



Shoreland Restoration Techniques, Bio-engineered Projects & Monitoring

2014

Wisconsin Lakes Partnership Convention

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Talking Points

Techniques

Possibilities

Materials Discussion

Project Examples - Before / After

Project Monitoring & Observations

Various Techniques or Combinations of Techniques

- Natural Shoreline
- Native Plantings
- Biolog w/ Plantings
- Branch Box Breakwater
- Brush Mattress
- Live Fascine
- Branch Packing
- Vegetated Geogrid
- Rock Riprap
- Rock Riprap w/ Live Stakes; “vegetated riprap”
- Demo/Experimental

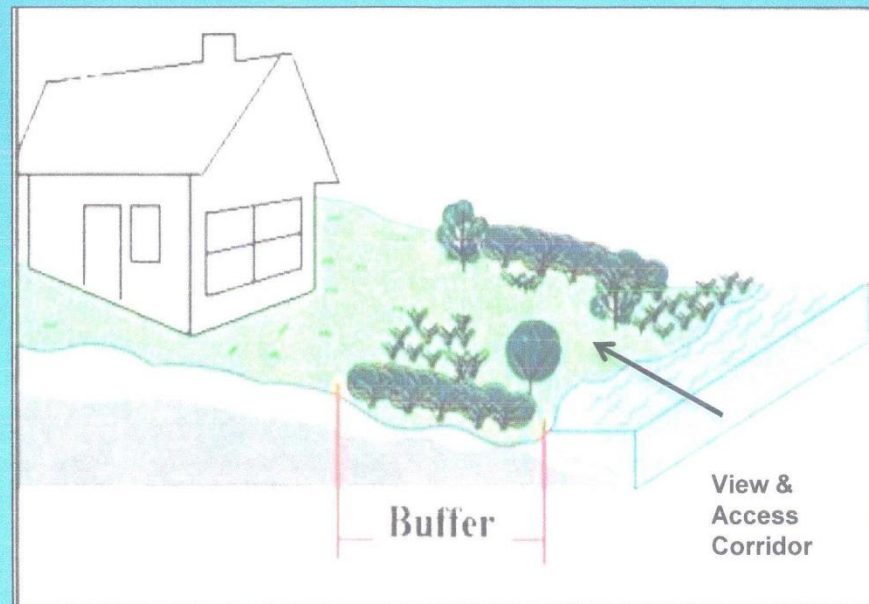
Natural Shoreline



- Left natural
- Buffer of vegetation left intact, i.e. no mow
- May have access to water, i.e. path, dock, stairway, etc.
- Removal of invasive species
- Easiest to maintain

What is a Shoreland Buffer?

Area of protected vegetation along the water





What is the Importance of maintaining a Shoreland Buffer?

- Erosion Prevention
- Fish & Wildlife Habitat Preservation
 - Protects spawning grounds
- Water Quality Protection & Improvement
 - Limits sedimentation and provides filtering of stormwater
- Natural Scenic Beauty
- Screening & Privacy from Boaters and Neighbors
- Increased Property Values

Undeveloped Apr - Oct Phosphorus/Sediment Runoff Model

- maple-beech forest
- 6% slope to lake
- sandy loam soil



IMPACT ON LAKE (April - Oct.)

- 1,000 ft³ runoff to lake
- 0.03 lbs. phos. to lake
- 5 lbs. sediment to lake

Developed with Shoreland Buffer – 1940s

Apr - Oct Phosphorus/Sediment Runoff Model

- maple-beech forest
- 6% slope to lake
- grass corridor 20'-wide
- cottage 700 ft² perimeter
- gravel drive 800 ft²
- 35'-wide buffer strip



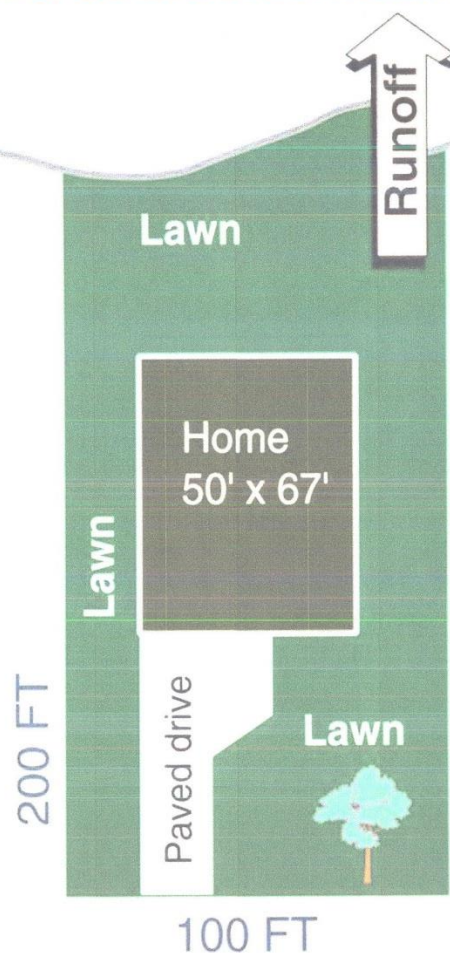
IMPACT ON LAKE (April - Oct.)

- 1,000 ft³ runoff to lake
- 0.03 lbs. phos. to lake
- 20 lbs. sediment to lake

Developed – 1990s

Apr - Oct Phosphorus/Sediment Runoff Model

- maintained lawn, soil graded
- 6% slope to lake
- home 3,350 ft² perimeter
- paved drive 770 ft²



IMPACT ON LAKE (April - Oct.)

- 5,000 ft³ runoff to lake
- 0.20 lbs. phos. to lake
- 90 lbs. sediment to lake

Passive Restoration

Effective only when the shoreline hasn't been altered to a great extent and the native ground covers and plants can regenerate on their own



Active Restoration Needed



Natural shoreline vegetation has been removed and replaced with sod. More difficult to establish native seed bank.

Why Plant Native Plants?

- ~ Adapted to Fluctuations in Wisconsin Weather
- ~ Disease and Pest Resistant
- ~ Less Maintenance (no fertilizers)
- ~ Provide Food and Habitat for Native Wildlife -
Birds, Insects, Fish, Amphibians

Techniques

Vegetation Holds Soil

Non-Natives

Spiraea
Spiraea sp.

Daylilies
Heimerocallis sp.

Perennial Fountain Grass
Pennisetum alopecuroides

Fescue Turf
Festuca sp.

Natives

Prairie Dropseed
Sporobolus heterolepis

Black-eyed Susan
Rudbeckia fulgida

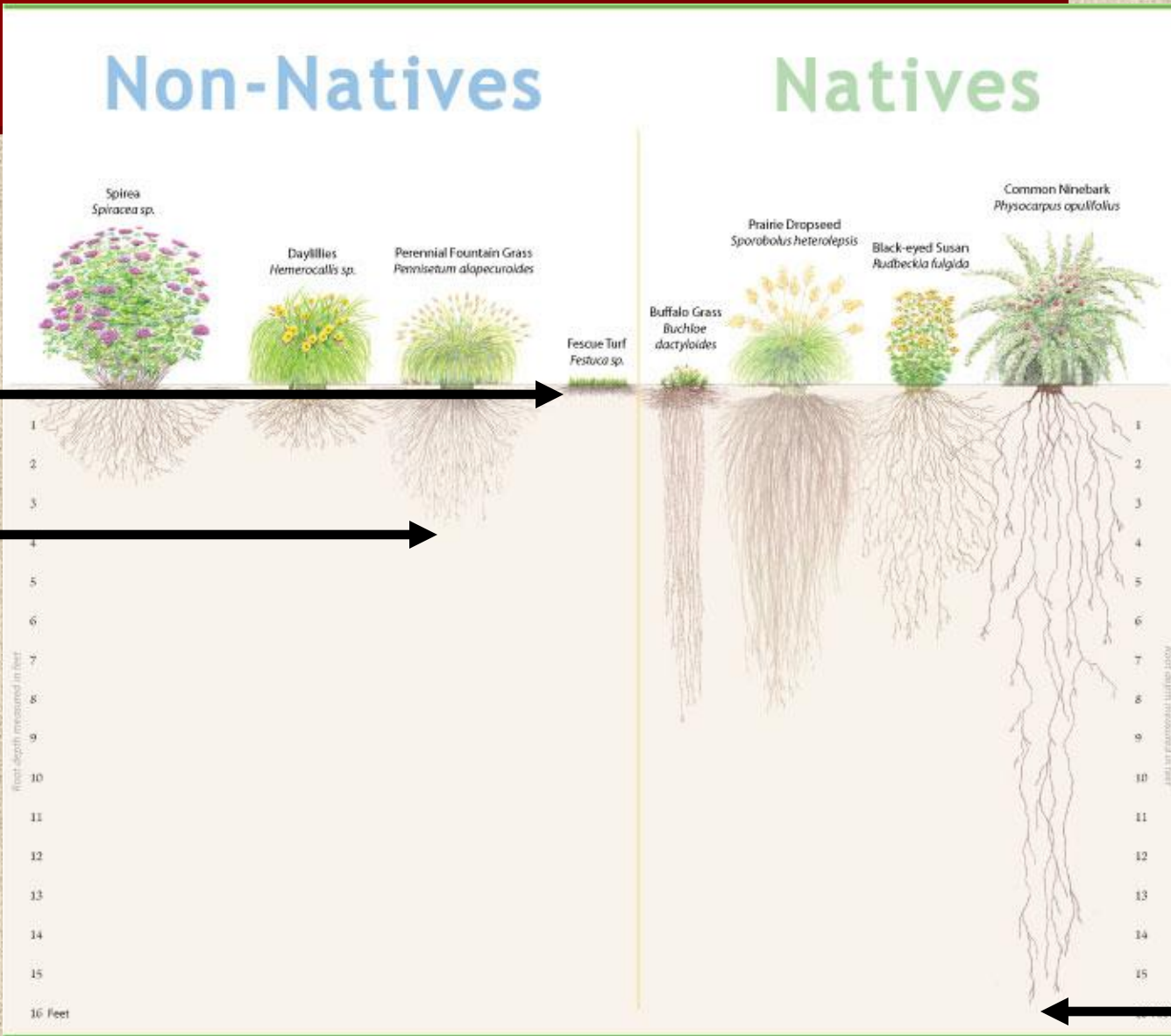
Common Ninebark
Physocarpus opulifolius

Buffalo Grass
Buchloe dactyloides

Turf
Grass

4.0 Ft

16 Ft



Techniques

Shrubs & Trees



Techniques

Biolog



3 YEAR OLD BIOLOG

Techniques

Brush Mattress



Techniques

Live Fascine



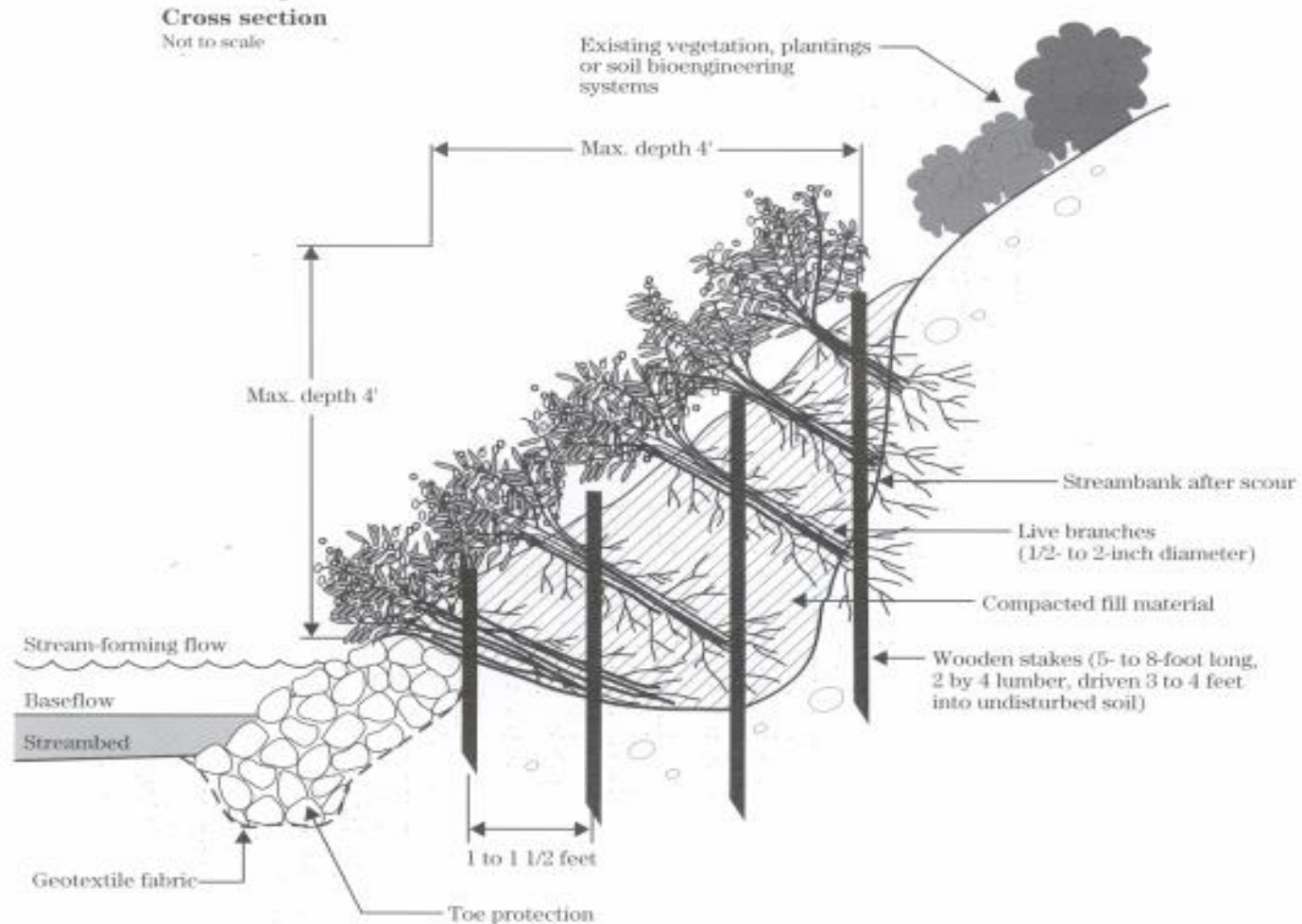
Techniques

Branchbox Breakwater



Branch Packing

Figure 16-10 Branchpacking details



Techniques

Vegetated Geogrid

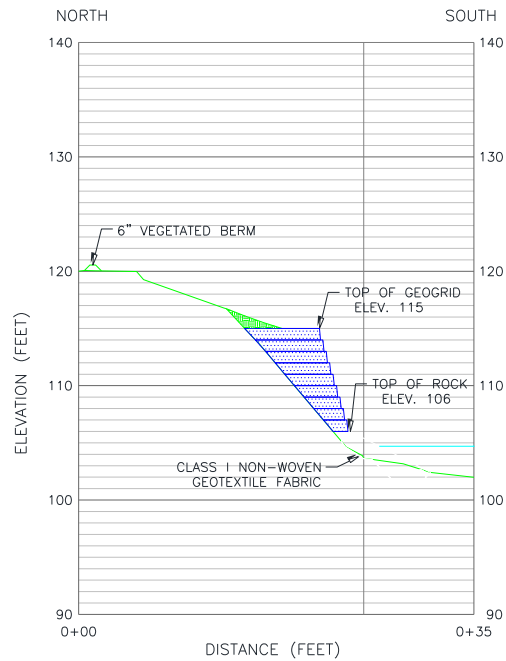
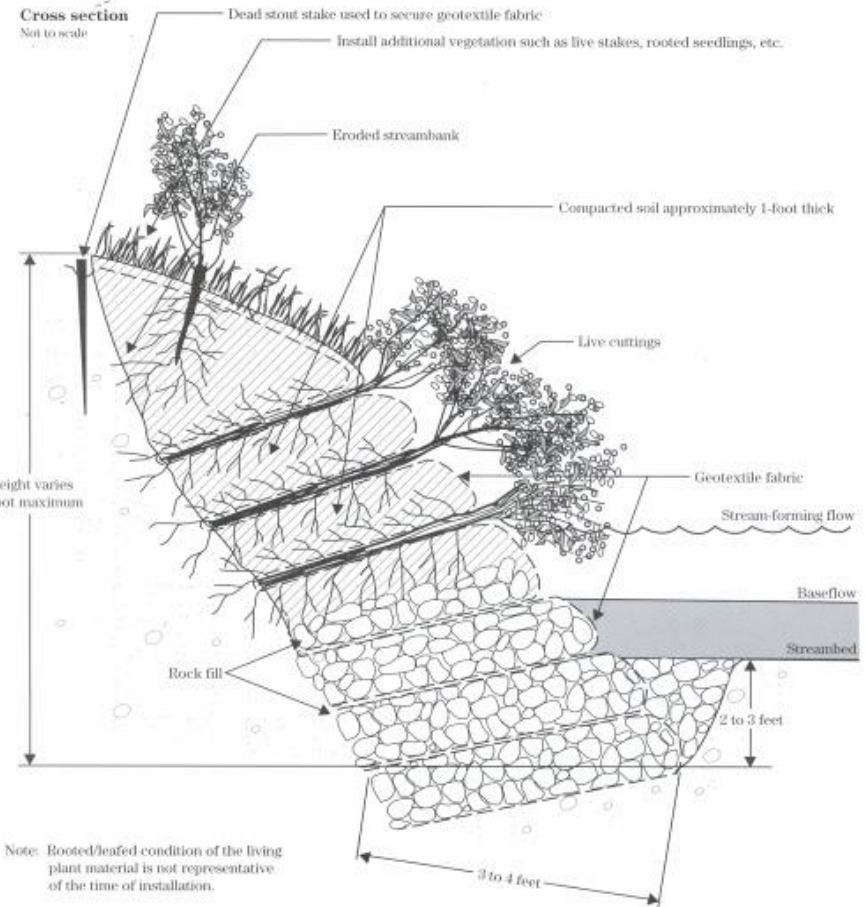
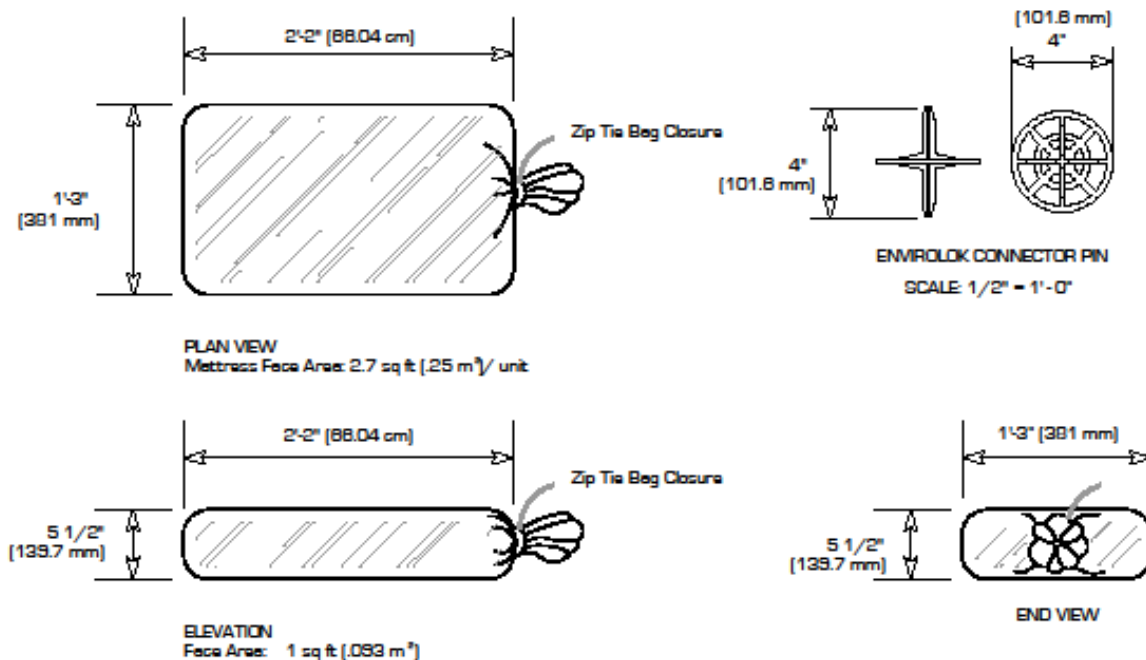


Figure 16-12 Vegetated geogrid details



Geotextile Bag Wall



ENVIROLOK SPECIFICATION:
 Calculated Unit Fill: 1.25 cu ft (.0354 m³) / unit
 Face Area: 1 sq ft (.093 m²)
 Mattress Face Area: 2.7 sq ft (.25 m²) / unit

NOTE:
 * Quantities required vary based on unit filling
 * One Envirolok Unit consists of:
 One Envirolok Bag
 Two Connector Pins
 One Zip Tie Bag Closure

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PROJECT
ENVIROLOK INSTALLATION STANDARD UNIT

DATE
 JANUARY 2012

SCALE
 1" = 1'-0"

DRAWN
 S-46271

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 Vegetated Environmental Solutions

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REVISIONS



Deltalok GTX Bag

The Deltalok System evolves bag work construction practices by combining an innovative and patented interlocking method with a vegetation sustainable GTX soil bag.



Deltalok
Standard Connector

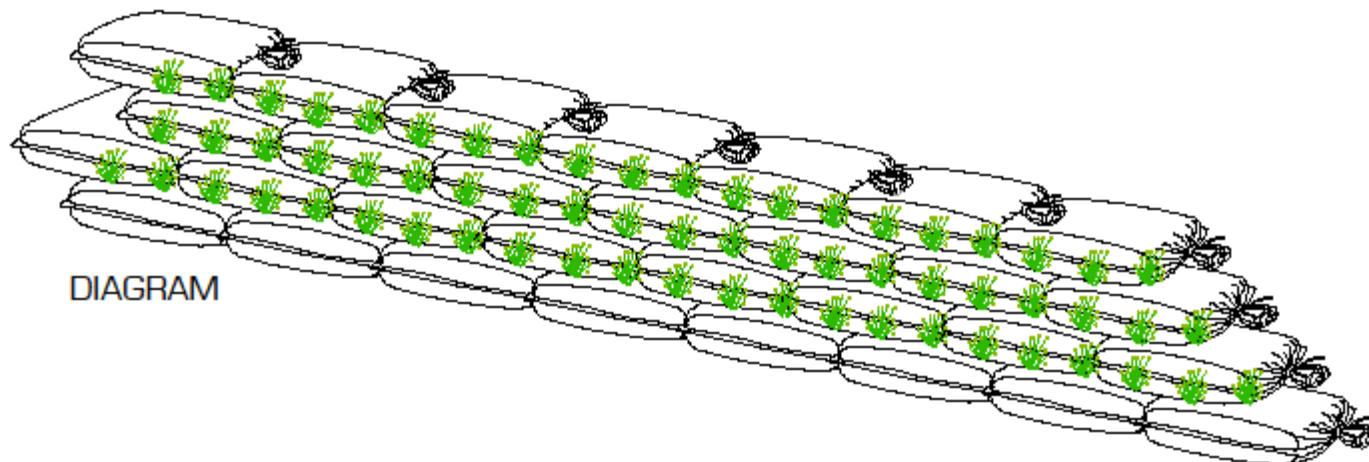
The Deltalok Connector is placed between sand/soil filled Deltalok GTX bags to dramatically increase the sheer strength of the bag structure. The result is an interlocking soil mass that promotes and sustains vegetation.



Deltalok
Engineered Connector

The connector also provides a positive mechanical connection to geogrid in the construction of steep slopes and retaining wall structures where needed.

Geotextile Bag Wall



DIAGRAM

NOTE:

Live Plant Material Planted Between Envirolok Courses
Do Not Rupture Envirolok Units
Recommended Density; Three Plants per Envirolok Unit

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PROJECT

ENVIROLOK INSTALLATION LIVE PLANTING DIAGRAM

DATE

JANUARY 2012

SCALE

1/2" = 1'-0"

SHEET

SH-657-27

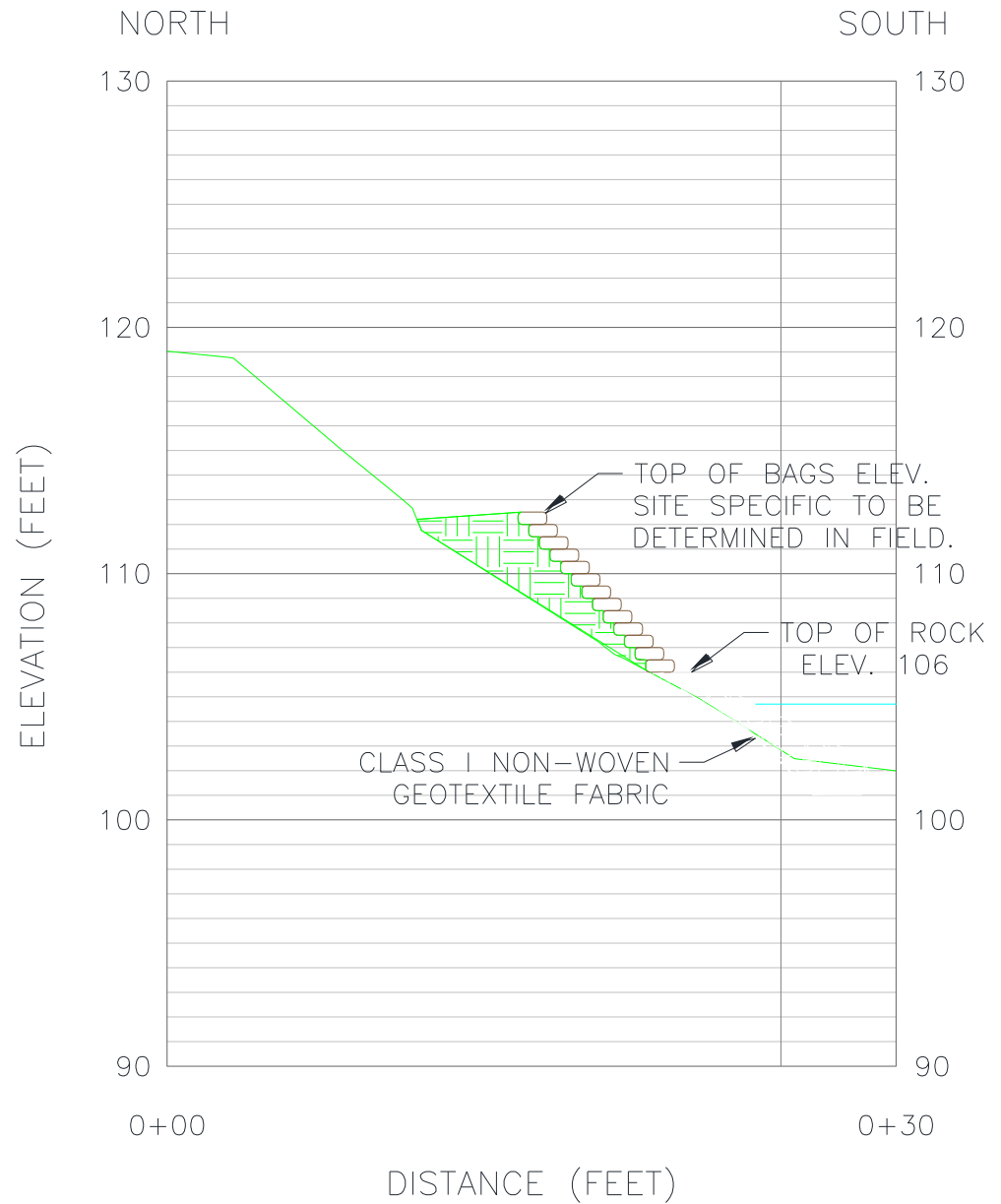
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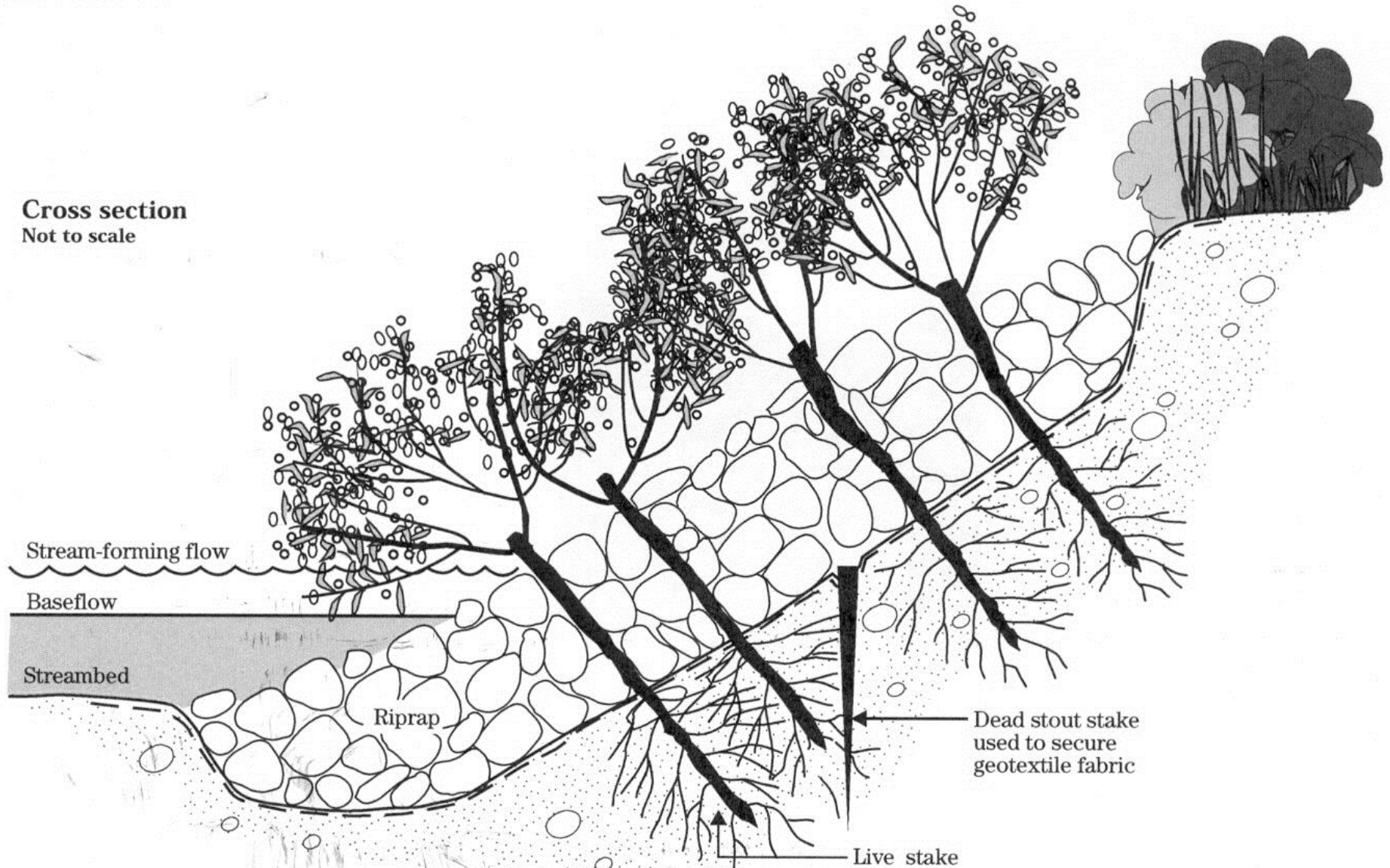
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REVISIONS

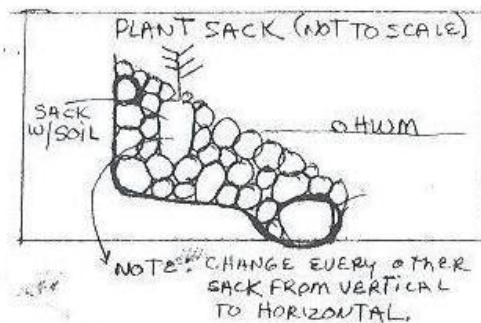
Geotextile Bag Wall



Vegetated Riprap



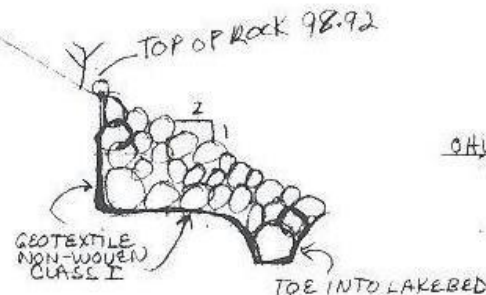
NOESGES PHASE II
TYPICAL CROSS SECTION STATIONS 0+80 — 2+00



ROCK GRADATION	
% PASSING	SIZE OF STONE (IN.)
100	10-12.5
85	8-10
50	5-7.5
15	1.5-2.5

NOTES

1. TOE INTO LAKE BED 1' X 1'
2. NON-WOVEN CLASS I GEOTEXTILE PLACED UNDER ROCK
3. WRAP GEOTEXTILE ONE FOOT ON ENDS
4. ROCK - d 50 5 inch
5. ROCK RIPRAP TO HAVE A FINISHED SLOPE OF 2:1
6. TBM - LAST PERMANENT STEP OF WOOD DECKING - NE CORNER - ELEVATION 100.00



Shrubs for sacks

Meadowsweet	<i>Spirea alba</i>
Sweet Gale	<i>Myrica gale</i>
Speckled alder	<i>Alnus incana</i>

Vertical Geotextile Bag Photo





Project Examples Before / After



15 foot Building
Envelope Around
Home

Before Buffer
Plantings



After Buffer Plantings

AMNICON LAKE

BEFORE



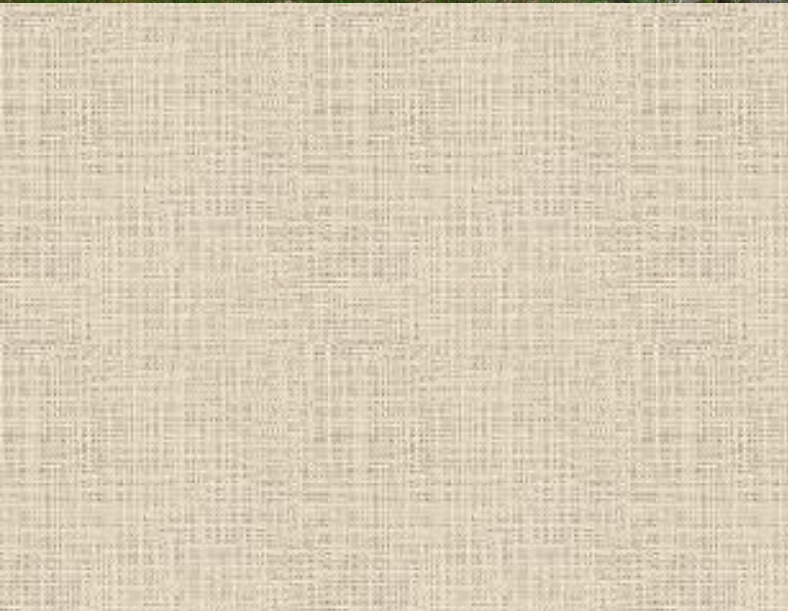
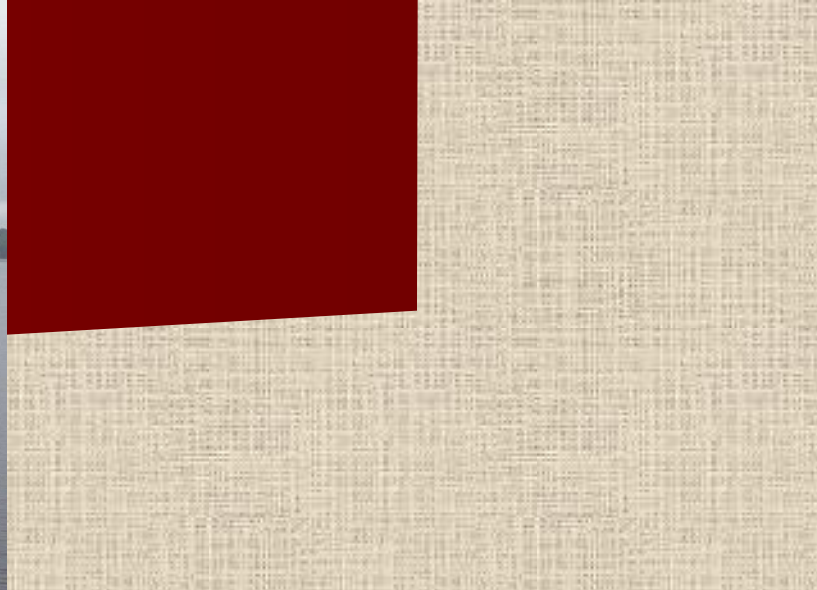
AFTER



BEFORE

Seawall Re

Rock Riprap
AFTER



BEFORE



AFTER







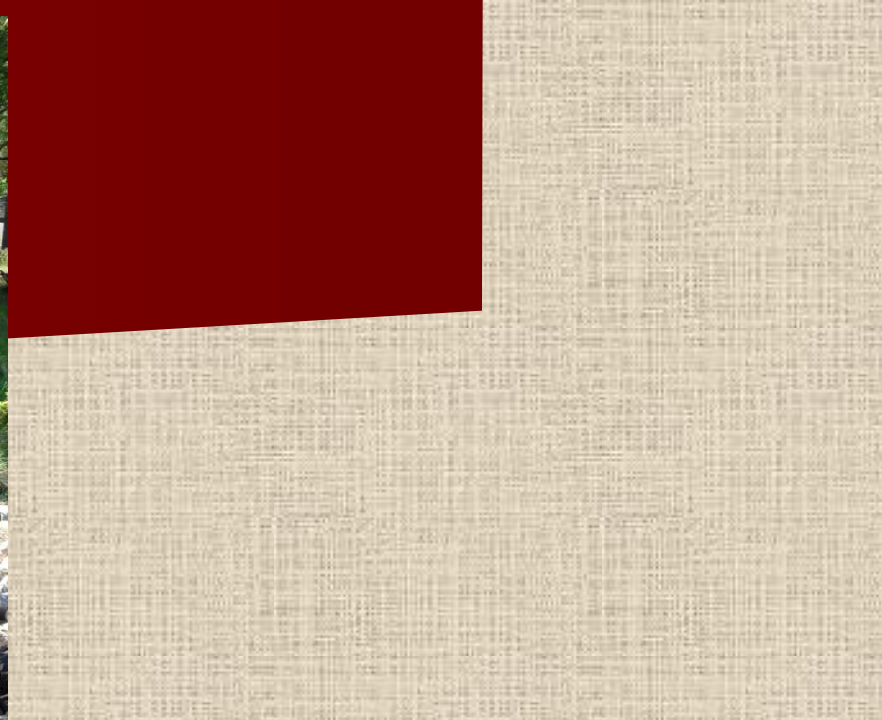














NOV 2 200







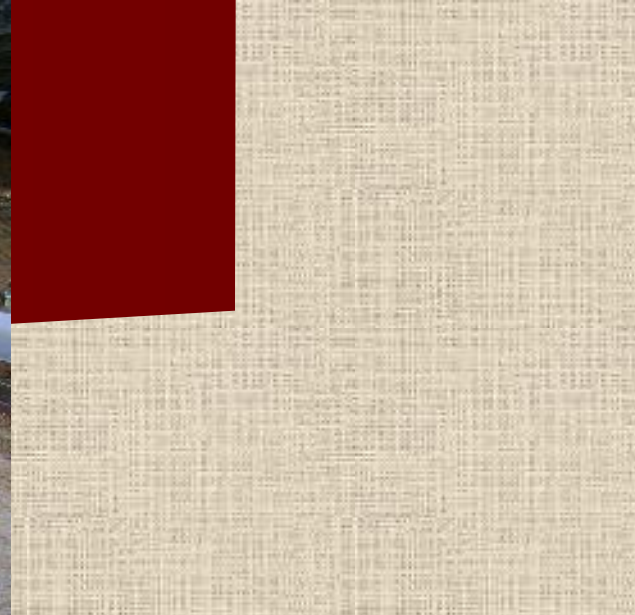


Before – Oct 2009



After - Oct 2012







After 5 months of growth (May 2010 to Oct 2010)





Vegetated Retaining Walls - Geotextile Bags (Install)



Vegetated Retaining Walls - Geotextile Bags (After)



**One growing season
later – Summer 2012**

(left side of stairs)

- Native plants are growing successfully
- Bags are camouflaged and will break down in time (biodegradable)

June 2010 Before



June 2011



June 2012

06/27/2012 13:44





After After

ShoreMax Product



ShoreMax™

Soft Revetment Scour Protection Mat

What is ShoreMax?

ShoreMax™ is a patent-pending soft revetment scour protection mat designed as mechanical protection over highly erosive areas. ShoreMax provides protection against much higher shear stresses and velocities than turf reinforcement mats (TRMs) alone. The ShoreMax system is comparable to hard armor products such as rock rip rap and articulated concrete blocks in turbulent flow and wave attack applications.

ShoreMax is a unique, highly flexible UV stabilized rubber mat designed with voids to allow vegetation establishment through the mat, or natural infilling of sediment. ShoreMax is a versatile product that should be used in conjunction with other erosion control products such as turf reinforcement mats above water lines and geotextiles below normal water lines.

Typical Applications and Uses for ShoreMax

- Shoreline protection along rivers, streams, and lakes
- Boat docking areas
- High flow channel bottoms and bends
- Stormwater pipe inlets and outlets
- Curb outfalls and downspouts
- Over-flow structures like levees and spillways
- Bridge abutments
- Anywhere extra scour protection is needed!



The flexible interlock system of the ShoreMax allows for easy installation in adverse conditions. ShoreMax can be installed with different fasteners including percussion earth anchors, standard wire staples, or rebar stakes.

For more information contact North American Green or your authorized distributor today by calling (800) 772-2040, emailing customerservice@nagreen.com or visiting www.nagreen.com.



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Tensar

NORTH AMERICAN GREEN

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After After

Not Advised!



Questions?

Thank you for your interest in
Shoreland Restoration and
Bioengineering Techniques!