

# Phase 1 Construction Kick-Off

Racetrack, MT

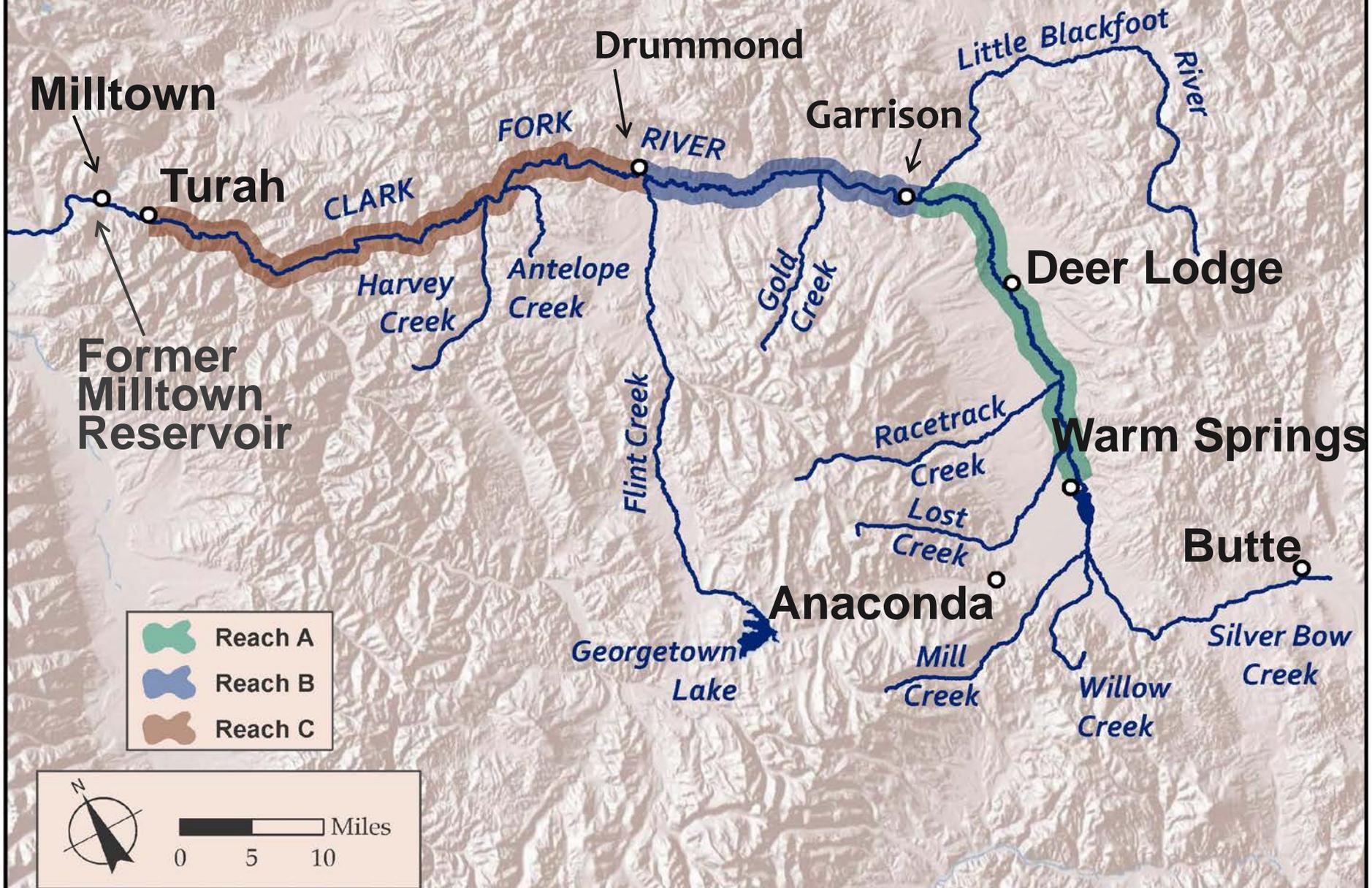
February 26, 2013



# Presentation Overview

- Introductions
- Overview of Reach A
- Phase 1 – Remediation and Restoration Design Approach
- Phase 1 Project Details
- Monitoring
- Questions/Discussion

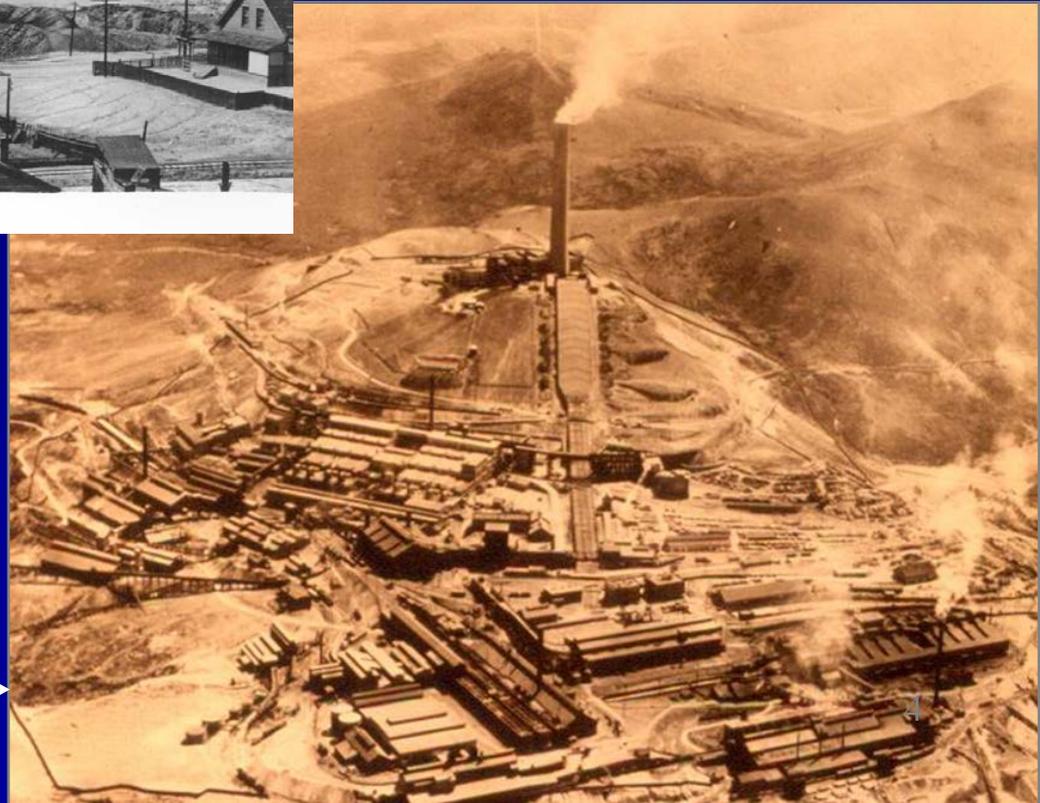
# Upper Clark Fork River



Butte – 1890's



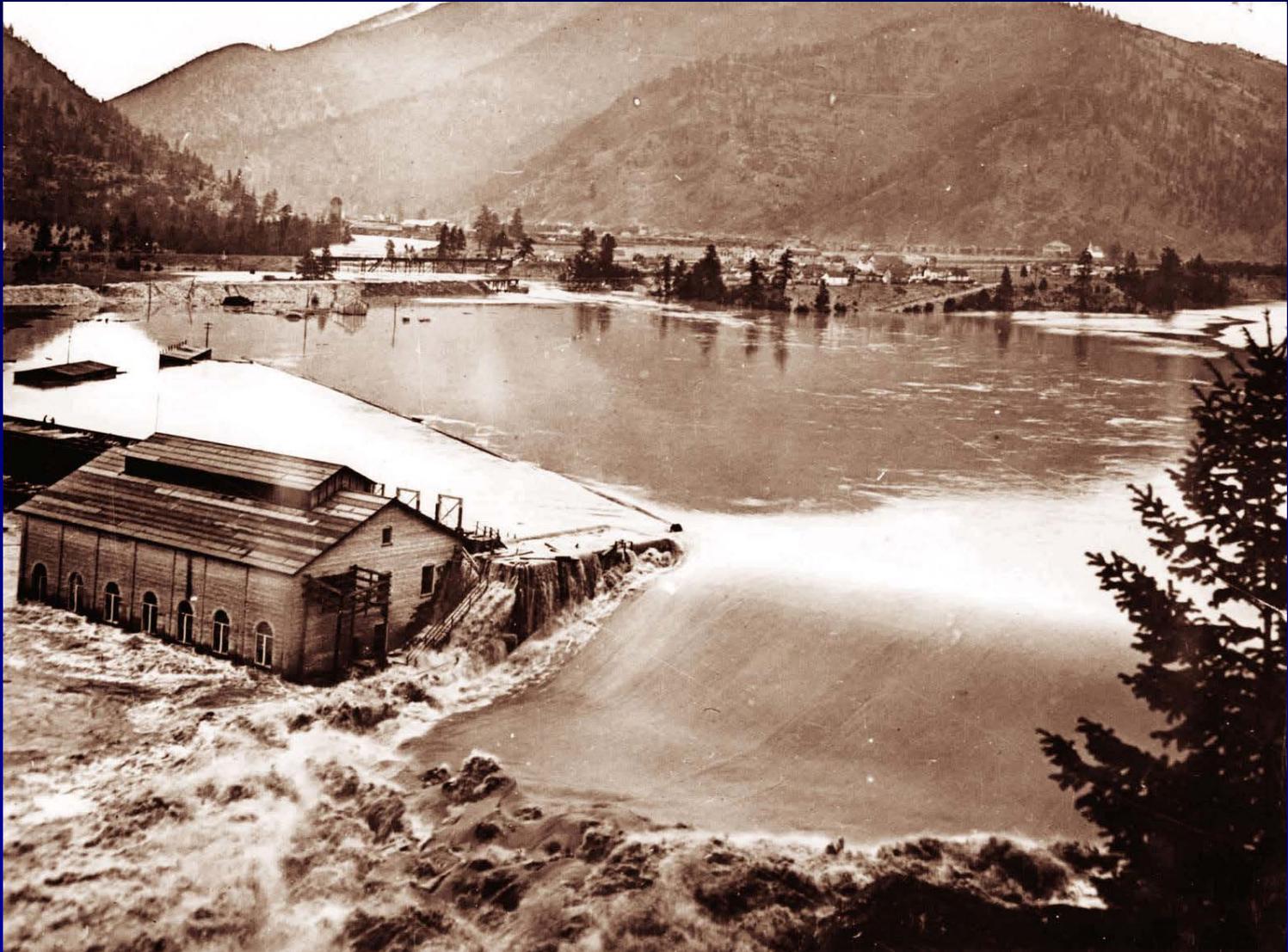
Smelter Hill and  
Stack Anaconda  
1902-1980



# Tailing next to Silver Bow Creek



# Milltown Dam – 1908





Mine waste along  
Silver Bow Creek



Mine waste along  
the Clark Fork River



Clark Fork River

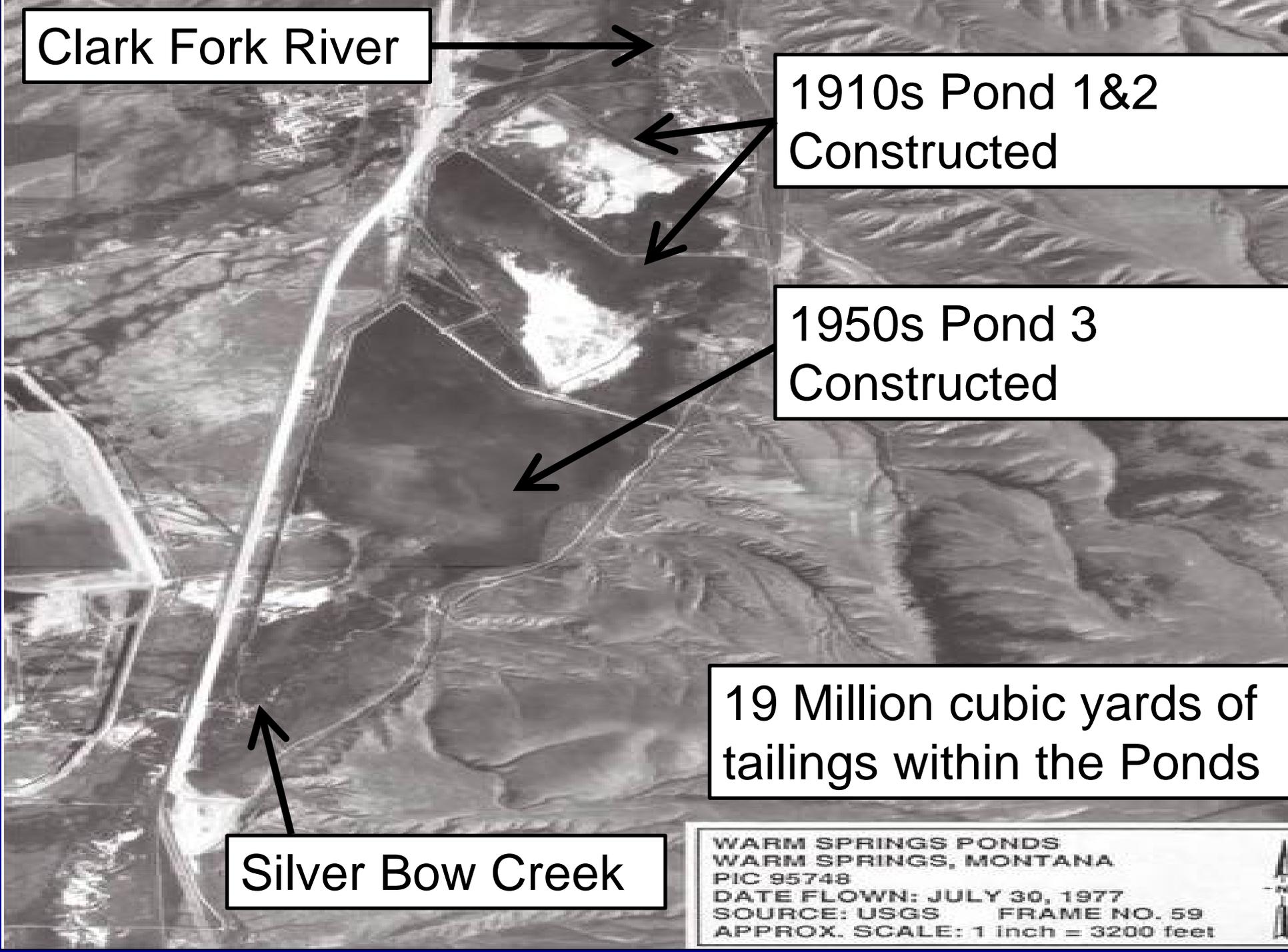
1910s Pond 1&2  
Constructed

1950s Pond 3  
Constructed

19 Million cubic yards of  
tailings within the Ponds

Silver Bow Creek

WARM SPRINGS PONDS  
WARM SPRINGS, MONTANA  
PIC 95748  
DATE FLOWN: JULY 30, 1977  
SOURCE: USGS      FRAME NO. 59  
APPROX. SCALE: 1 inch = 3200 feet

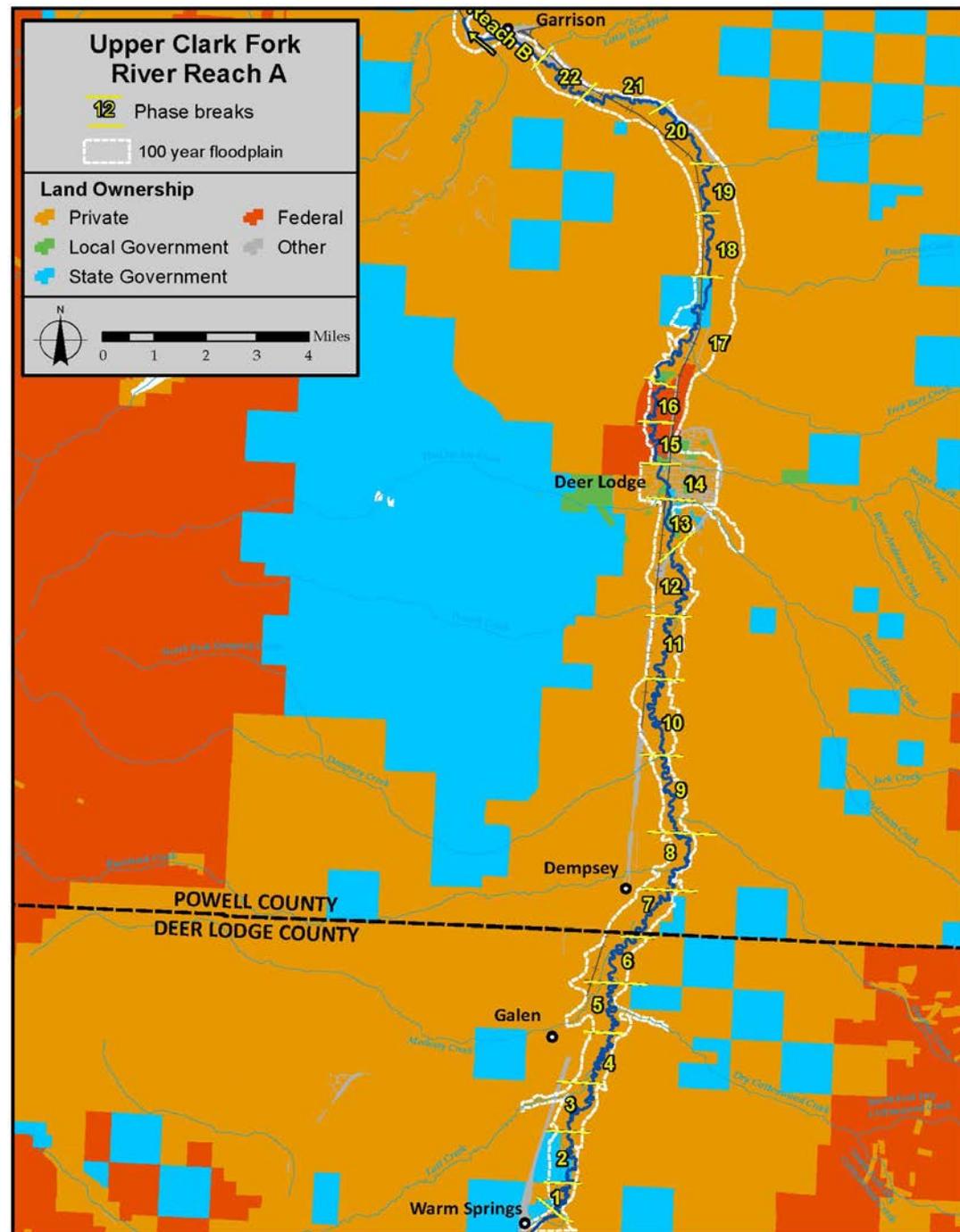


# Clark Fork River Remediation & Restoration

- ***Remediation*** – Protection of Public Health & the Environment
- ***Restoration*** - Restore, Replace or Acquire the equivalent of injured natural resources
  - Aquatic Resources
  - Terrestrial Resources

# Reach A

- 22 Phases ~47 river miles
- Over 300 landowners
- 14 landowners own 70% of Reach A
- National Historic Site - Grant Kohrs Ranch
- 1 City - Deer Lodge



# Problem

- Mine waste within the floodplain and banks of the River



- Human Health - Arsenic, Lead
- Ecological - Copper, Zinc

# Human Health Residential Yards

**During Cleanup**

**Completed**



# Human Health – Recreational Areas

**Before Cleanup**



**After Cleanup**



# Human Health – Recreational Areas



CFR Trestle Area  
April 16, 2012  
Location T-10

Winter -2012

# Human Health – Recreational Areas



Spring - 2012

# Human Health – Recreational Areas



CFR Trestle Area  
July 31, 2012  
Location T-10

30.4°N 106.9°W  
112° 44' 21.89"  
N 049° 23' 43.49"

Summer - 2012

# Human Health – Recreational Areas



CFR Trestle Area  
September 19, 2012  
Location T-10

304:HW mag  
W: 112° 44' 21.42"  
N: 046° 23' 43.28"

Fall - 2012

# Human Health – Pastures Areas



Over 150 acres of pastures flood irrigated with contaminated river water – blowing dust and runoff to the river

2012- Deep tilled (~12”), fertilized, seeded, grazing restrictions to establish self-sustaining vegetation



# Reach A

- Highly sinuous
- Variably entrenched
- Primarily Agricultural land

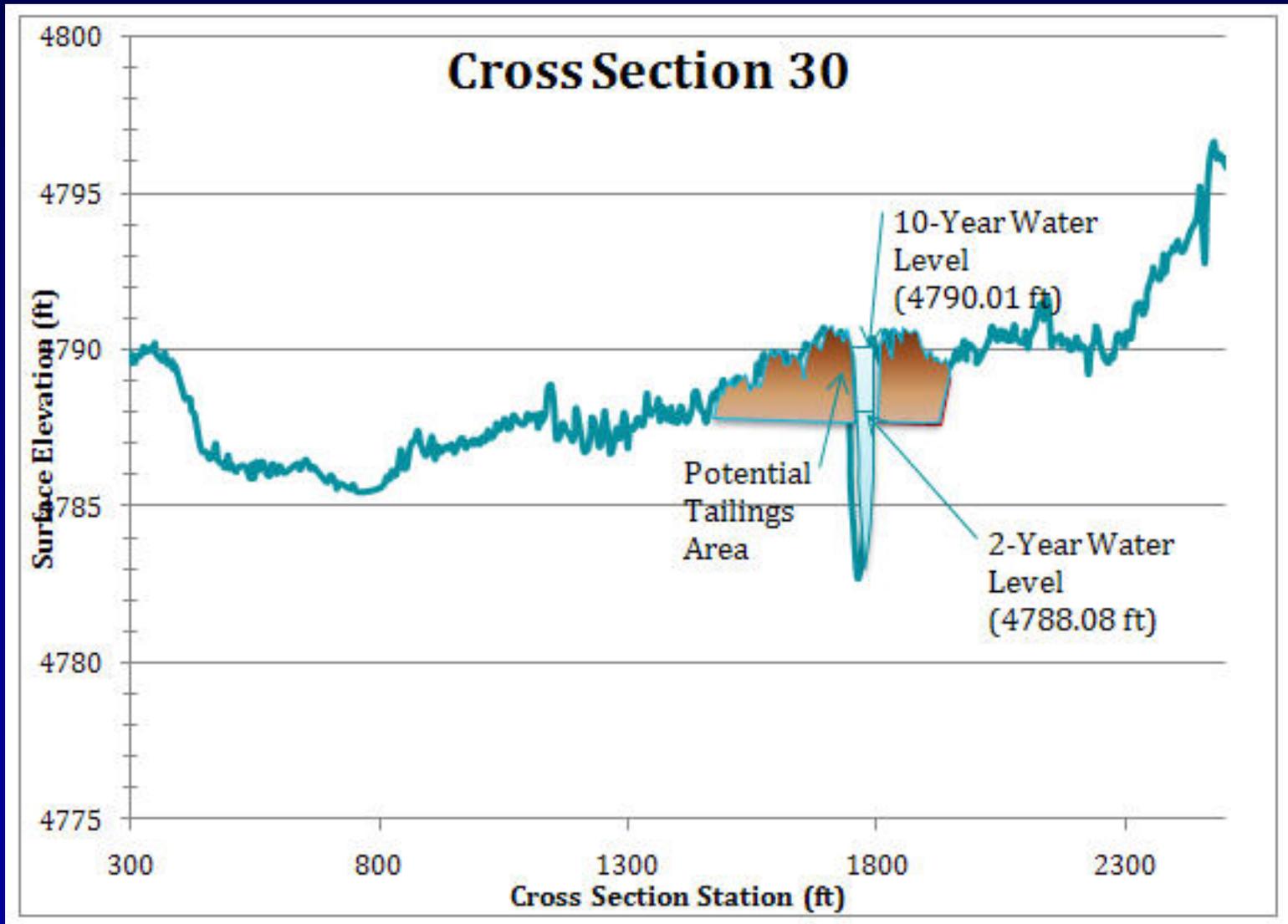


# Effects of Warm Spring Ponds

- 2,400 acres of ponds
- Significant reductions in flood flows – reduces flood peaks
- Reduction of sediment loading to the Clark Fork River



# Geomorphology



# Clark Fork River 10-year Flood Inundation Map Phase 1

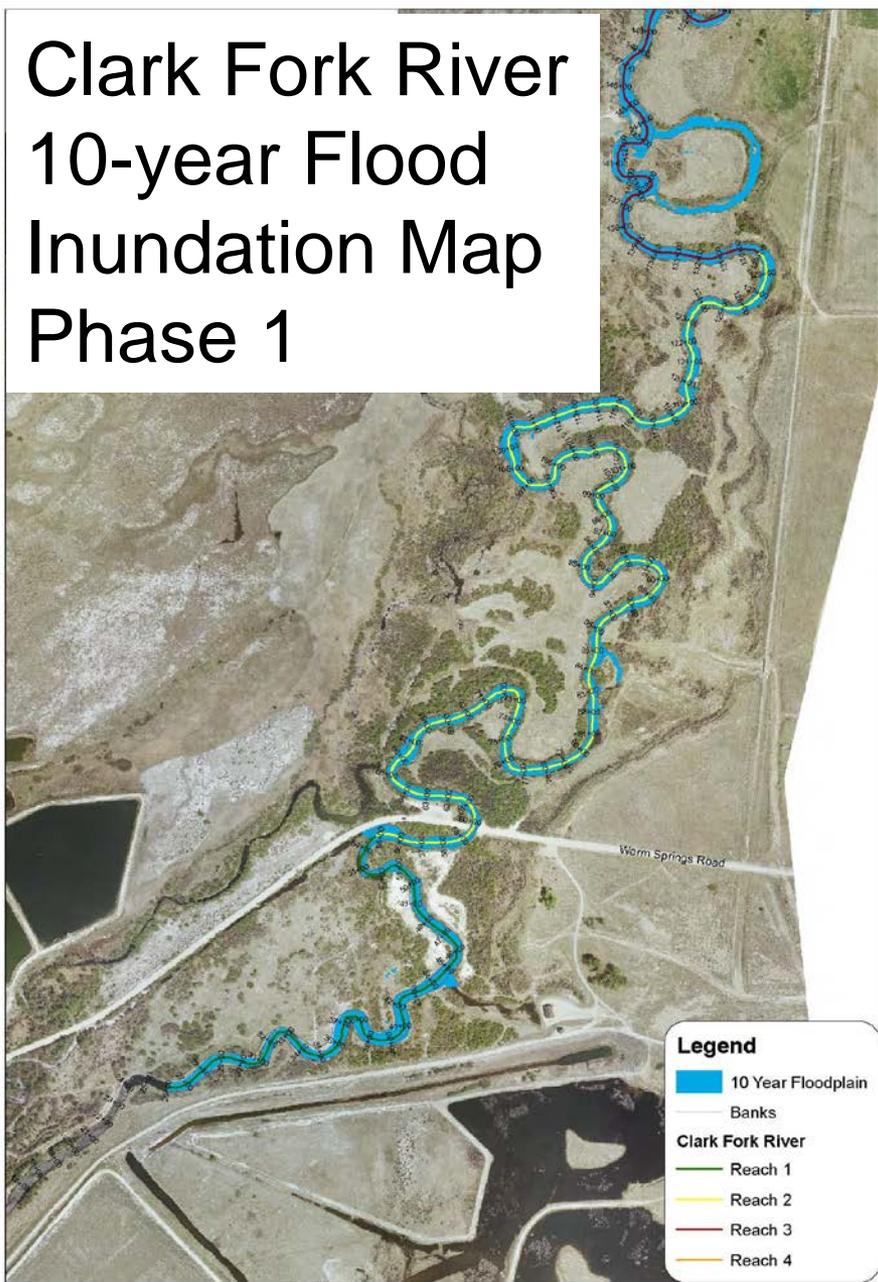


Figure D-1  
Plate 1

Scale of Feet  
0 187.5 375 750 1,125 1,500  
1 in = 400 feet

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# Clark Fork River 100-year Flood Inundation Map Phase 1

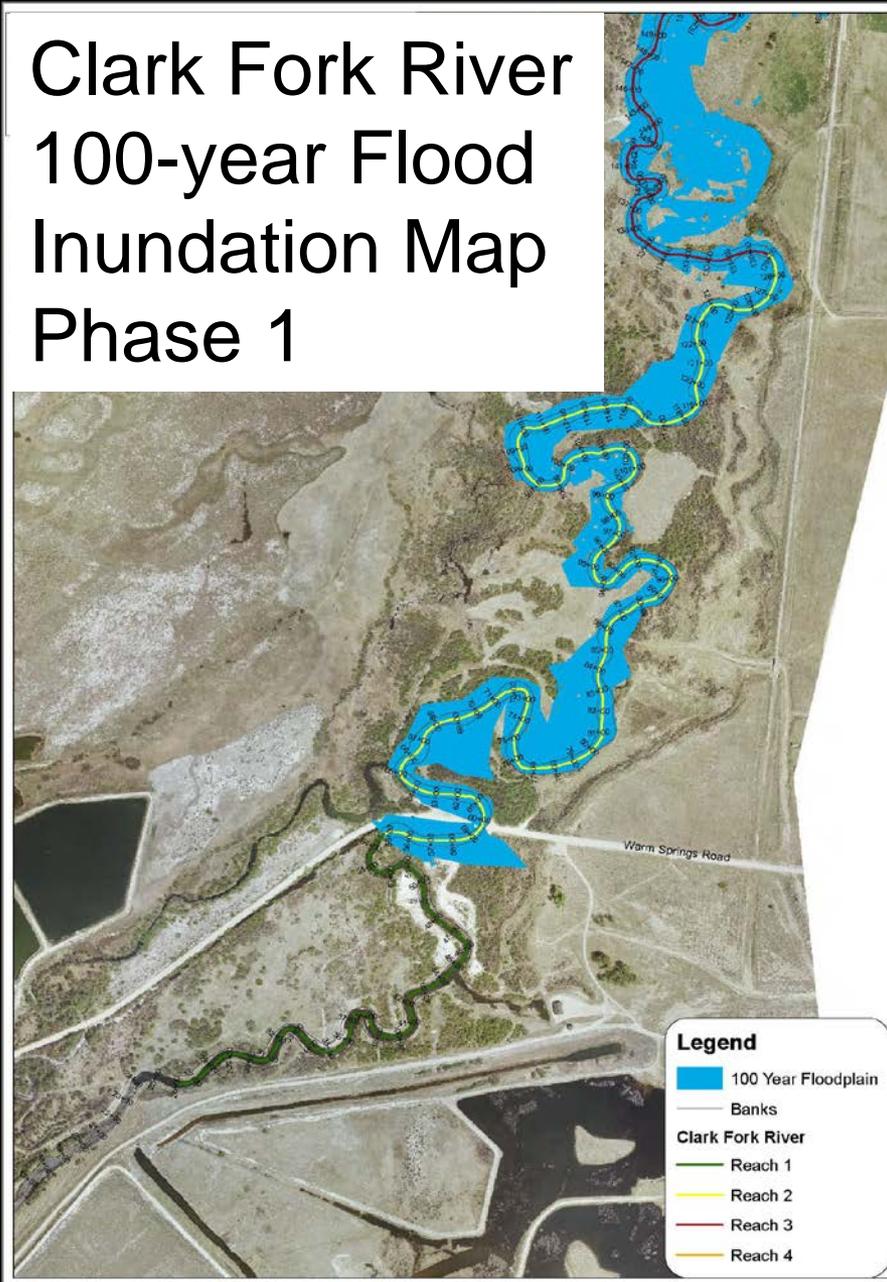


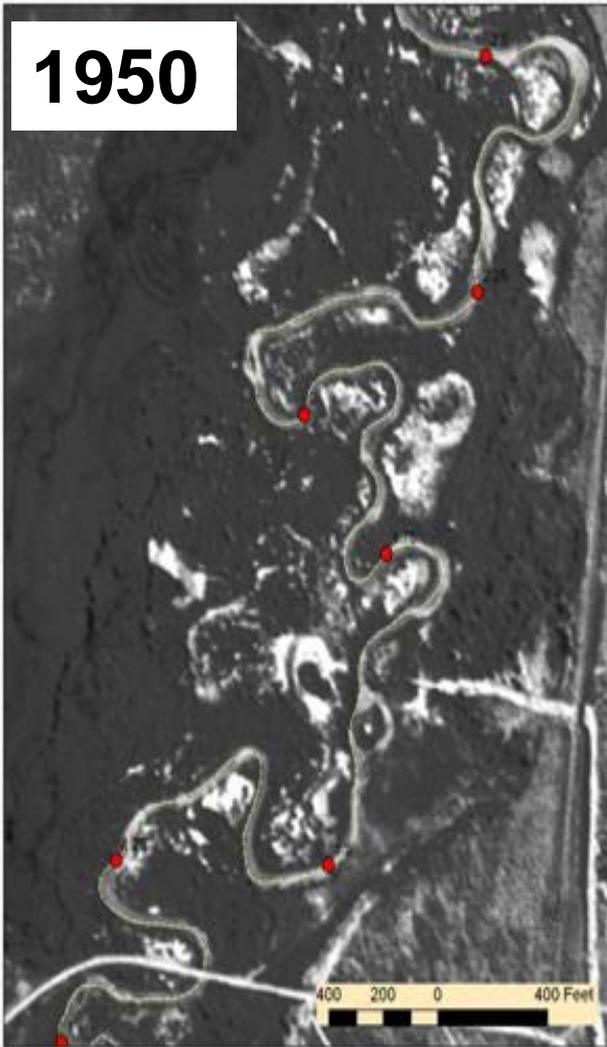
Figure D-2  
Plate 1

Scale of Feet  
0 187.5 375 750 1,125 1,500  
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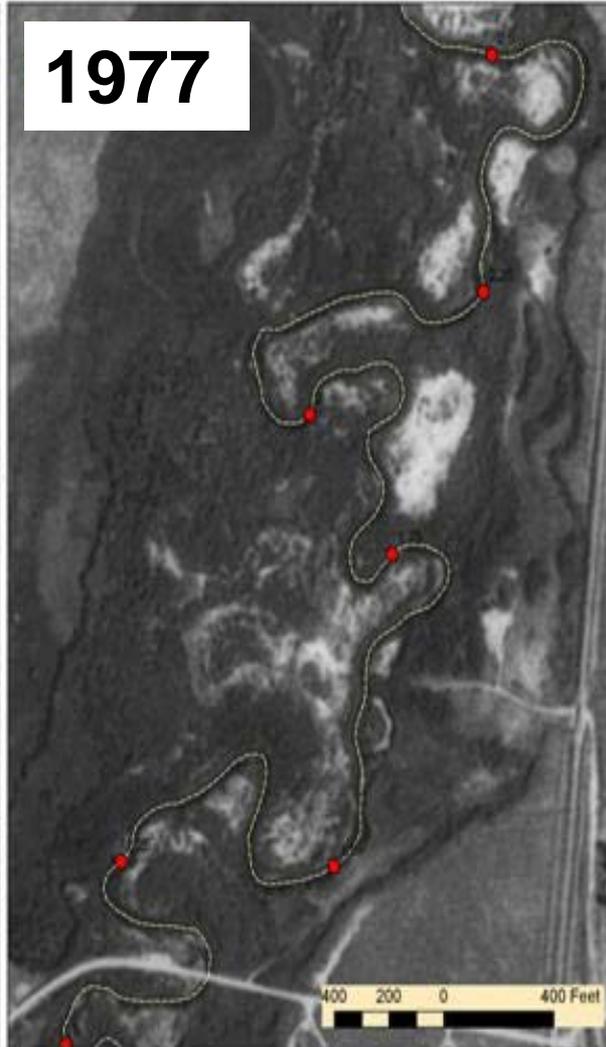
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# Geomorphology

1950



1977



2006



# Design Constraints

We are **NOT**:

- Removing all contamination from the floodplain
- Removing streambed sediment
- Altering the plan form of the River



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# Design Constraints

We **are**:

- Removing the worst of the contamination
- Lowering the floodplain
- Using bioengineered streambank treatment and native vegetation



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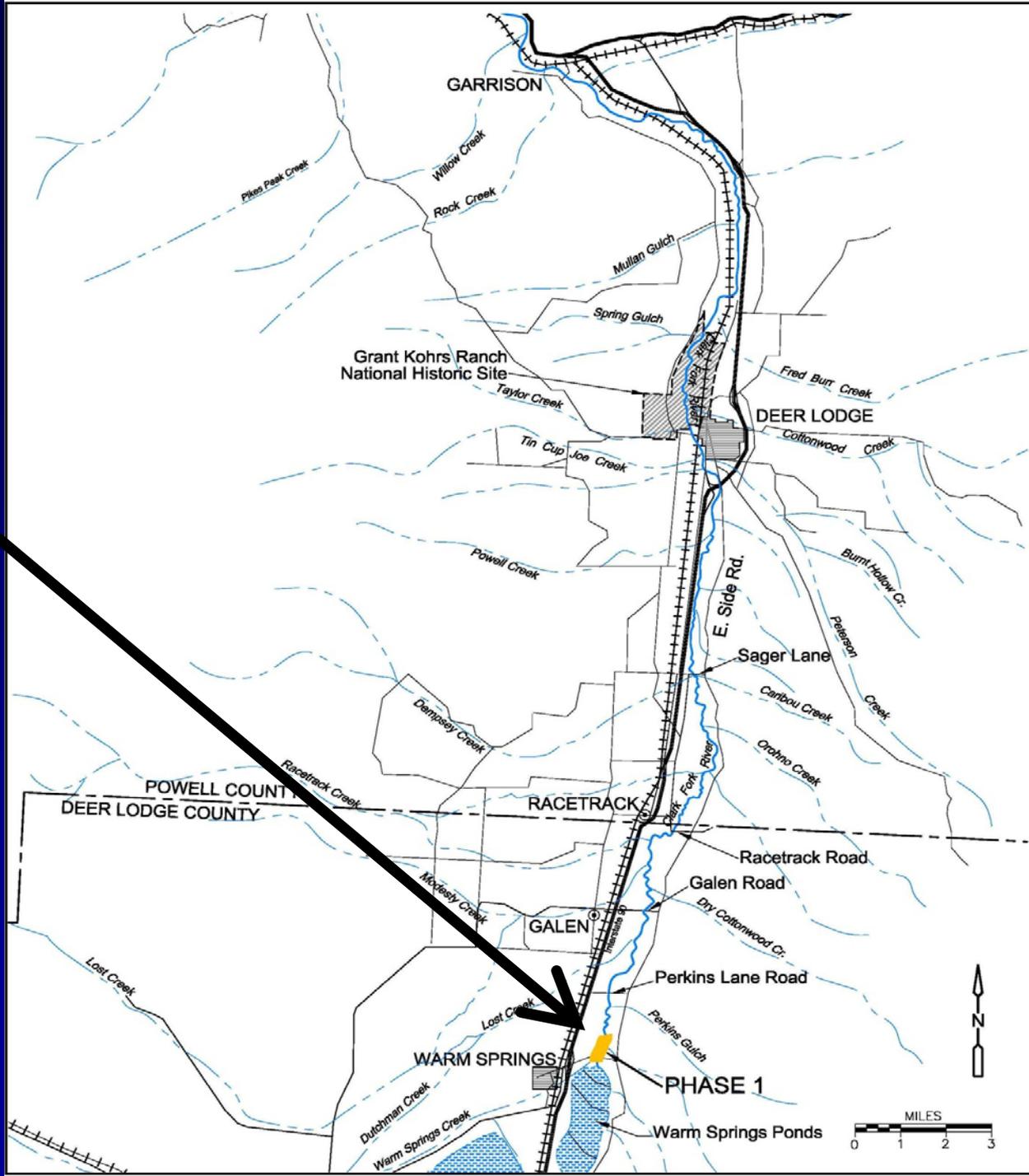
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# Phase 1 Project Site



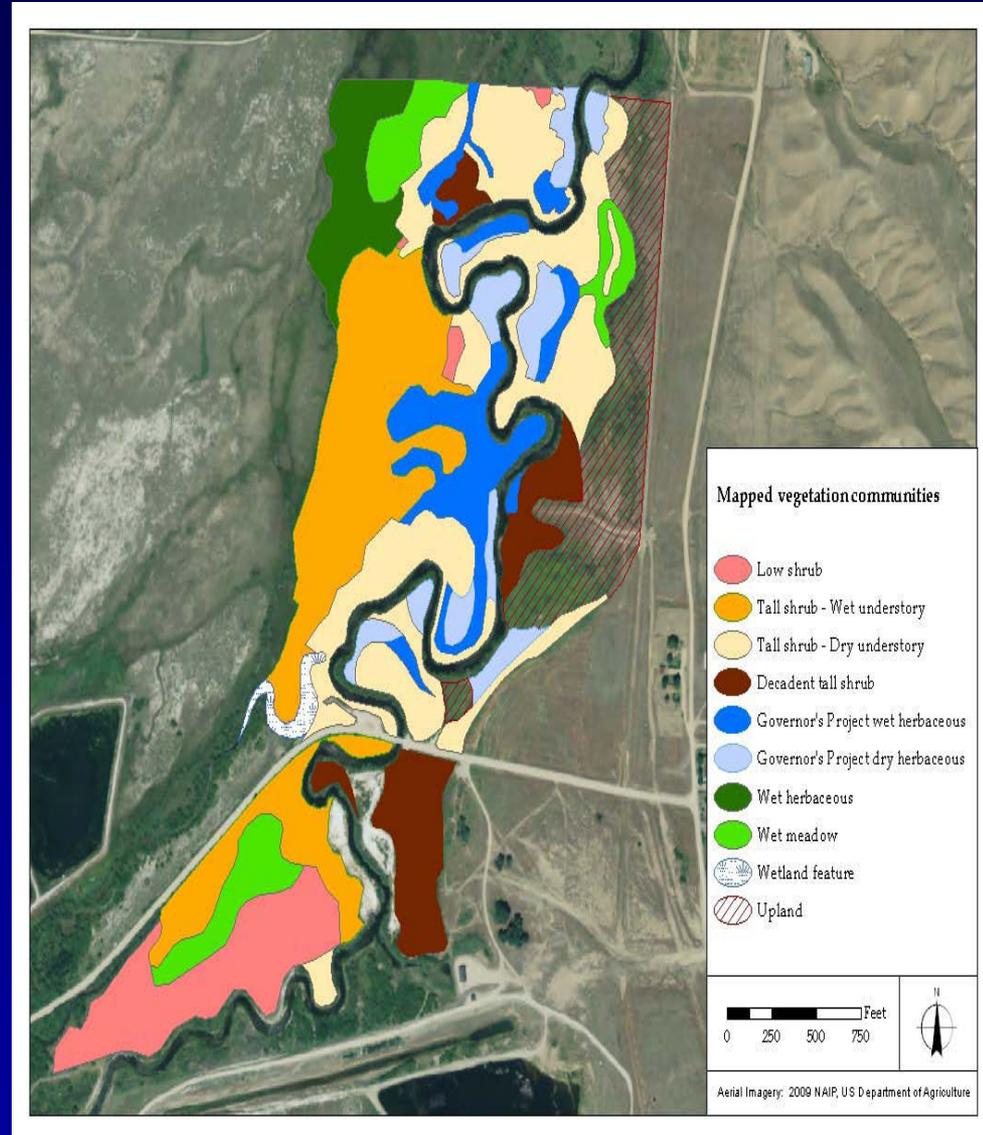
# Design Approach

- **Sample for contamination**
- Map existing vegetation
- Evaluate floodplain connectivity
- Calculate the Channel Migration Zone (CMZ)
- Determine a removal boundary
- Determine post remediation vegetation cover types
- Assign streambank treatments



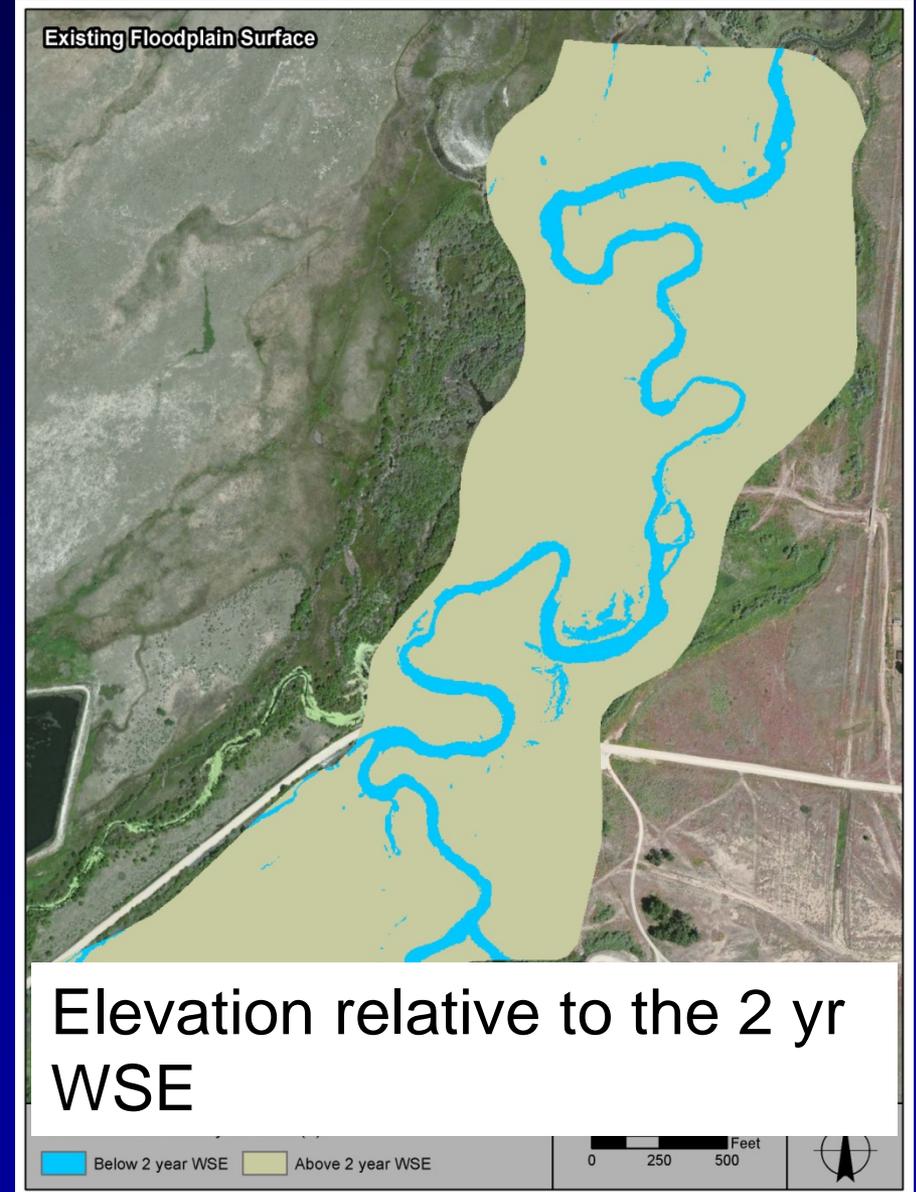
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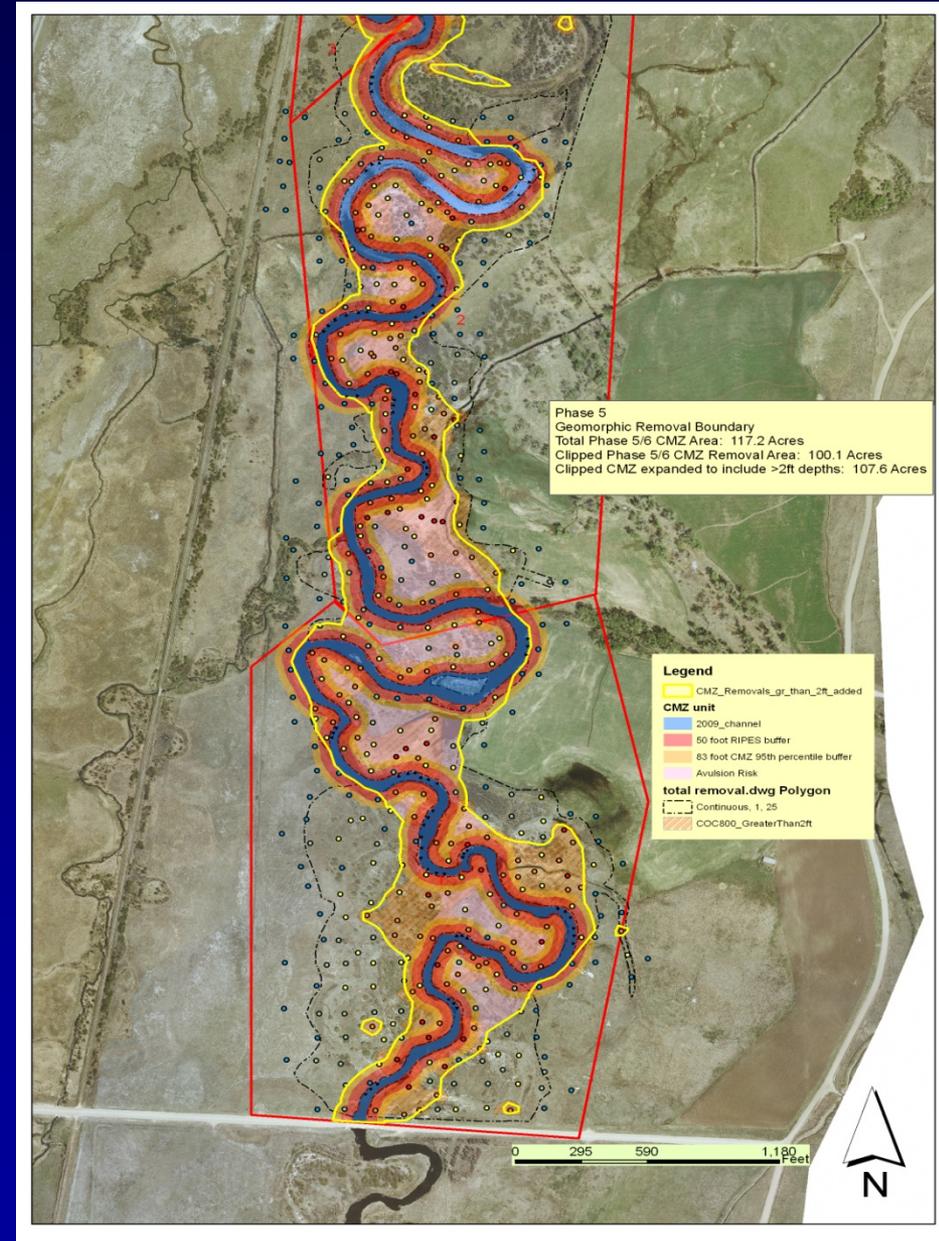
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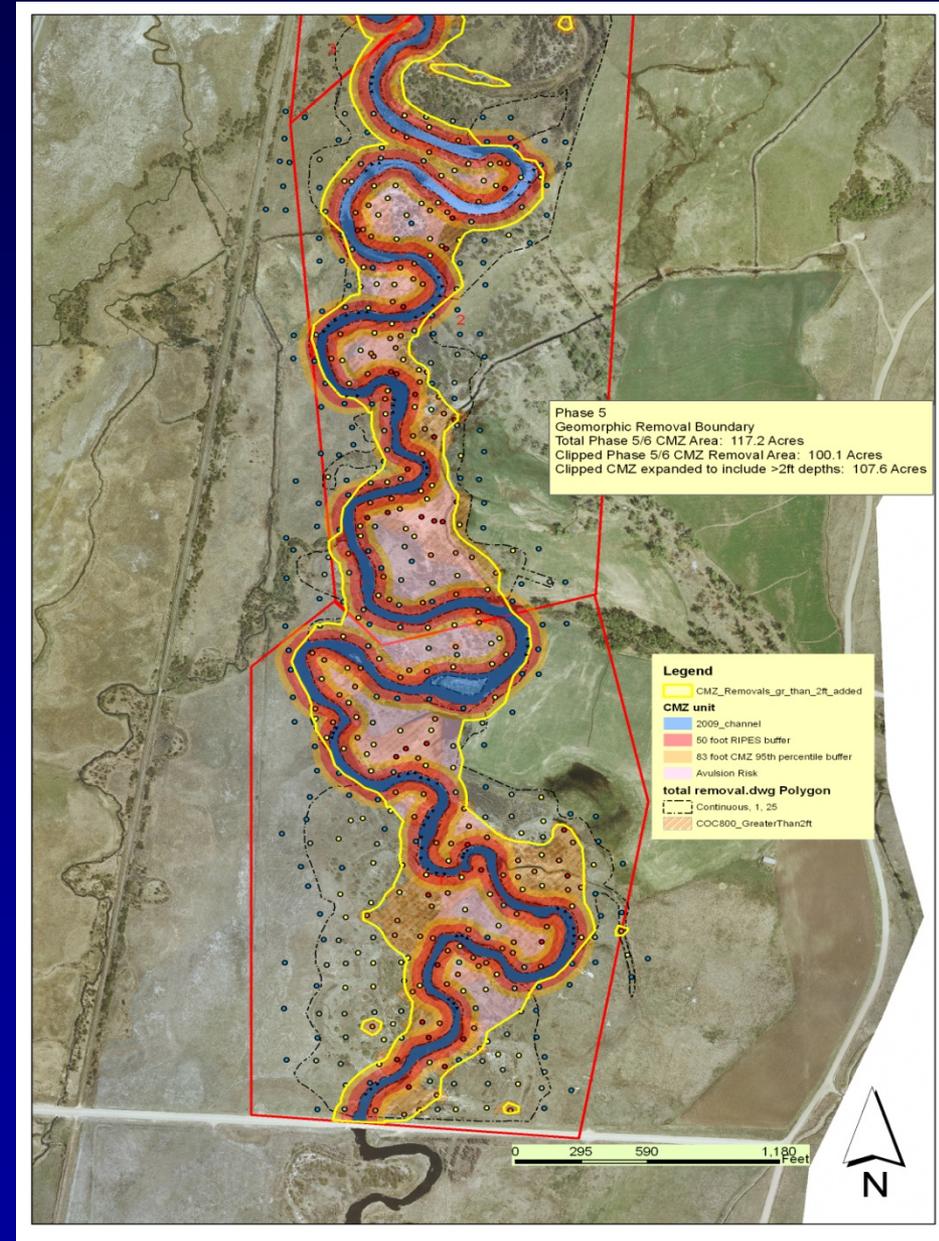
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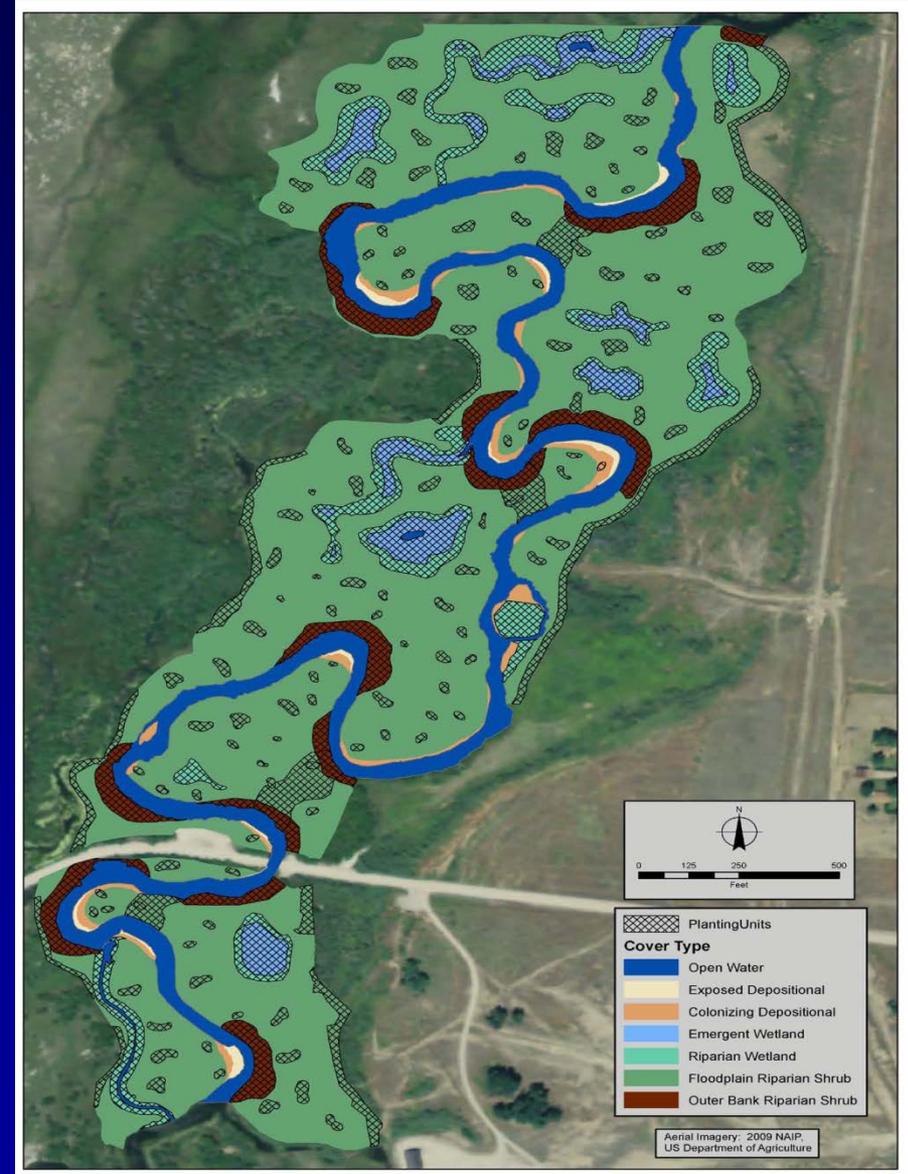
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- Determine a removal boundary
- Determine post remediation vegetation cover types
- **Assign streambank treatments**



# Reach A, Phase 1 Design

- 330,000 cubic yards of removal
- 188,900 cubic yards of backfill (alluvium and vegetative)
- 11,278 linear feet of various streambank treatments
- Microtopography
- 129,405 containerized plants and seeding
- Contract Price = \$5.6 Million

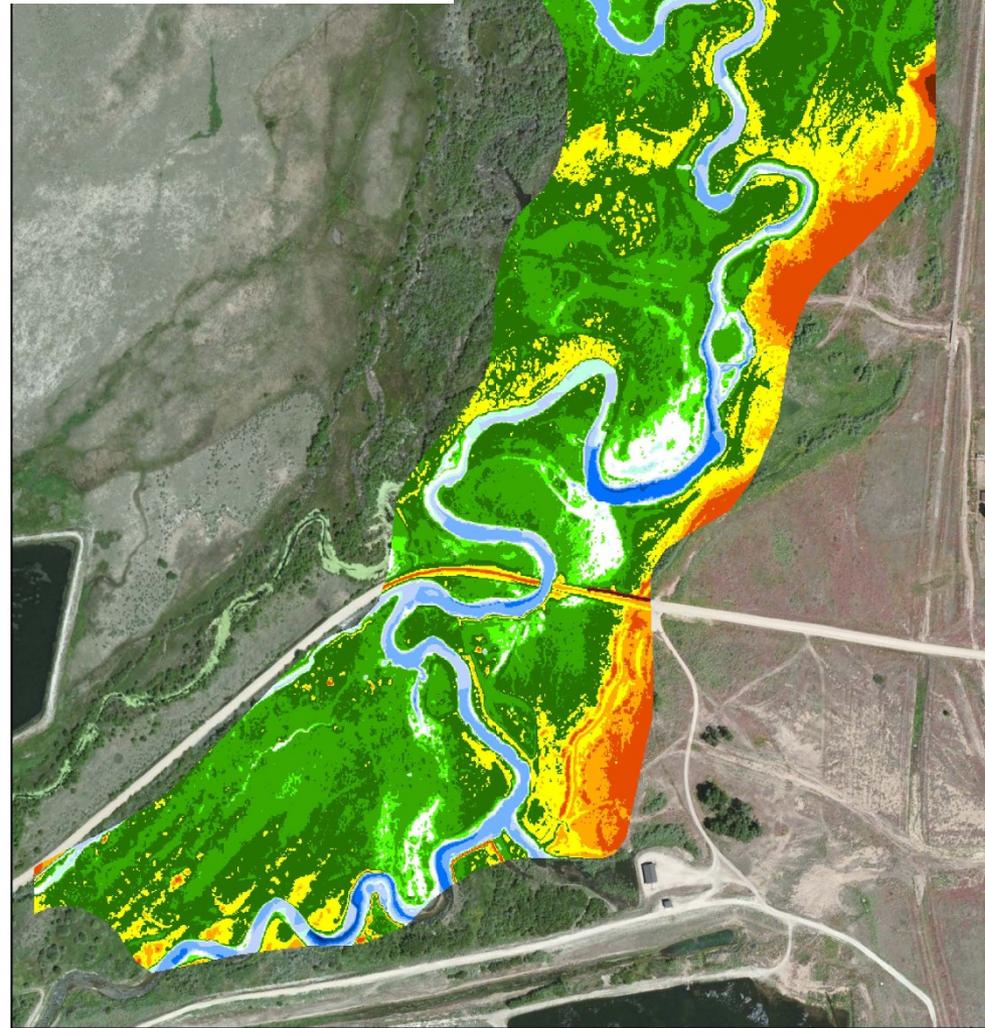


# Reach A Phase 1 Removal Area

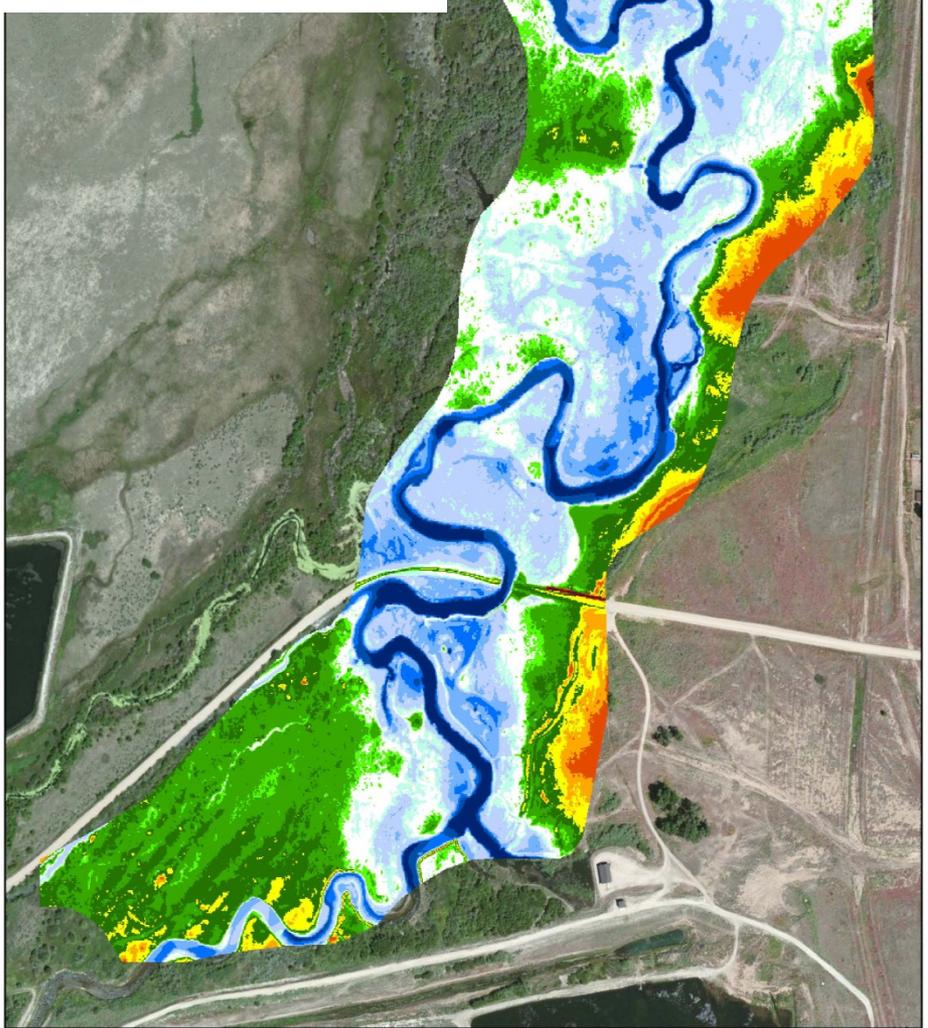
56 acres of removal



# Existing Floodplain Surface



# Design Floodplain Surface

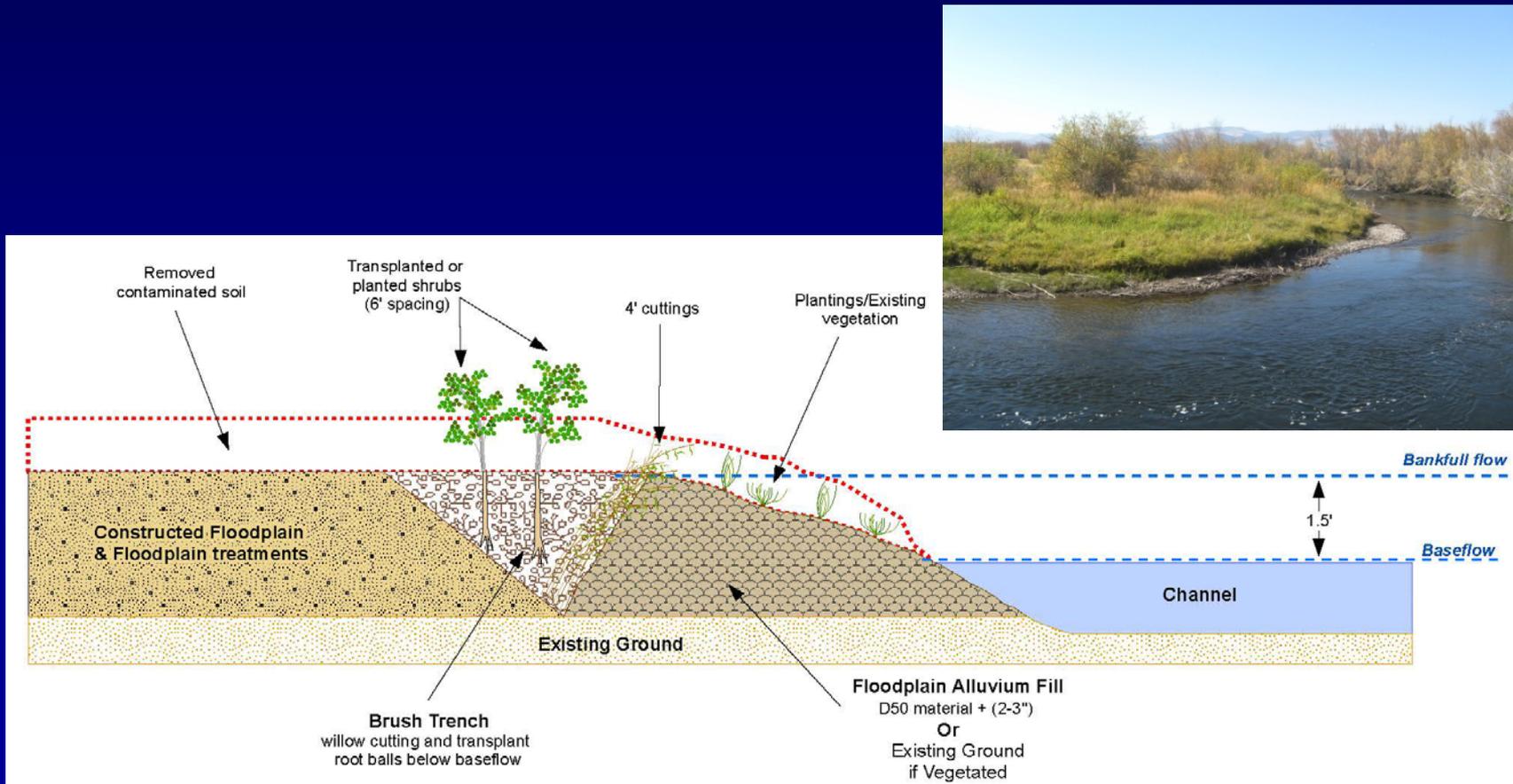


aminants



# Streambank Design

## Type 1 Bank Treatment – Brush Trench

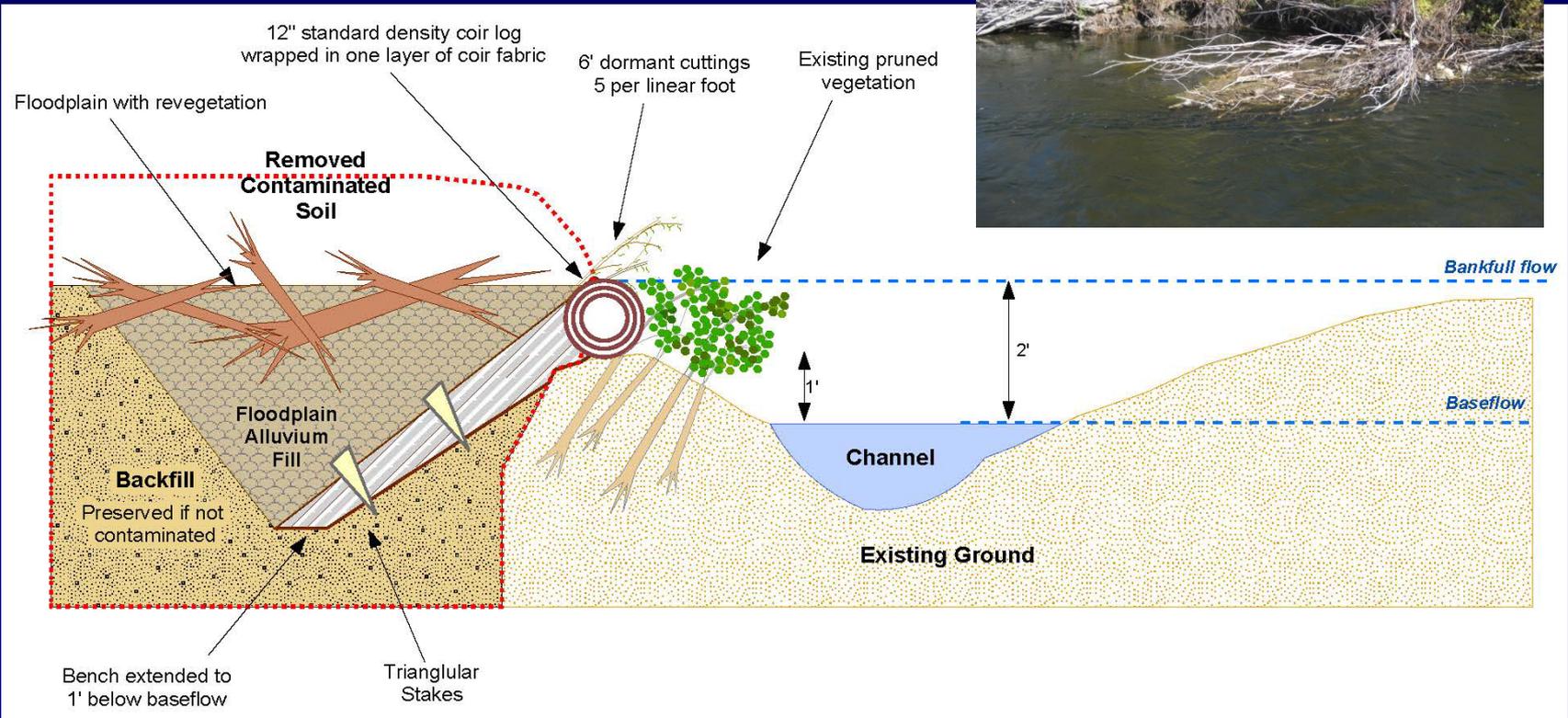


# Brush Trench



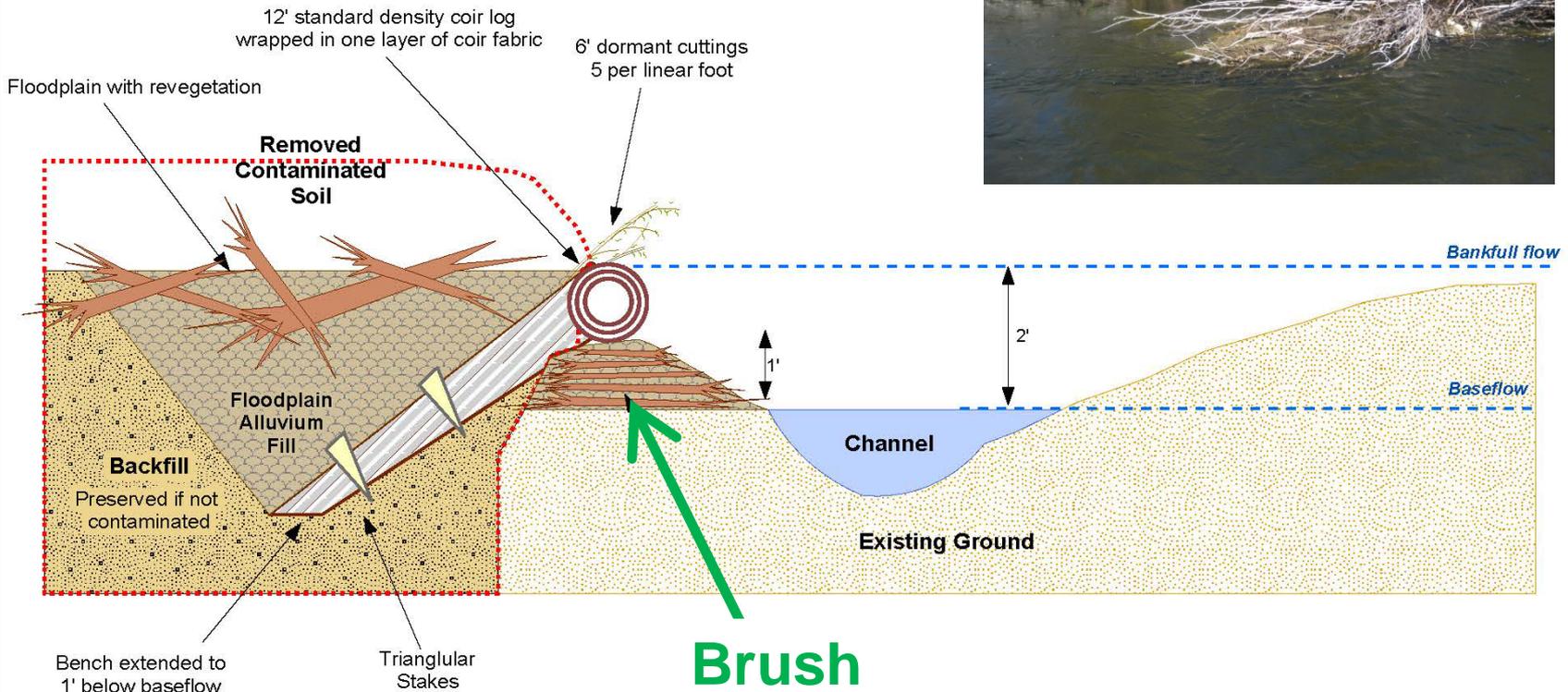
# Streambank Design

## Type 2 Bank Treatment Single Vegetated Soil Lift



# Streambank Design

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

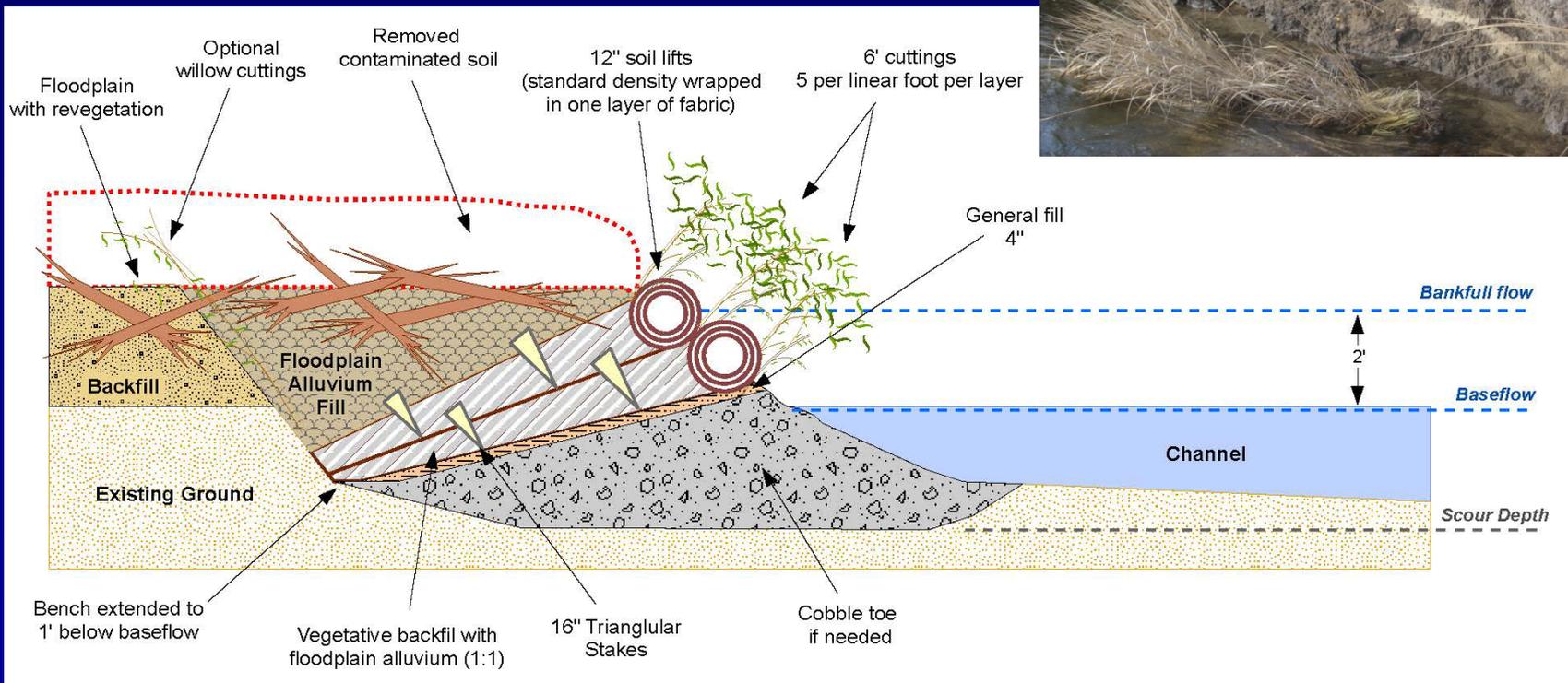


# Single Vegetated Soil Lift



# Streambank Design

## Type 3 Bank Treatment Double Vegetated Soil Lift



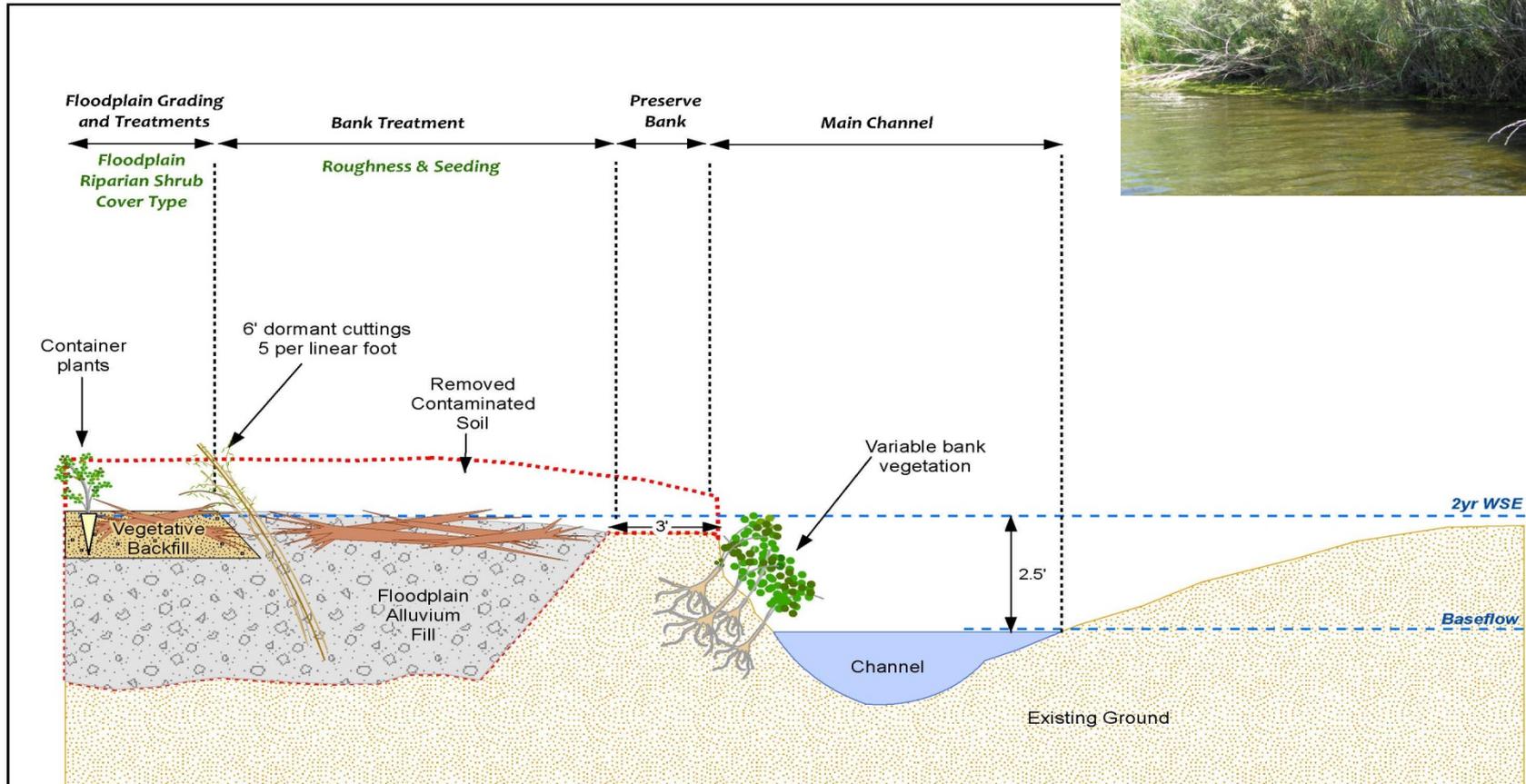
# Double Vegetated Soil Lift



# Streambank Design

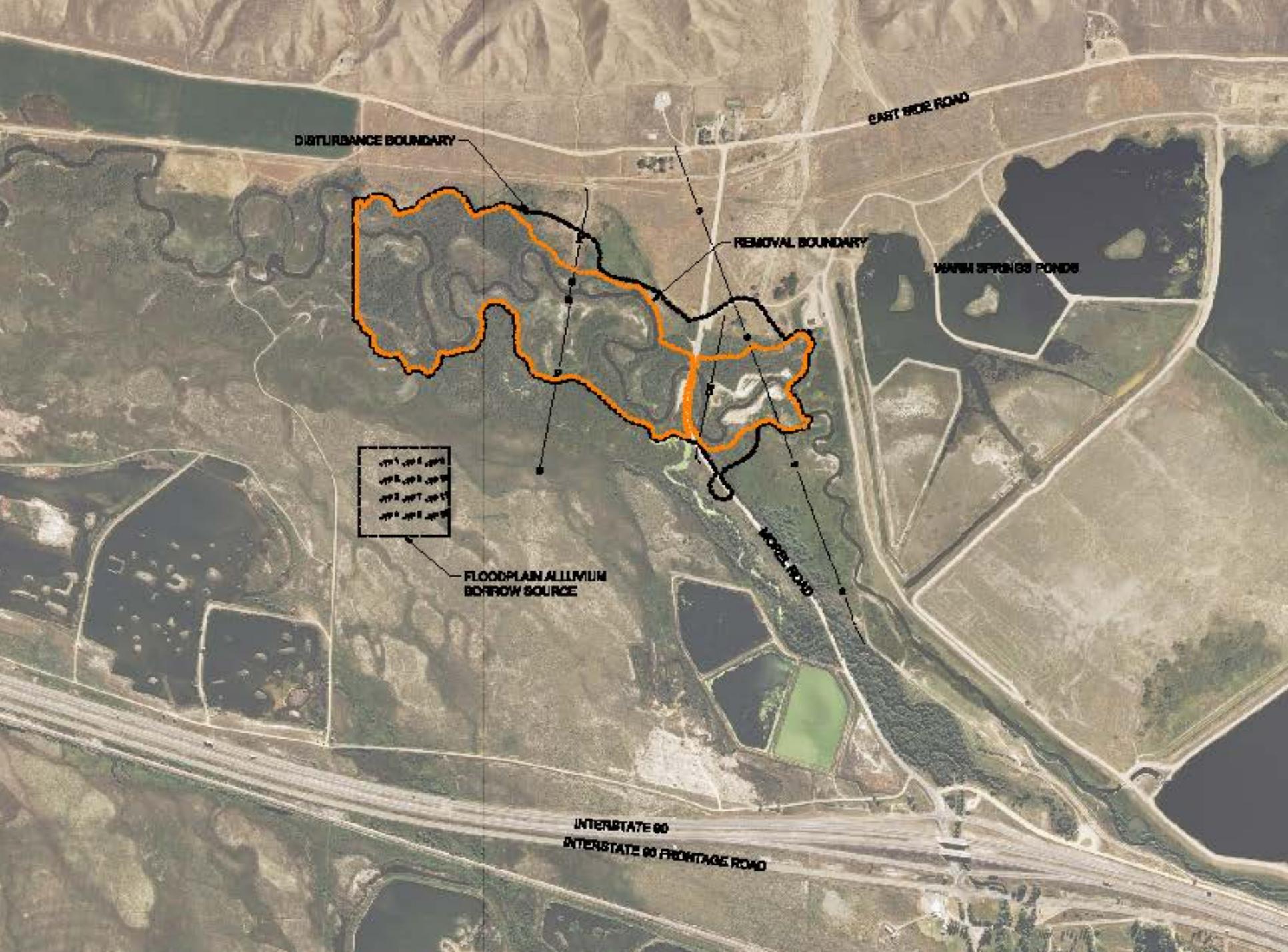
## Type 2 Modified Preserve Vegetation

Backfill bank (Phase 1 Type 2 modified bank treatment)



# Preserve Vegetation





DISTURBANCE BOUNDARY

EAST BIDE ROAD

REMOVAL BOUNDARY

WARM SPRINGS PONDS

✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓

FLOODPLAIN ALLUVIUM BORROW SOURCE

MOORE ROAD

INTERSTATE 90  
INTERSTATE 90 FRONTAGE ROAD

# Monitoring

- Construction
- Effectiveness
- Long-term



# Construction Monitoring

- Purpose: to evaluate the effectiveness of BMPs, Construction Techniques and impacts from Construction
- Upstream and downstream sediment monitoring
- Increase of  $>10$  NTUs  Expanded Monitoring
- Expanded Monitoring
  - Upstream and down stream total and dissolved metals
- As-built surveys

# Effectiveness Monitoring

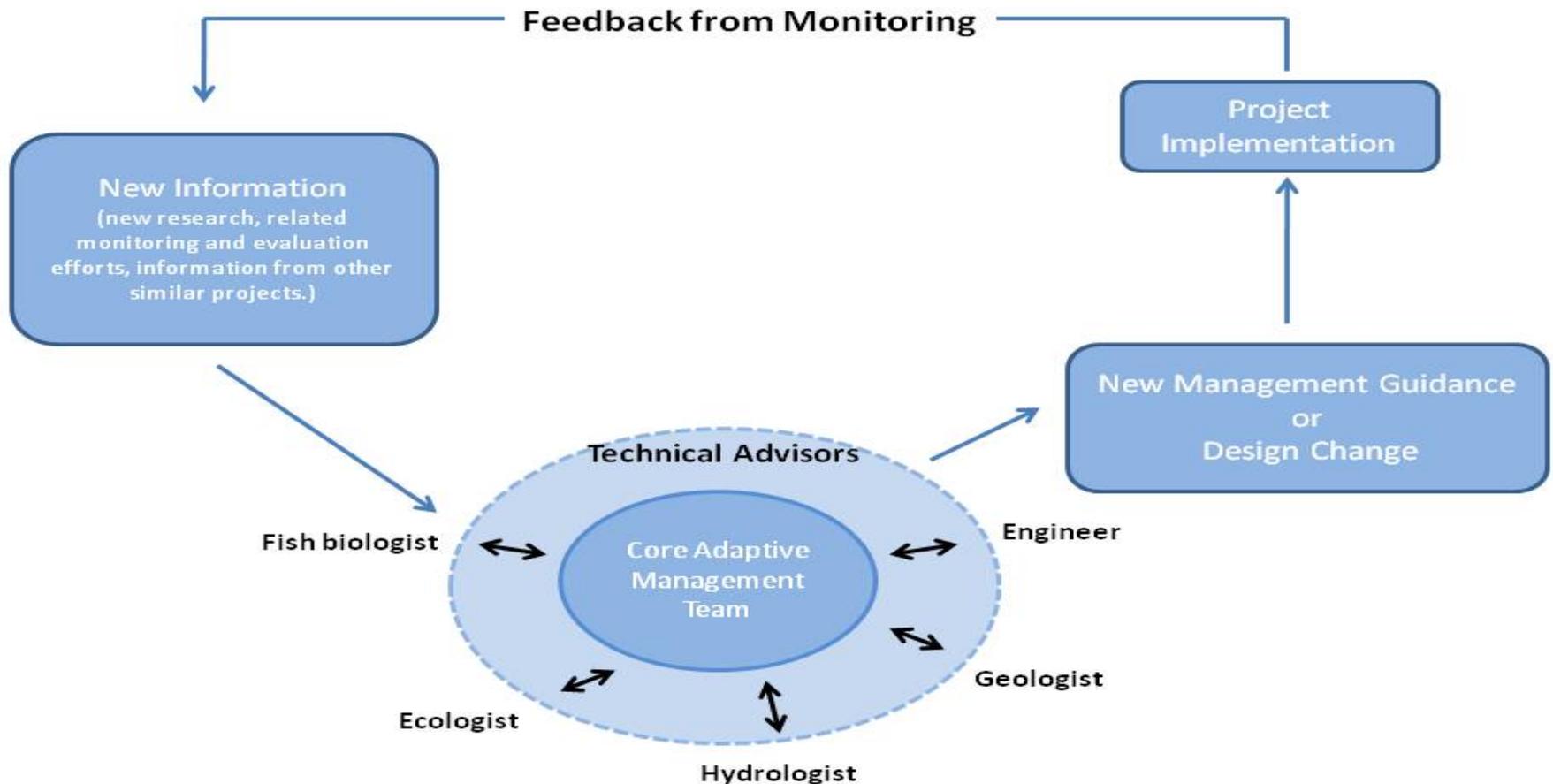
- Purpose: to evaluate the progress toward achieving project goals and objectives
- 0 – 15 years
- Geomorphology and vegetation targets

# Long-term Monitoring (30+ yrs)

- Superfund Performance Standards
  - Surface water, Groundwater, Vegetation
- Others
  - Streambed sediments, Macroinvertebrates, periphyton, nutrients, fish populations



# Adaptive Management



Questions?

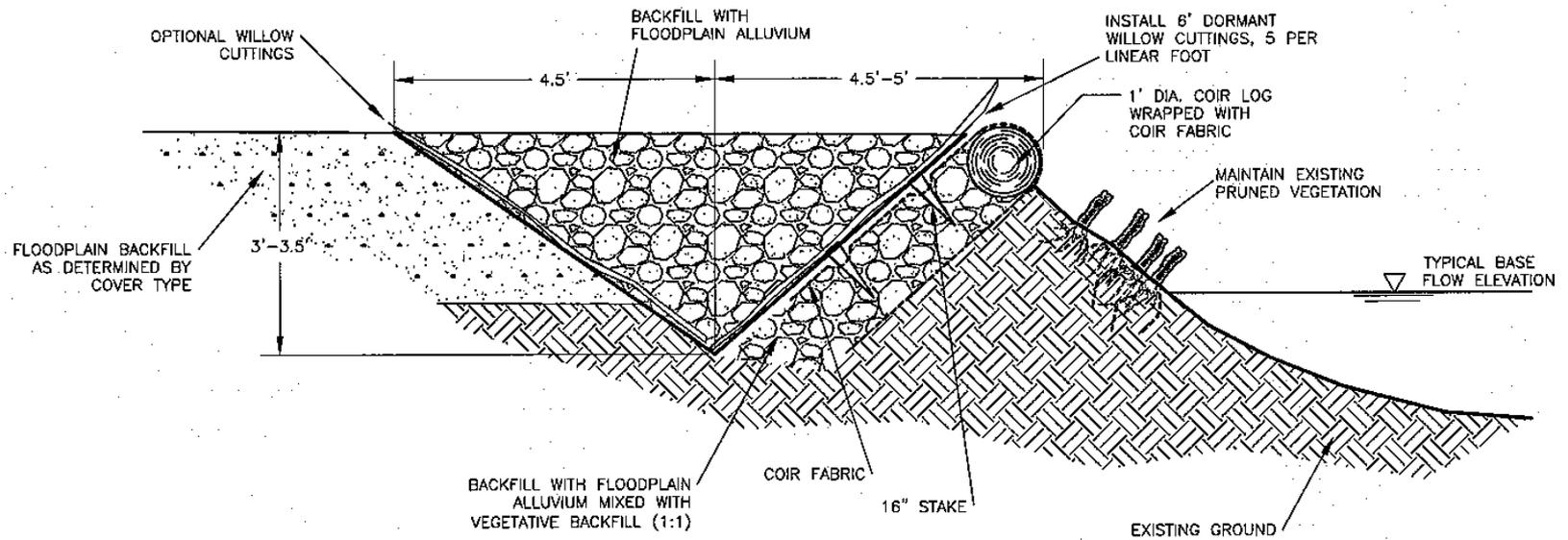


# Stream Bank Pilot Project

## Two Types of Bank Treatments

- Type 2 Treatment
- Type 2 Modified – Preserve Vegetation
- Goals:
  - Test the constructability of the streambanks
  - Make modification to the streambank designs (if necessary)
  - Better write up of the specifications for the streambanks
  - Better determine areas that are applicable to either type
  - Determine Short-term success

# Type 2 Bank Treatment



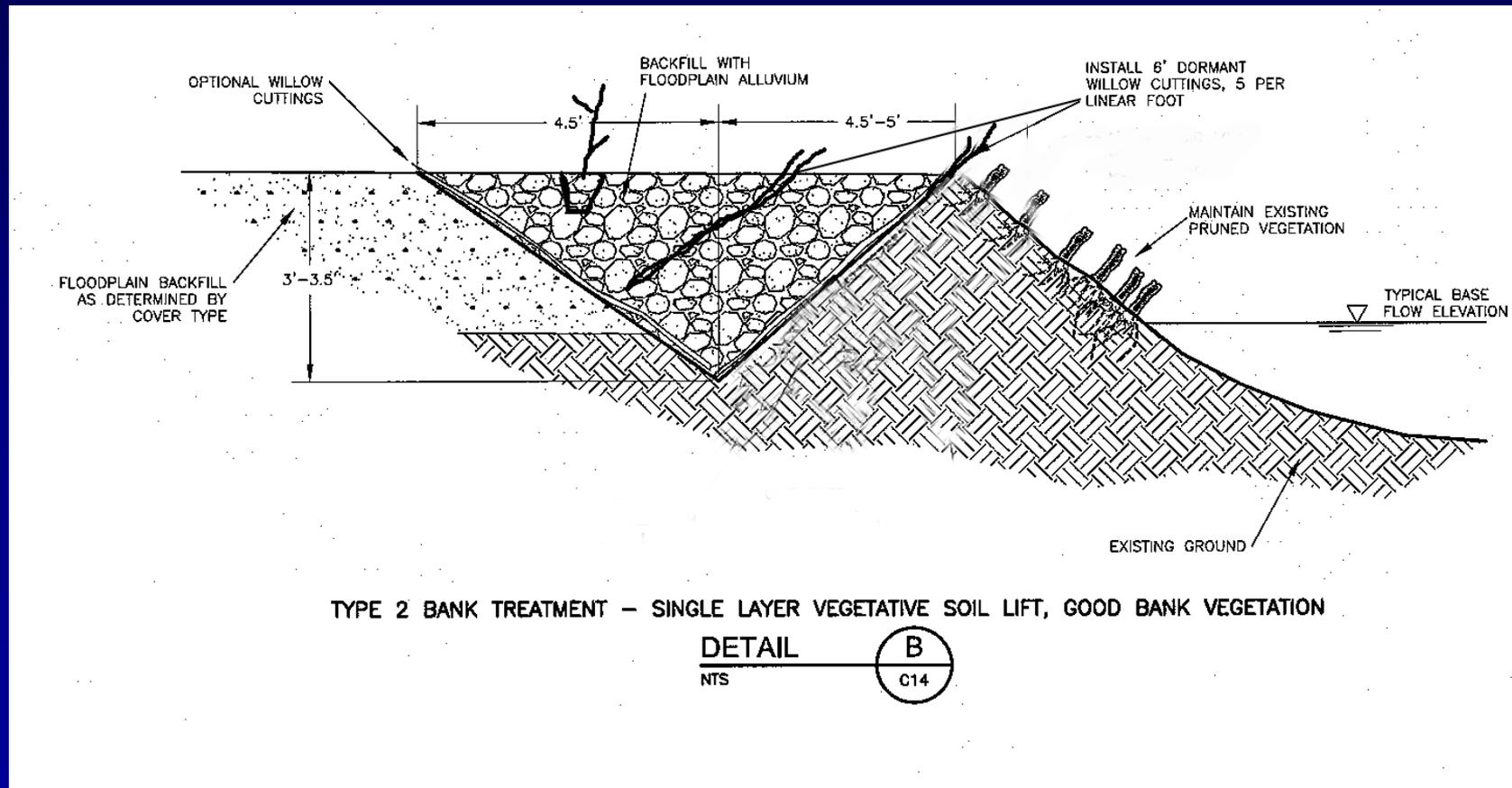
TYPE 2 BANK TREATMENT - SINGLE LAYER VEGETATIVE SOIL LIFT, GOOD BANK VEGETATION

DETAIL

NTS



# Type 2 Modified – Preserve Vegetation



# Type 2 Bank Treatment Contamination Removal Complete



# Type 2 Bank Treatment Single Lift Construction



# Type 2 Bank Treatment Staking Coir Fabric



# Type 2 Bank Treatment First Willow Cuttings in Place



# Type 2 Bank Treatment Willows Capped with Topsoil



# Type 2 Bank Treatment

## Second row of Willows and Plants



# Type 2 Bank Treatment Limited Browse Protection



# Type 2 Modified – Preserve Vegetation Contamination Removed



# Type 2 Modified – Preserve Vegetation Willow Cuttings



# Type 2 Modified – Preserve Vegetation Backfill Topsoil



# Type 2 Modified – Preserve Vegetation Limited Browse Protection



# Type 2 Bank Treatment

## June 2012



# Type 2 Bank Treatment

## June 2012



# Type 2 Bank Treatment September 2012



# Type 2 Modified – Preserve Vegetation June 2012



# Type 2 Modified – Preserve Vegetation June 2012



# Type 2 Modified – Preserve Vegetation September 2012



# 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, but needs to be trimmed
- Browse from beaver and deer was significant and we need to install browse protection and/or fencing
- Turbidity monitoring during construction showed very little increase in turbidity (sediment loading)