Tidal Culvert Removal and Habitat Restoration
Black Brook, Hantsport Nova Scotia

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Prepared for:

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Tidal Culvert Removal and Habitat Restoration - summary
Black Brook, Hantsport Nova Scotia

A culvert near the head of tide on Black Brook, tributary to the Halfway River was removed between October 1st and 4th, 2012 as part of a Nova Scotia Transportation and Infrastructure Renewal HADD compensation. The site is located north of the westbound Highway 101 exit 8 off ramp to Hantsport, approximately 150 m upstream of the intersection of Black Brook and the Hanstport Connector. The site is tidal with the culvert becoming fully submerged during high tides at the time of the works. At low tide Black Brook was partially impounded upstream of the culvert due to the inlet being partially obstructed with wood, stone, and concrete debris. The culvert was partially collapsed and much of the bottom was rusted out. Evidence of significant past erosion over the top of the culvert and roadbed was apparent.

East Coast Aquatics Inc. carried out the site restoration using a small excavator and compact tractor/trailer. This limited the amount of vegetation cover that needed to be removed to access the site, and eliminated the need to upgrade access to the site for larger equipment. The hydraulics of the excavator used for the project is run entirely on 100% vegetable oil to reduce risks associated with accidental equipment failure.

Small trees were cut from the surface of the former roadbed across the culvert. The restoration took place in two general steps. First, the entire road bed from approximately 4 m north of the culvert to a distance roughly 15-17 m south of the culvert was excavated down to the elevation of the top of the culvert, a variable depth of 0.5 – 0.75 m. Material was hauled out of the floodplain and broadcast piled in an area south of Black Brook but north of the cleared portion of the off ramp right of way.

A number of activities comprised the second general step, which was the removal of the culvert and remaining roadbed. The roadbed north of the culvert was then sloped down to near the natural stream bank elevation. All material was removed off the top of the culvert, and included large stones, an old brick chimney, sheet metal, and concrete. The south roadbed fill adjacent to the culvert was excavated down to the natural stream bank elevation, and the culvert removed. Culvert removal was carried out during the low tide as recommended by Fisheries and Oceans staff. The channel was widened slightly (approximately 0.5 m) on the south side in order to match upstream bankfull width channel dimensions. The remaining southern portion of the roadbed was excavated down to the natural floodplain elevations, a further depth of up to 0.75 m. This included a low floodplain that is periodically fully saturated or inundated with high tidal flood dominated by herbaceous growth, stepping up to a broader floodplain that exists because of extreme runoff flood conditions and is partially vegetated with woody plants. The site was then contoured further up to the forested upland boundary. A cluster of small hawthorn trees and several root stems of speckled alder were salvaged when removed from the road prism and replanted at the boundary between the low tidal floodplain and the higher floodplain. This mimics the change from herbaceous to woody plant composition observed immediately upstream of the former crossing.

As water had run both around and under the partially collapsed culvert for some period of time, stream washed large stone cobble adequately armoured the flow path at the location where the culvert was removed. Large boulders that had been placed along the north side of the culvert during installation were left in place to protect the re-sloped and vegetated roadbed that was left north of the culvert. The restored floodplain cross section south of the culvert should resist

erosion based on its natural dimensions, and all large boulder in the road fill was removed away from the lower floodplain, mimicking the conditions observed immediately upstream. The entire site was seeded with highway reclamation mix and covered in hay. Silt fences were installed above high tide levels at the boundary between the low floodplain and high flow floodplain. All access road surfaces were seeded and hayed, as was the contoured pile of excavated material. Further silt fence was placed around the excavated material pile that had been placed in the upland south of the site.

During the period of site restoration, higher than average high tides were occurring. The restored site was observed on consecutive days post high tides to ensure stability of the restored site, and no observable erosion or instability had occurred over two full tidal cycles. The site will be periodically observed during the fall of 2012 to ensure stability, and all sediment control structures (silt fencing) will be removed in late spring 2013 when adequate herbaceous vegetation cover has occurred.

Location	Before (after removal of some road cover vegetation)	During	After
Looking northward along existing road surface to Black Brook and culvert crossing.			
Looking northwestward toward Hantsport Connector, downstream view of culvert placement on Black Brook. **Low Tide.**			
Looking northwestward toward Hantsport Connector, downstream view of culvert placement on Black Brook. **High Tide.**	Non available		

Location	Before (after removal of some road cover vegetation)	During	After
Looking southeastward, upstream view of culvert placement on Black Brook. **Low Tide.**			
Looking southeastward, upstream view of culvert placement on Black Brook. **High Tide.**	None available		

Additional photo record, Black Brook Restoration

Water level downstream view of new channel, low tide

New channel during near high tide.

Submerged culvert during high tide.

Restored access road surface looking southward toward Exit 8 off ramp from Black Brook

New channel looking upstream during low tide.