Preapproved Routine Impact Assessment Subsurface Drilling: High-Pressure Directional Drilling and Punch and Bore Crossings

Ontario Waterways
IAA 2019

Preapproved Routine Impact Assessments (PRIA) are pre-determined environmental management and mitigation measures for a defined class of routine, repetitive projects or activities with well understood and predictable effects. Approved PRIAs are an acceptable Impact Assessment pathway as they fulfill Parks Canada's obligations under the *Impact Assessment Act* (IAA) as a manager of federal lands.

This PRIA applies to the use of subsurface drilling (specifically trenchless methods such as high pressure directional drilling (HPDD) and punch and bore crossings) as a means to install service lines (e.g., cables and pipelines) underneath a watercourse, in this case a historic canal. HPDD and punch and bore allow cables and pipelines to be installed under watercourses without imparting any disturbance to shorelines and without in-water work.

HPPD is a trenchless method of crossing beneath a watercourse using a pressurized mud system. It involves drilling a pilot bore hole underneath the watercourse towards a surface target, back-reaming the bore hole to the drill rig while pulling the pipe along through the hole. This process typically uses the freshwater gel mud system composed of a mixture of clean, freshwater as the base, bentonite (clay-based drilling lubricant) as the viscosifier and synthetic polymers. This is an effective method but has the possibility of a frac-out, whereby drilling fluids are unintentionally returned to the surface through seepage pathways like rock fault lines and fractures.

Punch and bore refers to a trenchless crossing method which involves the excavation of a vertical bell hole or shallow depression on either side of a watercourse. Horizontal punching or boring between the two points, at an appropriate depth below the watercourse, completes the creation of a passage-way for the crossing. Punch and bore crossings differ from high-pressure directional drilled crossings, in that no pressurized mud systems are required, thereby avoiding the risk of sediment release due to frac-out.

In addition to application of the mitigations herein, proponents are expected to adhere to all Federal, Provincial and Municipal regulations and codes governing construction activities and shall obtain all permits, licenses and approvals required. In particular, proponents should be aware that although Transport Canada considers this type of project to be "zero interference" work, as there are no impacts to navigation, the Canadian Navigable Waters Act still applies. Under this Act, the applicant must deposit information about the project and publish a notice to advise the public about the work (no advertising comment period is required). The deposit of information is done through Transport Canada's external submission site.

Service lines include gas, communications, fibre optics, power, sewer, storm water, oil and/or water utilities.

Water body includes a lake, a canal, a reservoir, an ocean, a river and its tributaries and a wetland, up to the annual high water mark, but does not include sewage or waste treatment lagoon, a mine tailings pond, an artificial irrigation pond, a dugout or a ditch that does not contain fish habitat as defined in subsection 2(1) of the *Fisheries Act*.

High water mark is the usual or average level to which a body of water rises at its highest point and remains for a sufficient time so as to leave a mark on the land. (Fisheries and Oceans Canada, 2015). Upper Controlled Water Elevation (UCWE) is used as definition of high water mark in managed waterways.

Sensitive features: Any areas designated by the Impact Assessment Officer or through the Impact Assessment process as locations that require additional care and consideration for project activities. Examples of sensitive features include but are not limited to nests, dens and roosts, fish spawning areas, locations of cultural resources, critical habitat or residences for species at risk, riparian areas, wetlands, wildlife corridors, rare ecotypes and areas of management concern.

Scope of Application:

This PRIA includes:

- Installation and maintenance of trenchless crossings, such as HPDD and Punch and Bore, underneath a historic canal.
- Installation of service lines.
- Equipment laydown.
- Minor vegetation removal

Conditions and Exceptions:

This PRIA does not apply under the following exceptions/conditions:

- The project permanently alters the characteristics of a water body (e.g., temperature, pH, turbidity, flow, water level, water body bed).
    - This includes, permanent fill placed in a water body or permanently increasing a physical work's footprint below the high water mark; dredging; and construction of a permanent diversion channel.

- Project results in **residual** adverse effects to sensitive natural or cultural features. Note that an archaeological assessment may be required for affected Parks Canada lands before it can be determined whether this exclusion applies.

- Cutting or removing trees through the use of heavy equipment (e.g. skidders, harvesters or excavators).

- The project results in **residual** adverse effects on migratory birds or their nests.

- The project results in **residual** adverse effects on an individual, a residence or the critical habitat of a listed species at risk under the *Species at Risk Act*.

- The project is likely to require an approval under the *Canadian Navigable Waters Act* (s. 5(1)). Check if your project is a Major Works in any Navigable Water or Works in Navigable Waters Listed on the Schedule.

- The project is likely to require an authorization under the *Fisheries Act* (s.35(1) or 36(3)). Check if your projects needs a review.

- The project involves the removal of or causes damage to cultural resources of heritage value, for example, heritage buildings designated by the Federal Heritage Buildings Review Office, archaeological sites, historical and archaeological objects, or cultural landscapes.

- The project involves the removal of or causes damage to paleontological resources.

- The project results in loss or reduction in size of a wetland.

- The project adversely impacts sites of significance to Indigenous peoples or current access and use of areas where hunting, fishing or gathering rights are exercised by Indigenous peoples.

- Projects likely to result in significant interest or controversy among members of the public, stakeholders or Indigenous peoples related to potential adverse effects on natural or cultural resources, or components of the environment critical to key visitor experience objectives.

Approved geographic area of application:

This PRIA may be used with projects located within the Trent-Severn Waterway and Rideau Canal National Historic Sites and could be applied to similar works in other historic canals.

Valued Components and Effects Analysis

Terrestrial Wildlife and Habitat

- Increased soil compaction due to heavy equipment
- Increased soil exposure resulting in erosion and sedimentation
- Contamination of soil through equipment leakage
- Disruption and mortality to wildlife (migration, breeding, nesting, feeding, resting) due to noise activity
- Physical damage and/or loss of vegetation and habitat

Aquatic Wildlife and Habitat

- Adverse modifications to physical drainage patterns
- Disruption to migration, spawning, feeding and resting, and possible mortality from noise activity, high turbidity, and/or releases of deleterious substances

Water Quality

- Contamination of water from equipment leaks, accidental spills, contaminated groundwater input, contaminant input from from surface runoff (e.g. metals, petroleum hydrocarbons)
- Contamination of water quality and reduced clarity due to frac-out, erosion and sedimentation
- Increased potential for release of sediments downstream, including contaminated sediments

Cultural Resources

- Negative impacts to cultural resources including structures, viewscapes and cultural landscapes
- Adverse impacts to terrestrial and underwater archaeological resources
- Detrimental impact to the outstanding universal values associated with UNESCO World Heritage Site status (applies to the Rideau Canal specifically)

Mitigation Measures

Pre-Project Planning, Scope and Scheduling:

1) All mitigation measures shall be implemented to the satisfaction of Parks Canada.
2) Inform Parks Canada of any changes to project plans and/or scheduling.
3) Ensure that all on-site personnel are aware of, and comply with, these mitigation measures.
4) Work within the vicinity of waterbodies will require a site specific Erosion and Sediment Control Plan, a Spill Response Plan, an Emergency Frac-out Response Plan (for HPDD only), and a Noise Monitoring Plan to include monitoring on land and in water. These plans should be submitted to Parks Canada for review and comment before the work begins.
5) Adhere to local noise by-laws and notify residents of planned activities that may cause disturbance.

6) A properly contained staging area set back at the maximum available on site distance from the water's edge (30 meter minimum unless otherwise approved by Parks Canada) shall be identified for the storage of materials, liquid products (in a secure area on impermeable pads) and equipment.
7) Clearly identify and avoid sensitive environmental features and habitats in the work area and schedule work to avoid critical wildlife life stages (see the Environmental Timing Windows Table).

Environmental Timing Windows Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fish	NO INSTREAM WORK (refer to fish window details below)						Least risk window for work in and around freshwater, July 1 – Sept 15			NO INSTREAM WORK (refer to fish window details below)		
Birds	Reduced risk for harm to birds			NO VEGETATION REMOVAL Bird Nesting Period: April - August					Reduced risk for harm to birds			
Bats	Bat in Hibernacula				Bats Nursing Pups							Bat in Hibernacula
Turtles	Hibernation			Road Mortality	Nesting -avoid disturbance		Road Mortality		Hatchlings – avoid disturbing	Road Mortality		Hibernation
Snakes	Avoid disturbance of Hibernacula				Road Mortality		Peak breeding, live young Mitigate road mortality			Migration Road mortality		Avoid disturbance of Hibernacula

8) To protect fish from noise impacts during the sensitive spawning period, no drilling should occur under the water body during the pertinent fish window, unless otherwise approved by Parks Canada.

Trent-Severn Waterway work restriction windows

- No work from September 15th to June 30th on the Trent River from the Downstream side of Lock 1 and Dam 1 to the Bay of Quinte.
- No work permitted from October 15 to June 30 in Stony Lake and Clear Lake.
- No work permitted from March 15 to July 15 in Severn River (including Gloucester Pool and Little Lake), Sparrow Lake, Talbot River and connecting canal channels.
- No work permitted from March 15 to June 30 in all other waterbodies that comprise the Trent-Severn Waterway

Rideau Canal work restriction windows

- No work permitted from September 15 – June 30 in the Cataraqui River.
- No work permitted from October 1 – June 30 in Big Rideau Lake and part of Dog Lake.
- No work permitted from October 15 – June 30 in Lower Rideau Lake and Indian Lake.
- No work permitted from January 1 – June 30 in the Rideau River (Ottawa to Old Slys) and Upper Rideau Lake.
- No work permitted from March 15 to June 30 in all other waterbodies that comprise the Rideau Canal.

9) Site clearing/commencement of construction should be planned to occur outside of sensitive nesting times for birds and bat maternity - April 1 to August 31. If this is not feasible, then the site must be inspected by a biologist prior to clearing, to check for the presence of nests or bat roosts.

Equipment Operations:

10) All machinery and equipment shall be clean, free of leaks, in optimal working condition.
11) Maintain equipment and machinery to avoid leakage of fuels and liquids. Ensure measures are in place to minimize impacts of accidental spills.

12) Vehicle and equipment re-fueling and/or maintenance shall be conducted over an impermeable-lined drip/spill tray to allow full containment of spill, off of slopes and at least 30 m away from the water. If this is not possible, locations closer than 30 m must be approved by Parks Canada.
13) Drip/spill trays shall be placed under all fuel-powered equipment. Drip trays shall be sized appropriately to encompass the outer perimeter of the equipment/machinery, providing adequate spacing for refueling activities.

Hazardous Materials Management:

14) If potentially contaminated material is uncovered during excavation / construction, work must stop and excavated materials must be secured onsite in a manner that prevents contamination of the surrounding environment, including leaching. Parks Canada must be contacted for further direction.
15) Store all oils, lubricants, fuels and chemicals within sealed, impermeable containers, within secure areas and upon impermeable-lined drip/spill trays.

Terrestrial Wildlife and Habitat:

16) Prior to commencement of work inspect the work area for any nests or dens and avoid disturbing any that may be found.
17) Should conditions at the worksite indicate there are unforeseen negative impacts to terrestrial wildlife including Species at Risk, all works shall cease until the problem has been corrected and Parks Canada has been consulted/notified. Parks Canada has the right to require that work be altered or ceased immediately.
18) Should any suspected Species at Risk snakes or turtles and/or eggs be encountered during construction (project staging, implementation or demobilization) work must halt immediately and Parks Canada be notified. Additional measures to avoid impacts may be required before work can restart. Stand back and allow the animal to leave the site.
19) Avoid damage to wildlife habitat features wherever possible.
20) Minimize the time excavations remain open and cover or fence when left unattended to reduce the potential for wildlife injury.
21) Never approach or harass wildlife (e.g., feeding, baiting, luring). If wildlife is observed at or near the work site, allow the animal(s) the opportunity to leave the work area.
22) Heavy equipment should only be used on roads or temporary access roads in order to avoid soil compaction.
23) If recommended by a qualified person and approved by Parks Canada, conduct "Pre-stressing" activities within a few days prior to the onset of site preparation (vegetation clearing and grubbing) to encourage wildlife to move away from the site. The need for, type and frequency of pre-stressing activities will consider:
    - o The amount and quality of information available about wildlife;
    - o The size of the area to be affected;
    - o The proposed timing of project works and activities (i.e., within or outside of prescribed timing windows);
    - o The need for multiple pre-stressing events

Aquatic Wildlife and Habitat:

24) Avoid modifications of physical drainage patterns within the work area.
25) Should conditions at the worksite indicate there are unforeseen negative impacts to aquatic wildlife including Species at Risk, all works shall cease until the problem has been corrected and Parks Canada has been consulted/notified. Parks Canada has the right to require that work be altered or ceased immediately.

Noise:

26) Ensure that noise levels related to all activities do not exceed 125 dBA in order to avoid auditory injury in birds.
27) Ensure that project activities do not exceed a sound pressure threshold of 207 dB re 1 μPa in order to avoid mortality or potential mortal injury in fish, fish eggs, and turtles.

Vegetation:

28) All clearing activities must be pre-approved by Parks Canada.
29) Clear minimum area necessary; trees should be removed only if necessary for project completion or visitor/staff safety.
30) Employ pruning techniques to minimize risk of tearing the bark and harming the tree. Prune limbs close to the tree trunk. For a clean cut, make a shallow undercut first, then follow with the top cut. This prevents the limb from peeling bark off the tree as it falls.
31) Where practical, the branches of the large trees should be trimmed back as the first option rather than cutting the entire tree.
32) Protect roots of trees to drip line to prevent disturbance or damage. Avoid traffic, dumping and storage of materials over root zone.
33) The felling of trees with obvious wildlife use (e.g., snags with cavity nests, large trees with stick nests) must be avoided wherever possible; if unavoidable, Parks Canada staff consultation and approval is required.
34) After suitably backfilling and packing the bell holes, vegetate any disturbed areas by planting and seeding with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with biodegradable erosion control blankets to keep the soil in place to prevent erosion and sediment deposition in the waterway) and vegetated the following spring.
35) Restore site with appropriate native plantings to maintain or improve wildlife habitat conditions. Ensure re-planting success.

Sediment and Erosion Control:

36) Erosion and sediment control measures shall be implemented prior to work and maintained during the work phase, to prevent erosion and the entry of sediment into the water.
37) All erosion and sediment control measures shall be inspected daily to ensure they are functioning properly and are maintained and/or upgraded as required to prevent entry of sediment into the water.
38) If sediment and erosion control measures are not functioning properly, no further work shall occur until the sediment and/or erosion problem is addressed to the satisfaction of Parks Canada.
39) Avoid activities that could lead to erosion during excessively wet weather conditions; monitor forecasts for heavy rainfall watches & warnings.
40) Any waste or stockpiled materials shall be stored and stabilized a safe distance away from any watercourse, drainage course or swales to prevent erosion and subsequent entry into the water, or removed from the site in accordance with all federal, municipal and provincial regulations.
41) All disturbed areas of the work site shall be stabilized immediately and re-vegetated as soon as conditions allow. All exposed areas should be covered with erosion control blankets or other measures to keep the soil in place and prevent erosion until vegetated in the spring.
42) Synthetic plastic Erosion Control Blankets/Mats should not be utilized, particularly during nesting season as they pose as an entrapment hazard to turtles. Fibre-based bio-degradable Erosion Control Blankets/Mats are only to be utilized.
43) Maintain effective erosion and sediment control measures until re-vegetation of disturbed areas is achieved.

Drilling, Excavation and Risk of Frac-out:

44) Design the drill/ punch or bore path to an appropriate depth below the waterway to minimize the risk of frac-out and to a depth to prevent the line from becoming exposed due to natural scouring of the stream bed. The drill entry and exit points are far enough from the banks of the waterway to have minimal impact on these areas.
45) If drilling fluids and required, only fresh water shall be used for fluid preparation. No toxic or hazardous substances are to be added to the drilling fluid.
46) Excavate bell holes beyond the high water mark, far enough away from any waterway to allow containment of any sediment or deleterious substances above the high water mark.

47) All waste generated by drilling shall be disposed according to Ontario Regulation 558/00. R.R.O. 1990 (General – Waste Management).
48) Construct a dugout/settling basin at the drilling exit site to contain drilling mud to prevent sediment and other deleterious substances from entering the waterway. If this cannot be achieved, use silt fences or other effective sediment and erosion control measures to prevent drilling mud from entering the waterway. Inspect these measures regularly during the course of construction and make all necessary repairs if any damage occurs.
49) Dispose of excess drilling mud, cuttings and other waste materials at an adequately sized disposal facility located away from the water to prevent it from entering the waterway.
50) Monitor the waterway to observe signs of surface migration (frac-out) of drilling mud during all phases of construction.
51) When dewatering bell holes, remove suspended solids by diverting water into a vegetated area or settling basin, and prevent sediment and other deleterious substances from entering the waterway.

Purged Groundwater and Flowing Wells:

52) Groundwater (contaminated or otherwise) that has been purged/removed from groundwater monitoring wells is defined as a Liquid Industrial Waste (LIW) under R.R.O 1990, Regulation 347 (O. Reg. 347) of the Environmental Protection Act. All groundwater purged from monitoring wells must be contained in sealed containers and temporarily stored on the project site until it is collected for disposal by a licensed waste hauler.
53) All off-site shipments of purged groundwater must be accompanied by a MOECC waste manifest and the generator of the purged groundwater must be registered as a generator of hazardous waste with the MOECC. A Hazardous Waste Information Network (HWIN) number will be issued for the waste generator upon their registration with the MOECC, and this HWIN number must be used on all waste manifests.
54) Artesian or flowing wells must be controlled and constructed in accordance with Ontario Regulation 903 (Wells) as amended, made under the Ontario Water Resources Act which provides minimum construction requirements for the construction of a flowing well.

Water Quality:

55) Activities causing turbidity or release of sediment will comply with the CCME Guidelines on Total Particulate Matter (see this website).

Spill Response Plans and Frac-Out Response Plan:

56) An emergency spill kit shall be kept on-site and employed immediately should a spill occur. The contractor shall ensure that adequate additional spill clean-up resources are available.
57) In the event of a spill, Parks Canada and the Ontario Spill Action Centre (1-800-268-6060) shall be notified immediately. Remediation will be conducted immediately to contain and clean up in accordance with federal and provincial regulatory requirements AND to the satisfaction of Parks Canada. Documentation of remediation, testing and results will be provided to Parks Canada.
58) Keep all material and equipment needed to contain and clean up drilling mud releases on site and readily accessible in the event of a frac-out.
59) If required, implement the frac-out response plan that includes measures to stop work, contain the drilling mud and prevent its further migration into the waterway. Notify all applicable authorities and prioritize clean up activities relative to the risk of potential harm. Dispose of the drilling mud in a manner that prevents re-entry into the waterway.
60) Ensure clean up measures do not result in greater damage to the banks and waterway than from leaving the drilling mud in place.
61) In the event of a frac-out, implement the contingency crossing plan including measures to either re-drill at a more appropriate location or to isolate the waterway to complete the crossing at the current location.

Cultural Resources:

62) If archaeological, cultural resources, or character-defining elements (e.g. structural features or artifact concentrations) are encountered or damaged during construction activities, work will cease in the immediate area and Parks Canada shall be informed. The Parks Canada Project Lead should then contact Parks Canada's Archaeology section for advice and assessment of significance, and if necessary, any further mitigation measures. Ensure that all exposed underwater cultural materials are kept submerged and/or wet while waiting direction. Work shall not resume at the location concerned until the Project Lead has been advised in writing that measures for the protection of those resources/remains have been put in place.

63) In accordance with the Rideau Canal National Historic Site of Canada's inscription as a UNESCO World Heritage Site, the implementation of all construction-related activities must have consideration towards maintaining the 30 metre buffer zone, and visual impacts are encouraged to be minimized within this area.

Supplementary Mitigations

A few supplementary mitigation(s) may be required to ensure all potential impacts are mitigated.

FUS/Director of Waterway Approval

Original signed by David Britton June 5, 2020

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David Britton, Director of Ontario Waterways Date

References:

Environmental Standards and Guidelines Document – Ontario Waterways, 2017. Prepared for Parks Canada by SLR Consulting (Canada) Ltd. 49 pp. + appendices.

Fisheries and Oceans Canada, 2007. Operational Statement for High-Pressure Directional Drilling. Version 3.0 No longer available on the DFO website. [Note that some of the PRIA mitigations were derived from this document].

Fisheries and Oceans Canada, 2007. Operational Statement for Punch and Bore Crossings. Version 3.0 No longer available on the DFO website. [Note that some of the PRIA mitigations were derived from this document].

Li, Z. and D. Zeddies. 2017. Underwater Noise Modelling of Impact Pile Driving: Based on a Preliminary Design of the Third Crossing of the Cataraqui River, Kingston, ON. Document 01193, Version 2.0. Technical report by JASCO Applied Sciences for Golder Associates Ltd. [Sound pressure thresholds adapted from Popper, A.N., A.D. Hawkins, R.R. Fay, D.A. Mann, S. Bartol, T.J. Carlson, S. Coombs, W.T. Ellison, R.L. Gentry, et al. 2014. Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI. Springer Briefs in Oceanography, vol. ASA S3/SC1.4 TR-2014. ASA Press. 87 pp.]

O'Neill, C. and H. Yurk. 2017. In-Air Noise Impact Assessment for Birds and Reptiles: Based on a Preliminary Design of the Third Crossing of the Cataraqui River, Kingston, ON. Document 01194, Version 1.0. Technical report by JASCO Applied Sciences for Golder Associates Ltd.

Ontario Waterways, 2018. BMP: High-Pressure Directional Drilling (HPDD) and Punch and Bore Crossings. Approved 09/19/2018.