

Detailed Environmental Impact Assessment for the Thompson Bay Dam, Peterborough, Ontario

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On Behalf of
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Acronyms and Abbreviations

°C	degrees Celsius
AQI	Air Quality Index
CEAA	<i>Canadian Environmental Assessment Act, 2012</i>
CH2M HILL	CH2M HILL Canada Limited
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRM	Cultural Resource Management
DIA	detailed impact analysis
EA	environmental assessment
Dam	Thompson Bay Dam
DIA	detailed impact analysis
km	kilometres
km ²	square kilometres
m	metres
m ³ /s	cubic metres per second
masl	metres above sea level
MBCA	<i>Migratory Birds Convention Act</i>
mbgs	metres below ground surface
mm	millimetres
NHIC	Natural Heritage Information Centre
OMNR	Ontario Ministry of Natural Resources
PCA	Parks Canada Agency
PM _{2.5}	air particles less than 2.5 micrometres in diameter
PWGSC	Public Works and Government Services Canada
SAR	Species at Risk
SARA	<i>Species at Risk Act, 2003</i>
VEC	Valued Ecosystem Component
VSC	Valued Social Component

SECTION 1

Introduction

The *Canadian Environmental Assessment Act, 2012 (CEAA)* outlines the responsibilities and procedures for the environmental assessment (EA) of projects that are within federal jurisdiction. Parks Canada Agency (PCA) developed an environmental impact analysis (EIA) program (detailed in the guidance document: Guide to Parks Canada EIA Process under CEAA 2012) in response to the *CEAA (S.C. 2012, c. 19, s. 52)* requirements. The purpose of this program is to: (1) meet its obligation under *CEAA* to ensure projects on federal lands do not cause significant adverse environmental effects; (2) systematically evaluate projects within protected heritage places to ensure they are as well designed as possible to avoid or reduce adverse impacts and; (3) achieve PCA's mandate to protect and present nationally significant examples of Canada's natural and cultural heritage, and foster public understanding, appreciation and enjoyment.

PCA is the proponent of the Project and owner of the land on which the Project will take place. As per the PCA guidance document, the work associated with the rehabilitation of the Thompson Bay Dam triggered the requirements for a detailed impact analysis (DIA). Figures noted herein are included in Appendix A. Site photographs are in Appendix B.

Project Information

2.1 Project Description

PCA is proposing to undertake the rehabilitation of the Thompson Bay Dam (Project) to address issues identified in engineering inspections and a dam safety review. The Thompson Bay Dam (Dam) is located along the Trent Canal on Ontario Waterways, Trent-Severn Waterway, and is a unit of PCA Ontario Waterways in Peterborough, Ontario (Figure 1). The Dam is owned and operated by PCA. The Dam has a concrete gravity spillway that consists of a sluice structure located in the earth embankment and closed by wooden stoplogs. The Dam was built to maintain the water levels in the navigation waterway (Trent Canal) and prevent flooding of the low-lying lands on Peterborough Island (AECOM, 2014). The DIA Study Area comprises the Dam and the area immediately surrounding it as shown in Figure 2.

In 2014, Public Works and Government Services Canada (PWGSC) retained AECOM Canada Ltd (AECOM) to inspect the Dam as part of the PCA Trent Severn Waterway Dam Safety Review (DSR) Program and complete a draft DSR report (AECOM, 2014). The DSR identified some deficiencies associated with the Dam structure. Therefore, the PCA intends to implement the Project which involves refacing of the concrete walls along the existing abutment walls and replacing the deck. Two cofferdams (upstream and downstream) will be built to facilitate the work. A water diversion system will be installed through the cofferdams to accommodate minimum flow requirements during the construction period. Note that the rehabilitated concrete structure will be limited to the existing concrete structure footprint.

2.2 Purpose of the Project – Justification/Need

The purpose of the Project is to rehabilitate the Dam in order to address the issues identified during the 2014 DSR (AECOM, 2014) and to upgrade the overall condition of the Dam to meet the regulatory requirements of the Canadian Dam Association (CDA).

2.3 Scope of Project

Several works and activities will be undertaken in order to complete the Project. These include setting up a staging area, laying down a site access road along the walking trail adjacent to the Dam, vegetation clearing, Dam demolition and reconstruction works, and site restoration. Construction is anticipated to be completed over an approximate six month period, commencing in late September or early October with partial mobilization which will consist of setting up the construction staging area and laying down the site access road. Ideally demolition and construction works will be completed by the winter of 2014. Final site restoration/cleanup of the DIA Study Area will take place in the spring of 2015.

2.4 Project Components

Table 2-1 lists the physical works and activities associated with the Project by project phase (B. McLellan, 2014, personal communication).

TABLE 2-1

Project Component by Phase

Project Phase	Core Project Components	Physical Works and Activities
Site Preparation	Vegetation clearing	<ul style="list-style-type: none"> • Clear limited amount of vegetation on and within 9 m of deck
	Establish a construction staging area	<ul style="list-style-type: none"> • Prepare and manage work zone, including storage of equipment and materials and utility line locates • Preparation of staging and storage area which is to be covered with geotextile and crushed stone for temporary pad • Install construction limit signage and perimeter fencing • Provide machine, vehicle, and equipment ingress and egress to the construction staging area • Install silt and erosion control measures (for example, around water and perimeter areas) • Preparation of temporary access road along walking trail which will include closure of the existing walking trail for the duration of construction
Construction	Install cofferdams and associated structures upstream and downstream of the Dam to keep construction area dry	<ul style="list-style-type: none"> • Install turbidity curtain outside cofferdam zones (upstream and downstream of the Dam) in order to contain sediment • Install upstream and downstream cofferdams; upstream cofferdam will consist of concrete interlocking blocks with polyurethane sheeting, downstream cofferdam will consist of bulk bags. • Install water diversion system (water will be diverted through the cofferdams) to accommodate minimum flows requirements during the construction period. • Use clean approved fill with negligible fines; alternatively, sheet pile may be used as part of a cofferdam system
	Remove/demolish existing structures	<ul style="list-style-type: none"> • Remove existing dam warning signs and install temporary dam warning signs for construction period. New permanent signs to be as part of construction contract • Demolish and remove existing Dam deck and excavate to bedrock • Remove old concrete facing along the existing abutment walls
	Perform reconstruction work	<ul style="list-style-type: none"> • Install new dam deck • Refacing of the concrete walls along the existing abutment walls • New concrete walls at upstream wingwalls • The dam safety fencing, railings, boom, and railings will follow construction but may wait until the spring dependent on the schedule and weather
	Removal of cofferdams	<ul style="list-style-type: none"> • Remove the upstream and downstream cofferdams and turbidity curtains will follow the installation of the site fencing
Demobilization and Restoration	Conduct all DIA Study Area restoration activities associated with the Dam construction.	<ul style="list-style-type: none"> • Re-grade and re-vegetate excavated/disturbed areas • Complete landscaping • Install permanent signage and fencing • Remove equipment, scrap materials, and stockpiled materials • Remove waste from DIA Study Area for disposal, reuse, recycling, or composting • Use construction vehicles and machinery during this component • DIA Study Area will be restored back to match the surrounding landscape • Demobilize the equipment at the end of the Project

2.5 Existing Environment and Other Background Information

2.5.1 General Description

The DIA Study Area is located along a portion of the Trent Canal, on Ontario Waterways, Trent-Severn Waterway (Figure 1; Appendix A). The Trent-Severn Waterway passes through the Otonabee River and the City of Peterborough; the Trent Canal (used for navigational purposes), bypasses an unnavigable stretch of the Otonabee River. Peterborough Island, part of the City of Peterborough in Ontario, is bordered by the Otonabee River to the west and the Trent Canal to the east.

The Dam is located on the northeast portion of Peterborough Island and is owned by PCA. Access to the Dam is via Scollard Drive near Armour Road on Peterborough Island. A large residential subdivision exists immediately west of the DIA Study Area and Waverly Park is present to the south of the DIA Study Area. A forested area is present to the north, and Thompson Bay is present to the east. The layout of the DIA Study Area is shown in Figure 2 and photographs taken during the site visit on June 17, 2014, are included in Appendix B. The Dam is one of four earth embankment dams that retains water in the Trent Canal on Ontario Waterways, Trent-Severn Waterway. The water retained by the Dam forms Thompson Bay; a calm-water reservoir. The Dam has as an overflow weir to provide flow to Thompson Creek that runs through the island to Otonabee River. The left embankment measures approximately 140 m in length and the right embankment measures approximately 80 metres (m) in length. The estimated maximum height of the Dam is 3.35 m.

The Dam's concrete structure is comprised of a sluice structure located in the earth embankment; a pedestrian bridge (concrete slab) spans over the sluice and is supported by four steel I-beams encased in concrete. The concrete section acts as an overflow weir. The Dam is equipped with stoplogs although they have not been in operation for several years. The embankments are covered with vegetation such as shrubs, weeds and small to medium size trees.

The Dam is open year round and is used as a walking trail by the public. From May until early October, Thompson Bay, to the immediate east of the Dam, provides opportunities for fishing and boating.

2.5.2 Physical Environment

Physiography, Geology, Soil, and Groundwater

According to the Ontario Ministry of Northern Development and Mines, the Dam is located in the Verulam Formation (Middle Ordovician). This formation is dominated by Sherman Fall limestone of Middle Trenton age, and is made up of thin to medium bedded, aphanitic to medium crystal-lime limestone and interbedded gray green shale. The thickness of the Sherman Fall limestone is around 75 m, and it is underlain by Rockland and Hull Beds of Lower Trenton age consisting of thin to medium-bedded, medium brownish-grey, fine to medium crystalline lime-stone, with prominent blue-gray shale partings (AECOM, 2014)

According to the geological mapping of the Peterborough area that was provided in the DSR completed by AECOM (2014), the bedrock around the Dam is covered by glacial till with a stone poor matrix made up of soil material ranging from sandy silt to silty sand, or covered by glaciofluvial deposits consisting of sandy or gravelly deposits. Also, Peterborough County is known for its numerous drumlins which are composed of highly calcareous glacial till shaped into elongated oval hills that measure approximately 1.5 kilometres (km) in length, 400 m or less in width and 25 m in height. The distance between many of the drumlins averages between 2 to 3 km². During the late Wisconsinan age, the study area was covered by an ice mass advancing southwest to Lake Ontario, which deposited significant amounts of till at its base. As the ice sheet advanced, it shaped the till deposits into drumlins. In this area the till overlying the bedrock is considered to be greater than 5 m thick (AECOM, 2014).

Climate and Air Quality

The climate of the Mixedwood Plains Ecozone, in which the DIA Study Area is located, is characterized by warm to hot summers and cool winters. The Great Lakes and Saint Lawrence River have a significant moderating effect in this ecozone, which is in a major North American storm belt. Warm air fronts from the Gulf of Mexico and U.S. South and Midwest often collide with cold polar air masses, providing abundant precipitation in some areas. Locally, winters tend to be snowy and wind-chilled, while summers are humid and longer than elsewhere in Canada. According to Environment Canada, annually the area receives approximately 749 millimetres (mm) of rain and 147.2 mm of snow (data for Peterborough Trent U), and the temperatures average around 20.7 degrees Celsius (°C) in July and -8.4°C in January (Environment Canada, 2014).

The following is summarized primarily from the “Air Quality in Ontario 2011 Report” (Ontario Ministry of the Environment [MOE], 2011), with specific data from the closest site to the DIA Study Area (ID 59006) located at 10 Hospital Drive in Peterborough, Ontario, which is approximately 5 km southwest of the DIA Study Area. The primary indicator used for air quality in the Province of Ontario is the Air Quality Index (AQI), which is a calculated index developed by the MOE. The AQI provides a standardized measure of air quality across the province and a scientific basis to issue ‘smog alerts’. The AQI is based on the following pollutants that adversely affect human health and the environment: ozone, PM_{2.5} (air particles less than 2.5 micrometres in diameter), nitrogen dioxide, carbon monoxide, sulphur dioxide, and total reduced sulphur compounds. Table 2-2 summarizes the AQIs for 2011 for Peterborough. In total, Peterborough had one day in which the AQI exceeded 49 for at least 1 hour.

TABLE 2-2

Air Quality Index Summary for Peterborough (2011)

Range	Category	Comments	Percent Valid Hours AQI in Range
AQI 0-15	Very Good	Not applicable	32.7
AQI 16-31	Good	Not applicable	63.0
AQI 32-49	Moderate	Moderate and may have some adverse effects for very sensitive people	4.2
AQI 50-99	Poor	May have adverse effects for sensitive members of human and animal populations and may cause significant damage to vegetation and property	<0.1
AQI > 100+	Very Poor	May have adverse effects for a large proportion of those exposed	0

Surface Water

The DIA Study Area is located along a portion of the Trent Canal on Ontario Waterways, Trent-Severn Waterway. Along its route, the Trent-Severn Waterway passes through the Otonabee River. In the City of Peterborough, a portion of the Otonabee River is bypassed by the Trent Canal as this stretch of the River is not navigable. Peterborough Island, part of the City of Peterborough, is bordered by the Otonabee River to the west and the Trent Canal to the east. The Trent Canal runs in a north-south direction and cuts across the natural drainage streams running north-east to south-west towards the Otonabee River.

The Dam is one of four main earth embankment dams that retains water in the Trent Canal to form Thompson Bay, a calm-water reservoir. The Dam has as an overflow weir to provide flow to Thompson Creek but does not actively control the water levels. The Dam retains 1,500,000 cubic metres (m³) of water at the maximum normal operating elevation of 212.58 m.

According to the Thompson Creek Detailed Flood Reduction Study completed by MMM (2007), the Trent Canal severed the headwaters of Thompson Creek; Thompson Creek originates at a dam on the Trent Canal located approximately 400 m northeast of Scollard Drive and generally flows in a southwesterly direction eventually discharging into the Otonabee River approximately 300 m west of Armour Road (MMM, 2007). As

part of their study, MMM (2007) conducted a short term flow monitoring program in Thompson Creek. In general, it was noted that the flow regime of Thompson Creek was somewhat unusual in that its headwaters were severed from its lower section as a result of the Trent Canal construction. The Dam controls inflows to the upper end of Thompson Creek and although the stoplogs have not been in operation for some years, leakage through them has allowed for a reasonably sustainable flow into Thompson Creek which was estimated to range from 0.1 cubic metres per second (m^3/s) to $0.15 \text{ m}^3/\text{s}$. During times of high flow, water levels in the Trent Canal have risen sufficiently to cause some overtopping of the stoplogs in the Thompson Bay Dam which has led to temporary flow increases in Thompson Creek. Runoff from subdivisions built in close proximity to Thompson Creek also result in short term inflows to the creek during rainfall events which are significantly larger than the background flow in the creek. Runoff from the undeveloped areas is extremely low by comparison. Also, according to MMM (2007) a series of beaver dams and low rock weirs were observed along Thompson Creek between Armour Road and the Thompson Bay Dam.

The study conducted by MMM (2007) also indicated that water quality in Thompson Creek was good as indicated by its clear appearance and the presence of pollution intolerant fish and submerged aquatic vegetation species.

2.5.3 Biological Environment

Ecozone and Ecoregion

The DIA Study Area is within the northern portion of the Mixedwood Plains Ecozone and the Lake Simcoe-Rideau Ecoregion of Ontario. This ecozone has the highest population density in Canada (35 percent) and in Ontario (92 percent) (Ontario Biodiversity Council, 2011). The landscape has changed over the past hundreds of years from forest, wetlands, prairies, and alvars to being dominated by agriculture and settlement. However, this ecozone still contains the most diverse flora and fauna in Canada (Ontario Biodiversity Council, 2011).

Vegetation

According to the Screening Level Environmental Assessment completed by PCA in 2012, the DIA Study Area is located within the Great Lakes-St. Lawrence Forest Region, which generally extends inland from the Great Lakes and the St. Lawrence River to southeastern Manitoba, but does not include the area north of Lake Superior. Mixed coniferous-deciduous forest comprise this region which is distinguished by the presence of eastern white and red pines, eastern white cedar, eastern hemlock, large-toothed aspen and yellow birch (PCA, 2012).

The study completed by MMM (2007) indicated that the natural vegetation within the vicinity of the DIA Study Area is composed of forests, wetlands, hedgerows, thickets, regenerating woodlands, old-field meadows and conifer plantation. Along the upland areas of Thompson Creek, coniferous, mixed and deciduous forests have established on fresh to moist mineral soils. Along the flooded, lowland areas of Thompson Creek, mixed swamps, deciduous swamps, thicket swamps, meadow marshes and shallow marshes have established on the flooded margins of the large beaver pond and on moist to wet soils (MMM, 2007).

Based on observations made during the site visit, the earth dam portion of the Thompson Bay Dam is covered with vegetation such as shrubs, weeds and small to medium size trees. Five plant species were identified in the DIA Study Area during CH2M HILL's site visit on June 17, 2014 including the Common Buckthorn, Chokecherry, Goldenrod, Grapevine and Smooth Brome.

Wildlife

The fauna in this ecoregion is amongst the most diverse in Canada. Wildlife typically found in this region and those observed during the site visit are detailed in the following sections.

Mammals

Characteristic mammals in the region include White-tailed Deer, Raccoon, Striped Skunk, and the Woodchuck (OMNR, 2009). During the site visit, evidence of a Beaver (dam) was observed adjacent to the upstream (east) side of the Dam.

During the study conducted by MMM (2007), beaver dams, lodges and one Beaver were observed in the vicinity of the DIA Study Area around Thompson Creek. A Muskrat was observed in Thompson Creek downstream of the Dam and two White-tailed Deer were observed in the deciduous forest and old-field meadow near the DIA Study Area (MMM, 2007).

Birds

In general, wetland habitats are home to many bird species, including the Wood Duck, Great Blue Heron, and Wilson's Snipe (OMNR, 2009). Upland forests in this ecoregion support many bird species, including the Hairy Woodpecker, Wood Thrush, Scarlet Tanager, and Rose-breasted Grosbeak (OMNR, 2009).

According to Ontario's Biodiversity Field Guide provided by the Royal Ontario Museum (ROM, 2014), 67 bird species (listed below) are common to Peterborough County.

- American Crow (*Corvus brachyrhynchos*)
- American Goldfinch (*Carduelis tristis*)
- American Kestrel (*Falco sparverius*)
- American Robin (*Turdus migratorius*)
- American Woodcock (*Scolopax minor*)
- Baltimore Oriole (*Icterus galbula*)
- Barn Swallow (*Hirundo rustica*)
- Belted Kingfisher (*Ceryle alcyon*)
- Black-capped Chickadee (*Parus atricapillus*)
- Blue Jay (*Cyanocitta cristata*)
- Bobolink (*Dolichonyx oryzivorus*)
- Brown-headed Cowbird (*Molothrus ater*)
- Canada Goose (*Branta canadensis*)
- Cedar Waxwing (*Bombycilla cedrorum*)
- Chipping Sparrow (*Spizella passerina*)
- Common Grackle (*Quiscalus quiscula*)
- Common Loon (*Gavia immer*)
- Common Merganser (*Mergus merganser*)
- Common Moorhen (*Gallinula chloropus*)
- Double-crested Cormorant (*Phalacrocorax auritus*)
- Downy Woodpecker (*Picoides pubescens*)
- Eastern Bluebird (*Sialia sialis*)
- Eastern Kingbird (*Tyrannus tyrannus*)
- Eastern Meadowlark (*Sturnella magna*)
- Eastern Phoebe (*Sayornis phoebe*)
- European Starling (*Sturnus vulgaris*)
- Evening Grosbeak (*Coccothraustes vespertinus*)
- Field Sparrow (*Spizella pusilla*)
- Great Blue Heron (*Ardea herodias*)
- Great Crested Flycatcher (*Myiarchus crinitus*)
- Great Horned Owl (*Bubo virginianus*)
- House Wren (*Troglodytes aedon*)
- Killdeer (*Charadrius vociferus*)
- Mallard (*Anas platyrhynchos*)
- Marsh Wren (*Cistothorus palustris*)
- Mourning Dove (*Zenaidura macroura*)
- Northern Cardinal (*Cardinalis cardinalis*)
- Northern Flicker (*Colaptes auratus*)
- Northern Harrier (*Circus cyaneus*)
- Northern Saw-whet Owl (*Aegolius acadicus*)
- Olive-sided Flycatcher (*Contopus borealis*)
- Osprey (*Pandion haliaetus*)
- Ovenbird (*Seiurus aurocapillus*)
- Purple Finch (*Carpodacus purpureus*)
- Purple Martin (*Progne subis*)
- Red-eyed Vireo (*Vireo olivaceus*)
- Red-tailed Hawk (*Buteo jamaicensis*)
- Red-winged Blackbird (*Agelaius phoeniceus*)
- Rock Dove (*Columba livia*)
- Rose-breasted Grosbeak (*Pheucticus ludovicianus*)
- Ruby-throated Hummingbird (*Archilochus colubris*)
- Ruffed Grouse (*Bonasa umbellus*)
- Savannah Sparrow (*Passerculus sandwichensis*)
- Song Sparrow (*Melospiza melodia*)
- Spotted Sandpiper (*Actitis macularia*)
- Tree Swallow (*Tachycineta bicolor*)
- Turkey Vulture (*Cathartes aura*)
- White-breasted Nuthatch (*Sitta carolinensis*)
- White-throated Sparrow (*Zonotrichia albicollis*)

- Hairy Woodpecker (*Picoides villosus*)
- Hermit Thrush (*Catharus guttatus*)
- Horned Lark (*Eremophila alpestris*)
- House Sparrow (*Passer domesticus*)
- Wood Duck (*Aix sponsa*)
- Yellow Warbler (*Dendroica petechia*)
- Yellow-bellied Sapsucker (*Sphyrapicus varius*)
- Yellow-rumped Warbler (*Dendroica coronata*)

As part the study conducted by MMM (2007), a breeding bird field survey was completed in and around the DIA Study Area. Forty species of breeding birds were recorded during the survey which are included in the list above and also include the Alder Flycatcher (*Empidonax alnorum*), American Redstart (*Setophaga ruticilla*), Black and White Warbler (*Mniotilta varia*), Brown Thrasher (*Toxostoma rufum*), Common Yellow Throat (*Geothlypis trichas*), Eastern Wood Pewee (*Contopus virens*), Gray Catbird (*Dumetella carolinensis*), Green Heron (*Butorides virescens*), Pied-billed Grebe (*Podilymbus podiceps*), Swamp Sparrow (*Melospiza georgiana*) and Warbling Vireo (*Vireo gilvus*).

During the site visit, Red-winged Blackbirds, Mallards and a Great Blue Heron were observed in the immediate vicinity of the DIA Study Area.

Fish

Characteristic fish species in this region include the White Sucker, Smallmouth Bass, Walleye, Northern Pike, Yellow Perch, Rainbow Darter, Emerald Shiner, and Pearl Dace (OMNR, 2009). According to PCA (2012), primarily a warm water fish community inhabits the Trent Canal. Some cool water fish species such as Walleye (*Sander vitreus*) were also reported to be present.

Fish community investigations were completed in Thompson Creek by MMM (2007). Results of the investigation confirmed a warm water fish community consisting of 11 species including seven baitfish species, two panfish species and two game fish species. Within Thompson Creek, the aquatic habitat is comprised of a beaver ponds and natural channel that flows through both forested areas and open fields. Approximately 250 m downstream of the Thompson Dam, a large beaver pond is present which consists of a combination of lentic and shallow littoral habitats (MMM, 2007).

As indicated by MMM (2007), the presence of warm and cool water species was observed. Certain species such as blackchin shiner indicate that Thompson Creek has clear, good water quality. Top predator species including largemouth bass, rock bass and smallmouth bass were captured at many of the sampling stations during the MMM study. In particular, young-of-the-year rock bass and largemouth bass indicate that the slow moving and highly vegetated areas of Thompson Creek are functioning as nursery habitat for these species. Evidence of adult Centrarchid species spawning were also observed in Thompson Creek during the MMM (2007) study.

Herpetiles

Reptiles and amphibians found in this ecoregion include American Bullfrog, Northern Leopard Frog, Spring Peeper, Red-spotted Newt, Snapping Turtle, Eastern Gartersnake, and Common Watersnake (OMNR, 2009). Evidence of Snapping Turtles (egg shells) were present on the Dam during the site visit.

During the study completed by MMM (2007), Green Frogs and Bullfrogs were heard calling from wetlands near Thompson Creek. One Snapping Turtle was observed along Thompson Creek and a Midland Painted Turtle (*Chrysemys picta*) was observed laying eggs in an old-field meadow on the south side of Thompson Creek. One Eastern Gartersnake was observed in a willow thicket swamp (MMM, 2007).

Species at Risk

Species at Risk (SAR) are plant or animal species in which individuals or populations are considered *Extirpated*, *Endangered*, *Threatened*, or *Special Concern* in Ontario and Canada. The designation for each species is determined by the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC; Government of Canada, 2014). The federal *Species at Risk Act, 2003* (SARA) provides full protection for wildlife species listed under Schedule 1. Schedule 1 species are those that have had their status reports reviewed by an official panel and are currently accepted with COSEWIC designation. SARA applies on federal

lands only. The federal government's responsibility for listed aquatic species and birds is also covered by the *Fisheries Act* (DFO, 1985) and the *Migratory Birds Convention Act* (MBCA, 1994), respectively, which means that protection and prohibitions apply to these species wherever they are found in Canada.

A search was conducted for SAR listed by SARA and/or COSEWIC that are potentially located near the DIA Study Area. The species listed in Table 2-3 were identified based on observations at or near the DIA Study Area listed on the OMNR's Natural Heritage Information Centre (NHIC) database in combination with discussion with the Peterborough Ministry of Natural Resources office. The DIA Study Area was located in Region 16 and 10 km² squares 17QK10 and 17QK11. NHIC gives provincial (or Subnational) ranks (i.e., SRanks such as S1) for each species. This ranking is used by NHIC to set protection priorities for rare species and natural communities. If any SAR are encountered during project activities, the proponent should contact Environment Canada and/or OMNR for species specific advice and mitigation measures.

TABLE 2-3

List of Species at Risk in the DIA Study Area

Species	Preferred Habitat ^a	NHIC ^b	SARA Sch.1 ^c	COSEWIC ^d	Likelihood of occurrence
Birds					
Barn Swallow (<i>Hirundo rustica</i>)	Barn Swallows often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges and in culverts. The species is attracted to open structures that include ledges where they can build their nests, which are often re-used from year to year. They prefer unpainted, rough-cut wood, since the mud does not adhere as well to smooth surfaces.	S4B	THR	THR	High potential for Barn Swallows to occur in the DIA Study Area (Chris Lewis/OMNR, 2014).
Black Tern (<i>Chlidonias niger</i>)	Black terns are found scattered throughout the province, but breed mainly in the marshes along the edges of the Great Lakes. They build floating nests in loose colonies in shallow marshes, especially in cattails. In winter, they migrate to the coast of northern South America.	S3B	SC (MRN Status)	NAR	Low to moderate potential for Black Terns to occur in the DIA Study Area.
Bobolink (<i>Dolichonyx oryzivorus</i>)	Historically, Bobolinks lived in North American tallgrass prairie and other open meadows. With the clearing of native prairies, Bobolinks moved to living in hayfields. Bobolinks often build their small nests on the ground in dense grasses.	S4B	THR	THR	Low potential for Bobolinks to occur DIA Study Area as the suitable habitat is not present.
Chimney Swift (<i>Chaetura pelagica</i>)	Before European settlement Chimney Swifts mainly nested on cave walls and in hollow trees or tree cavities in old growth forests. Today, they are more likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. They also tend to stay close to water as this is where the flying insects they eat congregate.	S4B,S4N	THR	THR	High potential for Chimney Swifts to occur in the DIA Study Area (Chris Lewis/OMNR, 2014).

TABLE 2-3

List of Species at Risk in the DIA Study Area

Species	Preferred Habitat^a	NHIC^b	SARA Sch.1^c	COSEWIC^d	Likelihood of occurrence
Eastern Meadowlark (<i>Sturnella magna</i>)	Eastern Meadowlarks breed primarily in moderately tall grasslands, such as pastures and hayfields, but are also found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Small trees, shrubs or fence posts are used as elevated song perches.	S4B	THR	THR	High potential for Eastern Meadowlarks to occur in the DIA Study Area (Chris Lewis/OMNR, 2014).
Least Bittern (<i>Ixobrychus exilis</i>)	The Least Bittern breeds strictly in marshes dominated by emergent vegetation surrounded by areas of open water. Most breeding grounds are dominated by cattails, but also occur in areas with other robust emergent plants and in shrubby swamps. The nests are almost always found within 10 m of open water. Wintering habitat is less specific, and appears to be met by a wide variety of wetlands—emergent marshes, and brackish and saline swamps. Habitat use during migration is poorly known, but is thought to be similar to their breeding and wintering habitat.	S4B	THR	THR	High potential for Least Bittern to occur in the vicinity of the DIA Study Area (Chris Lewis/OMNR, 2014).
Loggerhead Shrike (<i>Lanius ludovicianus</i>)	In Ontario, the Loggerhead Shrike prefers pasture or other grasslands with scattered low trees and shrubs. It lives in fields or alvars (areas of exposed bedrock) with short grass, which makes it easier to spot prey. It builds its nest in small trees or shrubs.	S2B	END	END	Low potential for Loggerhead Shrike to occur within the DIA Study Area as the suitable habitat is not present.
Prairie Warbler	The Prairie Warbler prefers various shrubby habitats, including regenerating forests, open fields, and Christmas-tree farms.	S3B	NAR	NAR	Low potential for Prairie Warbler to occur within the DIA Study Area as the suitable habitat is not present.
Reptiles and Amphibians					
Blanding's Turtle (<i>Emydoidea blandingii</i>)	The Blanding's Turtle is a primarily aquatic species. In the summer, it is found in several types of freshwater environments, including lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps. In general, the species prefers shallow water that is rich in nutrients, organic soil and dense vegetation. Adults are generally found in open or partially vegetated sites, whereas juveniles are more reclusive by nature and prefer areas that contain thick aquatic vegetation including sphagnum, water lilies and algae. They stay along the edge of the water. The Blanding's Turtle also needs terrestrial environments.	S3	THR	THR	Moderate potential for Blanding's Turtle to occur within the DIA Study Area based on the presence of suitable habitat.

TABLE 2-3

List of Species at Risk in the DIA Study Area

Species	Preferred Habitat^a	NHIC^b	SARA Sch.1^c	COSEWIC^d	Likelihood of occurrence
Northern Map Turtle (<i>Graptemys geographica</i>)	The Northern Map Turtle inhabits rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled.	S3	SC	SC	High potential for Northern Map Turtle to occur in the DIA Study Area (Chris Lewis/OMNR, 2014).
Snapping Turtle (<i>Chelydra serpentina</i>)	The preferred habitat of the species is characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges, and slow streams, or areas combining several of these wetland habitats.	S3	SC	SC	High potential for Snapping Turtle to occur in the DIA Study Area (Chris Lewis/OMNR, 2014). Evidence of snapping turtles (remnants of eggs) was observed onsite during the site visit.
Eastern Ribbonsnake (<i>Thamnophis sauritus</i>)	The Eastern Ribbonsnake is usually found close to water, especially in marshes, where it hunts for frogs and small fish. A good swimmer, it will dive in shallow water, especially if it is fleeing from a potential predator. At the onset of cold weather, these snakes congregate in underground burrows or rock crevices to hibernate together.	S3	SC	SC	Moderate potential for eastern ribbonsnake to occur within the vicinity of the DIA Study Area due to the presence of suitable habitat.
Five-Lined Skink (Southern Shield population; <i>Plestiodon fasciatus</i> pop. 2)	The five-lined skink populations are found on the southern edge of the Canadian Shield, from Georgian Bay to Leeds and Greenville County in south-central Ontario. They favour large rocky outcrops found within fields or mixed coniferous and deciduous forests. Young lizards are frequent found on open, well-drained, rocky areas where they seek shelter beneath rocks. The availability of suitable microhabitats is extremely important for shelter as they continually take refuge during their short foraging excursions. Objects that can provide protection from extreme temperatures and dehydration are an essential habitat element. As they are prone to dehydration, their habitat must include a permanent water body.	S3	SC	SC	Low potential for the species to occur within the DIA Study Area due to the absence of suitable habitat.
Milksnake (<i>Lampropeltis Triangulum</i>)	The milksnake is best known for occurring in rural areas, where it is most frequently reported in and around buildings, especially old structures. However, it is found in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types.	S3	SC	SC	High potential for the Milksnake to occur in the vicinity of the DIA Study Area (Chris Lewis/OMNR, 2014).

TABLE 2-3

List of Species at Risk in the DIA Study Area

Species	Preferred Habitat ^a	NHIC ^b	SARA Sch.1 ^c	COSEWIC ^d	Likelihood of occurrence
Vascular Plant and Lichen					
Butternut (<i>Juglans cinerea</i>)	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. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests, commonly associated with trees such as Linden, Black Cherry, Beech, Black Walnut, Elm, Hemlock, Hickory, Oak, Red Maple, Sugar Maple, Yellow Poplar, White Ash and Yellow Birch.	S3?	END	END	High potential for species to occur in the vicinity of the DIA Study Area. (Chris Lewis/OMNR, 2014).
A Lichen (<i>Lecanora chlorophaeodes</i>)	Found on granitic boulders in deciduous forest, or on ridge top (Wong and Brodo, 1999)	S1	No Status	No Status	Low potential for A Lichen to be found in the DIA Study Area due to the absence of suitable habitat.
Flooded Jellyskin (<i>Leptogium rivulare</i>)	Flooded Jellyskin is mainly found growing on the bark at the base of trees that are periodically flooded, typically during the spring. The trees are species that can withstand substantial flooding such as: Black Ash, Red Maple, American Elm and more rarely, Balsam Poplar. It can also be found growing on rocks that are subject to similar periodic flooding.	S3	THR	THR	Low potential for Flooded Jellyskin to be found in DIA Study Area based on the presence of Balsam Poplar as indicated in the vegetation survey conducted by MMM (2007) of the DIA Study Area.
Prickly Hornwort (<i>Ceratophyllum echinatum</i>)	The Prickly Hornwort is most often found in acid, softwater lakes and ponds (Voss and Reznicek, 2012). Habitat is in quiet water (Gleason and Cronquist, 1991).	S3	No Status	No Status	Low potential for Prickly Hornwort to occur in DIA Study Area due to the absence of suitable habitat.
Scarlet Beebalm (<i>Monarda didyma</i>)	Rich forests, banks, and floodplains (Voss and Reznicek, 2012). Grows in moist woods and thickets. Grow in more acidic soil conditions. (Gleason and Cronquist, 1991).	S3	No Status	No Status	Low potential for Scarlet Beebalm to occur in DIA Study Area due to the absence of suitable habitat.
One-sided Rush (<i>Juncus secundus</i>)	Often found in clay soil (Gleason and Cronquist, 1991)	S3	No Status	No Status	Low potential for Scarlet Beebalm to occur DIA Study Area as suitable habitat is not present.
Insects					
Harlequin Darner (<i>Gomphaeschna furcillata</i>)	Harlequin Darner is mainly found around bogs, swamps, esp. cypress, alder, cedar swamps. They tend to favor habitats comprised of shallow bodies of water in swamps and sphagnum bogs. Feeding often takes places in drier areas including forest margins.	S3	No Status	No Status	Low potential for Harlequin Darner to be found in the vicinity of the DIA Study Area based on the presence of cedars and swampy areas as indicated in the vegetation survey conducted by MMM (2007) of the DIA Study Area.

TABLE 2-3

List of Species at Risk in the DIA Study Area

Species	Preferred Habitat ^a	NHIC ^b	SARA Sch.1 ^c	COSEWIC ^d	Likelihood of occurrence
Mottled Darner (<i>Aeshna clepsydra</i>)	This species can be found in marshes and bogs with open water, ponds, lakes and bays. They are often found in wetlands with water lilies and clear water. The adults of this species can be found hunting in open woods and clearings. They fly fast and high and are usually found perching on tree trunks. Males are often seen patrolling shorelines	S3	No Status	No Status	Low potential for Mottled Darner to be present in DIA Study Area based on the absence of suitable habitat

^a Source: OMNR (2014b) Species at Risk website (<http://www.mnr.gov.on.ca/en/Business/Species/index.html>) and the Species at Risk Public Registry (2012) website (http://www.sararegistry.gc.ca/sar/index/default_e.cfm).

^b Natural Heritage Information Centre Subnation ranking (S rank)

^c Species at Risk Act Schedule 1 status

^d Committee on the Status of Endangered Wildlife in Canada status

Codes:

S1 – Critically imperiled (often 5 or fewer occurrences)

S2 – Imperiled (often 20 or fewer occurrences)

S3 – Vulnerable (restricted range with few populations)

S4 – Apparently Secure (uncommon but not rare; some cause for long-term concern)

THR – Threatened

END – Endangered

SC – Special Concern

NAR – Not at Risk

The N or B after the ranking indicates conservation status at specific times of the year such as breeding (B) and non-breeding (N)

The desktop study of SAR indicated eight SAR with high potential to occur within the DIA Study Area and/or in the immediate vicinity of the DIA Study Area: Barn Swallow, Chimney Swift, Eastern Meadowlark, Least Bittern, Northern Map Turtle, Snapping Turtle, Milksnake and Butternut.

Mitigation measures related to the SAR with high potential to occur within the DIA Study Area or in the immediate vicinity of the DIA Study area are described in Table 2-5.

2.5.4 Socio-Economic Environment

Heritage and Archaeological Setting

The DIA Study Area is part of Ontario Waterways, Trent Severn Waterway National Historic Site of Canada. The Trent-Severn Waterway is a canal route traversing from Lake Ontario (Trenton) to Georgian Bay (Port Severn), and is administered by PCA. It was formerly used for industrial and transportation purposes, but is now being maintained for recreational boating and tourism purposes. The Trent-Severn Waterway is open for navigation from May until October, while its shore lands and bridges are open year-round. Thompson Bay Dam is owned and operated by PCA and is one of four main earth embankment dams that retains water in the Trent Canal along the Trent Severn Waterway.

According to PCA, the Dam is not classified as a Cultural Resource Management (CRM) structure and therefore an assessment and report regarding the impacts of the Project on cultural resources is not required. A PCA Archeologist will assess the requirement for archeological investigations and mitigations as part of the project planning. The impacts on archeological settings are currently unknown but may change after PCA has completed the assessment.

Population and Land Use

The DIA Study Area is located on Peterborough Island in the City of Peterborough, Ontario which has a population of approximately 76,000 individuals; the Greater Peterborough Area is home to more than 135,000 residents. Peterborough, known as a thoroughfare for people traveling to the Kawarthas (i.e. cottage country),

is a very popular tourism destination and as such the population increases substantially during the summer months. In addition to tourism, it comprises a significant technology and manufacturing sector hosting corporations such as Pepsico Foods (Quaker), General Electric, FisherCast Global, Siemens Milltronics, Minute Maid and SGS Lakefield Research (PCA, 2013).

The Dam provides opportunities for shoreline fishing and boating. The trail along the Dam is open to the public year round and is used as a walking trail.

DIA Study Area Visit

CH2M HILL Canada Limited (CH2M HILL) conducted a site visit on June 17, 2014, to gain an understanding of the proposed Project-specific physical works and the natural habitat characteristics of the DIA Study Area. The observations from the site visit are included in Section 2.4.1 and in other relevant sections of this report; photos taken during the site visit are included in Appendix B.

2.5.5 Scope of Assessment

The scope of the DIA is to assess the Project as described in the Scope of Project and in accordance with PCA's Scope of Work and CEAA 2012. Temporally, this assessment includes the timing of site preparation, installation of temporary access roads, cofferdams, reconstruction of the Dam, removal of vegetation, and restoration/cleanup of the DIA Study Area. It is anticipated that construction will start in late September/early October with partial mobilization which will consist of setting up the construction staging area and laying down the site access road. Final site restoration/cleanup of the DIA Study Area will take place in the spring of 2015. Spatially, the layout of the DIA Study Area is shown in Figure 2.

This environmental effects evaluation considers the full range of project/environment interactions and the environmental factors that could be affected by the Project as defined above and the significance of related effects after mitigation. The environmental effects of a Project to be considered include at a minimum those described under subsection 5(1) and 5(2) of CEAA 2012. The environmental effects evaluated in this DIA are listed in Table 2.4.

TABLE 2-4

Potential Project/Environmental Interaction Matrix

	As per Section 5(1)					As per Section 5(1c)						As per Section 5(2)	Due Diligence			
						Aboriginal Interest										
Project Phase/ Physical Work/ Activity	Fish (Fisheries Act)	Species at Risk (SARA)	Aquatic Species (SARA)	Birds (MBCA)	Beaver Dam (Fish and Wildlife Conservation Act [FWCA])	Health and Socio economic	Physical and culture heritage	Land use	*HAPA Significance	Health and Socio economic	Physical and culture heritage	*HAPA Significance	Air Quality/Acoustic Environment	Soil	Water (groundwater and surface water)	Terrestrial Habitat and Species
Site Preparation																
Vegetation clearing	P	P	P	P	-	-	-	-	-	-	-	-	P	P	P	P
Establish construction staging area	P	P	P	P	-	-	-	-	-	-	-	-	P	P	P	P
Construction																
Install cofferdams and associated structures upstream and downstream of the Dam to keep construction area dry	P	P	P	P	P	-	-	-	-	-	-	-	P	P	P	P
Remove and demolish existing structures	P	P	P	P	P	-	-	-	-	-	-	-	P	P	P	P
Perform reconstruction work	P	P	P	P	P	-	-	-	-	-	-	-	P	P	P	P
Removal of cofferdams	P	P	P	P	-	-	-	-	-	-	-	-	P	P	P	P
Demobilization and Restoration	P	P	P	P	-	-	-	-	-	-	-	-	P	P	P	P

Notes:

P – Potential Effect of Project on Environment

‘-’ – No Interaction)

*HAPA-structure, site or thing that is of historical, archeological, paleontological or architectural significance.

2.5.6 Consultation

Public Consultation

Due to the close proximity of the residential area to the DIA Study Area and its use a recreational area for the public, PWGSC and PCA will be notifying residents in the area about the Project. Notices from PCA will be sent out prior to the commencement of the Project to provide residents with information regarding the construction activities and timing of the Project.

Aboriginal Communications

According to PCA, currently there are no First Nations concerns associated with the DIA Study Area; however, PCA will undertake consultation as required for the Project.

2.6 Environmental Effects Analysis

2.6.1 Environmental Effects Analysis, Mitigation Measures, and Best Management Practices

The potential for the Project to interact with an ecosystem component was analyzed based on information provided by the proponent, a review of project related activities, an appraisal of the environmental setting, temporal and/or spatial conflict, personal knowledge, and professional judgment. Refer to Table 2.4, the Potential Project/Environmental Interactions Matrix. Measures to mitigate the identified potential adverse interactions were then recommended. The mitigation measures are a means to lessen or negate an environmental effect with the aim to have less impact to the environment overall.

After the application of mitigation measures, the significance of any residual effect was ascertained based on an evaluation of the effect's magnitude, reversibility, geographic extent, duration, and frequency. The required mitigation measures and best management practices to be implemented, significance of residual effects and, monitoring requirements are summarized in Table 2.5.

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
Fish/Fish Habitat (Fisheries Act)	Reduced fish biomass and diversity due to mortality from physical activities (e.g. de-watering construction area) and or releases of deleterious substances	Thompson Bay/Creek is a warm fishery although some cold water species are present with populations of both Walleye and Largemouth Bass; as such the timing window for in-water work is restricted to Mar. 15 to July 15; any work outside this window would require an exemption from MNR. Also, in the event that in-water work is conducted outside of this window, DFO must be contacted to obtain an exemption and provide instruction on how to proceed. DFO handles exemptions on a case-by-case basis.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	It is expected that the implementation of mitigation measures will address adverse effects to fish in Thompson Bay and Creek as a result of in-water construction activities.
		Implement water quality protection measures to control releases of sediment and spills and leaks from equipment.				
		To prevent fish from being killed by the placement of rock in the waterway during construction, measures will be taken to scare and move fish away from the immediate area prior to dumping the rock. Methods could include: 1) utilize a combination of noise and bubbles from an air compressor for a sufficient amount of time to direct fish away from the area where rock will be dumped, 2) place both turbidity curtains side by side across the waterway, then pull one away pushing fish away from corridor, 3) drag a net through the waterway between the turbidity curtains and relocate fish outside the construction zone.				
		Any fish in the area to be dewatered must be captured alive and relocated outside cofferdam or work area prior to commencement of dewatering.				

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
	Disruption of fish spawning and migration	Restrict in-water works to approved timing windows, as stated above unless exemption received from governing authorities.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied		It is expected that the implementation of mitigation measures will address adverse effects to Fish spawning as a result of construction activities in Thompson Bay and Creek. Unless exemption is granted it is recommended that the MNR approved timing window is adhered to.
	Physical changes to aquatic habitat (e.g. change in water levels and flow volumes, damage or loss of riparian habitat, base flows and water temperature)	Implement mitigation measures in accordance with DFO recommendations, "Measures to avoid causing harm to fish and fish habitat". Restore habitat where necessary. Restrict in-water works to approved timing windows, as described above unless exemption received from governing authorities.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	Impacts to aquatic biota considered minor and temporary with the implementation of mitigation measures. Reconstruction of the Dam is not anticipated to change water levels in Thompson Bay and Creek in the long term.
Species at Risk (SARA)	There is the potential for encountering species protected under the <i>Species At Risk Act</i> (SARA).	It is highly recommended that on-site workers familiarize themselves with information found at the following links: MNR Species at Risk website: www.ontario.ca/speciesatrisk Species at Risk information and Fact Sheets can be found at: http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_CSSR_SARO_LST_EN.html If an impact to a Species at Risk or its habitat cannot be avoided, a person(s) should contact MNR to discuss options, including applying for an authorization under the ESA. In situations where an activity is not registered with or authorized by the MNR, a person(s) must comply with the ESA by modifying proposed activities to avoid impacts to Species at Risk and habitat protected under the ESA.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	It is expected that the implementation of mitigation measures will address adverse effects to SAR as a result of Project activities.

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
		Should any species at risk or their habitat be potentially impacted by on site activities, MNR should be contacted immediately and operations should be modified to avoid any negative impacts to species at risk or their habitat until further discussions with MNR can occur regarding opportunities for mitigation. If you have any questions regarding any species at risk, contact the Peterborough District MNR office at 705-755-3134				
	Temporary noise generated from the Project activities has the potential to disturb SAR.	Implement the mitigation measures for Noise appearing in this table.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	It is expected that the implementation of mitigation measures will address adverse effects to SAR as a result of Project activities.
Aquatic Species (SARA)	Potential for SAR Turtles and Snakes (specifically Northern Map Turtle, Snapping Turtle and Milk Snake) to be disturbed by the Project activities	Workers must be vigilant and check work areas for the presence of turtles and snakes. If turtles or snakes are encountered, whenever possible, work should be temporarily suspended until the animal is out of harm's way. Workers should report any turtle observations (including photographs and coordinates) to the Peterborough District Biologist's immediately at (705) 755-3134. Please note that the turtle nesting season in the subject area extends from May 15 to Aug 15. Therefore, activities which may cause adverse impacts to a species or habitat (e.g. use of heavy equipment) should commence after Aug 15.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	It is expected that the implementation of mitigation measures will address adverse effects to of SAR as a result of Project activities.

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
Bird Species (SARA)	Potential for SAR birds (specifically Barn Swallow, Chimney Swift, Eastern Meadowlark, Least Bittern) to be disturbed by Project activities	Workers must be vigilant and check work areas for the presence of breeding birds and nests containing eggs and/or young. Fact sheets for the identification of the Species at Risk birds referenced above should be provided to the crew before the project begins. If breeding birds and/or nests are encountered, works should not continue in the location of the nest until after the date below (or as soon as it has been determined that the young have left the nest). Please note that the breeding bird season in the subject area extends from March 31 to Aug 31. Therefore, works should commence after Aug 31 whenever possible.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	It is expected that the implementation of mitigation measures will address adverse effects to of SAR as a result of Project activities.
Plant Species (SARA)	Potential for Butternut to be disturbed by Project activities	Butternut trees (Endangered) are likely to occur on or in the immediate area of the study site. Retainable Butternut trees are protected under Section 9 of the SARA which prohibits a person from killing or harming an endangered, threatened or extirpated species (as listed on the Species at Risk in Ontario List). Because of the high probability that Butternut occurs in the study area, it is recommended that the presence of this endangered species is confirmed and any butternut trees present assessed by a certified Butternut health assessor (BHA).	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	It is expected that the implementation of mitigation measures will address adverse effects to of SAR as a result of Project activities.

Table 2-5
Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
Migratory Birds/Birds (MBCA)	Impact on birds/migratory birds through habitat disturbance due to construction activities.	Migratory birds, their nests and eggs are protected under the <i>Migratory Birds Convention Act, 1994 (MBCA)</i> . Project works or activities, such as, construction access, site grubbing, vegetation clearing and construction activities, are potentially destructive or disruptive activities to birds, their nests or eggs and should be avoided at key locations or during key periods, including the breeding periods and periods of high usage such as migration and/or feeding. These locations and periods vary by region and by species. Plan ahead to minimize the risk of detrimental effects to migratory birds by developing and implementing appropriate preventive and mitigation measures to minimize the risk of incidental take and to help maintain sustainable populations of migratory birds. General information about incidental take, avoidance, and how to work during the core periods of migratory bird breeding can be found at http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=1B16EAFB-1	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	The mitigation measures will address potential impacts to habitat as long as the site is revegetated shortly after disturbance and the rehabilitation replaces as a minimum the vegetation impacted by this work. Also, it is recommended that construction be completed outside the breeding bird season.
		Minimize any disturbance to onsite vegetation, including vegetation surrounding the construction staging area. Construction must be in compliance with the <i>MBCA</i> guidelines for tree clearing. The <i>MBCA</i> states that vegetation clearing will be undertaken outside of the breeding season. Clearing of vegetation in this region will be avoided from Mar 31 to Aug 31 (EC, 2014b).				

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
		<p>To comply with the <i>MBCA</i>, if activities are proposed to occur between Mar 31 to Aug 31 (EC, 2014b) in any given year, a bird survey will be undertaken prior to the construction activities to check for nesting birds are located in the area. Should a nest be encountered, the area will be clearly staked or flagged and a buffer approved by the CWS will be established around the nest to avoid disturbance of the area.</p> <p>The proponent should contact EC if they are proposing work during the breeding season to comply with the <i>MBCA</i>.</p>				
		To minimize land disturbance, the construction envelope will be clearly demarcated and kept as small as possible.				
		Establish staging areas and site access routes away from existing trees/naturalized vegetation to the extent possible.				
		All exposed soils will be stabilized and re-vegetated as soon as possible.				

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
Beaver Dam (FWCA)		Section 8 (3) of the FWCA on Beaver dams states that a person shall not damage or destroy a beaver dam unless the person holds a license to trap furbearing mammals. Therefore, a qualified trapper must be used to trap the beaver and/or remove the dam. Furbearers may be trapped only during open season By the Area description (FWCA , O.Reg 663/98) – Oct 5 to Apr 30.				
Air Quality	Air quality contamination through dust and particulate emissions arising from construction and during transport of materials.	Use soil removal methods and best practices to avoid generating airborne dust and particulates, including hand held tools.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	Minor, temporary air emissions associated with dust and particulate during construction. Such effects are likely to be confined to the Project Study Area and can be limited through the application of mitigation measures.
		Undertake misting, create localized wind barriers, and use tarps to cover loads or implement other methods particularly during dry, dusty conditions to avoid generating airborne or surface dust and particulates. Provide dust control on access roads.				
		Minimize the extent of disturbed areas and avoid leaving areas exposed over extended periods, to the extent practicable.				
		Implement temporary erosion and sediment control measures and runoff conveyance structures as appropriate (for example, silt fence, straw bale or rock flow checks, temporary berms and grading, erosion prevention mats/covers) onsite. Maintain these measures until the site has stabilized.				
		During construction, soil/rock fill should not be dumped under high wind conditions.				

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
	Emissions generated from vehicles (for example, trucks) and/or equipment potentially degrading air quality.	Maintain trucks, boats, and equipment in good condition, equipped with emission controls as applicable, and operated within regulatory requirements, including meeting the local authority's emission requirements. Avoid unnecessary idling of vehicles and equipment.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	Minor, temporary air emissions associated with equipment usage, which are expected to be within acceptable limits. Such effects are likely to be confined to the Project Study Area and can be limited through the application of mitigation measures.
Noise	Temporary noise generated from construction activities has the potential to disturb terrestrial biota, local residents, public, and employees working onsite.	Conduct work during normal business hours and in accordance with the local noise By-Law. Check that equipment and vehicles are in good working order, are equipped with proper noise emission controls and that there is no excessive idling/running of vehicles and equipment. Monitor and mitigate any public complaints by keeping a record of complaints and addressing issues raised by the public should they arise. Avoid generating construction related noise during the breeding bird season, March 31 to August 31 (EC, 2014b). If work must occur during this time, avoid working during dawn and dusk when the birds are calling.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	Minor, temporary noise generated by equipment usage, which are expected to be within acceptable limits. Effects can be minimized through the application of mitigation measures

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
Soils	Project activities will result in soil being disturbed and/or exposed to erosion processes including wind and surface water runoff.	To minimize land disturbance, the construction envelope will be clearly demarcated and kept as small as possible. Stockpiled material away from watercourse and cover in order to prevent its erosion and transport. Ensure silt fences encompass stockpile areas	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	Construction activities will result in temporary disturbance and/or exposure of soil however impacts can be limited through the implementation of mitigation measures.
	Potential contamination of soil in the DIA Study Area through spills of deleterious substances from machinery, chemicals stored within or adjacent to the DIA Study Area and/or vehicles	Maintain equipment in good working order to avoid leakage of fuels and liquids. Operate and store all materials and equipment used for the Project in a manner that prevents any deleterious substance from being released to the ground. Check that any construction vehicle entering the site are clean Prior to arrival on the site to remove any soil, organisms, or propagules from tires and undercarriages. Refuel equipment off slopes, and 30 m away from any water body or aquatic habitats Store all oils, lubricants, fuels, and chemicals in secure areas on impermeable pads, 30 m away from any water body, and provide berms if necessary. This action should be completed to also protect surface water, groundwater, aquatic and terrestrial habitat. Securely contain and remove any contaminated soils or other contaminated materials offsite to a licensed facility.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	It is expected that accidental spills can be avoided through the application of best management practices and mitigation measures and should a spill occur the application of appropriate clean up related mitigation measures will minimize impacts to the environment.

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
		Check that absorbent materials are available onsite in the event that a spill of deleterious substances should occur. All spills and leaks of deleterious substances must be immediately contained and cleaned up in accordance with regulatory requirements and reported immediately to the Ontario Spills Action Centre (1-800-268-6060), PCA Project Leader (613-530-3300) and PCA sector manager (705) 457-2632				
Surface Water	Reduced water quality and water clarity due to increased erosion, sedimentation, transport of debris or from point or non-point sources of pollution (for example, discharge of waters, leaks and accidental spills, contaminated groundwater inputs, inputs of contaminants from construction activities and from surface runoff)	<p>Cofferdams will be installed upstream and downstream of the existing Dam. Materials and methods for use in coffer dams must comply with the regulations and guidelines of the DFO. Earth or granular materials with sand and fines is not acceptable, however, washed gravel with 6mm minimum aggregate size can be used for coffer dam construction. If using sand bags sand must be washed of fines before placing in water. Use gravel/rock fill with rubber membranes, caissons, sheet piling, frame type structures or other coffer dams that do not generate turbidity.</p> <p>Install marine grade turbidity curtains across waterbodies prior to any construction activity upstream and downstream of work site. The turbidity curtains to be anchored and weighted along length to form a continuous barrier with adequate flotation at water surface. Inspect daily and maintain turbidity curtains until the end of construction.</p> <p>Inspect all erosion and sediment control measures daily and leave them in place until the construction site has stabilized.</p>	<p>Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i></p>	Insignificant if mitigation measures applied	Yes	It is expected that accidental spills and debris releases can be avoided through the application of best management practices and mitigation measures and should a spill occur the application of appropriate cleanup related mitigation measures will minimize impacts to the environment. Turbidity monitoring is also recommended to monitor turbidity levels in the Thompson Bay and Creek.

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
		<p>Silt fences will be installed around the perimeters of all work areas including staging areas to prevent sediment and other deleterious substances from entering the water or other surrounding areas.</p> <p>Prepare and implement a turbidity monitoring program for the duration of construction activities. Initial visual observation of turbidity should be conducted, followed by additional measures as required such as installing monitoring stations both upstream and downstream of each activity site. The turbidity monitoring program shall include trigger levels (relative to background/ upstream conditions) for adjusting operations to minimize turbidity and also for work stoppage. Should increased turbidity levels or re-suspended sediments pose a hazard to sensitive natural habitats, PCA will be notified immediately.</p> <p>Minimize any runoff from stockpiles created through misting and wetting. Stockpiled or excavated materials will be stored well away from water and surrounded by sediment control measures to prevent runoff from entering waterbodies.</p> <p>Rocks/stones used should not be taken from the bed or shoreline.</p> <p>Implement wet weather restrictions to activities.</p> <p>Upon completion of work, completely remove all debris on the canal and creek bed and restore the area.</p> <p>as appropriate for DIA Study Area conditions</p>				

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
		Do not operate heavy equipment in waterway except when operated from a barge. Any small tools and equipment operating in water bodies must be cleaned prior to entering the water and inspected daily for leaks; equipment should never be left in water overnight. Do not skid construction material across waterways.				
		Refuel equipment off slopes and away from water bodies and aquatic habitat (a minimum of 30 m away from Thompson Bay and Creek.				
		Refuel machinery and follow spill avoidance procedures as specified above in Soils section of this table.				
		Do not pump water that flows/seeps through coffer dam into construction work area directly into waterways. Send all discharge to sediment traps in order to satisfy discharge requirements. Install, sediment trap as required to treat surface water runoff in the construction area and prevent sediment from entering waterways. Water quality downstream of construction site and/or released to watercourses not to exceed background turbidity readings of 8 nephelometric turbidity units (NTU) or change of 25 mg/l for suspended solids. Dispose of water so that it does not create a safety or health hazard, or cause damage to the environment, to adjacent property or cause erosion.				
		Check that all painting and staining are done upland well above the upper controlled water elevation level				

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects^b	Monitoring Required	Comments
		<p>Attach drop clothes to scaffolding to prevent deleterious materials such as, paints, timbers, concrete, and solvents from entering the water. Ensure all equipment and temporary access structures such as scaffolding placed in watercourses are free of earth material, fuel, lubricants coolant and other deleterious material that could enter the watercourses</p> <p>Check that absorbent materials are available onsite in case a spill of deleterious substances should occur. All spills and leaks of deleterious substances must be immediately contained and cleaned up in accordance with regulatory requirements and reported immediately to the Ontario Spills Action Centre at 1-800-268-6060.</p>				

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
		<p>As concrete leachate is alkaline and highly toxic to fish and other aquatic life, ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials (concrete) will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside formed structures. Provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment. All concrete wash water will be disposed of offsite in a location where it will not enter subsurface drains, water bodies or storm drains. Prevent any water that contacts uncured or partly cured concrete during activities like exposed aggregate wash-off, wet curing, or equipment washing from directly or indirectly entering any watercourse or storm water system. Maintain complete isolation of all cast-in-place concrete and grouting from fish-bearing waters for a minimum of 48 hours if ambient air temperature is above 0°C and for a minimum of 72 hours if ambient air temperature is below 0°C. Isolate and hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH. Use only non-toxic biodegradable form stripping agents.</p> <p>Operate and store all equipment used for the Project in a manner that prevents any deleterious substance from entering the water.</p>				

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
		Check that any construction vehicle entering onto privately owned lands or land outside of the DIA Study Area is thoroughly cleaned prior to arrival, for the purpose of removing any soil, organisms, or propagules from other worksites.				
		Remove accumulated sediments prior to removing erosion control devices.				
Groundwater	Change in groundwater flow patterns, recharge and levels in aquifers and yields of wells due to dewatering or interception of aquifers, changes to infiltration, changed flow patterns or damage to wells.	Avoid intercepting aquifers; avoid unnecessary disruption of active tile drains. Maintain surface drainage, ponding, existing soil and ground cover conditions, etc. in groundwater recharge areas.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	Limited potential exists for groundwater to be impacted if mitigation measures are applied.
	Potential contamination of groundwater through spills from machinery, vehicles and/or chemicals stored within the DIA Study Area during the construction activities.	Implement best practices for stored chemical removal to minimize disturbance for the potential for spill releases as discussed in Soils section of this table. Absorbent materials must be available in DIA Study Area in case a spill of deleterious substances should occur. Implement the procedures discussed above the Soil section of this table.	Magnitude: <i>Small</i> Reversibility: <i>Reversible</i> Geographic Extent: <i>Immediate</i> Duration: <i>Short-term</i> Frequency: <i>Once</i>	Insignificant if mitigation measures applied	No	There is the potential for accidental spills to occur during the Project however spills and impacts to groundwater can be avoided through the application of best management practices and mitigation measures. Should a spill occur the application of appropriate cleanup related mitigation measures will minimize impacts to the environment.

Table 2-5

Environmental Effects Analysis and Recommended Mitigation Measures

Valued Ecosystem Component	Potential Project Interaction with VEC	Recommended Mitigation Measures ^a	Evaluation of Effects (if mitigation measures applied) ^b	Residual Effects ^b	Monitoring Required	Comments
Terrestrial Habitat and Species	Habitat destruction and disturbance onsite and on private property through clearing of existing vegetation in DIA Study area during construction activities	<p>Minimize damage and removal of vegetation to the extent possible by establishing staging areas and site access routes away from existing trees/naturalized vegetation to the extent possible.</p> <p>If possible, remove only branches from trees that are obstructing construction works and avoid whole tree removal if practical.</p> <p>Schedule work so that tree trunks are removed prior to hibernation period. If unavoidable prior to cutting trees, rap their trunks repeatedly with a stick (or similar object) to awaken hibernating mammals for work being completed in the winter.</p> <p>Stabilize and re-vegetate all exposed soils as soon as possible.</p> <p>Undertake vegetation clearing outside of the breeding bird season. Avoid clearing from March 31 to August 31 (EC, 2014b).</p> <p>During stump removal, monitor the work and stop work as required to allow herpetofauna to escape the work area if observed. Relocate herpetofauna away from the construction area to a similar habitat within the surrounding area.</p>	<p>Magnitude: <i>Small</i></p> <p>Reversibility: <i>Some irreversible impacts</i></p> <p>Geographic Extent: <i>Immediate</i></p> <p>Duration: <i>Short-term</i></p> <p>Frequency: <i>Once</i></p>	Insignificant if mitigation measures applied	No	The mitigation measures will address potential impacts to habitat as long as the site is revegetated shortly after disturbance and the rehabilitation replaces as a minimum the vegetation impacted by this work.

Notes:

NA – Not applicable.

^a. Although some of the pertinent legislation, regulations, guidelines and policies are noted in the mitigation, the information is not necessarily considered complete. Furthermore, it is to be expected that new, amended, modified or otherwise updated legislation, regulations, guidelines and policies will become available over time. DND and/or their subcontractors are responsible to ensure that all applicable legislation, regulations, guidelines and policies are adhered to.

^b. Magnitude – Magnitude, in general terms, may vary among Issues, but is a factor that accounts for size, intensity, concentration, importance, volume and social or monetary value. Effect are relative to natural or background conditions (for example, small - relative to natural or background conditions , moderate - relative to natural or background conditions , large - relative to natural or background conditions).

Reversibility – of effect (that is, reversible - effect can be reversed or irreversible-effects are permanent).

Geographic extent – footprint of the effect (that is, immediate-confined to project site; local-effects beyond immediate project site but not regional in scale; regional-effects on a wide scale).

Duration – time effect is evident (that is, short term-between 0 and 6 months in duration; medium term-between 6 months and 2 years; long term-beyond 2 years).

Frequency – conditions causing an effect (that is, once-occurs only once; intermittent-occurs occasionally at irregular intervals; continuous-occurs on a regular basis and at regular intervals).

2.6.2 Cumulative Effects

In assessing the potential environmental impacts of the proposed Project as described in this DIA, it is necessary to consider the potential for, and significance of, any cumulative effects. Cumulative effects are changes to the environment that may be caused by the proposed Project in combination with other past, present, and future human actions and activities in the local area. In order to have a cumulative effect, the proposed project must overlap temporally and spatially with another project.

Identification of other Projects and Activities

Mr. Greg Giles, the Construction Services Coordinator for the City of Peterborough, was contacted by CH2M Hill in July 2014 to gather information regarding any potential projects of a similar nature to the Project that have the potential to overlap spatially or temporally with the Dam rehabilitation. According to Mr. Giles, there is currently a draft plan for a residential housing development approximately 100 m north of the DIA Study Area however at the time the DIA was written no proposals to develop the property had been submitted to the City. No other construction work has been planned for this area during the time the DIA was written (Greg Giles, City of Peterborough, per.comm.).

Based on the above information, cumulative effects are not expected with this Project. If cumulative effects are identified, a mitigation plan will need to be developed to avoid or minimize such interactions and the potential for environmental effects.

2.6.3 Environmental Effects Evaluation Conclusion

Potential impacts of this Project are associated with those outlined in Table 2.5. It is reasonable to conclude that with the implementation of appropriate mitigations measures and best management practices the environmental effects will be short term and occurring over the time period of the Project and the potential zone of influence will be confined to the Study Area. In conclusion, no significant environmental effects are likely to occur as a result of the Project if the mitigations measures are implemented.

2.6.4 Accuracy and Compliance Monitoring

All required mitigation measures and best management practices from Table 2.5 are summarized in the Mitigation Monitoring Report form, Appendix C. This report form is to be used to ensure that mitigation measures identified in this report are implemented. One or more qualified professionals assigned for this purpose will carry out this work. It is the responsibility of the PCA Project Manager or their delegate to check that mitigation monitoring is completed for the Project.

Note that the intent of the mitigation measures is to avoid significant environmental effects as a result of the Project. Implementation of the mitigation measures does not relieve the proponent from compliance with any applicable legislation.

Turbidity monitoring is also recommended as part of the mitigation measures to monitor turbidity levels in Thompson Bay and Thompson Creek.

2.6.5 Determination

PCA is required to provide a determination of the significance of environmental effects as a result of funding this Project. The decision outlined below is based on the interpretation of environmental effects and mitigation measures described in Section 2.5 of this report.

Project Name: Detailed Environmental Impact Assessment for the Thompson Bay Dam Rehabilitation

PWGSC Project #: R.065830.110

Location: Peterborough, Ontario

PCA has evaluated the Project for significant adverse environmental effects as required under Section 67 of CEAA, 2012. On the basis of this evaluation, the department has determined that the decision opposite the "X" applies to the proposed Project.

- ☐ Project not likely to cause significant adverse environmental effects - proceed.
- ☒ Project not likely to cause significant adverse environmental effects with mitigation - proceed using mitigation measures as determined.
- ☐ Inadequate information available - further study and assessment is required.
- ☐ Project likely to cause significant adverse environmental effects that cannot be justified in the circumstances - Project will not proceed.
- ☐ Project likely to cause significant adverse environmental effects that may be justified in the circumstances - refer to the Governor in Council for decision.

2.6.6 Signatures

This document summarizes the results of an environmental effects evaluation related to the above project that has been performed and completed by the Federal Authority in accordance with the *Canadian Environmental Assessment Act, 2012*.

Prepared by: Ed McGurk Date: July 31, 2014

Ed McGurk, Project Manager, CH2M HILL

The above has completed this DIA report to the best of their ability and knowledge.

Reviewed by: _____ Date: July 31, 2014

Selina Chowdhury, Senior Environmental Specialist, PWGSC

The above has reviewed the DIA report and agrees that it meets the requirement of the CEAA, 2012.

Recommended by: _____ Date: July 31, 2014

Brett McLellan, Engineer, Parks Canada Agency

The above has read and understood this DIA report and acknowledges responsibility for ensuring the implementation of mitigation measures and for ensuring the design and implementation of 'accuracy and compliance monitoring', if any, identified in this report.

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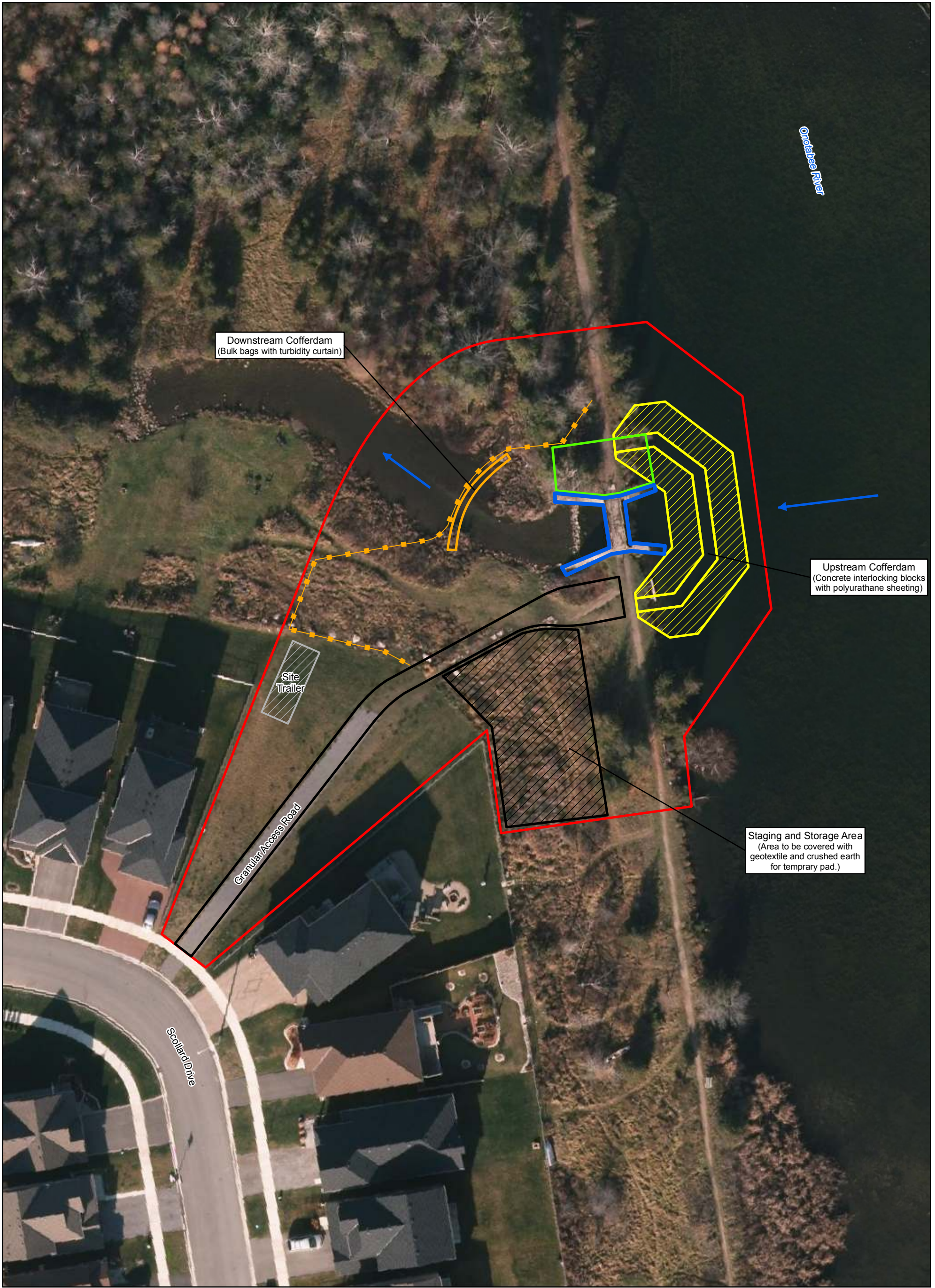
Appendix A

Figures



Notes:
1. Aerial Photograph - 2011 and 2008 Data set is copyrighted by First Base Solutions Inc. and licensed to CH2M HILL.

Figure 1
Site Location
Detailed Impact Analysis for Thompson's Bay Dam
Parks Canada
Peterborough, Ontario



Downstream Cofferdam
(Bulk bags with turbidity curtain)

Upstream Cofferdam
(Concrete interlocking blocks
with polyurathane sheeting)

Site
Trailer

Granular Access Road

Staging and Storage Area
(Area to be covered with
geotextile and crushed earth
for temprary pad.)

Scolard Drive

Orabee River

- | | |
|--|--|
| <div></div> Approximate DIA Study Area | <div></div> Constuction Fencing |
| <div></div> Clearing and Grubbing | <div></div> Surface Water Flow Direction |
| <div></div> Downstream Cofferdam (Bulk Bags) | |
| <div></div> Granular Access Road | |
| <div></div> Staging and Storage Area | |
| <div></div> Thompson Bay Dam | |
| <div></div> Upstream Cofferdam | |

Notes:
1. Aerial Photograph - 2011 Data
set is copyrighted by First Base
Solutions Inc. and licensed to
CH2M HILL.

Figure 2
Site Plan
Detailed Impact Analysis for
Thompson Bay Dam Reconstruction
Parks Canada
Peterborough, Ontario

Appendix B

Site Visit Photographs

Site Visit Photographs



Photo 1: View of Thompson Bay Dam looking east.



Photo 2: View of earth embankment (walking trail) along south side of Thompson Bay Dam; residential housing development present on the right and Thompson Bay present on the left side of photograph.



Photo 3: View of Thompson Bay (looking east) from the deck of Thompson Bay Dam



Photo 4: View of Thompson Creek and abutment wall on downstream (northwest) side of Thompson Bay Dam



Photo 5: View of upstream (east) side of Thompson Bay Dam and Thompson Bay



Photo 6: View of Thomson Creek on downstream side of Thompson Bay Dam.



Photo 7: View of residential housing development present along Scollard Drive to the west of Thompson Bay Dam.



Photo 8: View of earth embankment (walking trail) north of Thompson Bay Dam.

Appendix C

Mitigation Measures Report

APPENDIX C

Detailed Environmental Impact Assessment Mitigation Monitoring Report Form

Responsible Authority: Public Works and Government Services Canada

Project Name/Location: Thompson Bay Dam Reconstruction/Peterborough, Ontario

PWGSC Project No.: R.065830.110

The purpose of this record is to monitor the implementation of mitigation measures identified in the DIA. It is the responsibility of PCA to ensure that the Mitigation Monitoring Report form is completed for the Project. Specify in the table below whether the mitigation measures set out in the DIA have been applied.

It is reasonable to conclude that with appropriate mitigation in place and good work practices, adverse environmental effects will be of short duration and the potential zone of influence will be confined to the immediate vicinity of the work.

If for some reason a mitigation measure has not been applied, specify the reason(s) why this was not done.

Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/ Firm Responsible	Compliance (Task Complete – Yes/No and Date). If No, provide Reason.
Thompson Bay/ Creek is a warm fishery although some cold water species are present with populations of both Walleye and Largemouth Bass; as such the timing window for in-water work is restricted to Mar 15 to July 15; any work outside this window would require an exemption from MNR.			
Implement water quality protection measures to control releases of sediment and spills and leaks from equipment.			
To prevent fish from being killed by the placement of rock in the waterway during construction, measures will be taken to scare and move fish away from the immediate area prior to dumping the rock. Methods could include: 1) utilize a combination of noise and bubbles from an air compressor for a sufficient amount of time to direct fish away from the area where rock will be dumped, 2) place both turbidity curtains side by side across the waterway, then pull one away pushing fish away from corridor, 3) drag a net through the waterway between the turbidity curtains and relocate fish outside the construction zone.			
Any fish in the area to be dewatered must be captured alive and relocated outside cofferdam or work area prior to commencement of dewatering.			
Restrict in-water works to approved timing windows, as stated above unless exemption received from governing authorities.			
Implement mitigation measures in accordance with DFO recommendations, “Measures to avoid causing harm to fish and fish habitat”.			
Restore habitat where necessary.			

Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/ Firm Responsible	Compliance (Task Complete – Yes/No and Date). If No, provide Reason.
<p>It is highly recommended that on-site workers familiarize themselves with information found at the following links: MNR Species at Risk website: www.ontario.ca/speciesatrisk Species at Risk information and Fact Sheets can be found at: http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_CSSR_SARO_LST_EN.html</p> <p>If an impact to a Species at Risk or its habitat cannot be avoided, a person(s) should contact MNR to discuss options, including applying for an authorization under the ESA. In situations where an activity is not registered with or authorized by the MNR, a person(s) must comply with the ESA by modifying proposed activities to avoid impacts to Species at Risk and habitat protected under the ESA.</p> <p>Should any species at risk or their habitat be potentially impacted by on site activities, MNR should be contacted immediately and operations should be modified to avoid any negative impacts to species at risk or their habitat until further discussions with MNR can occur regarding opportunities for mitigation. If you have any questions regarding any species at risk, contact the Peterborough District MNR office at 705-755-3134</p>			
<p>Workers must be vigilant and check work areas for the presence of turtles and snakes. If turtles or snakes are encountered, whenever possible, work should be temporarily suspended until the animal is out of harm's way. Workers should report any turtle observations (including photographs and coordinates) to the Peterborough District Biologist's immediately at (705) 755-3134. Please note that the turtle nesting season in the subject area extends from May 15 to Aug 15. Therefore, activities which may cause adverse impacts to a species or habitat (e.g. use of heavy equipment) should commence after Aug 15.</p>			

Environmental Mitigation Measure	Implementation Schedule/Date	Person/Title/ Firm Responsible	Compliance (Task Complete – Yes/No and Date). If No, provide Reason.
Workers must be vigilant and check work areas for the presence of breeding birds and nests containing eggs and/or young. Fact sheets for the identification of the Species at Risk birds referenced above should be provided to the crew before the project begins. If breeding birds and/or nests are encountered, works should not continue in the location of the nest until after the date below (or as soon as it has been determined that the young have left the nest). Please note that the breeding bird season in the subject area extends from Mar 31 to Aug 31. Therefore, works should commence after Aug 31 whenever possible.			
Butternut trees (Endangered) are likely to occur on or in the immediate area of the study site. Retainable Butternut trees are protected under Section 9 of the SARA which prohibits a person from killing or harming an endangered, threatened or extirpated species (as listed on the Species at Risk in Ontario List). Because of the high probability that Butternut occurs in the study area, it is recommended that the presence of this endangered species is confirmed and any butternut trees present assessed by a certified Butternut health assessor (BHA).			
Migratory birds, their nests and eggs are protected under the <i>Migratory Birds Convention Act, 1994 (MBCA)</i> . Project works or activities, such as, construction access, site grubbing, vegetation clearing and construction activities, are potentially destructive or disruptive activities to birds, their nests or eggs and should be avoided at key locations or during key periods, including the breeding periods and periods of high usage such as migration and/or feeding. These locations and periods vary by region and by species. Plan ahead to minimize the risk of detrimental effects to migratory birds by developing and implementing appropriate preventive and mitigation measures to minimize the risk of incidental take and to help maintain sustainable populations of migratory birds. General information about incidental take, avoidance, and how to work during the core periods of migratory bird breeding can be found at http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=1B16EAFB-1			

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Minimize any disturbance to onsite vegetation, including vegetation surrounding the construction staging area. Construction must be in compliance with the <i>MBCA</i> guidelines for tree clearing. The <i>MBCA</i> states that vegetation clearing will be undertaken outside of the breeding season. Clearing of vegetation in this region will be avoided from Mar 31 to Aug 31 (EC, 2014b).			
To comply with the <i>MBCA</i> , if activities are proposed to occur between Mar 31 to Aug 31 (EC, 2014b) in any given year, a bird survey will be undertaken prior to the construction activities to check for nesting birds are located in the area. Should a nest be encountered, the area will be clearly staked or flagged and a buffer approved by the CWS will be established around the nest to avoid disturbance of the area. The proponent should contact EC if they are proposing work during the breeding season to comply with the <i>MBCA</i> .			
To minimize land disturbance, the construction envelope will be clearly demarcated and kept as small as possible.			
Establish staging areas and site access routes away from existing trees/naturalized vegetation to the extent possible.			
All exposed soils will be stabilized and re-vegetated as soon as possible.			
Section 8 (3) of the <i>FWCA</i> on Beaver dams states that a person shall not damage or destroy a beaver dam unless the person holds a license to trap furbearing mammals. Therefore a qualified trapper must be used to trap the beaver and/or remove the dam. Furbearers may be trapped only during open season. By the Area description (<i>FWCA</i> , O.Reg 663/98) - October 5 to April 30.			
Use soil removal methods and best practices to avoid generating airborne dust and particulates, including hand held tools.			

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Undertake misting, create localized wind barriers, and use tarps to cover loads or implement other methods particularly during dry, dusty conditions to avoid generating airborne or surface dust and particulates. Provide dust control on access roads.			
Implement temporary erosion and sediment control measures and runoff conveyance structures as appropriate (for example, silt fence, straw bale or rock flow checks, temporary berms and grading, erosion prevention mats/covers) onsite. Maintain these measures until the site has stabilized.			
During construction, soil/rock fill should not be dumped under high wind conditions.			
Maintain trucks, boats, and equipment in good condition, equipped with emission controls as applicable, and operated within regulatory requirements, including meeting the local authority's emission requirements.			
Avoid unnecessary idling of vehicles and equipment.			
Conduct work during normal business hours and in accordance with the local noise By-Law.			
Check that equipment and vehicles are in good working order, are equipped with proper noise emission controls and that there is no excessive idling/running of vehicles and equipment.			
Monitor and mitigate any public complaints by keeping a record of complaints and addressing issues raised by the public should they arise.			
Avoid generating construction related noise during the breeding bird season, Mar 31 to Aug 31 (EC, 2014b). If work must occur during this time, avoid working during dawn and dusk when the birds are calling.			
Stockpiled material away from watercourse and cover in order to prevent its erosion and transport. Ensure silt fences encompass stockpile areas.			

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Operate and store all materials and equipment used for the Project in a manner that prevents any deleterious substance from being released to the ground.			
Check that any construction vehicle entering the site are clean Prior to arrival on the site to remove any soil, organisms, or propagules from tires and undercarriages.			
Refuel equipment off slopes, and 30 m away from any water body or aquatic habitats. Store all oils, lubricants, fuels, and chemicals in secure areas on impermeable pads, 30 m away from any water body, and provide berms if necessary. This action should be completed to also protect surface water, groundwater, aquatic and terrestrial habitat.			
Securely contain and remove any contaminated soils or other contaminated materials offsite to a licensed facility.			
Check that absorbent materials are available onsite in the event that a spill of deleterious substances should occur. All spills and leaks of deleterious substances must be immediately contained and cleaned up in accordance with regulatory requirements and reported immediately to the Ontario Spills Action Centre (1-800-268-6060), PCA Project Leader(613-530-3300) and PCA sector manager (705) 457-2632			
Cofferdams will be installed upstream and downstream of the existing Dam. Materials and methods for use in coffer dams must comply with the regulations and guidelines of the DFO. Earth or granular materials with sand and fines is not acceptable, however, washed gravel with 6mm minimum aggregate size can be used for coffer dam construction. If using sand bags sand must be washed of fines before placing in water. Use gravel/rock fill with rubber membranes, caissons, sheet piling, frame type structures or other coffer dams that do not generate turbidity.			

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Install marine grade turbidity curtains across waterbodies prior to any construction activity upstream and downstream of work site. The turbidity curtains to be anchored and weighted along length to form a continuous barrier with adequate flotation at water surface. Inspect daily and maintain turbidity curtains until the end of construction.			
Silt fences will be installed around the perimeters of all work areas including staging areas to prevent sediment and other deleterious substances from entering the water or other surrounding areas.			
Prepare and implement a turbidity monitoring program for the duration of construction activities. Initial visual observation of turbidity should be conducted, followed by additional measures as required such as installing monitoring stations both upstream and downstream of each activity site. The turbidity monitoring program shall include trigger levels (relative to background/ upstream conditions) for adjusting operations to minimize turbidity and also for work stoppage. Should increased turbidity levels or re-suspended sediments pose a hazard to sensitive natural habitats, PCA will be notified immediately.			
Rocks/stones used should not be taken from the bed or shoreline.			
Implement wet weather restrictions to activities			
Upon completion of work, completely remove all debris on the canal and creek bed and restore the area.			
Do not operate heavy equipment in waterway except when operated from a barge. Any small tools and equipment operating in water bodies must be cleaned prior to entering the water and inspected daily for leaks; equipment should never be left in water overnight. Do not skid construction material across waterways.			

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Do not pump water that flows/seeps through coffer dam into construction work area directly into waterways. Send all discharge to sediment traps in order to satisfy discharge requirements. Install, sediment trap as required to treat surface water runoff in the construction area and prevent sediment from entering waterways. Water quality downstream of construction site and/or released to watercourses not to exceed background turbidity readings of 8 nephelometric turbidity units (NTU) or change of 25 mg/l for suspended solids. Dispose of water so that it does not create a safety or health hazard, or cause damage to the environment, to adjacent property or cause erosion.			
Check that all painting and staining are done upland well above the upper controlled water elevation level.			
Attach drop clothes to scaffolding to prevent deleterious materials such as, paints, timbers, concrete, and solvents from entering the water. Ensure all equipment and temporary access structures such as scaffolding placed in watercourses are free of earth material, fuel, lubricants coolant and other deleterious material that could enter the watercourses.			

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<p>As concrete leachate is alkaline and highly toxic to fish and other aquatic life, ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials (concrete) will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside formed structures. Provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment. All concrete wash water will be disposed of offsite in a location where it will not enter subsurface drains, water bodies or storm drains. Prevent any water that contacts uncured or partly cured concrete during activities like exposed aggregate wash-off, wet curing, or equipment washing from directly or indirectly entering any watercourse or storm water system. Maintain complete isolation of all cast-in-place concrete and grouting from fish-bearing waters for a minimum of 48 hours if ambient air temperature is above 0°C and for a minimum of 72 hours if ambient air temperature is below 0°C. Isolate and hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH. Use only non-toxic biodegradable form stripping agents.</p>			
<p>Check that any construction vehicle entering onto privately owned lands or land outside of the DIA Study Area is thoroughly cleaned prior to arrival, for the purpose of removing any soil, organisms, or propagules from other worksites.</p>			
<p>Remove accumulated sediments prior to removing erosion control devices.</p>			
<p>Avoid intercepting aquifers; avoid unnecessary disruption of active tile drains.</p>			
<p>Maintain surface drainage, ponding, existing soil and ground cover conditions, etc. in groundwater recharge areas.</p>			

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Schedule work so that tree trunks are removed prior to hibernation period. If unavoidable prior to cutting trees, rap their trunks repeatedly with a stick (or similar object) to awaken hibernating mammals for work being completed in the winter.			
During stump removal, monitor the work and stop work as required to allow herpetofauna to escape the work area if observed. Relocate herpetofauna away from the construction area to a similar habitat within the surrounding area.			

