

# Hands-On Residential Stream Repair Projects

- Education on Stabilizing and Protecting Urban Streambanks -

- Mitch Woodward – Area Spec. Agent  
NC Extension
- Wendy Patoprsty – Blue Ridge Conservancy
- Wendi Hartup  
Stormwater Manager  
Town of Kernersville, NC
- Jon Page  
Extension Associate  
NCSU - BAE

- Greg Jennings  
Jennings Environmental
- Bill Lord – Area Spec. Agent  
NC Extension



## 30+ Backyard Stream Repair Workshops Impacts

- Since 2012: 650+ Participants
- Self-Supporting \$\$\$
- 3,000+ linear ft stabilized  
(6 repaired 7480 linear ft)

- 576 Tons Soil Saved Annually\*
- 690Lbs Phosphorus Saved Annually\*
- 1,531 Lbs Nitrogen Saved Annually\*
- \$575,000 saved in future costs  
(\$25/ft)

\*CEE: Channel Erosion Equation from MDEQ, 1999. Pollutants Controlled Calculation and Documentation for Section 319 Watersheds Training Manual: [https://www.michigan.gov/documents/deq/wrd-nps-pollutants-controlled\\_575549\\_7.pdf](https://www.michigan.gov/documents/deq/wrd-nps-pollutants-controlled_575549_7.pdf)



*Healthy ?*



# *Healthy Stream ?*



*What's going on here?*



*Is this helping?*



Is this a good idea?









*Are these good solutions?*



# *Healthy Stream? Where's the plants ?*



# *What's wrong with armoring?*



## *What can we do?*

- \$ Small Scale Stormwater controls
- \$-\$\$\$ Bank grading & planting
- \$\$\$-\$\$\$\$\$ Systematic restoration & engineered structures



# NCSU River Course Workshop



# Job #1: Motivating people to action.....



Where does your drinking water come from?

# Urban 'Rain-Scaping'



**Small Scale Practices That Slow  
Water Down, Spread it Out, Soak it In!**

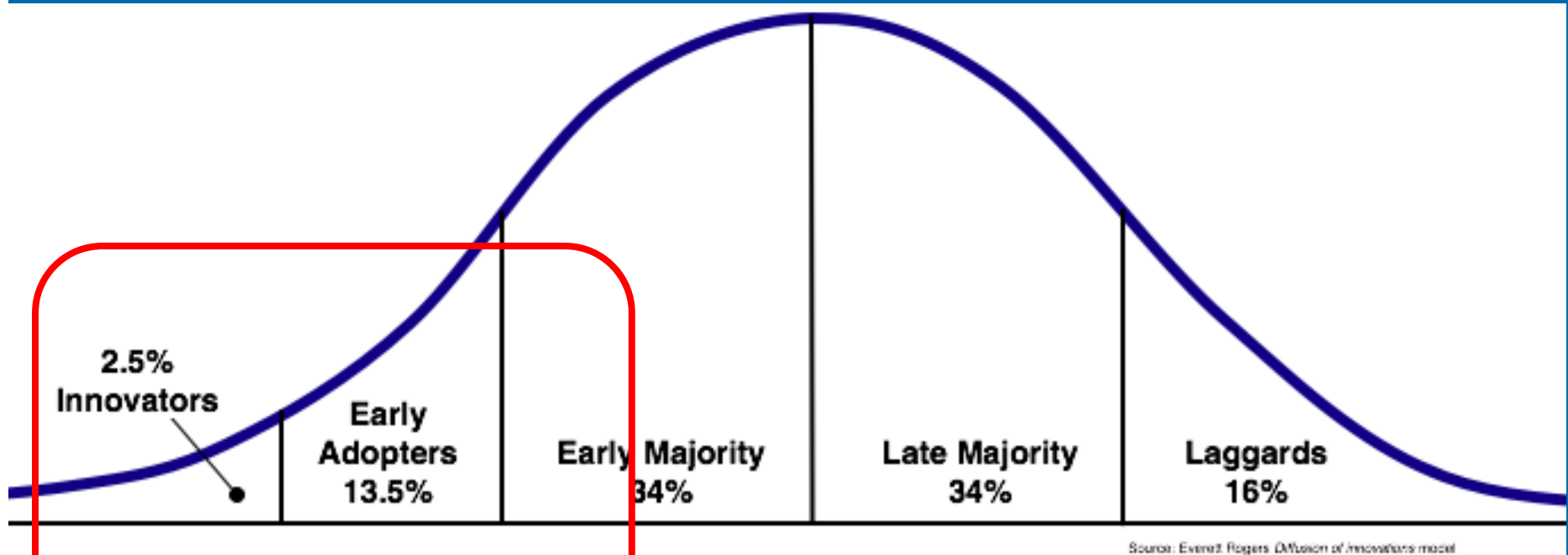


# Residential SCM Menu: 'Small Scale Solutions'

- 1 Downspout Disconnection
- 2 Raingardens
- 3 Innov. Water Harvesting
- 4 **Backyard Stream Repair**



# - Technology Adoption - The Human Component

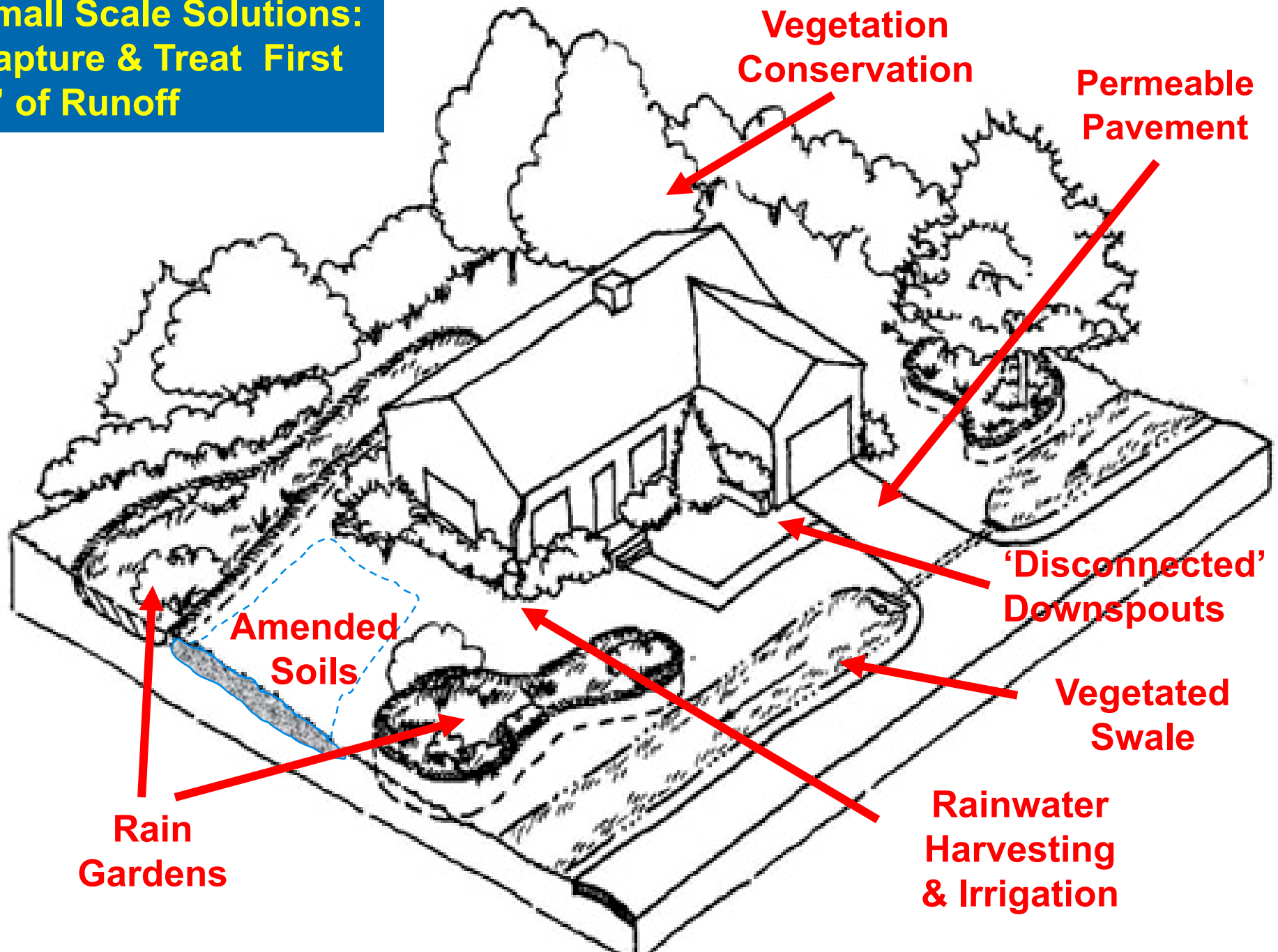


← 'Low hanging fruit' →

← Resistant to any change →

## The Classic 'Bell Curve'

**Small Scale Solutions:  
Capture & Treat First  
1" of Runoff**



[BAE Home](#) > [workshops](#)

## Backyard Stream Repair Workshops

This workshop is sponsored by [NC State University](#), and [NC Cooperative Extension](#).



### About the Workshop

Learn how to stabilize your backyard stream, improve the natural environment, and enhance your property. Learn about causes of streambank erosion and how to use native plants to create a healthy streamside environment. Participate "hands-on" in enhancing an eroding streambank using grading, matting, and various natural plants at a local stream. Attendees will have the opportunity to watch, ask questions, and even plant trees and shrubs to stabilize and beautify a streambank. Scroll down to the bottom of this page for a list of [resources](#).



- Learn benefits of stream buffers
- Learn common streambank plants
- Learn small-scale solutions to reduce erosion
- Free plants for first 50 respondents
- Program free to the public



Piedmont Triad  
Water Quality  
Partnership

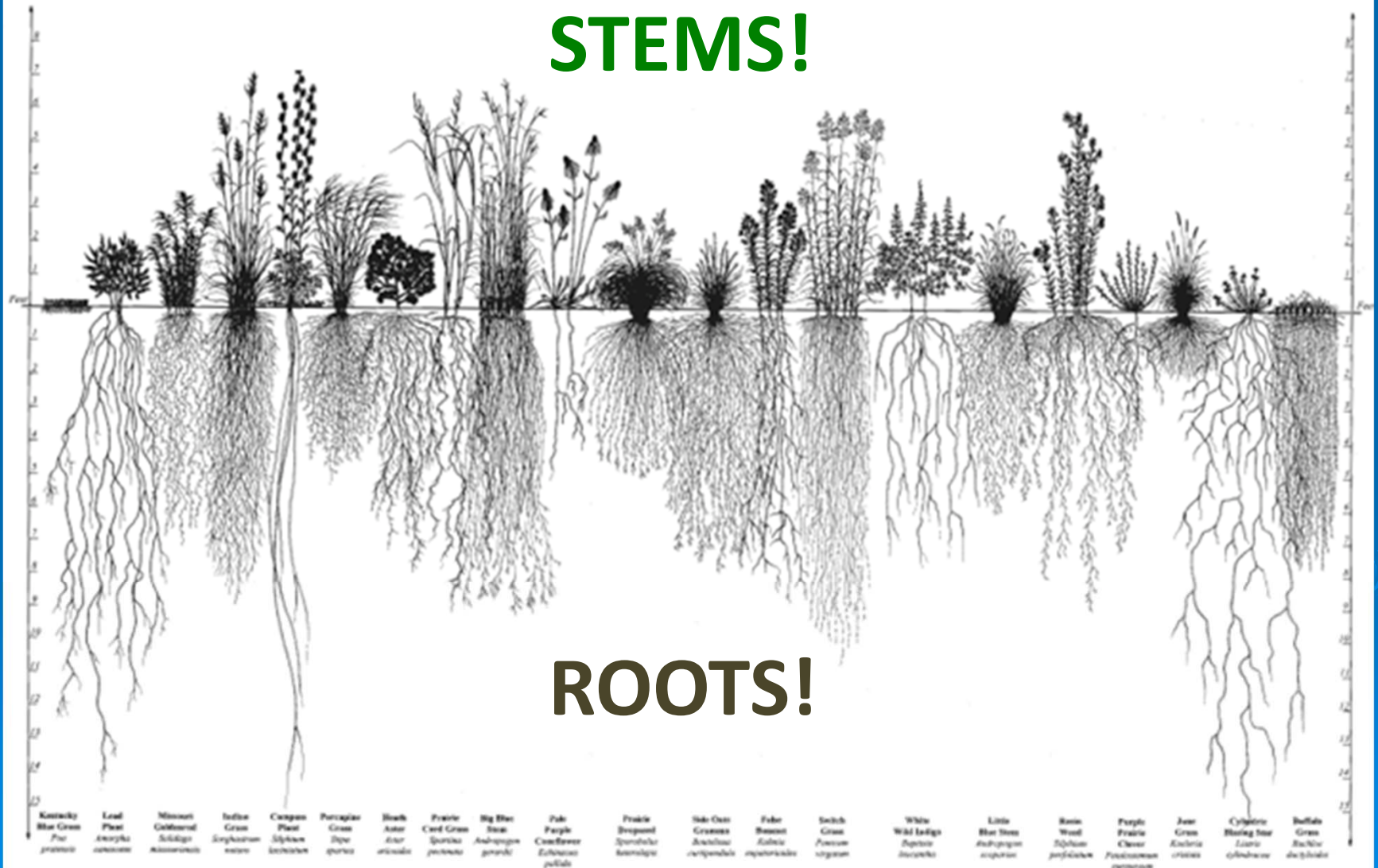


Program funded by The Piedmont Triad Water Quality Partnership, in cooperation with NC Cooperative Extension and Soil & Water Conservation Districts in Alamance, Forsyth, Guilford and Randolph counties.



# Erosion Minimization – PLANTS HOLD SOIL!

## STEMS!



Use color !



# Stream Repair Workshop: Newland, NC





# Rough Grading Morning of Workshop



## Installing the coir erosion control matting.





**Before**



**After**







**6 Weeks After  
Installation  
Cost = \$13 / ft**



*Now.....*



# Stream Restoration Workshop Apex, NC

More Complex  
Repairs Requiring  
Permitted In-  
Stream Structures

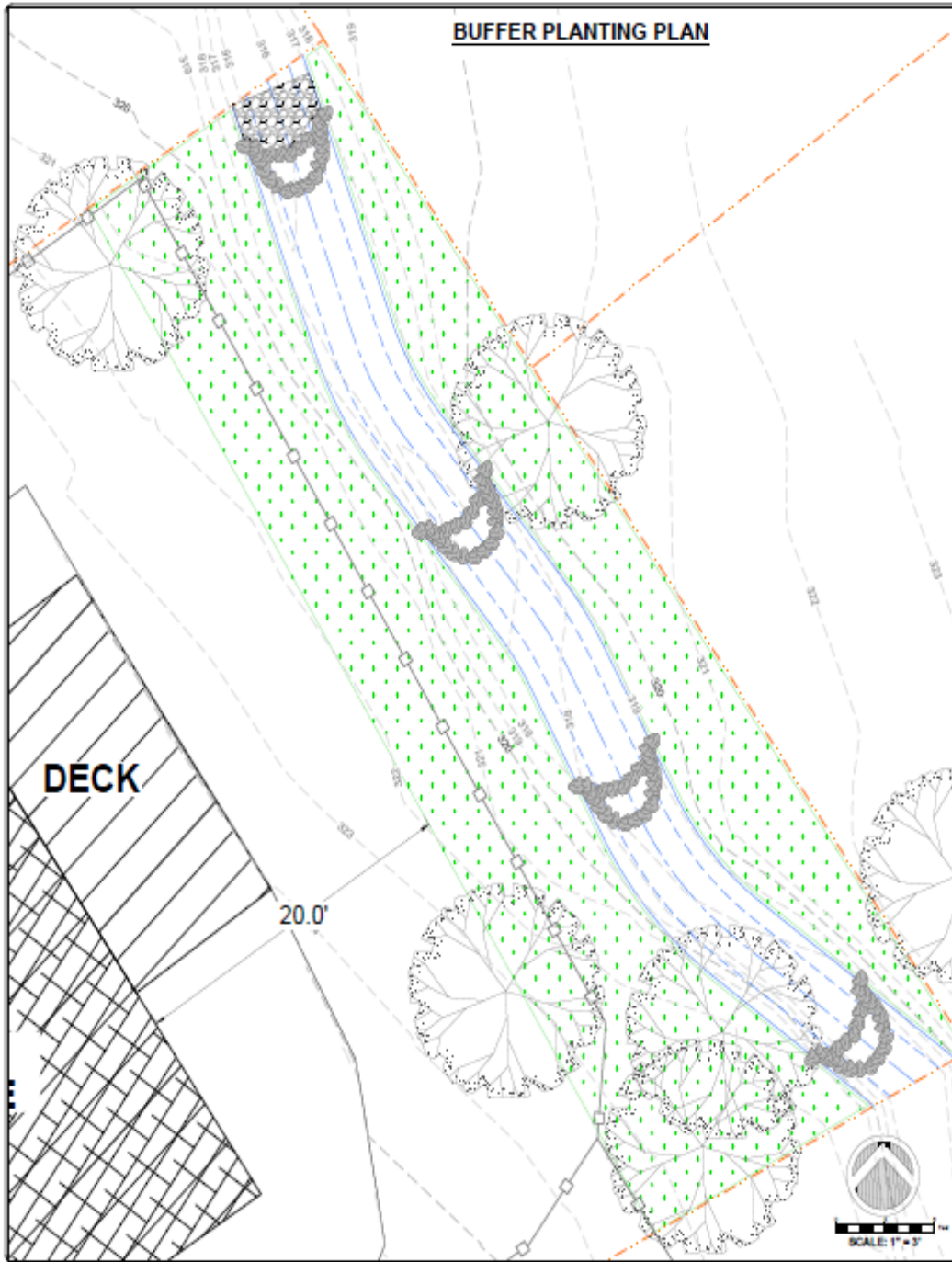






*Effective  
Homemade  
Solutions?*

# BUFFER PLANTING PLAN



## STREAM BANK AND BUFFER PLANTING SPECIFICATIONS

### LIVE STAKES AND CONTAINERIZED PLANTS - 900 SF

| SYMBOL   | SCIENTIFIC NAME                | COMMON NAME   | SIZE (CAL)   | SPACING    | QUANTITY |
|----------|--------------------------------|---------------|--------------|------------|----------|
| [Symbol] | <i>Liriodendron tulipifera</i> | TULIP POPLAR  | 0.25' - 1.0' | 10 - 15 FT | 10       |
| [Symbol] | <i>Salix sericea</i>           | SILKY WILLOW  | 0.50' - 1.0' | 6 - 10 FT  | 20       |
| [Symbol] | <i>Platanus occidentalis</i>   | SYCAMORE      | 0.25' - 1.0' | 10 - 15 FT | 10       |
| [Symbol] | <i>Betula nigra</i>            | RIVER BIRCH   | 0.25' - 1.0' | 10 - 15 FT | 10       |
| [Symbol] | <i>Cornus amomum</i>           | SILKY DOGWOOD | 0.25' - 1.0' | 10 - 15 FT | 10       |

### PERMANENT SEEDING - 900 SF

| SYMBOL   | SCIENTIFIC NAME                | COMMON NAME         | TYPE | APP. RATE       | QUANTITY |
|----------|--------------------------------|---------------------|------|-----------------|----------|
| [Symbol] | ---                            | RIPARIAN SEED MIX   | SEED | 2 LBS / 1000 SF | 5 LBS    |
| [Symbol] | <i>Elymus virginicus</i>       | VIRGINIA WLD RYE    | SEED | 20 %            | ---      |
| [Symbol] | <i>Agrostis perennans</i>      | AUTUMN BENT GRASS   | SEED | 15 %            | ---      |
| [Symbol] | <i>Panicum virgatum</i>        | SWITCHGRASS         | SEED | 15 %            | ---      |
| [Symbol] | <i>Rudbeckia hirta</i>         | BLACK-EYED SUSAN    | SEED | 10 %            | ---      |
| [Symbol] | <i>Coneopogon lanceolate</i>   | LANCELEAF COREOPSIS | SEED | 10 %            | ---      |
| [Symbol] | <i>Andropogon gerardii</i>     | BIG BLUESTEM        | SEED | 10 %            | ---      |
| [Symbol] | <i>Juncus effusus</i>          | SOFT RUSH           | SEED | 10 %            | ---      |
| [Symbol] | <i>Schizachyrium scoparium</i> | LITTLE BLUESTEM     | SEED | 5 %             | ---      |
| [Symbol] | <i>Sorghastrum nutans</i>      | INDIAN GRASS        | SEED | 5 %             | ---      |

### TEMPORARY SEEDING, SOIL PREP AND MULCHING - 900 SF

| SYMBOL   | SCIENTIFIC NAME       | COMMON NAME  | TYPE   | APP. RATE        | QUANTITY |
|----------|-----------------------|--|--------|------------------|----------|
| [Symbol] | <i>Secale Cereale</i> | RYE GRAIN (OR OTHER SUITABLE GROUND COVER I.E. MILLET) | SEED   | 5 LBS / 1000 SF  | 13 LBS   |
| [Symbol] | ---                   | GROUND AG. LIMESTONE                                   | PELLET | 45 LBS / 1000 SF | 100 LBS  |
| [Symbol] | ---                   | 10-10-10 FERTILIZER                                    | PELLET | 17 LBS / 1000 SF | 40 LBS   |
| [Symbol] | ---                   | WHEAT STRAW MULCH                                      | STRAW  | 90 LBS / 1000 SF | 200 LBS  |

#### PLANTING TECHNIQUES

- PLANTINGS, TEMPORARY AND PERMANENT SEED SHALL EXTEND 20 FT OUTSIDE LTOB AND 15 FT OUTSIDE RTOB AS SHOWN ON THE PLAN.
- INSURE THAT ROOTS, ONCE REMOVED FROM POT, ARE STRAIGHTENED AND FACE DOWNWARD.
- CREATE PLANTING AREA FOR EACH PLANT AND EXCAVATE PIT COMPLETELY DOWNWARD.
- PLACE PLANTS IN PIT INSURING ROOTS ARE FACING COMPLETELY DOWNWARD.
- HEEL IN SOIL AROUND PLANT AND PROCEED TO NEXT PLANTING LOCATION.
- NEWLY-PLANTED PLANTS NEED TO BE FASTENED TO THE SUBSTRATE FOR THE ESTABLISHMENT OF NEW ROOTS.
- ROOTS SHALL BE SPREAD IN THEIR NORMAL POSITION. ALL BROKEN OR FRAYED ROOTS SHALL BE CUT OFF CLEANLY.
- THE DIAMETER OF THE PLANTING HOLES (PITS) FOR EACH PLANT SHOULD BE AT LEAST THREE TIMES THE DIAMETER OF THE ROOT MASS. SCARIFY THE PLANTING PIT PRIOR TO EACH PLANT INSTALLATION.
- SET PLANTS UPRIGHT IN THE CENTER OF THE PIT. THE BOTTOM OF THE ROOT MASS SHOULD BE RESTING ON UNDISTURBED SOIL.
- PLACE BACKFILL AROUND BASE AND SIDES OF ROOT MASS, AND WORK EACH LAYER TO SETTLE BACKFILL AND TO ELIMINATE VOIDS AND AIR POCKETS. WHEN PIT IS APPROXIMATELY 3/4 FULL, WATER THOROUGHLY BEFORE PLACING REMAINDER OF THE BACKFILL. WATER AGAIN AFTER PLACING FINAL LAYER OF BACKFILL.

#### CONTAINER STOCK / LIVE STAKES

- STOCK SHALL HAVE BEEN GROWN IN A CONTAINER LONG ENOUGH FOR THE ROOT SYSTEM TO HAVE DEVELOPED SUFFICIENTLY TO HOLD ITS SOIL TOGETHER ONCE REMOVED FROM THE CONTAINER.
- CONTAINER PLANTS WILL NEED TO BE WATERED REGULARLY AND PLACED IN SHADY CONDITIONS UNTIL PLANTING OCCURS.
- CUTTINGS SHOULD BE INSTALLED THE SAME DAY THEY ARE CUT. THE STAKE SHOULD BE ORIENTED WITH THE BUDS POINTED UP, AND THE BOTTOM SHOULD BE CUT AT AN ANGLE FOR EASY INSERTION INTO THE GROUND.
- ABOUT FOUR-FIFTHS OF THE LENGTH OF THE STAKE SHOULD BE BELOW GROUND AND ANGLED DOWNSTREAM. AN IRON BAR CAN BE USED TO MAKE A PILOT HOLE TO PREVENT BARK FROM BEING DAMAGED DURING INSTALLATION.

#### PLANT LOCATIONS

- NEW PLANTINGS SHALL BE LOCATED WHERE SHOWN ON PLAN EXCEPT WHERE CHANGES HAVE BEEN MADE BY THE PROJECT ENGINEER ON-SITE.
- NECESSARY ADJUSTMENTS SHALL BE MADE ONLY AFTER APPROVED BY THE OWNER OR PROJECT ENGINEER.

KIRBY BANK STABILIZATION  
117 COUNTRY VALLEY CT  
AREA, NC 27502  
WAKE COUNTY

7 OF 7  
C-016  
BUFFER



SCALE



PROJECT # \_\_\_\_\_  
DATE \_\_\_\_\_  
DRAWN BY \_\_\_\_\_  
CHECKED BY \_\_\_\_\_  
DATE \_\_\_\_\_  
PROJECT # \_\_\_\_\_  
PAGE # \_\_\_\_\_









## 30+ Backyard Stream Repair Workshops Impacts

- Since 2012: 650+ Participants
- Self-Supporting \$\$\$
- 3,000+ linear ft stabilized  
(6 repaired 7480 linear ft)

- 576 Tons Soil Saved Annually\*
- 690Lbs Phosphorus Saved Annually\*
- 1,531 Lbs Nitrogen Saved Annually\*
- \$575,000 saved in future costs  
(\$25/ft)

\*CEE: Channel Erosion Equation from MDEQ, 1999. Pollutants Controlled Calculation and Documentation for Section 319 Watersheds Training Manual: [https://www.michigan.gov/documents/deq/wrd-nps-pollutants-controlled\\_575549\\_7.pdf](https://www.michigan.gov/documents/deq/wrd-nps-pollutants-controlled_575549_7.pdf)



# Lessons Learned

- There is a Market !
- Realtors : Property value +10%
- Work w/ local partners to provide audience + contacts
- Awareness: Educate before, during and after the project
- \*\*\*WARNING\*\*\* Challenging Education Environment –
  - Time & Patience Needed -
- Numerous meetings, emails, phone calls, texts, videos, ...time coordinating Army Corps, NC-DENR, homeowner, engineers, neighbors, more neighbors, HOAs, Conservation District, town officials, and contractor.
- A New Metric Invented!: 5.58 Client Contacts / Linear Ft
- Solution: Customer service 'Buffer ' between clients and engineers & contractor required



# Lessons Learned Con't

- Experienced Contractor Required!
- Homeowners: Rock and Plants = Stability
- Neighbors HOA : Standing Water = Snakes & Mosquitoes
- Typical Costs (linear ft.) :
  - Simple Bank Repair (permits not required) - \$15 - \$30
  - Mid-Level Restoration (permits, survey, sealed plans, single rock structure) - \$150 - \$230
  - High-Level Restoration ( permits, survey, sealed plans, multiple rock structures) - \$350 – \$500
- Questions Remain:  
Costs? Risk? Liability? Long Term Maintenance?
- **Easiest Solution - Don't Buy a House on a Stream!**



Questions ?



# Permitted Residential In-Stream Structures



## Increases:

- Time
- Permitting
- Handholding / Education
- Cost \$\$\$





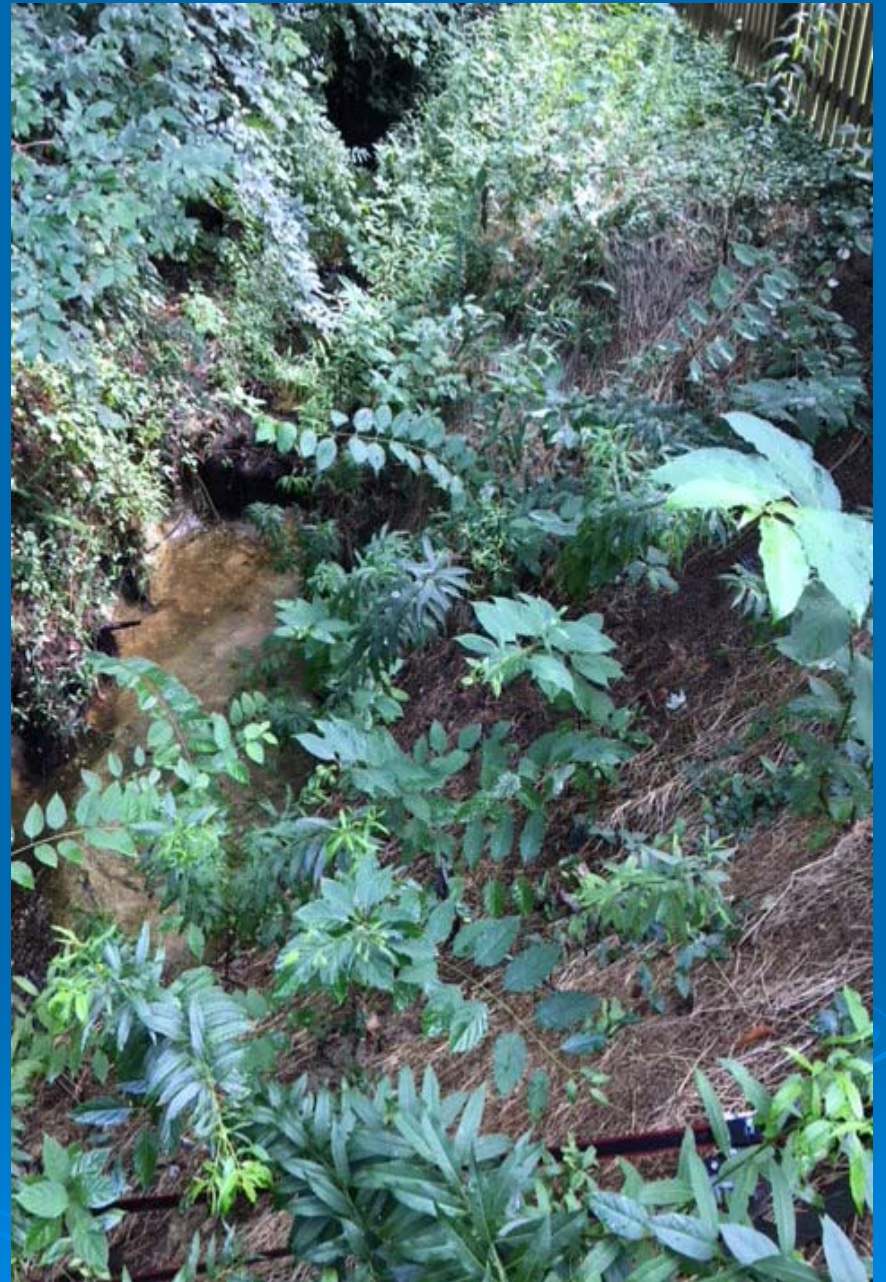


**6 ft back from water**

**2 ft  
high**



























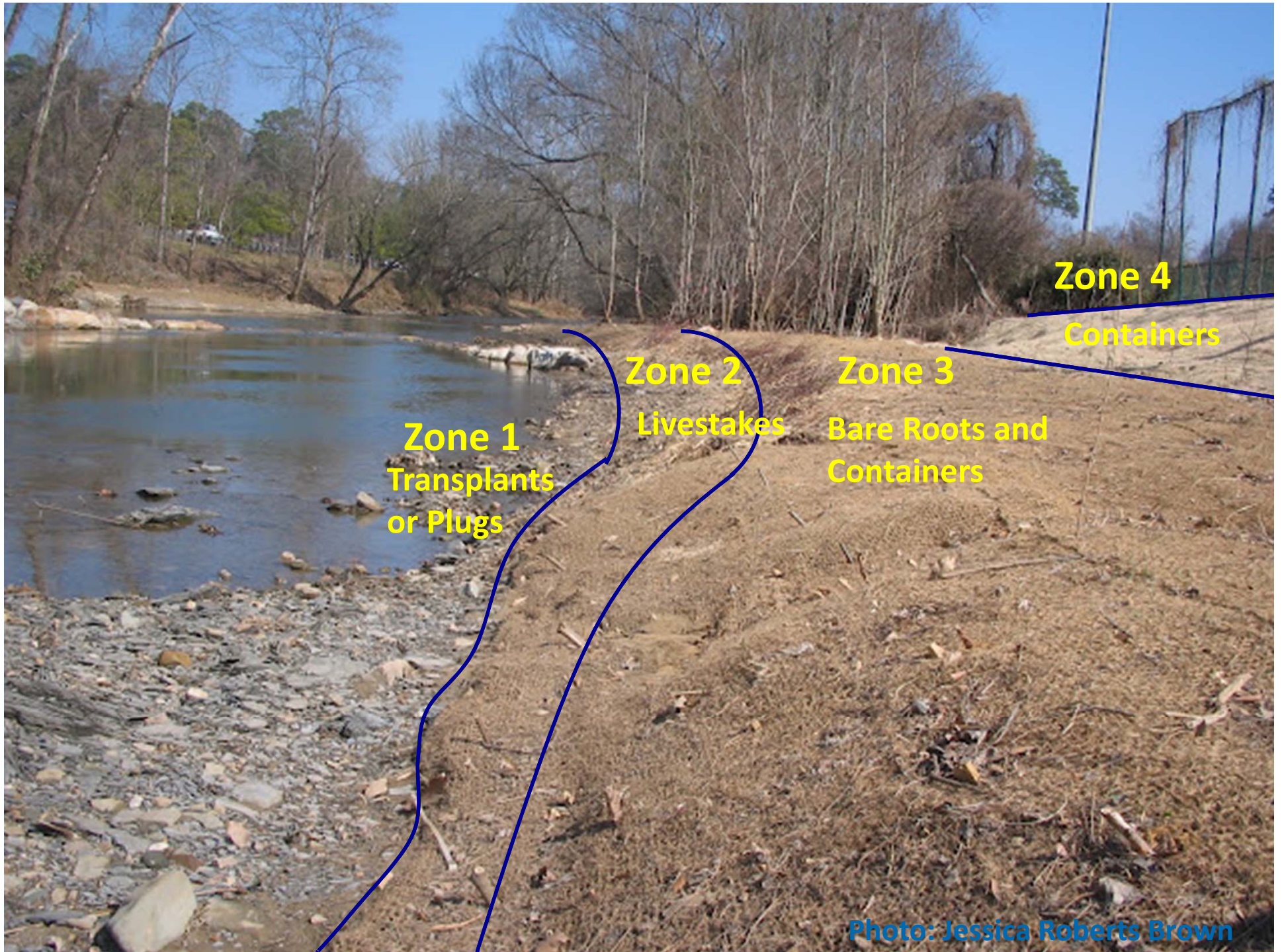


# The day before the workshop.....



## Homeowner and Keith Hoilman, Town of Newland Director of Public Works





**Zone 1**  
Transplants  
or Plugs

**Zone 2**  
Livestakes

**Zone 3**  
Bare Roots and  
Containers

**Zone 4**  
Containers

Photo: Jessica Roberts Brown

Livestakes were installed on 100 linear feet of stream

