Blending Engineering and Environmental Considerations in the Design of Infrastructure Protection and Improvement Projects

2017 NH Water & Watershed Conference
Impacts to aquatic and riparian environments have often been overlooked in the design and construction of infrastructure protection and improvement projects.

Riprap bank stabilization on the East Branch of the Pemigewasset River adjacent to municipal sewage lagoons in Lincoln, NH

Concrete-encased oil pipeline across Stag Hollow Brook in Jefferson, NH creating a fish passage barrier
The Prioritization of infrastructure protection is understandable given high project costs, consequences of failure, and potential liability.

Bank erosion on the Mad River in Campton, NH following TS Irene

Landslide along the Souhegan River in Greenville, NH (above and below)
However, in some cases it is possible to utilize or at least incorporate bioengineering into project designs to minimize adverse environmental impacts.

The key is to identify where a completely bioengineered solution is appropriate, a traditionally engineered solution is needed, or a combination of hard armor and bioengineering can be utilized.

The best designs achieve the multiple objects of improving/protecting infrastructure and enhancing riparian and aquatic environments.

Several examples of project designs follow.
Mascoma River Bank Stabilization
K-Mart Plaza, Lebanon, NH

Construction: November/December 2015
Photos captured: March 2016
Breezy Hill Road Bridge Replacement
Warner River, Bradford, NH

Roadway inundation during 2006 Mother’s Day Flood

Pre-existing bridge (33’ span)

New bridge (80’ span)
Breezy Hill Road Bridge
Replacement
Warner River, Bradford, NH

Construction: 2016
Photos captured: November 2016

View downstream

View upstream
Smith River Bank Stabilization
Bristol, NH

April 2011 (pre-construction)

April 2016 (post-construction)
Smith River Bank Stabilization, Bristol, NH

Proposed Site Plan
Smith River Bank Stabilization, Bristol, NH

Construction: October/November 2011
Photo above captured: November 2011
Photos right captured: September 2013

View downstream

View upstream
Lower Warren Brook Restoration Alstead, NH

Post 2005 Flood

Pre-Restoration (Dec. 2011)
Lower Warren Brook Restoration, Alstead, NH

Pre-project Site Plan
Lower Warren Brook Restoration, Alstead, NH

Proposed Site Plan
Lower Warren Brook Restoration, Alstead, NH

Construction: July-October 2016
All photos looking downstream
November 2016
Bissell Brook Bank
Stabilization
Stratford, NH

Construction: October 2016
All photos captured October 2016
Bissell Brook Bank
Stabilization
Stratford, NH

All photos captured October 2016

View upstream

View downstream

Shrub plantings
Ainsworth Pond Dam Removal, Jaffrey, NH

11/24/15

12/9/15

12/21/15

9/27/16
Ainsworth Pond Dam Removal, Jaffrey, NH

May 2015 (pre-construction)

April 2016 (post-construction)
Ainsworth Pond Dam Removal, Jaffrey, NH

5/10/16

9/27/16