

# NHTI, Concord's Community College Campus Erosion Mitigation Plan

Joy Roberts and Tracey E. Lesser

Department of Natural Sciences



## Concern

NHTI has an eroded area where the facilities department needs to have access to the Merrimack River (Figure 1.). Access is needed to provide water to the campus pump house. The pump house moves water to the soccer fields on campus. Erosion in this area has resulted in the relocation of the pump house once (estimated 2005).

## Goals

1. Mitigate Erosion
2. Long Term Solution
3. Cost Effective
4. Maintain Water Accessibility
5. Stabilize Riverbank



Figure 1. Map of NHTI campus with erosion location marked

## Design

### Mass Riparian Planting

- Native plantings put right into riverbank (Figure 7.)
- Utilizing seeds, live stakes, and cultivated growths
- Plants chosen are low maintenance and hardy

## Planting Diagram

**Key: O = 3' spaced planting spot**

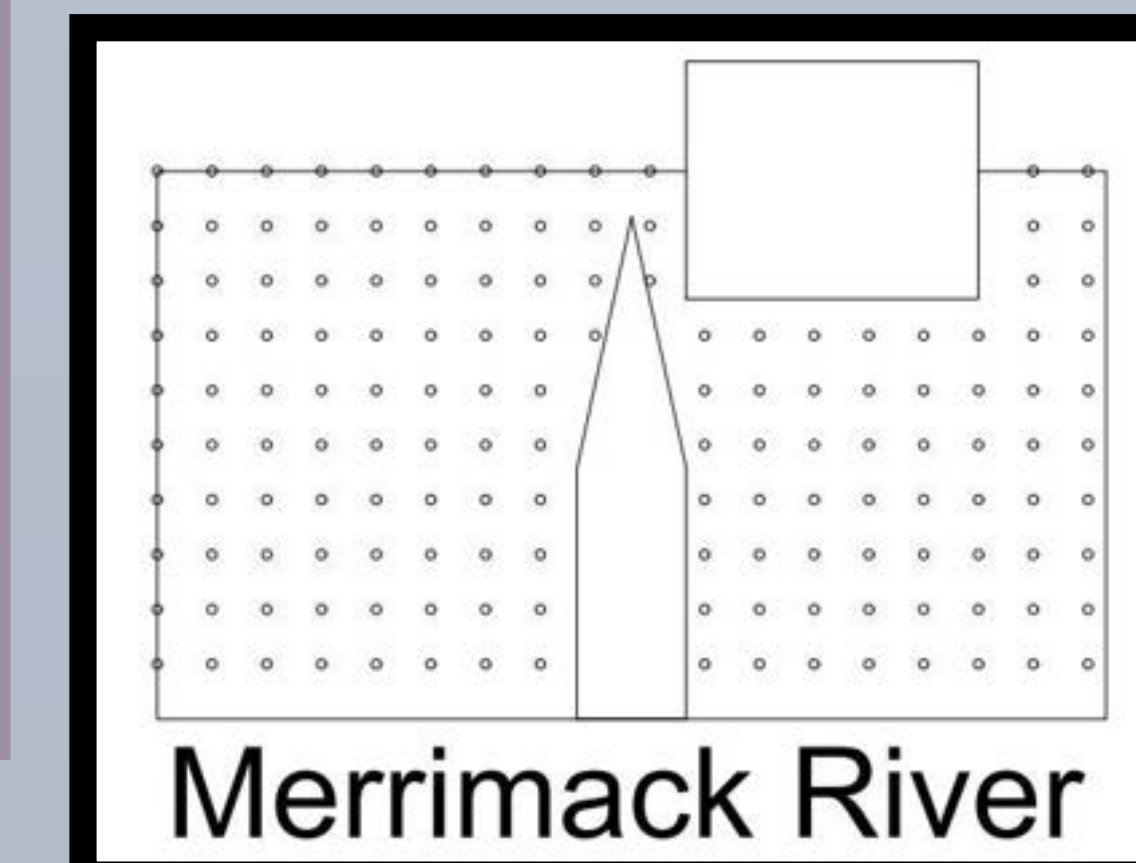


Figure 7. Diagram displaying planting spacing around erosion (where staircase will be placed) and old pump house foundation

## Designated Vegetation

The following vegetation are all native plants which will stabilize the riverbank with strong root systems and run-off absorption (Figures 2-5) :

1. Wintergreen (*Gaultheria Procumbens*)
2. Sweet Pepperbush (*Clethra alnifolia*)
3. Brunswick Blueberry (*Vaccinium angustifolium 'Brunswick'*)
4. Joe Pye Weed (*Eutrochium purpureum*)
5. Sedges (*Carex vulpinoidea* and *Carex amphibola*)
6. Northeastern Grasses [Kentucky bluegrass (*Poa pratensis*) and Perennial ryegrass. (*Lolium perenne*)]
7. Button Bush (*Cephalanthus occidentalis*)
8. New England Aster (*Symphyotrichum novae-angliae*)
9. Native Bee Balm (*Monarda fistulosa*)
10. Swamp Azalea (*Rhododendron Viscosum*)

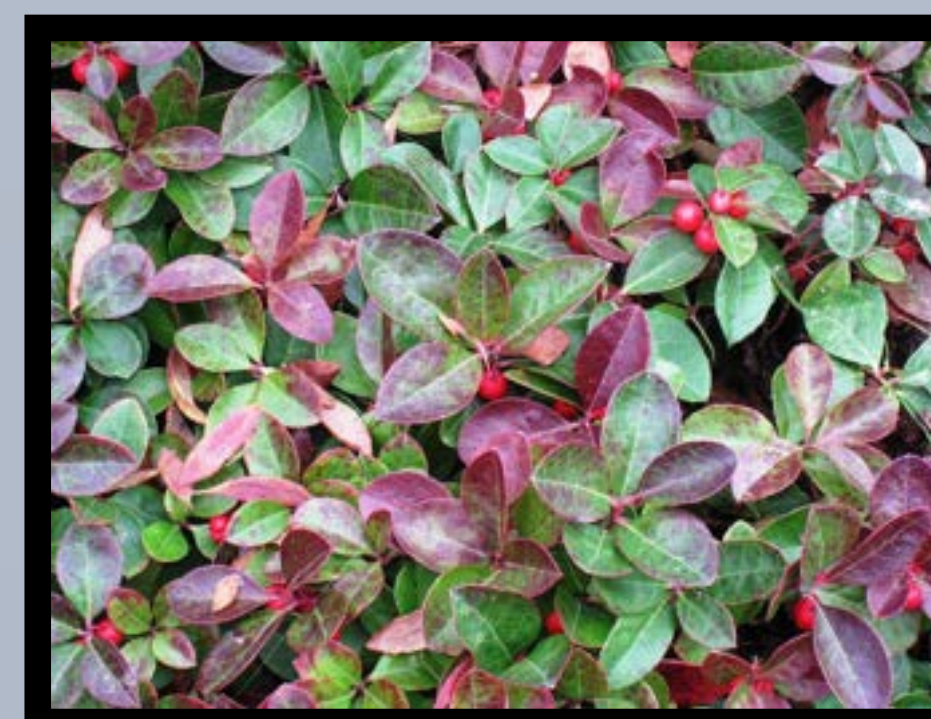


Figure 2. Dense growing wintergreen

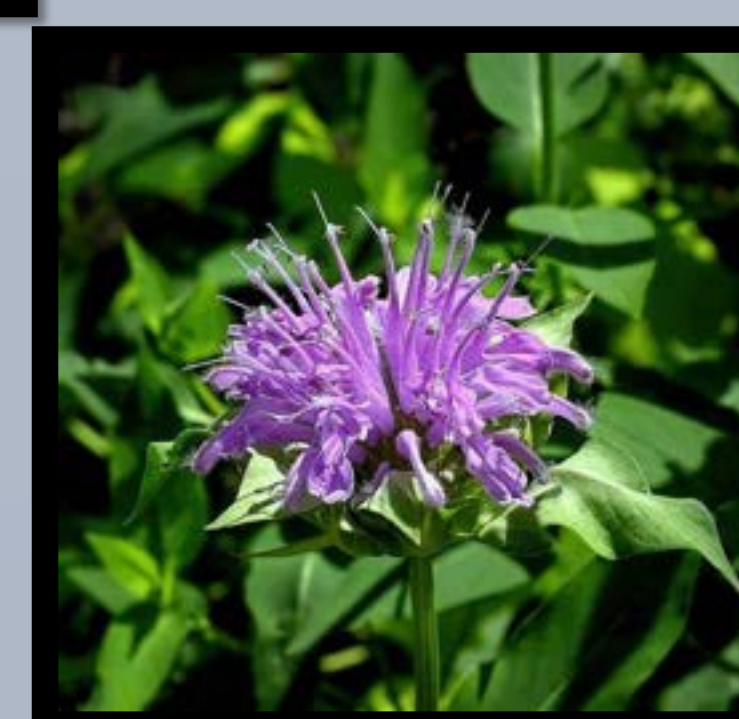


Figure 3. NH native bee balm

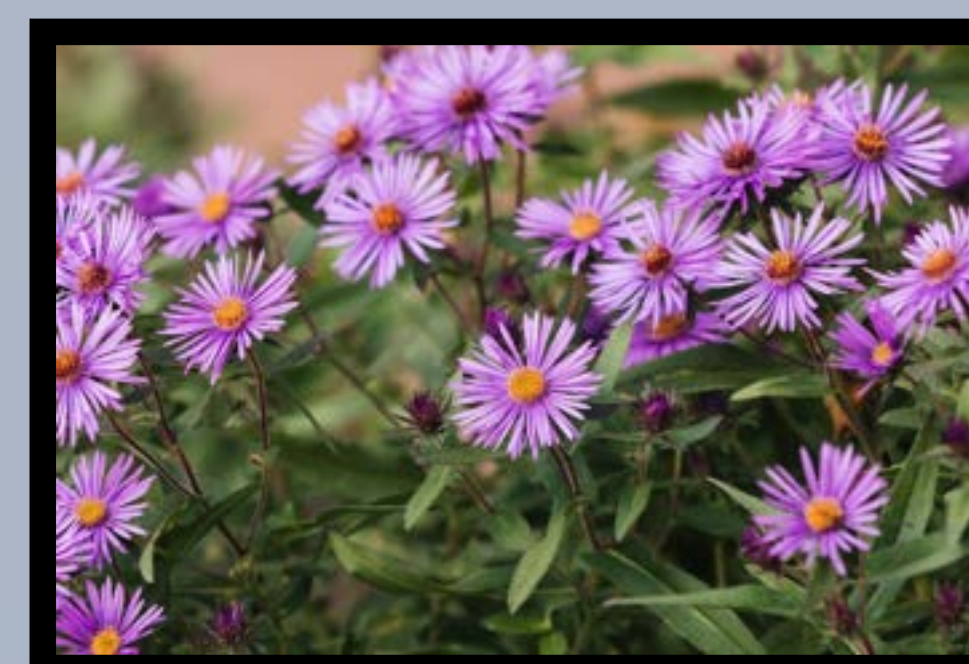


Figure 4. New England Aster



Figure 5. Fox Sedge

## Water Accessibility

An effective way to create a safe and non-eroding water access is to implement a pre-made metal staircase (Figure 6.). The staircase will be held in place by metal stakes put into the riverbank. These stairs will be removable for winter and will allow vegetation to grow underneath.



Figure 6. Premade stairway

## Overview

**Permitting: Standard Dredge and Fill Permit**

**Cost: Estimated at \$3,900-\$11,450**

Plants will be planted at an average rate of 3 feet apart. The low-cost estimation considers the idea of volunteered plantings while the high cost considers paid plantings (Figure 8.).

Design Cost Breakdown					
Estimate	Vegetation	Permitting	Stairway	Labor	Total:
Low	\$2,500	\$1,150	\$250	\$0	\$3,900
High	\$3,500	\$1,400	\$550	\$6,000	\$11,450

Figure 8. Shows how the high and low-cost estimates were derived

## Alternative Designs

Should the vegetation not prevent further erosion there is a hierarchy of erosion mitigation (Figure 9.). As the lower levels fail there is a progression of intensity. For this design fail the progression would be as follows:

- Reinforce plantings with coir mats/logs
- Have surveyed for consideration of riprap or gabions

## Mitigation Intensity Progression

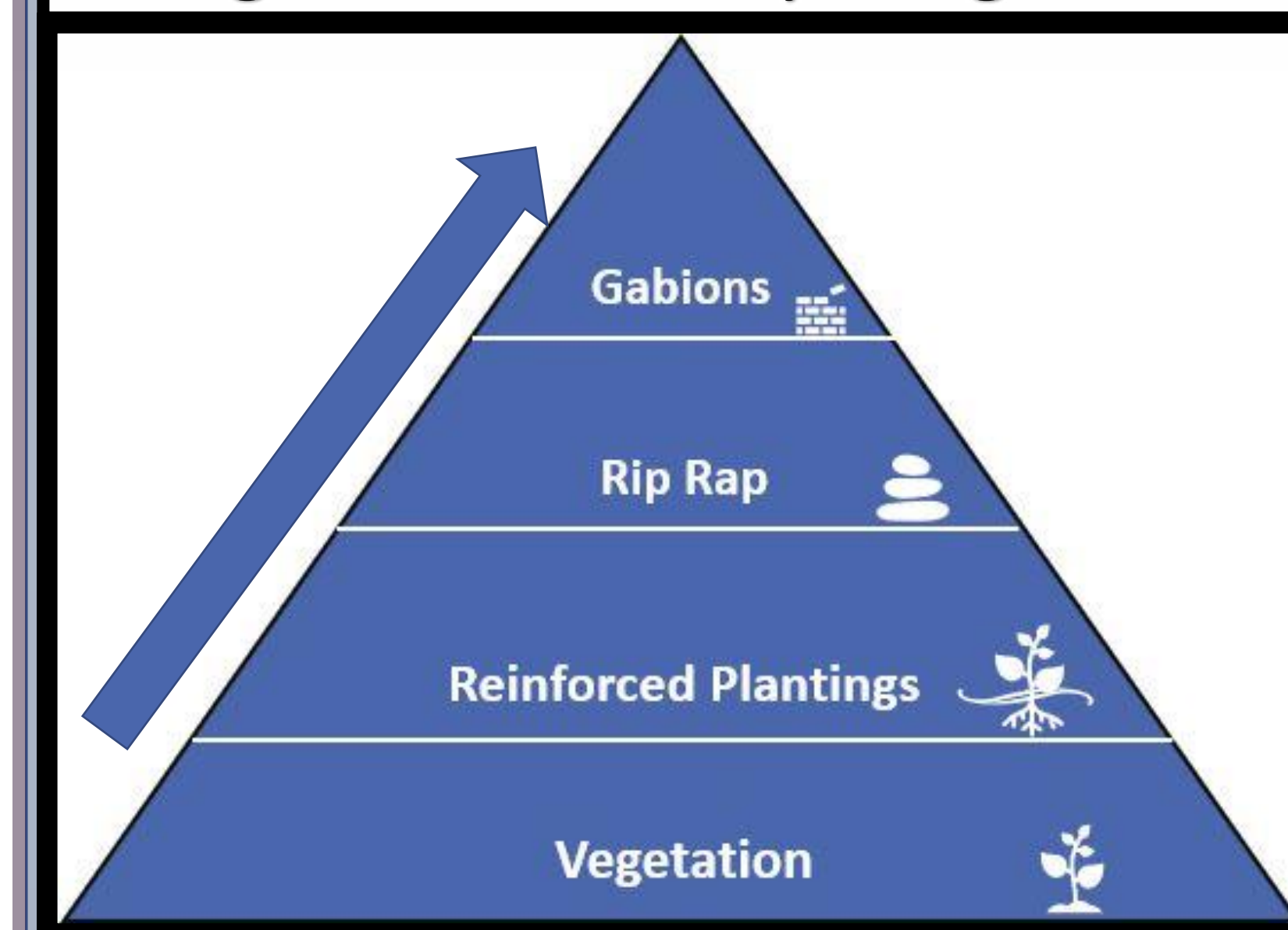


Figure 9. Shows progression of mitigation intensity as previous efforts alone fail