EFFECTIVE GREEN BMPS FOR STREAMBANK RESTORATIONS

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Objective

- The objective of this presentation is to present several innovative technologies for: **streambank restoration, soil erosion control and sediment control** which are in-line with the national trends for greener solutions
- With the ever-increasing construction activities around streambanks, there is a great need for cost effective, efficient, and greener BMPs for streambank restorations

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Soil Bioengineering & Coir

Soil bioengineering is an interdisciplinary approach to environmental restoration which protects water resources by combining biological systems with engineering principles to restore deteriorated soil masses

These techniques make use of ability of mature vegetation to resist erosive forces. Strong, durable, natural and biodegradable coir products are used to provide initial soil protection as well as support for young vegetation until mature vegetation becomes established

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Advantages of bio-engineered streambank restorations

- Aesthetically pleasing applications
- Provide wildlife and fish habitats
- Nourish naturally strong, healthy environment
- Support recreational activities
- Create environment to reduce human stress
- Convey peace of mind for all of us

Advantages of coir products with thick fiber cover on streambank restorations

- Coir is a renewable natural resource
- By product of coconut industry
- High functional longevity (over 6 years)
- Higher degree of abrasion resistance
- No harm to wildlife
- Proven performance over the years

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In streambank restorations done with coir products

- **Phase I** - Structural stability (support) and protection against erosion provided by coir products.
- **Phase II** - Fully or partial structural stability (support) and protection against erosion comes from natural vegetation.

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Coir products for streambank restorations

1. **Coir SiltTrap** – Latest coir product for streambank restoration. It is developed to reduce material cost without sacrificing the integrity of the product effectiveness
2. **Coir Block System** – Rectangular coir fiber block with three sides wrapped in a woven coir matting and the coir matting extends outward of the coir fiber block
3. **Coir rectangular log** – Coir log with rectangular shaped cross section
4. **Coir circular log** – Coir log with circular shaped cross section

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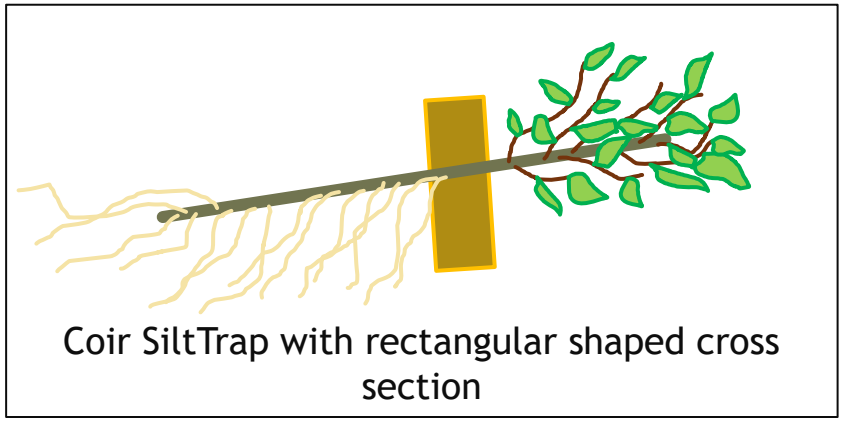
Streambank Restoration

Coir SiltTrap



Coir SiltTrap with rectangular shaped cross section

- 5”x18” and 4”x12” thick coir fiber rectangular blocks
- Provides stronger abrasion resistance at the face of the lift.
- Built in invisible holes in the fiber block allow live plant cuttings to be planted directly into the soil mass. Once rooted and grow these plants create a strong anchor system for the Coir SiltTraps.
- These coir fiber block prevents exposing the soil in the soil lift for 4-6 years, allowing vegetation to grow on soil mass while preventing chances for failure.
- Combination of coir fiber block & high strength coir fabric provides significantly higher shear stress resistance for extended time than soil lifts made of wrapping coir fabric only.

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Advantages of Coir SiltTrap

Savings Opportunities:

1. Material cost
2. Handling cost
3. Transportation cost
4. Installation cost

Features and Benefits

- Invisible holes
  - Ability to plant live stake through fiber block
  - With time these plantings facilitate additional anchoring by means of growing branches and the root mass
- Larger soil mass behind
  - A larger soil mass encourages healthy rooting in the live plant cuttings
- Longer lengths that eliminate joints

Typical Installation of Coir SiltTrap on a Stream Bank

1

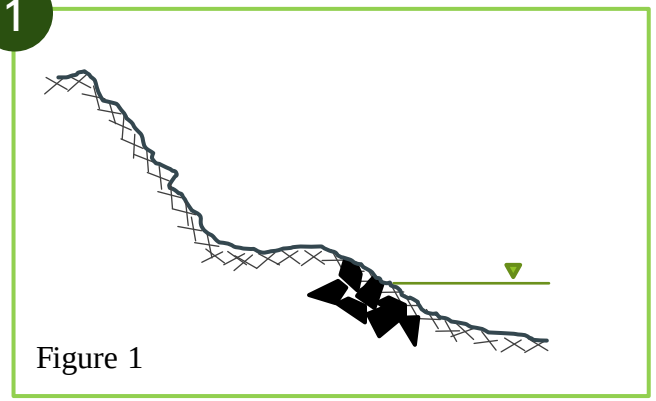

Figure 1

2

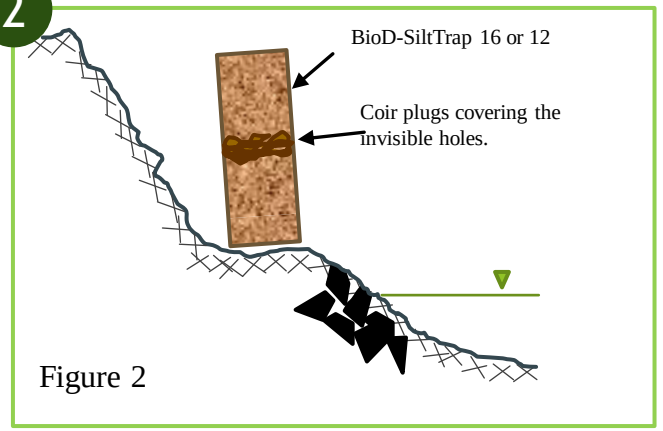

Figure 2

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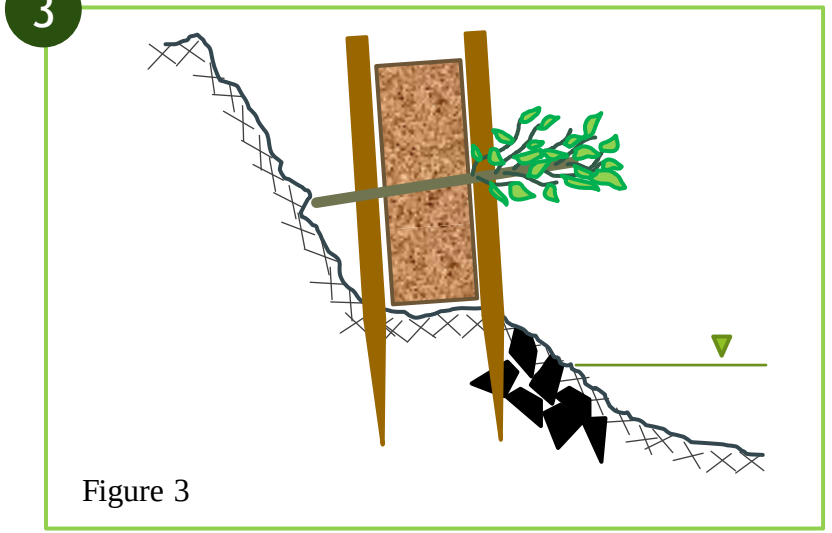

Figure 3

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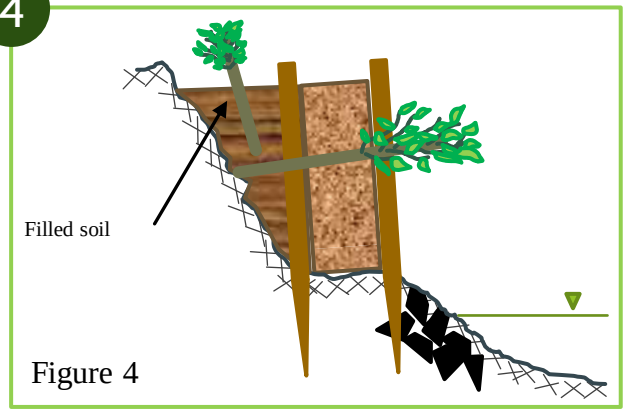

Figure 4

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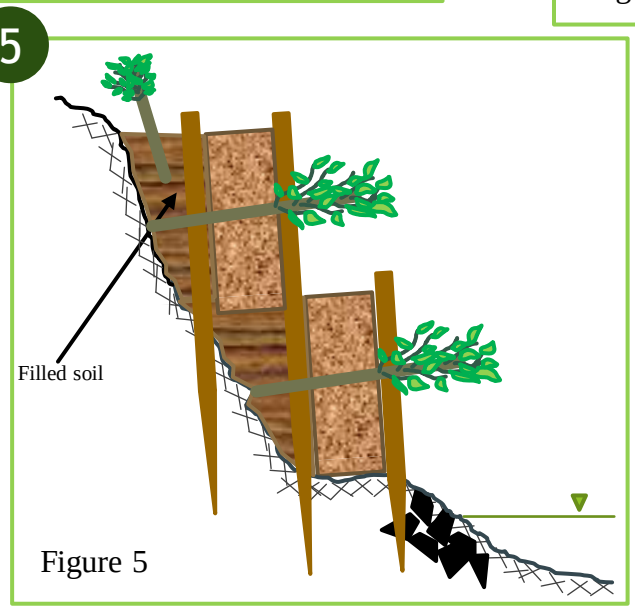

Figure 5

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Demonstration of Installation of Coir Silt Trap on a Stream Bank

One Month Later…

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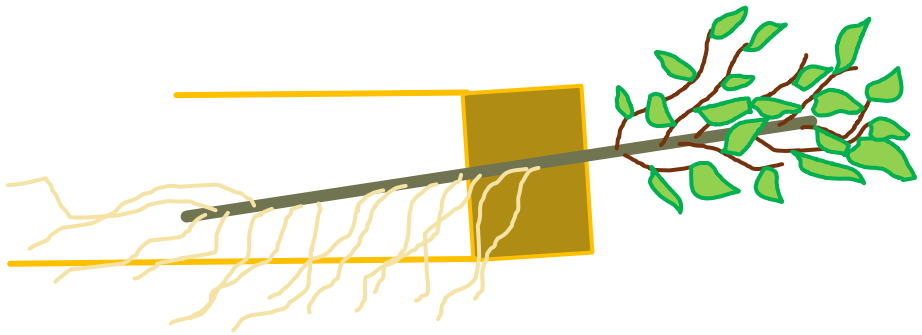
Two Months Later…

Coir Block System



- Thick coir fiber block provides stronger abrasion resistance at the face of the lift
- Invisible holes allow planting through the coir block
- Thick coir fiber block prevents exposing the soil in the soil lift for 6-10 years, thus allowing vegetation to grow on soil mass while preventing chances for failure
- Combination of coir fiber block & high strength coir fabric provides significantly higher shear stress resistance for extended time than soil lifts made of wrapping coir fabric only

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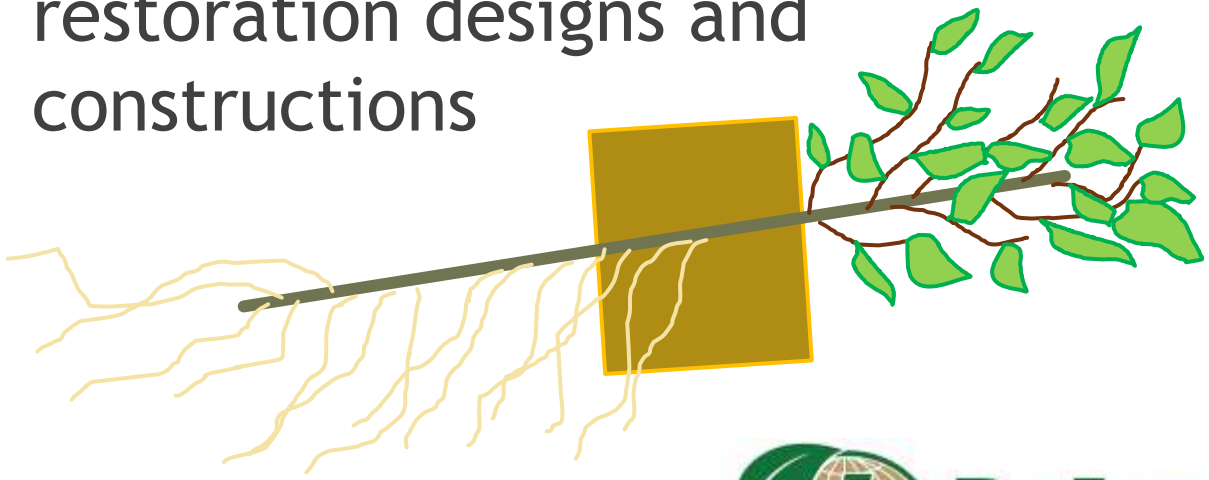
Field demonstration

Coir Log with rectangular shaped cross section

- Coir Log with rectangular shaped cross section has not historically been common in streambank restoration designs and constructions



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Demonstration

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Field demonstration Coir Log with rectangular shaped cross section

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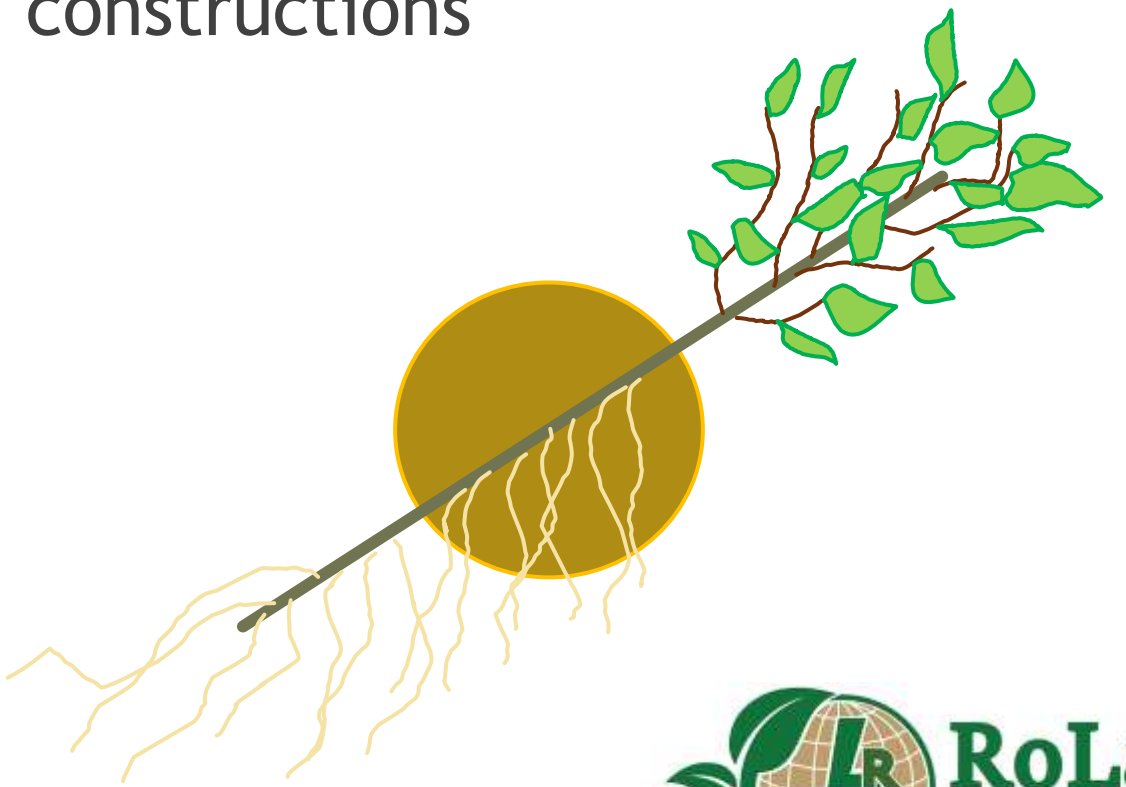
Coir Log with circular shape cross section

- Coir Log with circular shaped cross section is very common in streambank restoration designs and constructions



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Demonstration

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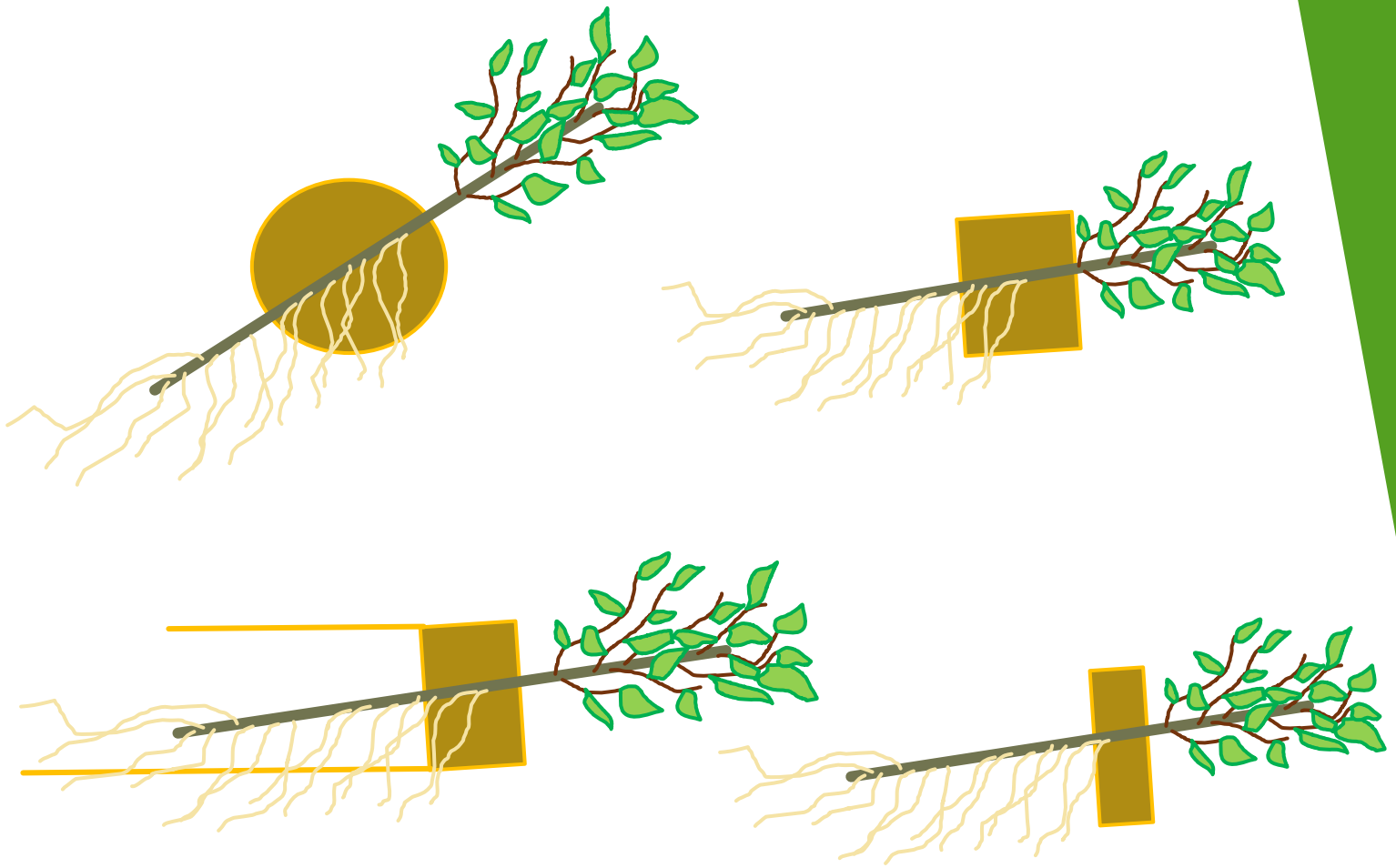
Field demonstration

A Common Feature

Invisible Holes

- All four products described earlier has invisible holes for planting and anchoring. These holes can be used for planting during construction or after construction
- Furthermore, as planting is done through the coir fiber mass, the growing plants will provide better anchoring of the product
- The plugs from the invisible holes can be used as a wick drain to transport water into the soil mass



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Field demonstration

Sediment Control

Rectangular Wattle for Sediment Control

- Better performances & all-natural product
- Shipping, raw material savings
- Easy handling & fast installation.

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Applications

- Check dam devices
- Slope length shortening devices
- Perimeter sediment control devices
- Drop inlet protection devices

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Long term performance

- No plastic nets to interfere with wildlife or maintenance activities.

- No need to remove at the end of the project. Vegetation grows over it.

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Testing

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AASHTO, NTPEP Performance Testing 3/26/2020

NTPEP

AASHTO

Project: ASTM D 7351 modified for Inlet
Client / Listing # / Product: NTPEP / ECP-2019-03-007 / BioD-SiltTrap 12
Test Date: 3/26/2020
Test Setup: Inlet Protection Installation per Manufacturer Reccommendation
Duration: 30 minutes
Water / Soil Input: 4700 lbs water 57 lbs soil
Sediment Concentration: Sandy Clay @ 1.2%

Soil Retention Effectiveness: 80.05%
Water Retention Effectiveness: 10.29%
Seepage Effectiveness: 89.71%

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AASHTO, NTPEP Performance Testing 9/19/2019

NTPEP
AASHTO NATIONAL TRANSPORTATION PRODUCT EVALUATION PROGRAM

Project: ASTM D 7351
Client / Listing # / Product: NTPEP / ECP-2019-03-006 / BioD-SiltTrap 9"
Test Date: 9/19/2019
Test Setup: Toe-of-Slope Installation per Manufacturer Recommendation
Duration: 35 minutes
Water / Soil Input: 1650 lbs water 20 lbs soil
Sediment Concentration: Sandy Clay @ 1.2%

Soil Retention Effectiveness: 84.24%
Water Retention Effectiveness: 10.26%
Seepage Effectiveness: 89.74%

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- Thank you
- RoLanka helping the environment through its innovations of 100% natural and wildlife friendly coir product since 1993