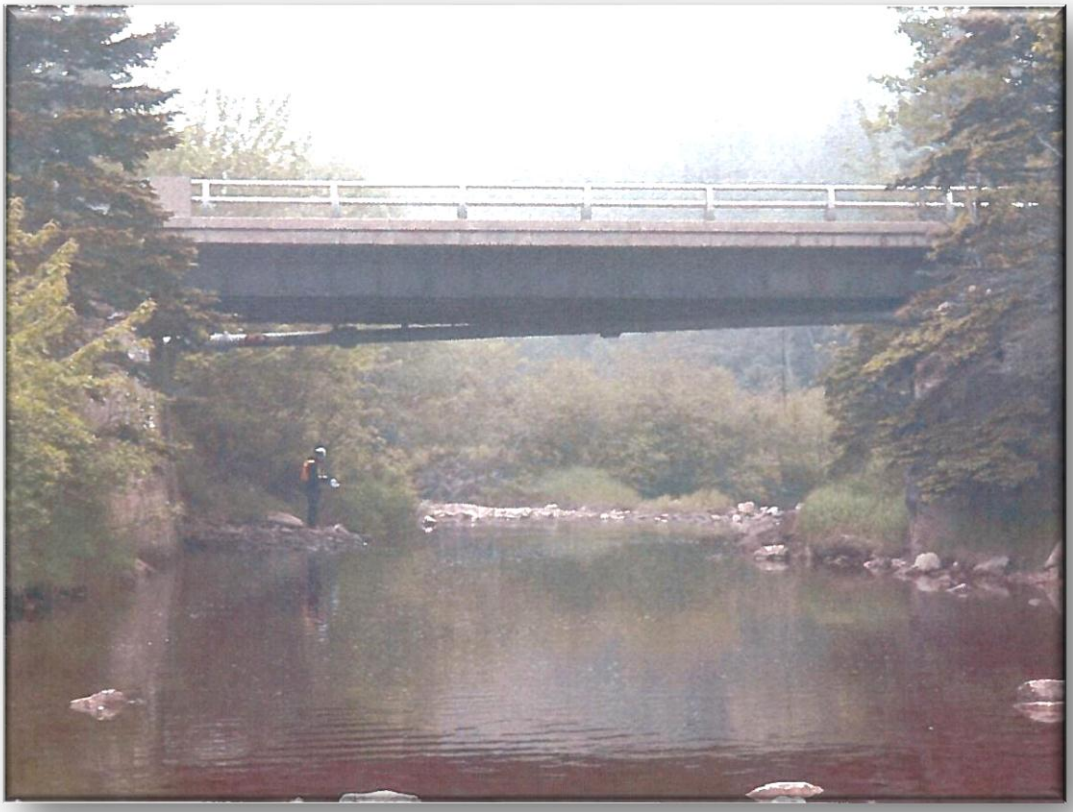
Appendix B

Basic Impact Analysis

Basic Impact Analysis

Neil Brook Bridge Replacement Project
Cape Breton Highlands National Park of Canada
Neil's Harbour, Nova Scotia



Cape Breton Field Unit

File #: CBFU2015-004

November 2015

Parks Canada Parcs Canada

Canada

PROJECT TITLE	Neil Brook Bridge Replacement, CBHNPC
PROJECT LOCATION	Cape Breton Highlands National Park of Canada
PROJECT SITE	Cabot Trail/ Neil's Harbour Intersection – adjacent to Neil Brook Day Use Area
PROPONENT	Kate McCarthy, *Project Manager* (PWGSC) 902.496.5047 kate.mccarthy@pwgsc.gc.ca
PROJECT DATES	2015/12/01 to 2017/03/30
PROJECT #	CBFU-2015-004

BACKGROUND

Built in 1948, Neil Brook Bridge is a single-span structure with two concrete abutments overlain with steel girders. Numerous repairs over the years have resulted in the need for full bridge replacement. Examples of such defects include: deformation and gouging of tube rails and posts; cracks in the concrete deck surface; expansion joints are full of sand and gravel and are leaking; pot-holed approaches, significant cracks in the deck underside and spalls along top flange edges of the steel girders. A previous inspection report revealed that the structure has approximately five (5) years of useful life remaining.

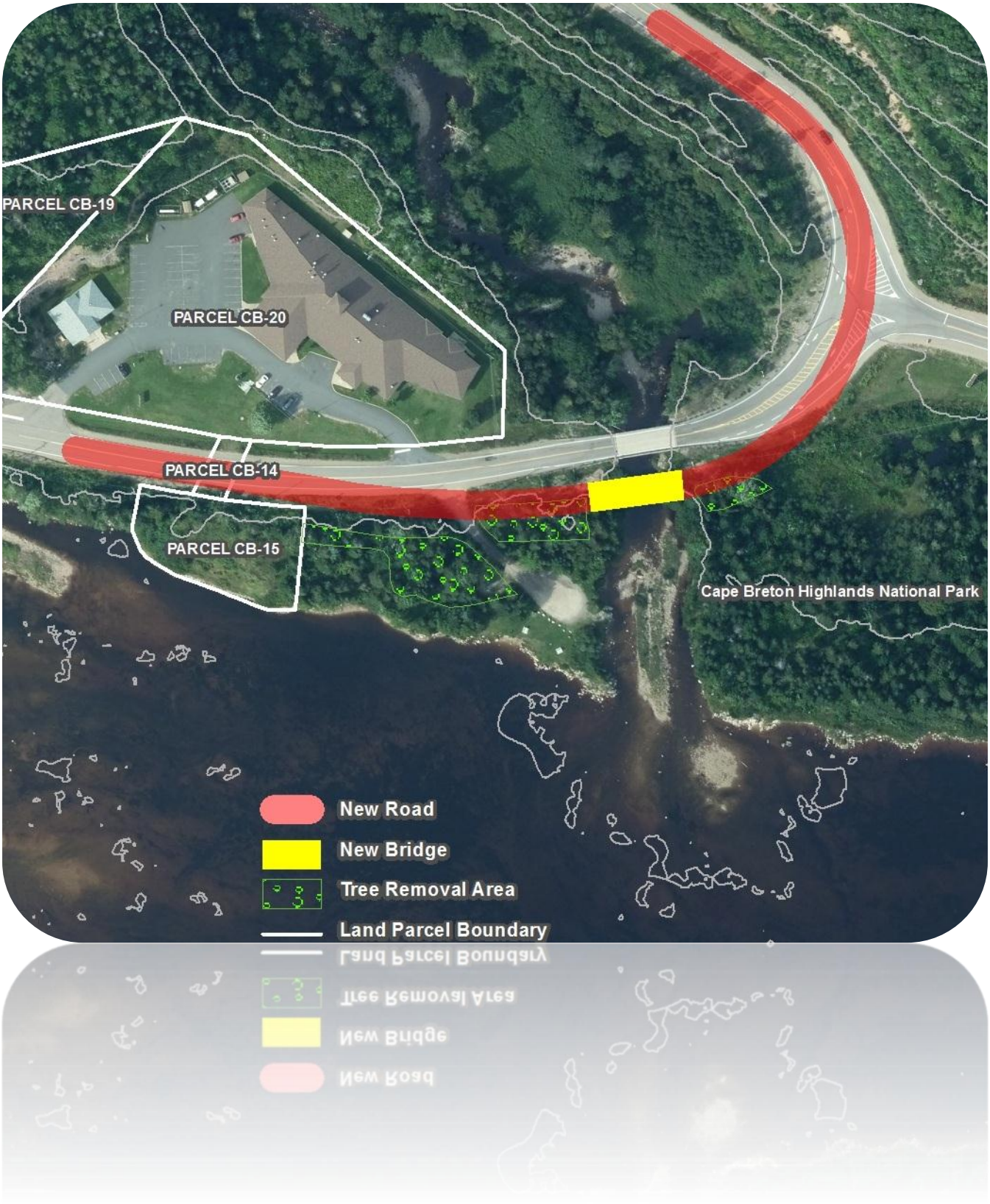
PROJECT DESCRIPTION

The objective is to replace the existing Neil Brook Bridge with a new replacement structure. Using NSTIR and PWGSC design standards, the intent is for a superior, durable, cost-effective and safe solution that enhances and promotes tourism appeal of the Neil's Harbour area. The construction aims to ensure uninterrupted service for vital hospital, emergency, school, and community traffic.

The new bridge will be realigned downstream (south) of the existing bridge which, by the way, will remain operational during construction. The new alignment is based on the *Transportation Association of Canada Geometric Design Guide* classifying this new section as RCU-60 (i.e., Rural Local Undivided with a design speed of 60 km/hr, up from 50). Other design considerations include, constructability, challenges associated with proximity of the Buchanan Memorial Community Health Centre, and the nearby Cabot Trail and Neil's Harbour Road intersection. In the end, the new alignment will allow for a reduction in the "hairpin turn" effect with an increase curvature radius compared to current conditions.

The estimated bridge footprint general work vicinity is about 100m² part of which includes installation of water control measure to allow for work completion in the dry. There are no other in-water works planned beyond the immediate abutment bases. There is a low probability of siltation originating from within the construction footprint. Should accidental release occur, the magnitude of effects would likely be low factoring in standard mitigation from this BIA.

Figure 1. Neil Brook Proposed Realignment.



PROJECT CONSIDERATIONS

Schedule

- Construction is tentatively scheduled from December 2015 and continue until March 2017.
- The existing bridge will remain operational until new construction is complete.
- Demolition of existing bridge is scheduled upon completion of the new structure.
- Special precautions will be in place to ensure negative impacts to the hospital are mitigated. For example during pile driving, integral to bridge construction, the schedule will have to be carefully communicated to the adjacent hospital.

Traffic

- Minor traffic disruptions are anticipated when transferring to new alignment with tie-in delays from one to two days with single-lane closure.
- Traffic control personnel will be posted onsite during lane closure to accommodate emergency vehicle passage.

Waterline

- The municipal waterline that services the hospital, crosses under the existing bridge.
- The new waterline will be installed just prior to when the new bridge is ready for opening and before the existing bridge is removed, thereby allowing for minimal supply disruption.
- If during construction the existing waterline conflicts with the location of the new structure, a temporary water service will have to be provided.

Power Line and Utility Poles

- The existing power poles running along the south side of the road will require relocation.
- Any interruptions will be coordinated by utility providers and the hospital and others affected.

Final Alignment

- This new alignment will reduce risk to the hospital by moving highway to a greater distance away, thus reducing property and highway proximity issues.
- The new 70m highway curve radius will be an improvement the over existing conditions, though still below the 150m curve radius as suggested in the TAC Manual. Additional cautionary signage will be required to offset risk and reduce motorist concern.

Property Boundaries

- Bridge realignment will slightly encroach onto the partially developed area where the “Welcome to Neil’s Harbour” sign exist. There may be a need to inform those responsible for sign upkeep about the proposed realignment.

Contractor Lay-Down

- Some initial concern was expressed due to the lack of lay down area for contractors during construction.
- If the Neil Brook DUA is chosen, site closure would be necessary during construction. Pre-work authorization will be required.
- A second less desirable lay-down site is located on the small clearing south of the Neil's Harbour/ Cabot Trail, adjacent to the existing alignment.

Bridge Pedestrian Walkway

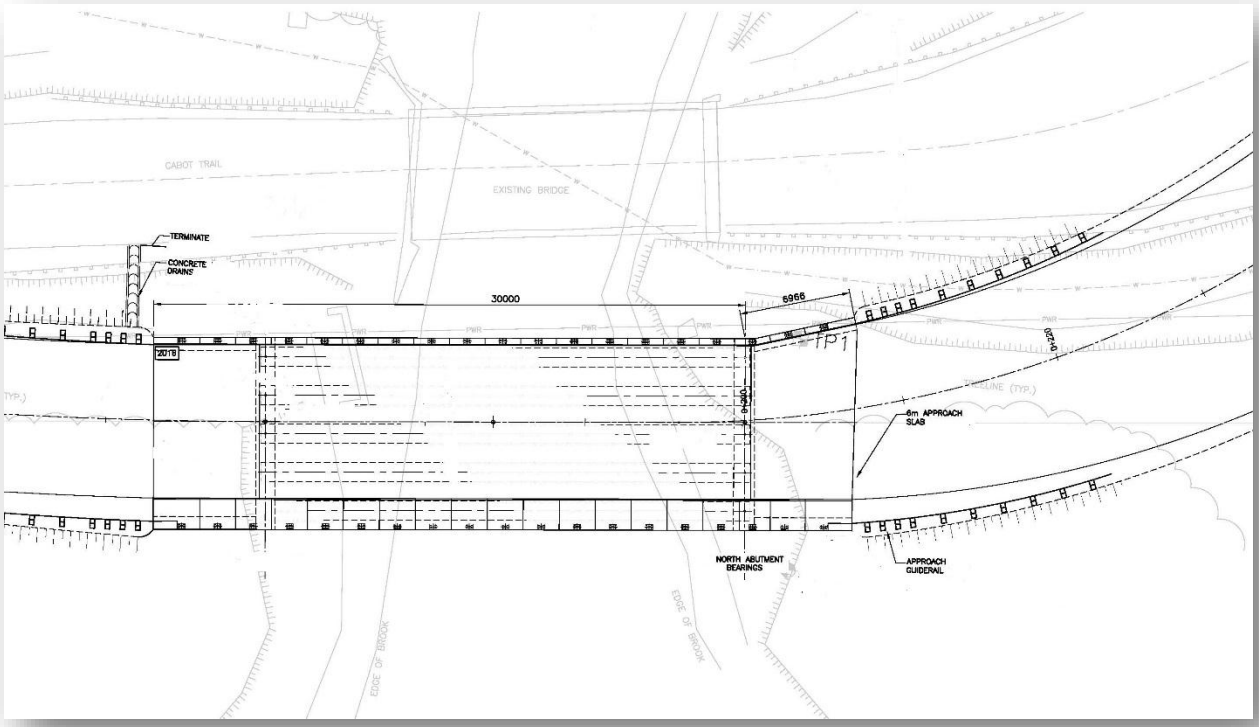
- There will be no separation between the pedestrian sidewalk and the bridge roadway.
- The railing will consist of a hardened material resistance to snow-plow loading that complies with pedestrian safety, and does not block views from roadway to off-road features.

BRIDGE REPLACEMENT ACTIVITIES

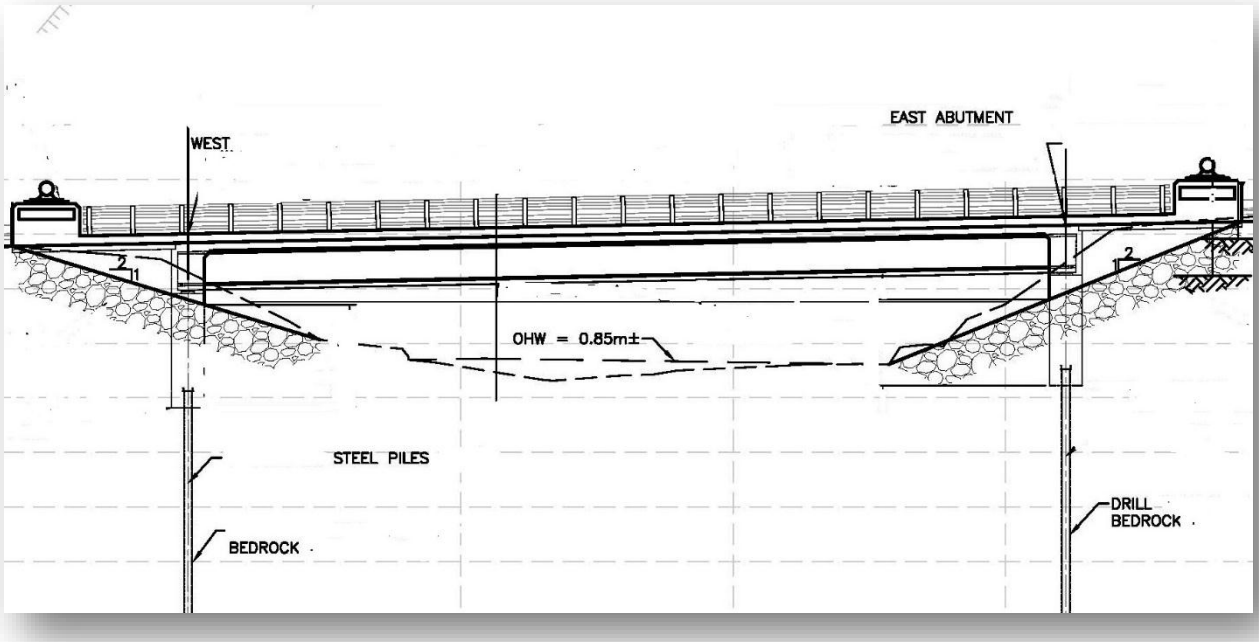
Although actual project specifics have yet to be determined, the following provides a general listing of planned activities.

- Delineation and clearing of buffer zones;
- Installation of environmental protection measures, including terrestrial silt controls and aquatic turbidity curtain(s);
- Further site preparation including excavation and contouring;
- Traffic control during construction activities;
- Installation of abutments, formation and casting of concrete;
- Erection of infrastructure support and forming and placing concrete deck on the steel plate girders;
- Placement of riprap for slope protection in accordance with geotechnical report;
- Construction of approach end alignments;
- Placement sub-grade granular material, & asphalt pavement on approaches and bridge deck;
- Removal of existing piers and abutments;
- Remove temporary detour and access roads; sediment control fences and other environmental protection devices;
- Demobilization of equipment and temporary infrastructure; and,
- Remediation of slopes and impacted areas to the satisfaction of PCA. This may involve use of topsoil, mulch, hydro-seed, sod shrubs and small trees as per specifications.

Overview of Proposed Bridge (Specs)



Cross-sectional



VALUED ECOSYSTEM COMPONENTS

Valued Ecosystem Components (VECs) are environmental elements with scientific, social, cultural, economic, archaeological or aesthetic importance. VECs with potential to interact with project components are listed below:

BIOPHYSICAL

Vegetation (*clearing shoreline vegetation*)

- Loss of riparian habitat could undermine channel stability, alters cover and protection from predators, and creates physical disturbances;
- Riparian clearing leads to water temperature rise, affecting fish (i.e., reduced reproductively, direct mortality, etc.); and,
- Planting vegetation adjacent to a watercourse may involve the use of fertilizers, and increases the risk of non-native introductions.

Aquatic habitat (*equipment use and potential for spills*)

- Direct injury or mortality of fish eggs, larvae, invertebrates, etc.;
- Increased streambank erosion and siltation of waterbody; and,
- Increased pollutants can breach the range of chemical parameters that support healthy aquatic communities and seriously affect fish and fish habitat (i.e., direct fatality, ecosystem alteration, changes in the abundance, composition, diversity of communities and habitats.

Avifaunal *(bridge demolition and nearby construction activities)*

- Construction and demolition activities could disturb nesting migratory birds;
- Construction could disrupt waterfowl (e.g. mergansers, goldeneye) using area waters near bridge;
- During construction, lights can adversely impact birds especially night-flying birds attracted to lights during fog, drizzle, haze, storm, etc. This may result in collisions or their support structures;
- Disoriented birds are prone to circling a light source and may deplete their energy reserves and either die of exhaustion or drop to the ground where they are at risk of predation; and,
- Vehicle and pedestrian traffic on shorelines and beaches loosens sand, damages the plant cover and disrupts or displaces avifaunal.

Aquatic species (*in-water structures and other physical barriers, accidental spills, etc.*)

- Improper timing may impact sensitive stages for fish, especially during larval and hatching;
- Channel modification promotes insurgence of invasive species or non-native aquatic species;
- Fish may become entrained through intakes or impinged at screens resulting in injury or mortality; and,
- Alteration to water depth, flows or substrate can cause a disruption to fish habitats essential during various life processes as spawning and rearing.

Terrestrial landforms (*temporary access road development, shoreline excavations, trenching, ditching, etc.*)

- Altered flows lead to changes land surface characteristics;
- Change in water temperature directly affects physical, biological and chemical characteristics;
- Increased streambank erosion results in excess of organic and inorganic materials; and,
- Removal of riparian vegetation reduces channel stability, cover and protection from predators and physical disturbances.

Aquatic debris (*direct removal of shoreline debris, aquatic debris, instream travel, etc.*)

- Ecological effects can range from direct fatality to ecosystem alteration with changes to species abundance, composition, diversity of communities;
- Eroded soils can affect the watercourse's capacity to maintain a diverse community of aquatic organisms by restricting habitat connectivity and opportunities for aquatic organisms;
- Removal of riparian vegetation could reduce channel stability, cover and protection from predators and the availability of diverse and stable habitats; and,
- An increase or decrease in the quantity or composition of the food supply can alter the structure of the aquatic community.

Flow - timing, duration, frequency (*installation of erosion control devices in waterbodies*)

- Instream infrastructure can prevents fish migration between feeding, rearing and spawning areas;
- Excessive flow velocities can create migration barriers, and displace fish from habitat;
- Reduced flow can result in the stranding of fish; and
- Deposition of eroded soil from instream and adjacent infrastructures can restrict habitat connectivity and the opportunities for organisms to use, colonize, and move between existing aquatic environments.

Soundscape/ viewscapes (*construction noise and associated visual impacts)*

- Construction noise, especially during pile driving and heavy equipment operations may affect hospital staff and residence and well as nearby community members.
- During construction, aesthetic impacts expected for this high visibility area, even during the low visitation off season.

CULTURAL RESOURCES (*earthworks - excavations, trenching, contouring, etc.*)

- Archeological resources could be damaged or destroyed. The significance of which is unknown but the risk is considered low.

VISITOR EXPERIENCE (*general construction and replacement activities*)

- Closure of the DUA may draw some concern from park visitors and locals; and,
- Potential safety concerns for the travelling public through the construction zone, especially for pedestrians, cyclists, motorcyclists and the general motorists.

EFFECTS ANALYSIS

Ecologically, the most important **positive** effect from this proposal is the anticipated improvements to aquatic habitat. The newer bridge will enable a higher more natural flow accommodation during periods of high precipitation.

The most important **negative** effect could be the impacts to fish and fish habitat during construction phase of the undertaking (*Refer to Appendix 1 Effects Matrix Analysis for detailed information).*

MITIGATION

Planning

1. As much as possible, design alignment at right angles for stream crossings to minimize span length, number of bridge piers, etc. thereby resulting in minimal instream habitat loss;
2. As much as possible, situate abutments back against the slope to minimize the need for instream causeway construction and encroachment;
3. Plan to maintain existing riparian habitat as much as possible – consider alternative locations - alignments, designs, etc. to minimize environment footprint; and,
4. If deemed appropriate, consider compensation for situations involving a net loss of aquatic habitat. PCA should identify candidate locations of already impacted park aquatic ecosystems in exchange for lost habitat. Restore such areas to a scale equal to or greater than subject habitat loss.

Surveying

5. Clearing is to be carried out manually (e.g., chainsaws, axes, chippers etc.);
6. Equipment used for the surveying process shall be in good working order;
7. No trees or bushes shall be felled across or into watercourse;
8. Place cut vegetation where it cannot be washed into a watercourse;
9. Fuels required during surveying will be stored at least 30m from watercourse;
10. Work will be carried out in a manner that minimizes ground disturbance, soil exposure and not result in noticeable suspended sediment in a watercourse; and,
11. Vegetation shall be maintained along waterbodies to provide bank stability and adequate shade for fish, especially around pool areas.

Geotechnical investigations

12. All access roads shall remain unobstructed;
13. Test pits shall be backfilled and smooth-graded immediately following data collection;
14. Exposed soils from drill holes, test pits and drill rig tracks must be stabilized (e.g., hay);
15. Watercourse crossings shall be avoided – consider existing or alternate routes;
16. No in-channel test pits shall be excavated at any time;
17. All equipment shall be in good working order and free of deleterious substances;
18. Any equipment leaking fluids/ fuels shall be immediately and appropriately cleaned up; and,
19. All equipment shall have a spill kit readily available.

Vegetation

20. Chipped material will be evenly dispersed or used as fill for ruts and exposed soils;
21. No trees or chipped waste will be felled or disposed of into watercourse;
22. If it cannot be achieved of as outlined above, disposal will then occur at a PCA-approved landfill; and,
23. Stockpiled or disposed material shall be kept 30m from watercourse.

Watercourse diversions

24. Field staff must be familiar with the requirements as outlined in the BIA and DFO Letter of Advice;
25. Pumps & hoses fitted with screens are required when pumping directly from the river;
26. Two pumps are required: one to pump water, one for back up;
27. Pumps, when in use, should be monitored to ensure that they are functioning properly;
28. If water does not naturally flow from diverted area, then remaining water must be pumped; and,
29. If water has a high concentration of sediments, pumped water must be filtered to a vegetated area at least 30m from watercourse.

Sediment

30. Prior to ground disturbance, sediment controls will be installed downslope of disturbed areas;
31. Sediment controls will not be installed across areas with a concentrated channel flow;
32. Sediment controls will be located in a continuous fashion, perpendicular to the direction of flow.
33. Sediment must be removed after it has exceeded ½ the height of the fence;
34. Removed sediment must be disposed of at least 30m from watercourse;
35. Sediment control fence shall be inspected daily to ensure materials do not damage fence;
36. If repairs to existing fence are impractical, another line of fencing will be installed;
37. Sediment control fence shall be removed once permanent stabilization has been carried out; and,
38. Avoid construction activity during extreme forecasted wet conditions. Prepare accordingly.

Dust

39. Trucks shall have application controls to avoid wastage and excess flowing to watercourse;
40. Water withdrawal shall be limited to approved locations **outside** the national park;
41. When withdrawing, ensure sufficient flow and depth remains to protect fish and fish habitat;
42. Water trucks shall not be driven near a watercourse unless firm support is available; and,
43. Tankers using liquid calcium chloride shall not be washed within 30m of a watercourse.

Bridge Demolition

44. Demolition material will be sorted and disposed of at an approved C&D landfill (e.g., Baddeck);
45. Hazardous waste (creosote posts) shall be disposed of off-site at a certified disposal facility;
46. An invoice will be submitted to the proponent verifying that contaminated material has been properly disposed of; and,
47. Consider reuse of material where feasible.

Abutments

48. Ensure work does not obstruct fish passage, especially in thalweg or main channel areas;
49. Erosion and sediment control measures will be in place prior to commencing work;
50. Vegetation will be maintained as much as possible;
51. The work shall be performed during low flow and/or dry weather as much as possible;
52. Foundation excavation shall be done in a manner that minimizes release of sediment to watercourse;
53. Excavated material shall be disposed of offsite at a PCA approved location;
54. High noise periods may require scheduling restrictions (Consult with PCA); and,
55. Fresh concrete shall not be discharged into a watercourse.

Riprap

56. Riprap will be properly sized and based on intended use and proper application;
57. Riprap will not be obtained from a source that has the potential to be acid generating;
58. Excavated material must be disposed of at least 30m away from the watercourse/wetland;
59. Riprap shall be inspected prior to, during and after any rainfall event; and,
60. Any damaged areas will be repaired immediately.

Stockpiles

61. Stockpiled materials shall be located at least 30m away from a watercourse or wetland;
62. Sediment controls shall be installed around the perimeter to contain erodible material; and,
63. In dry, windy conditions, stockpiles may require containment to minimize impacts.

Decommissioning of temporary facilities

64. Sites containing temporary facilities shall be cleaned up, and stabilized by seeding and mulching, placing of riprap, or a combination thereof;
65. Erosion and sediment control measures shall be maintained until which time vegetation has been established and protection measures are no longer warranted; and,
66. Soils affected by construction activities (e.g., compaction) soil shall be restored and adequately prepared or amended with topsoil.

Hydroseed

67. Only PCA-approved hydroseed mix will be used;
68. Hydroseeding will not be carried out on harden, crusted or eroded soils;
69. Areas will be shaped or completed to the final grade prior to hydroseeding;
70. Hydroseeding will not be carried out during windy conditions or during heavy rainfall;
71. Hydroseed shall be monitored and maintained from the time of application until vegetation is established as an effective erosion and sedimentation control; and,
72. Areas not receiving proper coverage and/ or areas with bare spots will be repaired immediately.

Trees and shrubs

73. Only native trees and shrubs will be considered for planting - consult PCA;
74. Trees and shrubs will only be planted if there is enough growing season left for vegetation to establish and in accordance according to suppliers recommendations; and,
75. Trees and shrubs shall be monitor and maintained from the time of planting until they become established.

Accidents and malfunctions

76. The contractor shall develop an Environmental Protection Plan(s) to cover project components in need of special environmental protection, especially for work near sensitive or unique areas not identified within this BIA;
77. EPP(s) will be communicated to machine operator(s), site supervisors, and other onsite personnel;
78. WHMIS sheets will be made available informing of the product, precautions, etc.;
79. Report **all** spills to Project Engineer or Supervisor as required.
80. Onsite fuelling must not occur within 30m of a watercourse or wetland;
81. Construction and maintenance areas must be equipped with at least one spill kit;
82. Control and contain spilled product using onsite spill kit materials; and,
83. Material for rapid containment and clean-up of spills must be available during any activity in or near any watercourse/wetland or environmentally significant area.

Archaeological

84. In the event of archaeological resource discovery, all work shall cease in the immediate area until such time as FOL personnel have been notified Maura.McKeough@pc.gc.ca (902.733.3530).
85. Authorize resumption of work when deemed necessary by Cultural Resource personnel

Wildlife

86. Consult with PCA to address wildlife concerns;
87. Feeding of wildlife is prohibited under the CNPA.
88. Schedule construction around sensitive periods for wildlife, especially during nesting, denning, migration etc.; and,
89. During construction, only designated roadway accesses shall be used to limit off-road interactions with wildlife.
90. If a structure is being used for nesting migratory birds, PCA will not issue a permit to destroy nests should these birds take aggressive measures to protect their eggs/chicks;
91. Lights can result in adverse impacts on birds. In assessing the impacts of lights, a focus should be placed on the most vulnerable species and the occurrence of infrequent, but potential risk for large-scale collision events.

92. To minimize the risk of destroying bird nests, including nesting waterfowl, avoid certain activities which during nesting periods (Consult with PCA).
93. For active nests or birds caring for chicks discovered outside the breeding season, minimized risk by establishing buffer zones around nests. Minimize of reschedule high disturbance activities in until nesting is complete and chicks have naturally migrated.
94. Activities such as cleaning, application and removal of protective coatings (e.g. paints), and demolition should not take place during the breeding season on structures where migratory birds are known to nest, since there is a risk of disturbing or destroying eggs or nestlings.
95. Concentrations of birds (e.g. waterfowl, seabirds and shorebirds) should not be approached when accessing a project site from water or from land.
96. Engines should be properly maintained, and well muffled to reduce disturbance due to noise. Other measures may include reducing travel speeds around potentially sensitive habitats or colonies and using alternative travel routes.
97. Food scraps and other wastes can attract predators of eggs and chicks. Proponents are encouraged to take steps that would help ensure waste is minimized and is not left behind as "litter".

DFO MITIGATION

The remaining section involves DFO recommended measures to avoid causing harm to fish and fish habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html). Adherence will help avoid causing harm to fish and comply with the Act.

Planning (*DFO recommendations*)

1. Time work inwater to respect timing windows (June 1 to September 30) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed;
2. Minimize duration of in-water work;
3. Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows;
4. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation;
5. Design and plan activities and works in waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided;
6. Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation;
7. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures;
8. Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse;
9. Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse;
10. Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and keep an emergency spill kit on site;

11. Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish;
12. Develop and implement an *Erosion and Sediment Control Plan* for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include:
    a. Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body;
    b. Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system;
    c. Site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g., dredging, underwater cable installation);
    d. Measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry;
    e. Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction;
    f. Repairs to erosion and sediment control measures and structures if damage occurs; and,
    g. Removal of non-biodegradable erosion and sediment control materials once site is stabilized.

Shorelines

13. Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting;
14. Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed;
15. Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site;
16. Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
17. If replacement rock reinforcement/armoring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment; and,
18. Remove all construction materials from site upon project completion.

Fish

19. Ensure all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows.
20. Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.
21. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself. In freshwater, follow these measures for design and installation of intake end of pipe fish screens to protect fish where water is extracted from fish-bearing waters:

    I. Screens should be located in areas and depths of water with low concentrations of fish throughout the year.
    II. Screens should be located away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
    III. The screen face should be oriented in the same direction as the flow.
    IV. Ensure openings in the guides and seals are less than the opening criteria to make “fish tight”.
    V. Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
    VI. Structural support should be provided to the screen panels to prevent sagging and collapse of the screen.
    VII. Large cylindrical and box-type screens should have a manifold installed in them to ensure even water velocity distribution across the screen surface. The ends of the structure should be made out of solid materials and the end of the manifold capped.
    VIII. Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where there is debris loading (woody material, leaves, algae mats, etc.). A 150 mm (6 in.) spacing between bars is typical.
    IX. Provision should be made for the removal, inspection, and cleaning of screens.
    X. Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.
    XI. Pumps should be shut down when fish screens are removed for inspection and cleaning.

Machinery

22. Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.
23. Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody.

24. Limit machinery fording of the watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.
25. Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.
26. Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.

CONSIDERATION OF THE NEED FOR PUBLIC PARTICIPATION & ABORIGINAL CONSULTATION

Due to the limited scope, public participation is not warranted. During project implementation, the project will likely cause temporary delays and inconveniencies. Upon completion, motorists will benefit in ways of increased safety of roadway and greater convenience (e.g., reduced need for continual repair maintenance).

Formal Aboriginal Consultation on this project was initiated with the representatives of the Mi'kmaq of Nova Scotia. Based on the Mi'kmaq response, several measures to mitigate impacts on archeological resources are set out in this BIA.

EFFECT SIGNIFICANCE

Taking into account the specific mitigation measures mentioned above, the project is not likely to cause significant residual environmental effects. Implementation of the chosen alternative would have a limited effect on natural resources and therefore no cumulative environmental impacts are forecasted.

SITE INSPECTION

Periodic surveillance monitoring is required by qualified PCA personnel which may include daily site visits during work activity, attending related meetings and briefings, evaluating effectiveness of mitigation measures, and consultation with staff and work crews during work activity.

When unavailable, the PCA environmental protection officer shall be continuously updated on project developments as they unfold.

DECISION

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

✓ **Unlikely** to cause significant adverse environmental effects.

_____ **Likely** to cause significant adverse environmental effects.

SIGNATURES AND APPROVAL

BIA Author

Name: Archie Doucette *Environmental Assessment Coordinator,* CBFU

Signature: Archie Doucette Date: 26 November, 2015

BIA Recommender

***Name*:** Maura McKeough, *A/ Cultural Resource Manager,* CBFU

Signature: Maura Mc Keough Date: 26 November, 2015

BIA Recommender

***Name*:** Derek Quann, *Resource Conservation Manager,* CBHNPC

Signature: Derek Quann Date: 26 JAN 2016

Project Manager (*Functional*)

***Name*:** Kate McCarthy *Project Manager, PWGSC*

Signature: [redacted] Date: 2015. 11. 30

(I have read and commit to following the mitigations set out in this report)

APPROVED BY:

Name: Éric Le Bel, *Superintendent, CBHNPC*

Signature: [signature] Date: 26 January 2016

Comment:

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APPENDIX 1

Effects Identification Matrix:

Neil Brook Bridge Replacement Project

A. Direct Effects (during preparation/construction phases)														
			Components potentially directly affected by the proposed project											
			Natural Resources					Cultural Resources		Visitor Experience				
	Phase	Associated Activities	Air	Soil & geology	Hydrology	Flora	Fauna	~ Landscapes	~ Resources	Visitor access	Recreational	Viewscapes	Soundscapes	Visitor Safety
Project Components	Preparation / construction	Material storage	√	√	√	√	√					√	√	√
		Clearing	√	√	√	√	√			√	√	√	√	√
		Detour set up	√	√	√	√	√			√	√	√	√	√
		Waste disposal	√	√	√	√	√						√	√
		Dredging	√	√	√	√	√			√	√	√	√	√
		Drainage	√	√	√	√	√			√	√	√	√	√
		Excavation	√	√	√	√	√	√	√	√	√	√	√	√
		Grading	√	√	√	√	√	√	√	√	√	√	√	√
		Backfilling	√	√	√	√	√	√	√	√	√	√	√	√
		Machinery use	√	√	√	√	√	√	√	√	√	√	√	√
		Transport - materials & equipment	√	√	√	√	√			√	√	√	√	√
		Sedimentation	√	√	√	√	√	√	√	√	√	√	√	√
		Use of chemicals	√	√	√	√	√			√	√	√	√	√
		Temporary facilities	√	√	√	√	√			√	√	√	√	√
		Vehicle traffic	√	√	√	√	√			√	√	√	√	√
		Decommissioning	√	√	√	√	√			√	√	√	√	√
		Remediation	√	√	√	√	√			√	√	√	√	√

APPENDIX 2

Federal Coordination Request:

Request for Review (DFO)

Fisheries and Oceans Canada | Pêches et Océans Canada

Ecosystem Management
Fisheries and Oceans Canada
1 Challenger Dr. P.O. Box 1006, Station B610
Dartmouth, Nova Scotia, B2Y 4A2

Your file *Votre référence*
CBFU-2015-004

Our file *Notre référence*
15-G-027

December 18, 2015

Archie Doucette
Cape Breton Field Unit
Parks Canada Agency
P.O. Box 158, 16648 Cabot Trail
Cheticamp, N.S.
B0E 1H0

Dear Archie:

Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish.

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received the proposal on February 2, 2015.

DFO File No.:	15-G-027
Title:	Neil's Brook – Bridge Replacement, Cape Breton Highlands National Park, Neil's Harbour, Victoria County, N.S.

The proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

The proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 and 58 of the *Species at Risk Act*.

Our review consisted of:

- Neil's Brook Bridge Replacement Project Request for Review, received February 2, 2015
- Project Map, and Design Development Report – Neil's Brook Bridge Replacement, SNC-Lavalin Inc. 2015, received November 13, 2015
- Basic Impact Analysis – Neil's Brook Bridge Replacement Project including design drawings, received November 25, 2015
- Responses received on December 4, 2015 from Katherine McCarthy (Public Works Government Services Canada) to questions posed by the Program on December 3, 2015

We understand the proponent proposes to:

- Install a 30 meter (m) long clear span replacement bridge on a new alignment immediately downstream of the existing structure (19 m long) just above the head-of-tide on Neil's Brook, Cape Breton Highlands National Park
- Instream footprint below the ordinary high water mark will not to exceed 100 square meters (m^2), and is for scour protection only with abutments well above the ordinary high water mark
- Demolish and remove existing bridge
- Commence work in winter 2015-2016, with no in-water work outside of the June to September work window

To avoid the potential of serious harm to fish and their habitat, we are recommending that in addition to adhering to the guidance provided on the DFO website (http://www.dfo-mpo.gc.ca/pnw-ppe/fpp-ppp/index-eng.html), the proponent should also include the site specific mitigations listed below:

- Work should be scheduled and carried out in a manner to minimize the extent of exposed soil at any given time.

- Sediment, erosion, and water control measures should be designed and implemented to be effective at a time when heavy rain and high flow events can be expected.

- After September 30th any exposed soil should be stabilized with plastic and/or riprap at the end of each day.

- Fish passage should not be blocked at any time.

- Fish should be removed from any isolated work areas prior to de-watering and released alive immediately downstream.

- Rip-rap scour protection (including any scour protection placed in the area of the existing abutments once they are removed) should be placed in a manner that minimizes instream footprint and should follow the contours of the watercourse.

- Care should be taken to ensure that bridge debris does not enter the water.

- Any areas of disturbed riverbank and riparian area should be stabilized immediately and re-vegetated upon completion of the work. If completed outside the growing season, exposed soil should be stabilized with rock until next growing season at which time the rock should be removed and the area should be re-vegetated.

Provided that these mitigation measures are incorporated into the proponent's plans, the Program is of the view that the proposal will not result in serious harm to fish. The Program is also of the view that the proposal will not contravene sections 32, 33, or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with the proposal.

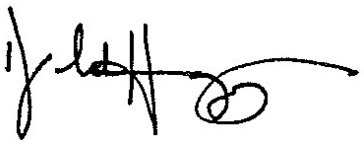
.../3

The proponent should be made aware that if the activities or undertakings associated with the project results in serious harm to fish, or there is imminent danger of causing serious harm, the proponent has a duty to notify DFO, in accordance with subsection 38(4) of the *Fisheries Act*.

If the plans have changed or if the description of the proposal is incomplete, or changes in the future, the proponent should consult our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review is required by the Program.

If you have any questions, please contact Lisa Paon at our Dartmouth office at (902-431-3551), by fax at (902-426-1489), or by email at (Lisa.Paon@dfo-mpo.gc.ca). Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Donald Humphrey
Team Lead, Regulatory Reviews
Fisheries Protection Program

COPY LIST: Lisa Paon

Request for Review

A) Contact information

Name of Business/Company:

Parks Canada Agency

Name of Proponent:

Audrey Buchanan - General Works Manager

Mailing address:

C/o FOLNHS

259 Park Service Road

City/Town:

Louisbourg,

Province/Territory:

NS

Postal Code:

B1C 2L2

Tel. No. :

902.733.3520

Fax No.:

902.733.3262

Email:

Audrey.Buchanan@pc.gc.ca

Select additional contact:
Contractor/Agency/Consultant *(if applicable)*:

Mailing address:

City/Town:

Province/Territory:

Postal Code:

Tel. No. :

Fax No.:

Email:

Is the Proponent the main/primary contact? ○ Yes ◉ No

If no, please enter information for the primary contact or any additional contact.

Archie Doucette - Environmental Assessment and Ecosystem Restoration
Archie.Doucette@pc.gc.ca
902.224.4233

B) Description of Project

If your project has a title, please provide it.

Neil Brook Bridge Replacement Project

Is the project in response to an emergency circumstance*? ○ Yes ◉ No

Does your project involve work in water? ◉ Yes ○ No

If yes, is the work below the High Water Mark*? ◉ Yes ○ No

What are you planning to do? Briefly describe all project components you are proposing in or near water.

(1) Preparation (i.e., surveying, delineation, geo-technical investigations, access development (if necessary) supply and storage of materials, and set-up of temporary facilities).

(2) Deconstruction (i.e., shoreline stabilization, sediment and erosion control installations, minor ditching, drainage, minor dewatering at abutment base, traffic control, demolition & disposal of waste, material transport)

(3) Construction (i.e., excavation, grading, backfilling, infrastructure installations involving heavy equipment use and handling, off-site staging area development, site reclamation following installation.

How are you planning to do it? Briefly describe the construction materials, methods and equipment that you plan to use.

Information attached

Include a site plan (figure/drawing) showing all project components in and near water.

Are details attached? ◉ Yes ○ No

Identify which work categories apply to your project.

- ☐ Aquaculture Operations
- ☐ Aquatic Vegetation Removal
- ☐ Beaches
- ☐ Berms
- ☐ Blasting / Explosives
- ☐ Boat Houses
- ☐ Boat Launches / Ramps
- ☐ Breakwaters
- ☒ Bridges
- ☐ Cable Crossings
- ☐ Causeways
- ☐ Culverts
- ☐ Dams
- ☐ Dewatering / Pumping
- ☐ Docks
- ☐ Dredging / Excavation
- ☐ Dykes
- ☐ Fishways / Ladders
- ☐ Log Handling / Dumps
- ☐ Log Removal
- ☐ Moorings
- ☐ Open Water Disposal
- ☐ Piers
- ☒ Riparian Vegetation Removal
- ☐ Seismic Work
- ☒ Shoreline Protection
- ☐ Stormwater Management Facilities
- ☐ Surface Water Taking
- ☐ Tailings Impoundment Areas
- ☒ Temporary Structures
- ☐ Turbines
- ☒ Water Control Structures
- ☐ Water Intakes / Fish Screens
- ☐ Water Outfalls
- ☐ Watercourse Realignment
- ☐ Weirs

- [ ] Flow Modification (hydro)
- [ ] Groundwater Extraction
- [ ] Groynes
- [x] Habitat Restoration
- [ ] Ice Bridges
- [ ] Wharves
- [ ] Wind Power Structures
- [ ] Other Please Specify

Was your project submitted for review to another federal or provincial department or agency? ○ Yes ◉ No

If yes, indicate to whom and associated file number(s).

C) Location of the Project

Coordinates of the proposed project Latitude 46.810033 N Longitude 60.332506 W

OR UTM zone ; Easting

Northing

Include a map clearly indicating the location of the project as well as surrounding features.

Name of Nearest Community (City, Town, Village): Neil's Harbour

Municipality, District, Township, County, Province: Victoria County

Name of watershed (if applicable): Neil Brook Watershed

Name of watercourse(s) or waterbody(ies) near the proposed project: Neil Brook

Provide detailed directions to access the project site:

Site is situated directly within the Cabot Trail roadway corridor. See attached watershed map.

D) Description of the Aquatic Environment

Identify the predominant type of aquatic habitat where the project will take place.

- ○ Estuary (Estuarine)
- ○ Lake (Lacustrine)
- ◉ On the bank/shore at the interface between land and water (Riparian)
- ○ River or stream (Riverine)
- ○ Salt water (Marine)
- ○ Wetlands (Palustrine)

Provide a detailed description of biological and physical characteristics of the proposed project site.

Known fish species include American eel, Brook trout and rare occurrences of Rainbow and Brown trout. The substrate within the

immediate vicinity of the bridge footprint primarily consists of sand, gravel and smaller fines. Nearby shoreline outcroppings of bedrock are visible from the bridge deck (downstream).

No inwater works (i.e., within main channel) is planned beyond the immediate based abutments, a footprint area encompassing approximately 40msq/ side. Within these immediate areas, water control measures will be installed so as to allow for work in the dry.

There is a low probability of siltation originating from within the construction footprint. And, should accidental release occur, the magnitude of effects would likely be low, factoring in standard mitigation.

Include representative photos of affected area (including upstream and downstream area) and clearly identify the location of the project.

E) Potential Effects of the Proposed Project

Have you reviewed the Pathways of Effects (PoE) diagrams (http://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html) that describe the type of cause-effect relationships that apply to your project?

◉ Yes ○ No

If yes, select the PoEs that apply to your project.

- ☐ Addition or removal of aquatic vegetation
- ☐ Change in timing, duration and frequency of flow
- ☐ Cleaning or maintenance of bridges or other structures
- ☐ Dredging
- ☒ Excavation
- ☐ Fish passage issues
- ☒ Grading
- ☐ Marine seismic surveys
- ☒ Organic debris management
- ☐ Placement of marine finfish aquaculture site
- ☒ Placement of material or structures in water
- ☒ Riparian Planting
- ☐ Streamside livestock grazing
- ☒ Structure removal
- ☐ Use of explosives
- ☒ Use of industrial equipment
- ☒ Vegetation Clearing
- ☐ Wastewater management
- ☐ Water extraction

Will there be changes (i.e., alteration) in the fish habitat*? ○ Yes ◉ No ○ Unknown

If yes, provide description.

Will the fish habitat alteration be permanent*? ○ Yes ◉ No ○ Unknown

Is there likely to be destruction or loss of habitat used by fish? ○ Yes ◉ No ○ Unknown

What is the footprint (area in square meters) of your project that will take place below the high water mark*?

Abutment replacements will occur on typically dry shoreline environment above or near the high-water mark. No in-water work is planned beyond that which is planned at the based.

Is your project likely to change water flows or water levels? ○ Yes ◉ No ○ Unknown

If your project includes withdrawing water, provide source, volume, rate and duration.

Abutment replacements will be done in the dry with flow containment barriers set up around the base.

If your project includes water control structure, provide the % of flow reduction.

No in-water control structures are planned.

If your project includes discharge of water, provide source, volume and rate.

If the need arises for water discharge from heavy precipitation events, discharge flows will be directed overland as per standard BMPs for such works.

Will your project cause death of fish? ○ Yes ◉ No ○ Unknown

If yes, how many fish will be killed (for multi-year project, provide average)? What species and lifestages?

Are there aquatic species at risk (http://www.sararegistry.gc.ca/species/aquatic_e.cfm) present? If yes, which ones?

No known SAR species present.

What is the time frame of your project?

The construction will start on 05/05/2015 and end by 03/30/2017

If applicable, the operation will start on MM/DD/YYYY and end by MM/DD/YYYY

If applicable, provide schedule for the maintenance

Scheduling details have yet to be worked out and will be provided once available.

If applicable, provide schedule for decommissioning

To be determined.

Are there additional effects to fish and fish habitat that will happen outside of the time periods identified above? ○ Yes ◉ No

(If yes, provide details)

Have you considered and incorporated all options for redesigning and relocating your project to avoid negative effects to fish and fish habitat?

◉ Yes ○ No

If yes, describe.

The new bridge is being designed to accommodate increased flow capacity compared to current structure - slightly wider.

Have you consulted DFO's Measures to Avoid Harm to Fish and Fish Habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html) to determine which measures apply to your project?

◉ Yes ○ No

Will you be incorporating applicable measures into your project? ◉ Yes ○ No

If yes, identify which ones. If No, identify which ones and provide reasons.

Parks Canada will conduct an Environmental Impact Analysis (EIA) (formerly Environmental Assessment). The DFO recommended measures will be included in the EIA for the proponent to adhere to in addition to other recommended mitigation measures from the EIA. Note, the EIA will recommend surveillance monitoring during project implementation by qualified PCA staff.

Have you considered and incorporated additional best practices and mitigation measures recommended in relevant guidelines to avoid negative effects to fish and fish habitat?

○ No ◉ Yes

If Yes, include a list of the guidelines being used to avoid negative effects to fish and fish habitat.

See previous comment. Eventually, EIA will be available upon request.

Are there any relevant best practices or mitigation measures that you are unable to incorporate? ○ Yes ◉ No

(If yes, identify which ones.)

Can you follow appropriate Timing Windows (http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html) for all your project activities below the High Water Mark*?

◉ Yes ○ No

(If no, provide explanations.)

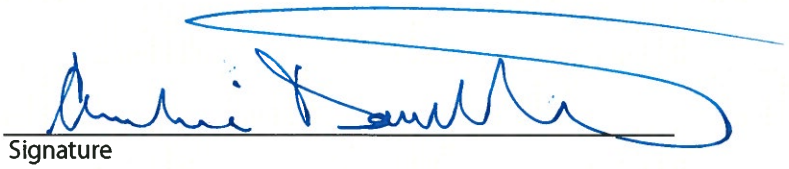
The need for an increased window timeline is not foreseen at this point.

What residual effects to fish and fish habitat do you foresee after taking into account the avoidance and mitigation measures described above?

The project is unlikely to cause residual effects to fish and fish habitat following adherence to mitigation.

F) Signature

I, Archie Doucette (print name) certify that the information given on this form is to the best of my knowledge, correct and completed.



Signature

01 / 27 / 2015
Date

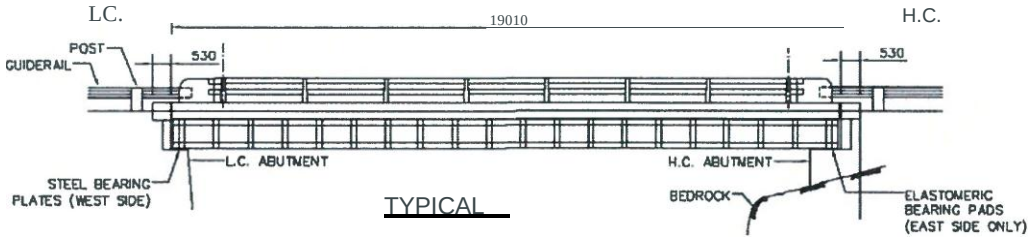
Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the fisheries protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-PPU-680. Under the *Privacy Act*, Individuals have a right to, and on request shall be given access to any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provision of the *Access to Information Act*.

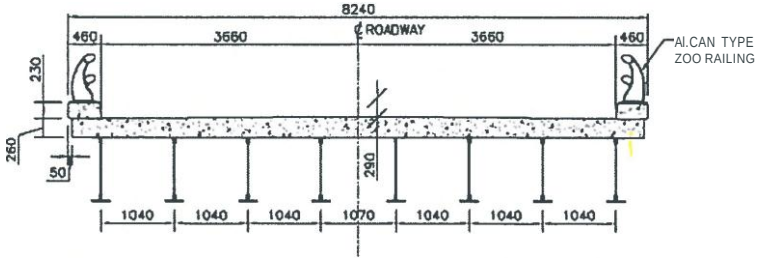
**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

Neil's Brook Bridge

Cabot Trail, 26.2km from lngonish Park Headquarters

Downstream Elevation





Neil's Brook Bridge Replacement Project

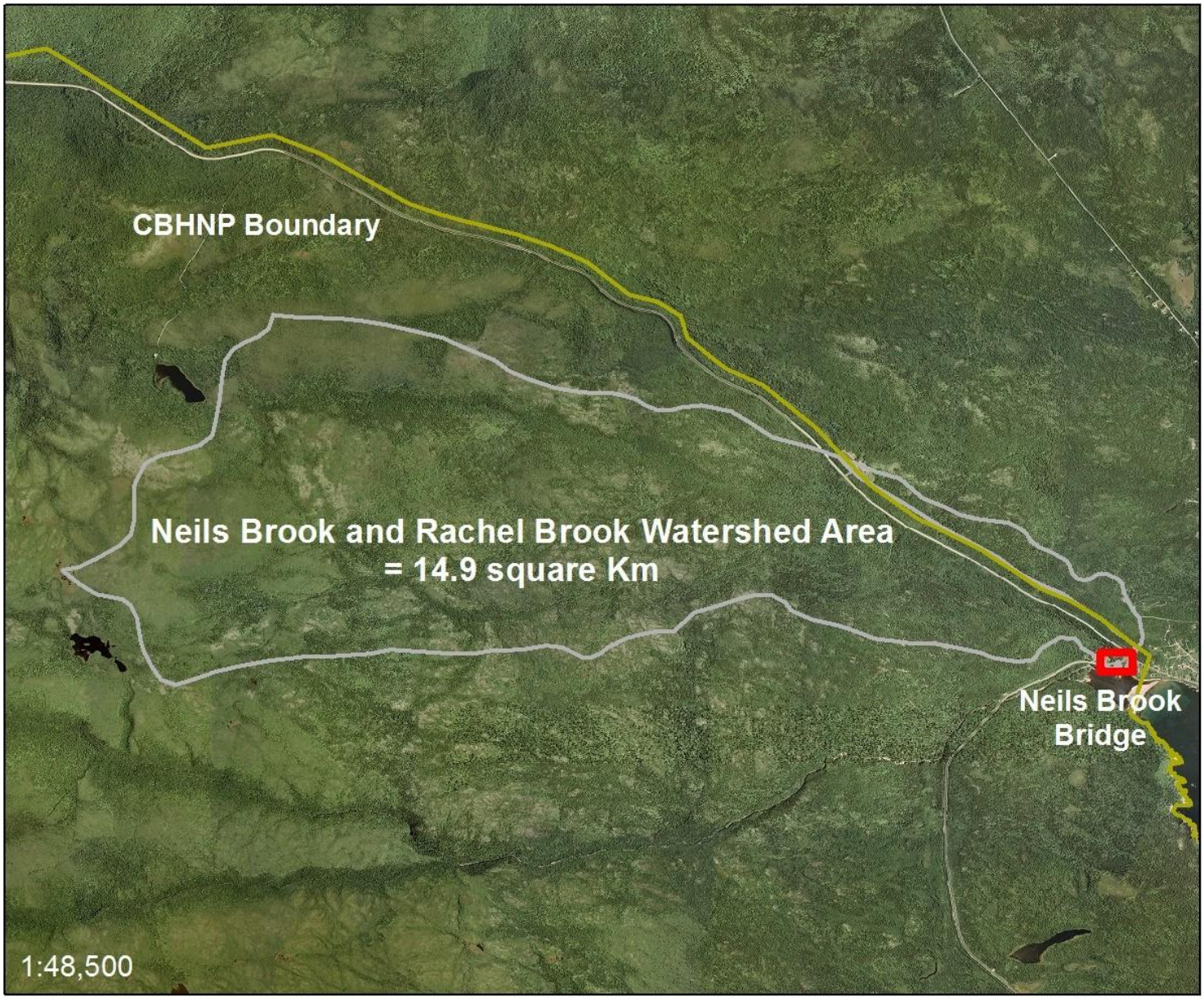
Introduction

Built in 1948, the Neil Brook Bridge is a single span bridge consisting of a concrete slab on built-up, with riveted steel girders. The bridge has had numerous repairs over the years, and due to such defects, the bridge is now in need of replacement. Examples of such defects include: deformations and gouges out of the tube railing; damaged rail posts; cracks in the concrete deck; expansion joints are full of sand and gravel and are leaking; approaches have potholes; and the deck underside has many cracks, and spalls along the edges of the top flanges of the steel girders. It is estimated that the deck has five (5) years of useful life remaining.

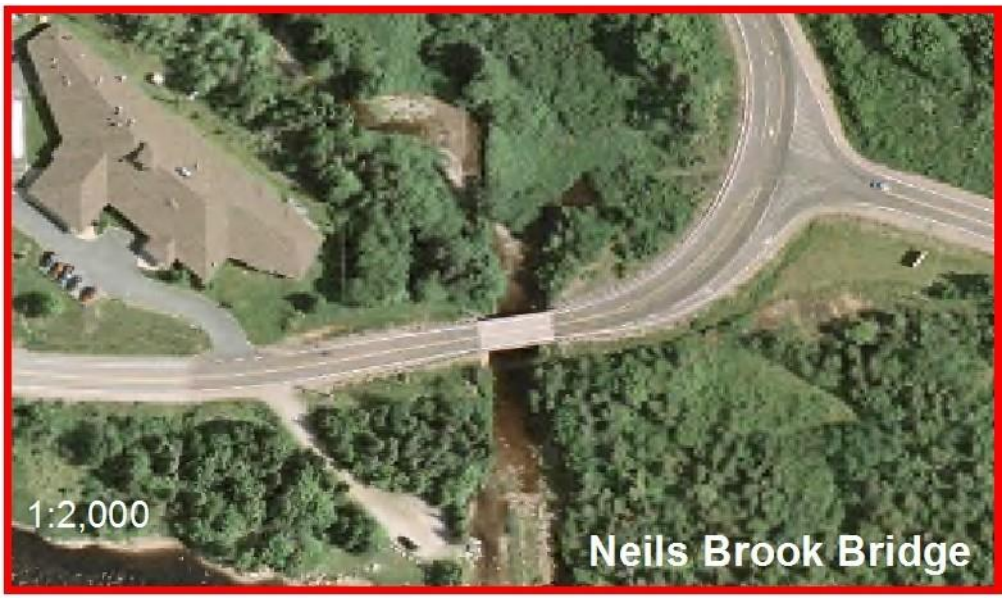
General Construction Sequencing involves execution of the following tasks:
(*Specifics have yet to be worked out. They will be provided upon availability and request*)

- Delineation of buffer zones and installation of silt traps and other environmental protection measures;
- Installation of turbidity curtain(s) on each side of the river;
- Temporary bridge installation to create a temporary detour.
- Diversion of all traffic of the existing bridge structure;
- Demolition and removal of existing bridge deck and support structure;
- Installation of abutments, formation and casting of concrete in the dry behind the existing abutments;
- Placement of fill material against structure;
- Placement of riprap apron and slope protection at abutments;
- Placement of embankment rock and fill material in accordance with geotechnical report;
- Erection of infrastructure support and forming and placing concrete deck on the steel plate girders;
- Construct new approach alignments at each end of the bridge;
- Installation of sidewalk and barrier systems;
- Placement sub-grade granular material, & asphalt pavement on approaches and bridge deck;
- Remove temporary detour;
- Placement of erosion control rock fill and hydro-seeding of embankments;
- Removal of existing piers and abutments;
- Removal of construction materials prior to the landscaping and reinstatement of the site;
- Removal of sediment control fences and other environmental protection devices;
- Demobilization of equipment and temporary infrastructure; and,
- Site remediation – hydroseeding, replanting, decommissioning temporary access routes.

Specific terms and conditions will be subsequently determined by Parks Canada management, proponent and contractor. Such details will be included in contract specifications and the environmental assessment.


CBHNP Boundary
Neils Brook and Rachel Brook Watershed Area
= 14.9 square Km
Neils Brook
Bridge
1:48,500


1:1,000,000
CBHNP


1:2,000
Neils Brook Bridge

Fish and Fish Habitat (*source: National Park database for biological resources***)**

The bridge, situated over Neil Brook, is located at the upper limits of tidal influence and on the edge of an estuarine environment. Instream habitat at the site consists primarily of a mixture of cobble, gravel rock and pebble. The water is clear and vegetation is minimal within the aquatic environment however grassy areas are present along the low-grade stream edges. Nearby, there is abundant streamside vegetation consisting of a mixture of deciduous and coniferous tree species. The habitat characteristics of the river in the vicinity of the project site are consistent with spawning and rearing requirements for several fish species. Key fish species of interest within the general area are listed below.

American Eel (Anguillarostrata)

Eels may remain in freshwater for five to twenty years before leaving on long oceanic migrations to the Sargasso Sea to spawn. Their buoyant eggs float to the surface, hatch and develop into larvae, which drift with ocean currents to the coastal areas of North America. Glass eels Guveniles) are attracted to freshwater and actively migrate into brackish estuaries and freshwater. Glass eels and elvers reach the Maritime coast in April and May. They may remain in the estuaries for some time moving up and down with the tides as they adapt to living in freshwater. The upstream migration can take several years, but not all eels migrate upstream; some elvers tend to remain in the estuaries.

The American eel has been listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as a species of Special Concern. It is a catadromous species, spending most of its life in freshwater before returning to saltwater to spawn between August and December. Peak migration for this species occurs in September and October.

Brook trout *(*Salvelinus fontinalis*)*

Brook trout in Nova Scotia have been listed as a species of concern by NSDNR pursuant to the General Status Rank of Wild Species in Nova Scotia. Brook trout or speckled trout, is native to many areas of eastern North America, but has been introduced throughout the world due to its popularity as a sportfish. It can be found in a variety of different waters including tiny ponds, large rivers, lakes and saltwater estuaries; however they usually live in spring-fed streams with many pools and riffles. Speckled trout prefer cool, clear waters with plenty of cover and make use of nearly anything that will provide them with protection.

Sea-run brook trout in Nova Scotia spawn during October and November in shallow, gravelly areas of streams with clean bottoms and good water flow. Some populations of brook trout migrate to sea for short periods. In the spring and early summer they move downstream or upstream to estuaries and ocean areas where there is plenty of food. About two months later they return to freshwater before some of them begin over-wintering in the estuaries while others move up and down the coastline. Not all fish in a population migrate nor do they necessarily migrate every year.

Rainbow trout (*Oncorhynchus mykiss*)

Rainbow trout are native to the Pacific Ocean and freshwaters in western North America, but have been introduced throughout the world and now occur across central North America and the eastern coast. The population of rainbow trout present are anadromous, spending part of their lives at sea before returning to freshwater to reproduce.

Rainbow trout in Atlantic Canada spawn in spring between March and May in small tributaries of rivers that have shallow riffles with gravel bottoms, or in inlets or outlets of lakes, often returning to their natal streams. Spawning can also take place in late fall or early winter. Young rainbow trout prefer slow-moving shallow stream areas where they can seek cover in rubble, rocks, in-stream debris and undercut banks. Older ones on the other hand, prefer faster and deeper stream waters. They spend up to four years in freshwater before migrating to sea, doing so in spring and remaining there for a few months to several years before returning. Rainbow trout can live to be 11 years old, many spawning repeatedly.

Brown trout *(Salmo trutta)*

Brown trout occur throughout Europe and western Asia. They were introduced to Canadian waters in 1890. Sea-run populations, which occur in Atlantic Canada and Quebec, spend two to three years in freshwater before migrating downstream to spend one or two growing seasons in and around river mouths and estuaries. Most return to their home streams to spawn. Brown trout spawn in the fall and early winter (October to February) and prefer very similar habitats to our native brook trout except that they can tolerate slightly higher water temperatures. They often frequent the lower reaches of rivers and streams that are unsuitable for brook trout. There is no commercial fishery for brown trout in Nova Scotia, but they have become quite popular with recreational anglers throughout the Province.

Rainbow smelt *(*Osmerus mordax*)*

Rainbow smelt are found in rivers and along coastal areas of North America from Labrador to New Jersey, as well as along the West Coast. They are a schooling, anadromous species that grow and mature in shallow coastal waters and migrate up freshwater streams to spawn, including Neil's Brook. Although they sometimes return to their natal streams to spawn, they will often choose other streams if nearby. Spawning occurs between February and June at night in fast moving water between 4 and 10 degrees Celsius. After spawning, although some adults die, many of the survivors will return to coastal waters for the summer. The sticky eggs become attached to stream bottoms and submerged debris. In their first year, smelt grow rapidly, increasing their tolerance for saltwater. As they age, smelt begin eating larger invertebrates and fish, while staying close to shore seeking cover in eelgrass beds or mud.

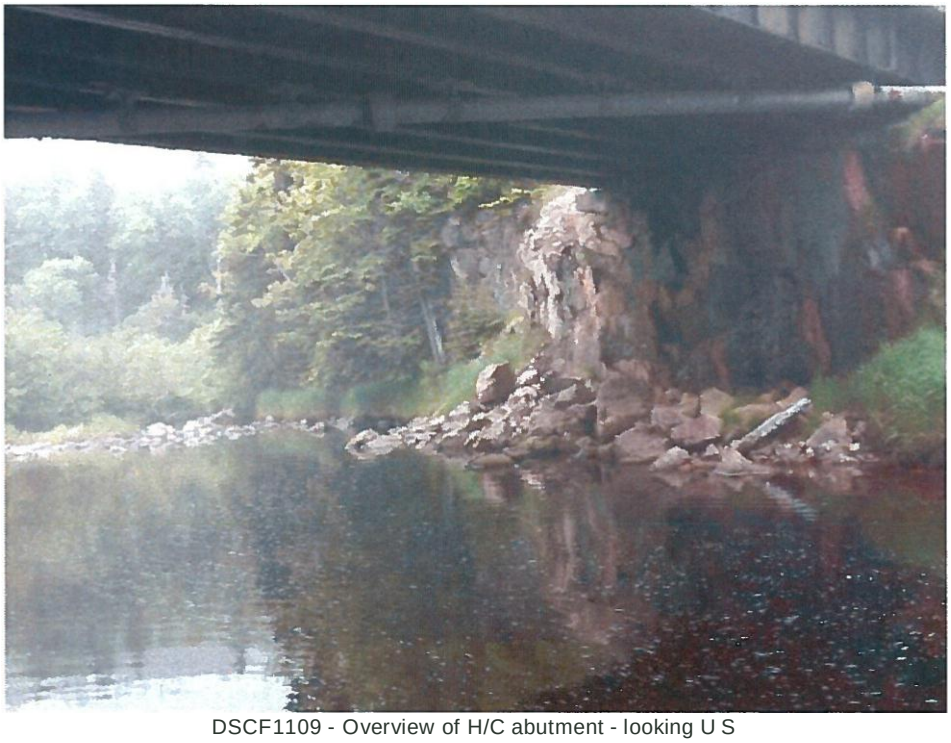
Gaspereau or **alewife** *(Alosa* spp.)

The Nova Scotia Department of Natural Resources (NSDNR) has listed Gaspereau as a Yellow species. Limited biological information is available on those that inhabit many of the rivers within Nova Scotia. Gaspereau comprise two closely related species: alewife *(Alosa pseudolarengus)* and the blueback herring *(A. aestivalis).* Gaspereau are ubiquitous to watercourses, entering the majority of streams in Nova Scotia. From August to October, the young-of-the-year migrate downstream in large schools to live in estuaries and surrounding coastal areas. Adults overwinter at sea. In the Maritimes, gaspereau spend most of their life growing in saltwater. Gaspereau that spawn upriver, tend to spawn in June and July when water temperatures are greater than 10°C. Gaspereau are repeat spawners, spawning up to three to six times during their lifespan.

Other information

- There are no other in-water work activities planned beyond that which is scheduled for the immediate abutment bases, including temporary bridge installation adjacent to the site.
- The estimated footprint of the general work vicinity is about 100m sq. Within such areas, water control measures will be installed so as to allow for work in the dry.
- There is a low probability of siltation originating from within the construction footprint.
- Should accidental release occur, the magnitude of effects would likely be low, factoring in standard mitigation from the environmental assessment and other recommended environmental protection measures.
- An environmental assessment and mandatory project surveillance monitoring is anticipated for this project.

DSC03388 - Overview of *UC* abutment



DSCF1109 - Overview of H/C abutment - looking U S