# Monitoring Report MY03

**Stony Fork Restoration Site**
**Upper Neuse River Basin - 03020201**
**Monitoring Year 03**
**DMS Contract 6830**

**DMS Project Number 97085**
**DWR #: 2016-0372**
**USACE Action ID: 2016-00875**
**Johnston County, North Carolina**

Prepared for:
NCDMS, 1652 Mail Service Center, Raleigh, NC 27699-1652

**Monitoring Data Collected: 2021**
**Date Submitted: December 2021**

# Monitoring and Design Firm

Prepared by:

KCI Associates of North Carolina
4505 Falls of Neuse Road
Suite 400
Raleigh, NC 27609
(919) 783-9214

**Project Contact: Tim Morris**
**Email: tim.morris@kci.com**

KCI ASSOCIATES OF NORTH CAROLINA, PA

ENGINEERS • SCIENTISTS • SURVEYORS • CONSTRUCTION MANAGERS

4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 (919) 783-9214 (919) 783-9266 Fax

**MEMORANDUM**

Date: January 27, 2022
To: Lindsay Crocker, DMS Project Manager
From: Tim Morris, Project Manager
KCI Associates of North Carolina, PA
Subject: MY-03 Monitoring Report Comments
Stony Fork DMS #6830, Contract 006830
Neuse River Basin CU 030202018
Johnston County, North Carolina

Please find below our responses in italics to the MY-03 Monitoring Report comments from NCDMS received on January 13, 2022 for the Stony Fork Restoration Site.

1. Include DMS violation letter from subdivision BMP, and Johnston County buffer violation letter. Provide some updated narrative to indicate that this violation is on-going and there will be continued follow up. Provide some mention of continued trespass from the adjacent subdivision lots from Sherill Farms Phase 1 that is also working towards resolution.
   *KCI Response: These letters have been added to Appendix F – Other Data and the narrative has been updated.*

2. Please update asset table (Table 1) to show total credit areas out to 3 significant digits to match credit ledgers (6,585.933 SMU and 480,337.942 BMU).
   *KCI Response: Table 1 has been updated.*

3. T3 has shown aggradation in other years as well. Please identify the suspected source of this sediment upstream for clarity.
   *KCI Response: The banks of the upstream reach of T3, which is located outside of the bounds of the project, are the primary source of sediment that is causing aggradation. This banks are very unstable and actively eroding. Several pictures of these banks have been added to Appendix B – Visual Assessment Data.*

4. In future reports you may omit table 8 because this is already in the MY0 report.
   *KCI Response: KCI has made note of this comment for future reports.*

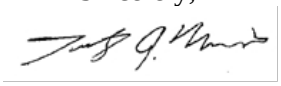
5. Check XS10 BHR to confirm the number is correct (aggradation typically shows a BHR < 1).
   *KCI Response: Aggradation typically results in BHR < 1 but because in this case both the stream bed and banks aggraded it resulted in a BHR of 1.2 (bank height= 0.52, bankfull max depth=0.44).*

6. In future reports you may omit substrate sampling.
   *KCI Response: KCI has made note of this comment for future reports.*

7. Provide cumulative bankfull event table to assist with documenting the four events in four separate years to prove bankfull event standard on stream reaches.
   *KCI Response: This table has been added to the report.*

   Digital Review:
   - Note that the annual mean values for Table 7 differ from the excel workbook. Please ensure that the values in the workbook reflect the values in the report table.
     *KCI Response: The values from the excel workbook were the correct values and Table 7 in the report has been updated with the correct values.*

Sincerely,



Tim Morris
Project Manager

# TABLE OF CONTENTS



## Appendix A – Background Tables



## Appendix B – Visual Assessment Data



## Appendix C – Vegetation Plot Data



## Appendix D – Stream Measurement and Geomorphology Data



## Appendix E – Hydrologic Data



## Appendix F – Other Data

## PROJECT SUMMARY

The Stony Fork Restoration Site (SFRS) was completed in May 2019 and restored a total of 6,810 linear feet of stream and 949,747 square feet of riparian buffer under the Neuse Buffer Rule (NCAC Rule 15A 02B.029). The SFRS is a riparian system in the Upper Neuse River Basin (03020201 8-digit cataloging unit) in Johnston County, North Carolina. The site's natural hydrologic regime had been substantially modified through the relocation and straightening of the existing stream channels, impacted by land clearing, and cleared of any riparian buffer. This completed project will restore impacted agricultural and timber lands to a stable stream ecosystem with a functional riparian buffer and floodplain access.

The SFRS is protected by a 24.4 acre permanent conservation easement, held by the State of North Carolina. The site is located approximately 5.5 miles north of Benson, NC. Specifically, the site is 0.2 mile west on Elevation Road from its intersection with Federal Road (SR-1331).

The North Carolina Ecosystem Enhancement Program (NCEEP) published the Neuse River Basin Priorities in 2010. These were updated in for the Neuse 01 cataloging unit (CU) in 2015 due to extensive mitigation needs and changes in watershed conditions since 2010. The project 14 digit CU (03020201150010) was identified as a Targeted Local Watershed (TLW) in the updated priorities. The goals and priorities for the SFRS are based on the information presented in the Neuse River Basin Restoration Priorities: maintaining and enhancing water quality, restoring hydrology, and improving fish and wildlife habitat (NCEEP, 2009). The project will support the following basin priorities:

- Managing stormwater runoff
- Improving/restoring riparian buffers
- Reducing sediment loading
- Improving stream stability

The goals for the project are to:

- Restore channelized and agriculture impacted streams to stable C/Cb channels.
- Restore a forested riparian buffer to provide bank stability, filtration, and shading.

The project goals will be addressed through the following objectives:

- Relocate a channelized stream to its historic landscape position.
- Install cross-sections sized to the bankfull discharge.
- Create bedform diversity with pools, riffles, and habitat structures
- Plant the site with native trees and shrubs and an herbaceous seed mix.

Project planting and construction were completed in May 2019. The SFRS involved restoration and establishment of a functioning stream ecosystem with 6,810 linear feet of stream restored by re-meandering the stream and by tying the bankfull elevation to the historic floodplain where feasible. The entire site was planted to establish a forested riparian buffer. The site was constructed as designed with no major modifications from the design plan. The monitoring components were installed in May 2019. Four automatica recording pressure transducer stream gauges that take a reading every 10 minutes were installed in the upper third of T1, T1-A, T2 and T3 to document flow within those reaches. Cameras were installed in the vicinity of each of these gauges and set to record a short video once a day to provide additional verification of flow. An additional automatic recording pressure transducer stream gauge was installed near the bottom of the main stem (SF3) to record the occurrence of bankfull events. To determine the success of the planted mitigation areas, seven 10 m x 10 m permanent vegetation monitoring plots were established. An additional five 10 m x 10 m random vegetation monitoring plots were sampled as well. The locations of the planted stems relative to the origin were recorded within the permanent plots and the species and height of each planted stem were recorded for all plots. Any volunteers found within the plots were also grouped into size categories by species, but separate from the planted stems. Twelve permanent photo reference points were established and will be taken annually. Sixteen permanent cross-sections (eight riffle

cross-sections and eight pool cross-sections) were also established and a detailed longitudinal profile of the stream was taken. Wolman pebble counts were performed at all of the riffle cross-sections. The cross-section measurements will be repeated in future monitoring years, but the longitudinal profile will only be repeated if there are concerns about bed elevation adjustments. Reports will be submitted to DMS each year.

Vegetative success criteria for the stream mitigation is 260 woody stems/acre after five years, and 210 woody stems/acre after seven years. Trees in each plot must average seven feet in height at Year 5 and ten feet in height at Year 7. Volunteer species must be present for a minimum of two growing seasons and must be a species from the approved planting list to count toward vegetative success. A single species may not account for more than 50% of the required number of stems within any plot. A minimum of four bankfull events must also be recorded during the monitoring period. All project streams must show a minimum of 30 continuous days of flow within a calendar year for three out of the first four years of monitoring. Bank height ratios (BHR) should not exceed 1.2 and the entrenchment ratios (ER) should be 2.2 or greater. BHR and ER at any measured riffle cross-section should not change more than 10% from the baseline condition during any given monitoring interval (e.g. no more than 10% between years 1 and 2, 2 and 3, 3 and 5, or 5 and 7). Visual assessments will also be used to identify problem areas.

Vegetative success criteria for the areas proposed for riparian buffer credit is 260 woody stems/acre at the end of five years of monitoring. Trees in each plot must average seven feet in height at Year 5. There should be a minimum of four native hardwood tree species, with no species accounting for greater than 50% of the stems. Volunteer species must be from the approved planting list to count toward vegetative success.

## MONITORING RESULTS

The third-year vegetation monitoring was conducted between August 26 and 30, 2021. The site averaged 502 planted stems/acre across all 12 plots. Ten of the twelve plots had greater than 260 planted stems/acre. Including volunteers, the site averaged 701 total stems/acre. The plots that did not meet the success criteria were Plots 5 and R1. Both of these plots are located in areas with many mature trees both in and around the plots. Canopy coverage for Plot 5 is estimated at 80% and for Plot R1 at 60%. In general the site is well vegetated, with widespread herbaceous coverage and many healthy planted stems. Ongoing treatment of Chinese privet and kudzu continued in MY03. These treatments have been repeated several times during the growing season in each year since the site was constructed and will be continued throughout the monitoring period.

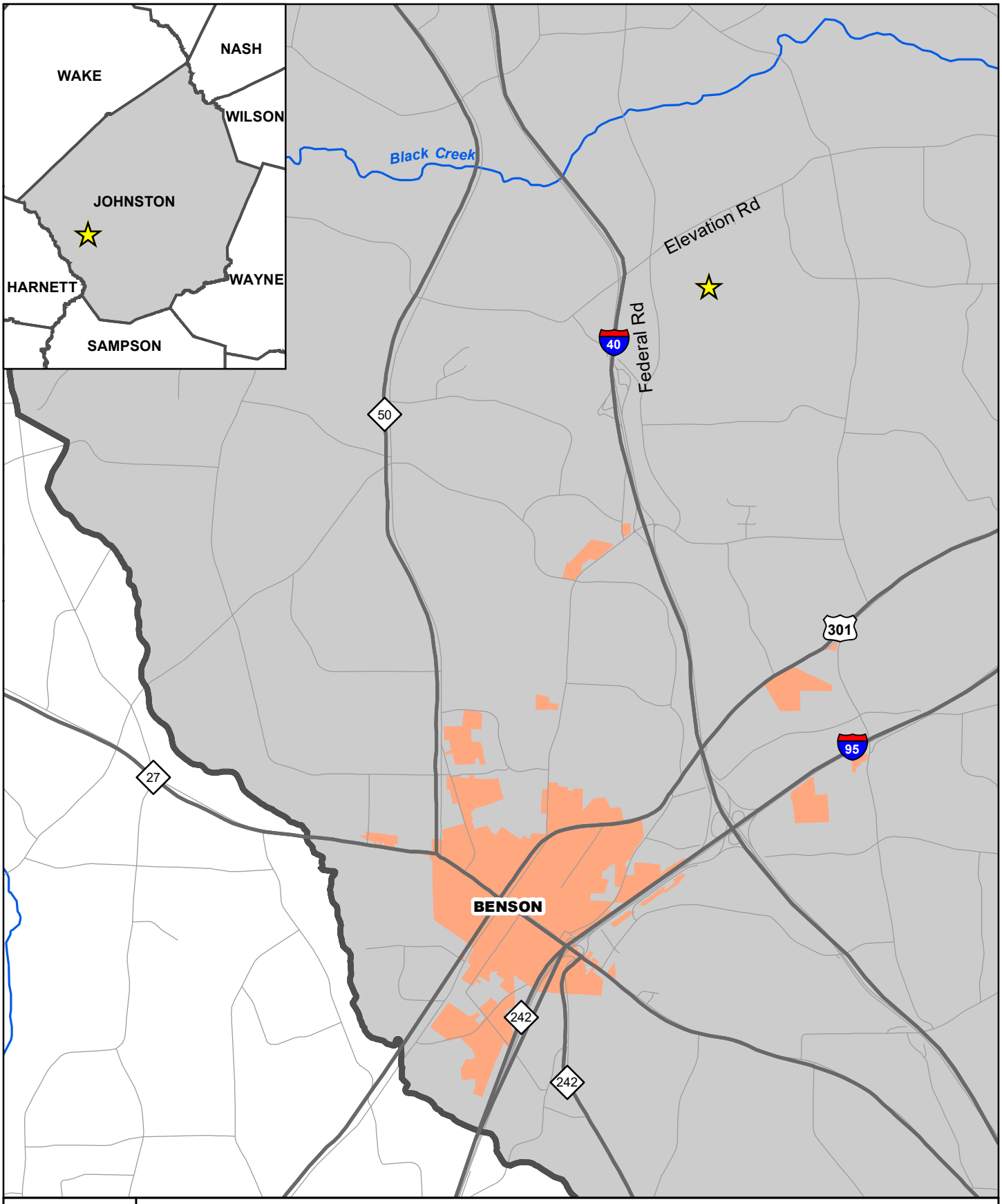
The stream gauge near the bottom of SF3 recorded five bankfull events in 2021. All four stream flow gauges recorded at least 30 consecutive days of flow. The gauge on T1 recorded flow for 147 days from January 1 to May 27 and for 98 days between May 29 and September 3. The gauge on T1A recorded flow for 259 days from January 1 to September 16 and for 41 days from October 9 to November 18 (the last download of the year). The gauge on T2 recorded flow for 146 days from January 1 to May 26 and for 95 days from May 30 to September 1. The gauge on T3 recorded flow for 256 days, between January 1 and September 13.

The data from the flow gauges was further backed up by the cameras on site. Due to malfunctions at the beginning of the year, the cameras on T1 and T3 didn't begin recording until February 10, and the cameras on T1A and T2 didn't begin recording until June 30. Despite this, all four cameras showed at least 30 consecutive days of flow. The camera on T1 showed 67 days of flow from February 10 until it was obscured by vegetation on April 17. Once vegetation was cleared away this camera showed 76 days of flow from June 10 to August 24. The camera on T1A showed flow for 41 days from June 10 until it was obscured by vegetation on July 20. The camera on T2 showed flow for 75 days from June 10 until it was obscured by vegetation on August 24. The camera on T3 showed flow for 106 days from February 10 to May 26 and for 32 days from May 29 until it malfunctioned on June 29.

The third-year cross-section survey was completed between August 26 and 30, 2021 and found that for the majority of the site, the dimensions of the stream are as designed, with some small variation as is typical for stream restoration projects. Both of the cross-sections on T3 (XS9 and 10) show significant levels of aggradation. Only the bottom 129 feet of this stream are located within the bounds of the project and so the upper reaches contribute a large amount of sediment to the stream from eroding banks. The large sediment source upstream combined with the small size of the stream has resulted in a significant amount of deposition throughout the entire reach. Many herbaceous plants also were able to colonize the stream bed during the first two monitoring years, which further exacerbated this problem. Now that the streamside plantings have achieved a large enough size to shade out these herbaceous plants, it is believed that at least a portion of the sediment that has accumulated in the stream will wash through. KCI will continue to monitor this reach closely to ensure it does not become a threat to project success. The monitored cross-section data have been calculated by adjusting the bankfull elevation to maintain the baseline bankfull area for each cross-section.

During MY02, ATV tracks were discovered traveling through a small portion of the easement. These tracks appeared to originate from the neighborhood adjacent to the project. A formal notice of violation was issued and the issue was discussed with the landowner of the site. Fresh tracks were noted in the first half of 2021 but since June 10, 2021, no new tracks have been seen and the area has revegetated to the point that no evidence of this encroachment remains.

During a site visit on August 26, 2021, it was noted that construction had begun on the culvert at the end of Sherrill Farm Road that will cross Reach SF2. As of November 18, 2021 a temporary crossing had been installed. KCI has been in touch with the developer to ensure that the crossing will be built as it was designed during the design phase of the site. All work on the crossing has taken place within the confines of the easement exception that was created for this crossing. At a site visit on November 18, 2021, it was noted that an outlet from a sediment retention pond had been dug through the site easement and to the project stream. This encroachment occurred on the right bank, approximately 150 feet upstream of the crossing on Reach SF2. Upon noticing this encroachment, KCI immediately notified the developer responsible as well as the responsible agencies. This violation is on-going and there will be continued follow up. Additionally, several property owners in the Sherrill Farms Phase 1 subdivision have stored vehicles and a trampoline within the easement. Sherrill Farms LLC has been contacted about these encroachments in 2018, 2019, and 2021 and a resolution to this encroachment is being sought. Please see Appendix B – Visual Assessment Data and Appendix F – Other Data for more information.




KCI ASSOCIATES OF NC

**FIGURE 1. VICINITY MAP, STONY FORK RESTORATION SITE, JOHNSTON COUNTY, NC**

## REFERENCES


NCDEQ, Division of Mitigation Services. March 2015. 2015 Neuse 03020201 Priorities. Last accessed at: http://portal.ncdenr.org/c/document_library/get_file?uuid=340a3f58-336b-42bf-bab2-fb663cbfd78d&groupId=60329

NCDENR, Ecosystem Enhancement Program. 2014. NCDENR, Ecosystem Enhancement Program. 2014. Stream and Wetland Mitigation Monitoring Guidelines. Last accessed1/2016 at: http://portal.ncdenr.org/c/document_library/get_file?p_l_id=60409&folderId=18877169&name=DLFE-86604.pdf

NCDENR, Ecosystem Enhancement Program. 2014. Stream and Wetland Mitigation Monitoring Guidelines. Last accessed 6/2015 at: http://portal.ncdenr.org/c/document_library/get_file?p_l_id=60409&folderId=18877169&name=DLFE-86606.pdf

NC Wetland Functional Assessment Team. 2010. NC Wetland Assessment Method (NC WAM) User Manual, version 4.1. Last accessed 11/2012 at: http://portal.ncdenr.org/c/document_library/get_file?uuid=76f3c58b-dab8-4960-ba43-45b7faf06f4c&groupId=38364

Schafale, M.P. and A.S. Weakley. 2012. Guide to the Natural Communities of North Carolina: Fourth Approximation. Natural Heritage Program, Division of Parks and Recreation, N.C. Department of Environment and Natural Resources. Raleigh, NC.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Soil Survey of Johnston County, North Carolina*. 1994

# APPENDIX A

Background Tables

**Table 1. Project Components and Mitigation Credits**
**Stony Fork Restoration Site, DMS Project #97085**

**Mitigation Credits**

| | Stream | | Riparian Wetland | | Non-riparian Wetland | | Buffer | | Nitrogen Nutrient Offset | Phosphorous Nutrient Offset |
|---|---|---|---|---|---|---|---|---|---|---|
| **Type** | R | RE | R | RE | R | RE | R | RE | | |
| **Linear Feet/Acres** | 6,405 | 405 | | | | | 450,285 sf | 499,462 sf | | |
| **Credits** | 6,405 | 181 | | | | | 425,434 | 59,904 | | |
| **TOTAL CREDITS** | **6,585.933** | | | | | | **480,337.942** | | | |

**Project Components**

| Project Component -or- Reach ID | Stationing/ Location | Existing Footage/ Square Footage | Approach (PI, PII etc.) | Restoration -or- Restoration Equivalent | MP Restoration Footage* | As-built Restoration Footage | Mitigation Ratio |
|---|---|---|---|---|---|---|---|
| SF1 | 10+00 – 21+55 | 1,235 | PI/PII | R | 1,155 | 1,155 | 1:1 |
| SF2 | 21+55 – 49+54 | 2,453 | PI | R | 2,707** | 2,714** | 1:1 |
| SF3 | 49+54 – 56+08 | 618 | PI | R | 624** | 624** | 1:1 |
| T1 | 100+00 – 105+10 | 365 | PI/PII | R | 510 | 510 | 1:1 |
| T1A | 150+00 – 151+59 | 47 | PI/PII | R | 159 | 159 | 1:1 |
| T2-1 | 200+00 – 203+34 | 327 | N/A | EII | 334 | 334 | 2.5:1 |
| T2-2 | 203+34 – 206+71 | 326 | PI/PII | R | 337 | 337 | 1:1 |
| T2-3 | 206+71 – 215+26 | 780 | PI/PII | R | 855 | 855 | 1:1 |
| T3-1 | 300+00 – 300+71 | 72 | PI/PII | EI | 71 | 71 | 1.5:1 |
| T3-2 | 300+71 – 301+29 | 82 | PI/PII | R | 58 | 58 | 1:1 |
| Buffer Restoration TOB to 100’ | N/A | 413,194 | N/A | R | 413,194 | 413,194 | 100% |
| Buffer Restoration 101-200’ | N/A | 37,091 | N/A | R | 37,091 | 37,091 | 33% |
| Buffer Enhancement TOB to 100’ | N/A | 74,802 | N/A | E | 74,802 | 74,802 | 50% |
| Buffer Preservation TOB to 100’ | N/A | 424,660 | N/A | P | 424,660 | 424,660 | 10% |

*Mitigation Plan footage used for credit calculations. **Crossings have been removed from creditable linear footage for all project streams

| Component Summation | | | | | |
|---|---|---|---|---|---|
| **Restoration Level** | **Stream (linear feet)** | **Riparian Wetlands (Acres)** | | **Non-Riparian Wetlands (Acres)** | **Buffer (square feet)** |
| | | Riverine | Non-Riverine | | |
| Restoration | 6,405 | | | | 450,285 |
| Enhancement | | | | | 74,802 |
| Enhancement I | 71 | | | | |
| Enhancement II | 334 | | | | |
| Creation | | | | | |
| Preservation | | | | | 424,660 (175,029 allowable for credit) |
| High Quality Preservation | | | | | |
| **TOTAL CREDITS** | 6,586 | | | | 480,338 |

| **Table 2. Project Activity & Reporting History<br>Stony Fork Restoration Sites, DMS Project #97085** | | |
|---|---|---|
| **Activity or Report** | **Data Collection Complete** | **Actual Completion or Delivery** |
| Mitigation Plan | | September 5, 2018 |
| Final Design - Construction Plans | | Oct. 15, 2018 |
| Construction Grading Completed | | May 3, 2019 |
| Planting Completed | | May 6 2019 |
| Baseline Monitoring/Report | May 2019 | July 2018 |
| *Vegetation Monitoring* | *May 9, 2019* | |
| *Stream Survey* | *May 15, 2019* | |
| Invasive Treatment | | Summer 2019 |
| Year 1 Monitoring | November 2019 | January 2020 |
| *Vegetation Monitoring* | *November 5, 2019* | |
| *Stream Survey* | *November 11, 2019* | |
| Invasive Treatment | | Summer 2020 |
| Year 2 Monitoring | November 2020 | January 2021 |
| *Vegetation Monitoring* | *September 4, 2020* | |
| *Stream Survey* | *June 29, 2020* | |
| Invasive Treatment | | Summer 2021 |
| Year 3 Monitoring | November 2021 | December 2021 |
| *Vegetation Monitoring* | *August 30, 2021* | |
| *Stream Survey* | *August 30, 2021* | |

| **Table 3. Project Contacts**<br>**Stony Fork Restoration Site, DMS Project #97085** | |
|---|---|
| **Design Firm** | KCI Associates of North Carolina<br>4505 Falls of Neuse Road<br>Suite 400<br>Raleigh, NC 27609<br>Contact: Mr. Tim Morris<br>Phone: (919) 278-2512<br>Fax: (919) 783-9266 |
| **Construction Contractor**<br>Stony Fork and T3 | Fluvial Solutions, Inc.<br>PO Box 28749<br>Raleigh, NC 27611<br>Contact: Mr. Peter Jelenevsky<br>Phone: (919) 605-6134 |
| **Construction Contractor**<br>T1, T1A, and T2 | KCI Environmental Technologies and Construction<br>4505 Falls of Neuse Road, Suite 400<br>Raleigh, NC 27609<br>Contact: Mr. Tim Morris<br>Phone: (919) 278-2512 |
| **Planting Contractor** | Bruton Natural Systems, Inc.<br>PO Box 1197<br>Fremont, NC 27830<br>Contact: Mr. Charlie Bruton<br>Phone: (919)783-9214 |
| **Monitoring Performers** | |
| | KCI Associates of North Carolina<br>4505 Falls of Neuse Road<br>Suite 400<br>Raleigh, NC 27609<br>Contact: Mr. Adam Spiller<br>Phone: (919) 278-2514<br>Fax: (919) 783-9266 |

| **Table 4. Project Information**<br>**Stony Fork Restoration Site, DMS Project #97085** | | | | |
|---|---|---|---|---|
| **Project Name** | Stony Fork Restoration Site | | | |
| **County** | Johnston County | | | |
| **Project Area (acres)** | 24.4 acres | | | |
| **Project Coordinates (lat. and long.)** | 35°26'55.0"N, 78°31'18.5"W | | | |
| **Project Watershed Summary Information** | | | | |
| **Physiographic Province** | Coastal Plain | | | |
| **River Basin** | Neuse | | | |
| **USGS Hydrologic Unit 8-digit** | 03020201 | **USGS Hydrologic Unit 14-digit** | 03020201150010 | |
| **DWQ Sub-basin** | 03-04-04 | | | |
| **Project Drainage Area (acres)** | 497 acres | | | |
| **Project Drainage Area Percentage of Impervious Area** | 5% | | | |
| **CGIA Land Use Classification** | Managed Herbaceous Cover 53% (262 ac), Mixed Hardwoods/Conifers 31% (150 ac), Low Density Developed 9% (42 ac), Medium Density Residential 5% (24 ac), Transportation/Impervious 3% (13 ac) | | | |
| **Existing Reach Summary Information** | | | | |
| **Parameters** | **Stony Fork** | **T1 and T1A** | **T2** | **T3** |
| Length of reach (linear feet) | 3,141 | 412 | 1,433 | 154 |
| Drainage area (acres) | 497 | 12 | 150 | 29 |
| Perennial, Intermittent, Ephemeral | Perennial | Intermittent | Perennial | Intermittent |
| NCDWQ Water Quality Classification | C; NSW | C; NSW | C; NSW | C; NSW |
| Stream Classification (exisiting) | G4c | G4 | G4 | G4 |
| Stream Classifcation (proposed) | C4 | C4 | C4 | C4 |
| Evolutionary trend (Simon) | Channelized, Stage III | Channelized, Stage III | Channelized, Stage III | Modified with pond, Stage III |
| FEMA classification | None | None | None | None |
| **Existing Wetland Summary Information** | | | | |
| **Parameters** | | | | |
| Size of Wetland (acres) | 0.33 (WA and WE) | 0.06 (WB) | 0.14 (WC and WF) | |
| Wetland Type | Headwater Forest | Bottomland Hardwood Forest | Non-Tidal Freshwater Marsh | |
| Mapped Soil Series | Gilead sandy loam | Bibb sandy loam | Bibb sandy loam | |
| Drainage class | Moderately Well Drained | Poorly Drained | Poorly Drained | |
| Soil Hydric Status | Non-hydric | Hydric | Hydric | |
| Source of Hydrology | Surface Water | Stream Floodplain | Stream Floodplain | |
| Restoration or Enhancement Method | N/A | N/A | N/A | |

| Regulatory Considerations | | | |
|---|---|---|---|
| **Regulation** | **Applicable?** | **Resolved?** | **Supporting Documentation** |
| Waters of the United States – Section 404 | Yes | Yes | 404 permit |
| Waters of the United States – Section 401 | Yes | Yes | 401 permit |
| Endangered Species Act | No | N/A | N/A |
| Historic Preservation Act | No | N/A | N/A |
| Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA) | No | N/A | N/A |
| FEMA Floodplain Compliance | No | Yes | |
| Essential Fisheries Habitat | No | N/A | N/A |

# APPENDIX B

Visual Assessment Data

Project Easement

**Stream Mitigation**

R *(6,405 lf / 6,405 SMCs)*

EI *(71 lf / 47 SMCs)*

EII *(334 lf / 134 SMCs)*

**Buffer Mitigation**

R 0-100' *(413,194 sf / 413,194 credits)*

R 101-200' *(37,091 sf / 12,240 credits)*

E *(74,802 sf / 37,401 credits)*

P *(424,660 sf / 17,503 credits)*

Easement Encroachment

Stream Bed Aggradation

Cross-Sections

Photo Points

Flow Gauge

Camera

Bankfull Gauge

Vegetation Monitoring Plots

Success Criteria Met

Success Criteria Not Met

T2-1

T2-2

T2-3

Sheet 4

SF3

Sheet 3

Sheet 2

T1

T1A

Sheet 1

T3-1

T3-2

SF2

Start SF1

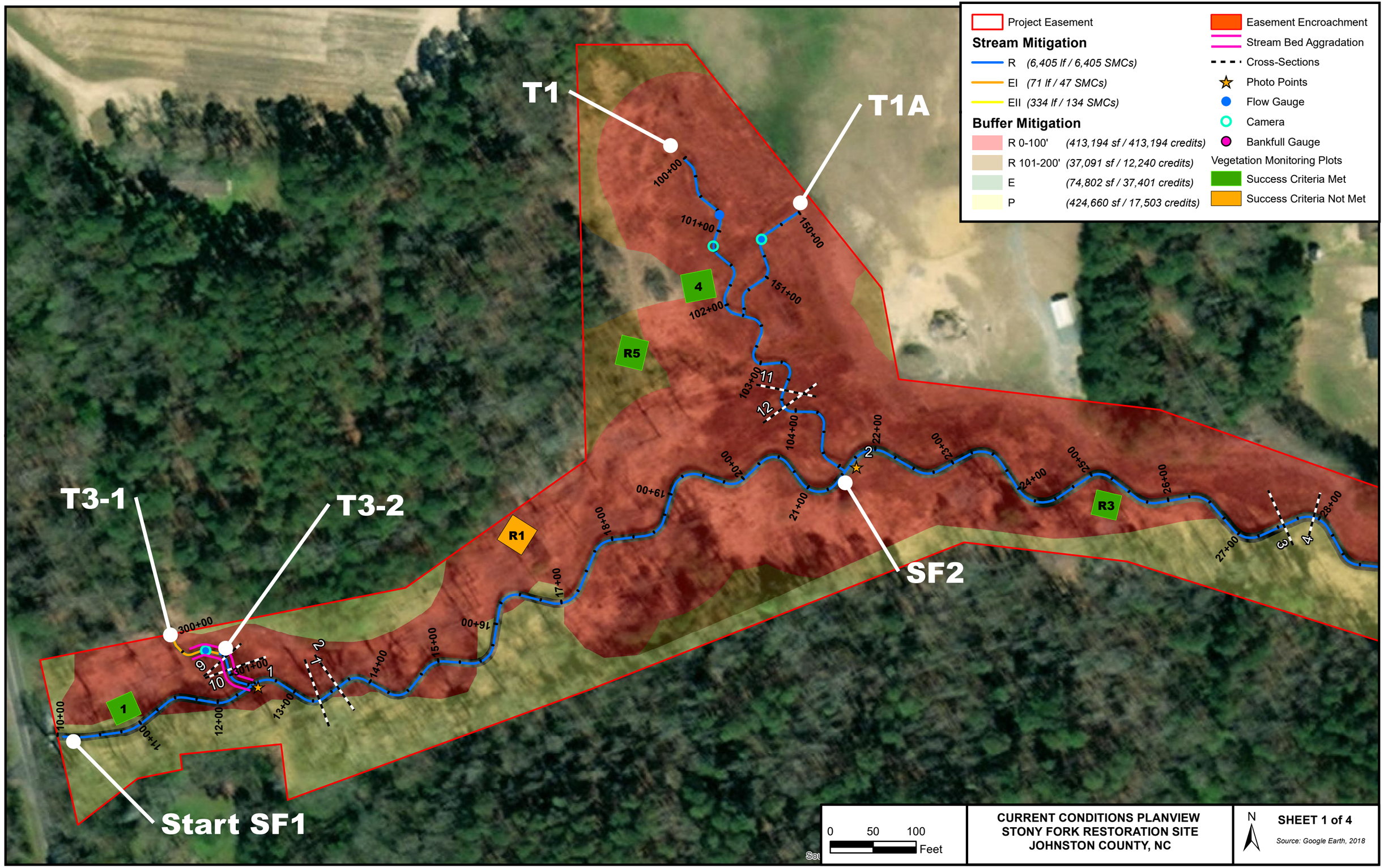
0 150 300 Feet

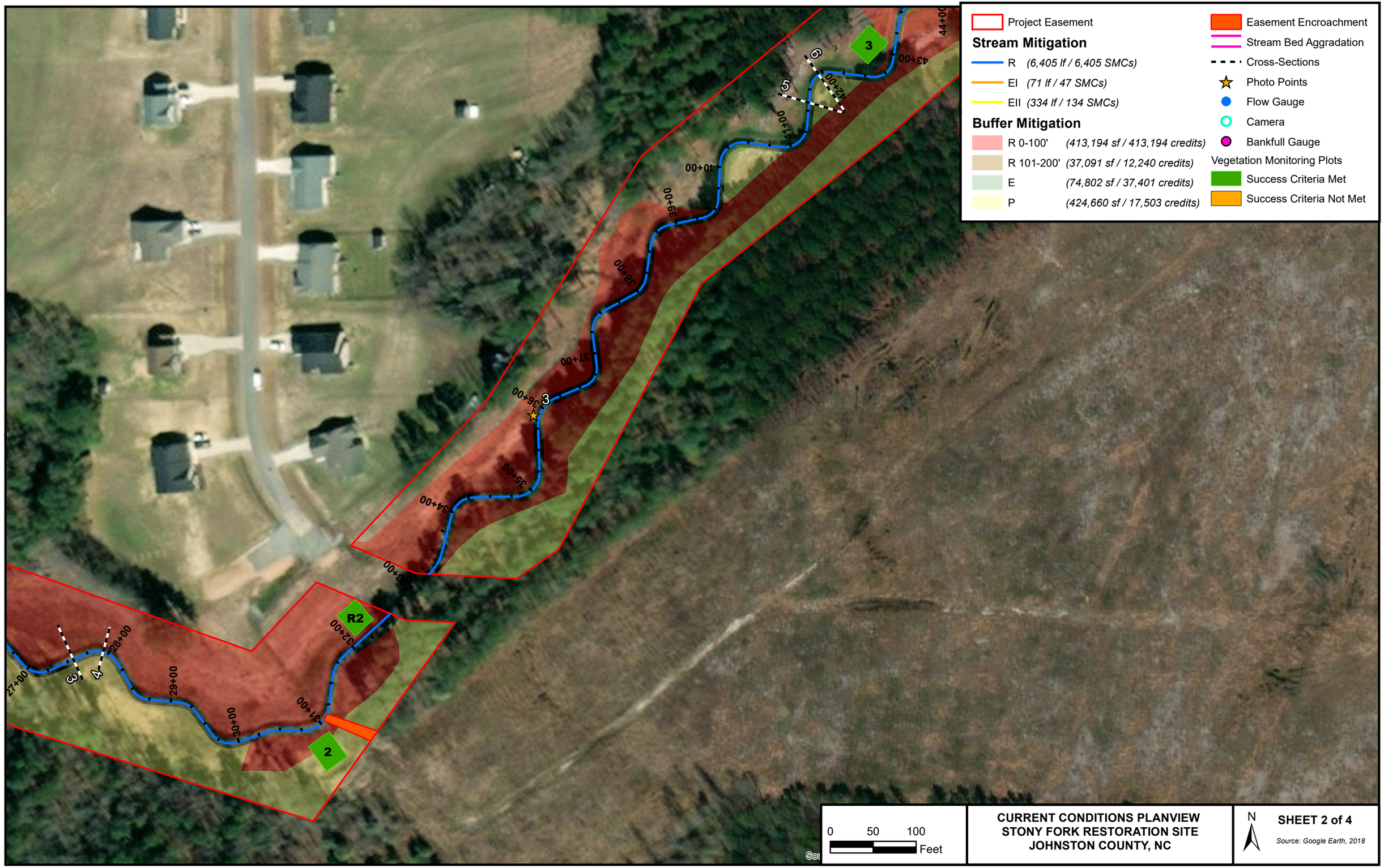
**CURRENT CONDITIONS PLANVIEW**
**STONY FORK RESTORATION SITE**
**JOHNSTON COUNTY, NC**

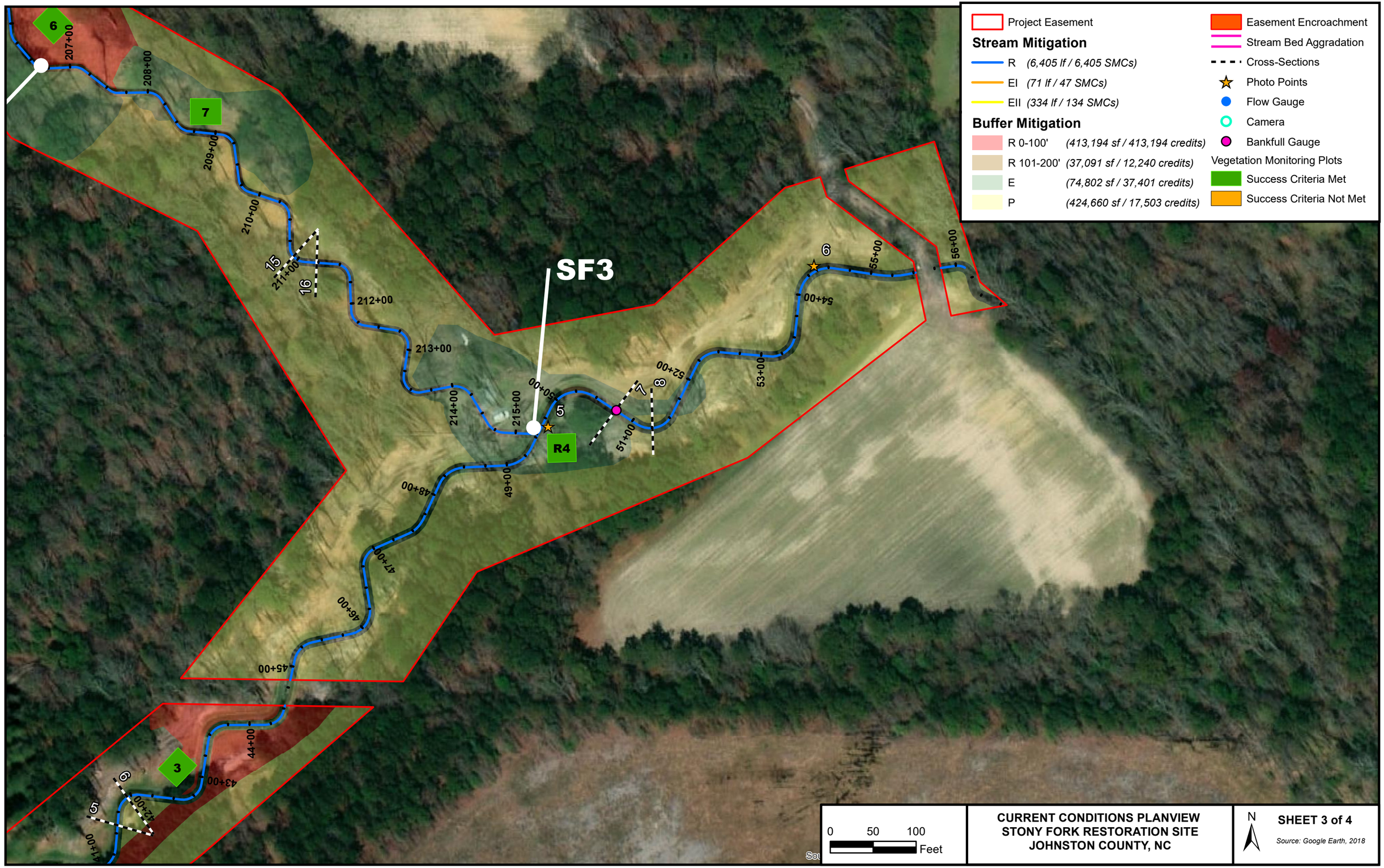
N

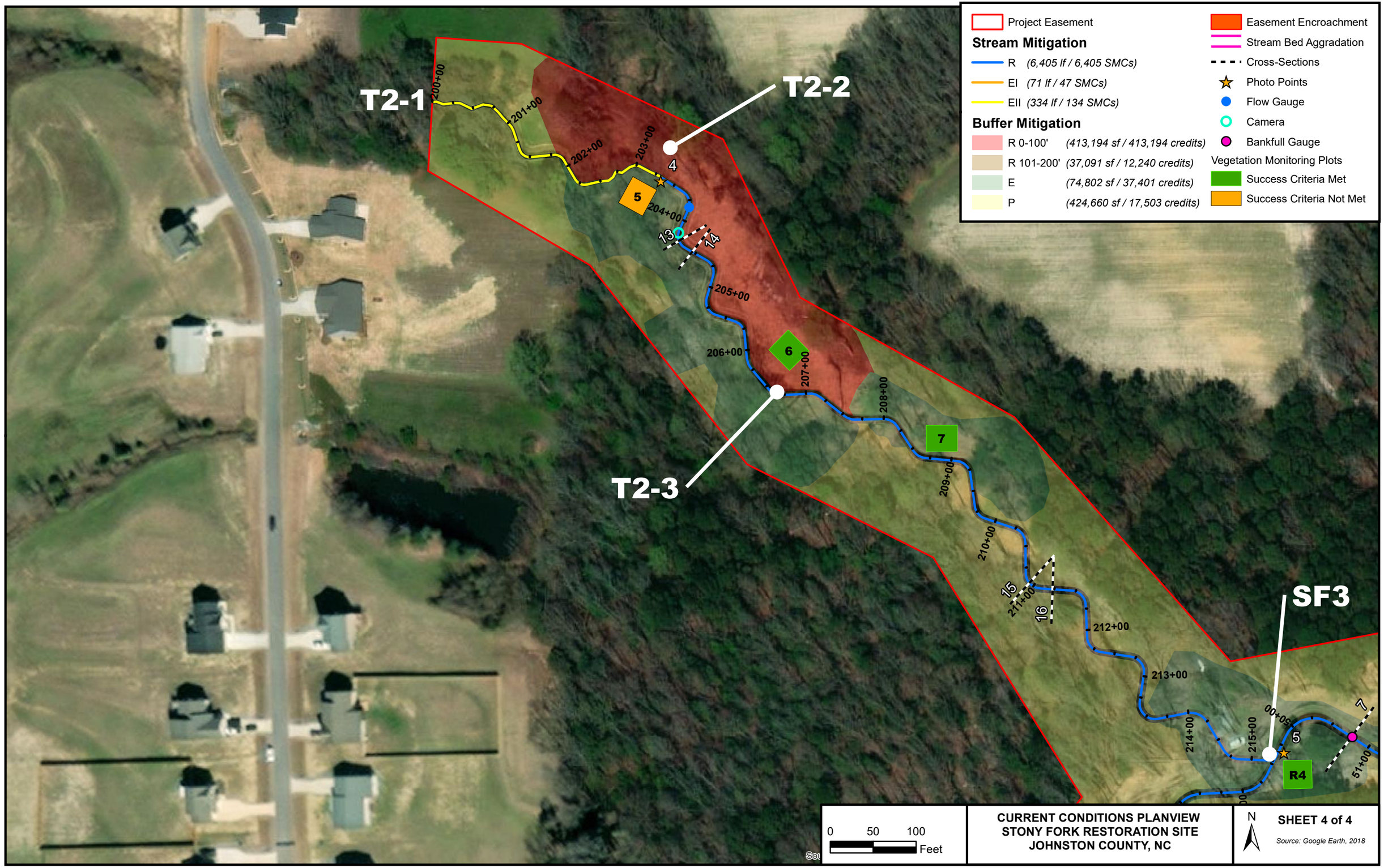
**Overview**

*Source: Google Earth, 2018*


T1
T1A
T3-1
T3-2
SF2
Start SF1
100+00
101+00
102+00
103+00
104+00
150+00
151+00
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
21+00
22+00
23+00
24+00
25+00
26+00
27+00
28+00
300+00
301+00
4
R5
R1
R3
1
2
3
4
11
12
10
9
Project Easement
Stream Mitigation
R (6,405 lf / 6,405 SMCs)
EI (71 lf / 47 SMCs)
EII (334 lf / 134 SMCs)
Buffer Mitigation
R 0-100' (413,194 sf / 413,194 credits)
R 101-200' (37,091 sf / 12,240 credits)
E (74,802 sf / 37,401 credits)
P (424,660 sf / 17,503 credits)
Easement Encroachment
Stream Bed Aggradation
Cross-Sections
Photo Points
Flow Gauge
Camera
Bankfull Gauge
Vegetation Monitoring Plots
Success Criteria Met
Success Criteria Not Met
0 50 100
Feet
CURRENT CONDITIONS PLANVIEW
STONY FORK RESTORATION SITE
JOHNSTON COUNTY, NC
N
SHEET 1 of 4
Source: Google Earth, 2018


Project Easement
Stream Mitigation
R (6,405 lf / 6,405 SMCs)
EI (71 lf / 47 SMCs)
EII (334 lf / 134 SMCs)
Buffer Mitigation
R 0-100' (413,194 sf / 413,194 credits)
R 101-200' (37,091 sf / 12,240 credits)
E (74,802 sf / 37,401 credits)
P (424,660 sf / 17,503 credits)
Easement Encroachment
Stream Bed Aggradation
Cross-Sections
Photo Points
Flow Gauge
Camera
Bankfull Gauge
Vegetation Monitoring Plots
Success Criteria Met
Success Criteria Not Met
3
6
5
4
3
R2
2
44+00
43+00
42+00
41+00
40+00
39+00
38+00
37+00
36+00
35+00
34+00
33+00
32+00
31+00
30+00
29+00
28+00
27+00
0
50
100
Feet
CURRENT CONDITIONS PLANVIEW
STONY FORK RESTORATION SITE
JOHNSTON COUNTY, NC
N
SHEET 2 of 4
Source: Google Earth, 2018


Project Easement
Stream Mitigation
R (6,405 lf / 6,405 SMCs)
EI (71 lf / 47 SMCs)
EII (334 lf / 134 SMCs)
Buffer Mitigation
R 0-100' (413,194 sf / 413,194 credits)
R 101-200' (37,091 sf / 12,240 credits)
E (74,802 sf / 37,401 credits)
P (424,660 sf / 17,503 credits)
Easement Encroachment
Stream Bed Aggradation
Cross-Sections
Photo Points
Flow Gauge
Camera
Bankfull Gauge
Vegetation Monitoring Plots
Success Criteria Met
Success Criteria Not Met
SF3
R4
6
7
3
207+00
208+00
209+00
210+00
211+00
212+00
213+00
214+00
215+00
216+00
217+00
218+00
219+00
220+00
221+00
222+00
223+00
224+00
225+00
226+00
227+00
228+00
229+00
230+00
231+00
232+00
233+00
234+00
235+00
236+00
237+00
238+00
239+00
240+00
241+00
242+00
243+00
244+00
245+00
246+00
247+00
248+00
249+00
250+00
251+00
252+00
253+00
254+00
255+00
256+00
15
16
5
7
8
9
10
11
12
13
14
0 50 100 Feet
CURRENT CONDITIONS PLANVIEW
STONY FORK RESTORATION SITE
JOHNSTON COUNTY, NC
N
SHEET 3 of 4
Source: Google Earth, 2018


T2-1
T2-2
T2-3
SF3
200+00
201+00
202+00
203+00
204+00
205+00
206+00
207+00
208+00
209+00
210+00
211+00
212+00
213+00
214+00
215+00
4
5
6
7
13
14
15
16
R4
Project Easement
Stream Mitigation
R (6,405 lf / 6,405 SMCs)
EI (71 lf / 47 SMCs)
EII (334 lf / 134 SMCs)
Buffer Mitigation
R 0-100' (413,194 sf / 413,194 credits)
R 101-200' (37,091 sf / 12,240 credits)
E (74,802 sf / 37,401 credits)
P (424,660 sf / 17,503 credits)
Easement Encroachment
Stream Bed Aggradation
Cross-Sections
Photo Points
Flow Gauge
Camera
Bankfull Gauge
Vegetation Monitoring Plots
Success Criteria Met
Success Criteria Not Met
0 50 100
Feet
CURRENT CONDITIONS PLANVIEW
STONY FORK RESTORATION SITE
JOHNSTON COUNTY, NC
N
SHEET 4 of 4
Source: Google Earth, 2018

| Table 5 | Visual Stream Morphology Stability Assessment | | | | | | |
|---|---|---|---|---|---|---|---|
| Stony Fork Stream Restoration Site, DMS Project#97085 | | | | | | | |
| Reach ID | | SF1 | | | | | |
| Assessed Length | | 1,155 | | | | | |
| **Major Channel Category** | **Channel Sub-Category** | **Metric** | **Number Stable, Performing as Intended** | **Total Number in As-built** | **Number of Unstable Segments** | **Amount of Unstable Footage** | **% Stable, Performing as Intended** |
| **1. Bed** | 1. **Vertical Stability** (Riffle and Run units) | 1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars) | | | 0 | 0 | 100% |
| | | 2. Degradation - Evidence of downcutting | | | 0 | 0 | 100% |
| | **2. Riffle Condition** | 1. Texture/Substrate - Riffle maintains coarser substrate | 18 | 18 | | | 100% |
| | **3. Meander Pool Condition** | 1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6) | 17 | 17 | | | 100% |
| | | 2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle) | 17 | 17 | | | 100% |
| | 4.**Thalweg Position** | 1. Thalweg centering at upstream of meander bend (Run) | 17 | 17 | | | 100% |
| | | 2. Thalweg centering at downstream of meander (Glide) | 17 | 17 | | | 100% |
| | | | | | | | |
| **2. Bank** | **1. Scoured/Eroding** | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 0 | 0 | 100% |
| | **2. Undercut** | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat. | | | 0 | 0 | 100% |
| | **3. Mass Wasting** | Bank slumping, calving, or collapse | | | 0 | 0 | 100% |
| | | | | **Totals** | 0 | 0 | 100% |
| **3. Engineered Structures** | **1. Overall Integrity** | Structures physically intact with no dislodged boulders or logs. | 5 | 5 | | | 100% |
| | **2. Grade Control** | Grade control structures exhibiting maintenance of grade across the sill. | 5 | 5 | | | 100% |
| | **2a. Piping** | Structures lacking any substantial flow underneath sills or arms. | 5 | 5 | | | 100% |
| | **3. Bank Protection** | Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document) | 5 | 5 | | | 100% |
| | **4. Habitat** | Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow. | 5 | 5 | | | 100% |

| Table 5 | Visual Stream Morphology Stability Assessment | | | | | | |
|---|---|---|---|---|---|---|---|
| Stony Fork Stream Restoration Site, DMS Project#97085 | | | | | | | |
| Reach ID | SF2 | | | | | | |
| Assessed Length | 2,802 | | | | | | |
| **Major Channel Category** | **Channel Sub-Category** | **Metric** | **Number Stable, Performing as Intended** | **Total Number in As-built** | **Number of Unstable Segments** | **Amount of Unstable Footage** | **% Stable, Performing as Intended** |
| **1. Bed** | 1. **Vertical Stability** (Riffle and Run units) | 1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars) | | | 0 | 0 | 100% |
| | | 2. Degradation - Evidence of downcutting | | | 0 | 0 | 100% |
| | **2. Riffle Condition** | 1. Texture/Substrate - Riffle maintains coarser substrate | 36 | 36 | | | 100% |
| | **3. Meander Pool Condition** | 1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6) | 35 | 35 | | | 100% |
| | | 2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle) | 35 | 35 | | | 100% |
| | 4.**Thalweg Position** | 1. Thalweg centering at upstream of meander bend (Run) | 35 | 35 | | | 100% |
| | | 2. Thalweg centering at downstream of meander (Glide) | 35 | 35 | | | 100% |
| | | | | | | | |
| **2. Bank** | **1. Scoured/Eroding** | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 0 | 0 | 100% |
| | **2. Undercut** | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat. | | | 0 | 0 | 100% |
| | **3. Mass Wasting** | Bank slumping, calving, or collapse | | | 0 | 0 | 100% |
| | | | | **Totals** | 0 | 0 | 100% |
| **3. Engineered Structures** | **1. Overall Integrity** | Structures physically intact with no dislodged boulders or logs. | 8 | 8 | | | 100% |
| | **2. Grade Control** | Grade control structures exhibiting maintenance of grade across the sill. | 8 | 8 | | | 100% |
| | **2a. Piping** | Structures lacking any substantial flow underneath sills or arms. | 8 | 8 | | | 100% |
| | **3. Bank Protection** | Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document) | 8 | 8 | | | 100% |
| | **4. Habitat** | Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow. | 8 | 8 | | | 100% |

| Table 5 | Visual Stream Morphology Stability Assessment | | | | | | |
|---|---|---|---|---|---|---|---|
| Stony Fork Stream Restoration Site, DMS Project#97085 | | | | | | | |
| Reach ID | SF3 | | | | | | |
| Assessed Length | 618 | | | | | | |
| **Major Channel Category** | **Channel Sub-Category** | **Metric** | **Number Stable, Performing as Intended** | **Total Number in As-built** | **Number of Unstable Segments** | **Amount of Unstable Footage** | **% Stable, Performing as Intended** |
| **1. Bed** | 1. **Vertical Stability** (Riffle and Run units) | 1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars) | | | 0 | 0 | 100% |
| | | 2. Degradation - Evidence of downcutting | | | 0 | 0 | 100% |
| | **2. Riffle Condition** | 1. Texture/Substrate - Riffle maintains coarser substrate | 9 | 9 | | | 100% |
| | **3. Meander Pool Condition** | 1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6) | 8 | 8 | | | 100% |
| | | 2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle) | 8 | 8 | | | 100% |
| | 4.**Thalweg Position** | 1. Thalweg centering at upstream of meander bend (Run) | 8 | 8 | | | 100% |
| | | 2. Thalweg centering at downstream of meander (Glide) | 8 | 8 | | | 100% |
| | | | | | | | |
| **2. Bank** | **1. Scoured/Eroding** | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 0 | 0 | 100% |
| | **2. Undercut** | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat. | | | 0 | 0 | 100% |
| | **3. Mass Wasting** | Bank slumping, calving, or collapse | | | 0 | 0 | 100% |
| | | | | **Totals** | 0 | 0 | 100% |
| **3. Engineered Structures** | **1. Overall Integrity** | Structures physically intact with no dislodged boulders or logs. | 1 | 1 | | | 100% |
| | **2. Grade Control** | Grade control structures exhibiting maintenance of grade across the sill. | 1 | 1 | | | 100% |
| | **2a. Piping** | Structures lacking any substantial flow underneath sills or arms. | 1 | 1 | | | 100% |
| | **3. Bank Protection** | Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document) | 1 | 1 | | | 100% |
| | **4. Habitat** | Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow. | 1 | 1 | | | 100% |

| Table 5 | Visual Stream Morphology Stability Assessment | | | | | | |
|---|---|---|---|---|---|---|---|
| Stony Fork Stream Restoration Site, DMS Project#97085 | | | | | | | |
| Reach ID | T1 | | | | | | |
| Assessed Length | 365 | | | | | | |
| **Major Channel Category** | **Channel Sub-Category** | **Metric** | **Number Stable, Performing as Intended** | **Total Number in As-built** | **Number of Unstable Segments** | **Amount of Unstable Footage** | **% Stable, Performing as Intended** |
| **1. Bed** | 1. **Vertical Stability** (Riffle and Run units) | 1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars) | | | 0 | 0 | 100% |
| | | 2. Degradation - Evidence of downcutting | | | 0 | 0 | 100% |
| | **2. Riffle Condition** | 1. Texture/Substrate - Riffle maintains coarser substrate | 13 | 13 | | | 100% |
| | **3. Meander Pool Condition** | 1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6) | 12 | 12 | | | 100% |
| | | 2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle) | 12 | 12 | | | 100% |
| | 4.**Thalweg Position** | 1. Thalweg centering at upstream of meander bend (Run) | 12 | 12 | | | 100% |
| | | 2. Thalweg centering at downstream of meander (Glide) | 12 | 12 | | | 100% |
| | | | | | | | |
| **2. Bank** | **1. Scoured/Eroding** | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 0 | 0 | 100% |
| | **2. Undercut** | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat. | | | 0 | 0 | 100% |
| | **3. Mass Wasting** | Bank slumping, calving, or collapse | | | 0 | 0 | 100% |
| | | | | **Totals** | 0 | 0 | 100% |
| **3. Engineered Structures** | **1. Overall Integrity** | Structures physically intact with no dislodged boulders or logs. | 4 | 4 | | | 100% |
| | **2. Grade Control** | Grade control structures exhibiting maintenance of grade across the sill. | 4 | 4 | | | 100% |
| | **2a. Piping** | Structures lacking any substantial flow underneath sills or arms. | 4 | 4 | | | 100% |
| | **3. Bank Protection** | Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document) | 4 | 4 | | | 100% |
| | **4. Habitat** | Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow. | 4 | 4 | | | 100% |

| Table 5 | Visual Stream Morphology Stability Assessment | | | | | | |
|---|---|---|---|---|---|---|---|
| Stony Fork Stream Restoration Site, DMS Project#97085 | | | | | | | |
| Reach ID | T2 | | | | | | |
| Assessed Length | 1,433 | | | | | | |
| **Major Channel Category** | **Channel Sub-Category** | **Metric** | **Number Stable, Performing as Intended** | **Total Number in As-built** | **Number of Unstable Segments** | **Amount of Unstable Footage** | **% Stable, Performing as Intended** |
| **1. Bed** | 1. **Vertical Stability** (Riffle and Run units) | 1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars) | | | 0 | 0 | 100% |
| | | 2. Degradation - Evidence of downcutting | | | 0 | 0 | 100% |
| | **2. Riffle Condition** | 1. Texture/Substrate - Riffle maintains coarser substrate | 27 | 27 | | | 100% |
| | **3. Meander Pool Condition** | 1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6) | 26 | 26 | | | 100% |
| | | 2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle) | 26 | 26 | | | 100% |
| | 4.**Thalweg Position** | 1. Thalweg centering at upstream of meander bend (Run) | 26 | 26 | | | 100% |
| | | 2. Thalweg centering at downstream of meander (Glide) | 26 | 26 | | | 100% |
| | | | | | | | |
| **2. Bank** | **1. Scoured/Eroding** | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 0 | 0 | 100% |
| | **2. Undercut** | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat. | | | 0 | 0 | 100% |
| | **3. Mass Wasting** | Bank slumping, calving, or collapse | | | 0 | 0 | 100% |
| | | | | **Totals** | 0 | 0 | 100% |
| **3. Engineered Structures** | **1. Overall Integrity** | Structures physically intact with no dislodged boulders or logs. | 7 | 7 | | | 100% |
| | **2. Grade Control** | Grade control structures exhibiting maintenance of grade across the sill. | 7 | 7 | | | 100% |
| | **2a. Piping** | Structures lacking any substantial flow underneath sills or arms. | 7 | 7 | | | 100% |
| | **3. Bank Protection** | Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document) | 7 | 7 | | | 100% |
| | **4. Habitat** | Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow. | 7 | 7 | | | 100% |

| Table 5 | Visual Stream Morphology Stability Assessment | | | | | | |
|---|---|---|---|---|---|---|---|
| Stony Fork Stream Restoration Site, DMS Project#97085 | | | | | | | |
| Reach ID | | T3 | | | | | |
| Assessed Length | | 154 | | | | | |
| **Major Channel Category** | **Channel Sub-Category** | **Metric** | **Number Stable, Performing as Intended** | **Total Number in As-built** | **Number of Unstable Segments** | **Amount of Unstable Footage** | **% Stable, Performing as Intended** |
| **1. Bed** | 1. **Vertical Stability** (Riffle and Run units) | 1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars) | | | 1 | 93 | 40% |
| | | 2. Degradation - Evidence of downcutting | | | 0 | 0 | 100% |
| | **2. Riffle Condition** | 1. Texture/Substrate - Riffle maintains coarser substrate | 3 | 3 | | | 100% |
| | **3. Meander Pool Condition** | 1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6) | 0 | 2 | | | 0% |
| | | 2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle) | 2 | 2 | | | 100% |
| | 4.**Thalweg Position** | 1. Thalweg centering at upstream of meander bend (Run) | 2 | 2 | | | 100% |
| | | 2. Thalweg centering at downstream of meander (Glide) | 2 | 2 | | | 100% |
| | | | | | | | |
| **2. Bank** | **1. Scoured/Eroding** | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 0 | 0 | 100% |
| | **2. Undercut** | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat. | | | 0 | 0 | 100% |
| | **3. Mass Wasting** | Bank slumping, calving, or collapse | | | 0 | 0 | 100% |
| | | | | **Totals** | 0 | 0 | 100% |
| **3. Engineered Structures** | **1. Overall Integrity** | Structures physically intact with no dislodged boulders or logs. | N/A | N/A | | | N/A |
| | **2. Grade Control** | Grade control structures exhibiting maintenance of grade across the sill. | N/A | N/A | | | N/A |
| | **2a. Piping** | Structures lacking any substantial flow underneath sills or arms. | N/A | N/A | | | N/A |
| | **3. Bank Protection** | Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document) | N/A | N/A | | | N/A |
| | **4. Habitat** | Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow. | N/A | N/A | | | N/A |

| **Table 6** | **Vegetation Condition Assessment** | | | | | |
|---|---|---|---|---|---|---|
| **Stony Fork Stream Restoration Site, DMS Project# 97085** | | | | | | |
| **Planted Acreage** | **24.4** | | | | | |
| **Vegetation Category** | **Definitions** | **Mapping Threshold** | **CCPV Depiction** | **Number of Polygons** | **Combined Acreage** | **% of Planted Acreage** |
| **1. Bare Areas** | Very limited cover of both woody and herbaceous material. | 0.1 acres | Pattern and Color | 0 | 0.00 | 0.0% |
| **2. Low Stem Density Areas** | Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria. | 0.1 acres | Pattern and Color | 0 | 0.00 | 0.0% |
| | | | **Total** | 0 | 0.00 | 0.0% |
| **3. Areas of Poor Growth Rates or Vigor** | Areas with woody stems of a size class that are obviously small given the monitoring year. | 0.25 acres | Pattern and Color | 0 | 0.00 | 0.0% |
| | | | **Cumulative Total** | 0 | 0.00 | 0.0% |
| | | | | | | |
| **Easement Acreage** | **9.5** | | | | | |
| **Vegetation Category** | **Definitions** | **Mapping Threshold** | **CCPV Depiction** | **Number of Polygons** | **Combined Acreage** | **% of Easement Acreage** |
| **4. Invasive Areas of Concern** | Areas or points (if too small to render as polygons at map scale). | 1000 SF | Pattern and Color | 0 | 0.00 | 0.0% |
| | | | | | | |
| **5. Easement Encroachment Areas** | Areas or points (if too small to render as polygons at map scale). | none | Pattern and Color | 1 | 0.02 | 0.2% |

# Photo Reference Photos

PP1U – MY-00 – 5/15/19

PP1U – MY-03 – 9/18/21

PP1D – MY-00 – 5/15/19

PP1D – MY-03 – 9/18/21

PP2U – MY-00 – 5/15/19

PP2U – MY-03 – 9/18/21

PP2D – MY-00 – 5/15/19

PP2D – MY-03 – 9/18/21

PP3U – MY-00 – 5/15/19

PP3U – MY-03 – 9/18/21

PP3D – MY-00 – 5/15/19

PP3D – MY-03 – 9/18/21

PP4U – MY-00 – 5/15/19

PP4U – MY-03 – 9/18/21

PP4D – MY-00 – 5/15/19

PP4D – MY-03 – 9/18/21

PP5U – MY-00 – 5/15/19

PP5U – MY-03 – 9/18/21

PP5D – MY-00 – 5/15/19

PP5D – MY-03 – 9/18/21

PP6U – MY-00 – 5/15/19

PP6U – MY-03 – 9/18/21

PP6D – MY-00 – 5/15/19

PP6D – MY-03 – 9/18/21

# Permanent Vegetation Monitoring Plot Photos

Vegetation Plot 1 – MY-00 – 5/15/19

Vegetation Plot 1 – MY-03 – 8/26/21

Vegetation Plot 2 – MY-00 – 5/15/19

Vegetation Plot 2 – MY-03 – 8/26/21

Vegetation Plot 3 – MY-00 – 5/15/19

Vegetation Plot 3 – MY-03 – 8/26/21

Vegetation Plot 4 – MY-00 – 5/15/19

Vegetation Plot 4 – MY-03 – 8/26/21

Vegetation Plot 5 – MY-00 – 5/15/19

Vegetation Plot 5 – MY-03 – 8/27/21

Vegetation Plot 6 – MY-00 – 5/15/19

Vegetation Plot 6 – MY-03 – 8/27/21

Vegetation Plot 7 – MY-00 – 5/15/19

Vegetation Plot 7 – MY-03 – 8/27/21

# Random Vegetation Monitoring Plot Photos

Vegetation Plot R1 – MY-03 – 8/30/21

Vegetation Plot R2 – MY-03 – 8/30/21

Vegetation Plot R3 – MY-03 – 8/30/21

Vegetation Plot R4 – MY-03 – 8/30/21

Vegetation Plot R5 – MY-03 – 8/30/21

# Easement Encroachment Photos

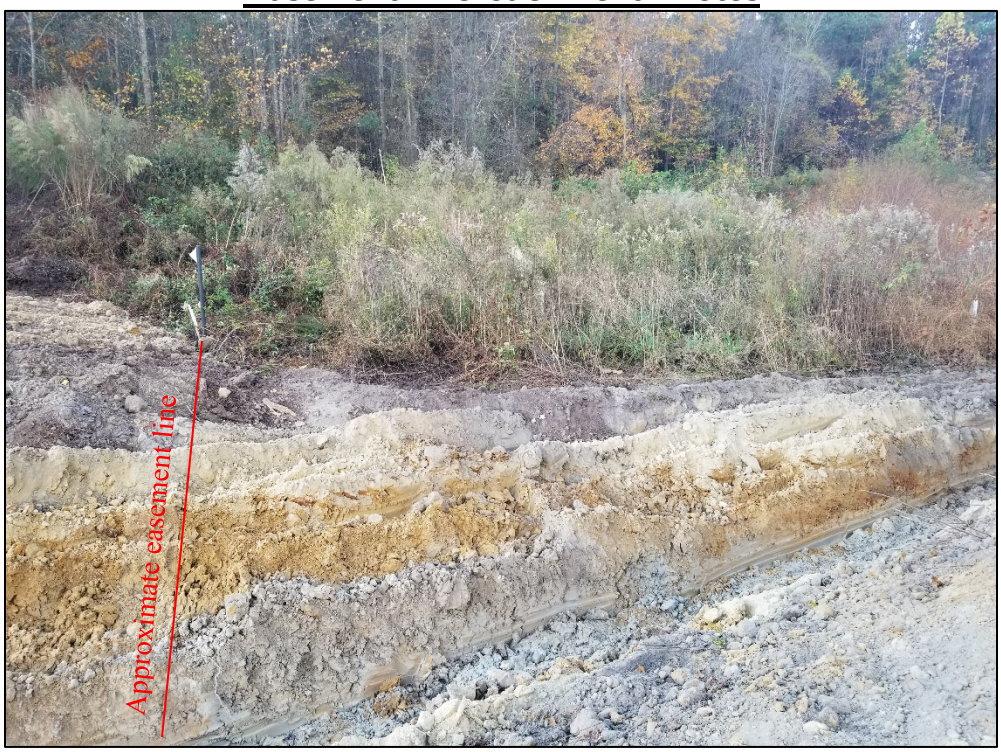



Photo 1 – View of encroachment looking along the easement line

Photo 2 – View of encroachment from left bank of project stream

# Upstream Reach of T3 Photos

# APPENDIX C

Vegetation Plot Data

**Table 7. Stem Count by Plot and Species**
**Stony Fork Restoration Site, DMS Project #97085**

| | Current Plot Data (MY03 2021) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Plot 01 | | Plot 02 | | Plot 03 | | Plot 04 | | Plot 05 | | Plot 06 | | Plot 7 | |
| **Species** | **Planted** | **Total** | **Planted** | **Total** | **Planted** | **Total** | **Planted** | **Total** | **Planted** | **Total** | **Planted** | **Total** | **Planted** | **Total** |
| American Elm (*Ulmus americana*) | | | | | | | | | | | | | | |
| American Holly (*Illex opaca*) | | | | | | | | | | | | | | |
| American Persimmon (*Diospyros virginiana*) | | | | | | | | | | | | | | |
| American Sycamore (*Platanus occidentalis*) | 4 | 4 | 7 | 7 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 3 | 1 | 1 |
| Bald Cypress (*Taxodium distichum*) | | | | | | | 1 | 1 | | | | | 4 | 4 |
| Black Willow (*Salix nigra*) | | 1 | | | | | | | | | | 4 | | 1 |
| Elderberry (*Sambucus canadensis*) | | | | | | | | | | | | | | |
| Green Ash (*Fraxinus pennsylvanica*) | 2 | 2 | 4 | 4 | 4 | 4 | | | | | | | | |
| Loblolly Pine (*Pinus taeda*) | | 6 | | | | | | 2 | | | | | | |
| Oak (*Quercus sp.*) | | | | | | | | | | | | | | |
| Pawpaw (*Asimina triloba*) | | | | | | | | | | | | | | |
| Pin Oak (*Quercus palustris*) | 2 | 2 | 2 | 2 | | | 1 | 1 | | | 1 | 1 | 1 | 1 |
| Red Maple (*Acer rubrum*) | | | | | | | | | | 2 | | | | |
| Red Oak (*Quercus rubra*) | | | | | | | | | | | | | | |
| River Birch (*Betula nigra*) | | | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 |
| Silky Dogwood (*Cornus amomum*) | | | | | | | 5 | 5 | | | 1 | 1 | 1 | 1 |
| Spicebush (*Lindera benzoin*) | | | | | | | | | | | | | | |
| Sugar Berry (*Celtis laevigata*) | | | | | | | | | | | | | | |
| Swamp Chestnut Oak (*Quercus michauxii*) | 2 | 2 | | | | | | | | | 1 | 1 | 1 | 1 |
| Sweet Bay (*Magnolia virginiana*) | | | | | | | | | | 1 | | | | |
| Sweetgum (*Liquidambar styraciflua*) | | 1 | | 1 | | 6 | | | | | | | | |
| Tulip Poplar (*Liriodendron tulipifera*) | | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | | |
| Water Oak (*Quercus nigra*) | | | | | | | | | | | | | | |
| Wax Myrtle (*Myrica cerifera*) | | 1 | | | | | | 1 | | | | | | |
| White Oak (*Quercus alba*) | 1 | 1 | | | 1 | 1 | | | 1 | 2 | | | | |
| Willow Oak (*Quercus phellos*) | 1 | 1 | 1 | 1 | 3 | 3 | 6 | 6 | | | 1 | 1 | 2 | 2 |
| Unknown | | | | | | | | | | | | | | |
| **Stem count** | 12 | 22 | 16 | 17 | 11 | 17 | 16 | 20 | 3 | 7 | 10 | 14 | 11 | 12 |
| **size (ares)** | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| **size (ACRES)** | 0.025 | | 0.025 | | 0.025 | | 0.025 | | 0.025 | | 0.025 | | 0.025 | |
| **Species count** | 6 | 11 | 6 | 7 | 6 | 7 | 6 | 8 | 3 | 5 | 7 | 8 | 7 | 8 |
| **Stems per ACRE** | 486 | 890 | 647 | 688 | 445 | 688 | 647 | 809 | 121 | 283 | 405 | 567 | 445 | 486 |

**Table 7. Stem Count by Plot and Species**
**Stony Fork Restoration Site, DMS Project #97085**

| | Current Plot Data (MY03 2021) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Plot R1 | | Plot R2 | | Plot R3 | | Plot R4 | | Plot R5 | |
| **Species** | **Planted** | **Total** | **Planted** | **Total** | **Planted** | **Total** | **Planted** | **Total** | **Planted** | **Total** |
| American Elm (*Ulmus americana*) | | | | | | | | | | |
| American Holly (*Illex opaca*) | | | | | | | | | | 1 |
| American Persimmon (*Diospyros virginiana*) | | | | | | | | | | |
| American Sycamore (*Platanus occidentalis*) | | | 6 | 6 | 2 | 2 | 10 | 10 | | |
| Bald Cypress (*Taxodium distichum*) | | | | | | | | | | |
| Black Willow (*Salix nigra*) | | | 1 | 1 | | | | | | |
| Elderberry (*Sambucus canadensis*) | | | | 4 | | | | | | |
| Green Ash (*Fraxinus pennsylvanica*) | 1 | 1 | 6 | 6 | 13 | 13 | 2 | 2 | 5 | 5 |
| Loblolly Pine (*Pinus taeda*) | | | | 1 | | 3 | | 1 | | |
| Oak (*Quercus sp.*) | | | | | | | | | | |
| Pawpaw (*Asimina triloba*) | | | | | | | | | | 2 |
| Pin Oak (*Quercus palustris*) | 1 | 1 | | | | | 1 | 1 | | |
| Red Maple (*Acer rubrum*) | | | | | | 3 | | | | 1 |
| Red Oak (*Quercus rubra*) | | | | | | | | | | |
| River Birch (*Betula nigra*) | | | | | 2 | 2 | 4 | 4 | | |
| Silky Dogwood (*Cornus amomum*) | | | | | | | | | | |
| Spicebush (*Lindera benzoin*) | | | | | | | | | | 1 |
| Sugar Berry (*Celtis laevigata*) | | | | | | | | | | |
| Swamp Chestnut Oak (*Quercus michauxii*) | | | | | | | 1 | 1 | 1 | 1 |
| Sweet Bay (*Magnolia virginiana*) | | | | | | | | | | |
| Sweetgum (*Liquidambar styraciflua*) | | 3 | | | | 8 | | | | 1 |
| Tulip Poplar (*Liriodendron tulipifera*) | 2 | 2 | 1 | 1 | | | | | 5 | 5 |
| Water Oak (*Quercus nigra*) | | | | | | | | | | |
| Wax Myrtle (*Myrica cerifera*) | | | | | | | | | | |
| White Oak (*Quercus alba*) | 1 | 1 | | | | | | | | |
| Willow Oak (*Quercus phellos*) | | | | | 4 | 4 | 1 | 1 | | |
| Unknown | | | | | | | | | | |
| **Stem count** | 5 | 8 | 14 | 19 | 21 | 35 | 19 | 20 | 11 | 17 |
| **size (ares)** | 1 | | 1 | | 1 | | 1 | | 1 | |
| **size (ACRES)** | 0.025 | | 0.025 | | 0.025 | | 0.025 | | 0.025 | |
| **Species count** | 4 | 5 | 4 | 6 | 4 | 7 | 6 | 7 | 3 | 8 |
| **Stems per ACRE** | 202 | 324 | 567 | 769 | 850 | 1,416 | 769 | 809 | 445 | 688 |

**Table 7. Stem Count by Plot and Species**
**Stony Fork Restoration Site, DMS Project #97085**

| | Annual Means | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | MY03 (2021) | | MY02 (2020) | | MY01 (2019) | | MY00 (2019) | |
| **Species** | **Planted** | **Total** | **Planted** | **Total** | **Planted** | **Total** | **Planted** | **Total** |
| American Elm (*Ulmus americana*) | | | | 3 | | | | |
| American Holly (*Illex opaca*) | | 1 | | | | | | |
| American Persimmon (*Diospyros virginiana*) | | | 2 | 2 | 4 | 4 | | |
| American Sycamore (*Platanus occidentalis*) | 37 | 37 | 43 | 44 | 40 | 40 | 9 | 9 |
| Bald Cypress (*Taxodium distichum*) | 5 | 5 | 5 | 5 | 7 | 7 | 1 | 1 |
| Black Willow (*Salix nigra*) | 1 | 7 | 2 | 6 | | 2 | | |
| Elderberry (*Sambucus canadensis*) | | 4 | | 3 | 1 | 1 | 2 | 2 |
| Green Ash (*Fraxinus pennsylvanica*) | 37 | 37 | 31 | 31 | 25 | 25 | 29 | 29 |
| Loblolly Pine (*Pinus taeda*) | | 13 | | 30 | 2 | 2 | | |
| Oak (*Quercus sp.*) | | | | | 1 | 1 | 18 | 18 |
| Pawpaw (*Asimina triloba*) | | 2 | | | | | | |
| Pin Oak (*Quercus palustris*) | 9 | 9 | 11 | 11 | 7 | 7 | 3 | 3 |
| Red Maple (*Acer rubrum*) | | 6 | | 5 | 4 | 11 | | 2 |
| Red Oak (*Quercus rubra*) | | | | | 2 | 2 | | |
| River Birch (*Betula nigra*) | 13 | 14 | 27 | 27 | 17 | 17 | 2 | 2 |
| Silky Dogwood (*Cornus amomum*) | 7 | 7 | 10 | 10 | 8 | 8 | 10 | 10 |
| Spicebush (*Lindera benzoin*) | | 1 | | | | | | |
| Sugar Berry (*Celtis laevigata*) | | | | | | | 2 | 2 |
| Swamp Chestnut Oak (*Quercus michauxii*) | 6 | 6 | 5 | 5 | 7 | 7 | 7 | 7 |
| Sweet Bay (*Magnolia virginiana*) | | 1 | | 1 | | 1 | | 1 |
| Sweetgum (*Liquidambar styraciflua*) | | 20 | | 11 | 2 | 8 | | |
| Tulip Poplar (*Liriodendron tulipifera*) | 11 | 12 | 6 | 8 | 14 | 20 | 14 | 14 |
| Water Oak (*Quercus nigra*) | | | | | | | 1 | 1 |
| Wax Myrtle (*Myrica cerifera*) | | 2 | | 1 | | | | |
| White Oak (*Quercus alba*) | 4 | 5 | 5 | 6 | 12 | 15 | 1 | 4 |
| Willow Oak (*Quercus phellos*) | 19 | 19 | 23 | 23 | 30 | 30 | 3 | 3 |
| Unknown | | | | | 4 | 4 | 199 | 199 |
| **Stem count** | 149 | 208 | 170 | 232 | 187 | 212 | 301 | 307 |
| **size (ares)** | 12 | | 12 | | 12 | | 12 | |
| **size (ACRES)** | 0.30 | | 0.30 | | 0.30 | | 0.30 | |
| **Species count** | 11 | 20 | 12 | 19 | 18 | 20 | 15 | 17 |
| **Stems per ACRE** | 502 | 701 | 573 | 782 | 946 | 1,072 | 1,523 | 1,553 |

# APPENDIX D

Stream Measurement and Geomorphology Data

**Table 8a. SF1 Data Summary**
**Stony Fork Restoration Site, DMS Project #97085**

| Parameter | Pre-Existing Condition | Reference Reach(es) Data | Design | As-built | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| **Dimension - Riffle** | | | | Min | Mean | Max | n |
| Bankfull Width (ft) | 7.2 | 14.8-18.8 | 9.7 | | 9.3 | | 1 |
| Floodprone Width (ft) | 8.7 | >50 | 100 | | >80 | | 1 |
| Bankfull Mean Depth (ft) | 0.9 | 1.3-1.8 | 0.7 | | 0.8 | | 1 |
| Bankfull Max Depth (ft) | 1.2 | 1.9-2.4 | 1.1 | | 1.2 | | 1 |
| Bankfull Cross-Sectional Area ($ft^2$) | 6.4 | 25 | 7.0 | | 7.0 | | 1 |
| Width/Depth Ratio | 8.1 | 9.0-14.0 | 13.5 | | 12.2 | | 1 |
| Entrenchment Ratio | 1.2 | >2.5 | 10.3 | | 8.7 | | 1 |
| Bank Height Ratio | 2.9 | 1.0-1.2 | 1.0 | | 1.0 | | 1 |
| **Pattern** | | | | | | | |
| Channel Beltwidth (ft) | * | 60 | 30-55 | | 30-55 | | |
| Radius of Curvature (ft) | * | 16—87 | 20-29 | | 20-29 | | |
| Rc:Bankfull width (ft/ft) | * | 3.5—12.9 | 9.6-13.6 | | 9.6-13.6 | | |
| Meander Wavelength (ft) | * | 66—191 | 93-132 | | 93-132 | | |
| Meander Width Ratio | * | 4.1 | 3.1-5.7 | | 3.1-5.7 | | |
| **Profile** | | | | | | | |
| Riffle Length (ft) | | | | 23.40 | 31.55 | 40.95 | 17 |
| Riffle Slope (ft/ft) | 0.009 | 0.013—0.035 | 0.009-0.015 | 0.0031 | 0.0141 | 0.0137 | 17 |
| Pool Length (ft) | * | 14—33 | 21-46 | 12.47 | 28.73 | 41.34 | 17 |
| Pool Spacing (ft) | * | 2.7—7.1 | 5.6-7.3 | 44.28 | 68.72 | 142.01 | 17 |
| **Substrate and Transport Parameters** | | | | | | | |
| SC% / Sa% / G% / C% / B% /Be% | 3/40/57/0/0/0 | | | 0/4/90/7/0/0 | | | |
| d16 / d35 / d50 / d84 / d95 (mm) | 0.15/1.2/2.2/7.5/11/-0.4/7.1 | Gravel | Gravel | 9.4/16/22/33/53/70 | | | |
| | | | | | | | |
| Channel length (ft) | 1235 | | 1155 | 1155 | | | |
| Drainage Area (SM) | 0.27 | 1.49 | 0.27 | 0.27 | | | |
| Rosgen Classification | G4c | C4 | C4 | C4 | | | |
| Sinuosity | 1.3 | 1.3 | 1.2 | 1.2 | | | |
| Water Surface Slope (ft/ft) | 0.009 | 0.005 | 0.009 | 0.01 | | | |

* : no data shown for pools, radius of curvature or meanders in existing stream do to channelization / lack of bed diversity

| **Table 8b. SF2 Baseline Stream Data Summary**<br>**Stony Fork Restoration Site, DMS Project #97085** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Parameter** | Pre-Existing Condition | Reference Reach(es) Data (SF) | Design | As-built | | | |
| | | | | | | | |
| **Dimension - Riffle** | | | | Min | Mean | Max | n |
| Bankfull Width (ft) | 5.0-10.0 | 14.8-18.8 | 11.3 | 12.2 | 12.4 | 12.6 | 2 |
| Floodprone Width (ft) | 7.4-14.5 | >50 | 100 | 53.3 | 67.0 | 80.7 | 2 |
| Bankfull Mean Depth (ft) | 1.0-1.4 | 1.3-1.8 | 0.8 | 0.9 | 0.95 | 1.0 | 2 |
| Bankfull Max Depth (ft) | 1.3-2.2 | 1.9-2.4 | 1.2 | 1.4 | 1.5 | 1.6 | 2 |
| Bankfull Cross-Sectional Area ($ft^2$) | 6.9-8.9 | 25 | 9.4 | 10.6 | 11.6 | 12.5 | 2 |
| Width/Depth Ratio | 3.7-11.2 | 9.0-14.0 | 13.5 | 12.8 | 13.5 | 14.1 | 2 |
| Entrenchment Ratio | 1.4-1.5 | >2.5 | 8.8 | 4.2 | 5.4 | 6.6 | 2 |
| Bank Height Ratio | 1.6-2.1 | 1.0-1.2 | 1.0 | 1 | 1 | 1 | 2 |
| **Pattern** | | | | | | | |
| Channel Beltwidth (ft) | * | 60 | 37-65 | 37-65 | | | |
| Radius of Curvature (ft) | * | 16—87 | 22-33 | 22-33 | | | |
| Rc:Bankfull width (ft/ft) | * | 3.5—12.9 | 9.3-13.1 | 9.3-13.1 | | | |
| Meander Wavelength (ft) | * | 66—191 | 105-148 | 105-148 | | | |
| Meander Width Ratio | * | 4.1 | 3.3-5.8 | 3.3-5.8 | | | |
| **Profile** | | | | | | | |
| Riffle Length (ft) | | | | 17.58 | 39.07 | 86.38 | 36 |
| Riffle Slope (ft/ft) | 0.003-0.008 | 0.013—0.035 | 0.009 - 0.015 | 0.0021 | 0.0118 | 0.0256 | 36 |
| Pool Length (ft) | * | 14—33 | 24-52 | 12.51 | 28.83 | 52.39 | 34 |
| Pool Spacing (ft) | * | 2.7—7.1 | 5.2-7.4 | 43.01 | 81.44 | 178.86 | 34 |
| **Substrate and Transport Parameters** | | | | | | | |
| SC% / Sa% / G% / C% / B% /Be% | 20.3/30/49.8/0/0/0 | | | 5/8/54/33/0/0 | | | |
| d16 / d35 / d50 / d84 / d95 (mm) | 0.33/0.61/1.2/6.2/9.8/0.3/5.5 | Gravel | Gravel | 5.9/31/45/61/98.5/140 | | | |
| | | | | | | | |
| Channel length (ft) | 2453 | | 2802 | 2802 | | | |
| Drainage Area (SM) | 0.41 | 1.49 | 0.41 | 0.41 | | | |
| Rosgen Classification | G4c—G5c | C4 | C4 | C4 | | | |
| Sinuosity | 1.1 | 1.3 | 1.2 | 1.2 | | | |
| Water Surface Slope (ft/ft) | 0.008 | 0.005 | 0.008 | 0.008 | | | |

* : no data shown for pools, radius of curvature or meanders in existing stream do to channelization / lack of bed diversity

| **Table 8c. SF3 Baseline Stream Data Summary**<br>**Stony Fork Restoration Site, DMS Project #97085** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Parameter** | Pre-Existing Condition | Reference Reach(es) Data (SF) | Design | As-built | | | |
| | | | | | | | |
| **Dimension - Riffle** | | | | Min | Mean | Max | n |
| Bankfull Width (ft) | 10.5 | 14.8-18.8 | 12.6 | | 11.6 | | 1 |
| Floodprone Width (ft) | 14.4 | >50 | 100 | | 92.4 | | 1 |
| Bankfull Mean Depth (ft) | 1.2 | 1.3-1.8 | 0.9 | | 1.1 | | 1 |
| Bankfull Max Depth (ft) | 1.3 | 1.9-2.4 | 1.4 | | 1.7 | | 1 |
| Bankfull Cross-Sectional Area ($ft^2$) | 12.5 | 25 | 11.8 | | 12.9 | | 1 |
| Width/Depth Ratio | 8.9 | 9.0-14.0 | 13.5 | | 10.4 | | 1 |
| Entrenchment Ratio | 1.4 | >2.5 | 7.9 | | 8.0 | | 1 |
| Bank Height Ratio | 2.0 | 1.0-1.2 | 1.0 | | 1.0 | | 1 |
| **Pattern** | | | | | | | |
| Channel Beltwidth (ft) | * | 60 | 46-77 | | 46-77 | | |
| Radius of Curvature (ft) | * | 16—87 | 28-35 | | 28-35 | | |
| Rc:Bankfull width (ft/ft) | * | 3.5—12.9 | 11.7-14 | | 11.7-14 | | |
| Meander Wavelength (ft) | * | 66—191 | 148-176 | | 148-176 | | |
| Meander Width Ratio | * | 4.1 | 3.7-6.1 | | 3.7-6.1 | | |
| **Profile** | | | | | | | |
| Riffle Length (ft) | | | | 7.4 | 35.2 | 52.4 | 7 |
| Riffle Slope (ft/ft) | 0.006 | 0.013—0.035 | 0.01 | 0.0032 | 0.0075 | 0.0175 | 7 |
| Pool Length (ft) | * | 14—33 | 35-62 | 12.4 | 33.9 | 39.7 | 7 |
| Pool Spacing (ft) | * | 2.7—7.1 | 6.7-8.0 | 92.0 | 103.1 | 114.4 | 7 |
| **Substrate and Transport Parameters** | | | | | | | |
| SC% / Sa% / G% / C% / B% /Be% | 10/0/0/0/0/0 | | | 21/21/40/18/0/0 | | | |
| d16 / d35 / d50 / d84 / d95 (mm) | 1.1/6.0/8.3/12/15/-0.7/3.3 | Gravel | Gravel | 0.06/0.77/16/29/70/120 | | | |
| | | | | | | | |
| Channel length (ft) | 618 | | 654 | 654 | | | |
| Drainage Area (SM) | 0.84 | 1.49 | 0.84 | 0.84 | | | |
| Rosgen Classification | G4c | C4 | C4 | C4 | | | |
| Sinuosity | 1.1 | 1.3 | 1.2 | 1.2 | | | |
| Water Surface Slope (ft/ft) | 0.006 | 0.005 | 0.008 | 0.006 | | | |

* : no data shown for pools, radius of curvature or meanders in existing stream do to channelization / lack of bed diversity

| **Table 8d. T1 Baseline Stream Data Summary**<br>**Stony Fork Restoration Site, DMS Project #97085** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Parameter** | Pre-Existing Condition | Reference Reach(es) Data (SF) | Design | As-built | | | |
| | | | | | | | |
| **Dimension - Riffle** | | | | Min | Mean | Max | n |
| Bankfull Width (ft) | 3.4 | 14.8-18.8 | 5.0 | | 4.2 | | 1 |
| Floodprone Width (ft) | 4.5 | >50 | 50 | | 45.0 | | 1 |
| Bankfull Mean Depth (ft) | 0.3 | 1.3-1.8 | 0.4 | | 0.2 | | 1 |
| Bankfull Max Depth (ft) | 0.4 | 1.9-2.4 | 0.6 | | 0.5 | | 1 |
| Bankfull Cross-Sectional Area ($ft^2$) | 0.9 | 25 | 1.9 | | 0.9 | | 1 |
| Width/Depth Ratio | 12.7 | 9.0-14.0 | 13.5 | | 18.6 | | 1 |
| Entrenchment Ratio | 1.3 | >2.5 | 10 | | 10.8 | | 1 |
| Bank Height Ratio | 4.5 | 1.0-1.2 | 1.0 | | 1.0 | | 1 |
| **Pattern** | | | | | | | |
| Channel Beltwidth (ft) | * | 60 | 23-37 | | 23-37 | | |
| Radius of Curvature (ft) | * | 16—87 | 11-17 | | 11-17 | | |
| Rc:Bankfull width (ft/ft) | * | 3.5—12.9 | 11.6-14.4 | | 11.6-14.4 | | |
| Meander Wavelength (ft) | * | 66—191 | 58-72 | | 58-72 | | |
| Meander Width Ratio | * | 4.1 | 4.6-7.4 | | 4.6-7.4 | | |
| **Profile** | | | | | | | |
| Riffle Length (ft) | | | | 4.53 | 18.2 | 29.1 | 11 |
| Riffle Slope (ft/ft) | 0.035 | 0.013—0.035 | 0.014-0.04 | 0.00 | 0.024 | 0.045 | 11 |
| Pool Length (ft) | * | 14—33 | 11-29 | 7.29 | 40.2 | 65.6 | 11 |
| Pool Spacing (ft) | * | 2.7—7.1 | 6.2-8.8 | 35.7 | 45.7 | 60.3 | 11 |
| **Substrate and Transport Parameters** | | | | | | | |
| SC% / Sa% / G% / C% / B% /Be% | | | | 10/3/21/66/0/0 | | | |
| d16 / d35 / d50 / d84 / d95 (mm) | Silt-Clay | Gravel | Gravel | 37/65/78/94/130/170 | | | |
| | | | | | | | |
| Channel length (ft) | 365 | | 510 | 510 | | | |
| Drainage Area (SM) | 0.02 | 1.49 | 0.02 | 0.02 | | | |
| Rosgen Classification | G5 | C4 | C4 | C4 | | | |
| Sinuosity | 1.0 | 1.3 | 1.2 | 1.2 | | | |
| Water Surface Slope (ft/ft) | 0.035 | 0.005 | 0.020 | 0.019 | | | |

* : no data shown for pools, radius of curvature or meanders in existing stream do to channelization / lack of bed diversity

| Table 8e. T2-1 Baseline Stream Data Summary<br>Stony Fork Restoration Site, DMS Project #97085 | | | | |
|---|---|---|---|---|
| **Parameter** | Pre-Existing Condition | Reference Reach(es) Data | Design | As-built |
| | | | | |
| **Dimension - Riffle** | | | | |
| Bankfull Width (ft) | 4.5-5.7 | 14.8-18.8 | 5.0 | |
| Floodprone Width (ft) | 5.7-30.7 | >50 | 50 | |
| Bankfull Mean Depth (ft) | 0.8-1.7 | 1.3-1.8 | 0.4 | |
| Bankfull Max Depth (ft) | 1.2-2.1 | 1.9-2.4 | 0.6 | |
| Bankfull Cross-Sectional Area ($ft^2$) | 3.6-9.4 | 25 | 1.9 | |
| Width/Depth Ratio | 3.4-5.4 | 9.0-14.0 | 13.5 | |
| Entrenchment Ratio | 1.3-5.4 | >2.5 | 10 | |
| Bank Height Ratio | 1.5-4.1 | 1.0-1.2 | 1.0 | |
| **Pattern** | | | | |
| Channel Beltwidth (ft) | * | 60 | 25-40 | 25-40 |
| Radius of Curvature (ft) | * | 16—87 | 12-15 | 12-15 |
| Rc:Bankfull width (ft/ft) | * | 3.5—12.9 | 14 | 14 |
| Meander Wavelength (ft) | * | 66—191 | 70 | 70 |
| Meander Width Ratio | * | 4.1 | 5.0-8.0 | 5.0-8.0 |
| **Profile** | | | | |
| Riffle Length (ft) | | | | |
| Riffle Slope (ft/ft) | 0.009-0.020 | 0.013—0.035 | 0.016 | |
| Pool Length (ft) | * | 14—33 | 6-16 | |
| Pool Spacing (ft) | * | 2.7—7.1 | 6.4-8.0 | |
| **Substrate and Transport Parameters** | | | | |
| SC% / Sa% / G% / C% / B% /Be% | | | | |
| d16 / d35 / d50 / d84 / d95 (mm) | Silt-Clay | Gravel | Gravel | |
| | | | | |
| Channel length (ft) | 327 | | 334 | 334 |
| Drainage Area (SM) | 0.23 | 1.49 | 0.04 | 0.04 |
| Rosgen Classification | G5c | C4 | C4 | C4 |
| Sinuosity | 1.1 | 1.3 | 1.2 | 1.2 |
| Water Surface Slope (ft/ft) | 0.014 | 0.005 | 0.012 | |

* : no data shown for pools, radius of curvature or meanders in existing stream do to channelization / lack of bed diversity

| **Table 8f. T2-2 Baseline Stream Data Summary**<br>**Stony Fork Restoration Site, DMS Project #97085** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Parameter** | Pre-Existing Condition | Reference Reach(es) Data | Design | As-built | | | |
| | | | | Min | Mean | Max | n |
| Bankfull Width (ft) | 4.5-5.7 | 14.8-18.8 | 7.6 | | 9.7 | | 1 |
| Floodprone Width (ft) | 5.7-30.7 | >50 | 50 | | 43.4 | | 1 |
| Bankfull Mean Depth (ft) | 0.8-1.7 | 1.3-1.8 | 0.6 | | 0.6 | | 1 |
| Bankfull Max Depth (ft) | 1.2-2.1 | 1.9-2.4 | 0.8 | | 1.0 | | 1 |
| Bankfull Cross-Sectional Area ($ft^2$) | 3.6-9.4 | 25 | 4.3 | | 5.8 | | 1 |
| Width/Depth Ratio | 3.4-5.4 | 9.0-14.0 | 13.4 | | 16.4 | | 1 |
| Entrenchment Ratio | 1.3-5.4 | >2.5 | 6.6 | | 4.5 | | 1 |
| Bank Height Ratio | 1.5-4.1 | 1.0-1.2 | 1.0 | | 1.0 | | 1 |
| **Pattern** | | | | | | | |
| Channel Beltwidth (ft) | * | 60 | 28-45 | | 28-45 | | |
| Radius of Curvature (ft) | * | 16—87 | 16-23 | | 16-23 | | |
| Rc:Bankfull width (ft/ft) | * | 3.5—12.9 | 11.2-11.8 | | 11.2-11.8 | | |
| Meander Wavelength (ft) | * | 66—191 | 85-90 | | 85-90 | | |
| Meander Width Ratio | * | 4.1 | 3.7-5.9 | | 3.7-5.9 | | |
| **Profile** | | | | | | | |
| Riffle Length (ft) | | | | 20.0 | 29.0 | 56.7 | 6 |
| Riffle Slope (ft/ft) | 0.009-0.020 | 0.013—0.035 | 0.014 | 0.01 | 0.018 | 0.028 | 6 |
| Pool Length (ft) | * | 14—33 | 14-24 | 10.8 | 17.6 | 22.8 | 6 |
| Pool Spacing (ft) | * | 2.7—7.1 | 5.7-6.6 | 47.0 | 48.8 | 51.2 | 6 |
| **Substrate and Transport Parameters** | | | | | | | |
| SC% / Sa% / G% / C% / B% /Be% | | | | 6/45/15/33/0/0 | | | |
| d16 / d35 / d50 / d84 / d95 (mm) | Silt-Clay | Gravel | Gravel | 26/35/42/51/74/110 | | | |
| | | | | | | | |
| Channel length (ft) | 326 | | 337 | 337 | | | |
| Drainage Area (SM) | 0.23 | 1.49 | 0.15 | 0.15 | | | |
| Rosgen Classification | G5c | C4 | C4 | C4 | | | |
| Sinuosity | 1.1 | 1.3 | 1.2 | 1.2 | | | |
| Water Surface Slope (ft/ft) | 0.014 | 0.005 | 0.012 | 0.011 | | | |

* : no data shown for pools, radius of curvature or meanders in existing stream do to channelization / lack of bed diversity

| **Table 8g. T2-3 Baseline Stream Data Summary**<br>**Stony Fork Restoration Site, DMS Project #97085** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Parameter** | Pre-Existing Condition | Reference Reach(es) Data | Design | As-built | | | |
| | | | | | | | |
| **Dimension - Riffle** | | | | Min | Mean | Max | n |
| Bankfull Width (ft) | 4.5-5.7 | 14.8-18.8 | 9.0 | | 8.6 | | 1 |
| Floodprone Width (ft) | 5.7-30.7 | >50 | 50 | | 80.9 | | 1 |
| Bankfull Mean Depth (ft) | 0.8-1.7 | 1.3-1.8 | 0.6 | | 0.7 | | 1 |
| Bankfull Max Depth (ft) | 1.2-2.1 | 1.9-2.4 | 1.0 | | 1.2 | | 1 |
| Bankfull Cross-Sectional Area ($ft^2$) | 3.6-9.4 | 25 | 5.8 | | 6.0 | | 1 |
| Width/Depth Ratio | 3.4-5.4 | 9.0-14.0 | 13.9 | | 12.3 | | 1 |
| Entrenchment Ratio | 1.3-5.4 | >2.5 | 5.6 | | 9.4 | | 1 |
| Bank Height Ratio | 1.5-4.1 | 1.0-1.2 | 1.0 | | 1.0 | | 1 |
| **Pattern** | | | | | | | |
| Channel Beltwidth (ft) | * | 60 | 32-45 | | 32-45 | | |
| Radius of Curvature (ft) | * | 16—87 | 18-23 | | 18-23 | | |
| Rc:Bankfull width (ft/ft) | * | 3.5—12.9 | 10.2-11.1 | | 10.2-11.1 | | |
| Meander Wavelength (ft) | * | 66—191 | 92-100 | | 92-100 | | |
| Meander Width Ratio | * | 4.1 | 3.6-6.0 | | 3.6-6.0 | | |
| **Profile** | | | | | | | |
| Riffle Length (ft) | | | | 25.8 | 33.6 | 38.9 | 15 |
| Riffle Slope (ft/ft) | 0.009-0.020 | 0.013—0.035 | 0.012-0.015 | 0.002 | 0.014 | 0.024 | 15 |
| Pool Length (ft) | * | 14—33 | 12-34 | 8.48 | 35.6 | 91.4 | 14 |
| Pool Spacing (ft) | * | 2.7—7.1 | 5.1-7.0 | 45.7 | 57.3 | 77.4 | 14 |
| **Substrate and Transport Parameters** | | | | | | | |
| SC% / Sa% / G% / C% / B% /Be% | | | | 4/7/65/24/0/0 | | | |
| d16 / d35 / d50 / d84 / d95 (mm) | 0.031/0.13/0.21/2.0/6.1/0.1/8 | Gravel | Gravel | 18/35/45/77/120 | | | |
| | | | | | | | |
| Channel length (ft) | 780 | | 855 | 855 | | | |
| Drainage Area (SM) | 0.23 | 1.49 | 0.23 | 0.23 | | | |
| Rosgen Classification | G5c | C4 | C4 | C4 | | | |
| Sinuosity | 1.1 | 1.3 | 1.2 | 1.2 | | | |
| Water Surface Slope (ft/ft) | 0.014 | 0.005 | 0.011 | 0.011 | | | |

* : no data shown for pools, radius of curvature or meanders in existing stream do to channelization / lack of bed diversity

| Table 8h. T3 Baseline Stream Data Summary<br>Stony Fork Restoration Site, DMS Project #97085 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Parameter** | Pre-Existing Condition | Reference Reach(es) Data | Design | As-built | | | |
| | | | | | | | |
| **Dimension - Riffle** | | | | Min | Mean | Max | n |
| Bankfull Width (ft) | 4.2-4.8 | 14.8 | 5.0 | | 5.2 | | 1 |
| Floodprone Width (ft) | 5.0-5.9 | >50 | 50 | | 38.0 | | 1 |
| Bankfull Mean Depth (ft) | 0.4-0.6 | 1.3-1.8 | 0.4 | | 0.4 | | 1 |
| Bankfull Max Depth (ft) | 0.6-0.7 | 1.9-2.4 | 0.6 | | 0.7 | | 1 |
| Bankfull Cross-Sectional Area ($ft^2$) | 1.9-2.6 | 25 | 1.9 | | 2.1 | | 1 |
| Width/Depth Ratio | 6.9-12.6 | 9.0-14.0 | 13.5 | | 13.0 | | 1 |
| Entrenchment Ratio | 1.2 | >2.5 | 10 | | 7.2 | | 1 |
| Bank Height Ratio | 3.2-3.4 | 1.0-1.2 | 1.0 | | 1.0 | | 1 |
| **Pattern** | | | | | | | |
| Channel Beltwidth (ft) | ** | 60 | 16-26 | | 16-26 | | |
| Radius of Curvature (ft) | ** | 16—87 | 11-14 | | 11-14 | | |
| Rc:Bankfull width (ft/ft) | ** | 3.5—12.9 | 8.6-9.4 | | 8.6-9.4 | | |
| Meander Wavelength (ft) | ** | 66—191 | 43-47 | | 43-47 | | |
| Meander Width Ratio | ** | 4.1 | 3.2-5.2 | | 3.2-5.2 | | |
| **Profile** | | | | | | | |
| Riffle Length (ft) | | | | 34.3 | 36.9 | 39.5 | 2 |
| Riffle Slope (ft/ft) | ** | 0.013—0.035 | 0.0025 | 0.006 | 0.0098 | 0.014 | 2 |
| Pool Length (ft) | ** | 14—33 | 7-15 | 38.43 | | | 1 |
| Pool Spacing (ft) | ** | 2.7—7.1 | 4.2-5.4 | | | | |
| **Substrate and Transport Parameters** | | | | | | | |
| SC% / Sa% / G% / C% / B% /Be% | 8/67/25/0/0/0 | | | 9/15/58/19/0/0 | | | |
| d16 / d35 / d50 / d84 / d95 (mm) | N/A | Gravel | Gravel | 0.3/8.2/18/35/72/140 | | | |
| | | | | | | | |
| Channel length (ft) | 154 | | 129 | 129 | | | |
| Drainage Area (SM) | 0.05 | 1.49 | 0.02 | 0.02 | | | |
| Rosgen Classification | G4 | C4 | C4 | C4 | | | |
| Sinuosity | 1.0 | 1.3 | 1.2 | 1.2 | | | |
| Water Surface Slope (ft/ft) | 0.007 | 0.005 | 0.0016 | 0.005 | | | |

** :channel affected by former pond

**Table 9. Cross Section Dimensional Morphology Summary**
**Stony Fork Stream Restoration Site, DMS Project #97085**

| Dimension and Substrate | Cross-Section 1 (Pool) Station 13+58, SF | | | | | | | Cross-Section 2 (Riffle) Station 13+85, SF | | | | | | | Cross-Section 3 (Riffle) Station 22+44, SF | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Bankfull Elevation (ft) based on AB BKF area | 206.8 | 206.7 | 206.7 | 206.6 | | | | 206.6 | 206.6 | 206.6 | 206.6 | | | | 192.5 | 192.5 | 192.4 | 192.6 | | | |
| Bankfull Width (ft) | 12.6 | 11.7 | 11.6 | 8.0 | | | | 9.3 | 11.0 | 10.2 | 11.3 | | | | 12.6 | 11.9 | 12.5 | 12.5 | | | |
| Floodprone Width (ft) | - | - | - | - | | | | >80 | >80 | >80 | >80 | | | | 53.3 | 53.2 | 50.1 | 52.7 | | | |
| Bankfull Mean Depth (ft) | 0.9 | 1.0 | 1.0 | 1.4 | | | | 0.8 | 0.6 | 0.7 | 0.6 | | | | 1.0 | 1.0 | 1.0 | 1.0 | | | |
| Bankfull Max Depth (ft) | 1.9 | 2.0 | 2.1 | 2.3 | | | | 1.2 | 1.1 | 1.3 | 1.3 | | | | 1.6 | 1.7 | 1.5 | 1.5 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF area | 11.5 | 11.5 | 11.5 | 11.5 | | | | 7.0 | 7.0 | 7.0 | 7.0 | | | | 12.5 | 12.5 | 12.5 | 12.5 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF elevation | 11.5 | 11.9 | 12.1 | 12.9 | | | | 7.0 | 7.1 | 6.8 | 6.4 | | | | 12.5 | 13.2 | 13.8 | 11.6 | | | |
| Bankfull Width/Depth Ratio | - | - | - | - | | | | 12.2 | 17.3 | 14.8 | 18.3 | | | | 12.8 | 11.4 | 12.6 | 12.5 | | | |
| Bankfull Entrenchment Ratio | - | - | - | - | | | | 8.7 | 7.2 | 8.0 | 7.2 | | | | 4.2 | 4.5 | 4.0 | 4.2 | | | |
| Bankfull Bank Height Ratio | - | - | - | - | | | | 1.0 | 0.9 | 1.0 | 0.8 | | | | 1.0 | 1.0 | 1.0 | 0.9 | | | |
| d50 (mm) | - | - | - | - | | | | 22 | 32 | 24 | 48 | | | | 38 | 46 | 20 | 69 | | | |
| | Cross-Section 4 (Pool) Station 26+17, SF | | | | | | | Cross-Section 5 (Riffle) Station 35+12, SF | | | | | | | Cross-Section 6 (Pool) Station 41+94, SF | | | | | | |
| | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Bankfull Elevation (ft) based on AB BKF area | 192.0 | 191.9 | 191.9 | 191.9 | | | | 182.1 | 182.2 | 182.2 | 182.3 | | | | 181.7 | 181.8 | 181.7 | 181.7 | | | |
| Bankfull Width (ft) | 12.5 | 13.0 | 12.4 | 12.7 | | | | 12.2 | 13.6 | 13.2 | 14.2 | | | | 12.0 | 13.1 | 11.5 | 11.2 | | | |
| Floodprone Width (ft) | - | - | - | - | | | | >80 | >80 | >80 | >80 | | | | - | - | - | - | | | |
| Bankfull Mean Depth (ft) | 1.1 | 1.1 | 1.1 | 1.1 | | | | 0.9 | 0.8 | 0.8 | 0.7 | | | | 1.2 | 1.1 | 1.3 | 1.3 | | | |
| Bankfull Max Depth (ft) | 1.9 | 2.1 | 2.1 | 2.2 | | | | 1.4 | 1.3 | 1.3 | 1.4 | | | | 2.4 | 2.4 | 2.5 | 2.4 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF area | 13.6 | 13.6 | 13.6 | 13.6 | | | | 10.6 | 10.6 | 10.6 | 10.6 | | | | 14.5 | 14.5 | 14.5 | 14.5 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF elevation | 13.6 | 14.5 | 15.2 | 14.6 | | | | 10.6 | 10.1 | 9.3 | 8.2 | | | | 14.5 | 14.3 | 15.2 | 15.0 | | | |
| Bankfull Width/Depth Ratio | - | - | - | - | | | | 14.1 | 17.4 | 16.4 | 19.1 | | | | - | - | - | - | | | |
| Bankfull Entrenchment Ratio | - | - | - | - | | | | 6.6 | 5.9 | 6.1 | 5.7 | | | | - | - | - | - | | | |
| Bankfull Bank Height Ratio | - | - | - | - | | | | 1.0 | 1.0 | 1.0 | 0.9 | | | | - | - | - | - | | | |
| d50 (mm) | - | - | - | - | | | | 52 | 44 | 25 | 36 | | | | - | - | - | - | | | |

**Table 9. Cross Section Dimensional Morphology Summary**
**Stony Fork Stream Restoration Site, DMS Project #97085**

| | Cross-Section 7 (Riffle) Station 42+58, SF | | | | | | | Cross-Section 8 (Pool) Station 57+19, SF | | | | | | | Cross-Section 9 (Pool) Station 57+44, T3 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Bankfull Elevation (ft) based on AB BKF area | 176.0 | 176.0 | 176.0 | 176.0 | | | | 175.3 | 175.2 | 175.2 | 175.3 | | | | 207.0 | 206.9 | 207.3 | 207.8 | | | |
| Bankfull Width (ft) | 11.6 | 13.4 | 14.2 | 13.9 | | | | 13.5 | 14.5 | 15.7 | 11.4 | | | | 5.5 | 5.9 | 8.2 | 5.5 | | | |
| Floodprone Width (ft) | >90 | >90 | >90 | >90 | | | | - | - | - | - | | | | - | - | - | - | | | |
| Bankfull Mean Depth (ft) | 1.1 | 1.0 | 0.9 | 0.9 | | | | 1.5 | 1.4 | 1.3 | 1.8 | | | | 0.7 | 0.6 | 0.4 | 0.7 | | | |
| Bankfull Max Depth (ft) | 1.7 | 1.6 | 1.8 | 1.6 | | | | 2.7 | 2.7 | 2.5 | 2.8 | | | | 1.1 | 1.1 | 0.8 | 0.8 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF area | 12.8 | 12.8 | 12.8 | 12.8 | | | | 20.7 | 20.7 | 20.7 | 20.7 | | | | 3.7 | 3.7 | 3.7 | 3.7 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF elevation | 12.8 | 13.2 | 13.3 | 13.0 | | | | 20.7 | 21.4 | 21.5 | 20.0 | | | | 3.7 | 4.0 | 2.0 | 0.0 | | | |
| Bankfull Width/Depth Ratio | 10.4 | 14.0 | 15.7 | 15.0 | | | | - | - | - | - | | | | - | - | - | - | | | |
| Bankfull Entrenchment Ratio | 8.0 | 6.8 | 6.5 | 6.6 | | | | - | - | - | - | | | | - | - | - | - | | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.0 | 1.0 | | | | - | - | - | - | | | | - | - | - | - | | | |
| d50 (mm) | 16 | 29 | 41 | 65 | | | | - | - | - | - | | | | - | - | - | - | | | |

| | Cross-Section 10 (Riffle) Station 96+69, T3 | | | | | | | Cross-Section 11 (Riffle) Station 99+07, T1 | | | | | | | Cross-Section 12 (Pool) Station 99+25, T1 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Bankfull Elevation (ft) based on AB BKF area | 207.1 | 207.1 | 207.2 | 207.3 | | | | 198.4 | 198.3 | 198.3 | 198.3 | | | | 198.4 | 198.3 | 198.3 | 198.4 | | | |
| Bankfull Width (ft) | 6.2 | 5.5 | 5.4 | 6.8 | | | | 6.0 | 5.8 | 5.7 | 6.1 | | | | 7.5 | 7.3 | 7.4 | 7.3 | | | |
| Floodprone Width (ft) | 38.0 | 39.4 | 41.5 | 34.1 | | | | >60 | >60 | >60 | >60 | | | | - | - | - | - | | | |
| Bankfull Mean Depth (ft) | 0.4 | 0.4 | 0.4 | 0.3 | | | | 0.3 | 0.3 | 0.4 | 0.3 | | | | 0.6 | 0.7 | 0.7 | 0.7 | | | |
| Bankfull Max Depth (ft) | 0.7 | 0.7 | 0.7 | 0.4 | | | | 0.7 | 0.7 | 0.6 | 0.7 | | | | 1.2 | 1.2 | 1.1 | 1.2 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF area | 2.2 | 2.2 | 2.2 | 2.2 | | | | 2.0 | 2.0 | 2.0 | 2.0 | | | | 4.8 | 4.8 | 4.8 | 4.8 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF elevation | 2.2 | 2.1 | 1.8 | 1.1 | | | | 2.0 | 2.6 | 2.6 | 2.2 | | | | 4.8 | 5.5 | 5.3 | 5.0 | | | |
| Bankfull Width/Depth Ratio | 17.7 | 13.7 | 13.4 | 20.9 | | | | 18.3 | 17.1 | 16.0 | 18.5 | | | | - | - | - | - | | | |
| Bankfull Entrenchment Ratio | 6.1 | 7.2 | 7.7 | 5.0 | | | | 10.9 | 10.9 | 11.2 | 10.7 | | | | - | - | - | - | | | |
| Bankfull Bank Height Ratio | 1.0 | 0.9 | 0.8 | 1.2 | | | | 1.0 | 1.1 | 1.2 | 1.1 | | | | - | - | - | - | | | |
| d50 (mm) | 18 | 20 | 2.5 | 0.062 | | | | 78 | 75 | 57 | 66 | | | | - | - | - | - | | | |

**Table 9. Cross Section Dimensional Morphology Summary**
**Stony Fork Stream Restoration Site, DMS Project #97085**

| | Cross-Section 13 (Pool) Station 252+25, T2 | | | | | | | Cross-Section 14 (Riffle) Station 225+97, T2 | | | | | | | Cross-Section 15 (Pool) Station 226+04, T2 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Bankfull Elevation (ft) based on AB BKF area | 188.4 | 188.4 | 188.2 | 188.4 | | | | 187.9 | 187.9 | 188.0 | 188.0 | | | | 180.9 | 180.8 | 180.7 | 180.6 | | | |
| Bankfull Width (ft) | 11.3 | 12.7 | 9.5 | 8.1 | | | | 9.7 | 11.8 | 11.1 | 11.5 | | | | 11.8 | 11.7 | 10.9 | 10.4 | | | |
| Floodprone Width (ft) | - | - | - | - | | | | 43.4 | 46.8 | 47.2 | 48.9 | | | | - | - | - | - | | | |
| Bankfull Mean Depth (ft) | 0.8 | 0.7 | 1.0 | 1.2 | | | | 0.6 | 0.5 | 0.5 | 0.5 | | | | 1.0 | 1.0 | 1.0 | 1.1 | | | |
| Bankfull Max Depth (ft) | 1.5 | 1.4 | 1.7 | 2.1 | | | | 1.0 | 1.1 | 1.1 | 1.2 | | | | 1.8 | 1.9 | 1.8 | 1.9 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF area | 9.3 | 9.3 | 9.3 | 9.3 | | | | 5.8 | 5.8 | 5.8 | 5.8 | | | | 11.2 | 11.2 | 11.2 | 11.2 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF elevation | 9.3 | 8.7 | 11.0 | 9.0 | | | | 5.8 | 5.3 | 4.4 | 4.6 | | | | 11.2 | 11.8 | 12.8 | 14.0 | | | |
| Bankfull Width/Depth Ratio | - | - | - | - | | | | 16.4 | 24.0 | 21.4 | 22.9 | | | | - | - | - | - | | | |
| Bankfull Entrenchment Ratio | - | - | - | - | | | | 4.5 | 4.0 | 4.2 | 4.3 | | | | - | - | - | - | | | |
| Bankfull Bank Height Ratio | - | - | - | - | | | | 1.0 | 0.8 | 0.9 | 0.8 | | | | - | - | - | - | | | |
| d50 (mm) | - | - | - | - | | | | 42 | 16 | 1.4 | 2 | | | | - | - | - | - | | | |

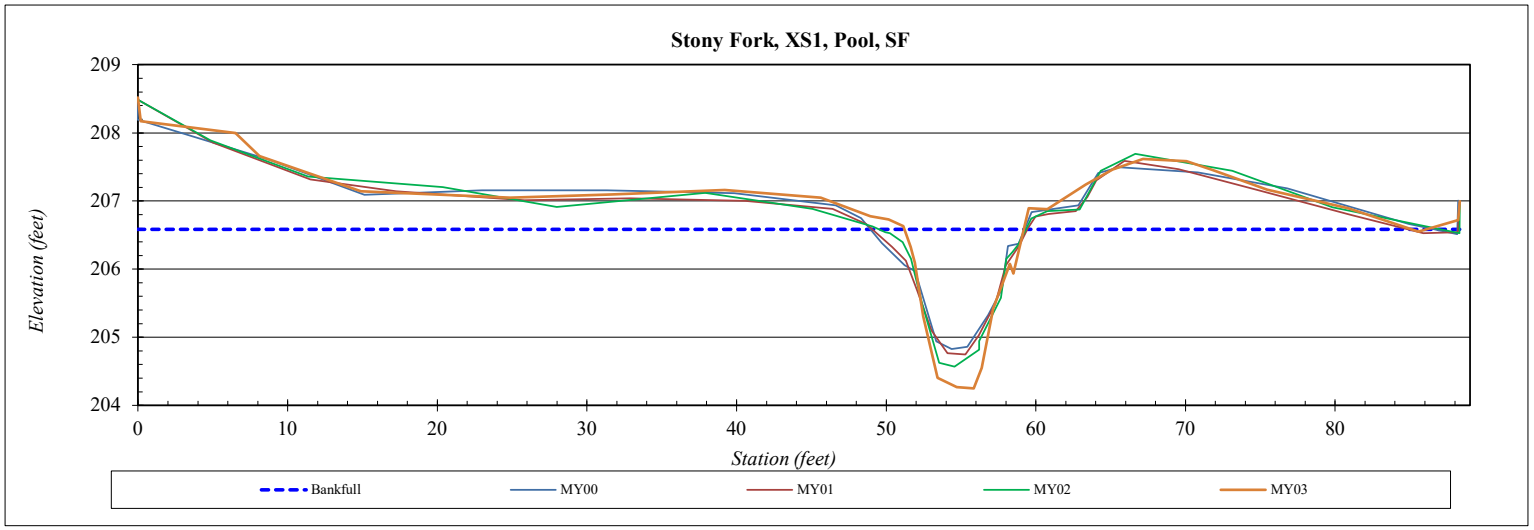
| | Cross-Section 16 (Riffle) Station 252+25, T2 | | | | | | |
|---|---|---|---|---|---|---|---|
| | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Bankfull Elevation (ft) based on AB BKF area | 180.7 | 180.7 | 180.8 | 180.8 | | | |
| Bankfull Width (ft) | 8.6 | 9.9 | 10.0 | 9.9 | | | |
| Floodprone Width (ft) | >80 | >80 | >80 | >80 | | | |
| Bankfull Mean Depth (ft) | 0.7 | 0.6 | 0.6 | 0.6 | | | |
| Bankfull Max Depth (ft) | 1.2 | 1.1 | 1.0 | 1.0 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF area | 6.0 | 6.0 | 6.0 | 6.0 | | | |
| Cross-Sectional Area ($ft^2$) based on AB BKF elevation | 6.0 | 5.8 | 5.2 | 5.1 | | | |
| Bankfull Width/Depth Ratio | 12.3 | 16.3 | 16.6 | 16.4 | | | |
| Bankfull Entrenchment Ratio | 9.4 | 8.3 | 7.6 | 8.1 | | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 0.9 | 0.9 | | | |
| d50 (mm) | 45 | 44 | 37 | 11 | | | |

# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS1 |
| **Drainage Area (sq mi):** | 0.28 |
| **Date:** | 7/26/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 208.52 |
| 0.2 | 208.17 |
| 6.5 | 208.00 |
| 8.1 | 207.66 |
| 14.9 | 207.14 |
| 24.9 | 207.05 |
| 31.6 | 207.10 |
| 39.2 | 207.16 |
| 45.6 | 207.05 |
| 48.9 | 206.78 |
| 50.2 | 206.73 |
| 51.1 | 206.63 |
| 51.6 | 206.33 |
| 51.9 | 206.10 |
| 52.5 | 205.31 |
| 53.4 | 204.41 |
| 54.7 | 204.27 |
| 55.8 | 204.25 |
| 56.4 | 204.55 |
| 57.1 | 205.42 |
| 58.3 | 206.08 |
| 58.5 | 205.94 |
| 59.5 | 206.89 |
| 60.8 | 206.88 |
| 63.3 | 207.24 |
| 65.1 | 207.46 |
| 67.2 | 207.62 |
| 70.1 | 207.58 |
| 71.8 | 207.46 |
| 75.4 | 207.17 |
| 80.9 | 206.89 |
| 85.6 | 206.55 |
| 88.2 | 206.72 |
| 88.3 | 207.00 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 206.58 |
| **Bankfull Cross-Sectional Area:** | 11.5 |
| **Total Cross-Sectional Area:** | 12.9 |
| **Bankfull Width:** | 8.0 |
| **Flood Prone Area Elevation:** | --- |
| **Flood Prone Width:** | --- |
| **Max Depth at Bankfull:** | 2.3 |
| **Mean Depth at Bankfull:** | 1.4 |
| **W / D Ratio:** | --- |
| **Entrenchment Ratio:** | --- |
| **Bank Height Ratio:** | --- |
| **Thalweg Elevation:** | 204.2 |

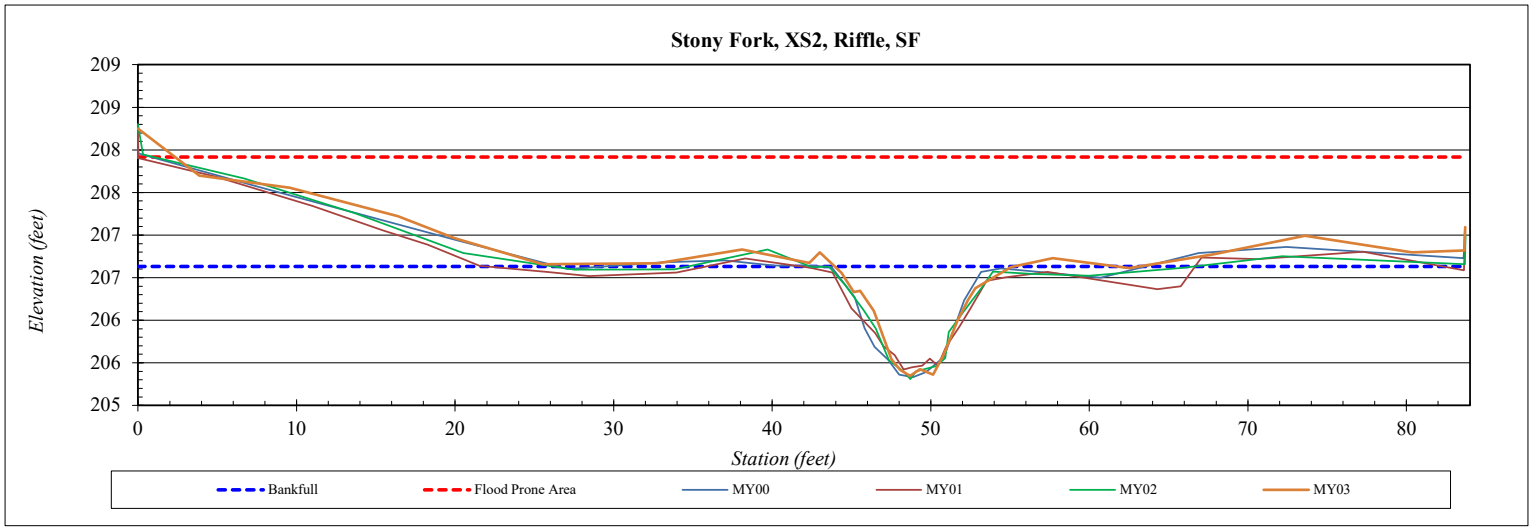


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS2 |
| **Drainage Area (sq mi):** | 0.28 |
| **Date:** | 7/26/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 208.25 |
| 3.9 | 207.70 |
| 9.6 | 207.56 |
| 16.4 | 207.22 |
| 19.9 | 206.97 |
| 25.5 | 206.66 |
| 32.8 | 206.67 |
| 38.1 | 206.83 |
| 42.3 | 206.67 |
| 43.0 | 206.80 |
| 44.4 | 206.56 |
| 45.1 | 206.33 |
| 45.6 | 206.35 |
| 46.4 | 206.11 |
| 47.5 | 205.54 |
| 48.1 | 205.42 |
| 48.7 | 205.35 |
| 49.3 | 205.43 |
| 50.1 | 205.36 |
| 50.8 | 205.59 |
| 51.7 | 205.99 |
| 52.4 | 206.24 |
| 52.8 | 206.38 |
| 55.1 | 206.62 |
| 57.7 | 206.73 |
| 62.5 | 206.61 |
| 67.8 | 206.78 |
| 73.6 | 206.99 |
| 80.4 | 206.80 |
| 83.7 | 206.82 |
| 83.7 | 207.09 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 206.63 |
| **Bankfull Cross-Sectional Area:** | 7.0 |
| **Total Cross-Sectional Area:** | 6.4 |
| **Bankfull Width:** | 11.3 |
| **Flood Prone Area Elevation:** | 207.9 |
| **Flood Prone Width:** | 81.4 |
| **Max Depth at Bankfull:** | 1.3 |
| **Mean Depth at Bankfull:** | 0.6 |
| **W / D Ratio:** | 18.3 |
| **Entrenchment Ratio:** | 7.2 |
| **Bank Height Ratio:** | 0.8 |
| **Thalweg Elevation:** | 205.3 |

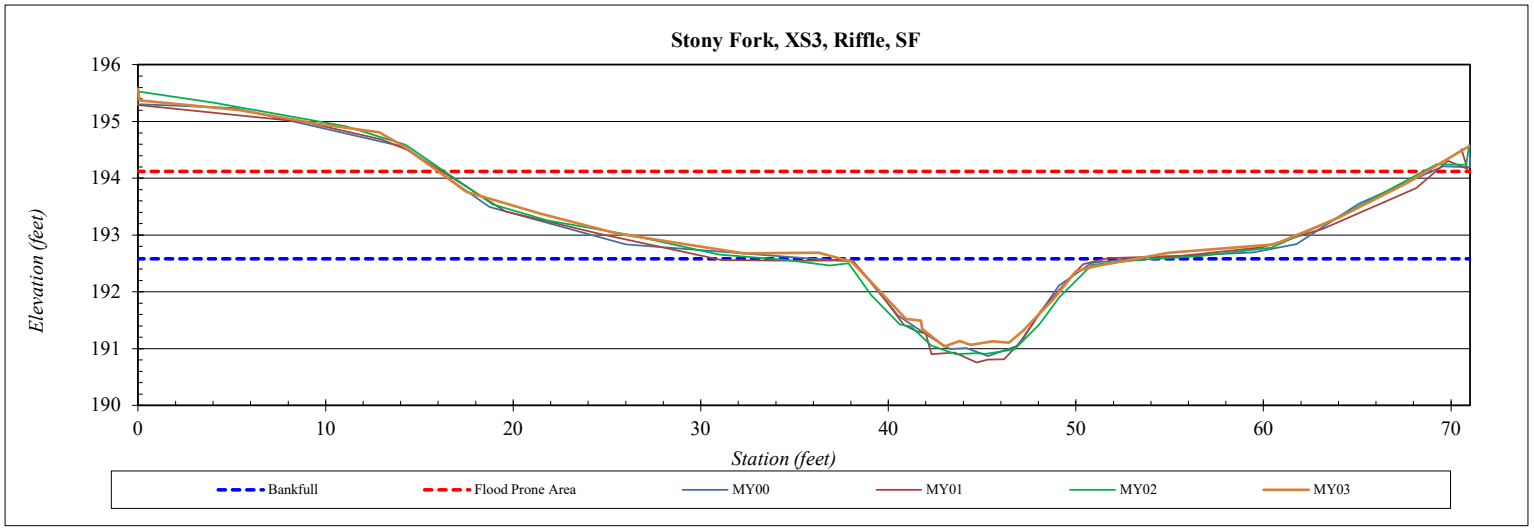


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS3 |
| **Drainage Area (sq mi):** | 0.46 |
| **Date:** | 7/26/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 195.58 |
| 0.1 | 195.37 |
| 5.4 | 195.20 |
| 9.7 | 194.96 |
| 12.9 | 194.81 |
| 14.3 | 194.55 |
| 17.5 | 193.76 |
| 21.4 | 193.38 |
| 25.5 | 193.03 |
| 32.3 | 192.68 |
| 36.3 | 192.69 |
| 38.0 | 192.53 |
| 39.1 | 192.18 |
| 40.9 | 191.52 |
| 41.7 | 191.49 |
| 41.8 | 191.35 |
| 43.0 | 191.04 |
| 43.8 | 191.14 |
| 44.4 | 191.07 |
| 45.5 | 191.13 |
| 46.4 | 191.11 |
| 47.2 | 191.32 |
| 48.8 | 191.88 |
| 50.0 | 192.36 |
| 51.1 | 192.45 |
| 55.0 | 192.69 |
| 60.6 | 192.84 |
| 64.0 | 193.30 |
| 67.7 | 193.93 |
| 71.0 | 194.57 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 192.58 |
| **Bankfull Cross-Sectional Area:** | 12.5 |
| **Total Cross-Sectional Area:** | 11.6 |
| **Bankfull Width:** | 12.5 |
| **Flood Prone Area Elevation:** | 194.1 |
| **Flood Prone Width:** | 52.7 |
| **Max Depth at Bankfull:** | 1.5 |
| **Mean Depth at Bankfull:** | 1.0 |
| **W / D Ratio:** | 12.5 |
| **Entrenchment Ratio:** | 4.2 |
| **Bank Height Ratio:** | 0.9 |
| **Thalweg Elevation:** | 191.0 |

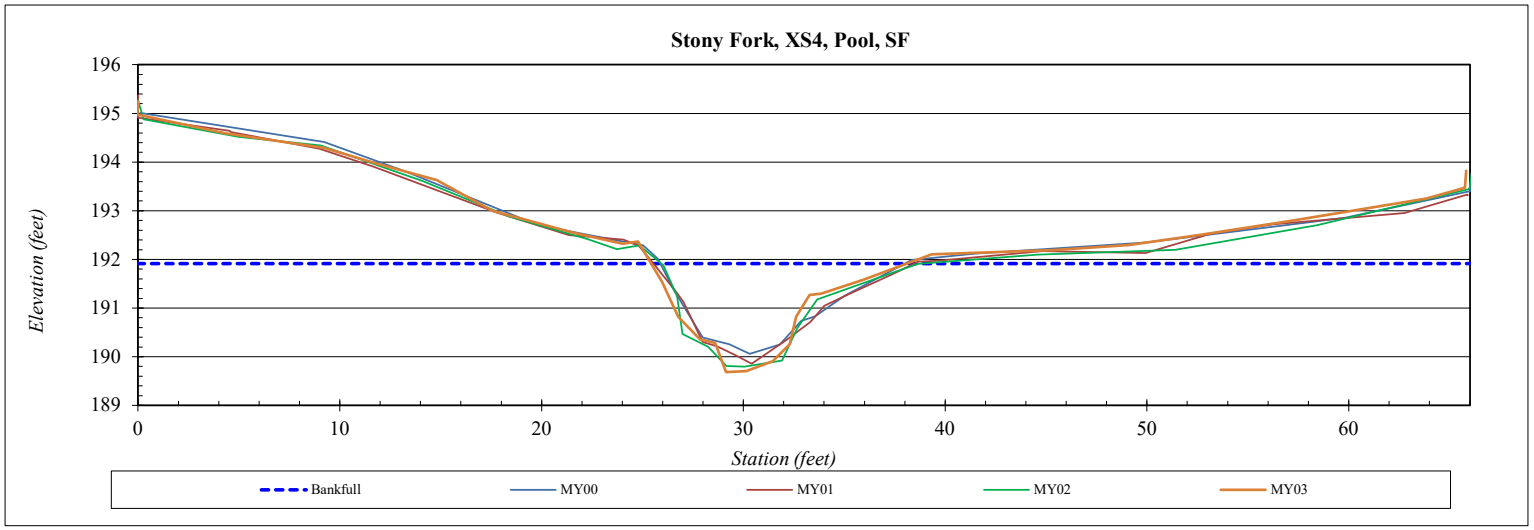


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS4 |
| **Drainage Area (sq mi):** | 0.46 |
| **Date:** | 7/26/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 195.24 |
| 0.0 | 194.98 |
| 4.3 | 194.59 |
| 9.2 | 194.30 |
| 11.9 | 193.97 |
| 14.8 | 193.63 |
| 17.6 | 193.00 |
| 21.5 | 192.56 |
| 24.0 | 192.33 |
| 24.8 | 192.37 |
| 26.0 | 191.54 |
| 26.8 | 190.82 |
| 27.9 | 190.35 |
| 28.6 | 190.28 |
| 29.1 | 189.68 |
| 30.1 | 189.70 |
| 31.5 | 189.91 |
| 32.3 | 190.26 |
| 32.6 | 190.82 |
| 33.3 | 191.27 |
| 33.8 | 191.30 |
| 35.9 | 191.58 |
| 39.3 | 192.10 |
| 45.3 | 192.19 |
| 49.1 | 192.30 |
| 52.7 | 192.51 |
| 57.2 | 192.79 |
| 63.8 | 193.25 |
| 65.8 | 193.47 |
| 65.8 | 193.82 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 191.91 |
| **Bankfull Cross-Sectional Area:** | 13.6 |
| **Total Cross-Sectional Area:** | 14.6 |
| **Bankfull Width:** | 12.7 |
| **Flood Prone Area Elevation:** | --- |
| **Flood Prone Width:** | --- |
| **Max Depth at Bankfull:** | 2.2 |
| **Mean Depth at Bankfull:** | 1.1 |
| **W / D Ratio:** | --- |
| **Entrenchment Ratio:** | --- |
| **Bank Height Ratio:** | --- |
| **Thalweg Elevation:** | 189.7 |

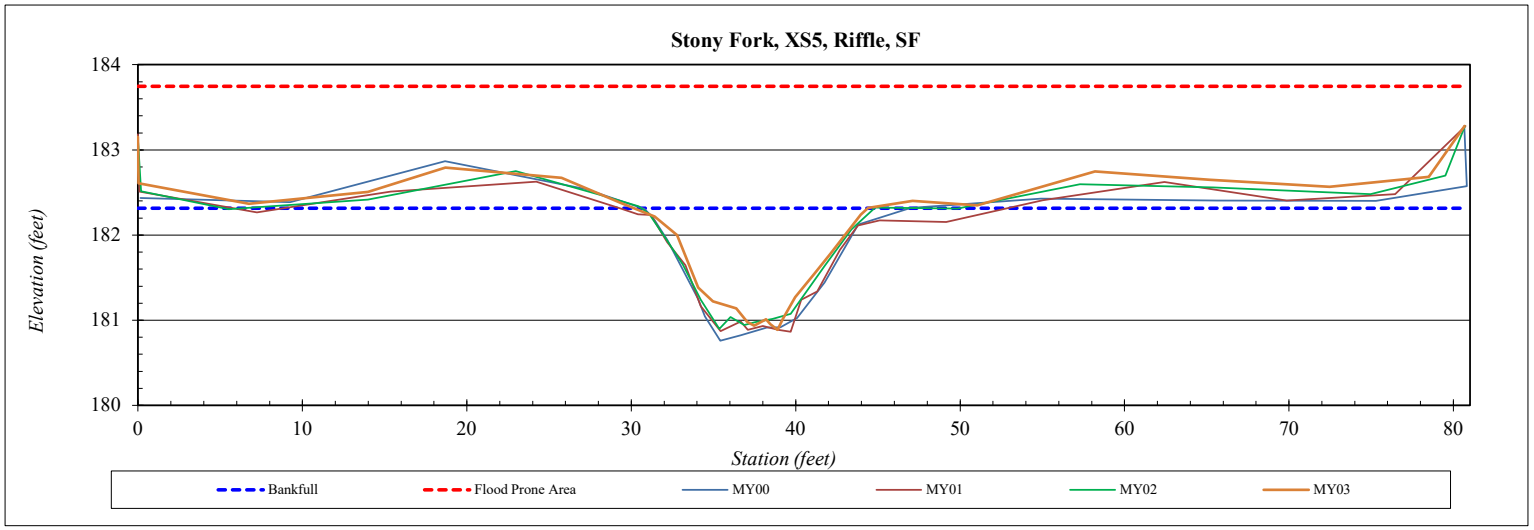


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS5 |
| **Drainage Area (sq mi):** | 0.46 |
| **Date:** | 7/31/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 183.16 |
| 0.0 | 182.61 |
| 6.8 | 182.37 |
| 14.0 | 182.51 |
| 18.7 | 182.79 |
| 25.8 | 182.67 |
| 29.3 | 182.38 |
| 31.4 | 182.22 |
| 32.8 | 182.00 |
| 34.1 | 181.38 |
| 35.0 | 181.22 |
| 36.4 | 181.14 |
| 37.0 | 180.98 |
| 37.5 | 180.94 |
| 38.2 | 181.01 |
| 38.4 | 180.95 |
| 38.9 | 180.89 |
| 39.2 | 181.02 |
| 40.0 | 181.27 |
| 41.1 | 181.54 |
| 42.1 | 181.79 |
| 43.9 | 182.24 |
| 44.4 | 182.32 |
| 47.1 | 182.40 |
| 51.0 | 182.35 |
| 58.2 | 182.75 |
| 65.2 | 182.65 |
| 72.5 | 182.57 |
| 78.5 | 182.68 |
| 80.7 | 183.28 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 182.32 |
| **Bankfull Cross-Sectional Area:** | 10.6 |
| **Total Cross-Sectional Area:** | 8.2 |
| **Bankfull Width:** | 14.2 |
| **Flood Prone Area Elevation:** | 183.7 |
| **Flood Prone Width:** | 80.7 |
| **Max Depth at Bankfull:** | 1.4 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | 19.1 |
| **Entrenchment Ratio:** | 5.7 |
| **Bank Height Ratio:** | 0.9 |
| **Thalweg Elevation:** | 180.9 |

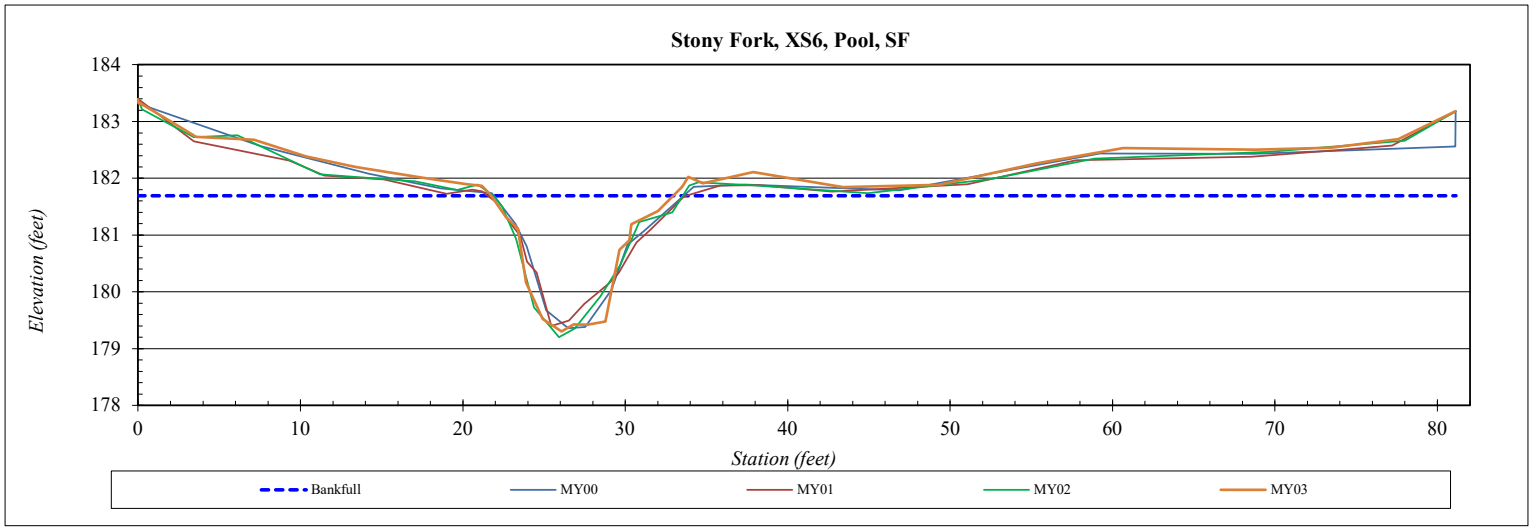


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS6 |
| **Drainage Area (sq mi):** | 0.46 |
| **Date:** | 7/31/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 183.39 |
| 0.0 | 183.32 |
| 0.1 | 183.32 |
| 2.1 | 183.00 |
| 3.6 | 182.73 |
| 7.1 | 182.68 |
| 10.3 | 182.38 |
| 13.4 | 182.20 |
| 17.6 | 182.01 |
| 20.2 | 181.89 |
| 21.2 | 181.87 |
| 21.7 | 181.71 |
| 22.6 | 181.32 |
| 23.4 | 181.11 |
| 23.5 | 180.83 |
| 23.9 | 180.17 |
| 24.9 | 179.52 |
| 26.1 | 179.30 |
| 26.8 | 179.43 |
| 27.7 | 179.42 |
| 28.8 | 179.48 |
| 29.6 | 180.74 |
| 30.3 | 180.91 |
| 30.4 | 181.19 |
| 32.0 | 181.43 |
| 33.5 | 181.85 |
| 33.9 | 182.03 |
| 34.8 | 181.91 |
| 37.9 | 182.11 |
| 43.4 | 181.85 |
| 49.3 | 181.89 |
| 55.3 | 182.26 |
| 60.7 | 182.53 |
| 68.8 | 182.51 |
| 73.4 | 182.54 |
| 77.6 | 182.69 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 181.69 |
| **Bankfull Cross-Sectional Area:** | 14.5 |
| **Total Cross-Sectional Area:** | 15.0 |
| **Bankfull Width:** | 11.2 |
| **Flood Prone Area Elevation:** | --- |
| **Flood Prone Width:** | --- |
| **Max Depth at Bankfull:** | 2.4 |
| **Mean Depth at Bankfull:** | 1.3 |
| **W / D Ratio:** | --- |
| **Entrenchment Ratio:** | --- |
| **Bank Height Ratio:** | --- |
| **Thalweg Elevation:** | 179.3 |

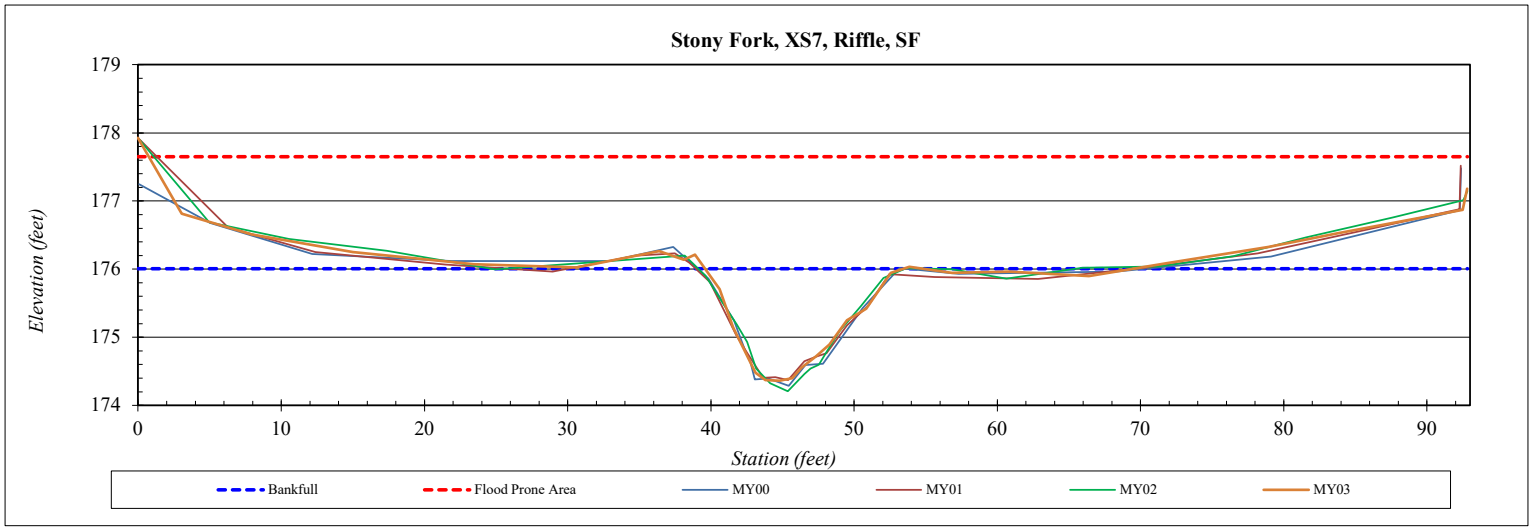


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS7 |
| **Drainage Area (sq mi):** | 0.83 |
| **Date:** | 7/31/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 177.93 |
| 3.0 | 176.82 |
| 8.0 | 176.51 |
| 15.0 | 176.25 |
| 23.4 | 176.07 |
| 30.6 | 176.03 |
| 36.4 | 176.27 |
| 38.1 | 176.14 |
| 38.9 | 176.22 |
| 40.6 | 175.71 |
| 41.5 | 175.15 |
| 43.1 | 174.48 |
| 43.8 | 174.37 |
| 44.8 | 174.36 |
| 45.7 | 174.40 |
| 46.3 | 174.56 |
| 47.3 | 174.72 |
| 48.3 | 174.89 |
| 49.5 | 175.25 |
| 50.8 | 175.42 |
| 52.6 | 175.94 |
| 53.9 | 176.03 |
| 56.8 | 175.94 |
| 60.8 | 175.97 |
| 66.4 | 175.90 |
| 71.9 | 176.09 |
| 78.9 | 176.33 |
| 83.9 | 176.53 |
| 92.5 | 176.87 |
| 92.8 | 177.18 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 176.01 |
| **Bankfull Cross-Sectional Area:** | 12.8 |
| **Total Cross-Sectional Area:** | 13.0 |
| **Bankfull Width:** | 13.9 |
| **Flood Prone Area Elevation:** | 177.6 |
| **Flood Prone Width:** | 92.0 |
| **Max Depth at Bankfull:** | 1.6 |
| **Mean Depth at Bankfull:** | 0.9 |
| **W / D Ratio:** | 15.0 |
| **Entrenchment Ratio:** | 6.6 |
| **Bank Height Ratio:** | 1.0 |
| **Thalweg Elevation:** | 174.4 |

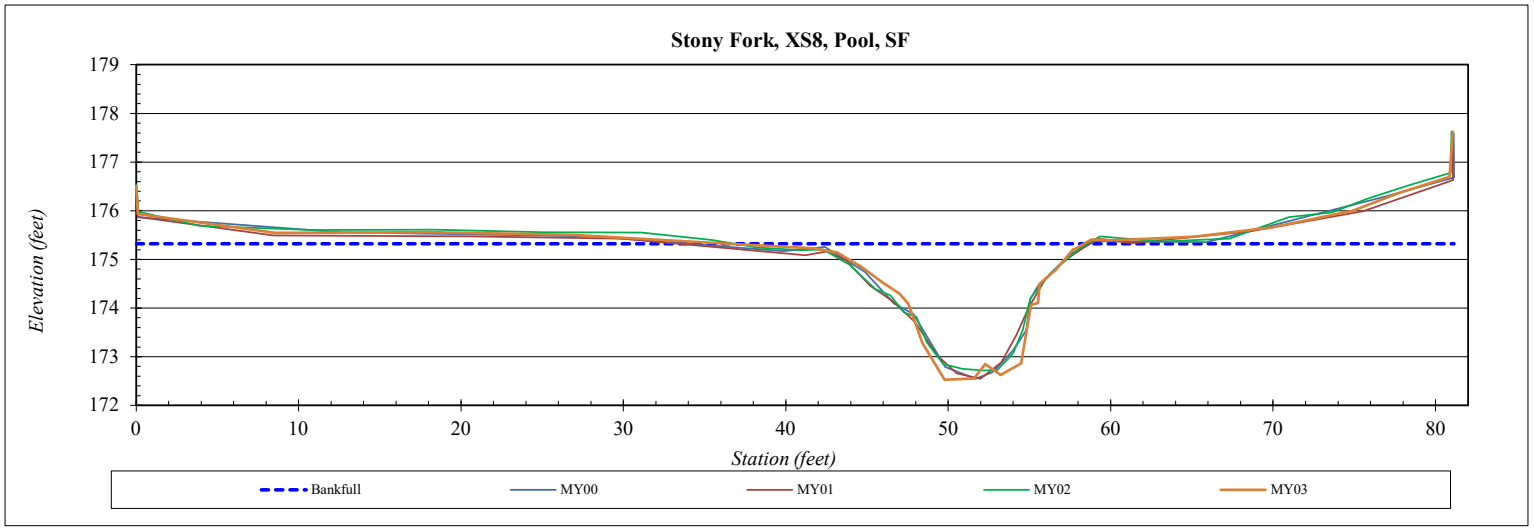


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS8 |
| **Drainage Area (sq mi):** | 0.83 |
| **Date:** | 7/31/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 176.51 |
| 0.1 | 175.94 |
| 8.6 | 175.54 |
| 18.2 | 175.56 |
| 26.8 | 175.51 |
| 36.8 | 175.31 |
| 41.6 | 175.23 |
| 43.2 | 175.14 |
| 44.7 | 174.84 |
| 46.0 | 174.51 |
| 47.0 | 174.30 |
| 47.6 | 174.08 |
| 48.4 | 173.28 |
| 49.8 | 172.53 |
| 51.6 | 172.56 |
| 52.3 | 172.85 |
| 53.2 | 172.63 |
| 54.5 | 172.87 |
| 55.1 | 174.07 |
| 55.5 | 174.10 |
| 55.6 | 174.50 |
| 56.6 | 174.79 |
| 57.7 | 175.21 |
| 57.8 | 175.21 |
| 58.8 | 175.41 |
| 60.2 | 175.39 |
| 65.1 | 175.47 |
| 69.9 | 175.66 |
| 74.9 | 176.00 |
| 77.7 | 176.36 |
| 80.9 | 176.70 |
| 81.0 | 177.63 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 175.32 |
| **Bankfull Cross-Sectional Area:** | 20.7 |
| **Total Cross-Sectional Area:** | 20.0 |
| **Bankfull Width:** | 11.4 |
| **Flood Prone Area Elevation:** | --- |
| **Flood Prone Width:** | --- |
| **Max Depth at Bankfull:** | 2.8 |
| **Mean Depth at Bankfull:** | 1.8 |
| **W / D Ratio:** | --- |
| **Entrenchment Ratio:** | --- |
| **Bank Height Ratio:** | --- |
| **Thalweg Elevation:** | 172.5 |

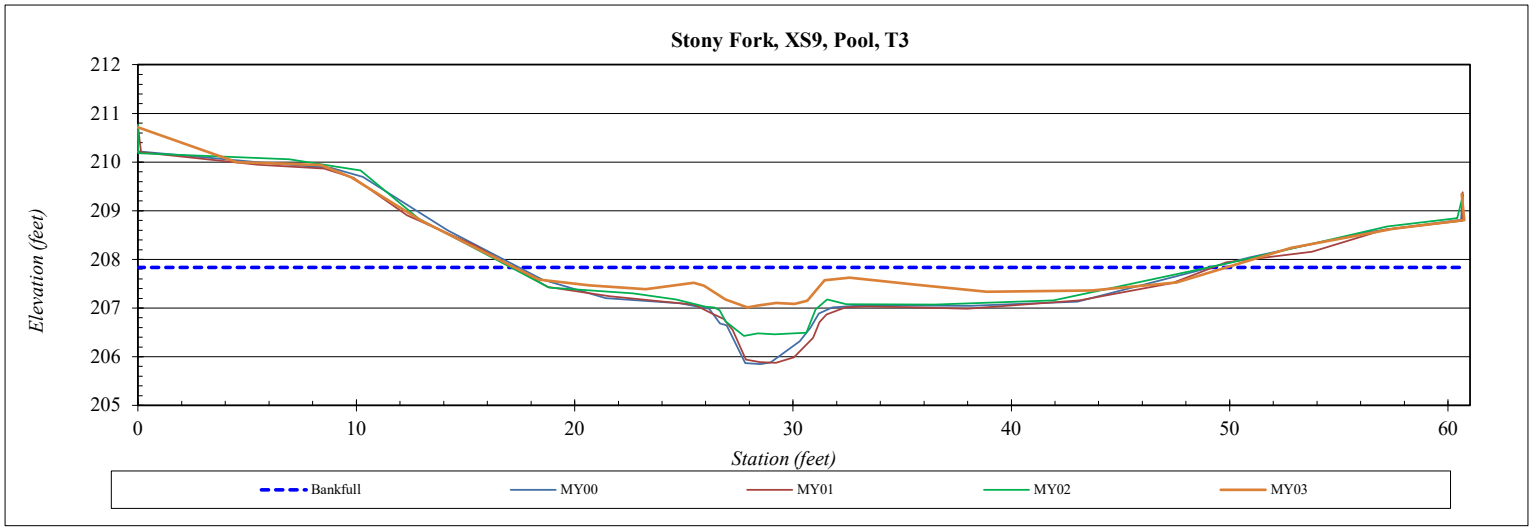


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS9 |
| **Drainage Area (sq mi):** | 0.04 |
| **Date:** | 7/26/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 210.71 |
| 4.5 | 210.00 |
| 8.4 | 209.94 |
| 9.8 | 209.69 |
| 13.0 | 208.80 |
| 18.4 | 207.59 |
| 20.7 | 207.47 |
| 23.2 | 207.39 |
| 25.4 | 207.52 |
| 25.9 | 207.46 |
| 26.9 | 207.18 |
| 27.9 | 207.01 |
| 28.4 | 207.05 |
| 29.2 | 207.11 |
| 30.1 | 207.09 |
| 30.7 | 207.15 |
| 31.4 | 207.57 |
| 32.6 | 207.62 |
| 35.8 | 207.48 |
| 38.9 | 207.34 |
| 43.7 | 207.36 |
| 47.6 | 207.53 |
| 52.8 | 208.24 |
| 57.5 | 208.63 |
| 60.7 | 208.81 |
| 60.6 | 209.34 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 207.83 |
| **Bankfull Cross-Sectional Area:** | 3.7 |
| **Total Cross-Sectional Area:** | 0.0 |
| **Bankfull Width:** | 5.5 |
| **Flood Prone Area Elevation:** | --- |
| **Flood Prone Width:** | --- |
| **Max Depth at Bankfull:** | 0.8 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | --- |
| **Entrenchment Ratio:** | --- |
| **Bank Height Ratio:** | --- |
| **Thalweg Elevation:** | 207.0 |

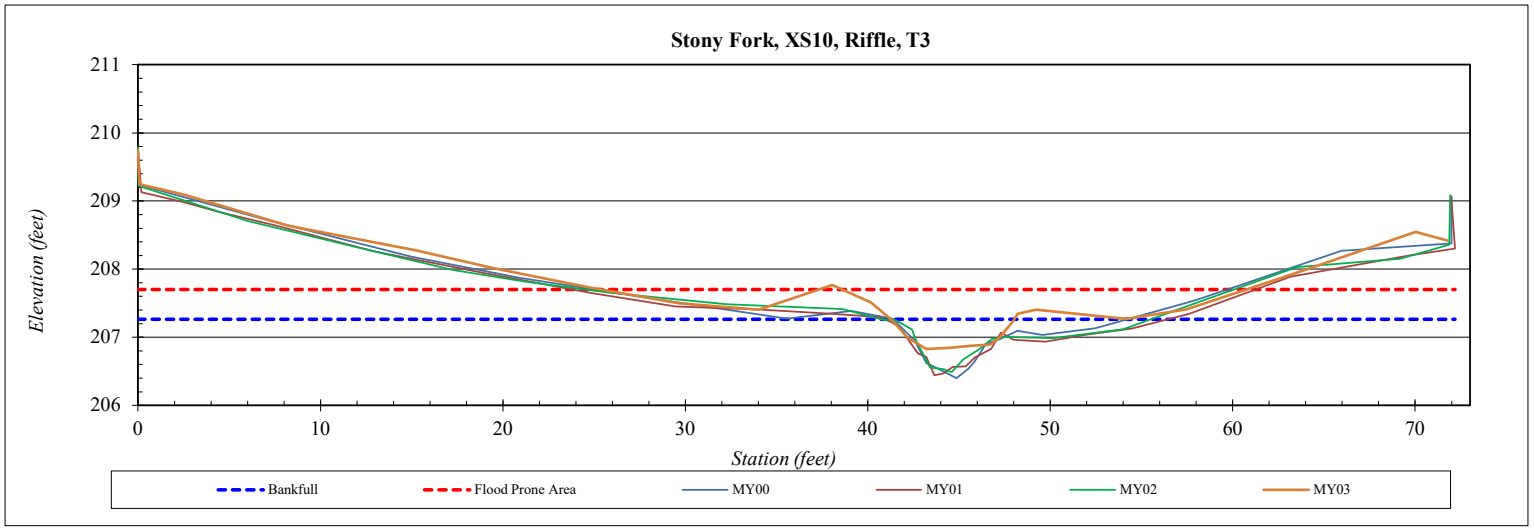


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS10 |
| **Drainage Area (sq mi):** | 0.04 |
| **Date:** | 7/26/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 209.74 |
| 0.1 | 209.25 |
| 2.5 | 209.09 |
| 8.2 | 208.64 |
| 15.2 | 208.28 |
| 19.5 | 208.02 |
| 24.7 | 207.73 |
| 29.7 | 207.50 |
| 34.0 | 207.41 |
| 38.1 | 207.77 |
| 40.2 | 207.51 |
| 41.3 | 207.25 |
| 42.2 | 206.99 |
| 43.2 | 206.83 |
| 44.5 | 206.85 |
| 45.6 | 206.88 |
| 46.7 | 206.89 |
| 47.2 | 206.98 |
| 48.0 | 207.24 |
| 48.2 | 207.34 |
| 49.2 | 207.41 |
| 54.2 | 207.27 |
| 57.5 | 207.41 |
| 64.1 | 208.00 |
| 70.0 | 208.55 |
| 71.8 | 208.42 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 207.26 |
| **Bankfull Cross-Sectional Area:** | 2.2 |
| **Total Cross-Sectional Area:** | 1.1 |
| **Bankfull Width:** | 6.8 |
| **Flood Prone Area Elevation:** | 207.7 |
| **Flood Prone Width:** | 34.1 |
| **Max Depth at Bankfull:** | 0.4 |
| **Mean Depth at Bankfull:** | 0.3 |
| **W / D Ratio:** | 20.9 |
| **Entrenchment Ratio:** | 5.0 |
| **Bank Height Ratio:** | 1.2 |
| **Thalweg Elevation:** | 206.8 |

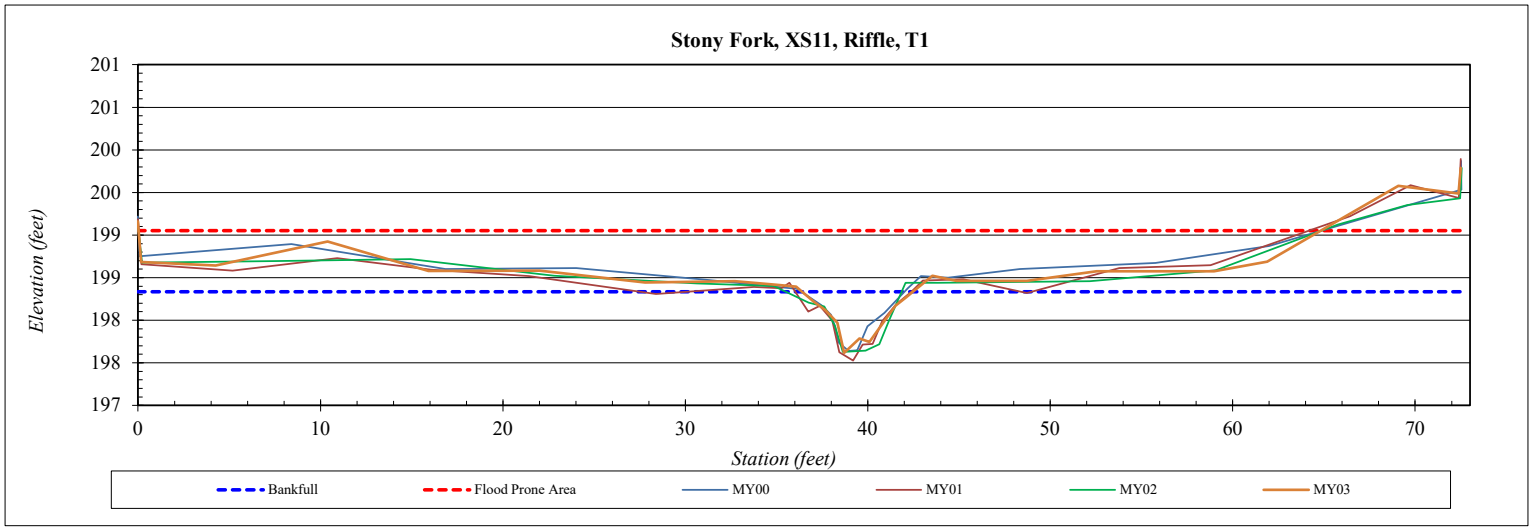


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS11 |
| **Drainage Area (sq mi):** | 0.02 |
| **Date:** | 7/26/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 199.16 |
| 0.2 | 198.69 |
| 4.3 | 198.64 |
| 10.4 | 198.93 |
| 15.9 | 198.58 |
| 22.0 | 198.58 |
| 27.8 | 198.45 |
| 32.7 | 198.46 |
| 35.0 | 198.42 |
| 36.1 | 198.39 |
| 37.0 | 198.22 |
| 37.7 | 198.12 |
| 38.3 | 197.97 |
| 38.7 | 197.62 |
| 39.5 | 197.79 |
| 40.1 | 197.74 |
| 41.1 | 198.05 |
| 41.5 | 198.17 |
| 42.1 | 198.27 |
| 43.5 | 198.52 |
| 44.9 | 198.46 |
| 48.7 | 198.46 |
| 52.5 | 198.57 |
| 59.0 | 198.57 |
| 61.9 | 198.69 |
| 66.4 | 199.24 |
| 69.1 | 199.58 |
| 72.4 | 199.49 |
| 72.5 | 199.79 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 198.33 |
| **Bankfull Cross-Sectional Area:** | 2.0 |
| **Total Cross-Sectional Area:** | 2.2 |
| **Bankfull Width:** | 6.1 |
| **Flood Prone Area Elevation:** | 199.1 |
| **Flood Prone Width:** | 64.8 |
| **Max Depth at Bankfull:** | 0.7 |
| **Mean Depth at Bankfull:** | 0.3 |
| **W / D Ratio:** | 18.5 |
| **Entrenchment Ratio:** | 10.7 |
| **Bank Height Ratio:** | 1.1 |
| **Thalweg Elevation:** | 197.6 |

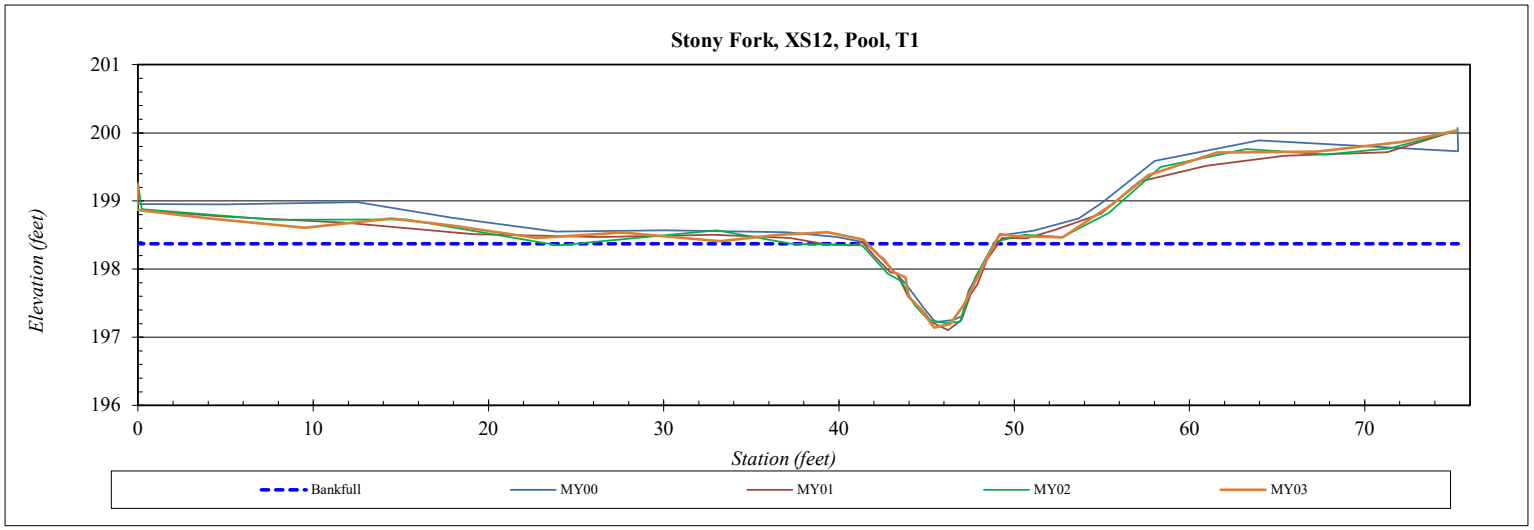


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS12 |
| **Drainage Area (sq mi):** | 0.02 |
| **Date:** | 7/26/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 199.23 |
| -0.1 | 198.87 |
| 3.9 | 198.75 |
| 9.5 | 198.61 |
| 14.5 | 198.75 |
| 18.0 | 198.64 |
| 22.7 | 198.46 |
| 27.6 | 198.54 |
| 33.2 | 198.41 |
| 36.6 | 198.50 |
| 39.3 | 198.54 |
| 41.4 | 198.44 |
| 42.3 | 198.19 |
| 42.5 | 198.15 |
| 43.1 | 197.96 |
| 43.8 | 197.88 |
| 44.0 | 197.59 |
| 44.6 | 197.43 |
| 45.4 | 197.14 |
| 46.3 | 197.19 |
| 47.1 | 197.47 |
| 48.3 | 198.11 |
| 49.2 | 198.51 |
| 50.0 | 198.49 |
| 52.8 | 198.47 |
| 55.6 | 198.96 |
| 57.6 | 199.38 |
| 61.6 | 199.71 |
| 67.3 | 199.73 |
| 72.1 | 199.87 |
| 75.3 | 200.03 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 198.37 |
| **Bankfull Cross-Sectional Area:** | 4.8 |
| **Total Cross-Sectional Area:** | 5.0 |
| **Bankfull Width:** | 7.3 |
| **Flood Prone Area Elevation:** | --- |
| **Flood Prone Width:** | --- |
| **Max Depth at Bankfull:** | 1.2 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | --- |
| **Entrenchment Ratio:** | --- |
| **Bank Height Ratio:** | --- |
| **Thalweg Elevation:** | 197.1 |

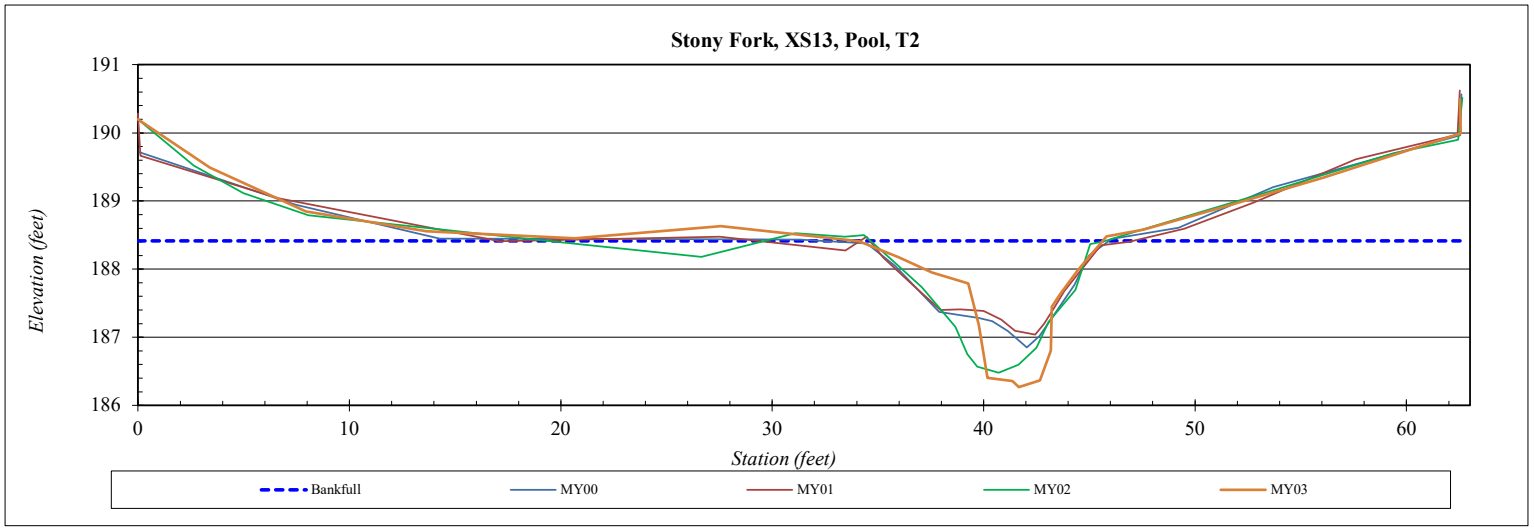


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS13 |
| **Drainage Area (sq mi):** | 0.14 |
| **Date:** | 7/31/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 190.20 |
| 3.4 | 189.49 |
| 7.9 | 188.85 |
| 13.7 | 188.56 |
| 20.7 | 188.45 |
| 27.6 | 188.63 |
| 34.1 | 188.41 |
| 36.0 | 188.18 |
| 37.6 | 187.95 |
| 39.3 | 187.79 |
| 39.8 | 187.18 |
| 40.2 | 186.41 |
| 41.4 | 186.36 |
| 41.7 | 186.27 |
| 42.7 | 186.37 |
| 43.2 | 186.80 |
| 43.2 | 187.45 |
| 43.6 | 187.63 |
| 44.4 | 187.98 |
| 45.8 | 188.48 |
| 47.6 | 188.58 |
| 51.4 | 188.91 |
| 56.1 | 189.35 |
| 62.6 | 190.00 |
| 62.5 | 190.49 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 188.42 |
| **Bankfull Cross-Sectional Area:** | 9.3 |
| **Total Cross-Sectional Area:** | 9.0 |
| **Bankfull Width:** | 8.1 |
| **Flood Prone Area Elevation:** | --- |
| **Flood Prone Width:** | --- |
| **Max Depth at Bankfull:** | 2.1 |
| **Mean Depth at Bankfull:** | 1.2 |
| **W / D Ratio:** | --- |
| **Entrenchment Ratio:** | --- |
| **Bank Height Ratio:** | --- |
| **Thalweg Elevation:** | 186.3 |

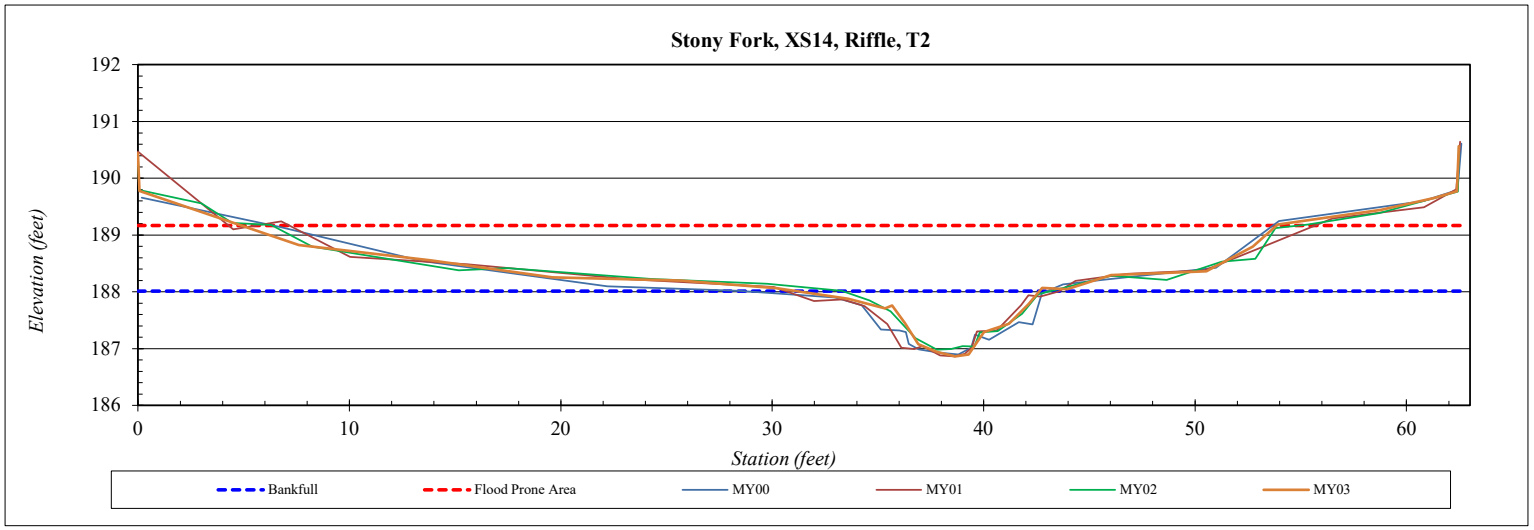


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS14 |
| **Drainage Area (sq mi):** | 0.14 |
| **Date:** | 7/31/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 190.44 |
| 0.1 | 189.78 |
| 7.6 | 188.83 |
| 13.9 | 188.56 |
| 19.6 | 188.26 |
| 25.7 | 188.20 |
| 30.2 | 188.06 |
| 33.6 | 187.88 |
| 35.3 | 187.71 |
| 35.7 | 187.76 |
| 36.3 | 187.45 |
| 36.9 | 187.08 |
| 37.8 | 186.94 |
| 38.7 | 186.86 |
| 39.3 | 186.90 |
| 40.0 | 187.29 |
| 41.2 | 187.44 |
| 42.1 | 187.78 |
| 42.8 | 188.07 |
| 44.0 | 188.05 |
| 46.0 | 188.30 |
| 50.5 | 188.36 |
| 52.7 | 188.80 |
| 53.9 | 189.18 |
| 58.8 | 189.45 |
| 61.3 | 189.65 |
| 62.4 | 189.77 |
| 62.5 | 190.57 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 188.01 |
| **Bankfull Cross-Sectional Area:** | 5.8 |
| **Total Cross-Sectional Area:** | 4.6 |
| **Bankfull Width:** | 11.5 |
| **Flood Prone Area Elevation:** | 189.2 |
| **Flood Prone Width:** | 48.9 |
| **Max Depth at Bankfull:** | 1.2 |
| **Mean Depth at Bankfull:** | 0.5 |
| **W / D Ratio:** | 22.9 |
| **Entrenchment Ratio:** | 4.3 |
| **Bank Height Ratio:** | 0.8 |
| **Thalweg Elevation:** | 186.9 |

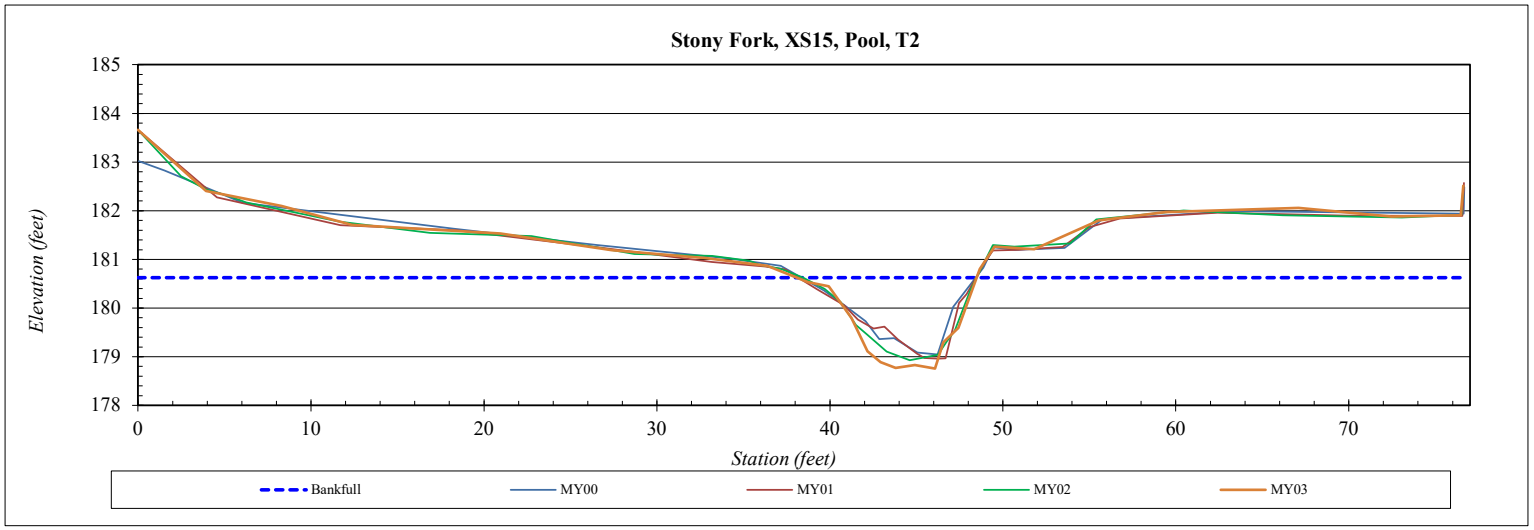


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS15 |
| **Drainage Area (sq mi):** | 0.22 |
| **Date:** | 7/31/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

| Station | Elevation |
|---|---|
| 0.0 | 183.66 |
| 3.9 | 182.41 |
| 8.3 | 182.10 |
| 12.4 | 181.71 |
| 20.9 | 181.53 |
| 27.4 | 181.19 |
| 32.9 | 181.03 |
| 36.4 | 180.87 |
| 38.7 | 180.54 |
| 39.9 | 180.45 |
| 41.2 | 179.80 |
| 42.2 | 179.11 |
| 42.9 | 178.89 |
| 43.8 | 178.77 |
| 44.9 | 178.83 |
| 46.1 | 178.76 |
| 46.6 | 179.30 |
| 47.4 | 179.59 |
| 48.7 | 180.80 |
| 49.5 | 181.26 |
| 51.8 | 181.21 |
| 55.6 | 181.80 |
| 59.4 | 181.98 |
| 67.1 | 182.06 |
| 72.5 | 181.88 |
| 76.5 | 181.91 |
| 76.6 | 182.51 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 180.62 |
| **Bankfull Cross-Sectional Area:** | 11.2 |
| **Total Cross-Sectional Area:** | 14.0 |
| **Bankfull Width:** | 10.4 |
| **Flood Prone Area Elevation:** | --- |
| **Flood Prone Width:** | --- |
| **Max Depth at Bankfull:** | 1.9 |
| **Mean Depth at Bankfull:** | 1.1 |
| **W / D Ratio:** | --- |
| **Entrenchment Ratio:** | --- |
| **Bank Height Ratio:** | --- |
| **Thalweg Elevation:** | 178.8 |

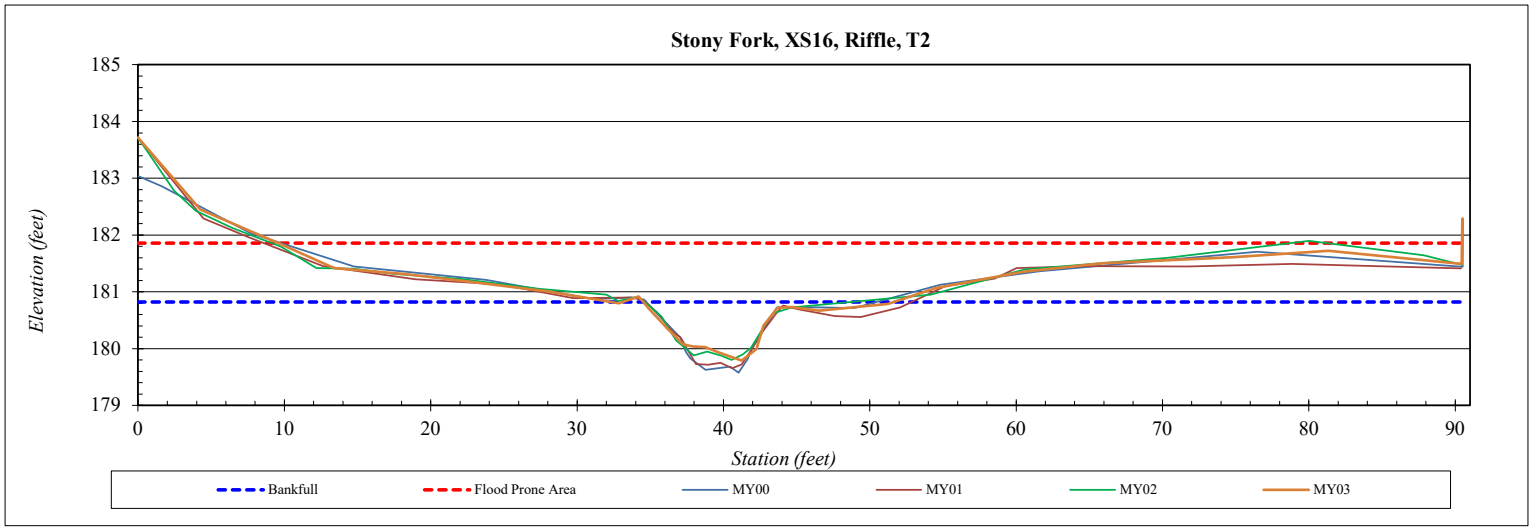


# Cross-Section Plots

| | |
|---|---|
| **River Basin:** | Neuse River |
| **Site:** | Stony Fork |
| **XS ID** | XS16 |
| **Drainage Area (sq mi):** | 0.22 |
| **Date:** | 7/31/2021 |
| **Field Crew:** | T. Seelinger/A. Gutierrez |

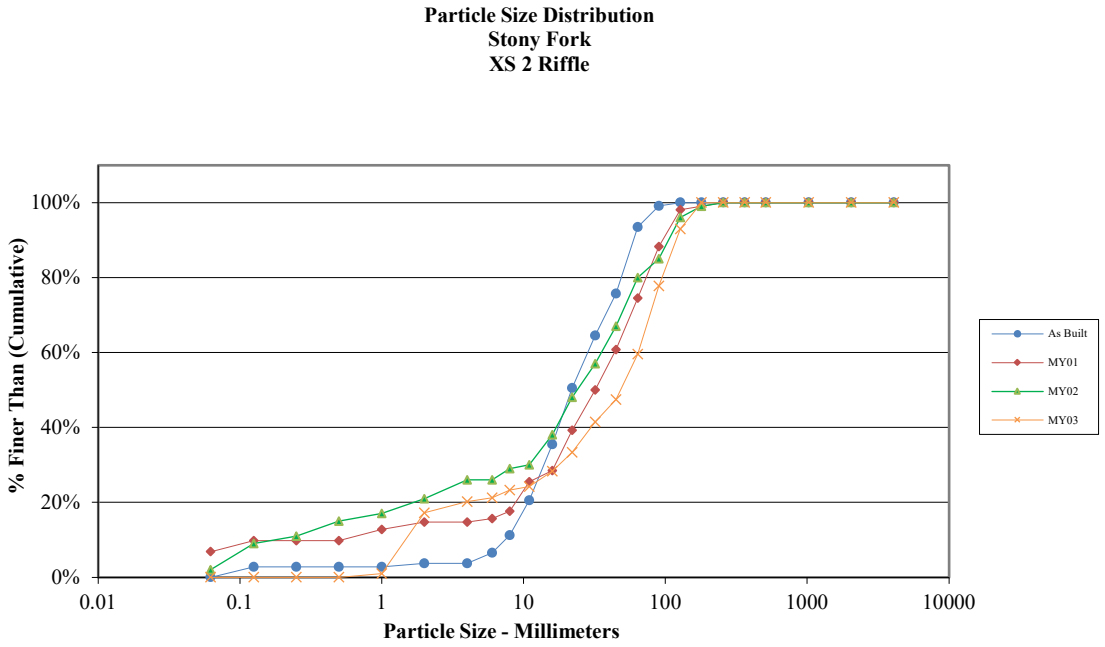
| Station | Elevation |
|---|---|
| 0.0 | 183.72 |
| 4.2 | 182.45 |
| 9.9 | 181.82 |
| 13.4 | 181.42 |
| 18.3 | 181.31 |
| 22.9 | 181.17 |
| 28.0 | 181.01 |
| 32.9 | 180.80 |
| 34.2 | 180.92 |
| 34.9 | 180.70 |
| 36.2 | 180.35 |
| 37.2 | 180.08 |
| 37.9 | 180.04 |
| 38.7 | 180.03 |
| 39.7 | 179.93 |
| 41.3 | 179.79 |
| 42.3 | 179.99 |
| 42.7 | 180.40 |
| 43.7 | 180.72 |
| 44.7 | 180.73 |
| 46.6 | 180.67 |
| 51.2 | 180.79 |
| 54.5 | 181.07 |
| 60.6 | 181.36 |
| 65.9 | 181.51 |
| 74.8 | 181.61 |
| 81.3 | 181.72 |
| 90.4 | 181.49 |
| 90.5 | 182.29 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft) - Based on AB-Bankfull Area** | 180.82 |
| **Bankfull Cross-Sectional Area:** | 6.0 |
| **Total Cross-Sectional Area:** | 5.1 |
| **Bankfull Width:** | 9.9 |
| **Flood Prone Area Elevation:** | 181.9 |
| **Flood Prone Width:** | 80.8 |
| **Max Depth at Bankfull:** | 1.0 |
| **Mean Depth at Bankfull:** | 0.6 |
| **W / D Ratio:** | 16.4 |
| **Entrenchment Ratio:** | 8.1 |
| **Bank Height Ratio:** | 0.9 |
| **Thalweg Elevation:** | 179.8 |



| Cross-Section 2 Riffle - MY03 | | | |
|---|---|---|---|
| Particle | Millimeter | | Count |
| Silt/Clay | < 0.062 | S/C | |
| Very Fine | .062 - .125 | S | |
| Fine | .125 - .25 | A | |
| Medium | .25 - .50 | N | |
| Coarse | .50 - 1 | D | 1 |
| Very Coarse | 1 - 2 | S | 16 |
| Very Fine | 2 - 4 | | 3 |
| Fine | 4 - 5.7 | G | 1 |
| Fine | 5.7 - 8 | R | 2 |
| Medium | 8 - 11.3 | A | 1 |
| Medium | 11.3 - 16 | V | 4 |
| Coarse | 16 - 22.6 | E | 5 |
| Coarse | 22.6 - 32 | L | 8 |
| Very Coarse | 32 - 45 | S | 6 |
| Very Coarse | 45 - 64 | | 12 |
| Small | 64 - 90 | C | 18 |
| Small | 90 - 128 | O | 15 |
| Large | 128 - 180 | B | 7 |
| Large | 180 - 256 | L | |
| Small | 256 - 362 | B | |
| Small | 362 - 512 | L | |
| Medium | 512 - 1024 | D | |
| Lrg- Very Lrg | 1024 - 2048 | R | |
| Bedrock | >2048 | BDRK | |
| | | **Total** | 99 |

Note:



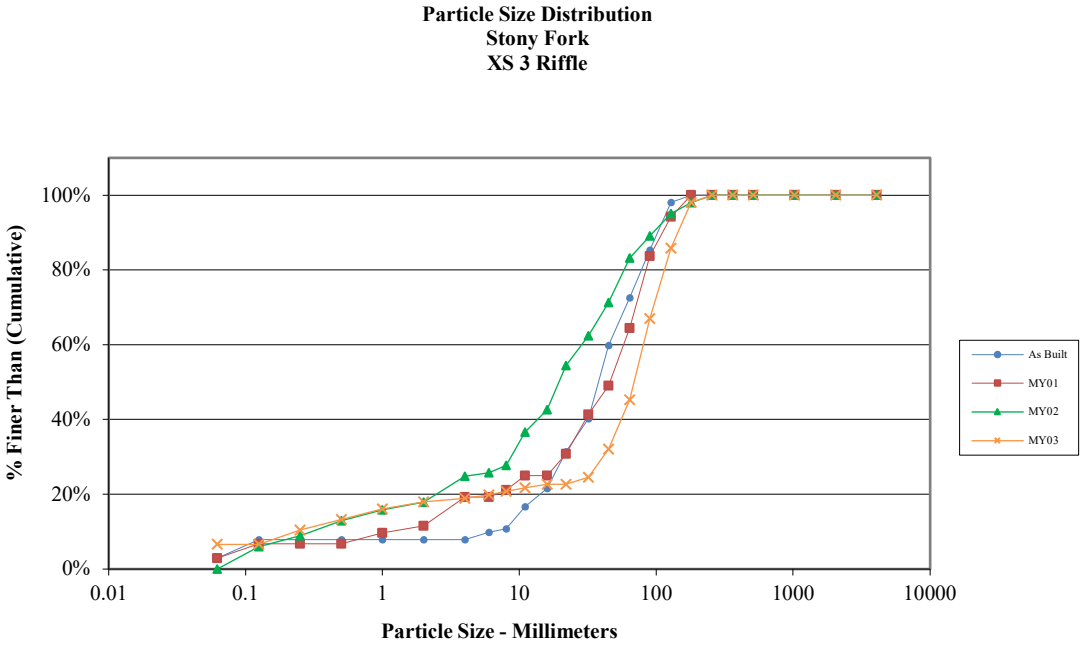

| Size (mm) | |
|---|---|
| D16 | 1.9 |
| D35 | 24 |
| D50 | 48 |
| D65 | 71 |
| D84 | 100 |
| D95 | 140 |

| Size Distribution | |
|---|---|
| mean | 13.8 |
| dispersion | 13.7 |
| skewness | -0.41 |

| Type | |
|---|---|
| silt/clay | 0% |
| sand | 17% |
| gravel | 42% |
| cobble | 33% |
| boulder | 0% |
| bedrock | 0% |
| hardpan | 0% |
| wood/det | 0% |
| artificial | 0% |

| Cross-Section 3 Riffle - MY03 | | | |
|---|---|---|---|
| Particle | Millimeter | | Count |
| Silt/Clay | < 0.062 | S/C | 7 |
| Very Fine | .062 - .125 | S | |
| Fine | .125 - .25 | A | 4 |
| Medium | .25 - .50 | N | 3 |
| Coarse | .50 - 1 | D | 3 |
| Very Coarse | 1 - 2 | S | 2 |
| Very Fine | 2 - 4 | | 1 |
| Fine | 4 - 5.7 | G | 1 |
| Fine | 5.7 - 8 | R | 1 |
| Medium | 8 - 11.3 | A | 1 |
| Medium | 11.3 - 16 | V | 1 |
| Coarse | 16 - 22.6 | E | |
| Coarse | 22.6 - 32 | L | 2 |
| Very Coarse | 32 - 45 | S | 8 |
| Very Coarse | 45 - 64 | | 14 |
| Small | 64 - 90 | C | 23 |
| Small | 90 - 128 | O | 20 |
| Large | 128 - 180 | B | 13 |
| Large | 180 - 256 | L | 2 |
| Small | 256 - 362 | B | |
| Small | 362 - 512 | L | |
| Medium | 512 - 1024 | D | |
| Lrg- Very Lrg | 1024 - 2048 | R | |
| Bedrock | >2048 | BDRK | |
| | | **Total** | 106 |

Note:



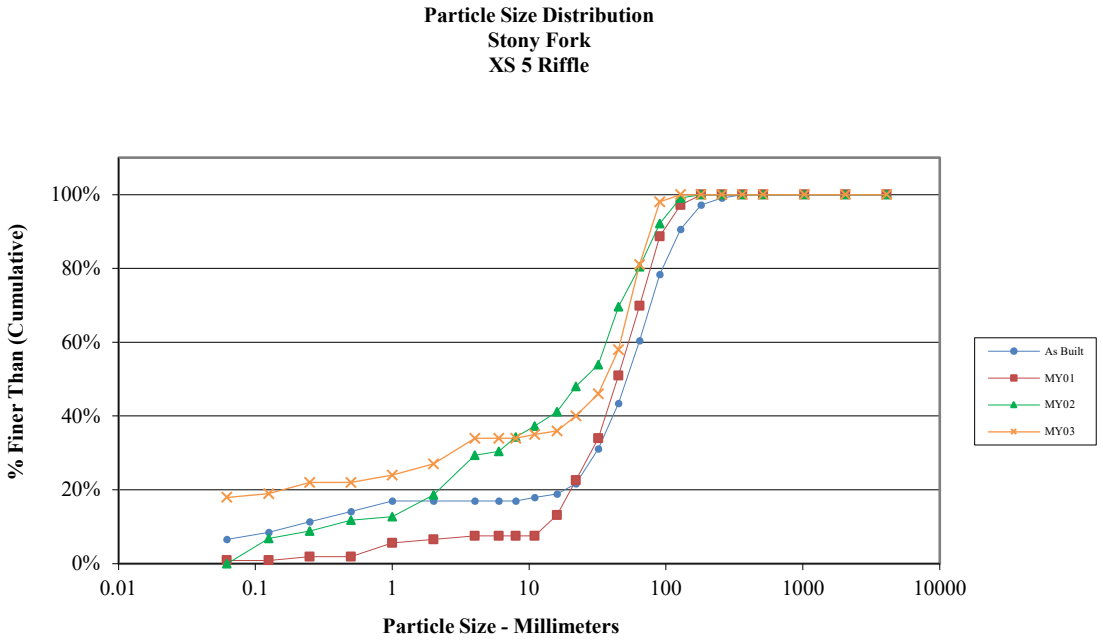

| Size (mm) | |
|---|---|
| D16 | 0.99 |
| D35 | 49 |
| D50 | 69 |
| D65 | 87 |
| D84 | 120 |
| D95 | 170 |

| Size Distribution | |
|---|---|
| mean | 10.9 |
| dispersion | 35.7 |
| skewness | -0.56 |

| Type | |
|---|---|
| silt/clay | 7% |
| sand | 11% |
| gravel | 27% |
| cobble | 55% |
| boulder | 0% |
| bedrock | 0% |
| hardpan | 0% |
| wood/det | 0% |
| artificial | 0% |

| Cross-Section 5 Riffle - MY03 | | | |
|---|---|---|---|
| Particle | Millimeter | | Count |
| Silt/Clay | < 0.062 | S/C | 18 |
| Very Fine | .062 - .125 | S | 1 |
| Fine | .125 - .25 | A | 3 |
| Medium | .25 - .50 | N | |
| Coarse | .50 - 1 | D | 2 |
| Very Coarse | 1 - 2 | S | 3 |
| Very Fine | 2 - 4 | | 7 |
| Fine | 4 - 5.7 | G | |
| Fine | 5.7 - 8 | R | |
| Medium | 8 - 11.3 | A | 1 |
| Medium | 11.3 - 16 | V | 1 |
| Coarse | 16 - 22.6 | E | 4 |
| Coarse | 22.6 - 32 | L | 6 |
| Very Coarse | 32 - 45 | S | 12 |
| Very Coarse | 45 - 64 | | 23 |
| Small | 64 - 90 | C | 17 |
| Small | 90 - 128 | O | 2 |
| Large | 128 - 180 | B | |
| Large | 180 - 256 | L | |
| Small | 256 - 362 | B | |
| Small | 362 - 512 | L | |
| Medium | 512 - 1024 | D | |
| Lrg- Very Lrg | 1024 - 2048 | R | |
| Bedrock | >2048 | BDRK | |
| | | **Total** | 100 |

Note:



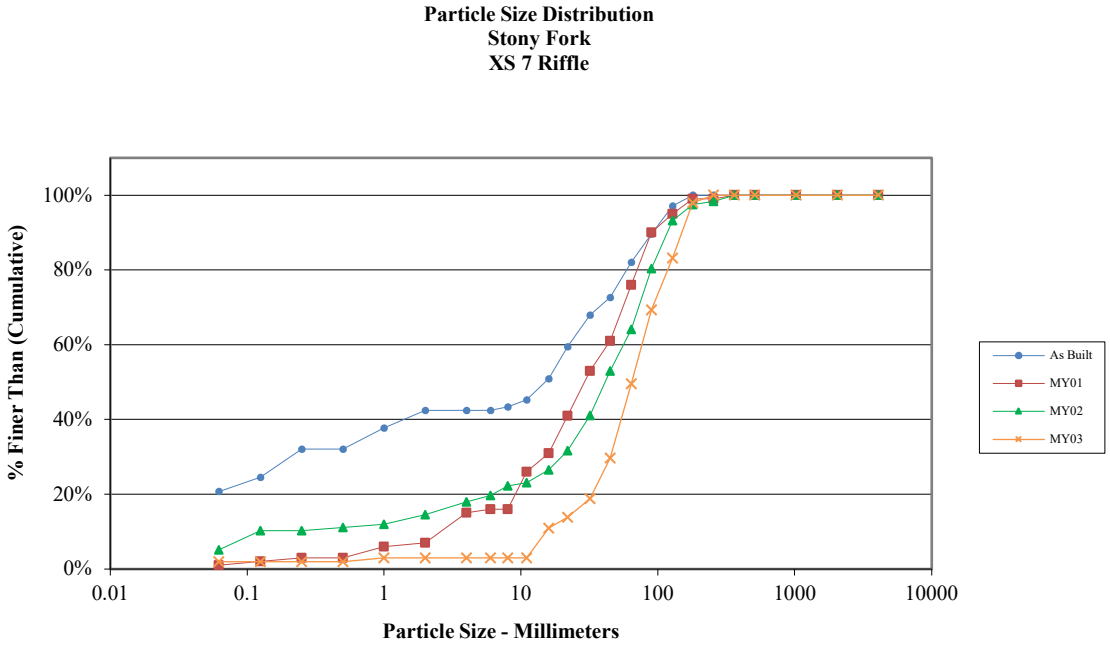

| Size (mm) | |
|---|---|
| D16 | 0.062 |
| D35 | 11 |
| D50 | 36 |
| D65 | 50 |
| D84 | 68 |
| D95 | 85 |

| Size Distribution | |
|---|---|
| mean | 2.1 |
| dispersion | 291.3 |
| skewness | -0.71 |

| Type | |
|---|---|
| silt/clay | 18% |
| sand | 9% |
| gravel | 54% |
| cobble | 19% |
| boulder | 0% |
| bedrock | 0% |
| hardpan | 0% |
| wood/det | 0% |
| artificial | 0% |

| Cross-Section 7 Riffle -MY03 | | | |
|---|---|---|---|
| Particle | Millimeter | | Count |
| Silt/Clay | < 0.062 | S/C | 2 |
| Very Fine | .062 - .125 | S | |
| Fine | .125 - .25 | A | |
| Medium | .25 - .50 | N | |
| Coarse | .50 - 1 | D | 1 |
| Very Coarse | 1 - 2 | S | |
| Very Fine | 2 - 4 | | |
| Fine | 4 - 5.7 | G | |
| Fine | 5.7 - 8 | R | |
| Medium | 8 - 11.3 | A | |
| Medium | 11.3 - 16 | V | 8 |
| Coarse | 16 - 22.6 | E | 3 |
| Coarse | 22.6 - 32 | L | 5 |
| Very Coarse | 32 - 45 | S | 11 |
| Very Coarse | 45 - 64 | | 20 |
| Small | 64 - 90 | C | 20 |
| Small | 90 - 128 | O | 14 |
| Large | 128 - 180 | B | 15 |
| Large | 180 - 256 | L | 2 |
| Small | 256 - 362 | B | |
| Small | 362 - 512 | L | |
| Medium | 512 - 1024 | D | |
| Lrg- Very Lrg | 1024 - 2048 | R | |
| Bedrock | >2048 | BDRK | |
| | | **Total** | 101 |

Note:



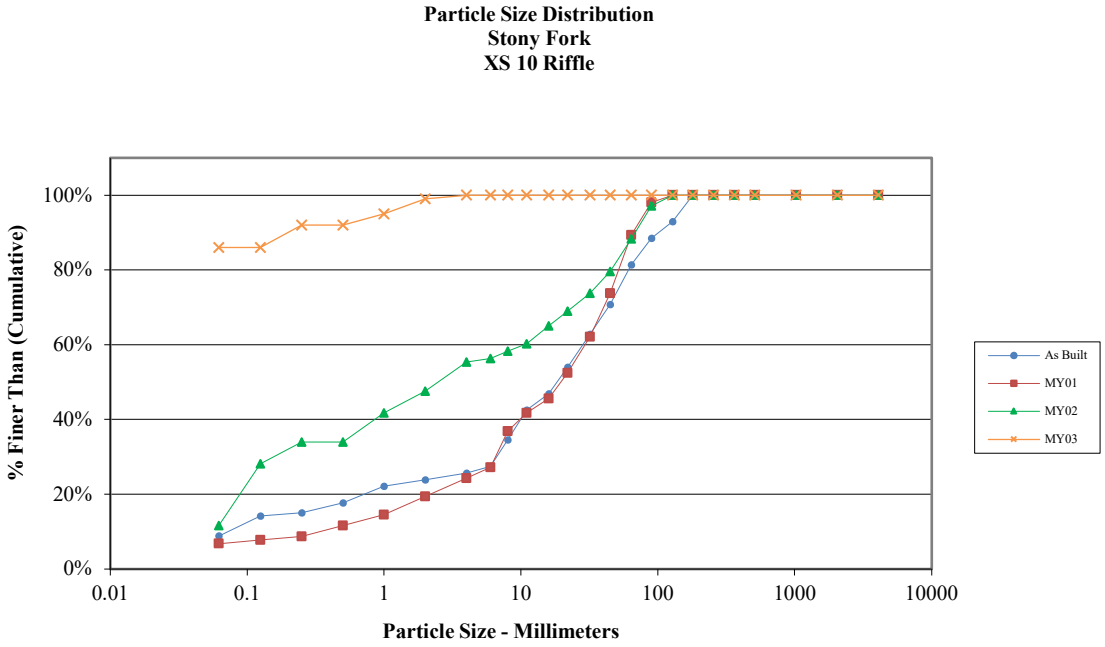

| Size (mm) | |
|---|---|
| D16 | 26 |
| D35 | 49 |
| D50 | 65 |
| D65 | 84 |
| D84 | 130 |
| D95 | 170 |

| Size Distribution | |
|---|---|
| mean | 58.1 |
| dispersion | 2.3 |
| skewness | -0.06 |

| Type | |
|---|---|
| silt/clay | 2% |
| sand | 1% |
| gravel | 47% |
| cobble | 49% |
| boulder | 0% |
| bedrock | 0% |
| hardpan | 0% |
| wood/det | 0% |
| artificial | 0% |

| Cross-Section 10 Riffle - MY03 | | | |
|---|---|---|---|
| Particle | Millimeter | | Count |
| Silt/Clay | < 0.062 | S/C | 86 |
| Very Fine | .062 - .125 | S | |
| Fine | .125 - .25 | A | 6 |
| Medium | .25 - .50 | N | |
| Coarse | .50 - 1 | D | 3 |
| Very Coarse | 1 - 2 | S | 4 |
| Very Fine | 2 - 4 | | 1 |
| Fine | 4 - 5.7 | G | |
| Fine | 5.7 - 8 | R | |
| Medium | 8 - 11.3 | A | |
| Medium | 11.3 - 16 | V | |
| Coarse | 16 - 22.6 | E | |
| Coarse | 22.6 - 32 | L | |
| Very Coarse | 32 - 45 | S | |
| Very Coarse | 45 - 64 | | |
| Small | 64 - 90 | C | |
| Small | 90 - 128 | O | |
| Large | 128 - 180 | B | |
| Large | 180 - 256 | L | |
| Small | 256 - 362 | B | |
| Small | 362 - 512 | L | |
| Medium | 512 - 1024 | D | |
| Lrg- Very Lrg | 1024 - 2048 | R | |
| Bedrock | >2048 | BDRK | |
| | | **Total** | 100 |

Note:



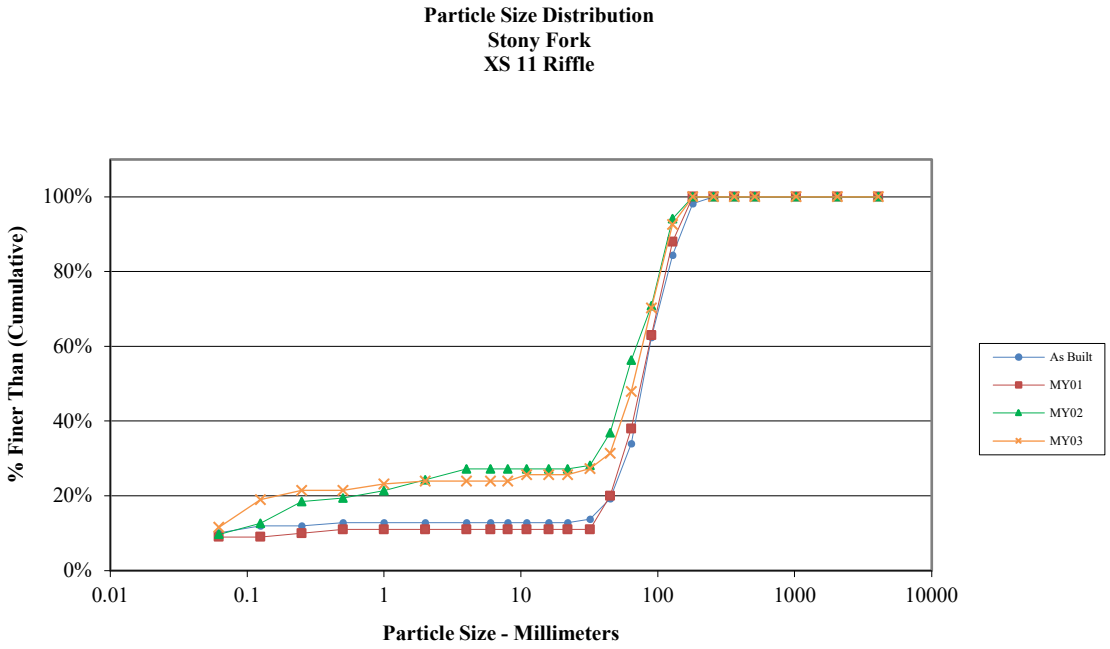

| Size (mm) | |
|---|---|
| D16 | 0.062 |
| D35 | 0.062 |
| D50 | 0.062 |
| D65 | 0.062 |
| D84 | 0.062 |
| D95 | 1 |

| Size Distribution | |
|---|---|
| mean | 0.1 |
| dispersion | 1.0 |
| skewness | --- |

| Type | |
|---|---|
| silt/clay | 86% |
| sand | 13% |
| gravel | 1% |
| cobble | 0% |
| boulder | 0% |
| bedrock | 0% |
| hardpan | 0% |
| wood/det | 0% |
| artificial | 0% |

| Cross-Section 11 Riffle -MY03 | | | |
|---|---|---|---|
| Particle | Millimeter | | Count |
| Silt/Clay | < 0.062 | S/C | 14 |
| Very Fine | .062 - .125 | S | 9 |
| Fine | .125 - .25 | A | 3 |
| Medium | .25 - .50 | N | |
| Coarse | .50 - 1 | D | 2 |
| Very Coarse | 1 - 2 | S | 1 |
| Very Fine | 2 - 4 | | |
| Fine | 4 - 5.7 | G | |
| Fine | 5.7 - 8 | R | |
| Medium | 8 - 11.3 | A | 2 |
| Medium | 11.3 - 16 | V | |
| Coarse | 16 - 22.6 | E | |
| Coarse | 22.6 - 32 | L | 2 |
| Very Coarse | 32 - 45 | S | 5 |
| Very Coarse | 45 - 64 | | 20 |
| Small | 64 - 90 | C | 27 |
| Small | 90 - 128 | O | 27 |
| Large | 128 - 180 | B | 9 |
| Large | 180 - 256 | L | |
| Small | 256 - 362 | B | |
| Small | 362 - 512 | L | |
| Medium | 512 - 1024 | D | |
| Lrg- Very Lrg | 1024 - 2048 | R | |
| Bedrock | >2048 | BDRK | |
| | | **Total** | 121 |

Note:



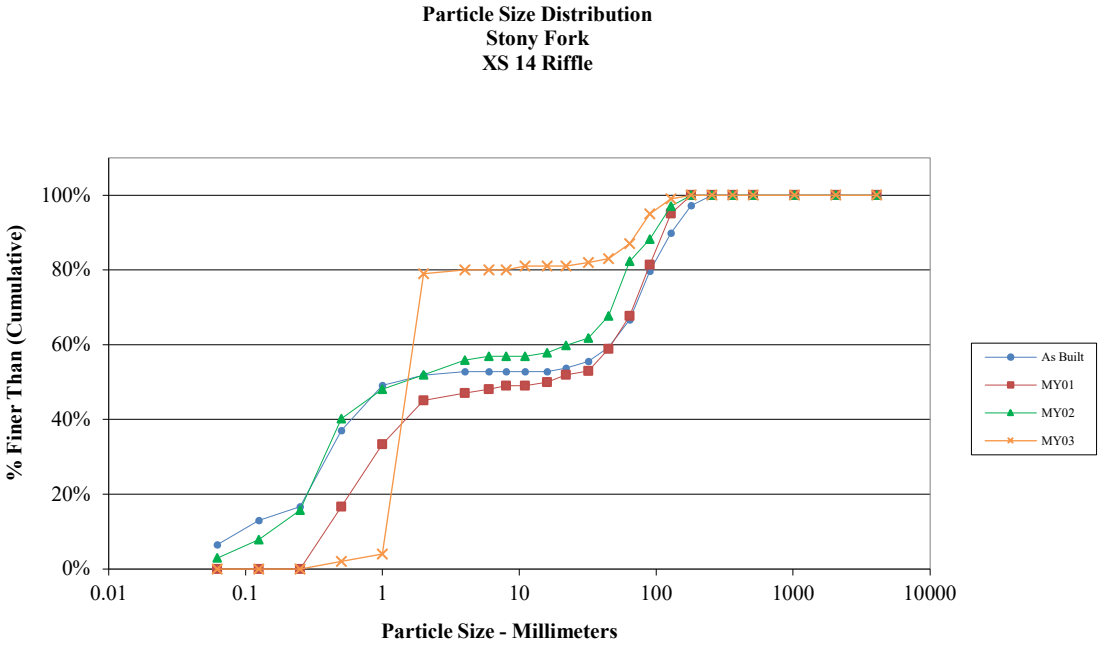

| Size (mm) | |
|---|---|
| D16 | 0.094 |
| D35 | 49 |
| D50 | 66 |
| D65 | 83 |
| D84 | 110 |
| D95 | 140 |

| Size Distribution | |
|---|---|
| mean | 3.2 |
| dispersion | 351.9 |
| skewness | -0.75 |

| Type | |
|---|---|
| silt/clay | 12% |
| sand | 12% |
| gravel | 24% |
| cobble | 52% |
| boulder | 0% |
| bedrock | 0% |
| hardpan | 0% |
| wood/det | 0% |
| artificial | 0% |

| Cross-Section 14 Riffle - MY03 | | | |
|---|---|---|---|
| Particle | Millimeter | | Count |
| Silt/Clay | < 0.062 | S/C | |
| Very Fine | .062 - .125 | S | |
| Fine | .125 - .25 | A | |
| Medium | .25 - .50 | N | 2 |
| Coarse | .50 - 1 | D | 2 |
| Very Coarse | 1 - 2 | S | 75 |
| Very Fine | 2 - 4 | | 1 |
| Fine | 4 - 5.7 | G | |
| Fine | 5.7 - 8 | R | |
| Medium | 8 - 11.3 | A | 1 |
| Medium | 11.3 - 16 | V | |
| Coarse | 16 - 22.6 | E | |
| Coarse | 22.6 - 32 | L | 1 |
| Very Coarse | 32 - 45 | S | 1 |
| Very Coarse | 45 - 64 | | 4 |
| Small | 64 - 90 | C | 8 |
| Small | 90 - 128 | O | 4 |
| Large | 128 - 180 | B | 1 |
| Large | 180 - 256 | L | |
| Small | 256 - 362 | B | |
| Small | 362 - 512 | L | |
| Medium | 512 - 1024 | D | |
| Lrg- Very Lrg | 1024 - 2048 | R | |
| Bedrock | >2048 | BDRK | |
| | | **Total** | 100 |

Note:



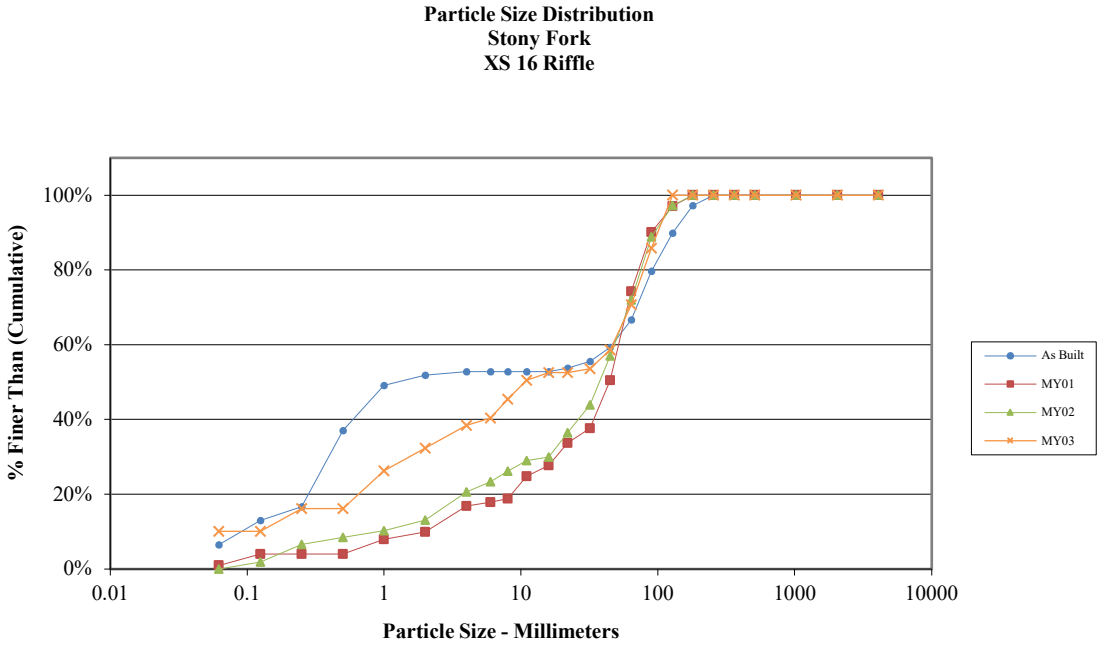

| Size (mm) | |
|---|---|
| D16 | 1.1 |
| D35 | 1.3 |
| D50 | 1.5 |
| D65 | 1.8 |
| D84 | 49 |
| D95 | 90 |

| Size Distribution | |
|---|---|
| mean | 7.3 |
| dispersion | 17.0 |
| skewness | 0.54 |

| Type | |
|---|---|
| silt/clay | 0% |
| sand | 79% |
| gravel | 8% |
| cobble | 13% |
| boulder | 0% |
| bedrock | 0% |
| hardpan | 0% |
| wood/det | 0% |
| artificial | 0% |

| Cross-Section 16 Riffle - MY03 | | | |
|---|---|---|---|
| Particle | Millimeter | | Count |
| Silt/Clay | < 0.062 | S/C | 10 |
| Very Fine | .062 - .125 | S | |
| Fine | .125 - .25 | A | 6 |
| Medium | .25 - .50 | N | |
| Coarse | .50 - 1 | D | 10 |
| Very Coarse | 1 - 2 | S | 6 |
| Very Fine | 2 - 4 | | 6 |
| Fine | 4 - 5.7 | G | 2 |
| Fine | 5.7 - 8 | R | 5 |
| Medium | 8 - 11.3 | A | 5 |
| Medium | 11.3 - 16 | V | 2 |
| Coarse | 16 - 22.6 | E | |
| Coarse | 22.6 - 32 | L | 1 |
| Very Coarse | 32 - 45 | S | 5 |
| Very Coarse | 45 - 64 | | 12 |
| Small | 64 - 90 | C | 15 |
| Small | 90 - 128 | O | 14 |
| Large | 128 - 180 | B | |
| Large | 180 - 256 | L | |
| Small | 256 - 362 | B | |
| Small | 362 - 512 | L | |
| Medium | 512 - 1024 | D | |
| Lrg- Very Lrg | 1024 - 2048 | R | |
| Bedrock | >2048 | BDRK | |
| | | **Total** | 99 |

Note:




| Size (mm) | |
|---|---|
| D16 | 0.25 |
| D35 | 2.7 |
| D50 | 11 |
| D65 | 54 |
| D84 | 86 |
| D95 | 110 |

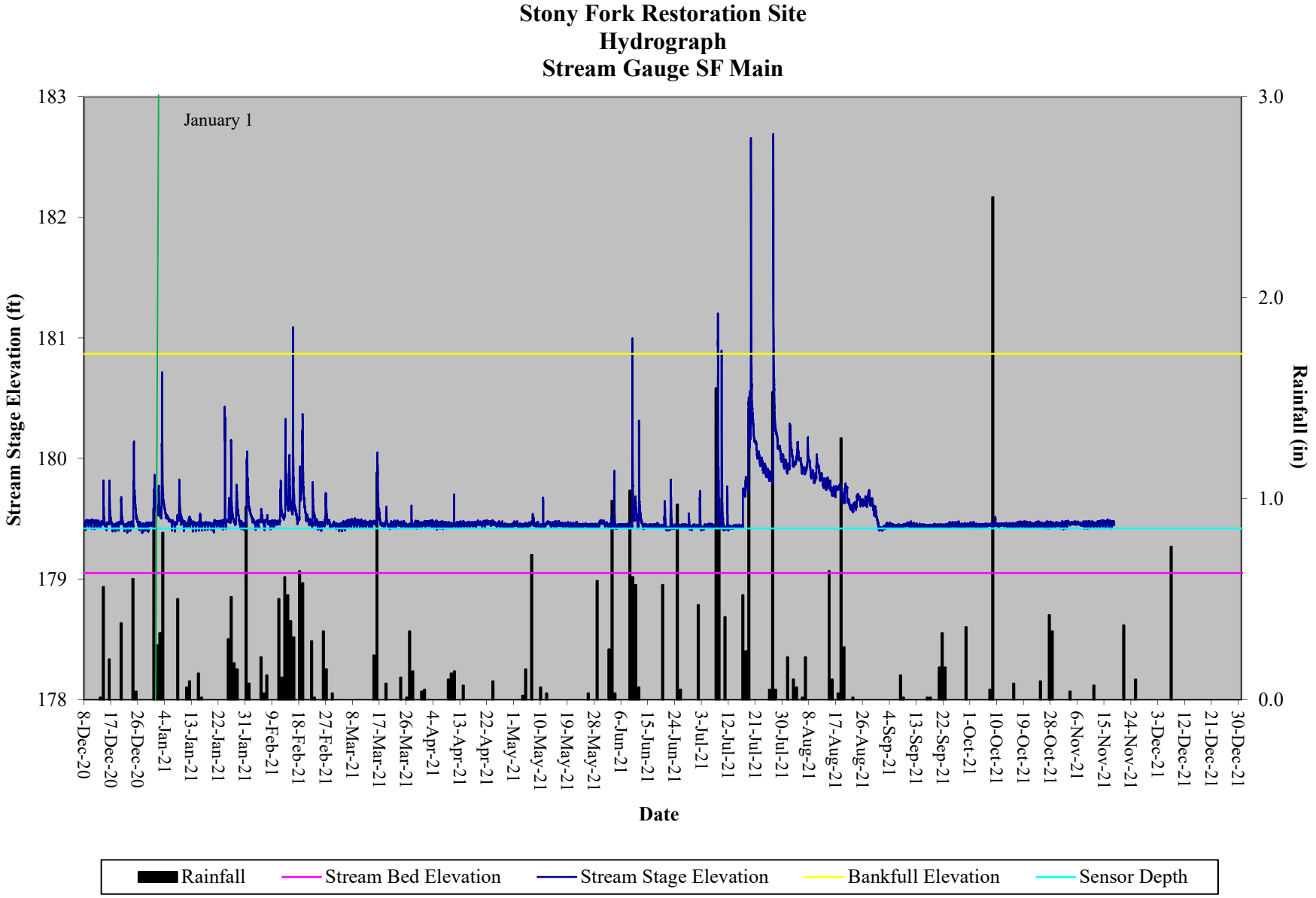
| Size Distribution | |
|---|---|
| mean | 4.6 |
| dispersion | 25.9 |
| skewness | -0.24 |

| Type | |
|---|---|
| silt/clay | 10% |
| sand | 22% |
| gravel | 38% |
| cobble | 29% |
| boulder | 0% |
| bedrock | 0% |
| hardpan | 0% |
| wood/det | 0% |
| artificial | 0% |

# APPENDIX E

Hydrologic Data

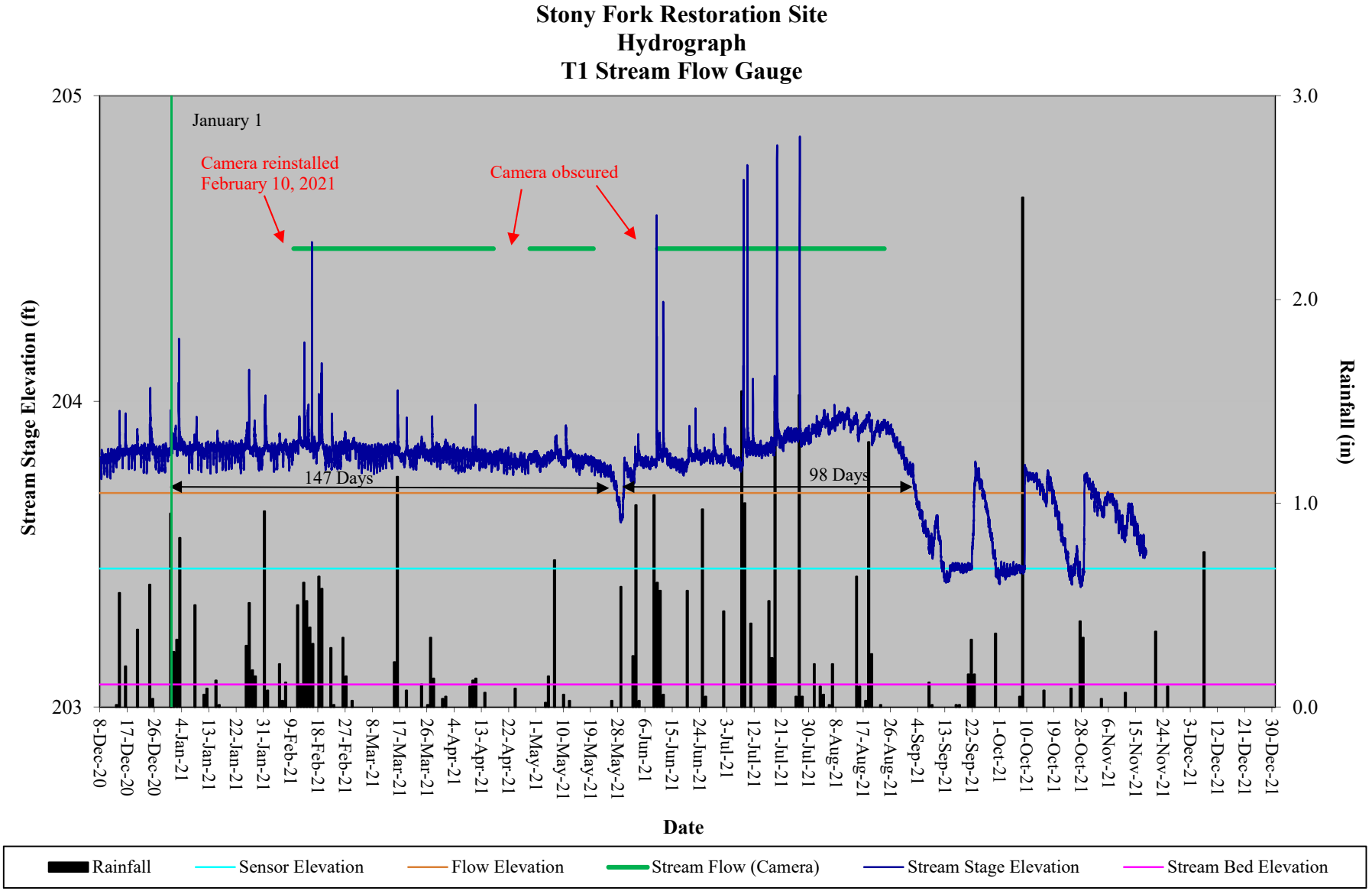
| Table 10. Verification of Bankfull Events<br>Stony Fork Restoration Site, DMS Project #97085 | | |
|---|---|---|
| **Monitoring Year** | **Date of Occurrence** | **Method** |
| MY02 | February 6, 2020 | Onsite stream gauge |
| | February 22, 2020 | Onsite stream gauge |
| | July 23, 2020 | Onsite stream gauge |
| | August 4, 2020 | Onsite stream gauge |
| | August 15, 2020 | Onsite stream gauge |
| | August 31, 2020 | Onsite stream gauge |
| | September 25, 2020 | Onsite stream gauge |
| | September 29, 2020 | Onsite stream gauge |
| MY03 | February 16, 2021 | Onsite stream gauge |
| | June 9, 2021 | Onsite stream gauge |
| | July 8, 2021 | Onsite stream gauge |
| | July 19, 2021 | Onsite stream gauge |
| | July 27, 2021 | Onsite stream gauge |

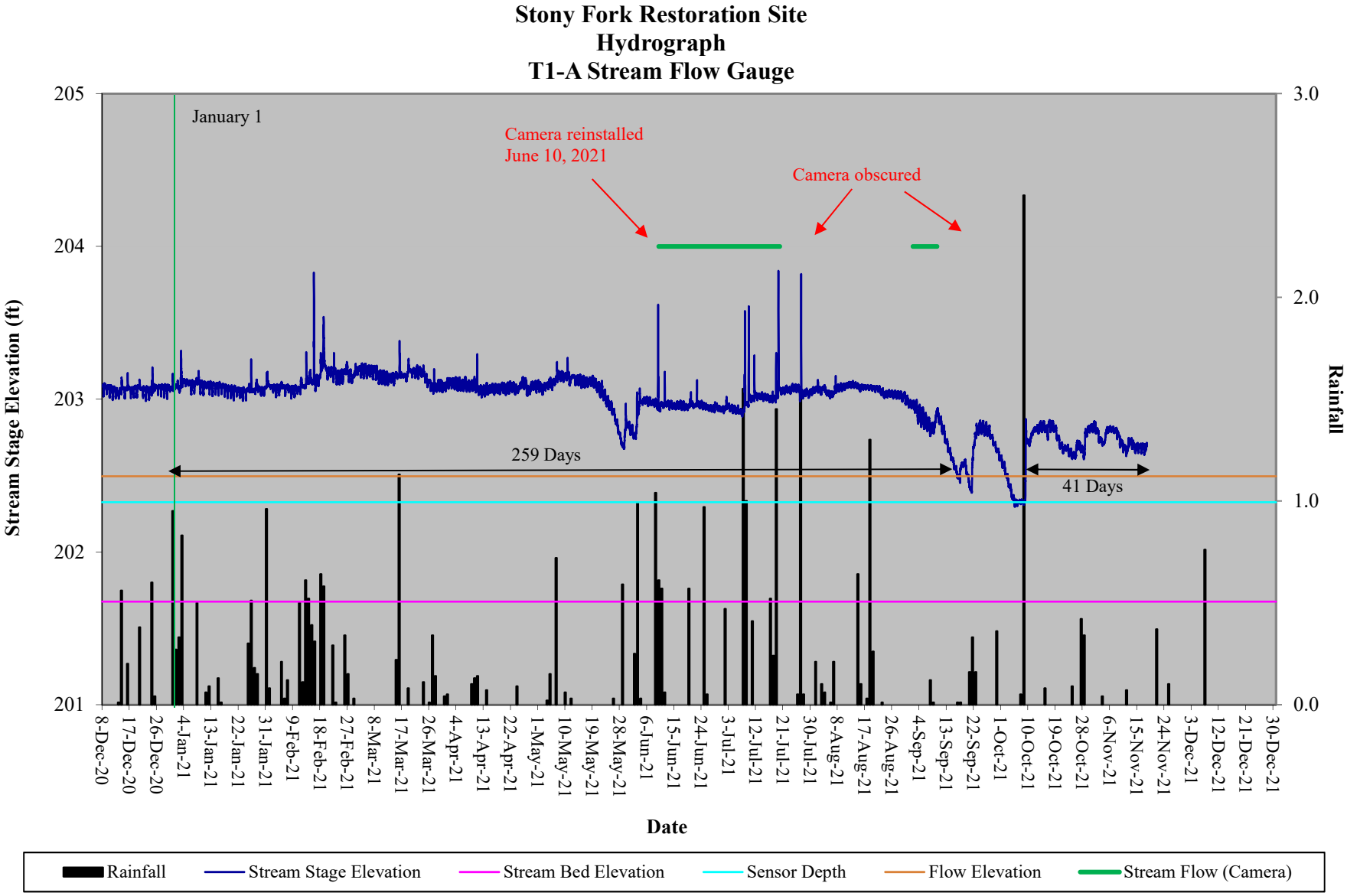

Stony Fork Restoration Site
Hydrograph
Stream Gauge SF Main
January 1
Stream Stage Elevation (ft)
Rainfall (in)
Date
183
182
181
180
179
178
3.0
2.0
1.0
0.0
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Stream Bed Elevation
Stream Stage Elevation
Bankfull Elevation
Sensor Depth

| Table 11. Verification of Stream Flow<br>Stony Fork Restoration Site, DMS Project #97085 | | | | |
|---|---|---|---|---|
| | Gauge | | Camera | |
| Reach | Dates Achieving | Maximum Consecutive Days | Dates Achieving | Maximum Consecutive Days |
| T1 | January 1 – May 27;<br>May 29 – September 3 | 147 | February 10 – April 17;<br>June 10 – August 24 | 76 |
| T1A | January 1 – September 16;<br>October 9 – November 18 | 259 | June 10 – July 20 | 41 |
| T2 | January 1 – May 26;<br>May 30 – September 1 | 115 | June 10 – August 23 | 75 |
| T3 | January 1 – September 13 | 256 | February 10 – May 26;<br>May 29 – June 29 | 106 |

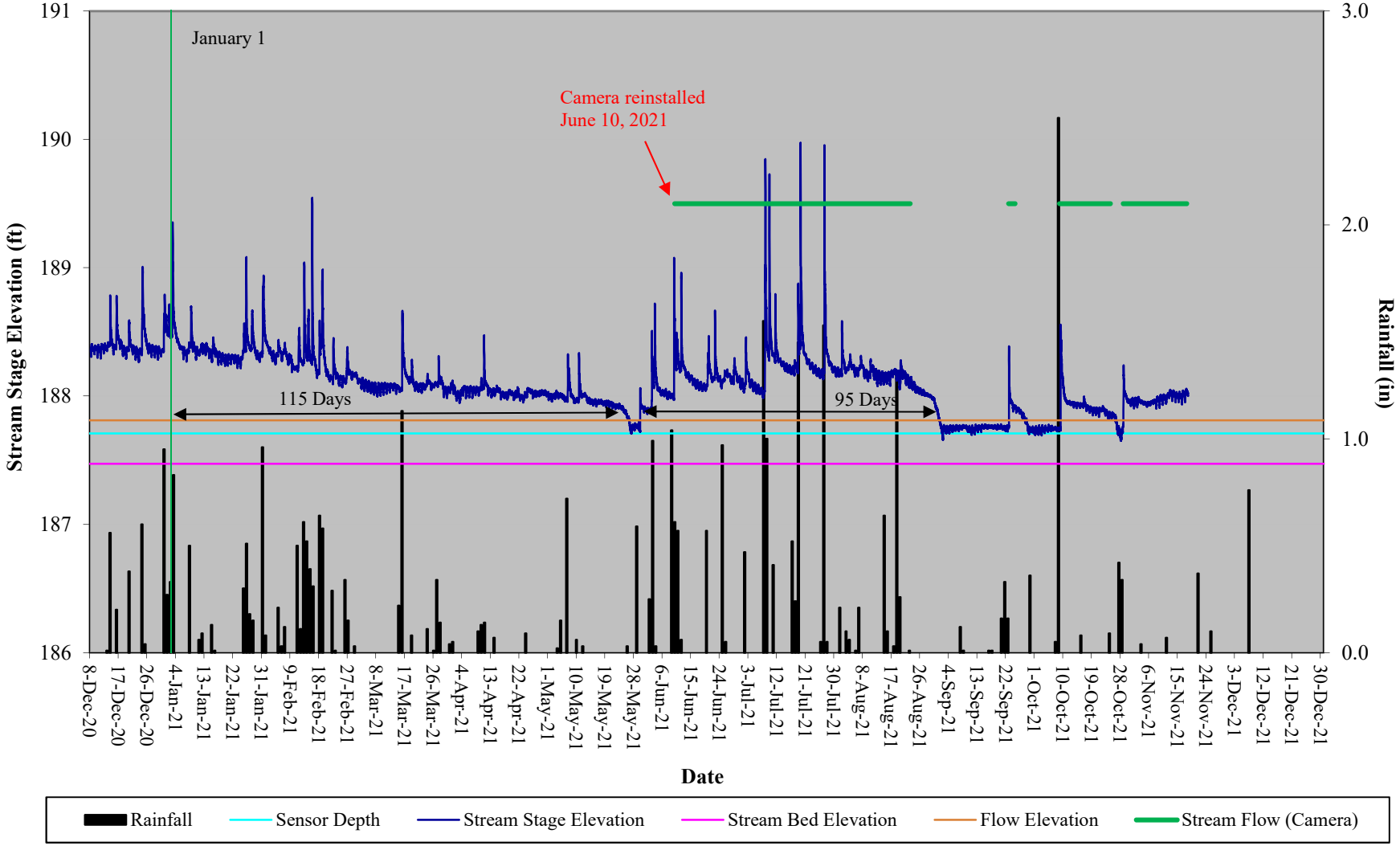
| Table 12. Stream Flow Criteria Attainment<br>Stony Fork Restoration Site, DMS Project #97085 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Greater than 30 Days of Flow/Max Consecutive Days | | | | | | |
| Reach | MY-01 2019 | MY-02 2019 | MY-03 2020 | MY-04 2021 | MY-05 2022 | MY-06 2023 | MY-07 2024 |
| T1 (Gauge) | Yes/60 | Yes/152 | Yes/147 | | | | |
| T1 (Camera) | * | * | Yes/76 | | | | |
| T1A (Gauge) | Yes/182 | Yes/152 | Yes/259 | | | | |
| T1A (Camera) | Yes/46 | Yes/183 | Yes/41 | | | | |
| T2 (Gauge) | Yes/85 | Yes/152 | Yes/115 | | | | |
| T2 (Camera) | Yes/84 | Yes/53 | Yes/75 | | | | |
| T3 (Gauge) | Yes/55 | Yes/152 | Yes/256 | | | | |
| T3 (Camera) | Yes/55 | * | Yes/106 | | | | |

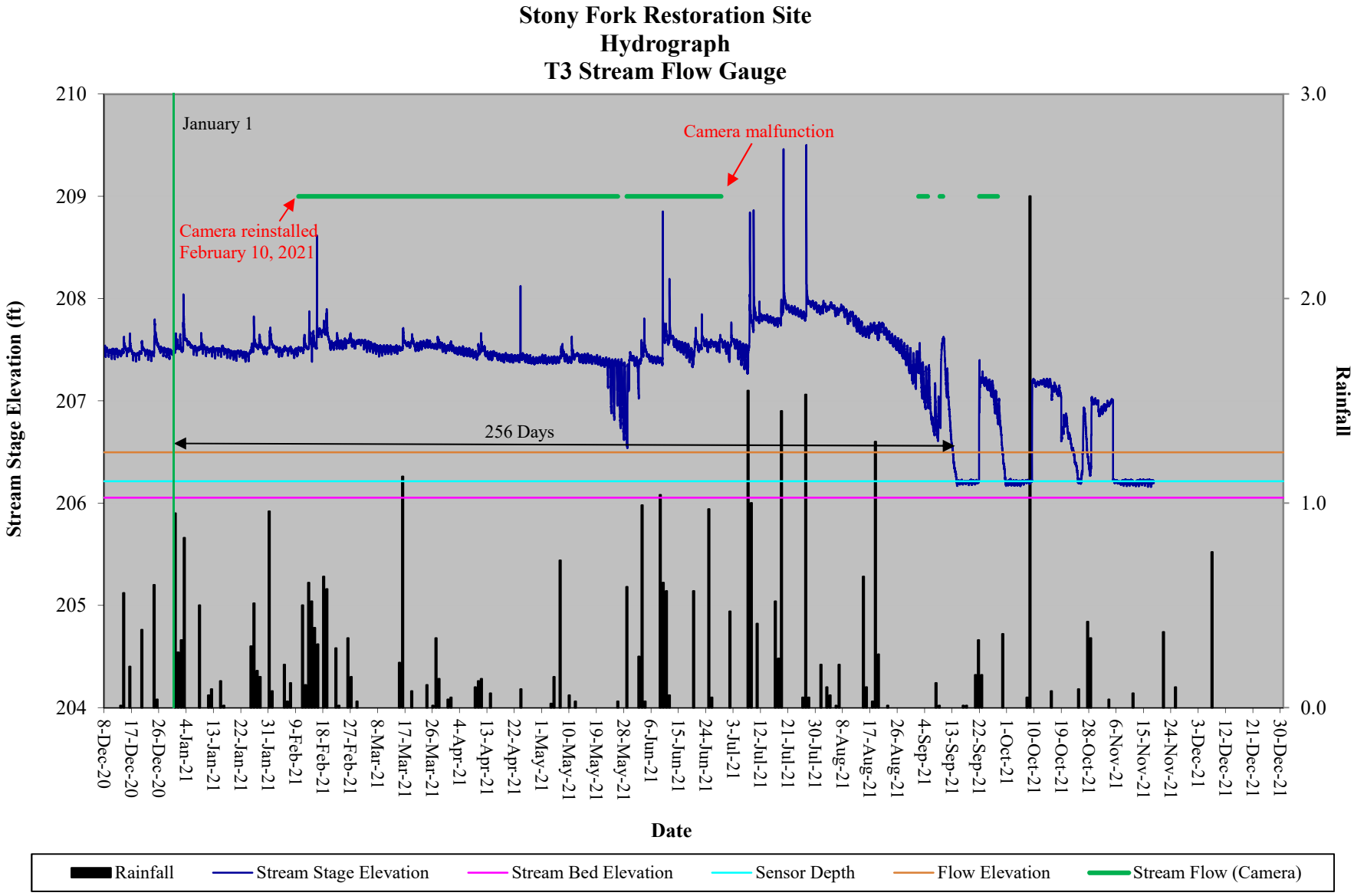
*Camera obscured or malfunctioned for most of the year


Stony Fork Restoration Site
Hydrograph
T1 Stream Flow Gauge
January 1
Camera reinstalled
February 10, 2021
Camera obscured
147 Days
98 Days
Stream Stage Elevation (ft)
Rainfall (in)
Date
205
204
203
3.0
2.0
1.0
0.0
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Sensor Elevation
Flow Elevation
Stream Flow (Camera)
Stream Stage Elevation
Stream Bed Elevation


Stony Fork Restoration Site
Hydrograph
T1-A Stream Flow Gauge
Stream Stage Elevation (ft)
Rainfall
Date
January 1
Camera reinstalled
June 10, 2021
Camera obscured
259 Days
41 Days
205
204
203
202
201
3.0
2.0
1.0
0.0
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Stream Stage Elevation
Stream Bed Elevation
Sensor Depth
Flow Elevation
Stream Flow (Camera)

# Stony Fork Restoration Site
# Hydrograph
# T2 Stream Flow Gauge




Stony Fork Restoration Site
Hydrograph
T3 Stream Flow Gauge
Stream Stage Elevation (ft)
Rainfall
Date
January 1
Camera malfunction
Camera reinstalled
February 10, 2021
256 Days
210
209
208
207
206
205
204
3.0
2.0
1.0
0.0
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Stream Stage Elevation
Stream Bed Elevation
Sensor Depth
Flow Elevation
Stream Flow (Camera)

# APPENDIX F

Other Data

ROY COOPER
*Governor*
ELIZABETH S. BISER
*Secretary*

NORTH CAROLINA
*Environmental Quality*

# NOTICE OF VIOLATION

December 14, 2021

**VIA** **US Mail First Class**
**Certified Mail # 7018 0040 0001 1456 0205**

Harold G. Carroll, Owner
Sherrill Farm, LLC
63 Vernon Court
Willow Springs, NC 27592

Re: Trespass and Injury to Conservation Easement
Stony Fork Mitigation Site

Dear Mr. Carroll,

In October 2017 the State of North Carolina acquired a conservation easement on your property for the purposes of protecting streams, wetlands, and forested riparian buffers restored by the North Carolina Department of Environmental Quality (NCDEQ). This easement protects the State's interest in the Stony Fork Mitigation Site (DMS # 97085) and restricts certain activities on the property. For reference the easement and plat are recorded in the Johnston County Register of Deeds:

| Owner | Reference | Date | SPO File No. |
|---|---|---|---|
| Sherrill Farm LLC | Deed Book 5042, Page 92-106 | 10/13/2017 | 51-CE |
| | Plat Book 85, Page 412-413 | 10/13/2017 | |

On November 18th, 2021 NCDEQ was notified by stream monitoring contractors that the development adjacent to this easement had cut an outlet through the easement from a large offsite sediment basin to drain directly to the stream inside the easement. Staff inspected this violation on November 19th and confirmed that this is related to an offsite BMP outfall that was constructed for Phase II of the Sherrill Farms development. There is fill material 6-8' high at the basin near the easement edge. There are approximately 1,250 square feet of impacted area within the 50' riparian buffer and there is some evidence sediment in the stream.

The conservation easement describes prohibited and restricted activities in *Section II. Grantors Reserved Uses and Restricted Activities*. Specifically, the following activities are restricted or prohibited:

- Per *paragraph D. Damage to Vegetation* - Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged

trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

- Per *paragraph K Grading, Mineral Use, Excavation, Dredging* – There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.
- Per *paragraph L Water Quality and Drainage Patterns* – There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited.
- Per *paragraph O. Disturbance of Natural Features* – Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

As the landowner of the property subject to this conservation easement, it is your responsibility to ensure all easement requirements and restrictions are adhered to. The remedy for these damages shall be the following:

1. Install a check dam outside the conservation easement to cease the trespass and to keep further sediment from entering the easement.
2. Develop an approvable restoration plan to stabilize the stream, regrade the floodplain back to tie into existing grade, amend soil including topsoil as necessary, and replant native hardwood trees matching the original project design.
3. Work with NC DMS Project Manager Lindsay Crocker (Lindsay.crocker@ncdenr.gov 919-594-3910) and KCI and Associates Project Consultant Tim Morris (tim.morris@kci.com 919-793-6886) to ensure that the plan is acceptable to regulatory authorities.
4. After regulatory approval, implement the restoration plan as approved under supervision of KCI and Associates.

During the November 19th inspection by the State of North Carolina, it was also observed that the easement trespass/encroachment on the north side of the conservation easement area (Sherrill Farms Phase 1) is also still ongoing. Property owners on lot 20S (Fede) and 21 (Stewart) are parking vehicles, trailers, and a trampoline inside the easement. Sherrill Farms LLC has been notified via email, phone and in person in 2018 and 2019 about these violations and is continuing to allow them.

Specifically, the following activities are restricted or prohibited:

- Per *paragraph J. Dumping or Storing* - Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

The remedy for this encroachment shall be the following:

- Move these items out of the conservation easement or install a fence along the property boundary.

**If you do not cease and desist performing or allowing these activities in the conservation easement area, legal action may be instituted to enjoin ongoing or future violations and to seek recovery of damages incurred because of these violations.**

Per t *Section IV. Enforcement and Remedies, paragraph A. Enforcement* of the conservation easement, you have 90 days from the date of this letter to remedy this violation.

I hope this is the last correspondence that you receive from the State on this issue and that no further action will be required. Please know that this conservation easement property is monitored on a regular basis and any further violations may result in legal action to resolve this matter. You may contact me by email or phone if you have any questions regarding this letter or would like to schedule a field visit to discuss this matter in more detail.

Sincerely,

Melonie Allen

Melonie Allen
Property and Project Close Out
NC Department of Environmental Quality
1606 Mail Service Center
Raleigh, NC 27699-1606
Phone: 919-368-9352
Email: Melonie.allen@ncdenr.gov

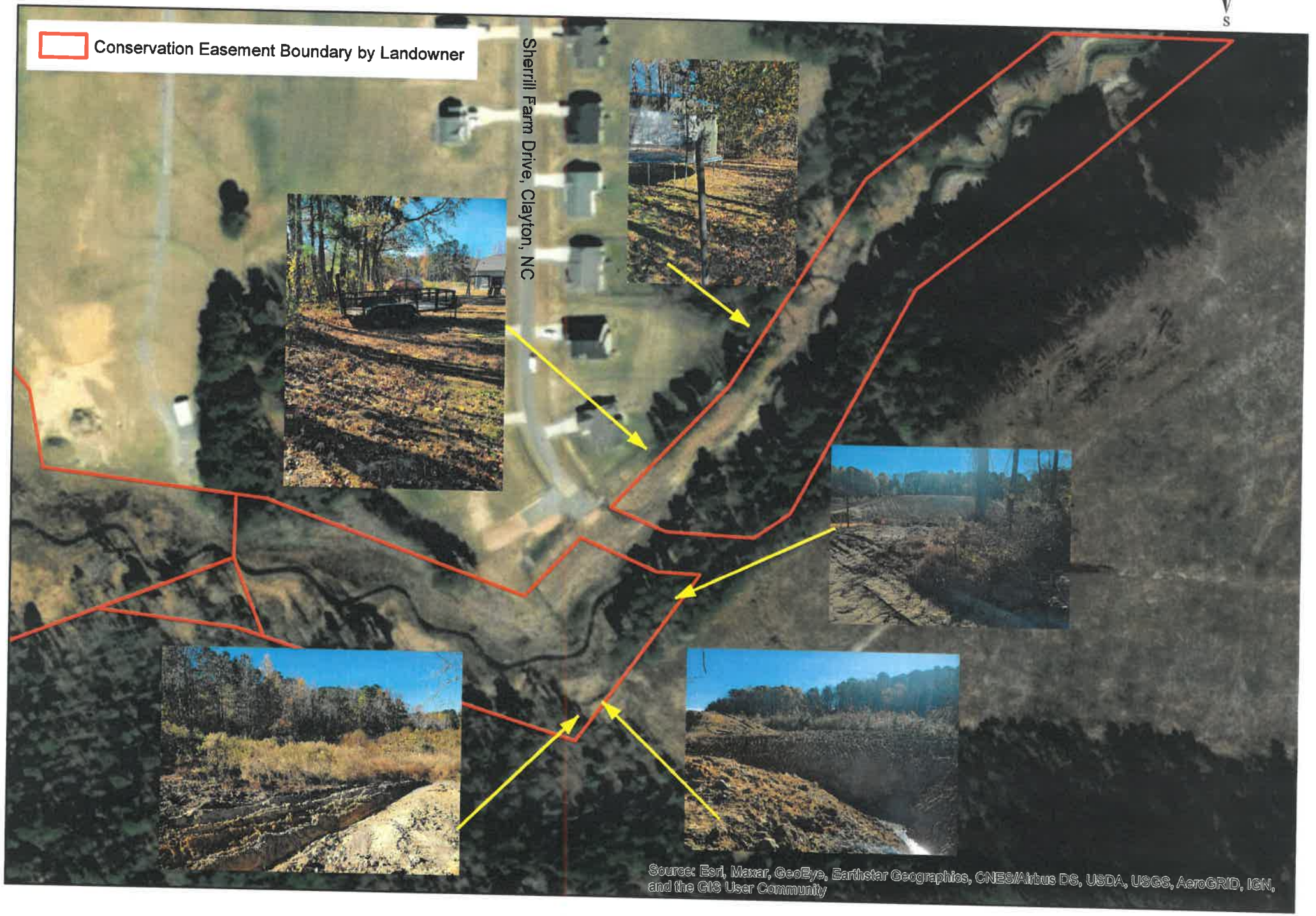
Cc via Email:

Douglas Ansel, Assistant General Counsel, NCDEQ
Blane Rice, State Property Office, NCDOA
Lanny Clifton, Son Lan Development
Wyatt Brown, Brown's Environmental Group
Jerry Dalton, Dalton Engineering
Lindsay Crocker, NCDEQ Division of Mitigation Services
Tim Morris, KCI and Associates

# Stony Fork Easement Violations
# Sherill Farms LLC (Georeferenced)

0 75 150 300 Feet

N W E S



*Johnston County*
**DEPARTMENT OF PUBLIC UTILITIES**
Post Office Box 2263
SMITHFIELD, NC 27577
(919) 989-5075

# NOTICE OF VIOLATION
# OF THE JOHNSTON COUNTY RIPARIAN BUFFER PROTECTION ORDINANCE

**CERTIFIED MAIL**
**RETURN RECEIPT REQUESTED**

December 1, 2021

Harold G. Carroll, Owner
Sherril Farm, LLC
63 Vernon Court
Willow Springs NC 27592

RE: NOTICE OF VIOLATION
Riparian Buffer Violation
Project Name: Sherrill Farm Ph.2
Project Location: Sherrill Farm Drive
Stream Classification: Stony Fork (C, NSW)

Mr. Carrol,

In response to a complaint, on November 24, 2021, personnel of this office conducted a site inspection of the stream located in the above referenced project area.
Accordingly, the following observations were noted during the site inspection of the above mentioned property:

- The perennial stream with the violation on the site, Stony Fork (also currently in a State Conservation Area) classified as *Class C; NSW* and located within the Neuse River Basin.
- Stoney Fork is depicted on the most recent published Johnston County NRCS Soil Survey (1994) as well as the most recent USGS Topographic map at a 1:24 scale and therefore, the features are subject to Section 14-393 of the Johnston County Code of Ordinances, Riparian buffer protection (for lands within the Neuse River Basin).
- The riparian buffer has been excavated through both zones 1 and 2. No diffused flow present from the sediment basin above the buffer.

*Please note that this list may not be all-inclusive and all buffer impacts will need to be addressed. Additional requirements may arise as information is provided to our office.

As a result of the site inspection and file review, the following violations, described below are noted:

**Item 1. Neuse River Basin Riparian Buffer Violation**
The Neuse River Basin is subject to riparian (streamside) buffer rules covered under Section 14-393 of the Johnston County, NC Code of Ordinances. The purpose of these rules is to protect and preserve riparian buffers in the Neuse River Basin that help protect surface water by removing nutrients from overland flow. The Johnston County buffer rules apply to areas immediately adjacent to surface waters which includes intermittent streams, perennial streams, lakes, and ponds that are approximately shown on either the most recent printed version of the soil survey map prepared by the Natural Resources Conservation Service or the most recent version of the 1:24,000 scale (7.5 minute) quadrangle topographic maps prepared by the United States Geologic Survey (USGS).

The protected riparian buffer has two zones: Zone 1 is measured from the top of stream bank landward for 30 feet. Zone 2 is measured an additional 20 feet landward from the outer edge of Zone 1. Both Zone 1 and Zone 2 must consist of a stable vegetated area that is undisturbed except for activities and uses provided for in Section 14-393(g)(2) of the Johnston County Code of Ordinances. No sediment from uphill disturbed areas, fill material, or impervious structures are permitted within the riparian buffer unless otherwise stated in Section 14-393(g)(2) Table of Uses.

**Requested Response**
You are directed to provide a response, including a plan of action, to this letter within **14 calendar days** of receipt of this NOV.

Provide an as-built map of sufficient detail to accurately delineate the boundaries of the land; the location, dimensions and type of any disturbance in riparian buffers; and the extent of riparian buffers on the land. We urge you to obtain an environmental consultant to assist you with this.

1. Riparian Zone Planting – Please submit a buffer restoration plan to this office for review and approval. This plan must be developed to ensure at least two native tree species are planted at a density sufficient to provide 320 trees/acre at maturity. This plan must include the types of native woody vegetation selected, methodology of planting, and a site map indicating the location of replanting efforts.

2. Include a detailed implementation schedule with dates explaining when the buffer restoration will be accomplished. This schedule should include a three-year monitoring plan to ensure that the buffer is restored. It is important that you adhere to this new plan once approved by Johnston County. If you make any modifications to approved plan, DWQ must approve them prior to implementation.

Thank you for your attention to this matter. This office requires that the violations, as described above, be properly resolved. These violations and any future violations are subject to a civil penalty assessment of up to $25,000.00 per day per violation. Each day of a continuing violation shall constitute a separate violation. Should you have any questions regarding these matters, please contact Shannon Stanley or Jessica Batten at (919) 209-8333 or via email at Shannon.stanley@johnstonnc.com and jessica.batten@johnstonnc.com.

Sincerely,

Shannon Stanley
Engineering and Environmental Technician

CC: Chandra Farmer, PE, JCPU
Jessica Batten, EI, JCPU