Agrecol®

Agricultural Ecological Solutions

Developing Native Plant and Erosion Control Solutions for Shorelands

Mark R Doudlah,

President

Agrecol LLC Madison WI

Envirolok™

Vegetated Retaining Walls from Agrecol®

Landscape Sustainability

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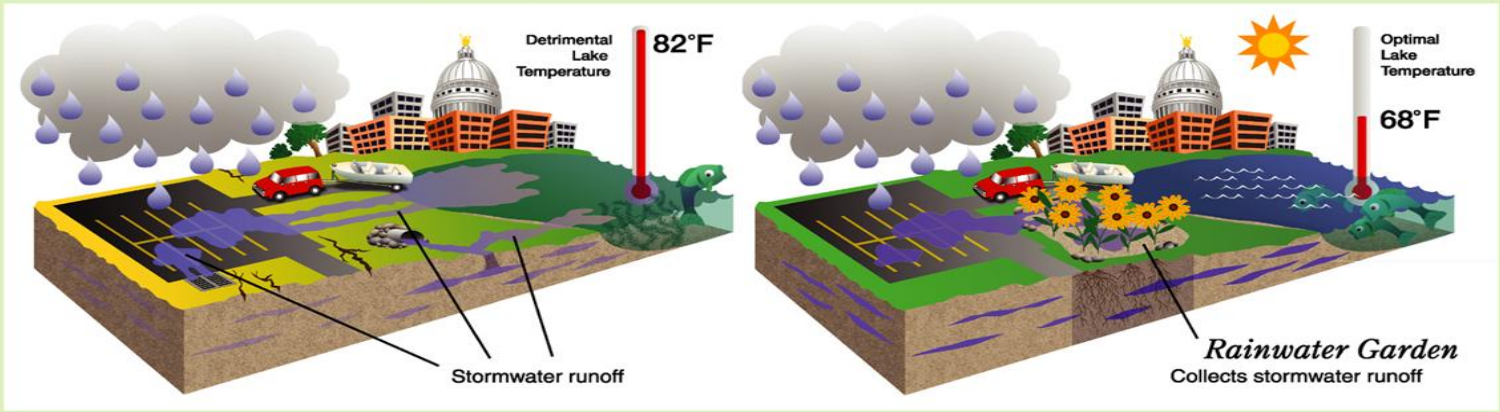
Infiltrate Storm water and Trap Pollutants

The Urban Hydrology Cycle



Illustrations: Roger Daleiden / Atomic Studios

Large amounts of water run off of parking lots, streets and sidewalks, carrying harmful pollutants to area lakes and streams.

Rain Gardens are natural water quality systems – collecting runoff, filtering out pollutants and helping protect our lakes and streams. They allow about 30% more water to soak into the ground.

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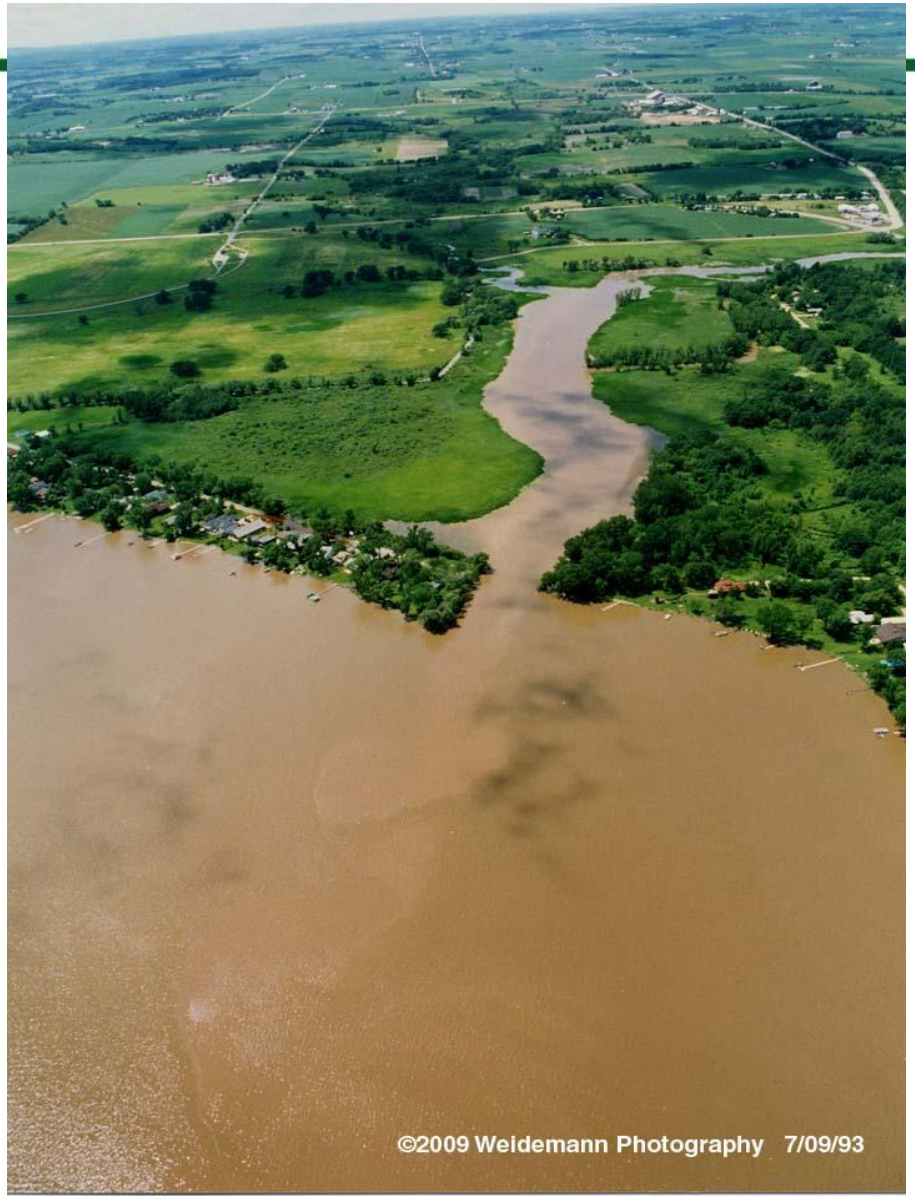
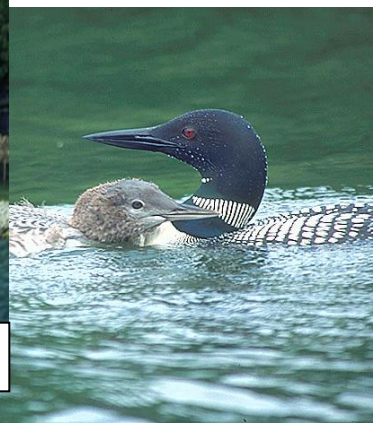
Six Mile Creek Phosphorous and Sediment Loading



Important ecological functions



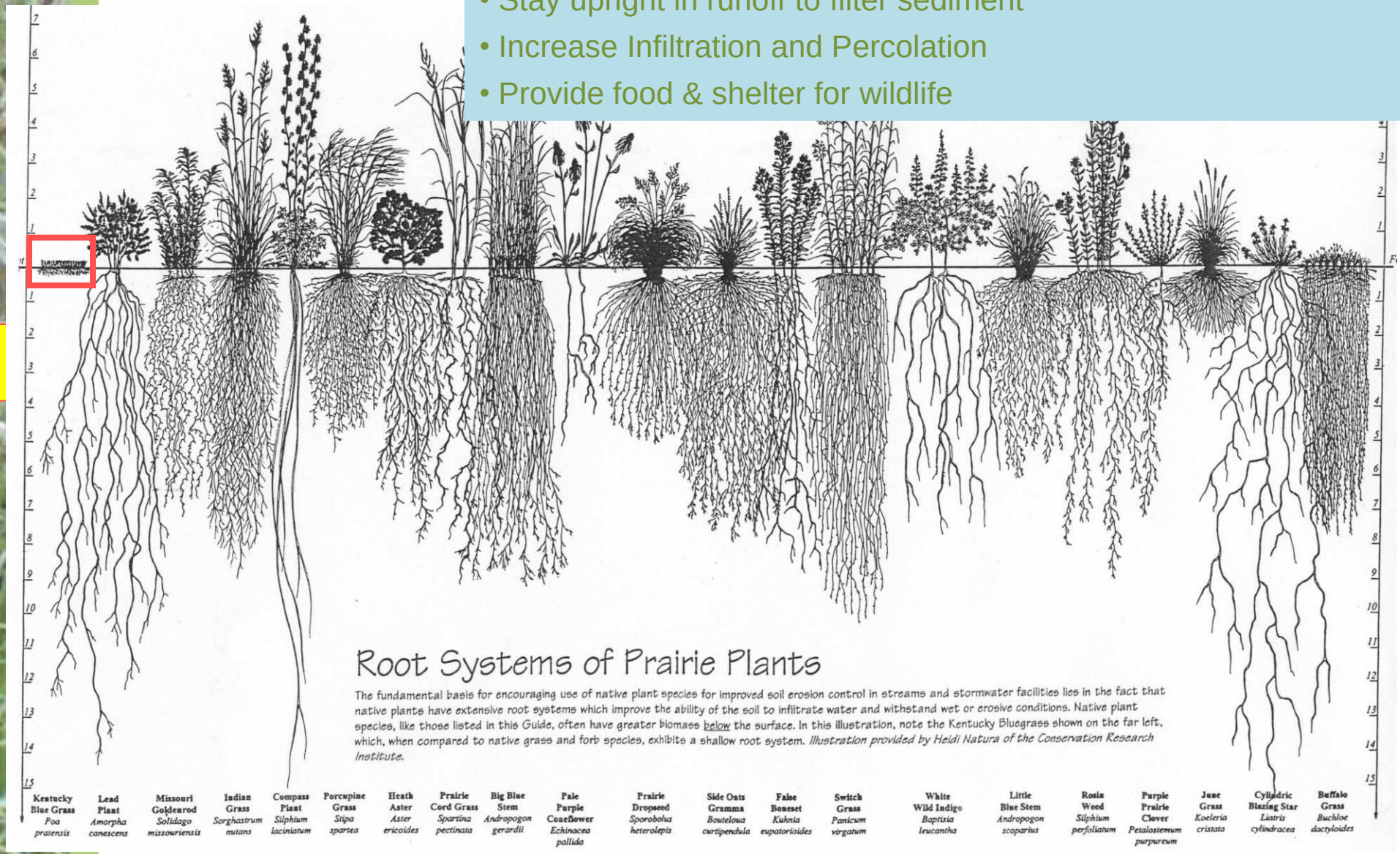
The Wisconsin Lakes Partnership

- Help clarity by holding sediment in place.
- Take up nutrients that would be used by algae.
- Shelter for wildlife.
- Wildlife food and nesting areas.
- Can help reduce erosion and runoff.
- Spawning beds in sedges /emergent plants for fish.

80-90% of all lake life is born, raised and fed in the area where land and water meet.

Native plants…

- Have deeper roots that stabilize & reinforce soil - living Geogrid
- Lessen raindrop impact & erosion
- Stay upright in runoff to filter sediment
- Increase Infiltration and Percolation
- Provide food & shelter for wildlife



It’s all about native vegetation!

- Natural Selection 10,000+Yrs
- Hardy to your area
- Deep root system
- Reinforcement, Anchorage & Matting
- Perennial
- Absorb Rain Drop Impact
- Infiltration/Percolation
- Root Microbes Clean Water
- Low Maintenance
- Habitat Restoration
- Aesthetic Beauty

Native Root Facts

- 1/3 die each year creating long channels to transport water, oxygen and microbes.
- They cycle minerals from deep in the soil to the top horizons.
- They both allow water infiltration from the surface to deep depths and they mine that same water during dry periods.
- Their root films provide habitat for microbes that are excellent at purifying recharge groundwater.

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Agrecol Basic Statistics

- Started Native Plant and Seed Production ‘95
- Increased to 1,100 acres on area farms.
- Produce 3.5 million greenhouse plants yearly
- 200 species on 350 production beds
- Produce 100,000 lbs of pure live seed
- Envirolok™ vegetative green wall system ‘05
- Envirolok™ Distributors throughout N.A.
- Consulting, Installation and Restoration

Agrecol is a primary producer of native seed and plants

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Local Native Seed Production

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Agrecol's Core-Native Seeds and Plants

Native Nursery Fields

Native PLS Seed

Live Native Plants

Conservation Installs & Maintenance

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Harvesting and Cleaning Prairie Seed

Applied Ecology

Tall-Grass Conservation Meadow

Infiltration Swale

Rainwater Garden

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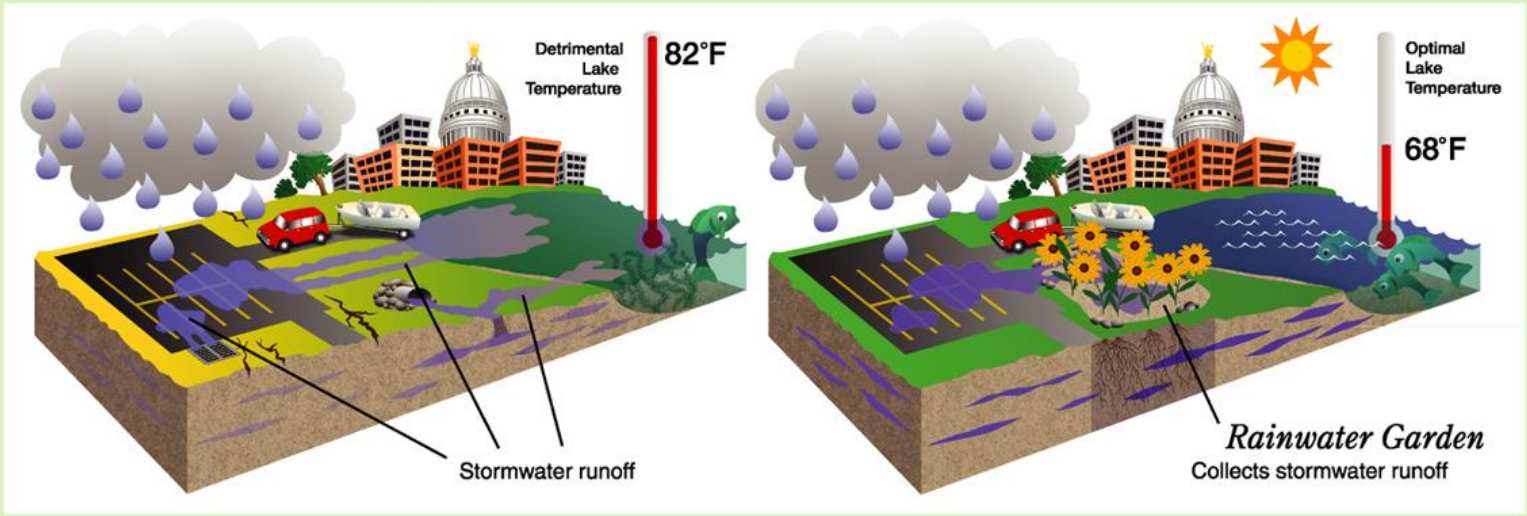
Rain Gardens

The Urban Hydrology Cycle



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Rain Gardens are natural water quality systems – collecting runoff, filtering out pollutants and helping protect our lakes and streams. They allow about 30% more water to soak into the ground.

Warner Park Existing Infiltration Basin June 2005

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Warner Park Infiltration Basin August 2006

Warner Park Rain Garden

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Deerfield School Prairie Restoration

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Wetland Restoration

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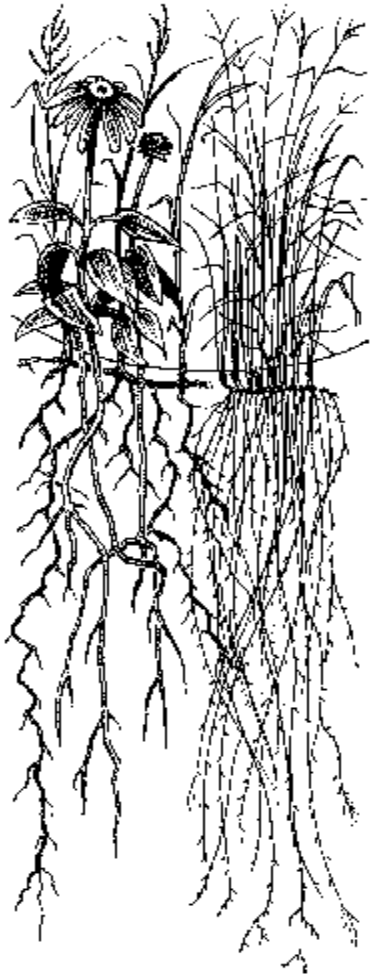
Cogen Retention Basin

Storm Water Swale

Sustainable - Long Term Solution



Deep Rooted Native Prairie

When Natives are not enough in our flashy artificial man made environment

- Erosion Control Devices
- Prairie Sod
- Green Walls

Concentrated Flow Areas

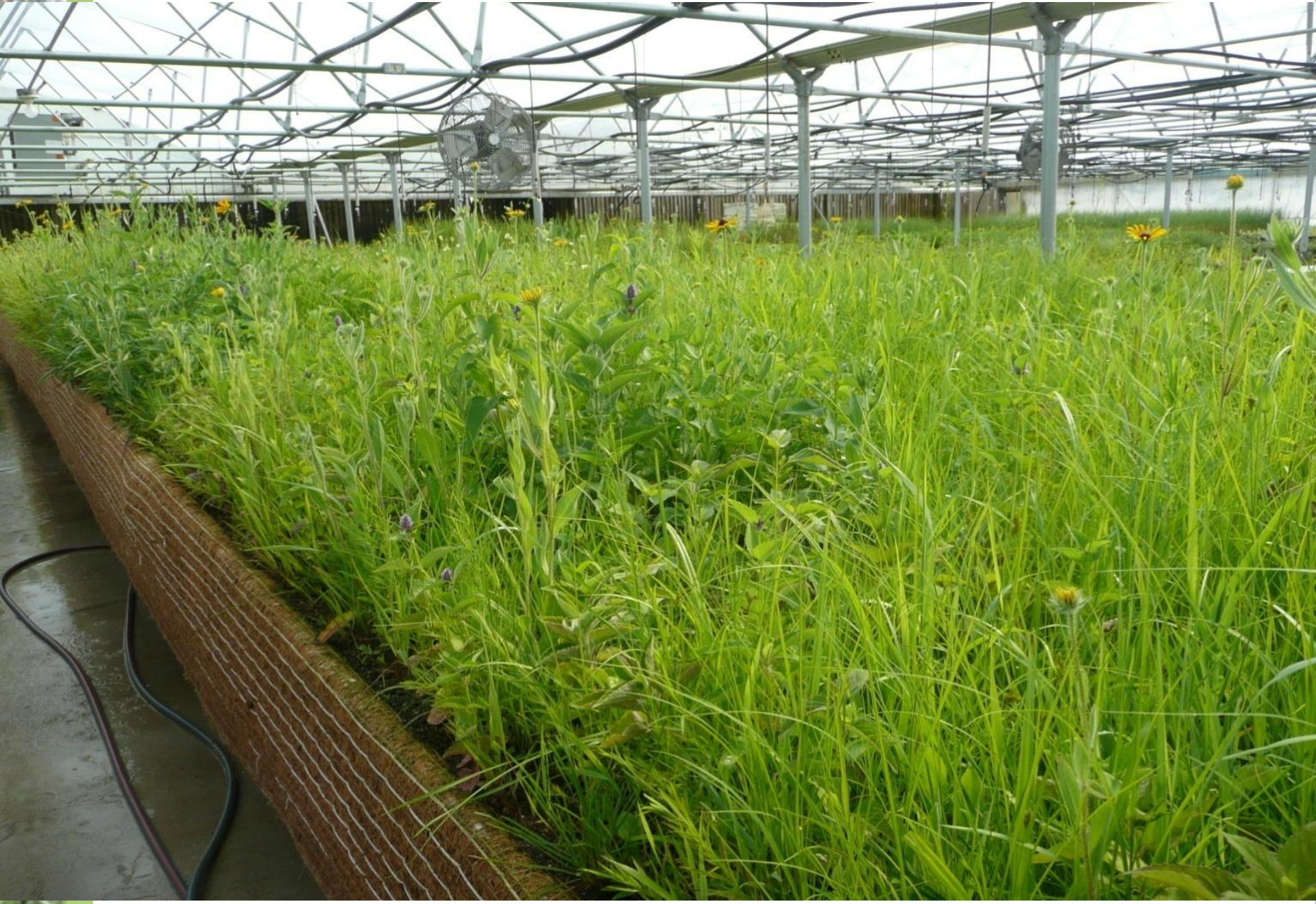
CHANNEL EROSION CONTROL MATRIX

(Concentrated Flow Application)

TYPE OF EROSION CONTROL DEVICE	PERMISSIBLE SHEAR LB/S.F.	DITCH GRADE															REMARKS
		< 2%			2% - 4%			4% - 6%			6% - 9% *			9% - 12% *			
		Max. Length (ft.)			Max. Length (ft.)			Max. Length (ft.)			Max. Length (ft.)			Max. Length (ft.)			
		300	600	1200	300	600	1200	300	600	1200	300	600	1200	300	600	1200	
Seed with properly anchored mulch	0.6																Anchor mulch per specifications.
Sod ditch checks with seed and mulch	N/A					C											Install one ditch check for every 1 foot of drop. Sod stakes required.
Temporary ditch checks (hay bales or approved manufactured alternatives lisited in the WisDOT PAL)	N/A																Install one ditch check for every 2 feet of drop. Maximum 200' spacing. Not recommended for slopes less than 1%.
Sod ditch liner	1.0																Upstream end must be buried. Additional sod stakes required.
Double netted light duty (WisDOT Class I Type B) erosion mat	1.5																Only mat type products allowed.
Sod reinforced with a double netted jute (WisDOT Class II Type A) erosion mat	1.5																Upstream end must be buried. Additional sod stakes required. Two bid items needed.
Stone or rock ditch checks, or Rock-Filled Filter Bags	N/A																Use No. 2 coarse aggregate, railroad ballast, or breaker run. Install one ditch check for every 2 feet of drop. Use in conjunction with a channel lining.
Medium duty coconut erosion mat (WisDOT Class II Type B or C)	2.0																
Heavy duty synthetic (WisDOT Class III Type A) erosion mat or turf reinforcement mat (WisDOT Class III Type B)	2.0																Germination may be a problem with Class III Type A mats. An ECRM is required for initial erosion protection for Class III Type B mats.
Heavy duty synthetic turf reinforcement (WisDOT Class III Type C) mat	3.5																An ECRM is required for initial erosion protection. Contact manufacturer if higher shears are needed.
Riprap ditch checks	N/A																Place top of downstream ditch check level with bottom of upstream ditch check. Use in conjunction with a channel lining.
Heavy duty synthetic turf reinforcement (Class III Type D) mat	5																An ECRM is required for initial erosion protection. Contact manufacturer if higher shears are needed.
Light riprap	4																Outfalling, overtopping and scour need to be addressed. Use 2' minimum ditch depth.
Medium riprap	5																
Heavy riprap	8																

Riprap measures apply to all ditch types. Use of these measure requires engineering judgement and design.

Prairie Sod



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Prairie Sod Cut to Order

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JUL 14 2009

Prairie Sod Install Nearly Complete

Prairie Sod Days after Installation

Green vegetated walls are strong, environmentally-friendly, and create beautiful, permanent natural landscapes with native plants

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Vegetated Retaining Walls from Agrecol®

Encapsulated Green Wall Solutions

- Decorative Vegetated Walls, fences and signs
- Stream Bank Corridors
- Estuary protection
- Shoreline & Beach Stabilization
- Steepened slope Protection
- Culvert protection
- Vegetated Ditch Check Dams
- Rain water garden perimeter
- Weir Structures for rain water gardens
- Anywhere that can be vegetated or UV protected
- Limited only by your imagination

Stream bank Stabilization

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Gerber Knife Co.

Troutdale, Oregon

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Shoreline Walls

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Residential Lakeshore

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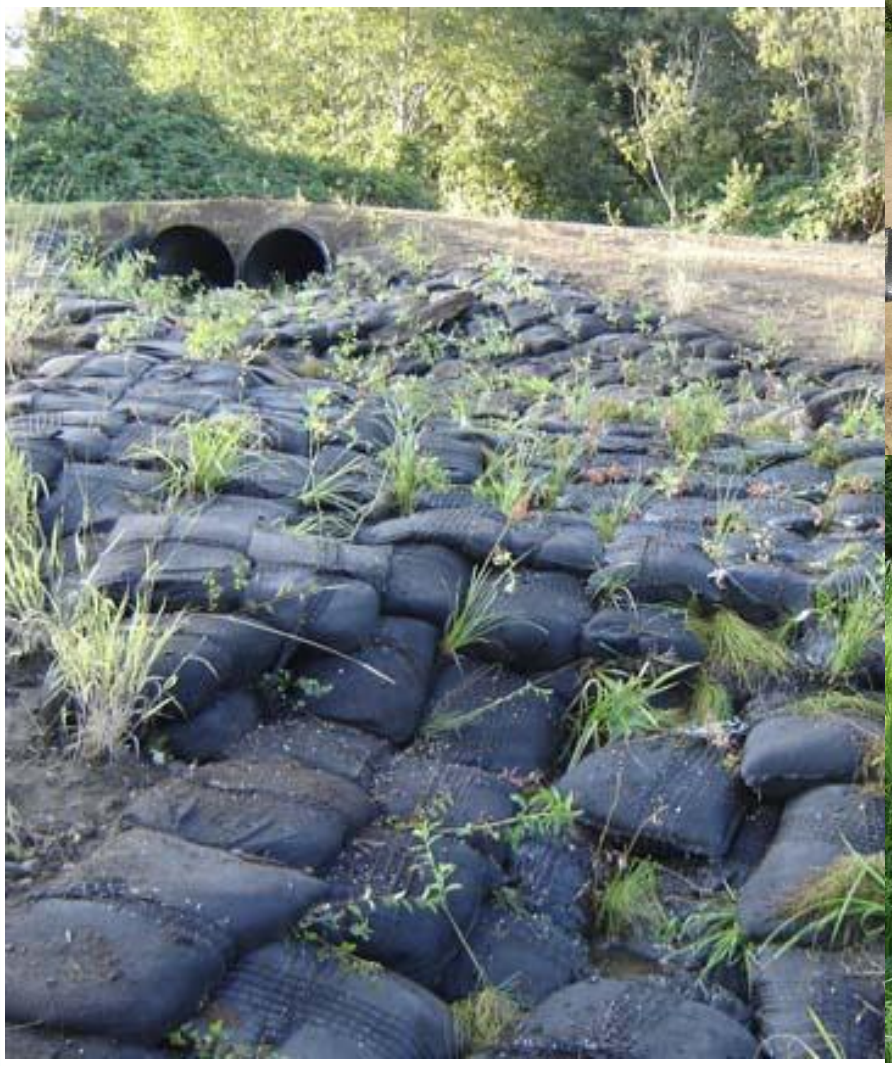
Flashy Storm Water



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Steep Walls

Weir Structure - Rain Water Garden

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Rainwater Gardens

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Shoreline Stabilization

Landscape Enhancements

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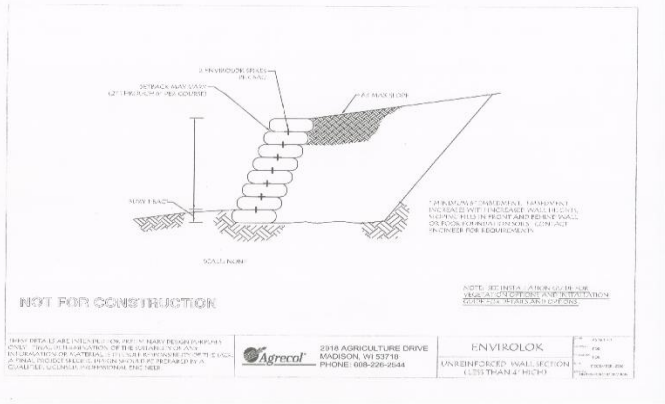
Decorative water feature

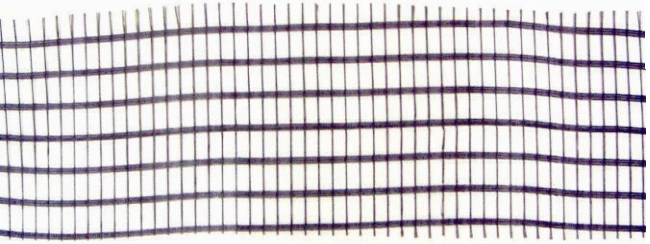
Green Wall Components

Native Vegetation

Bags



Engineering and Specifications



Bag Stabilizer

Spike

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Bag Life - 7 to 50+ Years

- Ultra Violet Radiation

- Unprotected Bag life is 7 years

- Protected Bag life is up to 200 years

It’s all about native vegetation!

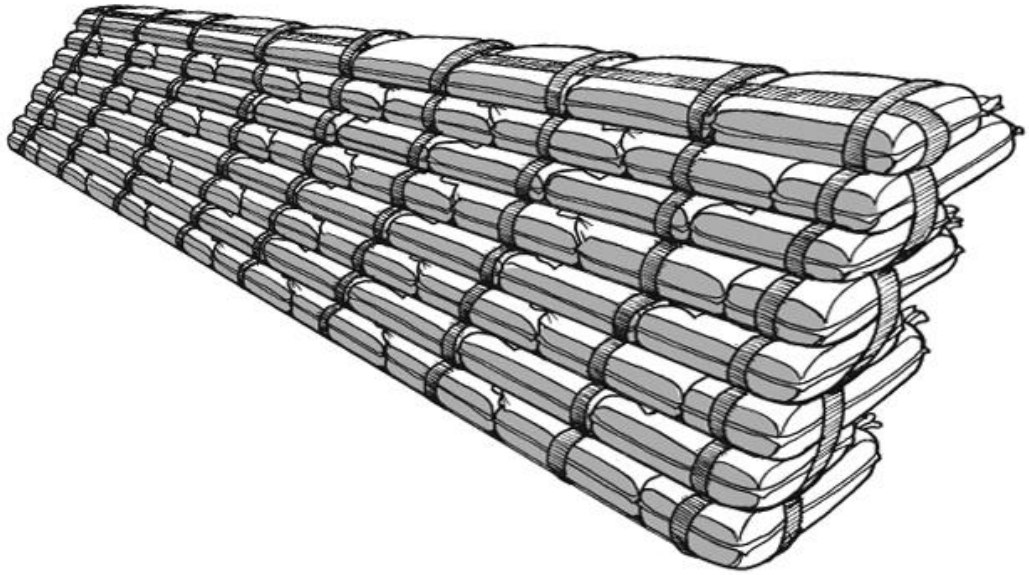
- Natural Selection for 10,000+ years
- Hardy to your area
- Deep root system
- Perennial
- Low Maintenance
- Habitat Restoration
- Aesthetic Beauty

The roots grow through the Green wall bags

Engineered Bag Media Specifications

- 60%* Coarse granular sand
- 40% High grade compost
  - *by volume and is site specific
- Medium must be free from debris, live rhizomes, and petrochemicals

When constructed to manufacturer's specifications, the wall grows into a solid, monolithic structure



The ecologically-advanced Green Wall System provides permanent erosion control.

The system grows stronger with time.

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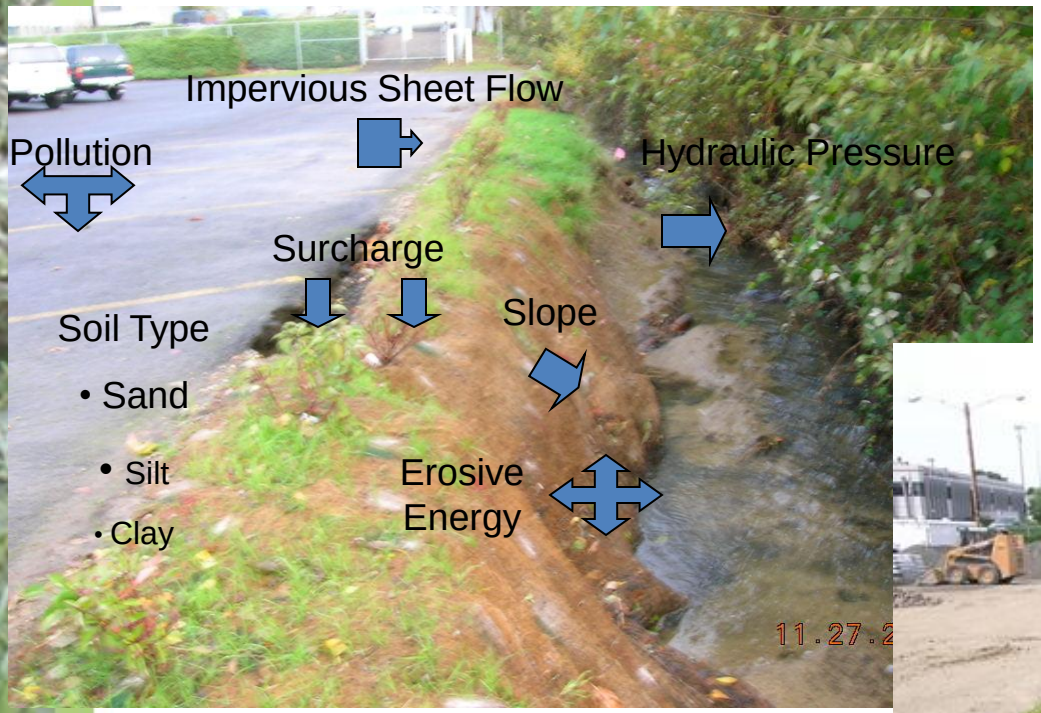
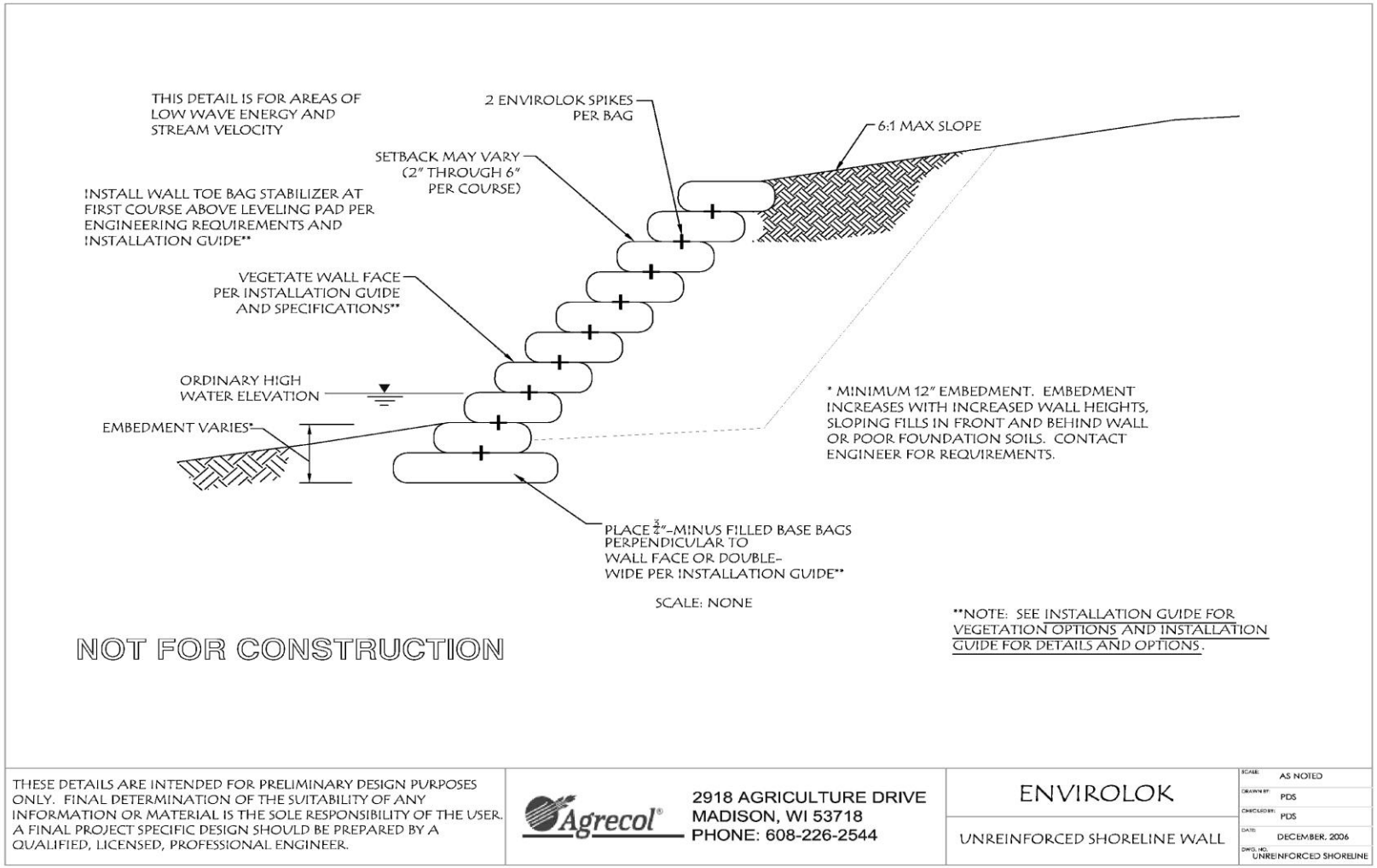
Site Evaluation



Un-reinforced Shoreline Wall



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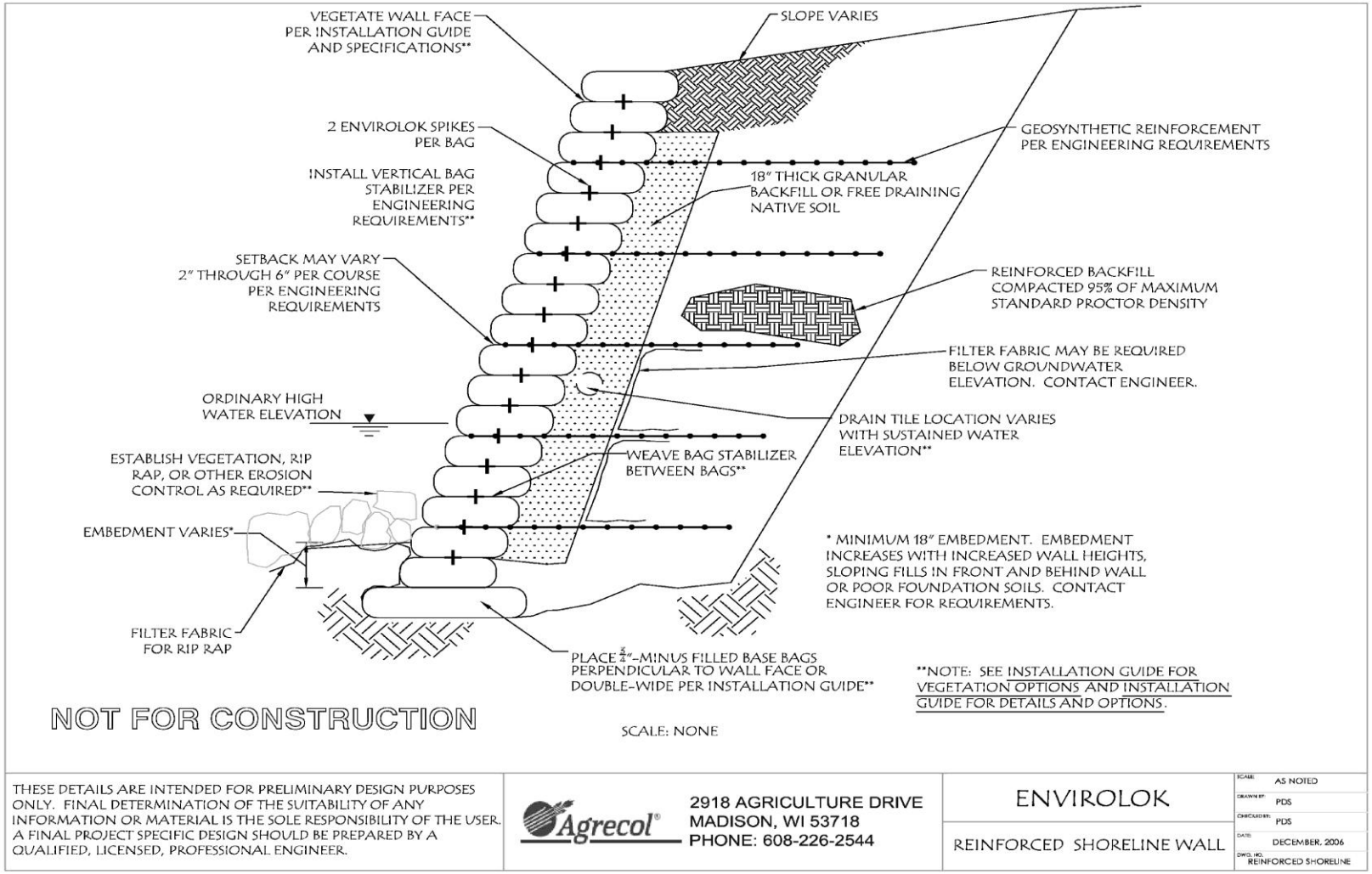
Reinforced Shoreline wall



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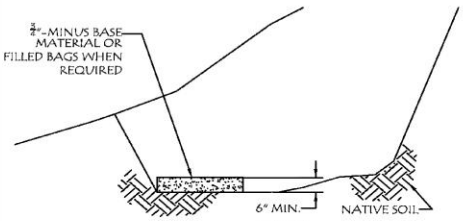
Installation Sequence

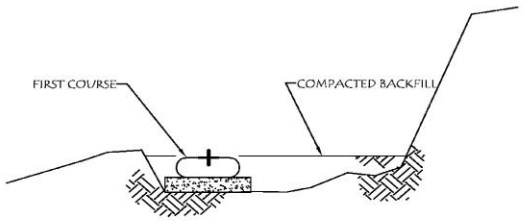
WALL CONSTRUCTION SEQUENCE WITH ENVIROLOK

- EXCAVATE TRENCH FOR A LEVEL BASE. REMOVE ALL ORGANIC AND UNSUITABLE SOILS AND COMPACT.
- INSTALL COMPACTED GRANULAR BASE MATERIAL OR PERPENDICULAR BAG LEVELING PAD WHEN REQUIRED.
- CHECK LEVELNESS OF BASE MATERIAL OR LEVELING PAD.
- PLACE INITIAL BAG STABILIZER ON BASE MATERIAL.**



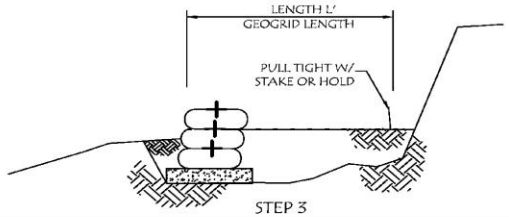
STEP 1

- CHECK ALL LINE GRADE AND CURVES.
- INSTALL FIRST COURSE INSURING ALL BAGS ARE REASONABLY LEVEL.
- ALIGN BAG FACES TO INSURE A STRAIGHT INSTALLATION.
- SET UNITS SIDE BY SIDE, SO THEY ARE TOUCHING AND ENDS ARE SLIGHTLY OVERLAPPING.**
- CONTINUE BAG STABILIZATION INSTALLATION.**
- PLACE AND COMPACT BACKFILL BEHIND AND IN FRONT OF THE FIRST COURSE.
- INSTALL TWO ENVIROLOK SPIKES PER BAG.



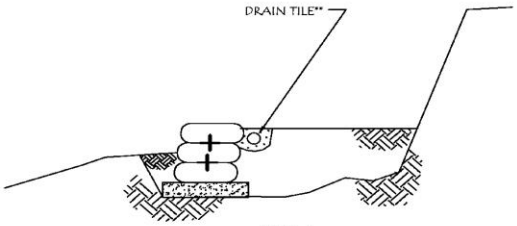
STEP 2

- INSTALL NEXT COURSE BY OFFSETTING THE CENTER OF BAGS OVER THE SEAMS OF PREVIOUS COURSE. PROVIDE MINIMUM 2 INCHES OF BATTER PER COURSE.
- CONTINUE BAG STABILIZATION INSTALLATION.**
- CONTINUE PLACING COURSES AND ENVIROLOK SPIKES UNTIL GEOGRID PLACEMENT IS REQUIRED.
- PLACE AND COMPACT 6" MAX LIFTS.
- PLACE GEOGRID OVER BAGS AND LAY OVER COMPACTED BACKFILL.
- PLACE NEXT COURSE OF BAG OVER GEOGRID.
- PULL GEOGRID TIGHT, KEEP TENSION APPLIED UNTIL BACKFILL IS PLACED.



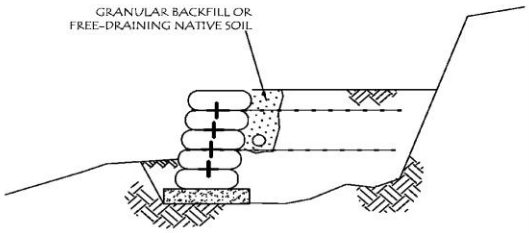
STEP 3

- PLACE DRAIN TILE ABOVE THE FINISH GRADE IN FRONT OF WALL WITH ONE FOOT OF GRANULAR BACKFILL OR FREE DRAINING NATIVE SOIL BEHIND WALL. WHEN REQUIRED.
- PLACE COMPACTED BACKFILL BEHIND DRAINAGE SOIL.
- PLACE ADDITIONAL BAG COURSES, ENVIROLOK SPIKES, AND BAG STABILIZER BY REPEATING STEP 3.**



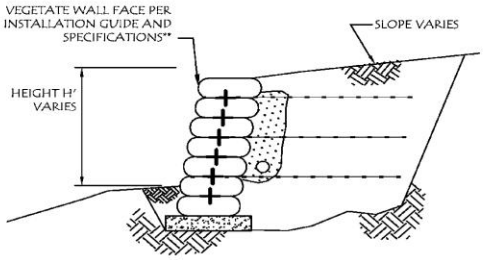
STEP 4

- CONTINUE WALL CONSTRUCTION TO FULL HEIGHT.
- PLACE ADDITIONAL BAG COURSES, ENVIROLOK SPIKES, AND BAG STABILIZER BY REPEATING STEP 3.**
- PLACE GEOGRID AT REQUIRED HEIGHTS AND LENGTHS (SEE ENGINEERING DETAILS) BY REPEATING STEP 4.



STEP 5

- REPEAT STEPS 3 THRU 5 UNTIL WALL IS AT REQUIRED HEIGHT.
- INSTALL FINAL BACKFILL AND FINISHED GRADE.
- REFER TO "INSTALLATION GUIDE FOR VEGETATION OPTIONS."



STEP 6

**NOTE: SEE INSTALLATION GUIDE FOR VEGETATION OPTIONS AND INSTALLATION GUIDE FOR DETAILS AND OPTIONS.

THESE DETAILS ARE INTENDED FOR PRELIMINARY DESIGN PURPOSES ONLY. FINAL DETERMINATION OF THE SUITABILITY OF ANY INFORMATION OR MATERIAL IS THE SOLE RESPONSIBILITY OF THE USER. A FINAL PROJECT SPECIFIC DESIGN SHOULD BE PREPARED BY A QUALIFIED, LICENSED, PROFESSIONAL ENGINEER.

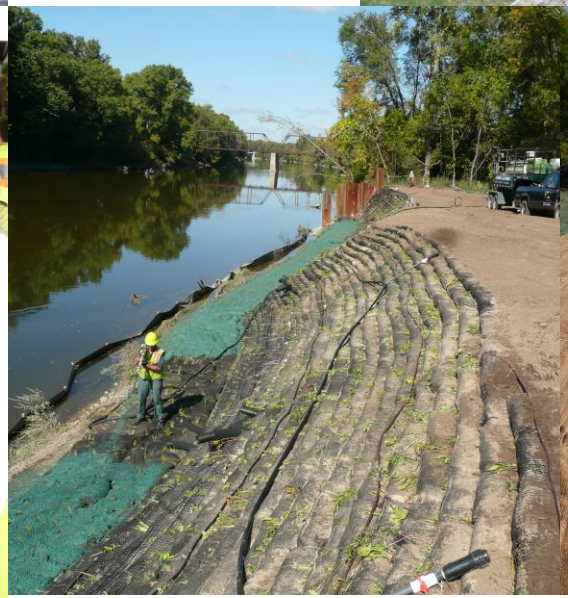
Agrecol®
2918 AGRICULTURE DRIVE
MADISON, WI 53718
PHONE: 608-226-2544

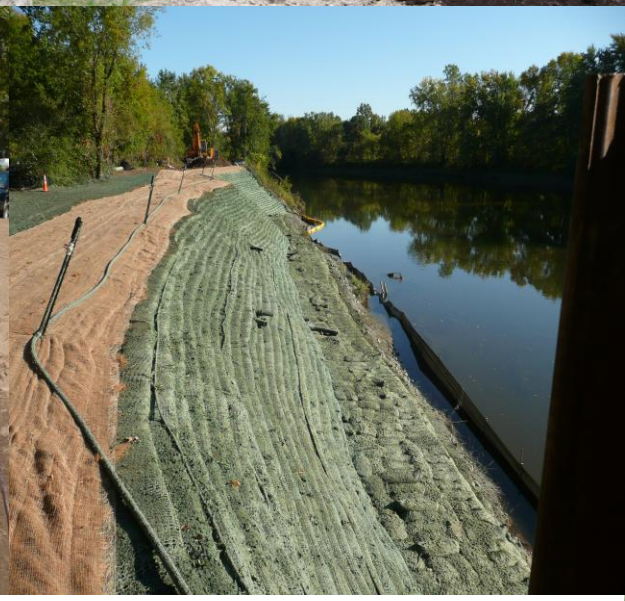
ENVIROLOK

INSTALLATION SEQUENCE

SCALE:	AS NOTED
DRAWN BY:	PDS
CHECKED BY:	PDS
DATE:	DECEMBER, 2006
DWG. NO.	INSTALLATION SEQUENCE

Green Wall Installation Equipment





One: Build the Wall

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Native Plant Specifications

Species Selection Criteria

- Perennial Native Species Preferred
- Aggressive and structurally sound root system
- Thrive in engineered bag media
- Will thrive in local climate (local ecotype)
- Fast establishment
- Long term stability
- Biodiversity and Appearance

Two: Plant the wall

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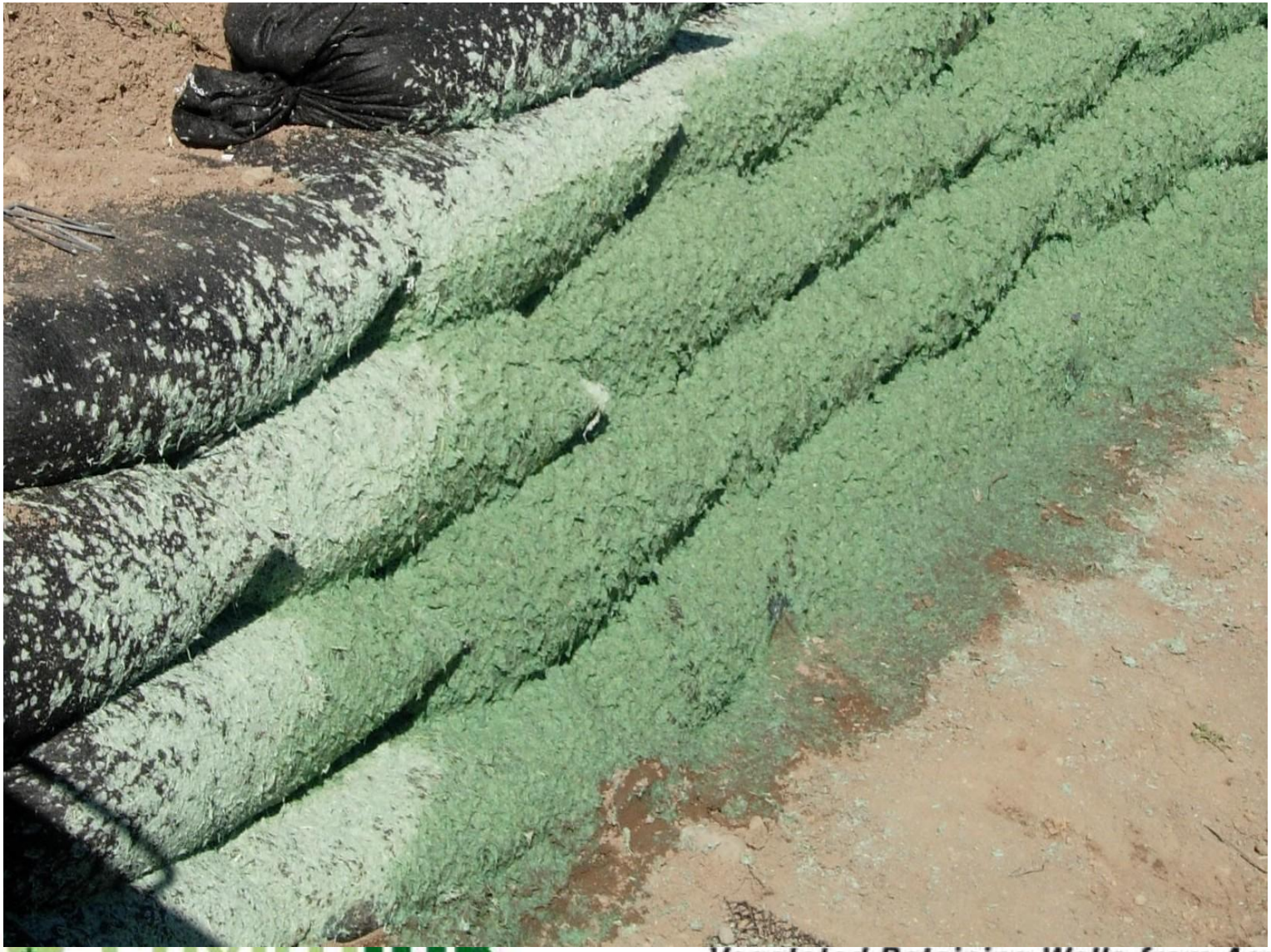
Hydroseeding



Shorelines

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Tenney Park

Day 16

Day 64

EnviroLok™

Vegetated Retaining Walls from Agrecol®

Badfish River

EnviroLok™

Vegetated Retaining Walls from Agrecol®

Central Florida University

Envirolok™ Vegetated Retaining Walls from Agrecol®

Chicago River IL

EnviroLok™

Vegetated Retaining Walls from Agrecol®

Lake Osakis MN

Envirolok™

Vegetated Retaining Walls from Agrecol®

Mass Wasting of River Bank in Midwest

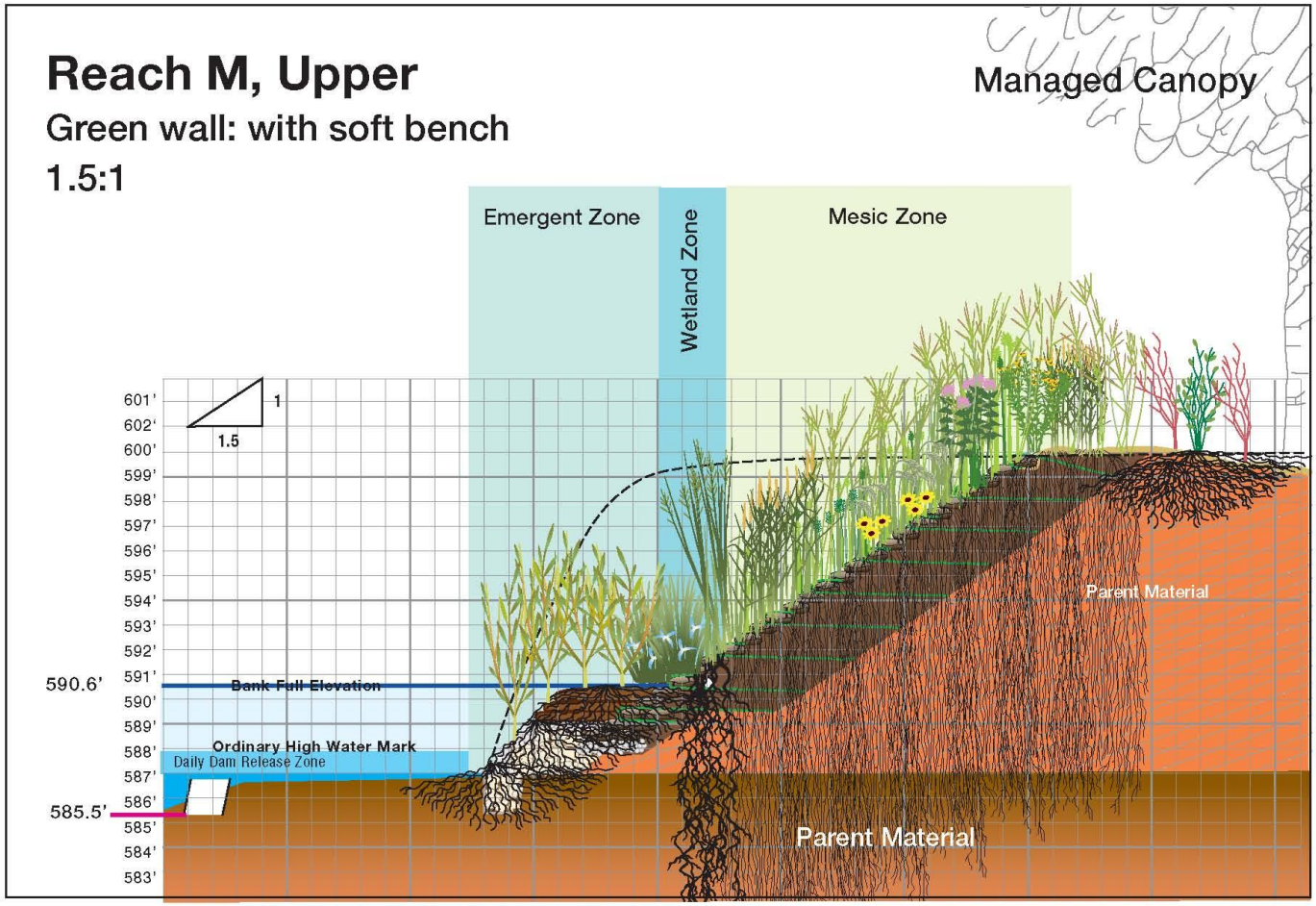
EnviroLok™

Vegetated Retaining Walls from Agrecol®

EnviroLok™

Vegetated Retaining Walls from Agrecol®

River in Midwest during install



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Sunmark Environmental - Holden

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Prev
Next
Show info

Fish Passage Restoration:

Problem - Fish migration populations have been reduced due to current culvert/bridge passage designs. Fish do not like to pass through darkened areas and artificial structures caused from culverts. It is also difficult and expensive to replace these passage systems.

Poor Fish Passage System

Poor Fish Passage System

Solution - Sunmark has developed a new fish passage system called the **FishWay Rx™**. Solid deck and/or damaged culverts/bridges are replaced with engineered, modular components that do not hinder the fish from passing through.

Sunmark Environmental Services, LLC
2255 NE 194th Ave. Portland OR 97230 * Phone: 503-241-7333 * Fax 503-491-0279 * www.sunmarkenvironmental.com

FISHWAY Rx™ What is it?

Integration of:

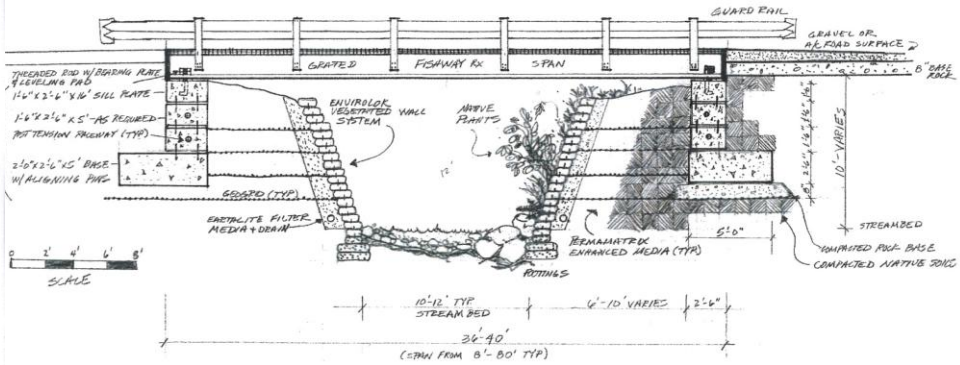
Native Environment

Natural Light

Engineered Structure

The **FishWay Rx™** system uses Agrecol's Envirolok™ structural vegetated wall consisting of geosynthetic bags filled with engineered growing media to create a structural wall and control erosion. This wall is locked into place with geosynthetic strapping, anchor spikes and completed with native vegetation that provides a natural habitat for fish migration.

Behind the wall pre-cast concrete footings are placed to support a mesh faced deck, or grate type crossing that serves as the bridge. These grates meet AASHTO load ratings from 12-30 tons per axle depending on the grate used. They also meet the specifications established by state and federal agencies including DOT, BLM, USFS, NP, and US Military installations. Due to the screen-like construction of the bridge deck, sunlight can penetrate to the water level supporting both plant and fish life. A secondary benefit to the cattle grate crossing is to prevent free-range animals from crossing into undesired territories.



- Low impact installation
- Prefabricated components assembled on-site

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Toe Protection

Versa-Lok – Patio Town

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Golf Course Drainage Ditch Before Restoration

Golf Course Drainage Ditch With Envirolok

Envirolok™

Vegetated Retaining Walls from Agrecol®

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Low Energy Shorelines

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Lake Mendota WI

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Lake Mendota Madison WI.

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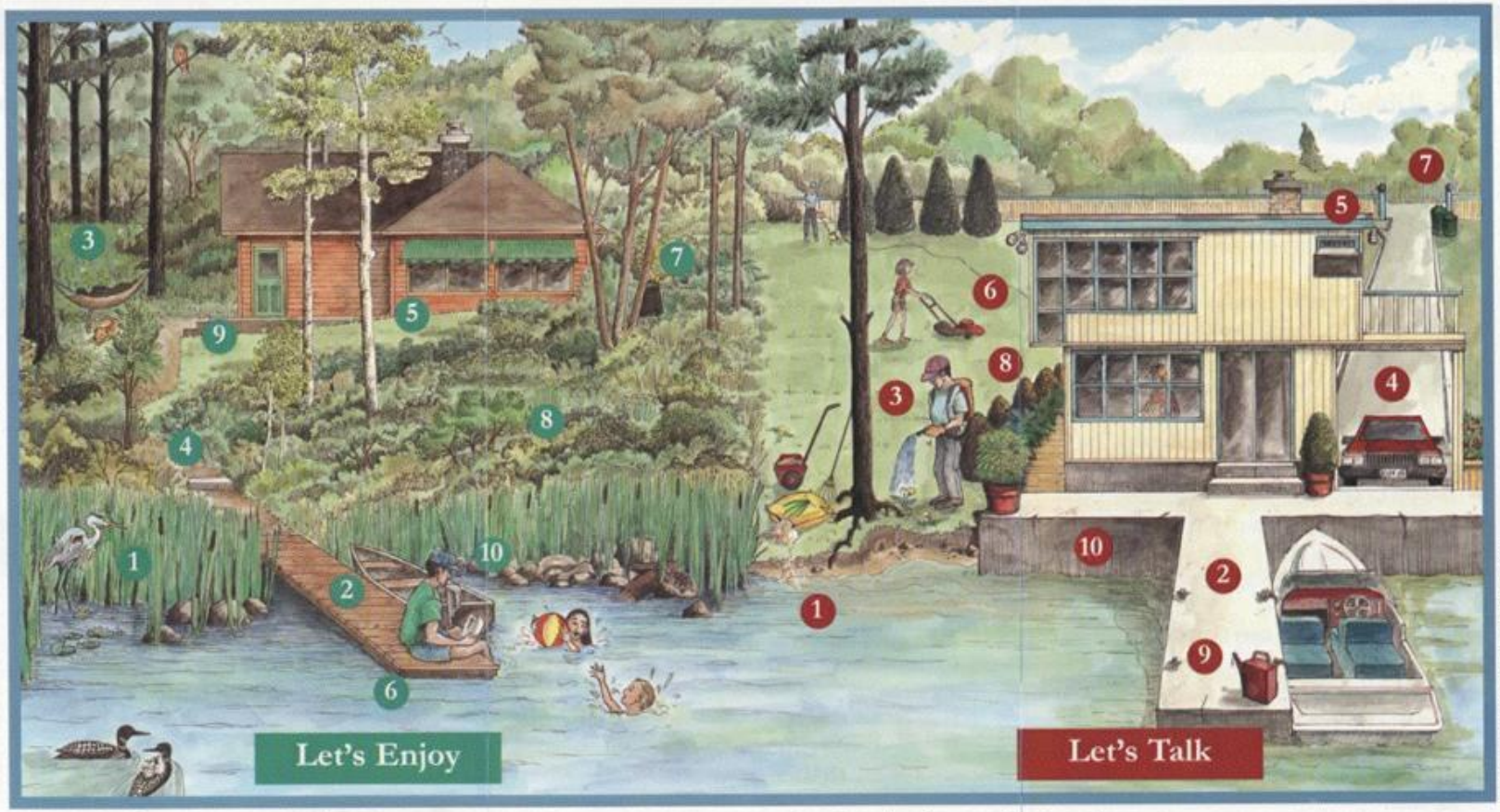
Vegetated Retaining Walls from Agrecol®

Starkweather Creek WI

EnviroLok™

Vegetated Retaining Walls from Agrecol®

Raised Garden Growth



1. Natural shoreline — great wildlife habitat.
2. Small floating dock — low impact on "ribbon of life."
3. Septic system far from the shore — reduces water pollution.
4. Narrow, gravelled footpath — less chance of erosion.
5. Trimmed trees and adjustable awnings — natural air conditioning with view maintained.
6. You work less — relax more!
7. Kitchen compost — improves your soil's quality.
8. Low-maintenance native plants — provide shoreline buffer.
9. Building — set back from shore and in character with setting.
10. Well-maintained motor — electric, or modern 4-stroke outboard, operated with low wake near shore.

1. Bare shoreline — subject to erosion.
2. Solid dock — destroys wildlife habitat, alters currents, causes erosion elsewhere.
3. Fertilizer spills and chemical run-off from lawn — damage water quality.
4. Paved lane — pollution-laden runoff flows to water.
5. No shade trees — overworked air conditioner adds to electric bill.
6. Removal of natural vegetation — more work for you and more runoff.
7. Collecting lawn clippings — deprives soil of nutrients.
8. Ornamental shrubs — require chemicals and extra work.
9. Poor fuel management — spills are deadly.
10. Hardened shoreline — eliminates "natural filter," degrades water quality, and blocks wildlife access.

Agrecol Installation Specifications

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