PARISH
aquatic services
A Division of Matrix Solutions Inc.

February 22nd, 2016

PAM RYAN
Anqotum Resource Management
32 MicMac Road
Eel Ground, NB
E1V 4B1

Subject: Conceptual Design Overview

Dear Ms. Ryan,

The following is a brief description of the conceptual design for the restoration of the Oxbow site on the Little Southwest Miramichi River. The conceptual design was presented to the stakeholders on February 8th, 2016. This document provides a description of proposed construction activities and stages for the work to be completed for the regulators to begin the permitting and approvals process. A more comprehensive design brief will be provide upon the completion of the hydraulic modeling for this reach of the river. The following figure (Figure 1) shows the location of the project site and the access road that will be utilized during restoration activities.

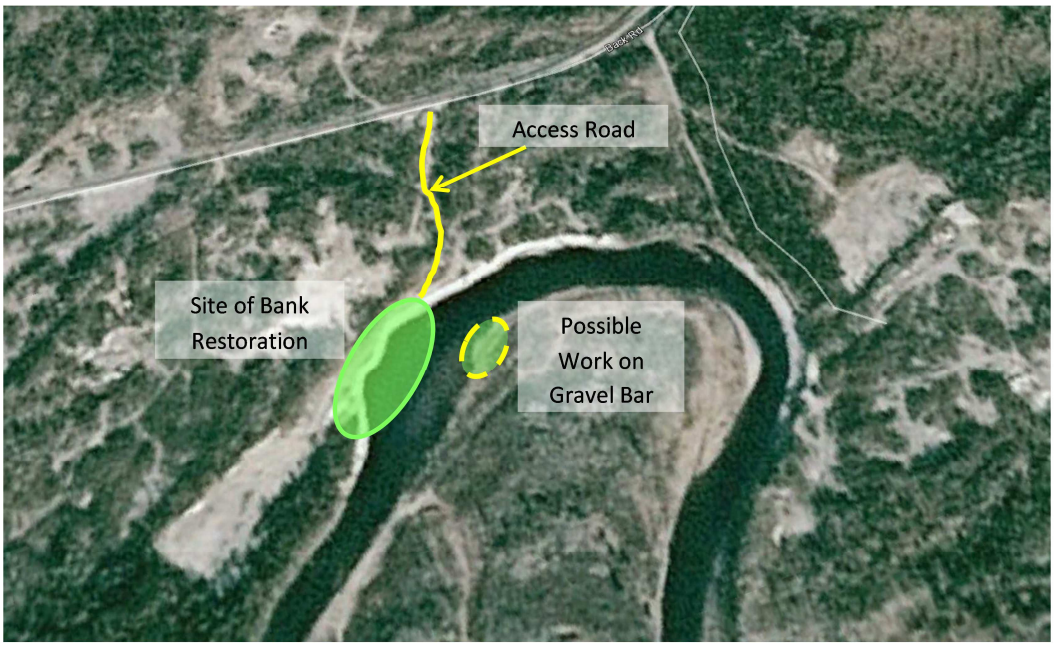

Figure 1 – Site access and location of work

Suite 300, 346 Queen Street,
Fredericton, New Brunswick, Canada E3B 1B2
Phone: 506.472.8440 Fax: 506.472.6250
www.parishgeomorphic.com

The restoration of the bank is expected to be completed over a two year period. Construction activities during year one will include the placement of the rock to form the toe of the bank. Year two construction activities will see the reshaping of the bank using soil lifts contained by an eco-friendly fabric. Figure 2 shows the location of the rock toe and bank lifts.

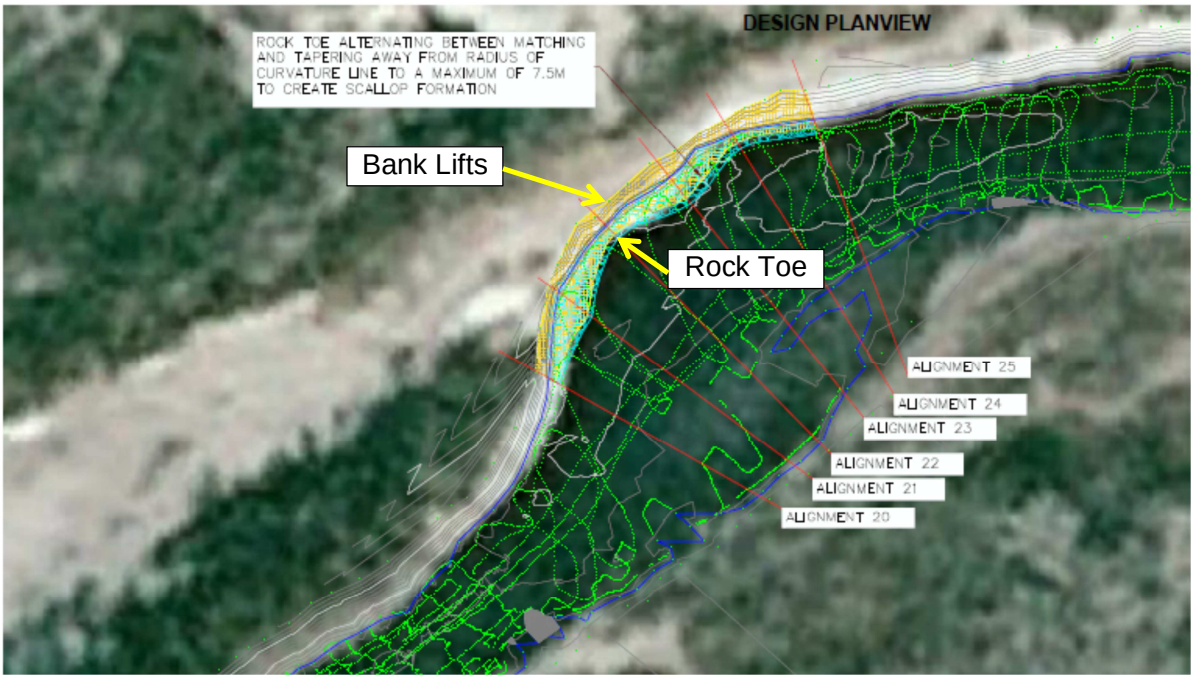

Figure 2 – Location of Rock Toe and Bank Lifts

Access to the restoration site will be along a dirt road that is off of Back Road. In order to gain access to the toe of the bank a continuation of the access road will be cut through the bank to the water's edge. The material removed from the bank to cut the access road will be stockpiled and used to fill in the cut once the toe construction is completed. The large rock used to construct the toe of new bank will be placed starting from the edge of the bank and moving out into the river to the desired end point. Once all the rock has been place to form the new toe of the bank the access road will be filled in using the stockpile material that was removed.

During year two the construction of the bank face will be completed. Figure 3 shows the constructed toe and bank lifts. The bank lifts will be seeded and planted with local native tree species and grasses. The fabric warp that is used to hold the soils in place will be made of bio-degradable material and will decompose over time.

The foot print of the rock toe is approximately 1733 m^2. The face of the bank that will be reshaped is approximately 1026 m^2.

Work on the gravel bar opposite the bank will be determined upon the completion of the hydraulic model. Once flows have been modelled and shear forces and energy grade lines calculated; removal of the top layer of material from the gravel bar may be necessary to achieve correct channel dimensions, particularly when it comes to width.

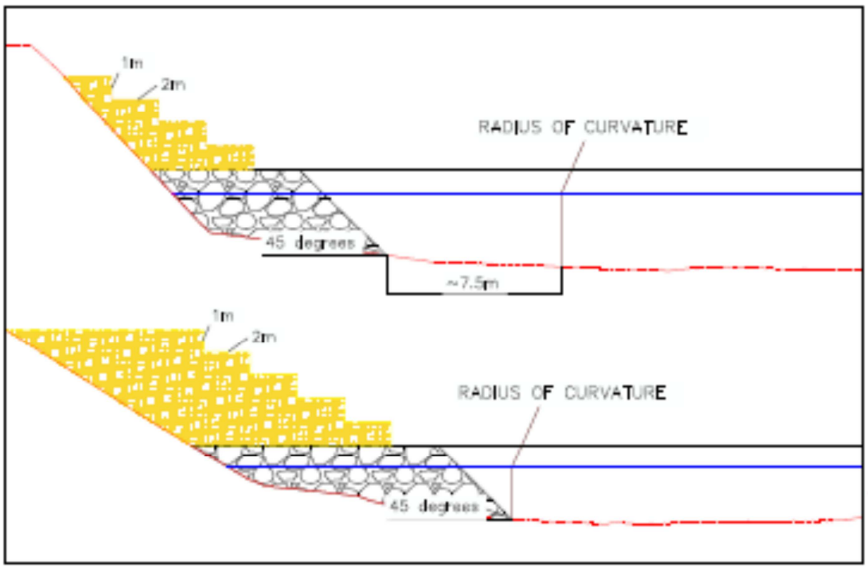

Figure 3 – Toe and bank lifts

The following is a brief outline listing the construction activities over a period of two years.

Construction Activities Year One (2016):

1) Install ESC measures
2) Cut access road to water's edge
3) Place large rock to form new toe of bank
4) Fill in access road that was cut through bank to access water's edge
5) Stabilize site
6) Remove ESC measure that will be impacted by high flows and ice

Construction time line is expected to take six to eight weeks.

Construction Activities Year Two (2017):

1) Install ESC measures
2) Cut access road to new toe of bank
3) Build soil lifts
4) Plant trees and shrubs
5) Fill in access road to new toe of bank
6) Stabilize site
7) Remove any ESC measures that will be impacted by high flows and ice

Construction time line is expected to take eight to ten weeks.

I hope this brief explanation of proposed construction activities based on the conceptual design will provide you with enough information to start the discussion with the regulators on permitting or any other issues that may arise.

Please feel free to contact me with any questions or concerns.

Regards,

Ron Jenkins, AScT, EP

Senior Project Manager