

Catheys Creek Restoration and Water Intake Rehabilitation

Achieving Multiple Objectives in a Water Supply Watershed

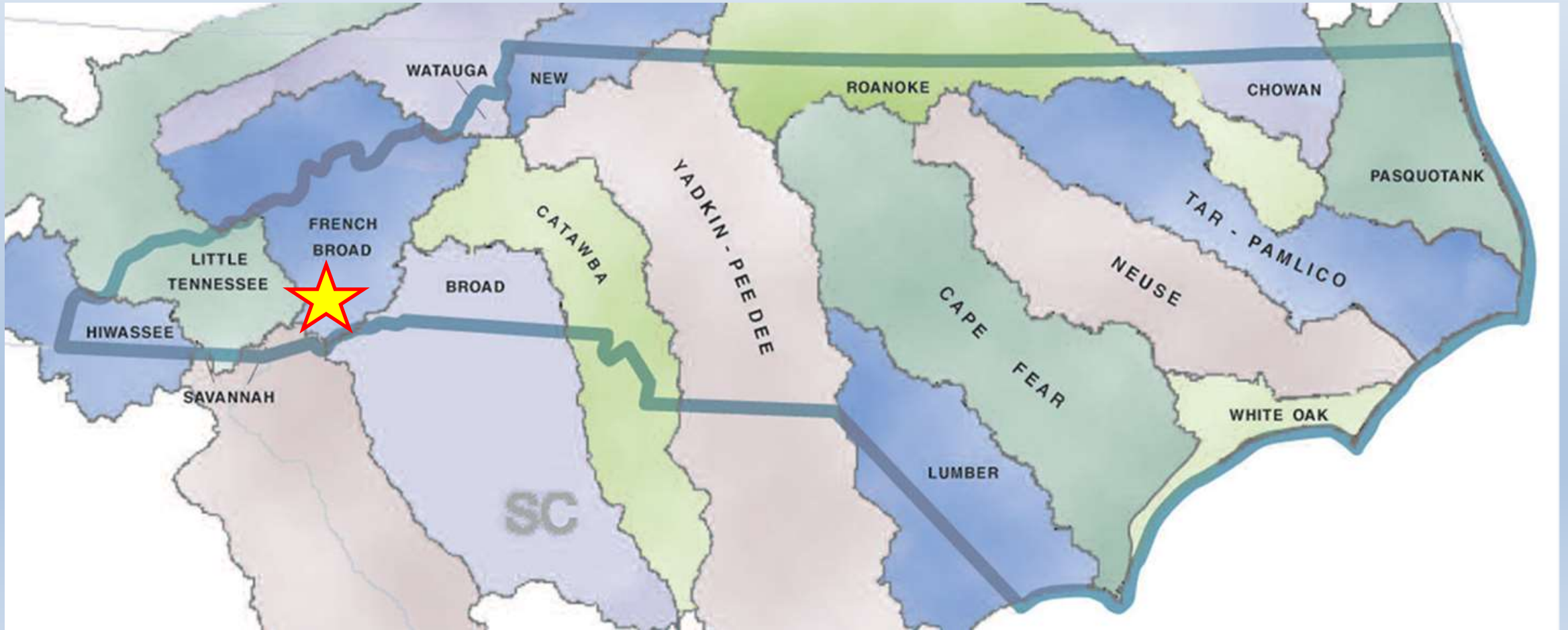
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Catheys Creek Project: 2018-2022

- French Broad River Basin, Blue Ridge Ecoregion
- 1,400 linear feet of Catheys Creek and Kuykendal Creek
- Funded by NC DEQ Division of Water Infrastructure



Catheys Creek: *Brevard Water Treatment Plant*

- Unstable streambanks and road bank
- Sediment clogging water intake
- Poor habitat – trout stream in National Forest



Catheys Creek Restoration and Water Intake Rehabilitation Project

- **Multiple objectives:**

- Ecological functions
- Infrastructure protection
- Water security

- **High-risk environment:**

- Site constraints
- Public access to National Forest
- Susceptible to flooding in an uncertain climate future

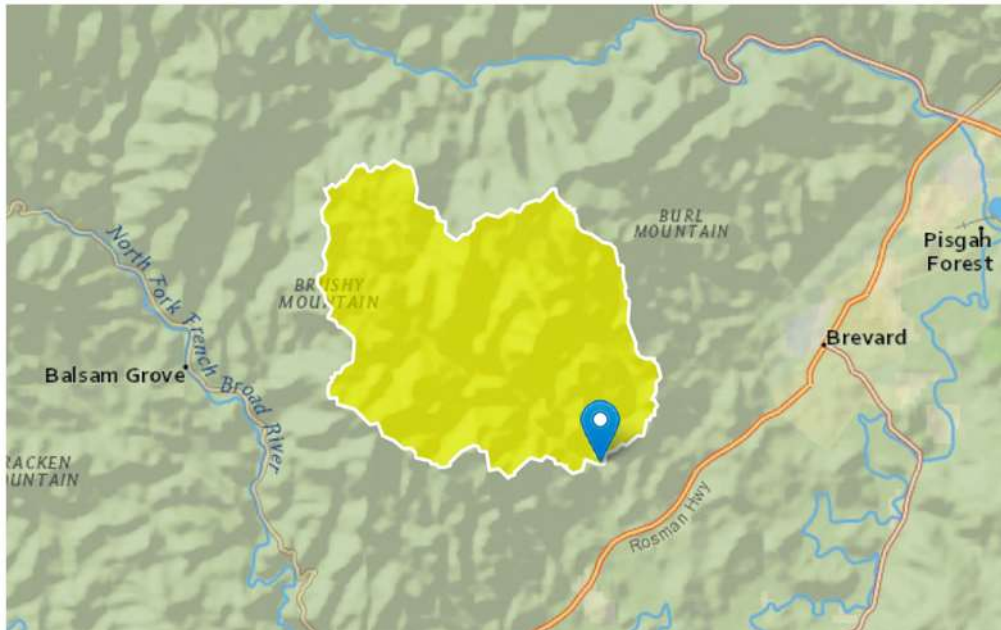


Catheys Creek

- 11.4 sq mi forested watershed
- High rainfall: > 100 inches/yr
- High bedload sediment supply

StreamStats Report

Region ID: NC
 Workspace ID: NC20210922131658218000
 Clicked Point (Latitude, Longitude): 35.21225, -82.78325
 Time: 2021-09-22 09:17:18 -0400

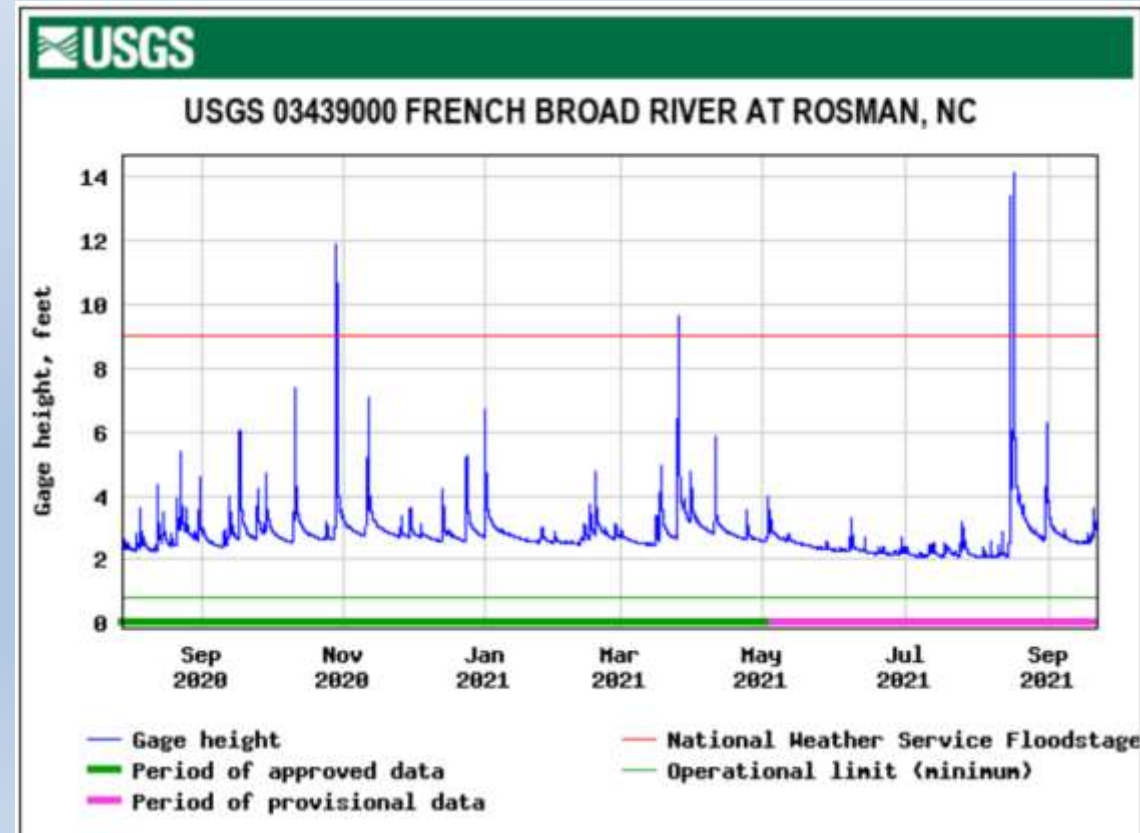
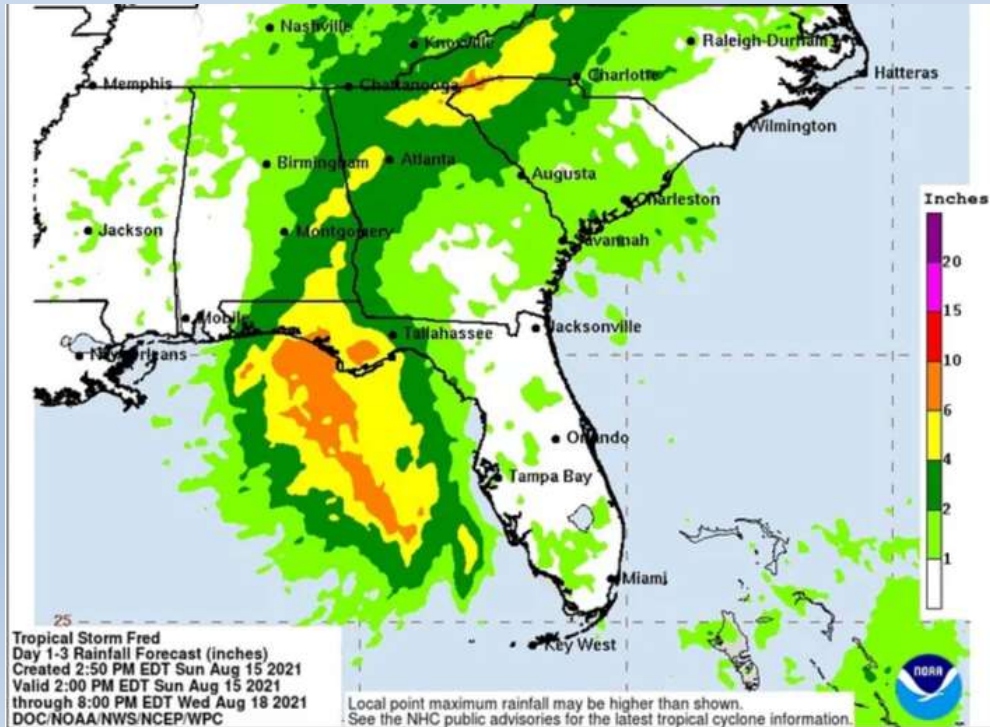


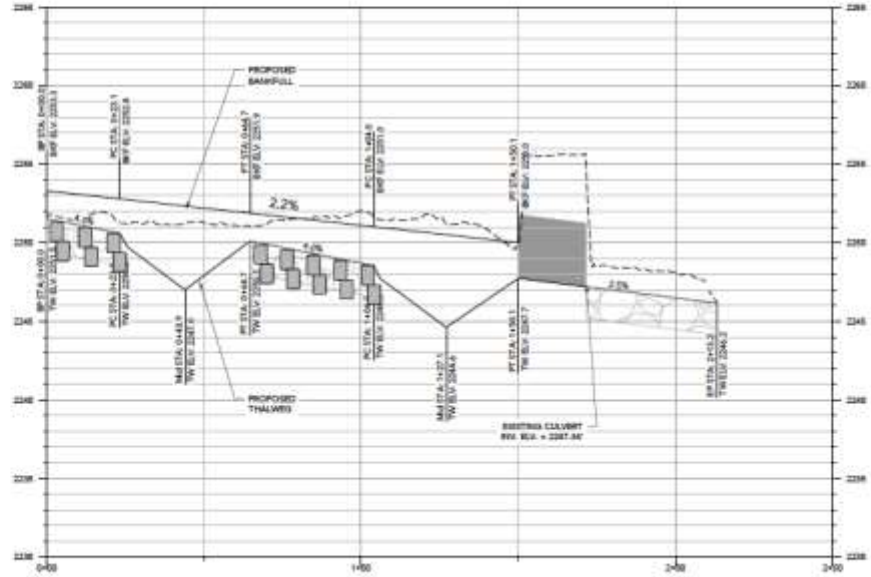
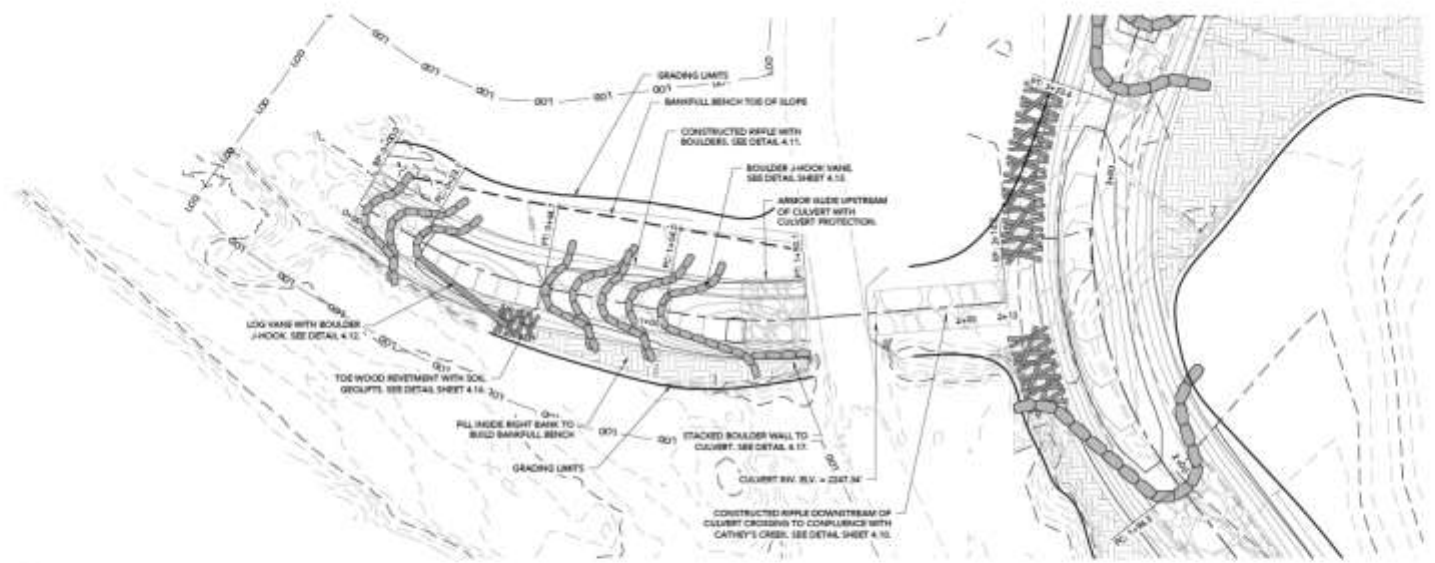
Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	11.4	square miles
PCTREG1	Percentage of drainage area located in Region 1 - Piedmont / Ridge and Valley	0	percent
PCTREG2	Percentage of drainage area located in Region 2 - Blue Ridge	100	percent
PCTREG3	Percentage of drainage area located in Region 3 - Sandhills	0	percent
PCTREG4	Percentage of drainage area located in Region 4 - Coastal Plains	0	percent
PCTREG5	Percentage of drainage area located in Region 5 - Lower Tifton Uplands	0	percent
BASINPERIM	Perimeter of the drainage basin as defined in SIR 2004-5262	21.3	miles
BSLDEM30FT	Mean basin slope, based on slope percent grid	40.9	percent
CSL10_85fm	Change in elevation between points 10 and 85 percent of length along main channel to basin divide divided by length between points ft per mi	183.19	feet per mi
ELEV	Mean Basin Elevation	3120	feet
ELEVMAX	Maximum basin elevation	4060	feet
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	10.5	inches
LC01BARE	Percentage of area barren land, NLCD 2001 category 31	0.4	percent
LC01CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2001	0.3	percent
LC01DEV	Percentage of land-use from NLCD 2001 classes 21-24	1	percent
LC01FOREST	Percentage of forest from NLCD 2001 classes 41-43	98.2	percent
LC01HERB	Percentage of herbaceous upland from NLCD 2001 class 71	0	percent
LC01IMP	Percent imperviousness of basin area 2001 NLCD	0.03	percent
LC01SHRUB	Percent of area covered by shrubland using 2001 NLCD	0.1	percent
LC01WATER	Percentage of open water, class 11, from NLCD 2001	0	percent
LC01WETLND	Percentage of wetlands, classes 90 and 95, from NLCD 2001	0	percent

Climate Uncertainty: *Risk Management*

- Hazard Risk = Likelihood X Consequence
- Resilience is the Ability to Recover from a Hazard
- Plan for Adaptive Management in Restoration Projects

T.S. Fred
August 2021





VERTICAL EXAGGERATION = 5:1

CATHEY'S CREEK WTP INTAKE REHAB. & STEAM RESTOR.
 TRANSYLVANIA COUNTY - NORTH CAROLINA

STREAM RESTORATION PLAN - PROFILE: KUKENDALL CREEK



FINAL DRAWING FOR CONSTRUCTION

REVISIONS:
06/01/2019

DATE: 06/30/2019
 PLOT SIZE: 24" x 36"
 SCALE: 1" = 30"
 H.D.: HAD03 (NCSP)
 V.D.: NAVD83
 JE PID: 4304
 HSRP-D-17-0127

Kuykendall Creek: *Tributary with DA = 3.0 sq mi*

- Eroding bank on outside bend threatening archaeological site
- Floodplain Connection, Log J-Hook Vane, Boulder Cascade, Riparian Vegetation

Before



As-Built in October 2020



Kuykendall Creek: *After T.S. Fred in August 2021*

- Floodplain scour and loss of vegetation
- Minor erosion

Immediately After Flood



2 Years Later



CATHEY'S CREEK WTP INTAKE REHAB. & STEAM RESTOR.
TRANSYLVANIA COUNTY - NORTH CAROLINA

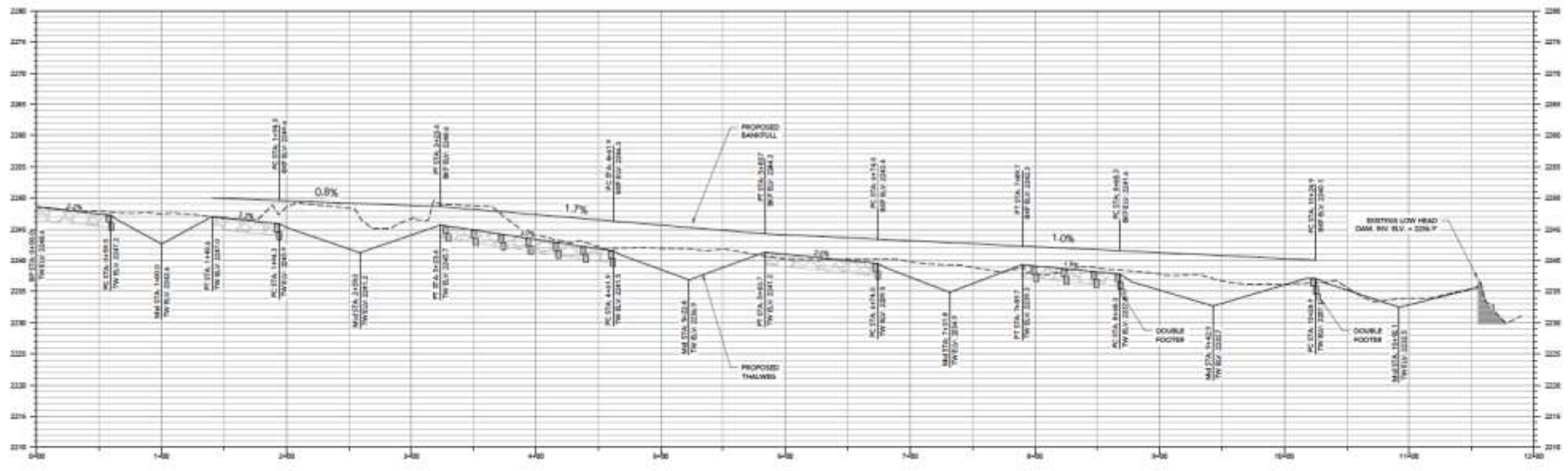
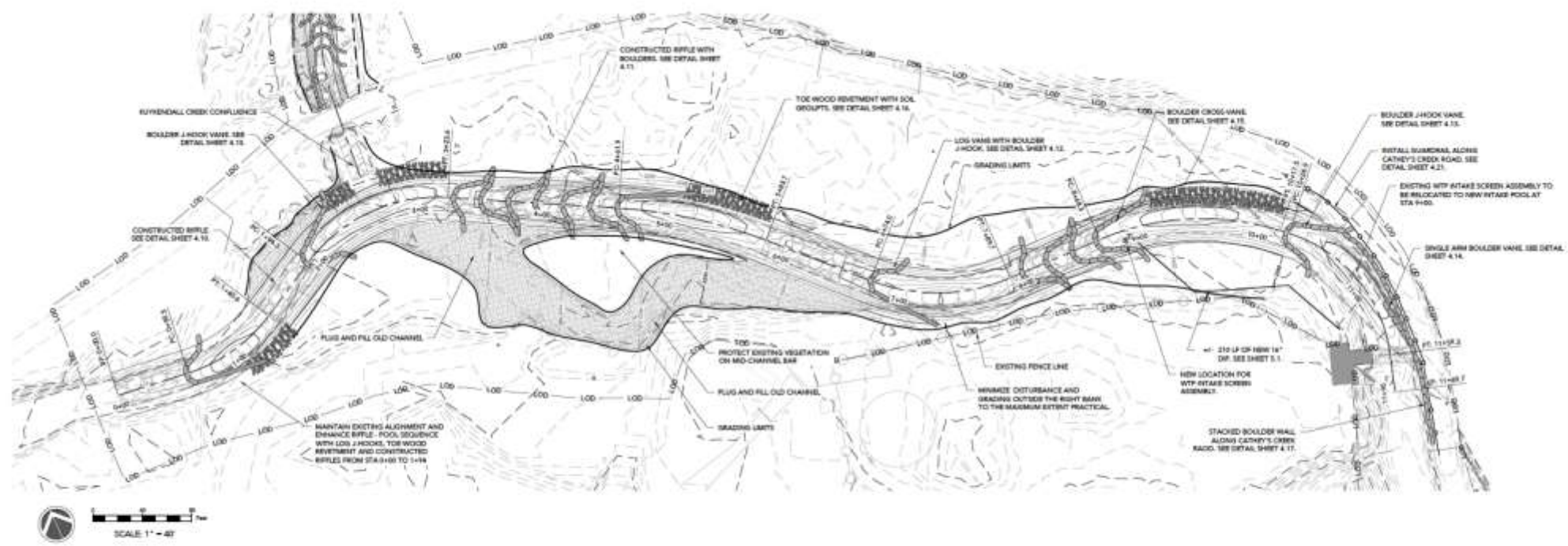
STREAM RESTORATION PLAN - PROFILE: CATHEY'S CREEK



FINAL DRAWING FOR CONSTRUCTION

REVISIONS:
08/01/2019
DATE: 08/30/2019
PLOT SIZE: 24" x 36"
SCALE: 1" = 40'
H.D.: NAD83 (NAD83)
V.D.: NAVD83
J.E. PRO. 4334
H-20P-D-17-0-127

4.2



VERTICAL EXAGGERATION = 5:1

Catheys Creek Reach 1: *Upstream of Confluence with Kuykendall Creek*

- Eroding banks on outside bends
- Floodplain Connection, Log J-Hook Vanes, Wood Toe Revetments, Riparian Vegetation

Before



As-Built in October 2020



Catheys Creek Reach 1: *After T.S. Fred in August 2021*

- Floodplain scour and loss of vegetation
- Minor erosion

Immediately After Flood



2 Years Later



Catheys Creek Reach 2: *Downstream of Confluence with Kuykendall Creek*

- Eroding banks on outside bends
- Floodplain Connection, Log J-Hook Vanes, Wood Toe Revetments, Riparian Vegetation

Before



As-Built in October 2020



Catheys Creek Reach 2: *After T.S. Fred in August 2021*

- Floodplain scour and loss of vegetation
- Moderate erosion

Immediately After Flood



2 Years Later



Catheys Creek Reach 2: *Facing Upstream*

- Floodplain scour and loss of vegetation
- Moderate erosion

Immediately After Flood



2 Years Later



Catheys Creek Reach 3: *Water Plant and Gravel Road*

- Eroding bank threatening road stability
- Floodplain Connection, Log J-Hook Vanes, Wood Toe Revetments, Riparian Vegetation

Before



As-Built in October 2020



Catheys Creek Reach 2: *After T.S. Fred in August 2021*

- Floodplain scour and loss of vegetation
- Sediment deposition on inside bend

Immediately After Flood



2 Years Later



Catheys Creek Reach 2: *Facing Upstream*

- Floodplain scour and loss of vegetation
- Sediment deposition on inside bend

Immediately After Flood



2 Years Later



Catheys Creek: Water Intake Relocation

- Moved upstream away from road
- Located in scour area to reduce clogging



Catheys Creek: Water Intake Relocation

- Moved upstream away from road
- Located in scour area to reduce clogging



Catheys Creek: *Infrastructure Protection at Downstream End of Project*

- Road bank stabilization with boulder revetment
- Guard rail along road



Catheys Creek:

Enhanced Functions & Resilience

- Design tailored for site constraints
- Address multiple objectives
- Manage risks:
 - Human safety
 - Water security
 - Ecological values
 - Public access



Thank You

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