

# Clark Fork River Remediation and Restoration Overview



By Brian Bartkowiak & Tom Mostad



Mine waste along  
Silver Bow Creek



Mine waste along  
the Clark Fork River





# Clark Fork River Red Water



# Contaminants of Concern

- Cadmium
- Copper
- Arsenic
- Lead
- Zinc





# Warm Springs Ponds



# CERCLA aka “Superfund” Law

## Remediation

- Cleanup of hazardous substances to protective levels
  - Human health
  - Environment



## Restoration

- Picks up where remediation leaves off
  - Return to baseline
  - Natural resources



# Clark Fork River Lawsuit Background

- 1983 Montana v. ARCO lawsuit
- 2008 Settlement of Clark Fork River Claim
- State received:
  - ~\$93 Million Remediation
  - ~\$27 Million Restoration
  - ~\$120 Million Total





# Clark Fork River Restoration Activities

**Restoration** - Restore, Replace or Acquire the equivalent of injured natural resources covered under the lawsuit

Terrestrial



Aquatic





# Additional Restoration



- Aquatics Monitoring
- Tributary Prioritization
- Channel Reconstruction
- Riparian Fencing
- Fish Screens
- Irrigation Improvements
- Riparian Planting
- Conservation Easements
- Land Acquisitions
- Project Development

# Working Together





# Reach A, Phase 1 Design

- Reach A, Phase 1 – Upper most section of the Clark Fork River (below Warm Spring Ponds)
- Preliminary Design Plan – available on DEQ's website:  
<http://www.deq.mt.gov/fedsuperfund/cfr.mcpx>
- Design Review Team Meeting, Spring, 2012
- Advertise and award contract for cleanup late 2012



# Overview of Preliminary Design

- Remove contaminated materials from the floodplain and rebuild with uncontaminated material, creating an inset flood plain.
- Develop secondary channels, wetlands, and point bars in the inset floodplain.
- Provide varying substrates, develop microtopography, and add roughness elements (woody debris).
- Preserve appropriately vegetated streambanks and rebuild where necessary using bioengineering techniques.
- Plant new vegetation in the niches where it will have a high likelihood of survival.



# Tailings Removal Design

## Summary of Excavation Volumes for Phase 1

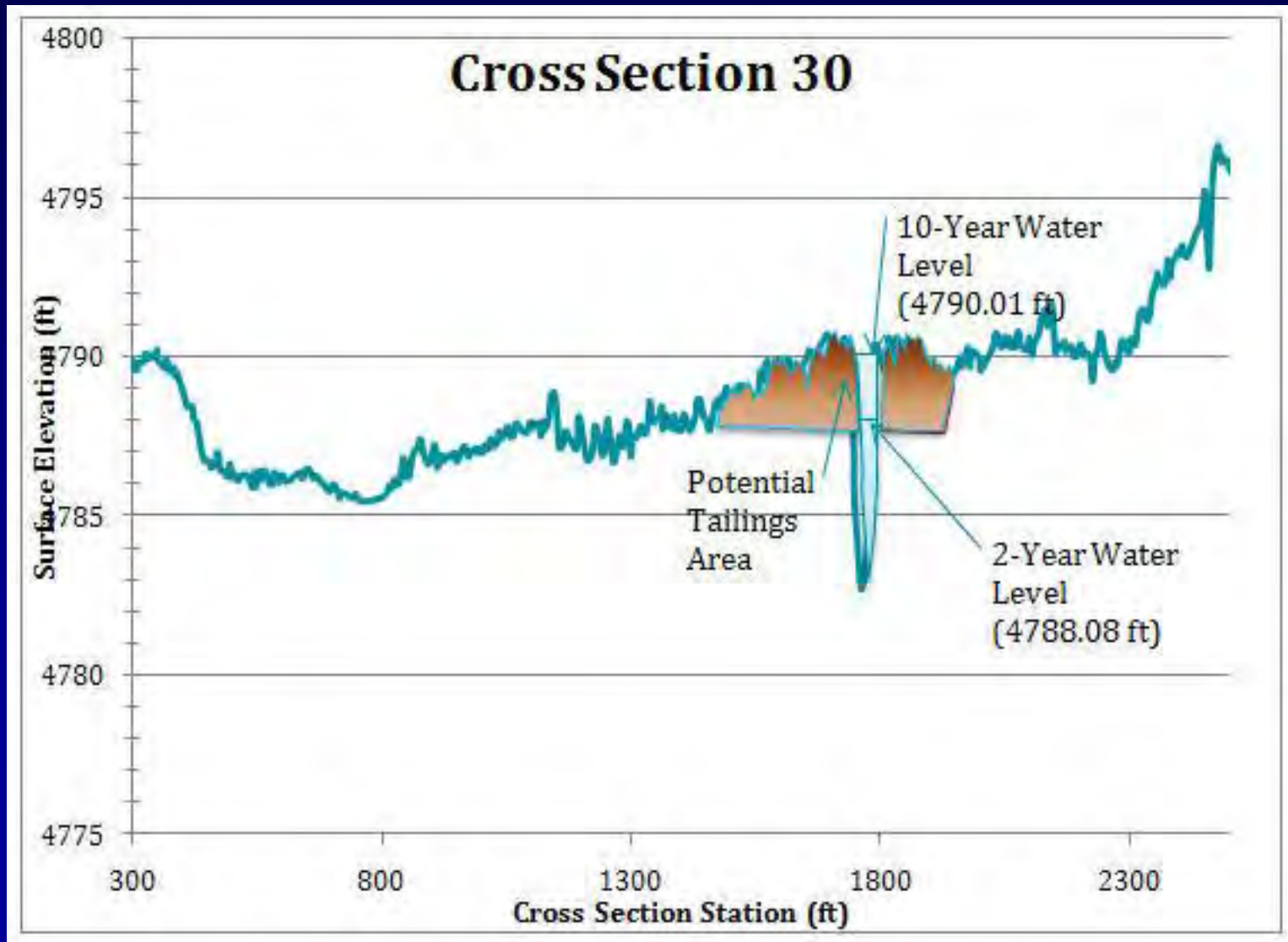
Excavation Area	53.5 Acres
Tailings Removal Volume	268,400 CY
Average Tailings Depth	3.1 ft.
Over Excavation Volume (0.5 ft)	41,600 CY
Total Excavation	311,000 CY
Average Removal Depth	3.6 ft.

# Reach A Phase 1 Removal Area



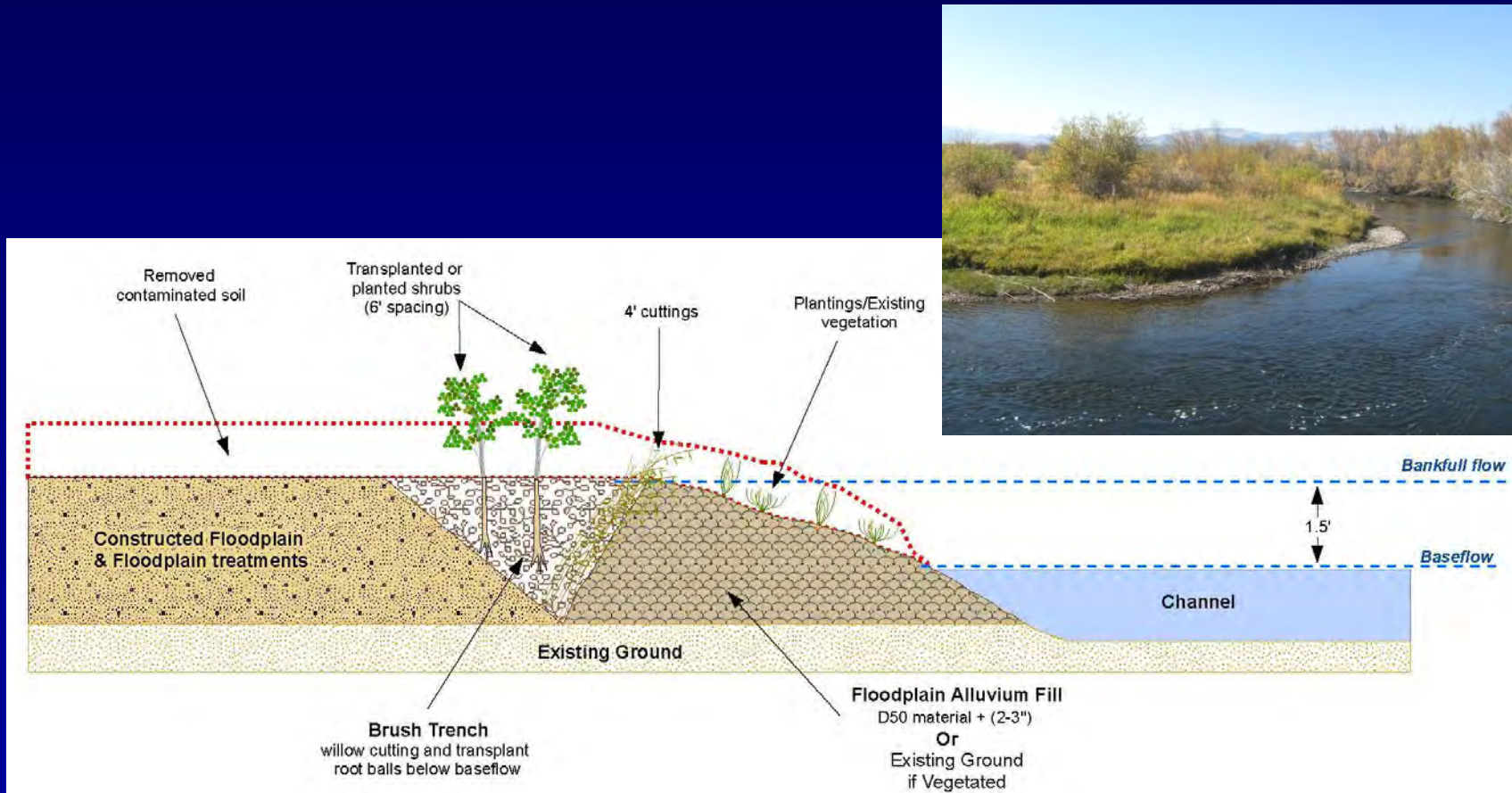


# Geomorphology



# Streambank Design

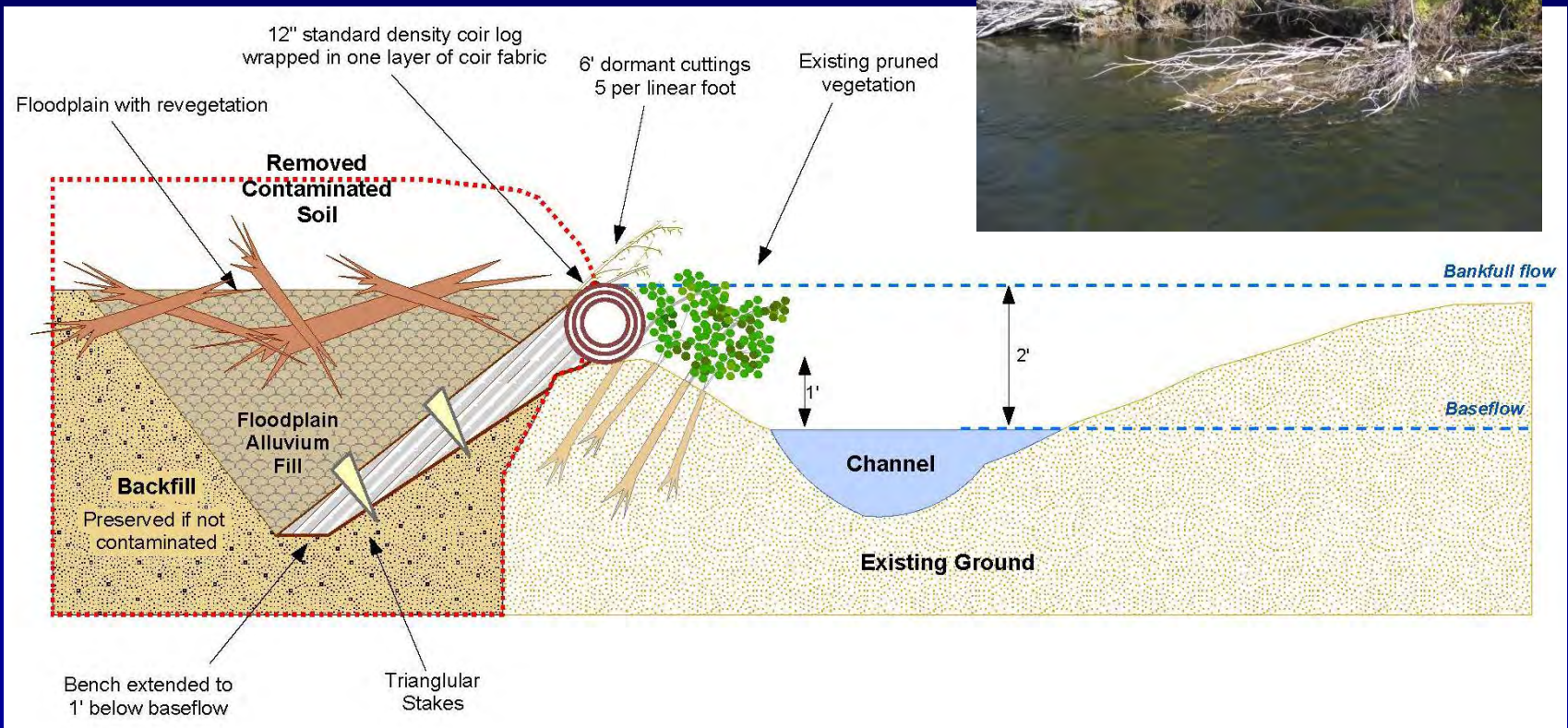
## Type 1 Bank Treatment – Brush Trench





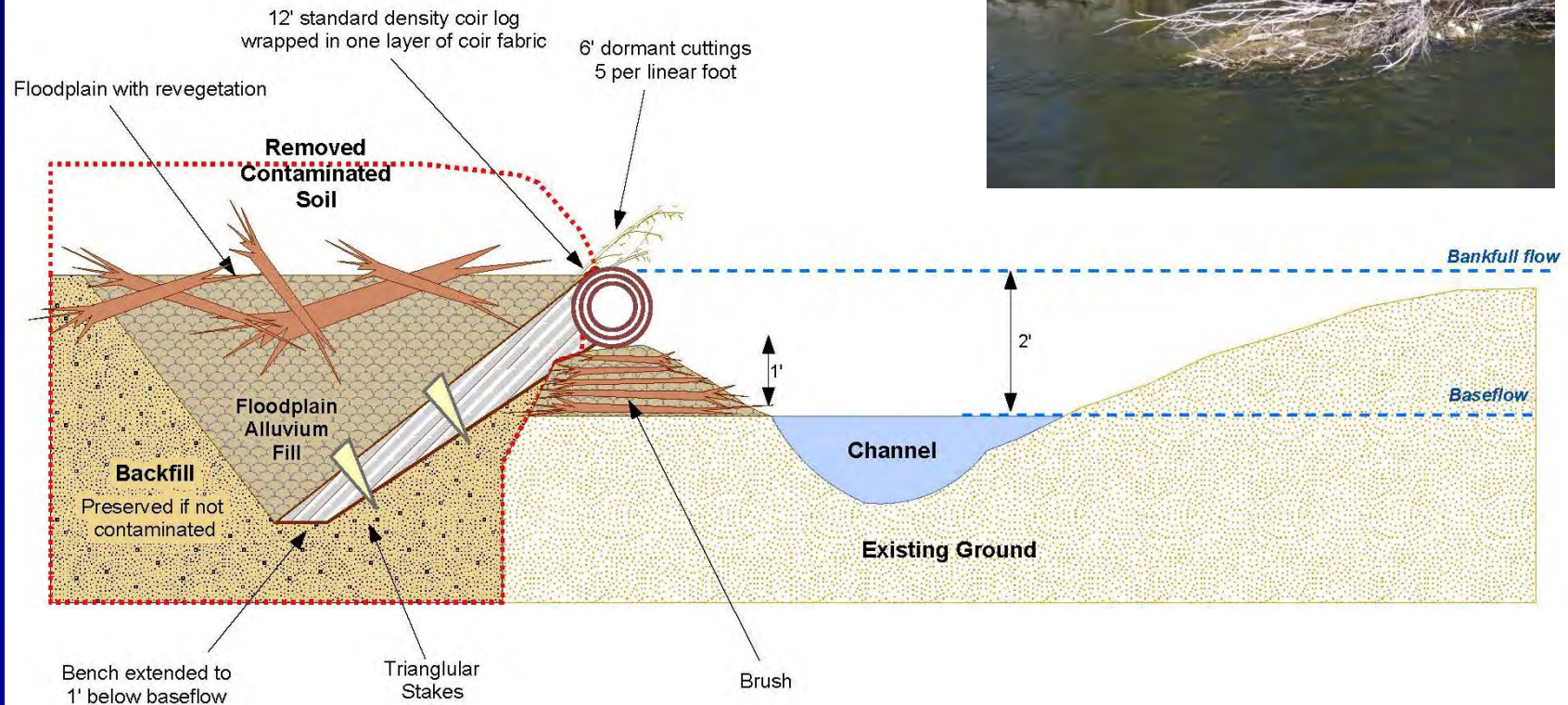
# Streambank Design

## Type 2 Bank Treatment Single Vegetated Soil Lift



# Streambank Design

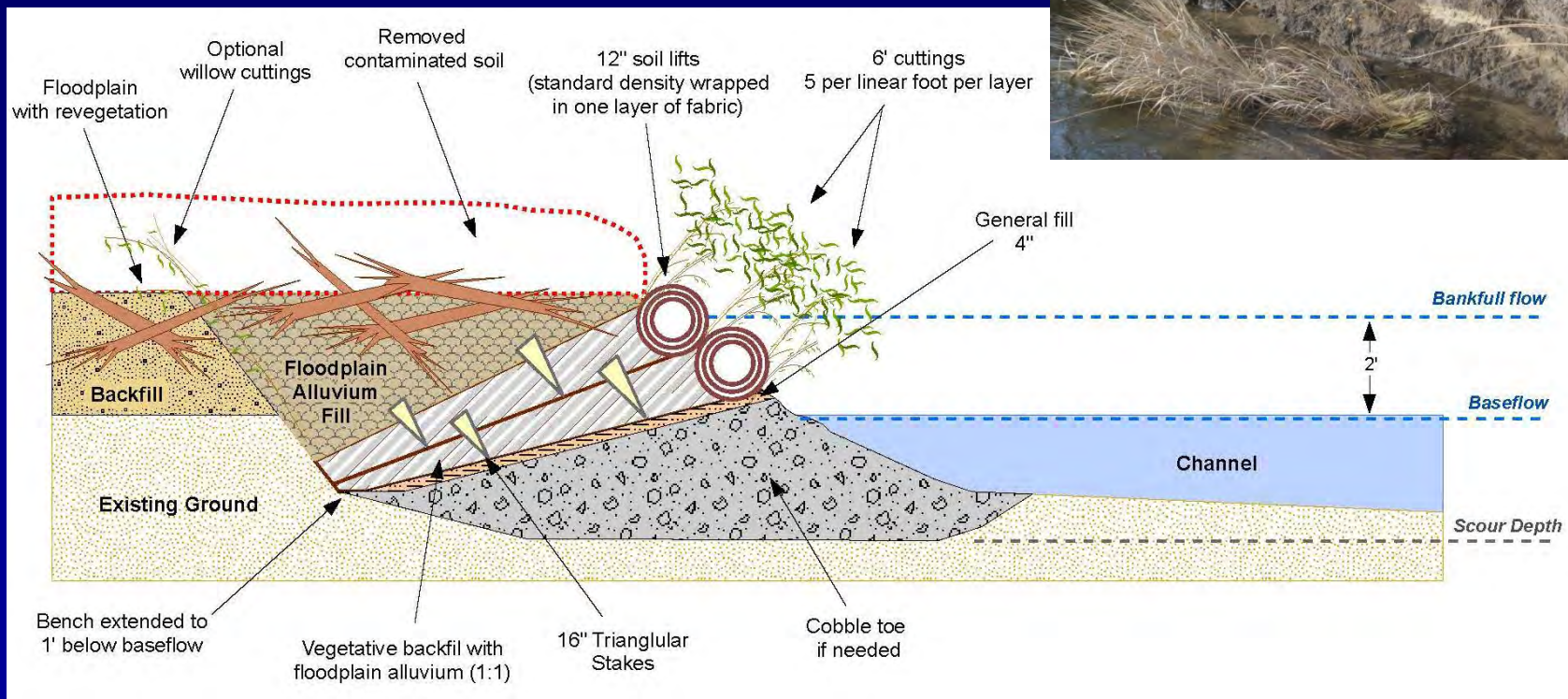
## Type 2 Bank Treatment Single Vegetated Soil Lift Gap in Bank Vegetation





# Streambank Design

## Type 3 Bank Treatment Double Vegetated Soil Lift



# Residential Yards

- DEQ cleaned up residential yard in and around Deer Lodge in 2010 & 2011
- ~13,000 cubic yards of contaminated material removed from residential yards





# Residential Yards

**During Cleanup**



**Completed**





# Residential Yards

**During Cleanup**



**Completed**





# Residential Yards

**During Cleanup**



**Completed**



# Trestle Area Cleanup

- The Trestle Area is located in downtown Deer Lodge, MT
- ~ 8,000 cubic yards of contaminated material was removed from this area
- ~ 1,000 feet of streambanks reconstructed
- Seeding and planting of over 3,000 trees and shrubs





# Trestle Area Cleanup

**Building Log Crib Wall**



**Finished Log Crib Wall**





# Trestle Area Cleanup

**Removing Contamination**



**Re vegetating**



# Trestle Area Cleanup

**Before Cleanup**



**After Cleanup**

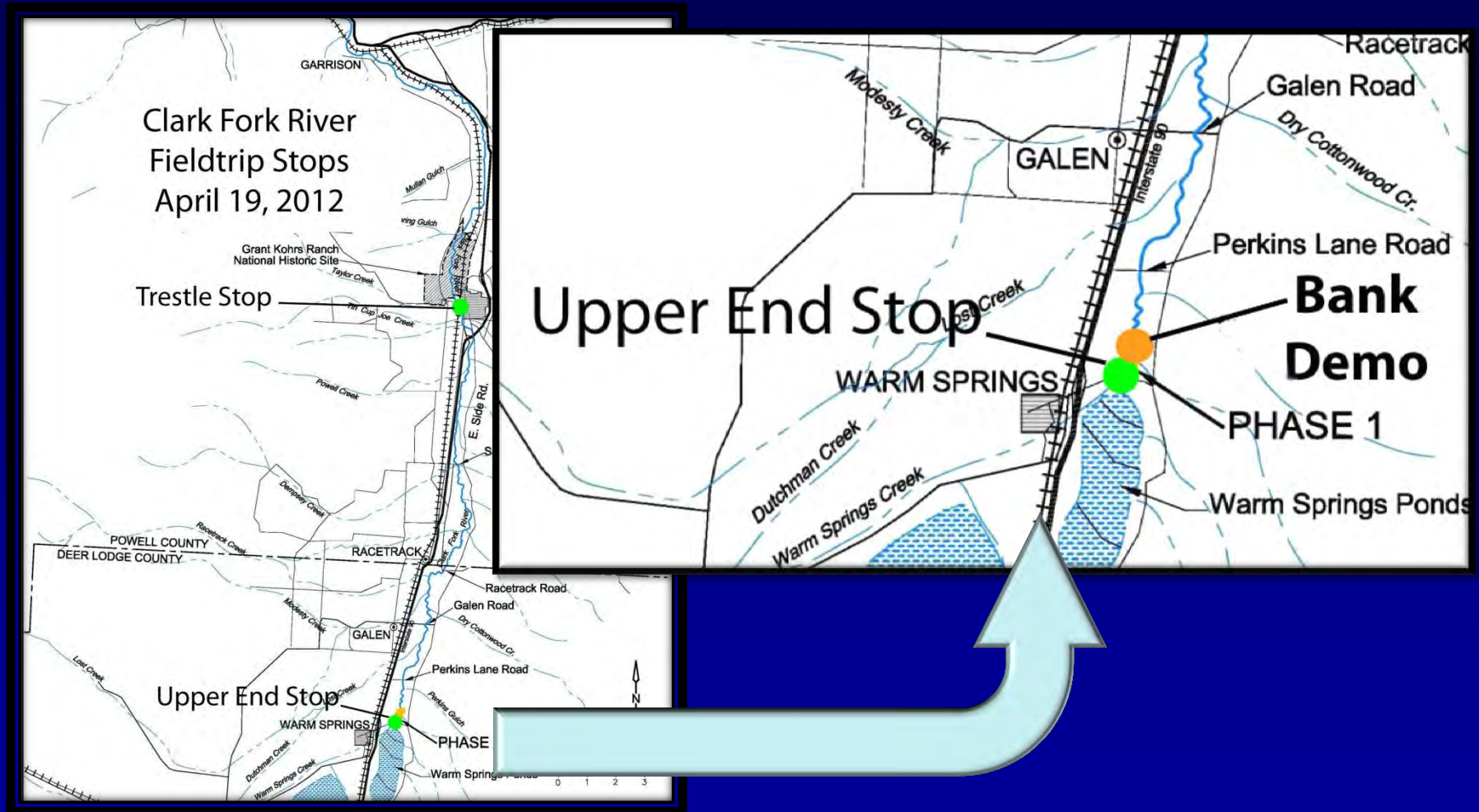




# Clark Fork River Reach A, Phase 1 Streambanks Pilot Project



# Map of Demo Area

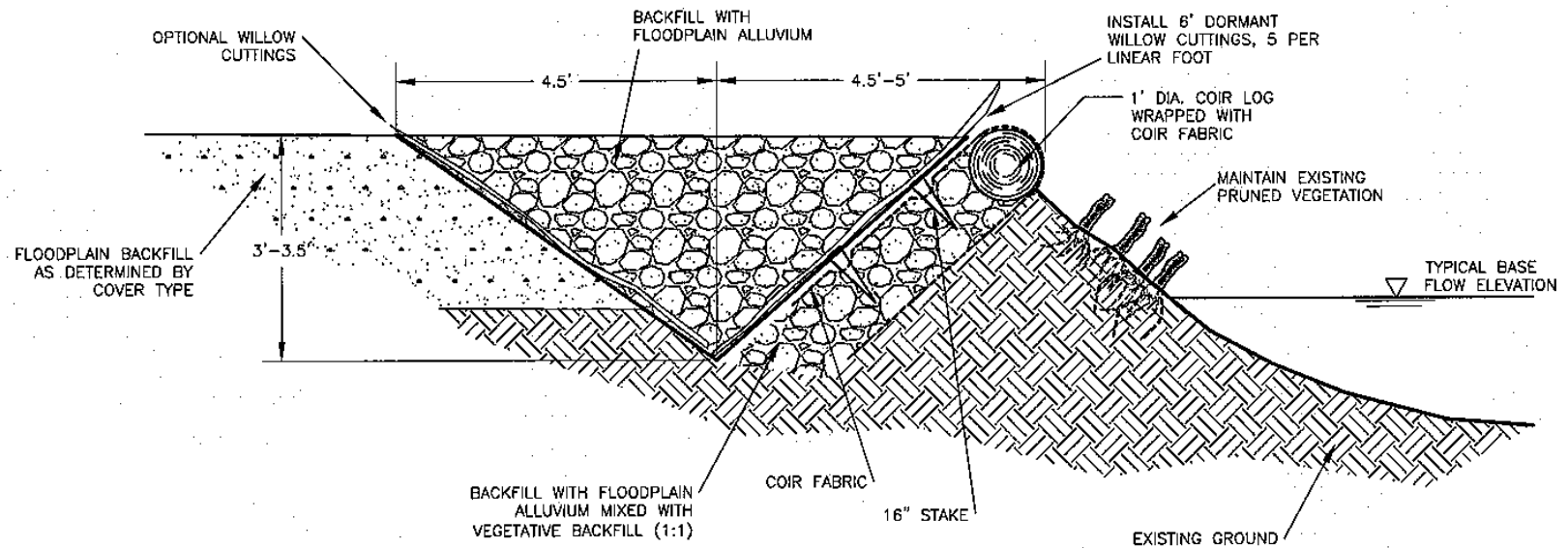




# Two Types of Bank Treatments

- Type 2 Treatment
- Modified Type 2 (B) Treatment
- Goals:
  - Test the constructability of the streambanks
  - Make modification to the streambank designs (if necessary)
  - Assist in writing the specifications for the streambanks
  - Better determine areas that are applicable to either type
  - Determine Short-term success

# Type 2 (B) Bank Treatment



TYPE 2 BANK TREATMENT – SINGLE LAYER VEGETATIVE SOIL LIFT, GOOD BANK VEGETATION

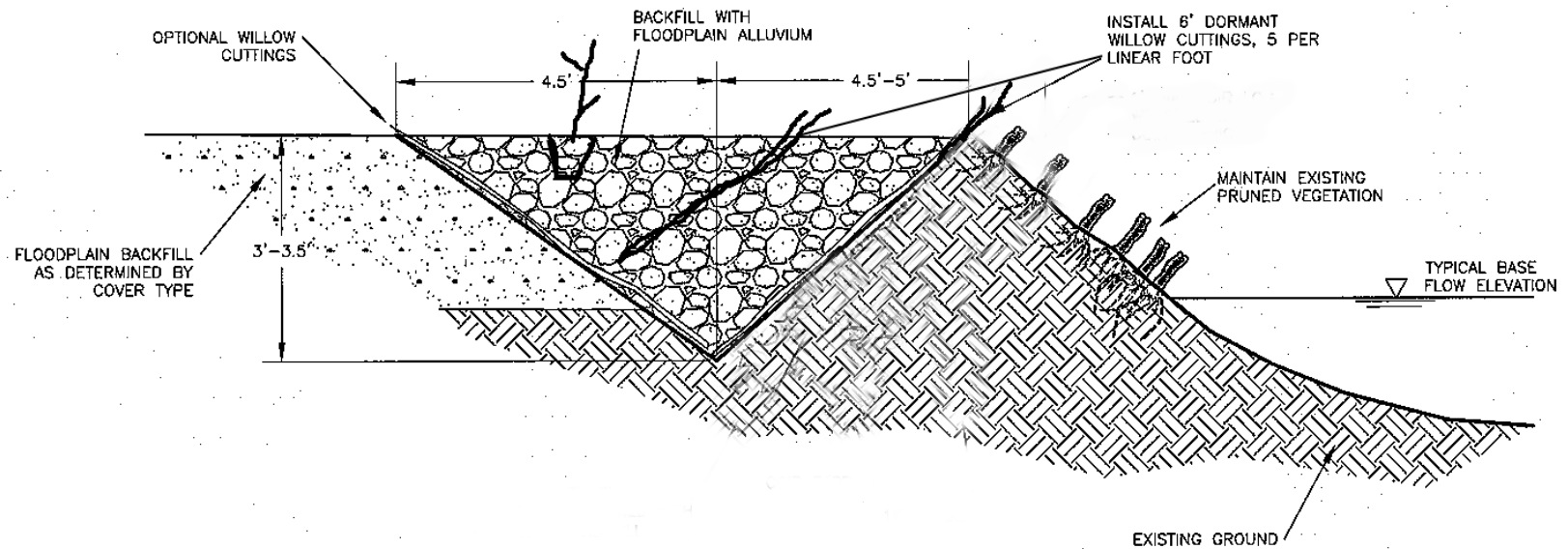
DETAIL

NTS





# Modified Type 2 (B)



TYPE 2 BANK TREATMENT – SINGLE LAYER VEGETATIVE SOIL LIFT, GOOD BANK VEGETATION

DETAIL

NTS



# Pre-Construction





# Contamination Removal Complete





# Single Lift Construction





# Staking Coir Fabric



Soil Lift



# First Willow Cuttings in Place





# Willows Capped with Topsoil





# Second Row of Willows and Plants





# Watering and seeding





# Limited Browse Protection





# Contamination Removal





# Contamination Removed





# Willow Cuttings





# Backfilled





# Limited Plant Protection

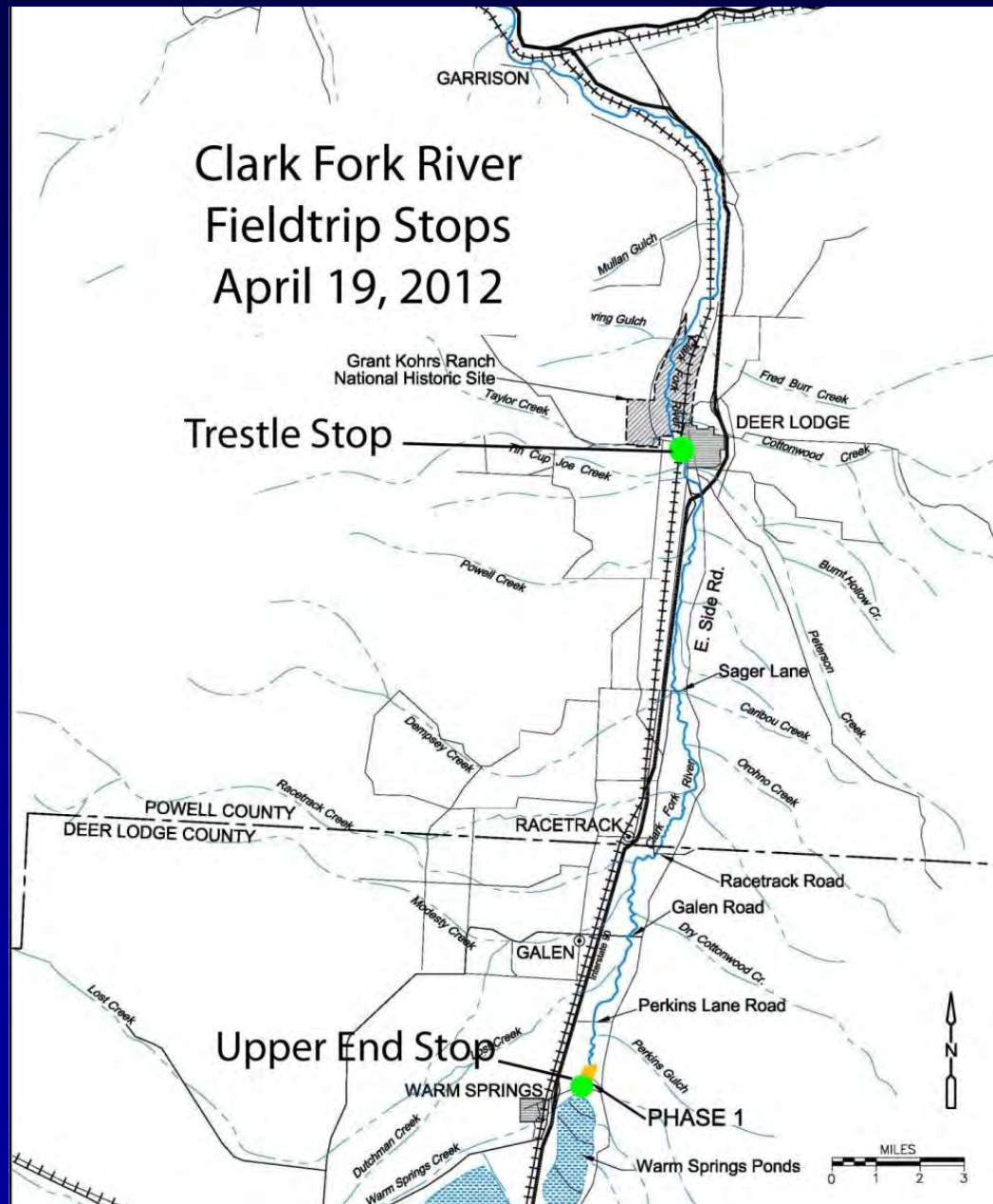


# Lessons Learned

- It is possible to construct both types of banks
- Coir “wraps” are not necessary on all streambanks
- Vegetation can be preserved on the face of the streambanks while successfully constructing bank treatment behind
- Turbidity monitoring during construction showed very little increase in turbidity (sediment loading)



# Clark Fork River Field Trip Preview



# Questions?

