McCORMICK TAYLOR

Headwater Stream Restoration Goals and Practices

National Stream Restoration Conference

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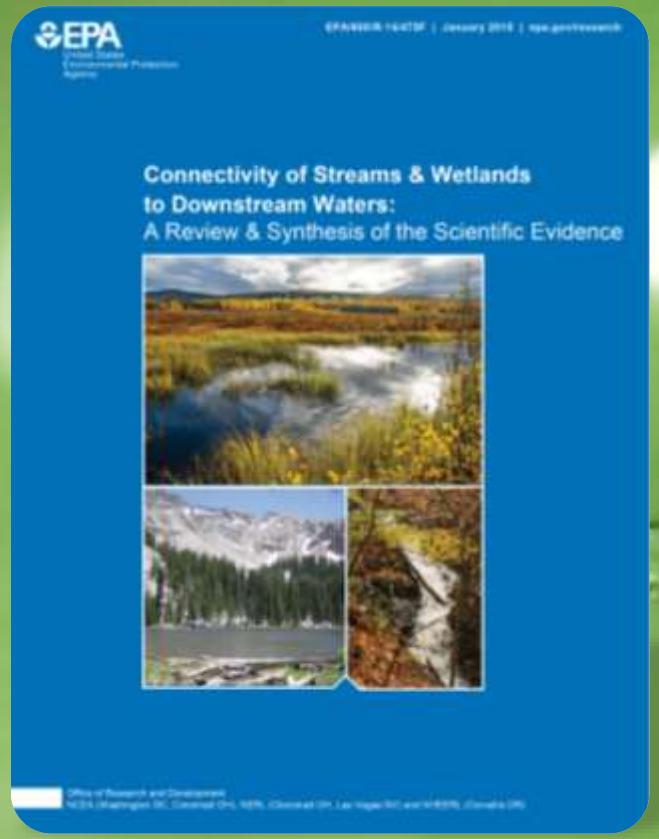
Benefits of Headwater Stream Connectivity

Effective in protecting downstream water quality

- Carbon source
- Filter pollutants
- Increase groundwater recharge
- Reduce flooding
- Biological habitat for aquatic organisms, plants, amphibians, fish and invertebrates
- Food source for receiving streams



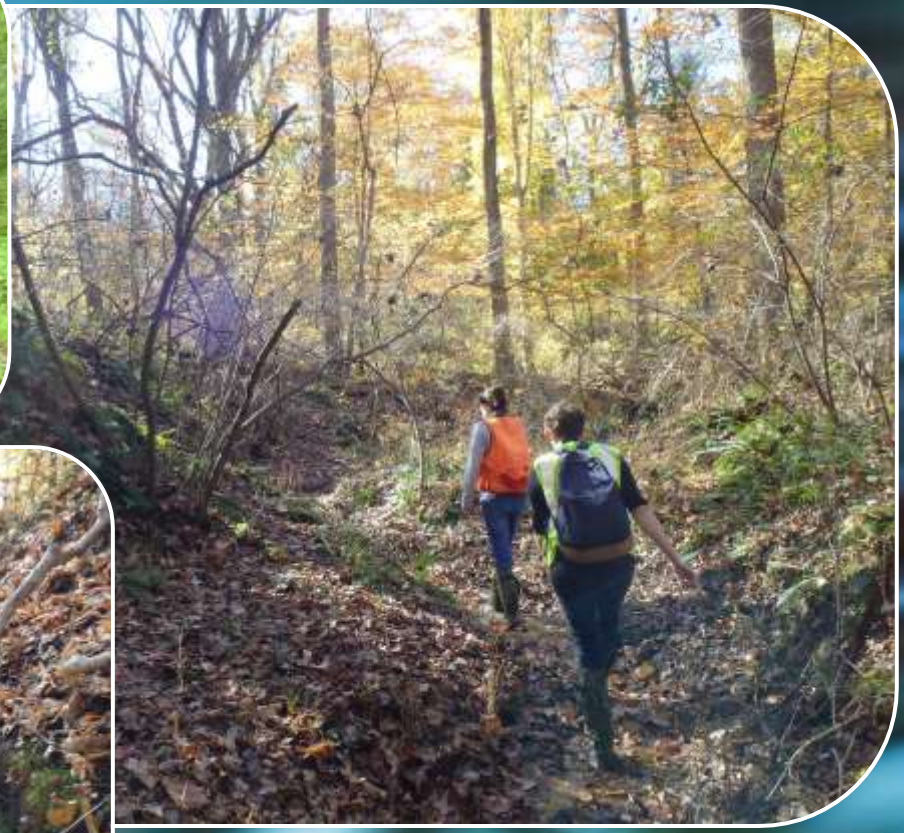
Case Study Methodology… Back to the Beginning

Project assessment followed guidance (Klingeman, 1998) that suggests a framework for understanding current impairments including:

- the system today
- the system in the past
- changes that have occurred
- assumptions about causes for changes
- projections of future changes if no new interventions occur
- projected future conditions

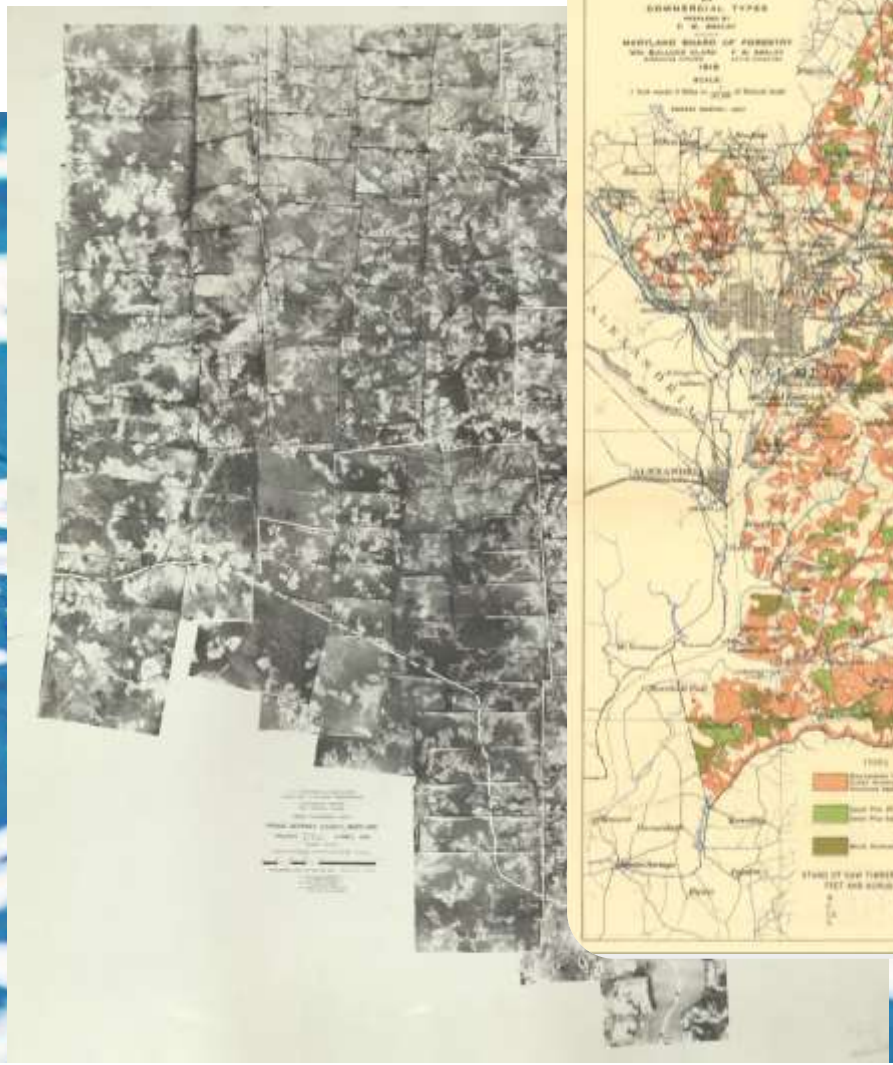
The System Today

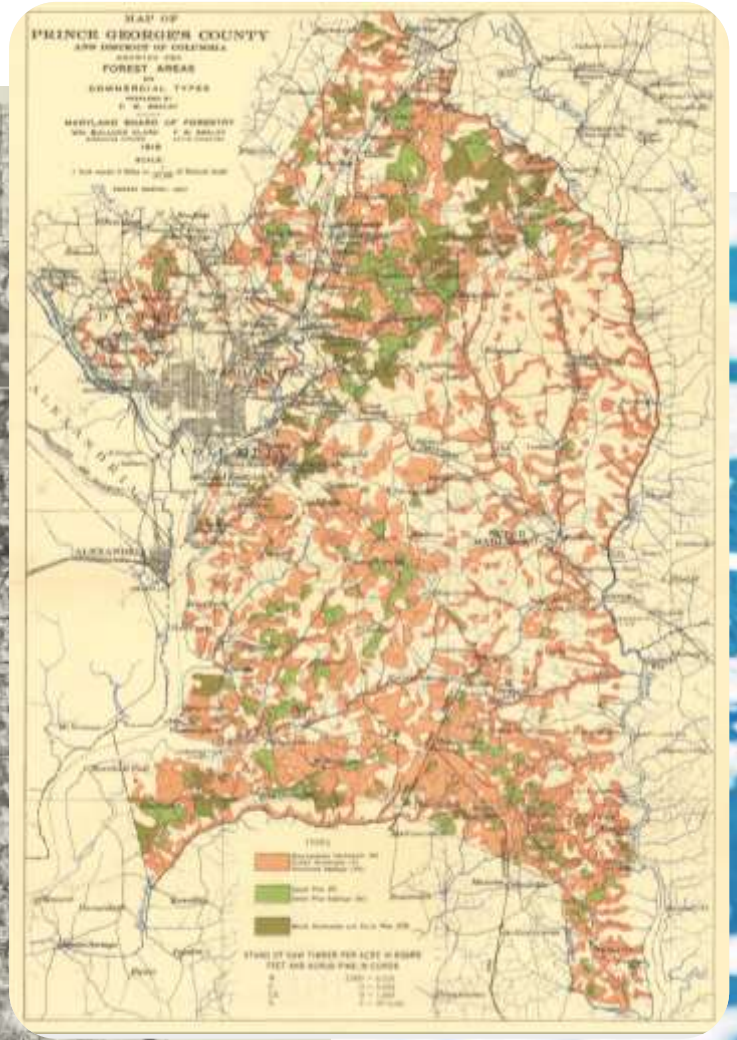
- Desktop Assessment
- Field Assessment
  - Project Reach Cruising
  - Upstream Drainage Network Cruising
  - Detailed Geomorphic Assessment



The System in the Past

- Historic Aerials
- Interviews with historians
- Historic record
- Geology



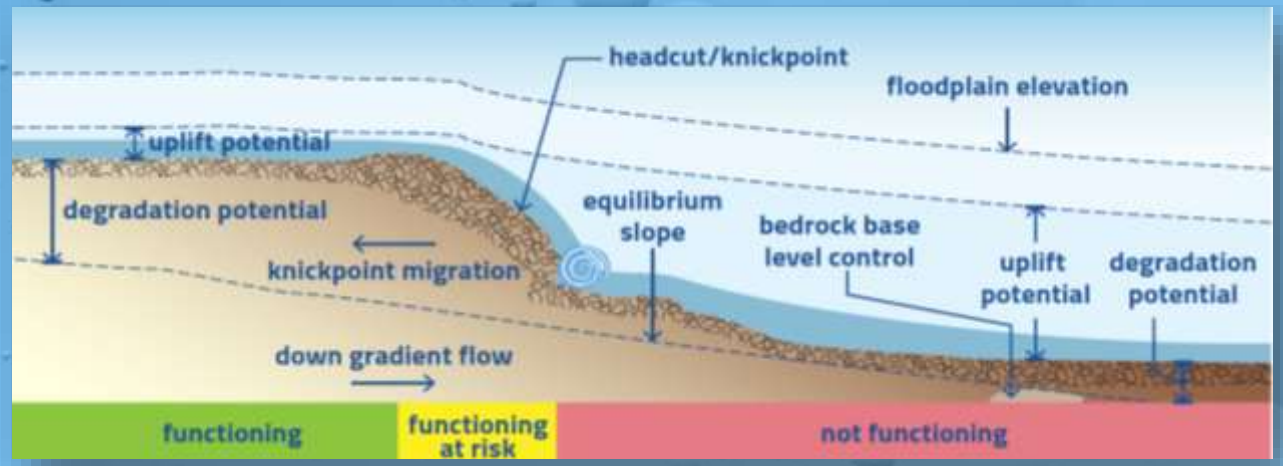


Changes That Have Occurred

- Past agricultural land use
- Roadway construction
- Utility Line Corridor Establishment
- Development Pressures
- Park Creation

Projections of Future Changes

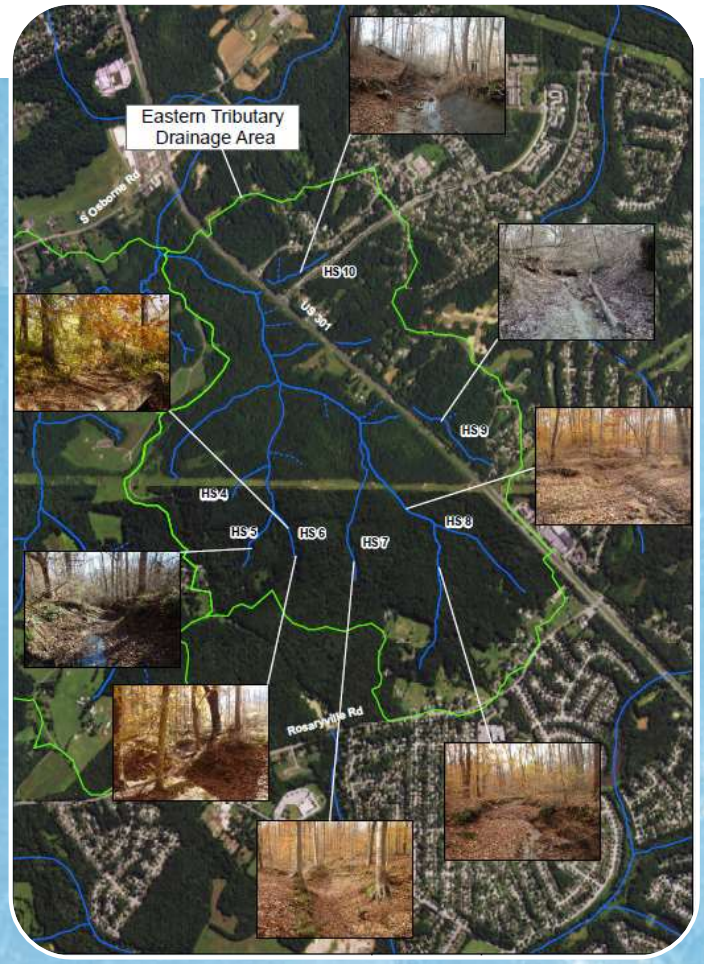
- To intervene or not?
- How bad is it?
- Where do we focus efforts?
- What are the associated risks and impacts?



Questions, Questions, Questions

Headcut erosion may contribute significantly to total erosion and suspended sediment concentrations within study area

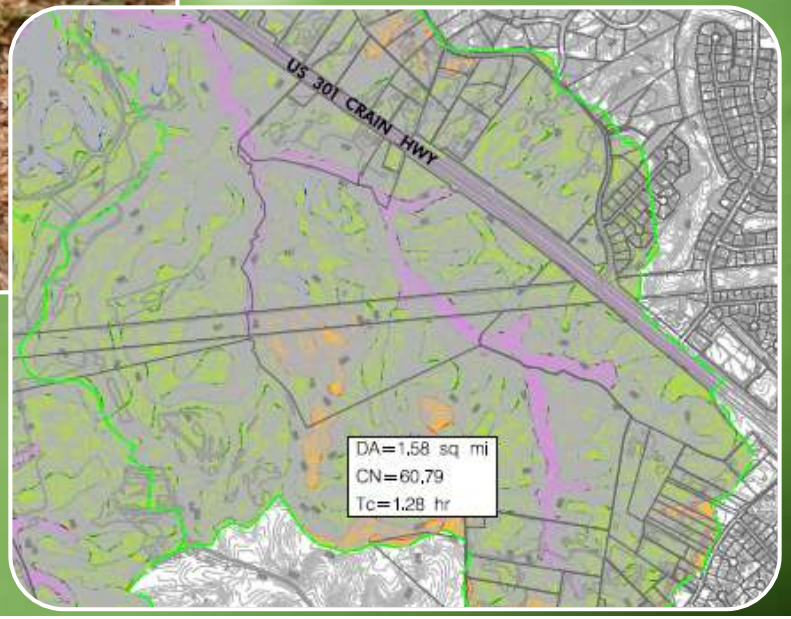
- How fast and how much material is eroding from headcuts today?
- Where are they located within the site limits and in terms of the geomorphic system?
- Were these channels in the past or has the channel network incised into wetlands or uplands?



And More Questions

Watershed soils appear to be highly infiltrative and there is significant forest cover, hydrology does not appear to be flashy

- How much is channel geometry changing over time in non-headcut areas?
- How does the hydrograph today compare to the hydrographs in the past?



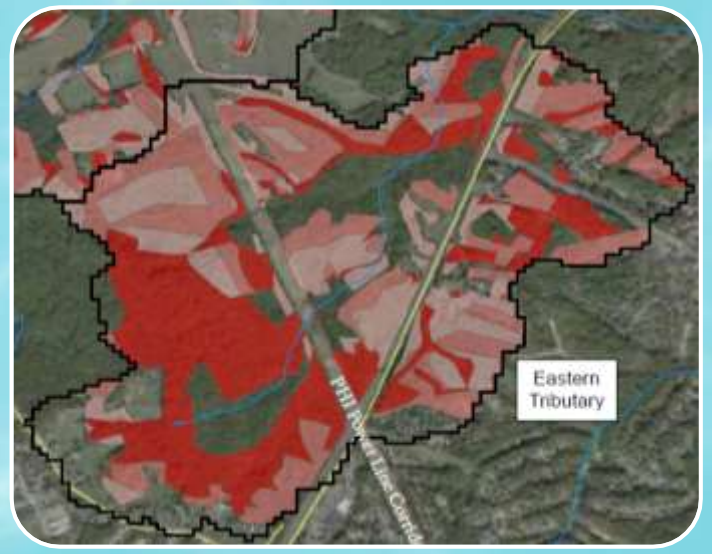
Questions… still?

Well-established forest is adjacent to incised channels

- What is the value, stability, and functionality of the existing riparian forest?

Patchy and inconsistent forest communities exist throughout the site

- What is the history of deforestation and reforestation in the watershed?
- How has it impacted channel morphology?



And More Questions

Substrate is homogenous, independent of hydrologic breaks, and with limited bedform diversity.

- What is the impact of the bed material and load on habitat and channel stability?

Limited signs of macroinvertebrate and fish communities

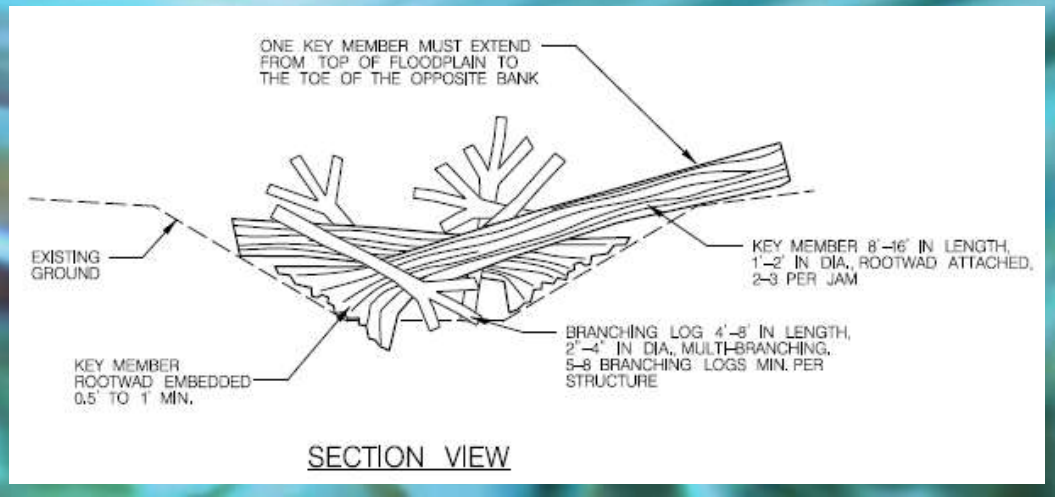
- What is desirable aquatic habitat within the site limits?
- Why is it currently lacking?

Tributary A

- 1.1% Slope
- 161-acre Drainage Area
- Perennial

Tributary A

- “Healing” hydrograph
- Difficult Access
- Wetlands



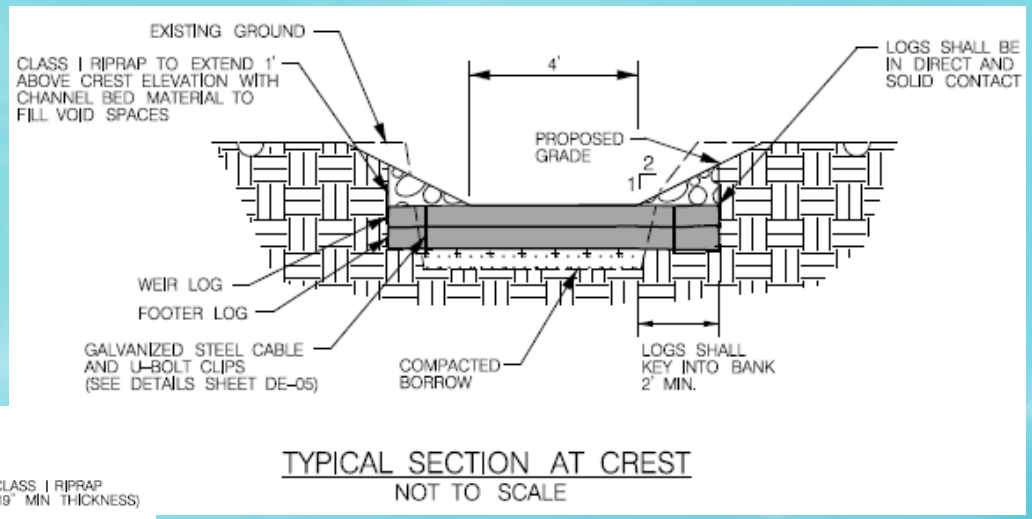
Tributary A

Tributary B

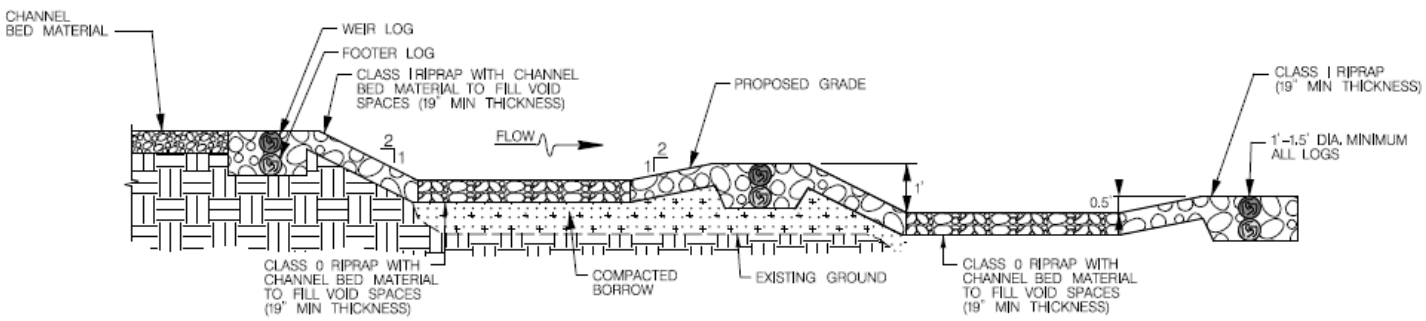
- 6.3% Slope
- 40-acre Drainage Area
- Intermittent

Tributary B

- Prominent Headcut
- Difficult Access Upstream
- No Wetlands
- Few high value or large trees



TYPICAL SECTION AT CREST
NOT TO SCALE



TYPICAL PROFILE
NOT TO SCALE

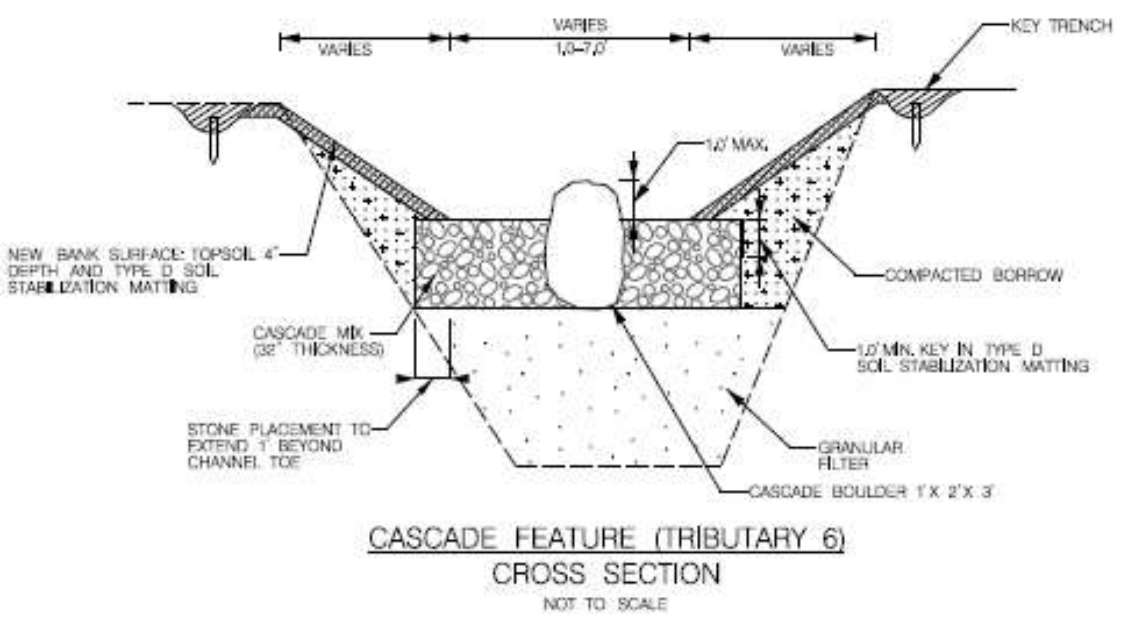
Tributary B

Tributary C

- 12% Slope
- 2-acre Drainage Area
- Ephemeral

Tributary C

- Active incision
- Roadway Runoff
- No Wetlands
- Few high value or large trees



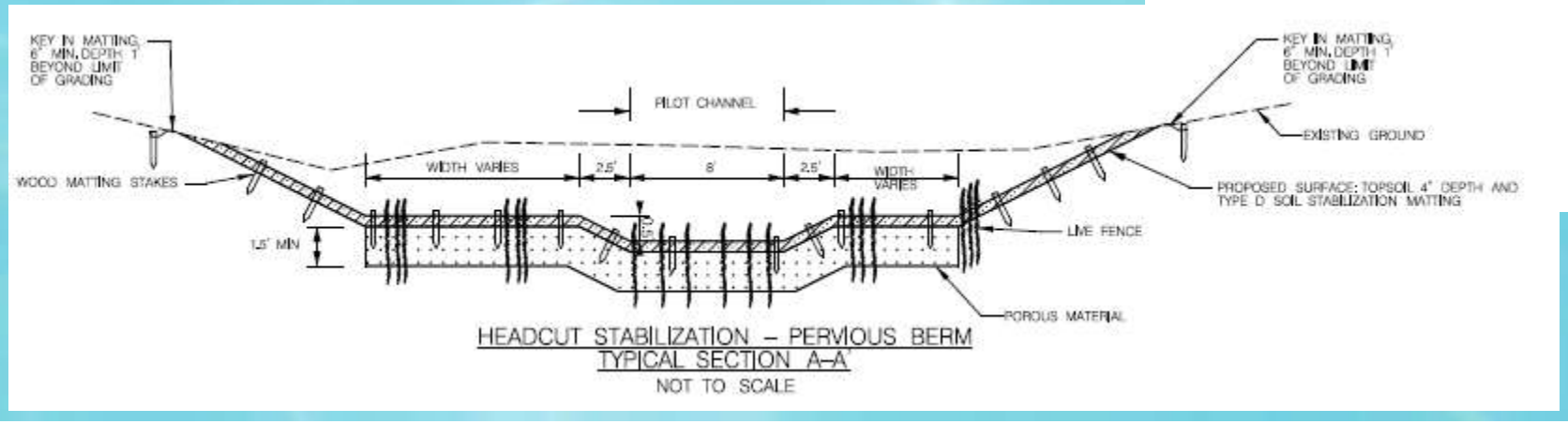
Tributary C

Headcut Tributary Complex

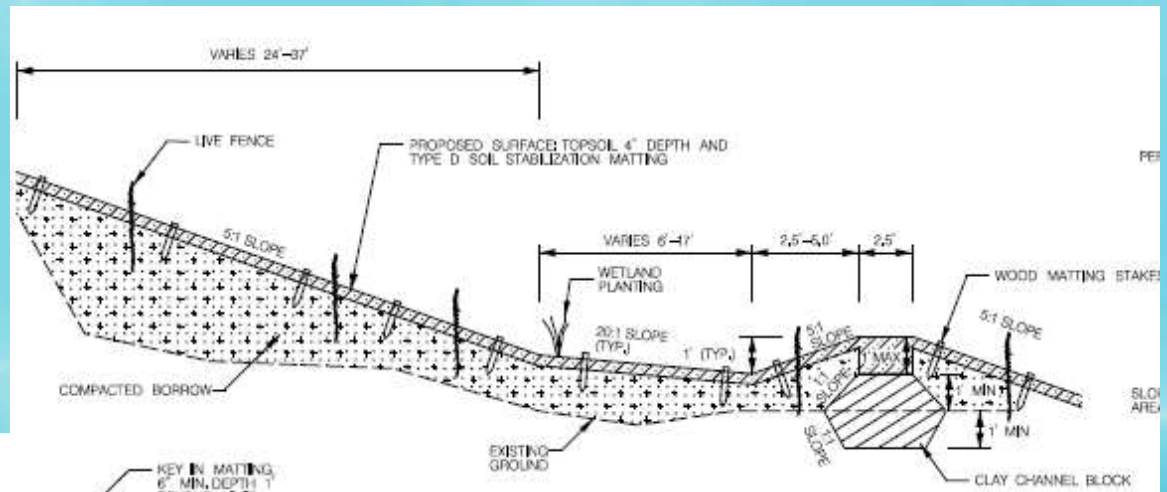
- 16-32% Slopes
- 10 – 30-acre Drainage Areas
- 10-30 ft bank heights
- Intermittent and Perennial

Headcut Tributary Complex

- Large-scale Multi-Lobed Headcuts
- “Easy” Access
- Heavy Invasives
- Few high value or large trees



HEADCUT STABILIZATION – PERVIOUS BERM
TYPICAL SECTION A–A'
NOT TO SCALE



HEADCUT STABILIZATION – IMPERVIOUS BERM
TYPICAL PROFILE
NOT TO SCALE

Headcut Tributary Complex

Headcut Tributary Complex

Headcut Tributary Complex

Headcut Tributary Complex

Thank You!

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An aerial view of the flooding in Erfstadt, in Germany’s North Rhine-Westphalia state (Rhein-Erft District/@BezRegKoeln/Twitter)