MAINE DEPARTMENT OF TRANSPORTATION

2006 POST - CONSTRUCTION
MONITORING REPORT:

Woodstock, Route 26 Stream Relocation Project

Year 1 of 5

Compensation for the Woodstock, Route 26 Highway Reconstruction Project
(MDOT PIN 10021.00)

ACOE Permit Number: NAE-2005-227
DEP Permit Number: L-22223-2G-A-N

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Woodstock, 10021.00

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1.0 Introduction

This report presents the results of the 2006 post-construction monitoring at the stream relocation project in Woodstock, Oxford County (Figure 1). The site provides compensation for 48,552 square feet of wetland impacts associated with the reconstruction of Route 26 in Woodstock by the Maine Department of Transportation (MaineDOT), as described in Wetland Mitigation Plan for the project submitted in January 2005. Compensation at the site consisted of relocating a roadside stream and removing road sand sediment from a small pond and restoring the riparian plantings at both sites. See *Figure 1* for project location.

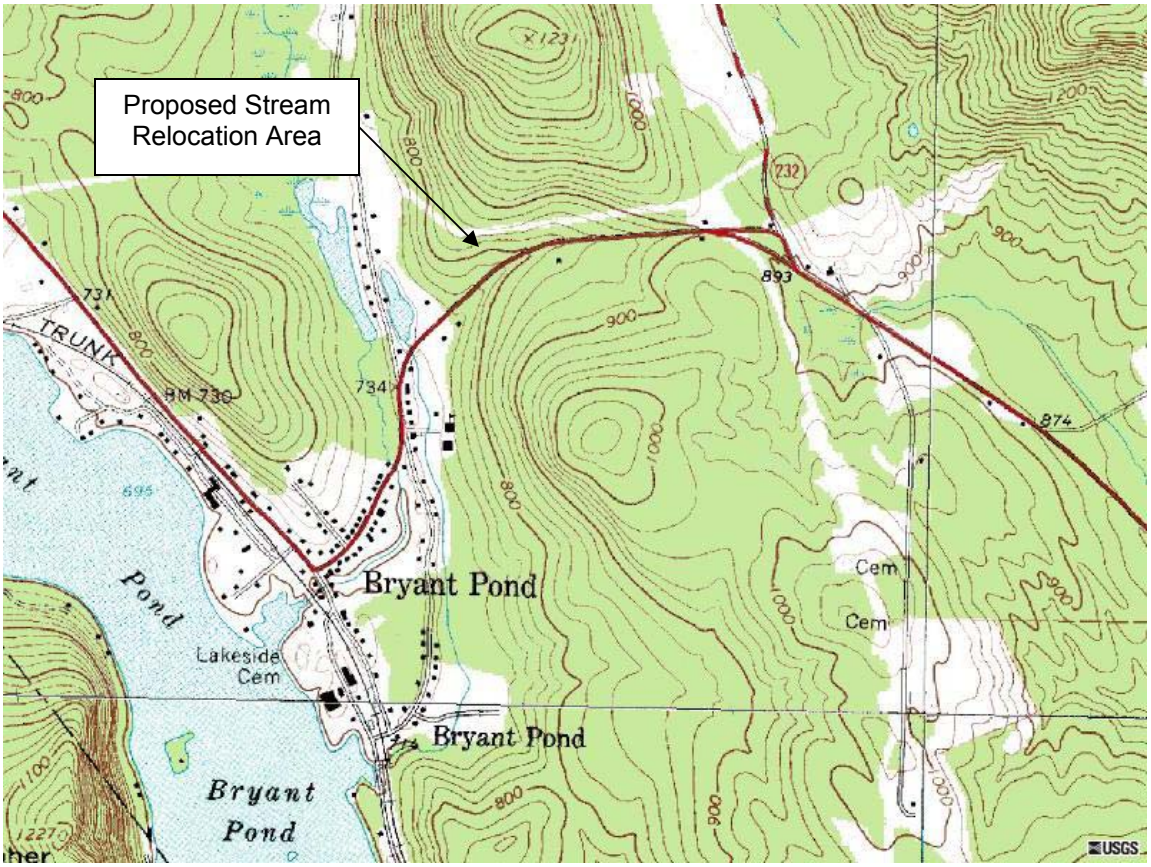

Figure 1 – Project Location Map

2.0 Stream Mitigation Summary

The stream relocation and dredging work was completed from July 7- August 18, 2005 by T. Buck Construction of Auburn, Maine. Peter Newkirk and Deane Van Dusen from MaineDOT's ENV Office prepared the design and provided construction oversight. The stream relocation moved the channel approximately 35' from the roadside ditch to a created cobble lined channel with adjacent riparian vegetation. The reconstructed stream channel was rebuilt with a series of pools and riffles. Within the riffle features, keystones were implanted in rows across the channel to form small cascades, thereby controlling the grade and "anchoring" the riffle structure. We expect that small pools will be scoured below each series of larger stones, thereby creating a variety of microhabitat niches that will benefit macroinvertebrates. Plantings of indigenous winterberry, alder, chokeberry, nannyberry, arrowwood, pussy willow and shadblow were installed in the riparian buffer along the stream course. In the pond where excess road sand had deposited at the end of a drainage culvert, the sediment was removed down to the existing wetland substrate. This area was re-graded with a pit and mound microtopography and planted with pussy willow, alder, and buttonbush. Wetland seed mix was planted in the re-graded areas. (see before and after photos, Appendix A).

3.0 Monitoring Inspections

MaineDOT staff visited the site on April 9, 2006 to check site conditions during spring flooding; on August 21, 2006 to assess the establishment of the planted woody species; and on September 26, 2006 to determine the presence and number of European Alder (Alnus glutinosa) a non native species that was installed by the landscape contractor.

4.0 Mitigation Goals and Performance Standards

The restoration goal is to improve the habitat value of the stream course by moving it out of the roadside ditch, and removing the sediment deposit from the small pond and planting riparian buffers.

5.0 Monitoring Methods

Stream morphology will be monitored using a pre-determined reference reach that is located approximately 200' downstream of the project area. This reach will be compared to the re-constructed areas in and around the new channel. The following performance standards will be used to monitor the success of the new stream channel: stabilize banks in the work area; establishment of riparian vegetation; no significant siltation in stream pools; no significant post-construction changes in stream planform configuration; and no significant re-arrangement of stream-bed material. The pond area where sediment was removed and a pit and mound micro-topography was developed and planted will be monitored for riparian establishment, invasive species and the presence of siltation.

6.0 Results and Discussion

The restored stream channel was developed according to landscape setting and topography. The new channel used characteristics borrowed from the reference reach to address grade changes and the placement of riffles and pools. The new channel consists of a cobble substrate with large boulder placement to encourage sinuosity. Because the stream is classified as high-gradient in this newly created section, there are a number of knick-points or drops with associated scour holes. All of these grade control structures were designed according to those natural structures in the reference reach. This stream does not support any fishery, so fish passage was not of concern. Channel morphology remained constant through the '05-'06 winter and '06 growing season with no changes to the channel planform. Minimal siltation was observed in the newly constructed pools. It was believed that the siltation that was observed was generated through the construction process and early flushing of the new stream channel. Stream banks remained stable through the same period. Riparian plantings consisting of: winterberry, alder, chokeberry, nannyberry, arrowwood, pussy willow and shadblow were installed in a 15' wider buffer on either side of the channel. Adjacent mixed hardwood and softwood forest will provide a seed source for volunteer stock within this riparian buffer. All planted stock was

monitored for survival and of the 1013 installed plants, 15 were determined unacceptable and tagged for replacement. See *Table 1 – Performance Standards Results*.

Prior to sediment dredging, the pond site was acting as a sediment trap for road sand and there was a considerable alluvial deposit at the end of the culvert that drained the road ditches. The road project installed a sediment basin, above the pond outlet, to capture this material. The restoration work removed the sediment plume down to existing wetland substrate, and re-developed a pit and mound microtopography and installed riparian plantings. The presence of invasive species to include common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*) and buckthorn (*Frangula alnus* syn. *Rhamnus frangula*) was reviewed and none were present. The site was monitored for siltation and was found to be stable with no sediment from the restoration site or the culvert. The 178 riparian plantings were all found to be in acceptable condition.

It came to our attention during this first year of monitoring that 53 European Alder (Alnus glutinosa) were planted in place of Speckled Alder (Alnus incana ssp. rugosa) in the restored pond area riparian plantings. The landscape contractor was notified and we requested that they replace this non-native species with the species requested in the contract. The contractor is currently negotiating with their supplier and will complete these replacements in spring ’07.

Table 1: Performance Standards Results

Performance Standard	2006 Findings (Year 1)
Stream banks stable	Banks appear to be well vegetated and stable.
Presence of siltation in stream pools	Some minor siltation in pools that appear to be the result of the construction activities from 2006.
Establishment of planted riparian buffers	Planted woody vegetation is doing very well. The 53 European Alder that were planted will be removed Spring ’07 and replaced with native Speckled Alder.

Changes in stream planform	Stream planform has not changed since the stream channel construction. The new channel is accommodating the flows successfully.
Re-arragement of stream bed material	Stream bed material appears to be very stable with some movement of siltation during high flows. No re-arrangement of bed material is occurring.
Invasive species control	No invasive species were present.

7.0 Recommendations

Continue monitoring the channel morphology and performance standards. The second year of monitoring will occur during the '07 growing season. To date, all the performance standards are being met on this restoration project.

8.0 References

Harrelson, Cheryl C.; Rawlins, C.L.; Potyondy, John P. 1994. Stream channel reference sites: an illustrated guide to field technique. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 pp.

Parish Geomorphic Ltd. 2001. South Bog Stream and Bemis Stream Fluvial Geomorphological Assessment (Memo to F. Bonney). 10 pp.

Pfankuch, D.J. 1975. Stream reach inventory and channel stability evaluation. USDA Forest Service, RI-75-002. Government Printing Office #696-260/200, Washington, D.C. 26 pp.

Rosgen, Dave. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

Appendix A – Photographs

Reference Reach Photographs:

Existing channel at Station 2+345 L

Existing channel drop point at Station 2+345

Existing channel at Station 2+380 L

Photographs prior to Construction:

Granite culvert at Station 2+340 L

Sediment plume at culvert outlet into pond at Station 2+480 R

Stream channel at Station 2+160 R

Old road bed and site of granite culvert at Station 2+300 L

Rte 26 road ditch stream at Station 2+270 L

Photographs after Construction:

Restored pit and mound topography at pond area Station 2+480 R

Restored stream channel at Station 2+460 R

Restored stream channel in old road bed at Station 2+320 L

New stream channel at Station 2+080 L

New stream channel at Station 2+160 R

New stream channel at Station 2+280 R

New stream channel at Station 2+100 L