species does not leave or cannot leave the site, the contractor must immediately stop the works and contact the Departmental Representative and PCA’s Environmental Assessment Officer on-file (705-750-4900) immediately. Additional measures to avoid impacts may be required before work can restart.



61. 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. For guidance on how to plan and install exclusion fencing, refer to the document titled Species at Risk Branch, Best Practices Technical Note, Reptile and Amphibian Fencing, Ver. 1.1, developed by the Ontario Ministry of Natural Resources and Forestry:http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_tx_rptl_amp_fnc_en.pdf
62. Synthetic plastic Erosion Control Blankets/Mats should not be utilized, particularly during nesting season, as they pose as an entrapment hazard to turtles. Fibre-based bio-degradable Erosion Control Blankets/Mats are only to be utilized.
63. If a turtle is found within the limits of the fencing it should be left alone to leave the area if possible, or the animal should be gently placed outside of the construction site. Typically, animals should be released not more than 250m from the capture site. Release sites should be near water with vegetation cover for shelter.

Fish /Water Quality

64. Grubbing should not proceed too far ahead of construction. This will limit the time that the mineral soil is exposed to erosion.
65. All in-water work should be completed before March 15th. Should in-water work be required beyond this date, additional mitigation measures may be required based on site specific characteristics. Work beyond March 15th must be approved by the Departmental Representative and PCA prior to work occurring, and may not be granted if site conditions do not allow it.
66. Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life will form the baseline for water and streambed quality (see <http://ceqg-rcqe.ccme.ca/en/index.html#void>).
67. At the discharge point into the watercourse, 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., > 24 h), 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 is observed during in-water activity, Parks Canada will assess potential impact to the aquatic environment. Additional mitigation measures may be required.
68. At the discharge point into the watercourse – i.e. the interface between the work site and the natural waterbody – 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., >24 h period). If elevated turbidity beyond 8 NTU from background levels is observed during in-water activity, Parks Canada will assess potential impact to the aquatic environment. Additional mitigation measures may be required.



Concrete

69. 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.
70. At the discharge point into the watercourse, pH will be maintained between 6.5 and 9.0. Water with pH > 9 cannot be released directly back into the watercourse, but must be treated prior to release. Water with a pH ≥ 12.5 is considered toxic and treated as a hazardous waste under Ontario Regulation 347 of the Environmental Protection Act and wastewater in this condition must be removed from the site.
71. 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;
72. 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;
73. In the event of a release of concrete or grout into a water course, Parks Canada and the Ontario Spill Action Centre (1-800-268-6060) shall be notified; 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.
74. An Erosion and Sediment Control Plan, as a stand-alone document, or as part of the Environmental Management Plan, must be prepared by a qualified professional and submitted to the Departmental Representative **and accepted by Parks Canada**. The document shall specify:
 - A focus on erosion control primarily and sediment control secondary;
 - Erosion and sediment controls will be tailored to the type of sediment found onsite (e.g. if clay is present, additional controls are necessary).
 - The area to be controlled. In addition to the construction site, it is necessary to identify adjacent areas that could be negatively impacted by construction activities;
 - Drainage areas and patterns based on pre-construction topography and construction design;
 - The EMP will have as a principal to reduce the amount of sediment laden water produced. A focus on separating offsite and infiltrating water into the construction site from construction activities and sediment sources.
 - How clean storm run-on will be diverted around the site and away from exposed areas;
 - How sediment-laden run-off will be directed to detention or retention facilities on-site. Large drainage areas can produce a significant amount of run-off, resulting in a need for large detention or retention structures;
 - Channels that are designed and constructed to the necessary design discharge;
 - Temporary and permanent erosion control needs for all drainage channels;
 - 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.
75. The size of particles present in the sediment is a key consideration for selecting the appropriate sediment treatment option(s):
 - If the sediment consists primarily of gravel or sand, which are relatively large particles, a single treatment using a more basic technology, such as a sediment trap or sediment bag, may be adequate.
 - If the sediment consists of silt and/or clay, which are relatively small particles, the effluent will most likely need a more advanced technology, such as a filter press or chemical treatment with anionic flocculent and a filtration method.
 - If the sediment consists of a large spectrum of particle sizes, the water may need primary treatment to remove larger particles, followed by secondary treatment to remove finer particles.
 76. All erosion and sediment 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.
 77. Eliminating unnecessary sources of sediment to the dewatering area will improve dewatering outcomes. This can be achieved by ensuring surface water flow is prevented from entering the project site.
 78. If erosion and sediment 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.
 79. All disturbed areas of the work site shall be stabilized immediately and re-vegetated as soon as conditions allow. All exposed areas should be covered with erosion control blankets or other measures to keep the soil in place and prevent erosion until vegetated in the spring.
 80. Erosion and sediment control measures shall be left in place until all areas of the work site have been stabilized.
 81. Avoid activities that could lead to erosion during excessively wet weather conditions; monitor forecasts for heavy rainfall watches & warnings. Environmental protection measures shall be checked after each extreme weather event.
 82. Upon completion of the work all debris shall be completely removed and the area restored to its original state or better. Repair all damages to property due to project activities.
 83. Sediment control measures and exclusion fencing must be removed in a way that prevents the escape or re-suspension of sediments.
 84. A turbidity curtain will be maintained in the water around all working areas during construction to contain and control the suspension of fines. If water levels/conditions do not permit the flotation of a turbidity curtain, other measures as approved will be implemented.
 85. Turbidity curtains should not be used as a primary or secondary settling area for dewatering activities. Supplementary sediment and erosion control measures should be installed prior to construction activities and should be added upon/reinforced as necessary.
 86. Flow dissipaters and/or filter bags, or equivalent, shall be placed at water discharge points to prevent erosion and sediment release.



87. Fine materials such as limestone-based aggregates, unwashed rocks or materials that have the possibility of being suspended or transported downstream will not be used.
88. In the event of a significant silting or debris caused by construction activities, the contractor will take appropriate measures to contain and mitigate the problem including the installation of additional downstream turbidity curtains.
89. The contractor will maintain a standby supply of pre-fabricated sediment fence barriers, or an equivalent ready-to install sediment control devices.

Cultural Resources and Archaeology

90. Before any on-site mobilisation/construction work commences, PCA staff will clearly delineate any archaeologically sensitive areas and photo-document this activity for PCA records. These areas will be deemed no-go zones for staging, vehicular traffic and machinery
91. Main vehicular access routes and staging areas will be restricted to roadways and parking lots. If this is not possible, the use of protective covering such as geotextile protective mats with a wood chip lift or granular "A" gravel is required. All protective covering must be removed following construction and the area restored to pre-construction state. Excavation is not permitted during installation or removal of protective covering.
92. The use of protective coverings such as geotextile and soils (or granular material) is required to protect Kane's swing bridge abutments. Excavation is not permitted during installation or removal of protective covering.
93. If unrecorded archaeological resources (e.g. structural features or artifact concentrations) are encountered during construction activities, work will cease in the immediate area, the findings photographed, and the Parks Canada Project Manager informed; contact the TSW, Peterborough Office at 705-750-4900. The Project Manager should then contact Parks Canada's Terrestrial Archaeology section for advice and assessment of significance, which will in turn determine what will be required to mitigate the find. Ensure that all exposed underwater cultural materials are kept submerged and/or wet while waiting for direction.

Air Quality and Noise

94. Minimize the noise levels from construction activities by using proper muffling devices, in addition to appropriate timing and location of these activities to reduce or minimize the effect of noise on nearby residents, recreational users, and wildlife.
95. Comply with any local or municipal Noise By-Laws.
96. The Departmental Representative or a Parks Canada Environmental Assessment Officer may stop a vehicle if they believe the vehicle is emitting excessive exhaust smoke or suspect that emission control equipment has been tampered with or removed.
97. Monitor and mitigate public complaints by keeping a record of complaints and addressing any issues raised by the public.
98. 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.
99. Keep idling of construction equipment to a minimum.



Waste Disposal

100. 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.
101. Waste generated will be disposed according to regulations (i.e., O. Reg. 102/94 and O. Reg. 558/00, R.R.O. 1990, 347).

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

Public participation was not sought on this project as the proposed work is considered maintenance of an existing asset. It does not have the potential to general conflict between the environmental, social or economic values of concern to the public.

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

- No
 Yes (describe the process to involve relevant parties and how the results were taken into consideration).

There is potential for project to affect use of lands or resources by aboriginal persons, potential effects on treaty rights, impact of activities on land, historic presence and use and spiritual significance will be considered.

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. 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.

As part of the agreed to process, the community consultation representatives will receive updates through the construction phase. As is Ontario Waterway practice, community consultation representatives have been and will be offered the opportunity for a site visit and will be accompanied by senior project staff should they make that request. In the event of an accident on site, contamination due to construction, or discovery of archaeological material, stop work order provisions in the contract will allow work to be temporarily halted around the impacted area and the community consultation representatives will be notified and if needed be invited to participate in any monitoring of the site.



10. SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

No residual adverse effects following mitigation and adverse effects on ecological integrity (EI), commemorative integrity (CI), and visitor experience (VE) objectives are anticipated.

11. SURVEILLANCE

- Surveillance is not required
- Surveillance is required
- Required in accordance with the *Parks Canada Cultural Resource Management Policy*

An Environmental Assessment Officer will visit the site regularly during construction to ensure that mitigation measures are in place, working as anticipated and are effective at preventing adverse effects to natural and cultural heritage features. Surveillance by Cultural Resource Management Staff is also recommended to ensure effectiveness of proposed mitigation measures.

12. FOLLOW-UP MONITORING

Follow-up monitoring is:

- Not required
- Legally required (e.g. under the *Species at Risk Act* or *Fisheries Act*)

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: Public Services & Procurement Canada	Date of Request: February 2017
Expert's Name & Contact Information: Dave Ness dave.ness@pwgsc-tpsgc.gc.ca	Title: Engineer, Project Manager
Expertise Requested: Project Description/Specifications	
Response: Provided	

Department/Agency/Institution: Parks Canada Agency	Date of Request: June 2017
Expert's Name & Contact Information: Nathalie Desrosiers nathalie.desrosiers@pc.gc.ca	Title: Policy Advisor, Cultural Resources Management
Expertise Requested: Cultural Resource Impact Analysis and Recommendations	
Response: Application of Standards 1-12 from the Standards and Guidelines, including Guidelines on Cultural Landscapes (Section 4.1), Archeological Sites (4.2), Engineering Works (Section 4.4) and Materials (Section 4.5). CRIA is required prior to construction.	



Department/Agency/Institution: Parks Canada Agency	Date of Request: September 9, 2016
Expert's Name & Contact Information: Barbara Leskovec barbara.leskovec@pc.gc.ca	Title: Federal Infrastructure Investments, Terrestrial Archaeology
Expertise Requested: Archeological Overview Assessment	
Response: Mitigation Provided	

Department/Agency/Institution: SLR Consulting	Date of Request: December 2016
Expert's Name & Contact Information: Michael Roy, SLR Consulting (Canada) Ltd. 300 Town Centre Blvd, Suite 200, Markham, ON, L3R 5Z6	Title: Project Team Lead
Expertise Requested: Species at Risk and Breeding Bird use of the project sites	
Response: Environmental Support Studies, Talbot River Dams, Lock Approach Walls and Earth, Dam Rehabilitation	

15. DECISION

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

- Not likely to cause significant adverse environmental effects.
- Likely to cause significant adverse environmental effects.

FOR SARA REQUIREMENTS:

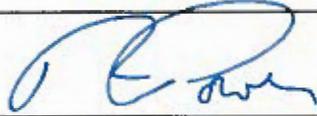
- There are no residual adverse effects to species at risk and therefore the SARA-Compliant Authorization Decision Tool was not required

OR, the SARA-Compliant Authorization Decision Tool was used and determined:

- There is no contravention of SARA prohibitions
- Project activities contravene a SARA prohibition and CAN be authorized under SARA
- Project activities contravene a SARA prohibition and CANNOT be authorized



16. RECOMMENDATION AND APPROVAL

Prepared by: Randy Power	Title: Environmental Assessment Officer, Parks Canada
Signature: 	Date: 28/08/2017
Recommended by: Valerie Minelga	Title: Environmental Assessment Scientist, Parks Canada
Signature: 	Date: 28/08/2017
Approved by: Jewel Cunningham	Title: Director, Parks Canada Ontario Waterways Unit, Trent-Severn Waterway, National Historic Site.
Signature: 	Date: Aug 28, 2017

17. ATTACHMENTS

- Appendix A: Site Photographs
- Appendix B: Environmental Support Studies, Talbot River Dams, Lock Approach Walls and Earth, Dam Rehabilitation (Kirkfield Bundle)

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*****



Project Phases and Activities Table

Project Phases and Activities Table				
	Phases	Examples of Associated Activities	Y / N	Details
Project Components	Construction / Site Preparation	Supply and storage of materials	Y	Materials and construction equipment will be transported to and off site, as required. Best efforts will be made to not stockpile any materials on-site.
		Burning	N	
		Clearing	Y	Clearing of the vegetation on the downstream slope of the Left and Right Earthfill Embankments is required.
		Temporary diversion channel	N	
		Demolition	Y	Demolition/removal of sections or the existing structure will take place.
		Vegetation Clearing	Y	Vegetation removal on the Earth Embankments.
		Flow diversion system	N	
		Disposal of waste	Y	Excess materials will be disposed at pre-approved disposal sites.
		Blasting/ Drilling	N	Drilling of exploratory test holes may take place at existing retaining walls.
		Dredging	N	
		Drainage	Y	Measures will be put in place to control of the surface drainage over the earthfill embankments.
		Dewatering	Y	Within normal operations
		Erosion Control	Y	Erosion control measures intended to keep the soil on site in place
		Excavation	Y	Re-grading / excavation or other stability improvement measures may be required.
		Embankment fill	Y	Embankment fill that has been properly moisture conditioned and compacted will be utilized.
		Concrete work	Y	Pouring of concrete to raise the core of the earth berms
		Grading	Y	Re-grading / excavation or other stability improvement measures may be required.
		Backfilling	Y	Refill of the excavated are with the material dug out of it may be required.
		Sheetpiling	Y	Sheet piling is an earth retention and excavation support technique that retains soil, using steel sheet sections with interlocking edges. Sheet piles are installed in sequence to design depth along the planned excavation perimeter or seawall alignment.
		Use of machinery	Y	Construction machinery will be utilized to complete the construction activities.
	Transport of materials/ equipment	Y	Materials and construction equipment will be transported to and off site, as required.	
	Placing formwork and reinforcement for concrete	N		
	Set up of temporary facilities	Y	Sediment capture areas	
	Operation/Implementation Decommissioning	Waste disposal	Y	Excess materials will be disposed at pre-approved disposal sites.
		Wastewater disposal	N	
		Maintenance	Y	Future Vegetation Management
		Use	Y	Operations at the canal will be limited to the navigation season of May to October
		Use/Removal of temporary facilities	Y	Temporary trailers and fences will be utilized during construction and removed upon completion of work.
		Use of Chemicals	N	
Active fire stage		N		
Clean-up of prescribed burn		N		
Planting		Y	Tree planting may occur as part of site restoration.	
Vehicle Traffic		Y	Construction vehicle traffic and haul routes will be pre-approved by responsible authorities prior to commencement of construction and documented in the traffic management plan.	



Appendix A: Site Photographs



Access Road to Lock Stations along top of earth dams on north side



Water levels in the reach prior to de-watering



View from north side across canal showing low non-navigation water levels



View from shallow water in canal looking east prior to navigation re-watering



Another view from the top of the berm showing low winter set levels between lock reaches. Lock gates are visible in the distance



Appendix B
Environmental Support Studies, Talbot River Dams, Lock Approach Walls and Earth, Dam
Rehabilitation (Kirkfield Bundle)

(To be appended when finalized)