Restoration in Mill Creek

Written by:
Darlene Elward, Environmental Project Manager

Association des pêcheurs récréatifs du sud-est (APRSE)/ Southeastern Anglers Association (SAA)

Cocagne, New Brunswick
Report 2017-2018

Canada

NB Wildlife Trust Fund
Fonds de fiducie de la faune du N.-B.

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INTRODUCTION

Between 1997 and 2000, the Southeastern Anglers Association (SAA) restored parts of the riparian zones and aquatic habitat on the Mill Creek tributary in the Bouctouche watershed. This watershed is an important watercourse for the Atlantic salmon (*Salmo salar*) and brook trout (*Salvelinus fontinalis*) in southeastern New Brunswick. After restoration activities, fish habitat was improved almost instantly. However, in recent years, other issues have surfaced such as fragmented habitat, bank degradation, increased sedimentation due to cattle grazing and fording activities, and the ineffectiveness and need for repairs of some restoration structures. Newer restoration techniques will help improve the fish habitat on Mill Creek tributary. On April 17 and 18, 2014, an important rain event caused a culvert on Mill Creek to break and washout, causing important damage to fish habitat.

The principal objective of this project is to restore and stabilize eroded riverbanks upstream and downstream of the culvert area and reconstruct the stream morphology closest to its state before the washout event. The restoration efforts will recreate a healthier fish habitat favoring atlantic salmon and brook trout productivity.

PROJECT DESCRIPTION

The whole restoration project will be carried out over three years. This document describes the work done during the first year (2017-2018). The SAA staff is working with Parish Aquatic Services (PAS) also known as Matrix Solutions now, the consultants, and the New Brunswick Department of Transportation and Infrastructure (DTI). For the second year of the project, Matrix Solutions has re-conducted a geomorphic and habitat survey on Mill Creek to have an update of the changes after SAA took out the old restoration structures in the first year and DTI put in the two new culverts. The objectives of the survey were to identify key habitat features and to prioritize locations for restoration of Atlantic salmon habitat. A key focus of the project was to develop a design that ensures efficient use of resources available for restoration and to maximize the long-term efficacy of the restoration efforts. The survey was conducted on more or less than 1.50km of stream surrounding the culvert blowout. Matrix Solutions has made recommendations, also explained in their report “Mill Creek Removal of structures and Instream restoration recommendations 2016”, on which erosion control and habitat restoration techniques should be used to reduce sedimentation and to improve fish habitat on this stream. During the second year of the project, after the second survey was completed, a few problem areas were found spread across the watercourse. Some of the problems are caused by a combination of the new culverts, secondary roads and the winter weather events. Matrix Solutions recommended that we focus the restoration work by adding a ‘brush mat’, also explained in Matrix Solutions’ report “Mill Creek Post-Installation Report Brush Mattress 2017”, to an area of the river that is widening and causing an island forming in the middle of the river. This brush matting technique is use to capture sediments in locations where sediment being lost. We hope this technique will be efficient enough to withstand the water flow while the river is re-adjusting to the changes.

From our understanding, the culverts will not be changed and will not be re-adjusted by DTI. They may, however, fix some of the erosion issues at the road crossing after winter events (Note: after January 2018 the road at the culvert area was closed due to erosion). SAA, in the third year, will concentrate restoration efforts on the upstream side of the culvert as planned to help improve fish habitat.

RESULTS

As stated in the previous section, some restoration work done in 2017-2018 was downstream of the Mill Creek culverts. Matrix Solutions recommended that we focus the restoration work by adding a 'brush mat' to an area of the river that was widening and causing an island to form in the middle of the river. The widening of the river was caused by the old fish habitat structures that were installed in the 1990's. SAA took out those malfunctioning structures during the first year of this project (2016-2017). One structure of 'brush mat' was created by SAA staff, with the help of volunteers and supervised by a Matrix Solutions technician. This structure was placed in order to ensure that the river stays in its proper course; the 'brush matting' should help refill the side of the river that lost sediment and help rebuild its natural morphology.

The 'brush matting' technique is an overlay of several small coniferous trees overlapped on each other and secured to the riverbank (see figure 1). It was secure as best as possible with stakes and rope attached to riverbank trees. Before and after pictures of the site are annexed to this report (along with site coordinates) and some are also in Matrix Solutions' report. Furthermore, Matrix Solutions' report contains details on the structure's location and why it was created. Results from the geomorphic and habitat survey have also been annexed.

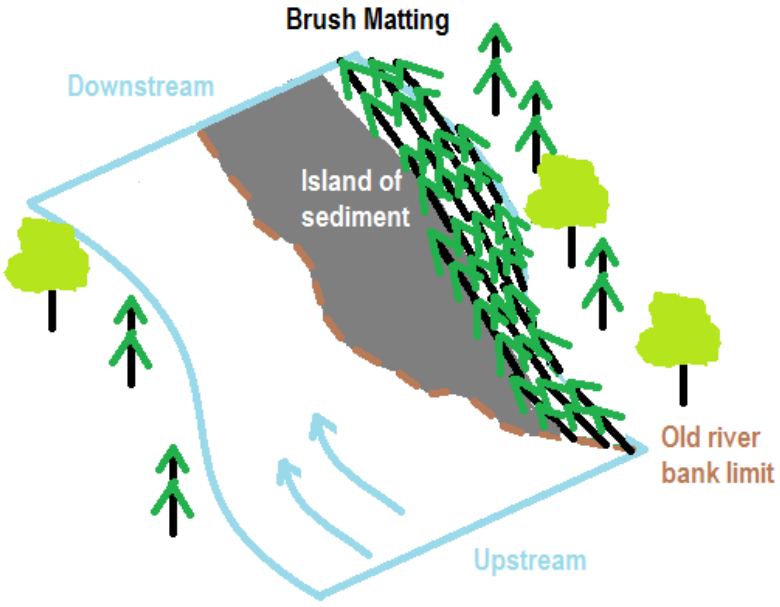

Figure 1: Brush matting technique to accumulate sediments in areas where it was lost.

SAA hope this technique will be efficient enough to withstand the water flow while the river is re-adjusting to the changes in the area. From our understanding, the culverts will not be changed and will not be re-adjusted by DTI. They may, however, fix some of the erosion issues strictly at the road crossing only after winter events (Note: after January 2018 the road at the culvert area was closed due to erosion).

After the first year of the project had passed, more damage was observed downstream. After the second survey was completed, a few problem areas were found spread across the watercourse. Some of the problems are caused by a combination of the new culverts' alignment and its stabilisation, secondary roads and the winter weather events. Many trees along the riverbank downstream of the new culverts were now un-rooted where they were not the year before. Parts of the substrate upstream of the culverts are exposing bedrock where it wasn't the year before. Matrix Solutions suggested SAA to concentrate restoration efforts on the upstream side of the culvert to help improve habitat through this river adjustment.

Signs explaining SAA's accomplished restoration work were placed at three locations surrounding the site: one near the culvert (N 46,27,11.8971 W 064,49,53.3158); one downstream of the culvert, crossing a seasonal access road (N 46,26,44.0879 W 064,49,36.1887); and one upstream of the culvert, crossing Route 495 (N 46,26,23.4072 W 064,53,9.4541). The signs will also mention the different funding programs that supported Mill Creek restoration work during these 3 years. Pictures of the signs will be added to this document once the signs have been printed and installed. Some installment had been delayed in 2016 and 2017 due to winter weather conditions, a missing sign and posts, and a DTI contractor running over a sign from a previous project on Mill Creek with a bulldozer. This year, two of the three signs were placed, but the other will only be place in 2018 due to erosion at the culvert; the tree on which the sign was to be placed is gone.

CONCLUSION

Some 'brush matting' were built in an area of the river that was widening, downstream from the culverts, that was cause by a malfunctioning old structure (installed in the 1990's). This old structure was taken out during the first year of this three year project. The widening of the river was creating an island of sedimentation in the middle. In order to bring back the natural morphology of that site, SAA was recommended to build 'brush matting', a technique known to collect and rebuild sediment where it was lost.

The re-evaluation of Mill Creek has shown that more damaged had been added to this watercourse due in part by the new culvert installed. Some of these changes involved increasing riverbank erosion, un-rooting trees, and uncovering the riverbed by exposing more bed rock.

SAA will then follow Matrix Solutions' recommendations on which restoration techniques to use upstream of the culvert to help improve the habitat while the river adjusts to the changes.

ACKNOWLEGEMENTS

The Southeastern Anglers Association wants to thank the New Brunswick Wildlife Trust Fund (NBWTF) and DFO's Recreational Fisheries Conservation Partnerships Program (RFCPP) for their financial support, without which this project would not be possible. It is thanks to these funds that SAA can help protect river habitat health. We also want to thank the team at Matrix Solutions and the New Brunswick Department of Transportation and Infrastructure for their contribution, in time and resources, to this three year restoration project.

Furthermore, we want to thank everyone in the river conservation team here at the Southeastern Anglers Association (especially the field team 2016-2018: Darlene Elward, Ronnie Robichaud, Jonathan Chevarie, Marie-Eve and André Luc Cormier) and the members of the board of directors for their great work. Finally, we want to thank all the volunteers who helped us remove the old structures in 2016 and build brush matting in 2017, notably members of the Groupe de Développement Durable du Pays de Cocagne (GDDPC), of the Shediac Bay Association (SBA) and Buctouche First Nation (BFN).

ANNEX A: 2017 – SIGNS AND BRUSH MATTING SITE (PICTURES AND SITE COORDINATES)

Sign downstream of the culvert, crossing a seasonal access road (N 46,26,44.0879 W 064,49,36.1887)

Sign upstream of the culvert, crossing Route 495 (N 46,26,23.4072 W 064,53,9.4541)

N 46,26,59.3747 W 064,49,46.6069
Site 3 was chosen to build brush matting:

Before pictures:
Looking downstream of the site

Looking upstream of the site

During pictures:
Looking downstream of the site – building the brush matting

Looking upstream of the site – building the brush matting

Getting out a tree stump in the river channel

After pictures:
Looking upstream of the site

Looking downstream of the site

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The side view of the brush matting (approximately 140m²; 35m length x 4m width):

ANNEX B: 2017 – OTHER PICTURES OF EROSION NEAR THE SITE AND CULVERTS

Near the culverts

Near site 3 (approximately 50m downstream of brush mat)

ANNEX C: 2016 – OLD STRUCTURES BEING TAKEN OUT IN 2016 (PICTURES AND SITE COORDINATES)

N 46,27,1.6014 W 064,49,49.7828
Site 1: Before

Site 1: During

Site 1: After

N 46,27,0.3263 W 064,49,47.9322

Site 2: Before

Site 2: During

Site 2: After

N 46,26,59.3747 W 064,49,46.6069

Site 3: Before

Site 3: During

Site 3: After

N 46,26,56.0922 W 064,49,48.1507

Site 4: Before

Site 4: During

Site 4: After

N 46,26,51.0478 W 064,49,52.7241

Site 5: Before

Site 5: During

Site 5: After

N 46,26,50.8560 W 064,49,52.2787
Site 6: Before

Site 6: During

Site 6: After

Some netting that was attached to the log was removed but the log has been left in place.

N 46,26,47.0567 W 064,49,44.0079
Site 7: Before

Site 7: During

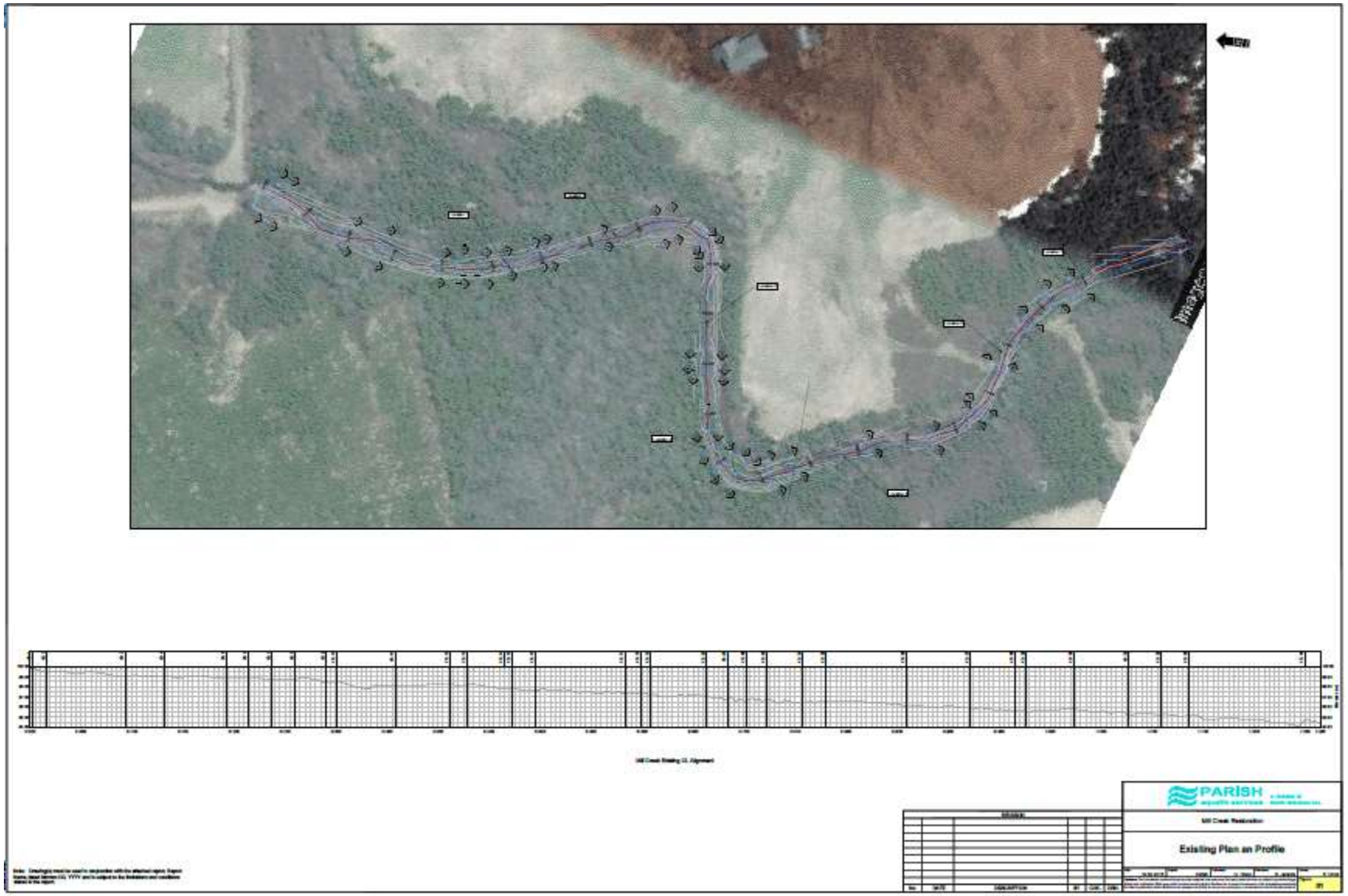
Site 7: After

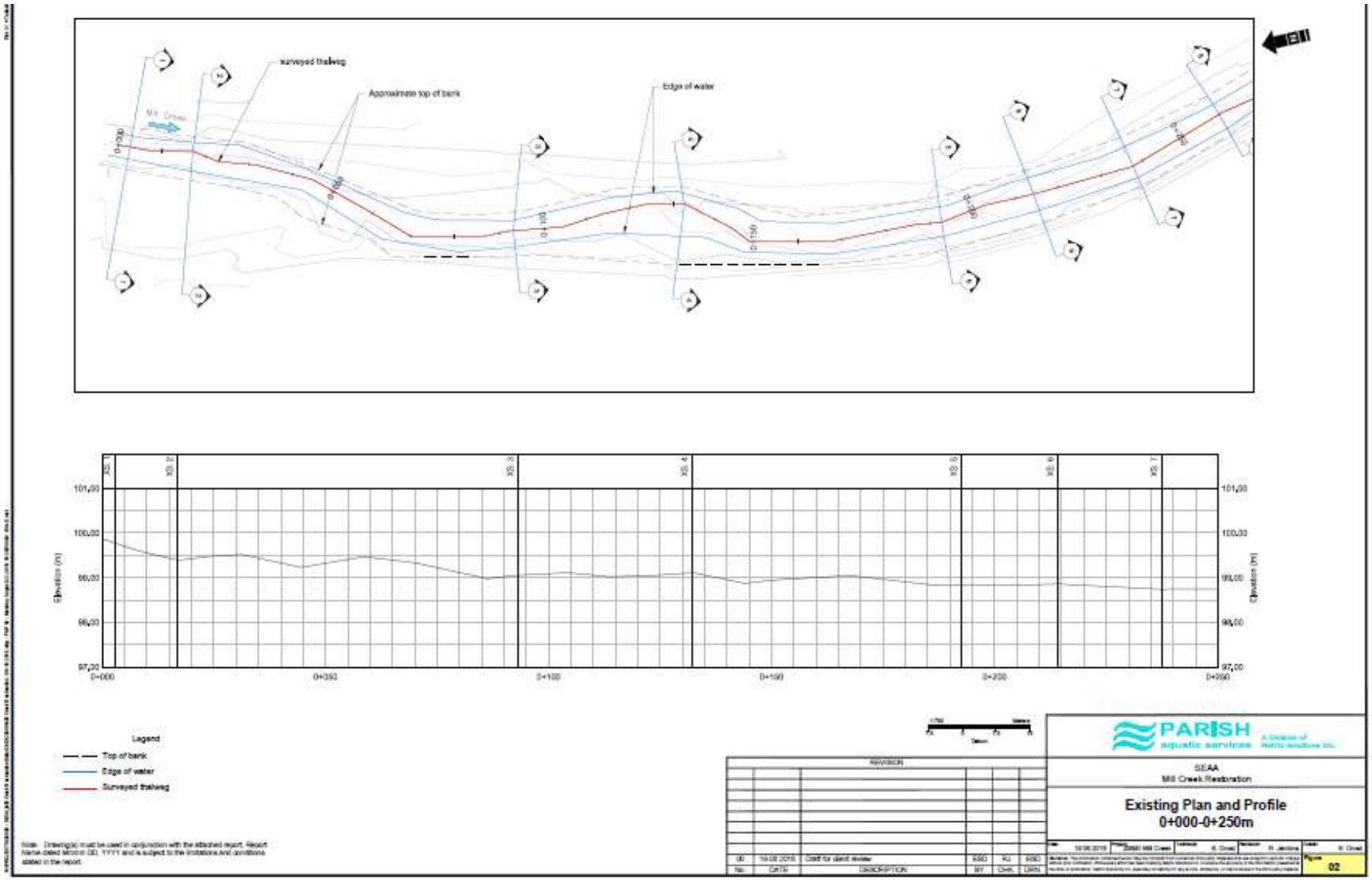
N 46,26,46.9037 W 064,49,42.2075
Site 8: Before

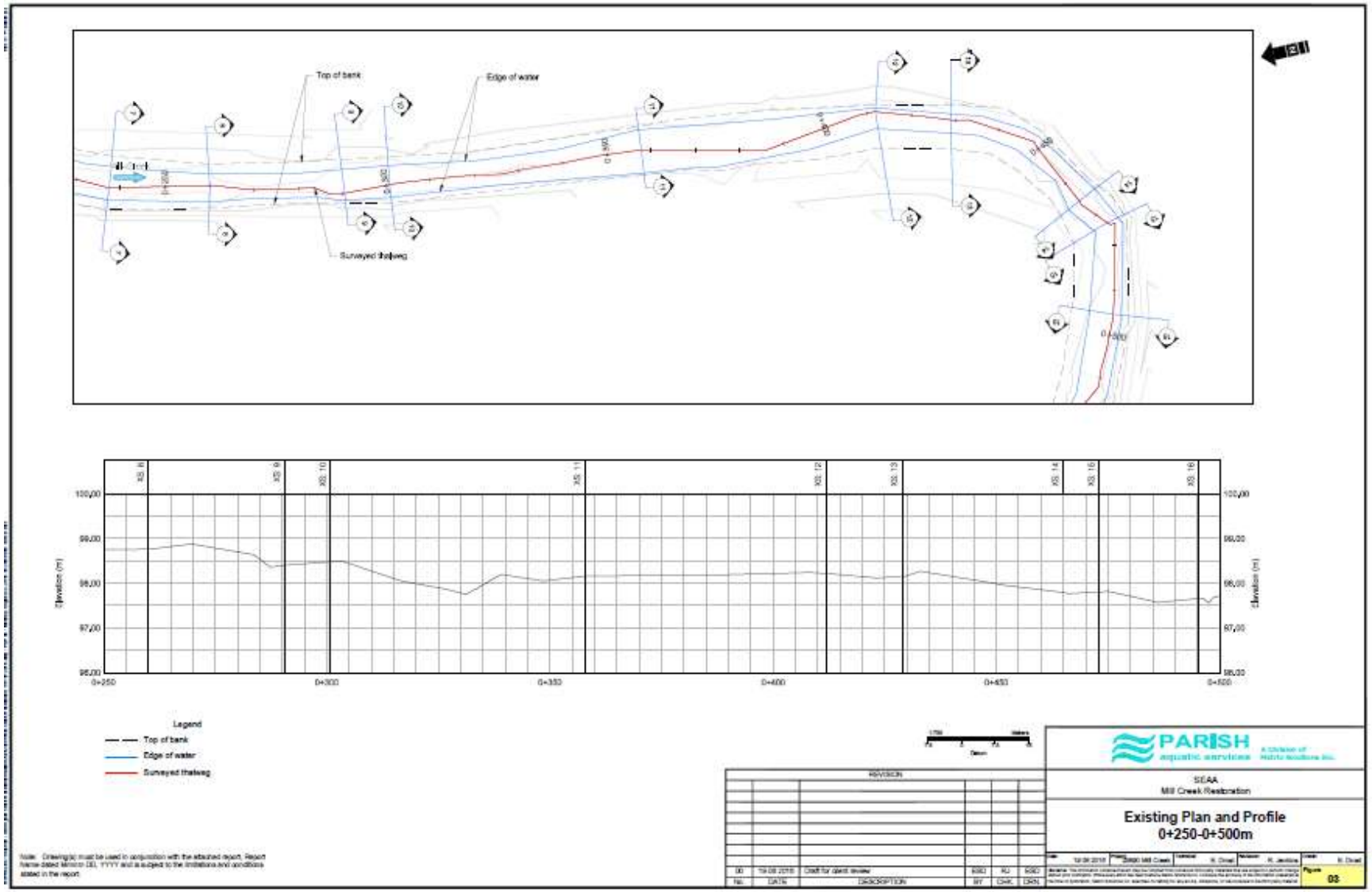
Site 8: During

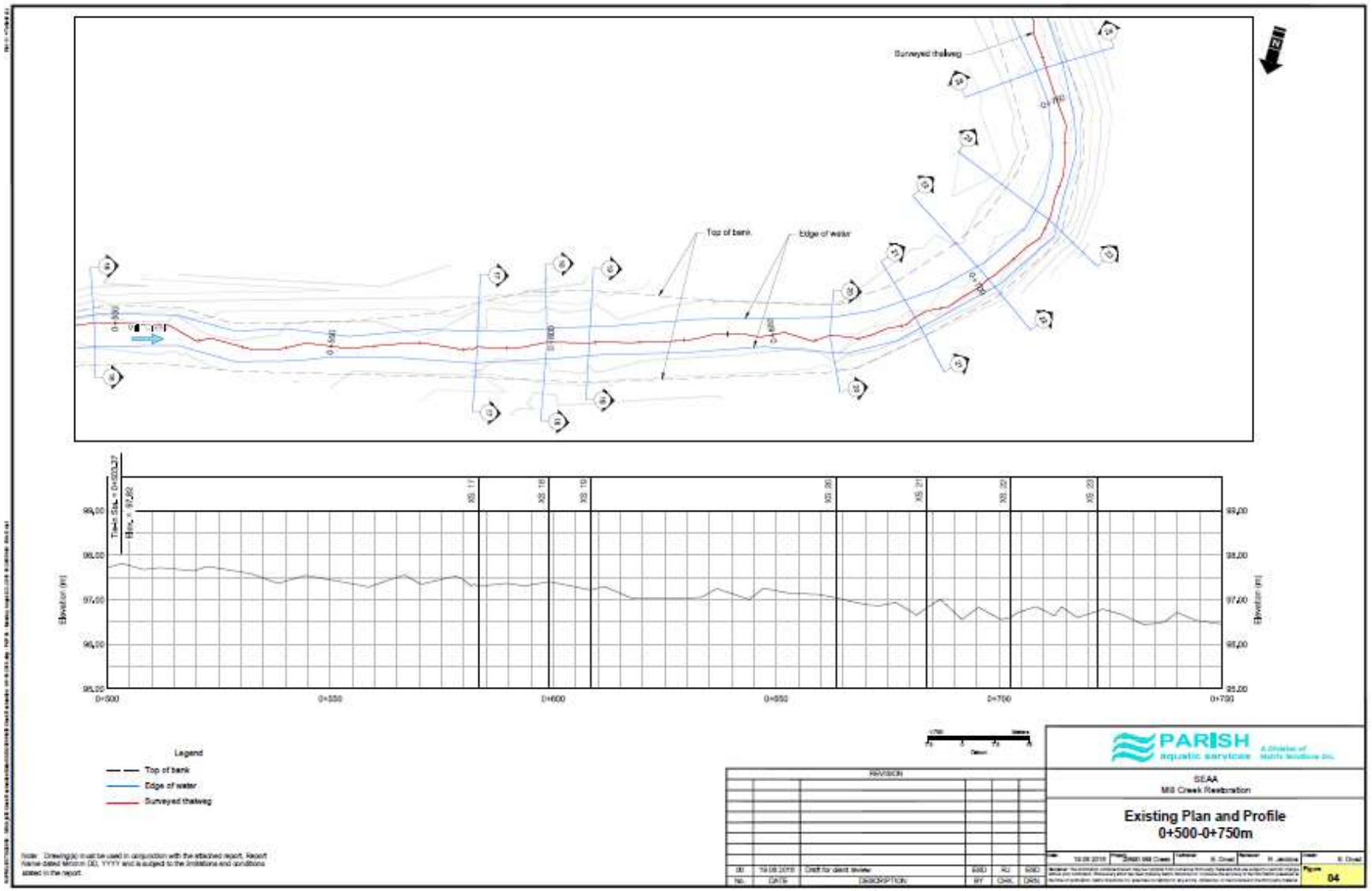
Site 8: After

ANNEX D: GEOMORPHIC AND HABITAT SURVEY RESULTS 2016




surveyed thalweg
Approximate top of bank
Edge of water
Mill Creek
0+000
0+050
0+100
0+150
0+200
0+250
XS 1
XS 2
XS 3
XS 4
XS 5
XS 6
XS 7
101,00
100,00
99,00
98,00
97,00
Elevation (m)
Legend
Top of bank
Edge of water
Surveyed thalweg
PARISH
aquatic services
SEAA
Mill Creek Restoration
Existing Plan and Profile
0+000-0+250m
02

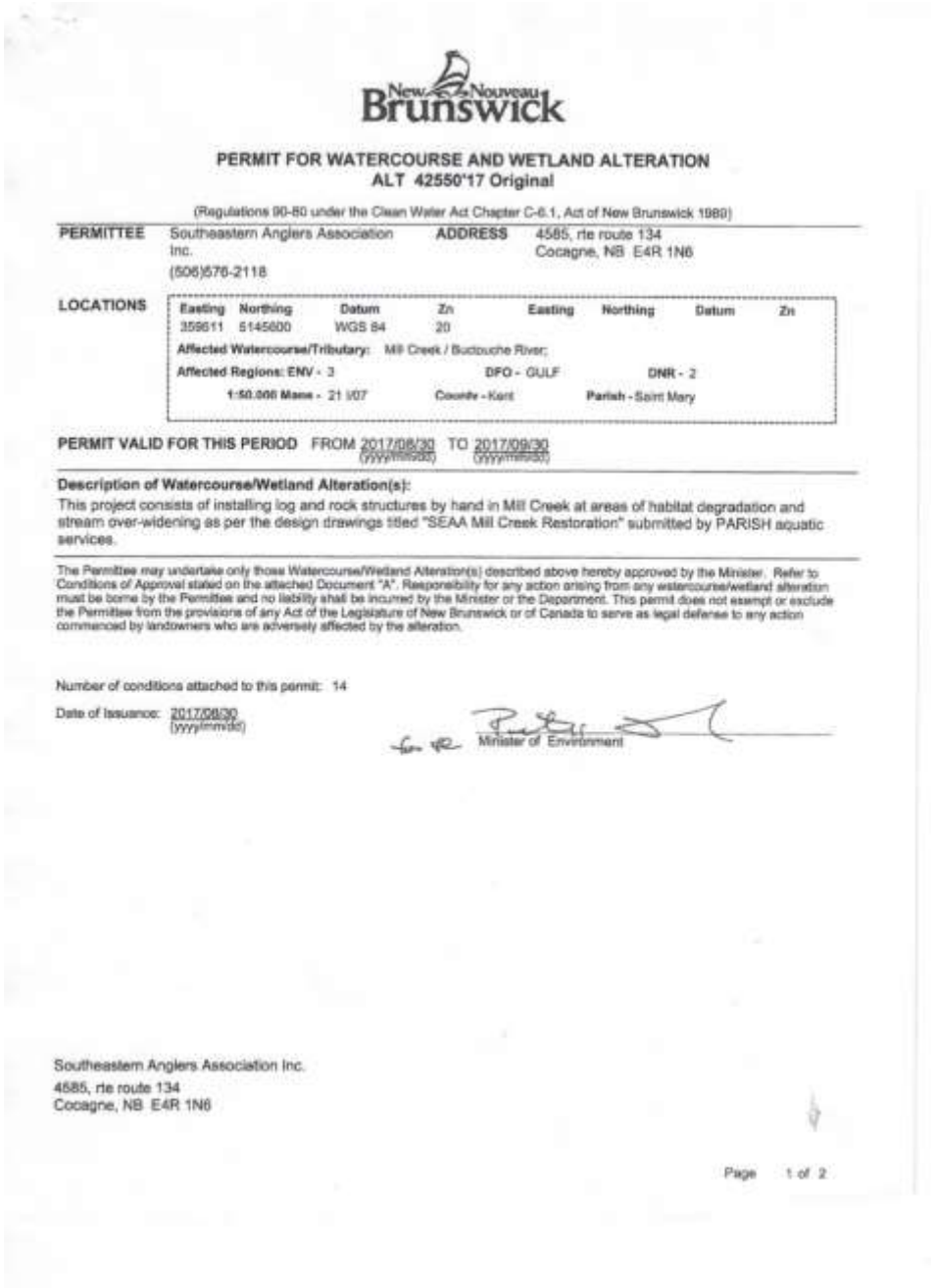

Top of bank
Edge of water
Surveyed thalweg
XS 8
XS 9
XS 10
XS 11
XS 12
XS 13
XS 14
XS 15
XS 16
100,00
99,00
98,00
97,00
96,00
Elevation (m)
0+250
0+300
0+350
0+400
0+450
0+500
Legend
Top of bank
Edge of water
Surveyed thalweg
PARISH
aquatic services
SEAA
Mill Creek Restoration
Existing Plan and Profile
0+250-0+500m
03


Surveyed thalweg
Top of bank
Edge of water
0+500
0+550
0+600
0+650
0+700
0+750
Elevation (m)
99.00
98.00
97.00
96.00
95.00
Legend
Top of bank
Edge of water
Surveyed thalweg
PARISH
aquatic services
SEAA
Mill Creek Restoration
Existing Plan and Profile
0+500-0+750m
04

ANNEX E: PARISH AQUATIC SERVICES' REPORT

See Matrix Solutions' report: "MILL CREEK SUMMARY OF INSTREAM WORK COMPLETED SEPTEMBER 2016" and "MILL CREEK SUMMARY OF INSTREAM WORK COMPLETED SEPTEMBER 2017"

ANNEX F: WATERCOURSE AND WETLAND ALTERATION PERMIT 2016 AND 2017



New Nouveau Brunswick

PERMIT FOR WATERCOURSE AND WETLAND ALTERATION
ALT 42550'17 Original

(Regulations 90-80 under the Clean Water Act Chapter C-6.1, Act of New Brunswick 1980)

PERMITTEE Southeastern Anglers Association Inc.
(506)576-2118

ADDRESS 4585, rte route 134
Cocagne, NB E4R 1N6

LOCATIONS

Easting	Northing	Datum	Zn	Easting	Northing	Datum	Zn
359611	5145600	WGS 84	20				

Affected Watercourse/Tributary: Mill Creek / Buctouche River;

Affected Regions: ENV - 3 **DFO** - GULF **DNR** - 2

1:50,000 Maps - 21 I/07 **County** - Kent **Parish** - Saint Mary

PERMIT VALID FOR THIS PERIOD FROM 2017/08/30 (yyyy/mm/dd) TO 2017/09/30 (yyyy/mm/dd)

Description of Watercourse/Wetland Alteration(s):

This project consists of installing log and rock structures by hand in Mill Creek at areas of habitat degradation and stream over-widening as per the design drawings titled "SEAA Mill Creek Restoration" submitted by PARISH aquatic services.

The Permittee may undertake only those Watercourse/Wetland Alteration(s) described above hereby approved by the Minister. Refer to Conditions of Approval stated on the attached Document "A". Responsibility for any action arising from any watercourse/wetland alteration must be borne by the Permittee and no liability shall be incurred by the Minister or the Department. This permit does not exempt or exclude the Permittee from the provisions of any Act of the Legislature of New Brunswick or of Canada to serve as legal defense to any action commenced by landowners who are adversely affected by the alteration.

Number of conditions attached to this permit: 14

Date of Issuance: 2017/08/30 (yyyy/mm/dd)

for the Minister of Environment

Southeastern Anglers Association Inc.
4585, rte route 134
Cocagne, NB E4R 1N6

Page 1 of 2

DOCUMENT "A" Attached to ALT 42550'17 Original
CONDITIONS OF APPROVAL

(Regulations 90-80 under the Clean Water Act Chapter C-6.1, Act of New Brunswick 1989)

(1) Other than the alterations described on this permit, no additional alteration shall be carried out in or within 30 metres of the shoulder of the bank of a watercourse and/or the edge of a wetland.

(2) A copy of this permit, including the "Conditions of Approval", shall be kept at the alteration site throughout the duration of the project, and such copy shall be produced upon the request of an inspector designated to act on behalf of the Minister of Environment and Local Government, or an employee of Fisheries and Oceans Canada.

(3) The permittee shall ensure that all persons involved in the project are aware of and comply with the scope, conditions, and environmental constraints of this permit.

(4) The Department of Environment and Local Government - Grand Falls Office (473-7744) shall be notified prior to project commencement (at least 2 working days ahead if possible).

(5) An appropriate emergency spill kit shall be kept on-site and be readily deployable. Any spill, regardless of quantity, must be reported by contacting the Department of Environment and Local Government during business hours or the Canadian Coast Guard Environmental Emergency number (1-800-565-1633) after hours.

(6) Any debris and excavated material generated by the project shall be disposed of such that it cannot be washed into a watercourse/wetland by floodwaters or surface runoff.

(7) All materials and self-propelled equipment used to fulfill the project shall be operated, and stored/parked in an area that prevents any deleterious substance (e.g. petroleum products, silt, etc.) from entering a watercourse/wetland.

(8) The equipment used to fulfill the project shall be in good working order and must not be leaking any fuel, lubricants, or hydraulic fluid.

(9) The permittee/agent carrying out the work shall take whatever steps are necessary to prevent noticeable suspended sediment from reaching a watercourse/wetland as a result of the alterations covered by this permit.

(10) All mitigation measures necessary to prevent suspended sediment from being washed downriver shall be implemented at the onset of the project and maintained throughout.

(11) If a silt plume results from the work, all work shall cease immediately and the issue must be corrected before continuing the project. If suspended sediments cannot be controlled, the project area shall be isolated from the remainder of the stream flow before work may proceed.

(12) All in-channel work shall be carried out manually using hand held tools only.

(13) The work shall be carried out during low flow conditions.

(14) Any vegetation destroyed as a result of project activities shall be replaced with non-invasive perennial vegetation native to the area. The species and density of woody vegetation planted shall be similar to that which existed in the area before the project took place.

New Brunswick

PROVISIONAL PERMIT FOR WATERCOURSE AND WETLAND ALTERATION
ALT 40869'16 Original

(Regulations 90-80 under the Clean Water Act Chapter C-6.1, Act of New Brunswick 1989)

PERMITTEE: Southeastern Anglers Association Inc.
(506) 576-2118

ADDRESS: 4585, rte route 134
Cocagne, NB E4R 1N6

LOCATION:
Longitude: -64.830752
Latitude: 46.450654
PID: 25042169
Parish: Saint Mary
Watercourse/Tributary: Mill creek → Bouctouche River (Trib)

Northing: 5145749 **Easting:** 359398 **Zone:** 20
NTS Map: 21I07
ENV Region: 3 **DNR Region:** 2
County: Kent

PERMIT VALID FOR THIS PERIOD: Aug-22-2016 **TO** JUL 30, 2016

Project Applicability

Removal of man-made obstructions and alterations

This provisional permit allows for the removal of structures and debris too large to be removed manually (e.g. bridges, culverts, pipelines, fridge, cars, etc.) in or over a watercourse/wetland, excluding man-made structures designed to impound water, provided that all equipment is operated in isolation of the stream flow and that all components of the structure can be removed with self-propelled equipment that is stationed outside the wetland or the wetted portion of the watercourse.

DATE OF ISSUANCE: ~~NOT ISSUED~~ Aug 24, 2016

SIGNATURE: Jamie Collett
Department of Environment and Local Government

DOCUMENT "A" Attached to ALT 40869'16 Original

(Regulations 90-80 under the Clean Water Act Chapter C-6.1, Act of New Brunswick 1989)

Conditions

Removal of man-made obstructions and alterations

1 The project, including site stabilisation, shall be carried out between June 1st and September 30th only.

2 A copy of this permit, including the "Conditions of Approval", shall be kept at the alteration site throughout the duration of the project, and such copy shall be produced upon the request of an inspector designated to act on behalf of the Minister of Environment and Local Government, or an employee of Fisheries and Oceans Canada.

3 When self-propelled equipment is being used, an appropriate emergency spill kit shall be kept on-site and be readily deployable. Any spill, regardless of quantity, must be reported by contacting the Department of Environment and Local Government during business hours or the Canadian Coast Guard Environmental Emergency number (1-800-565-1633) after hours.

4 The equipment used to fulfill the project shall be in good working order and must not be leaking any fuel, lubricants, or hydraulic fluid.

5 The permittee/agent carrying out the work shall take whatever steps are necessary to prevent noticeable suspended sediment from reaching a watercourse/wetland as a result of the alterations covered by this permit.

6 Self-propelled equipment used to fulfill the project shall be stationed outside of the wetland and/or the wetted portion of the watercourse. Fill shall not be added or new structures shall not be constructed to facilitate this project.

7 The removal of structures/debris in or over water shall be carried out during low stream flow/water level.

8 All spoil, structural components, and/or debris being removed shall be prevented from washing downstream. These materials shall be entirely captured and disposed of outside a regulated area, in a manner acceptable to the Department of Environment and Local Government.

9 A culvert and any associated cover material shall be removed, and the channel restored to the cross-section immediately upstream and downstream of the crossing, in isolation of the stream flow.

10 If you are unable to remove a crossing involving more than one culvert by pumping the stream flow around the work site, the culverts shall be removed during low flow conditions in accordance with the following sequence: a) First, the culvert on the far side of the channel (the side opposite from where the self-propelled equipment approaches the project), shall be removed in isolation of the stream flow. b) The bank of the watercourse adjacent to this culvert shall be restored to the cross-section immediately upstream and downstream of the crossing and permanently stabilized against erosion while all the flow is funnelled through the culvert closest to the other bank. c) As the project progresses toward the near bank, the reclaimed channel shall be restored to the cross-section immediately upstream and downstream of the crossing. d) Finally, while the last culvert is being removed and the bank adjacent to it is being restored to the cross-section immediately upstream and downstream of the crossing and permanently stabilized against erosion, the work shall be isolated from the stream flow with a cofferdam that constricts the flow to the other side of the watercourse.

11 The removal of structures or embedded debris along the bank of a watercourse requiring the excavation of unconsolidated material shall be isolated from the stream flow and any suspended sediment generated shall be prevented from causing downstream sedimentation by installing a cofferdam or deploying a silt curtain around the work area, that is weighted throughout the bottom (e.g. a chain threaded through it).

12 The cofferdam or silt curtain shall not be removed until all suspended sediment has settled onto the bed of the watercourse.

13 The approaches to a crossing that has been removed shall be blocked off to discourage fording and/or destabilization of the bed and banks of the watercourse by all-terrain traffic.

DOCUMENT "A" Attached to ALT 40869'16 Original

(Regulations 90-80 under the Clean Water Act Chapter C-6.1, Act of New Brunswick 1989)

14 The altered area shall be restored to its natural grades and/or the channel restored to the cross-section immediately upstream and downstream of the altered area.

15 Woody vegetation removed/cut shall be limited to those that are required to facilitate the removal of the structure/large debris.

16 Any vegetation destroyed in order to fulfil the project shall be replaced with non-invasive perennial vegetation native to the area. The species and density of woody vegetation planted shall be similar to that which existed in the area before the project took place.

17 Throughout the project, all exposed erodible soil shall be temporarily stabilized with mulch, erosion control blankets or other devices designed to prevent erosion and the runoff of suspended sediment into a watercourse/wetland, prior to each forecasted rain event.

18 Upon final grades being achieved, all exposed soil shall be permanently stabilized with non-invasive perennial vegetation native to the area and blanketed with mulch or blanketed with an engineered erosion control product designed to prevent the generation of suspended sediment due to rain or overland runoff events.

DOCUMENT "A" Attached to ALT 40869'16 Original

(Regulations 90-80 under the Clean Water Act Chapter C-6.1, Act of New Brunswick 1989)

Disclaimers:

Approval from the Department of Natural Resources, Crown Lands Branch, may be required for any proposed work or activities adjacent to, or within, inland or tidal waters. It is your responsibility to contact the Crown Lands Information Line at 1-888-312-5600, prior to the commencement of the project.

Responsibility for any action arising from any watercourse and wetland alteration shall be borne by the Permittee and no liability shall be incurred by the Minister or the Department of Environment and Local Government. This permit does not exempt or exclude the Permittee from the provisions of any Act of the Legislature of New Brunswick or of Canada to serve as a legal defense to any action commenced by landowners who are adversely affected by the alteration(s).