

# **Monitoring Report MY04**

**Stony Fork Restoration Site  
Upper Neuse River Basin - 03020201  
Monitoring Year 04  
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: 2022  
Date Submitted: January 2022**

## Monitoring and Design Firm

Prepared by:



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**Project Contact: Adam Spiller**  
**Email: [adam.spiller@kci.com](mailto:adam.spiller@kci.com)**



## MEMORANDUM

Date: January 20, 2023  
To: Lindsay Crocker, DMS Project Manager  
From: Adam Spiller, Project Manager  
KCI Associates of North Carolina, PA  
Subject: MY-04 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 20, 2023 for the Stony Fork Restoration Site.

1. Please add discussion of the 6/15/2022 IRT meeting on-site to the report narrative and any notes if gathered for the record. During this site visit, IRT discussed and viewed T3, and witnessed the remedial actions from encroachment including planting, live staking, seed, and straw in the minor encroachment area, re-set subdivision culvert crossing, and fencing installed to eliminate landowner encroachment.  
*KCI Response: This discussion has been added to the report.*
2. Table 8. This table shows vegetation is meeting criteria, but a number of the volunteer species are not typically considered for success criteria (loblolly, wax myrtle, sweetgum, red maple). Confirm that species counted for total success and species count do not include these 4 species.  
*KCI Response: The listed species are not counted towards the success criteria. Stems listed in the "Planted" column, which only counts species from the approved planting plan, are the ones used to determine success.*
3. Confirm that visual assessment was conducted on the date shown for the photo points (12/9/22).  
*KCI Response: That is correct. The photo points were taken during the annual visual assessment of the site on 12/9/22.*

Sincerely,

A handwritten signature in black ink that reads "Adam Spiller".

Adam Spiller  
Project Manager



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## **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 automatic 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 in MY00-03 and were discontinued starting in MY05. 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 fourth-year vegetation monitoring was not conducted per the Mitigation Plan but will resume in monitoring year five. 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 MY04. 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.

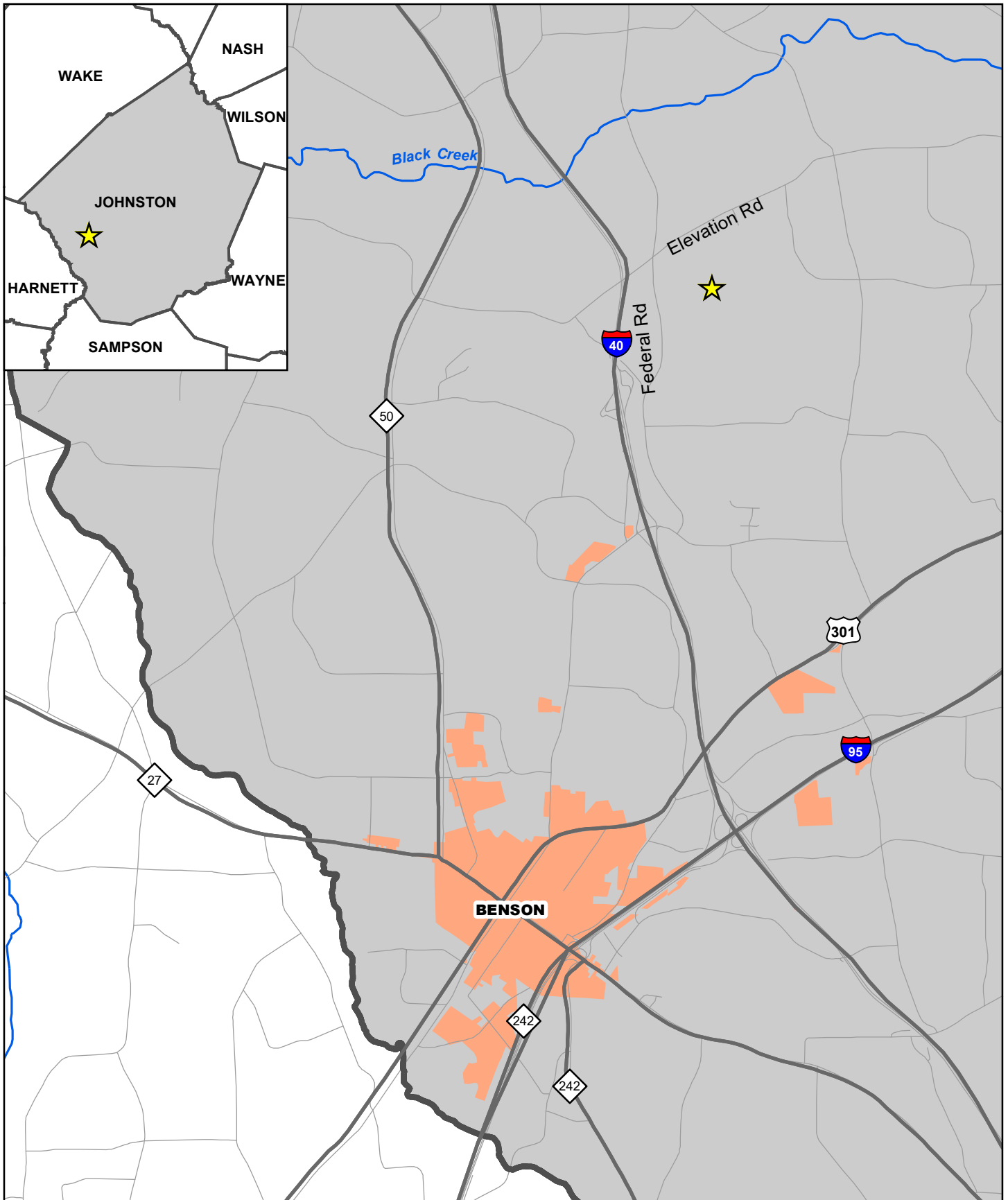
The stream gauge near the bottom of SF3 recorded three bankfull events in 2022. All four stream flow gauges recorded at least 30 consecutive days of flow. The gauge on T1 recorded flow for 158 days. The gauge on T1A recorded flow for 174 days and the gauges on T2 and T3 recorded flow for 155 days and 46 days, respectively. The data from the flow gauges was further backed up by the cameras on site. The cameras on T1 and T1A showed flow for 56 and 149 days, respectively. The cameras on T2 and T3 showed flow for 118 days and 154 days respectively. Differences in the number of days recorded by the cameras and the gauges are largely due to periods of time when the cameras become obscured by vegetation during the growing season or low flow that was not picked up by the gauges.

Cross-sections on the site were not surveyed in MY04, as stipulated in the Mitigation Plan. These measurements will be performed again in MY05. In MY03, it was noted that large amounts of aggradation within T3 had caused the channel to move from its original alignment. Since only the bottom 129 feet of this stream are located within the bounds of the project, there is a large sediment source in the form of heavily eroding banks and headcuts just upstream from the project reach. This issue is further compounded by the small size of this reach compared to SF1, which it flows into. When SF1 experiences an overbank event, sediment that is deposited on the floodplain is also deposited in T3. This combined with the upstream sediment source has led to large amounts of sediment being processed through this small reach. Although the stream has shifted alignment slightly, it is still functioning as a stream and has been processing this sediment. Please see Appendix B – Visual Assessment Data for photos of this reach and Appendix E – Hydrologic Data for a detailed record of the flow in this reach in 2022.

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. The outlet and sediment pond were filled in and on May 5, 2022 the area inside the easement that had been impacted was planted with 29 one-gallon containerized trees. Please see Appendix C – Vegetation Data for a list of the species and quantity planted in this area. In addition to the above violation, several property owners in the Sherrill Farms Phase 1 subdivision have stored vehicles and a trampoline within the easement. Sherrill Farms LLC was contacted about these encroachments in 2018, 2019, and 2021. In early 2022, a fence was installed along the easement boundary where these encroachments were occurring. Please see Appendix B – Visual Assessment Data and Appendix F – Other Data for more information.

On June 15, 2022, a site meeting with the IRT was conducted on site. At this meeting, the IRT reviewed the remedial actions taken to address the encroachment issues described above, including the newly planted trees and newly installed fence. The IRT also viewed and discussed the culvert crossing that has been installed where Sherill Farm Dr. crosses the project stream. This crossing was originally installed with one corner inside of the easement and with the invert at a lower elevation than KCI had recommended to the developer. At the time of the IRT site visit, the culvert had been reset so that it was no longer encroaching on the easement and was at a more appropriate elevation. The IRT also viewed T3 and discussed the shift in alignment that this reach had experienced. Because the stream was not flowing at the time of the site visit, the IRT request photos of this reach when it was flowing and these can be found in Appendix B – Visual Assessment Data. The IRT also noted some invasive species growing on the site, such as Chinese privet. KCI will continue to monitor and treat the invasives on site. No further encroachments were noted on the site during this walk and KCI has been continuing to monitor the site boundaries closely.

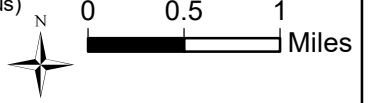




**FIGURE 1. VICINITY MAP, STONY FORK RESTORATION SITE, JOHNSTON COUNTY, NC**



- Project Site Location
- Major Roads
- County Boundary
- Minor Roads
- Cities and Towns
- Airports (none within a 5-mi radius)
- Major Rivers and Streams



## REFERENCES

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- 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		
<b>TOTAL CREDITS</b>	<b>6,585.933</b>						<b>480,337.942</b>			
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					
<b>TOTAL CREDITS</b>	6,586				480,338

**Table 2. Project Activity & Reporting History  
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
<i>Vegetation Monitoring</i>	<i>May 9, 2019</i>	
<i>Stream Survey</i>	<i>May 15, 2019</i>	
Invasive Treatment		Summer 2019
Year 1 Monitoring	November 2019	January 2020
<i>Vegetation Monitoring</i>	<i>November 5, 2019</i>	
<i>Stream Survey</i>	<i>November 11, 2019</i>	
Invasive Treatment		Summer 2020
Year 2 Monitoring	November 2020	January 2021
<i>Vegetation Monitoring</i>	<i>September 4, 2020</i>	
<i>Stream Survey</i>	<i>June 29, 2020</i>	
Invasive Treatment		Summer 2021
Year 3 Monitoring	November 2021	December 2021
<i>Vegetation Monitoring</i>	<i>August 30, 2021</i>	
<i>Stream Survey</i>	<i>August 30, 2021</i>	
Year 4 Monitoring	December 2022	January 2023

<b>Table 3. Project Contacts</b> <b>Stony Fork Restoration Site, DMS Project #97085</b>	
<b>Design Firm</b>	KCI Associates of North Carolina 4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266
<b>Construction Contractor</b> Stony Fork and T3	Fluvial Solutions, Inc. PO Box 28749 Raleigh, NC 27611 Contact: Mr. Peter Jelenevsky Phone: (919) 605-6134
<b>Construction Contractor</b> T1, T1A, and T2	KCI Environmental Technologies and Construction 4505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609 Contact: Mr. Kevin O'Briant Phone: (919) 278-2516
<b>Planting Contractor</b>	Bruton Natural Systems, Inc. PO Box 1197 Fremont, NC 27830 Contact: Mr. Charlie Bruton Phone: (919)783-9214
<b>Monitoring Performers</b>	
	KCI Associates of North Carolina 4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266


















<b>Table 4. Project Information</b> <b>Stony Fork Restoration Site, DMS Project #97085</b>				
<b>Project Name</b>	Stony Fork Restoration Site			
<b>County</b>	Johnston County			
<b>Project Area (acres)</b>	24.4 acres			
<b>Project Coordinates (lat. and long.)</b>	35°26'55.0"N, 78°31'18.5"W			
<b>Project Watershed Summary Information</b>				
<b>Physiographic Province</b>	Coastal Plain			
<b>River Basin</b>	Neuse			
<b>USGS Hydrologic Unit 8-digit</b>	03020201	<b>USGS Hydrologic Unit 14-digit</b>	03020201150010	
<b>DWQ Sub-basin</b>	03-04-04			
<b>Project Drainage Area (acres)</b>	497 acres			
<b>Project Drainage Area Percentage of Impervious Area</b>	5%			
<b>CGIA Land Use Classification</b>	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)			
<b>Existing Reach Summary Information</b>				
<b>Parameters</b>	<b>Stony Fork</b>	<b>T1 and T1A</b>	<b>T2</b>	<b>T3</b>
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 (existing)	G4c	G4	G4	G4
Stream Classification (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
<b>Existing Wetland Summary Information</b>				
<b>Parameters</b>				
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	

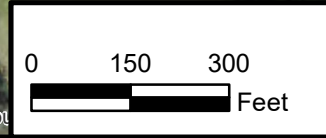
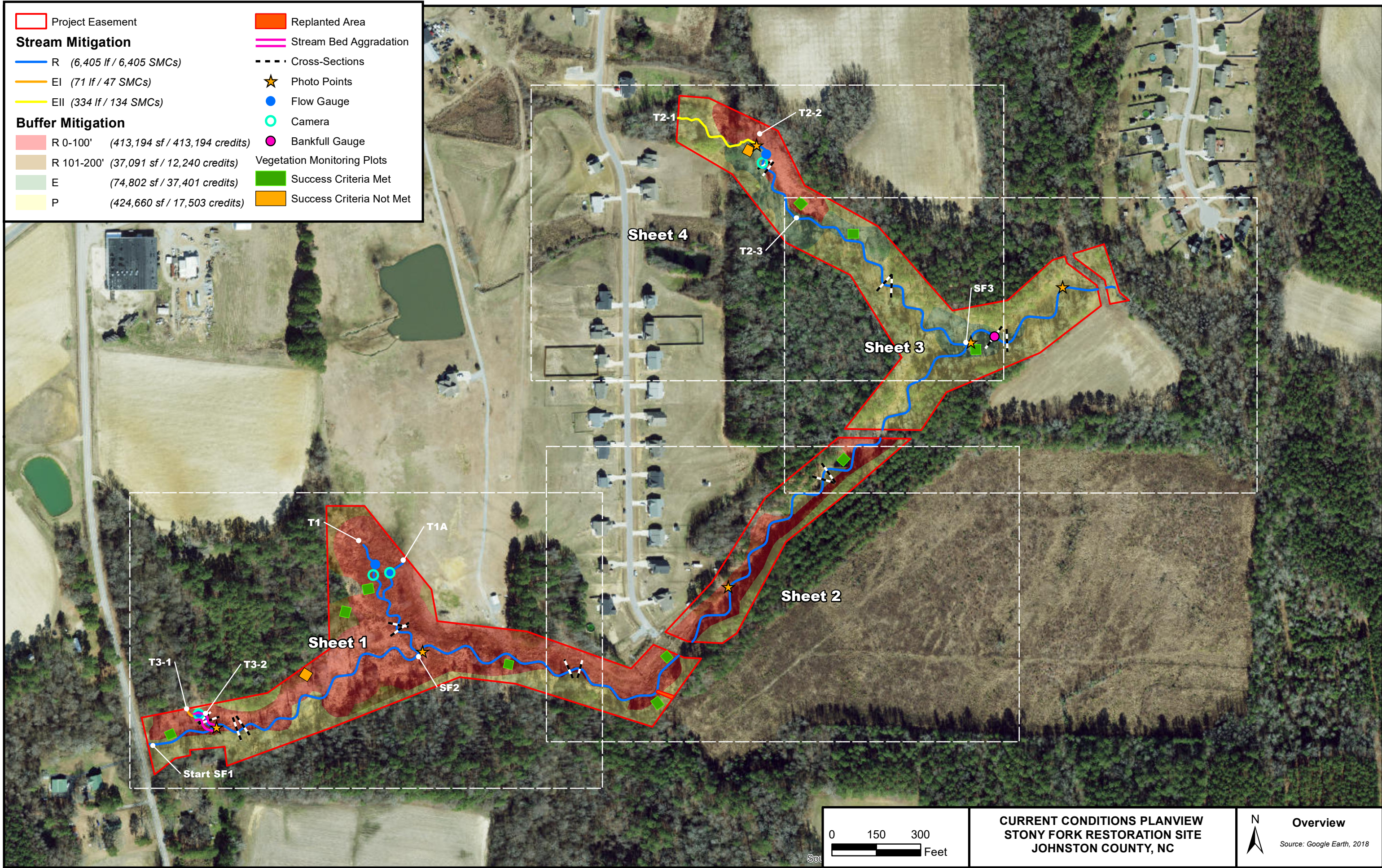
<b>Regulatory Considerations</b>			
<b>Regulation</b>	<b>Applicable?</b>	<b>Resolved?</b>	<b>Supporting Documentation</b>
Waters of the United States – Section 404	Yes	Yes	404 permit
Waters of the United States – Section 401	Yes	Yes	401 permit
Endangered Species Act	No	N/A	N/A
Historic Preservation Act	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**

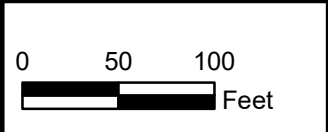
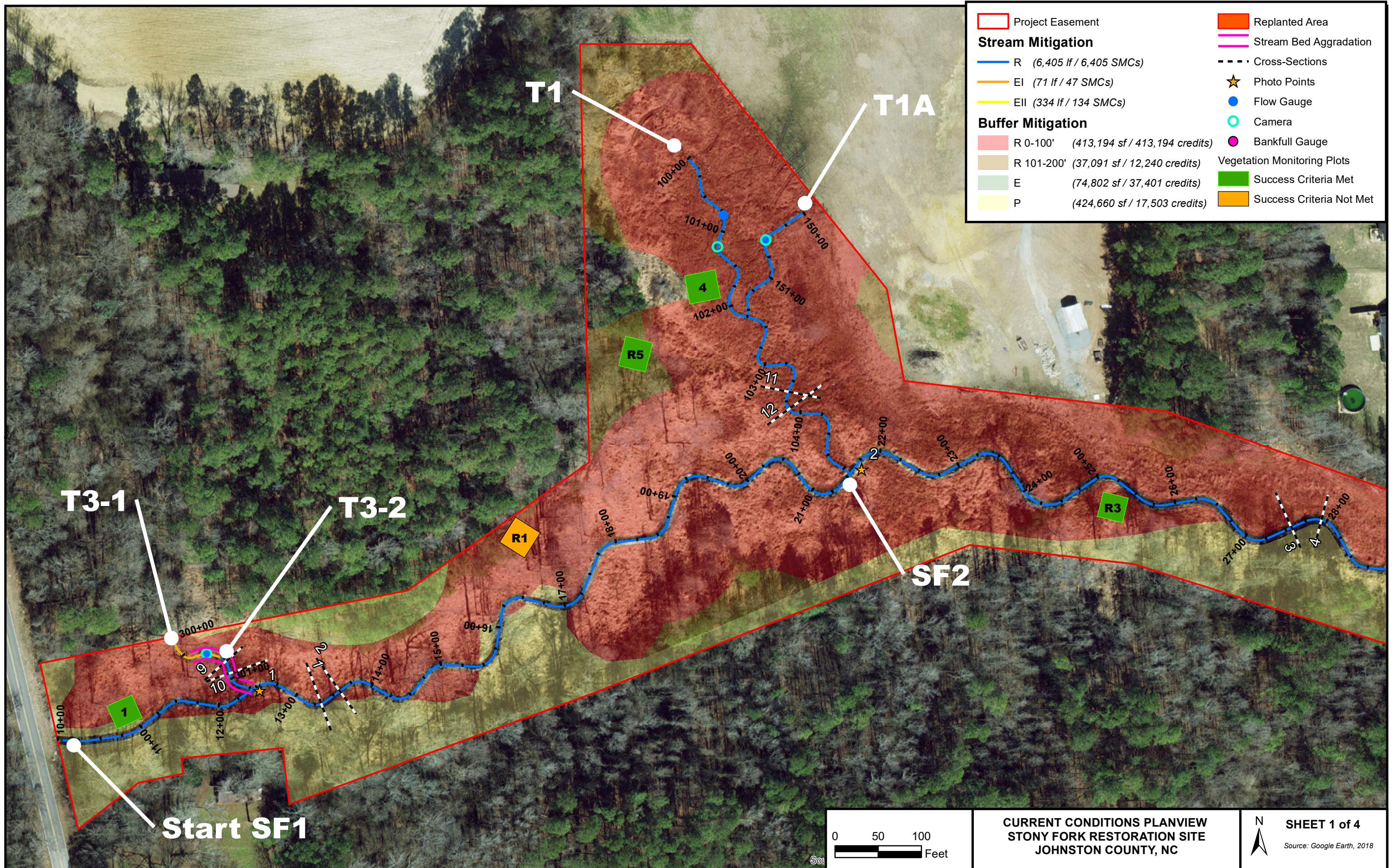
## Visual Assessment Data

 Project Easement	 Replanted Area
<b>Stream Mitigation</b>	 Stream Bed Aggradation
 R (6,405 lf / 6,405 SMCs)	 Cross-Sections
 EI (71 lf / 47 SMCs)	 Photo Points
 EII (334 lf / 134 SMCs)	 Flow Gauge
<b>Buffer Mitigation</b>	 Camera
 R 0-100' (413,194 sf / 413,194 credits)	 Bankfull Gauge
 R 101-200' (37,091 sf / 12,240 credits)	<b>Vegetation Monitoring Plots</b>
 E (74,802 sf / 37,401 credits)	 Success Criteria Met
 P (424,660 sf / 17,503 credits)	 Success Criteria Not Met

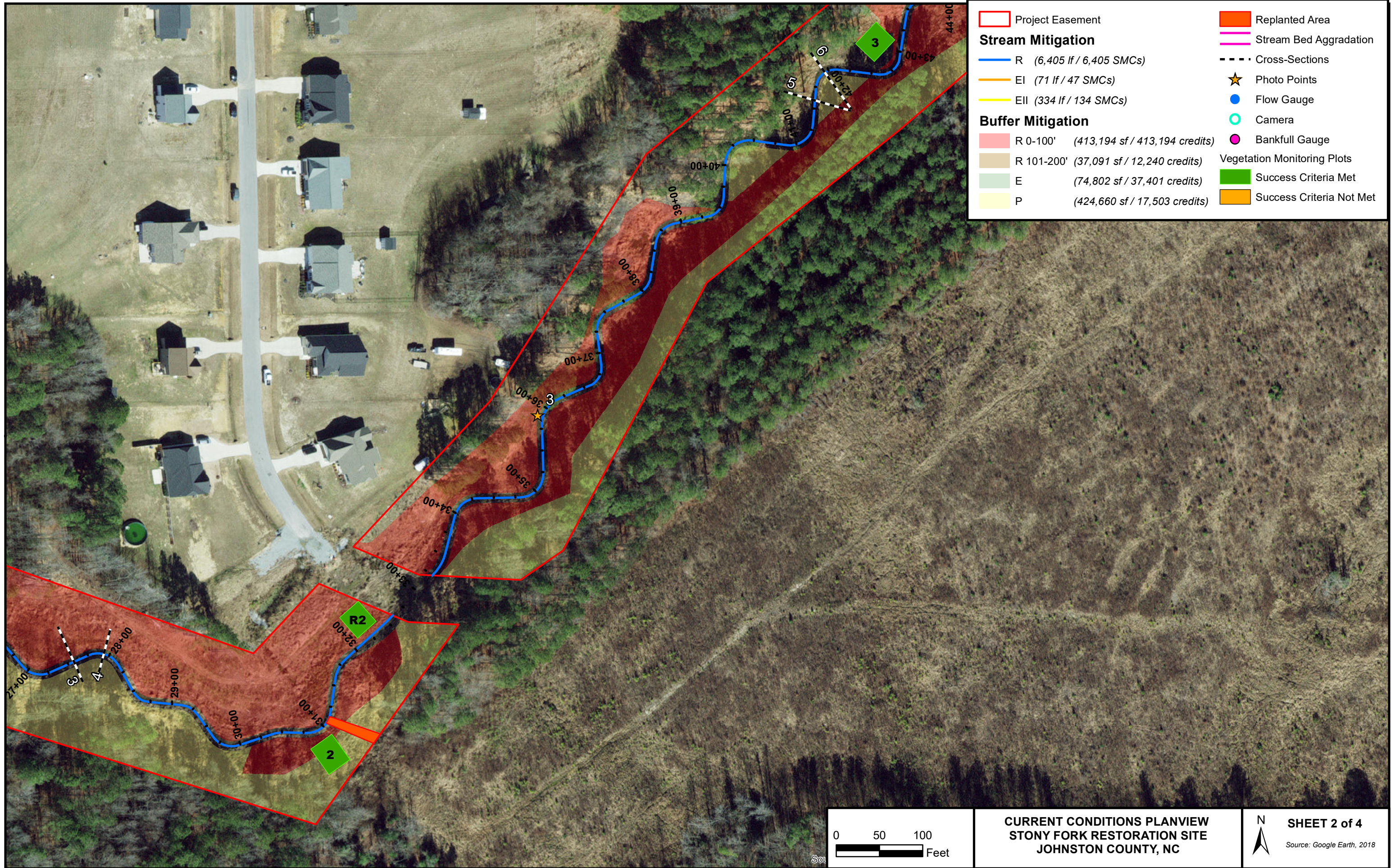


**CURRENT CONDITIONS PLANVIEW**  
**STONY FORK RESTORATION SITE**  
**JOHNSTON COUNTY, NC**

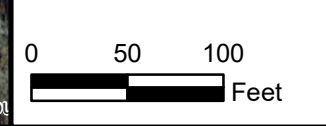
**N**  
**Overview**  
 Source: Google Earth, 2018



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

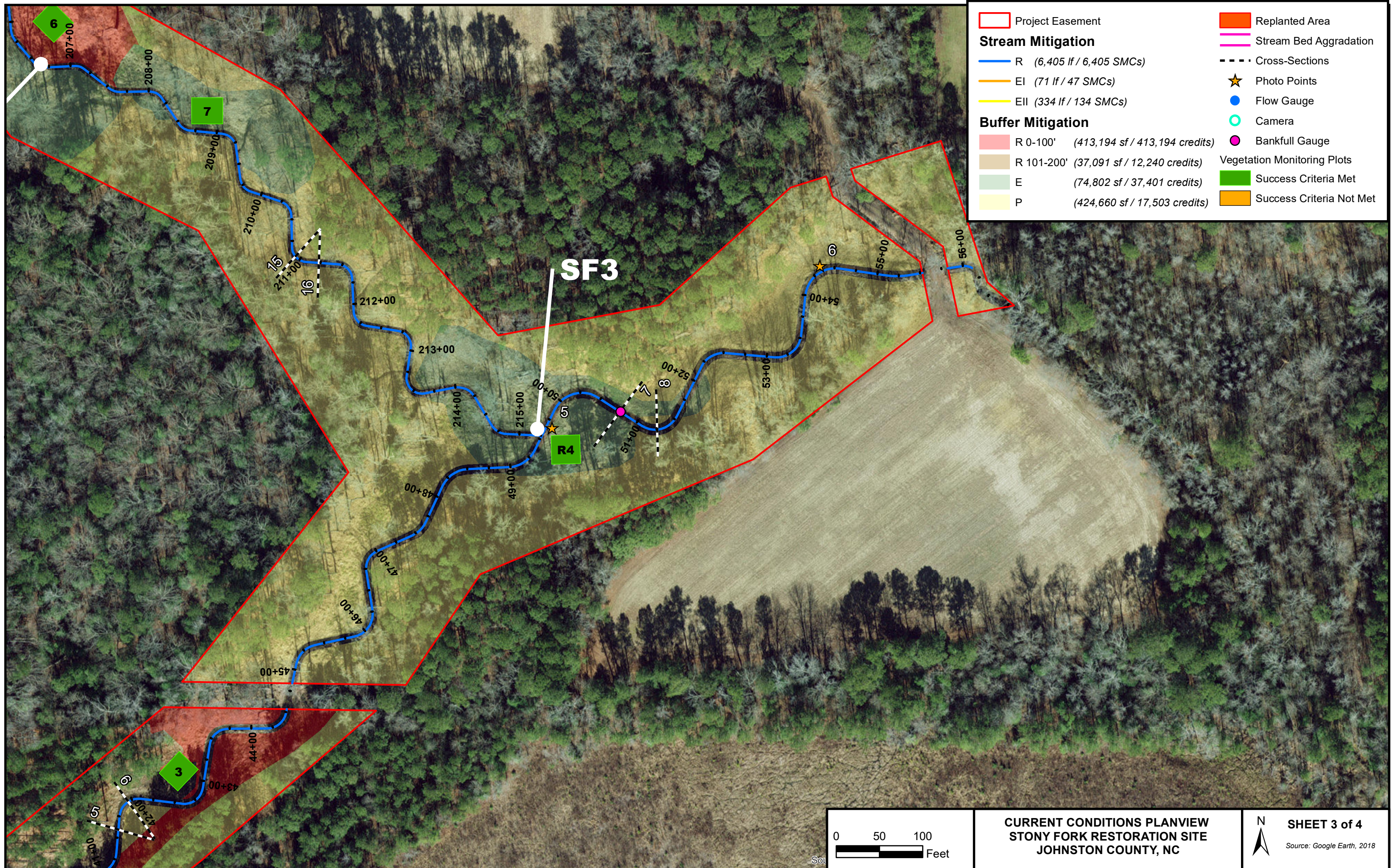


Project Easement	Replanted Area
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<b>Buffer Mitigation</b>	Camera
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R 101-200' (37,091 sf / 12,240 credits)	<b>Vegetation Monitoring Plots</b>
E (74,802 sf / 37,401 credits)	Success Criteria Met
P (424,660 sf / 17,503 credits)	Success Criteria Not Met

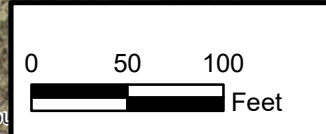


**CURRENT CONDITIONS PLANVIEW**  
**STONY FORK RESTORATION SITE**  
**JOHNSTON COUNTY, NC**

**SHEET 2 of 4**  
 Source: Google Earth, 2018

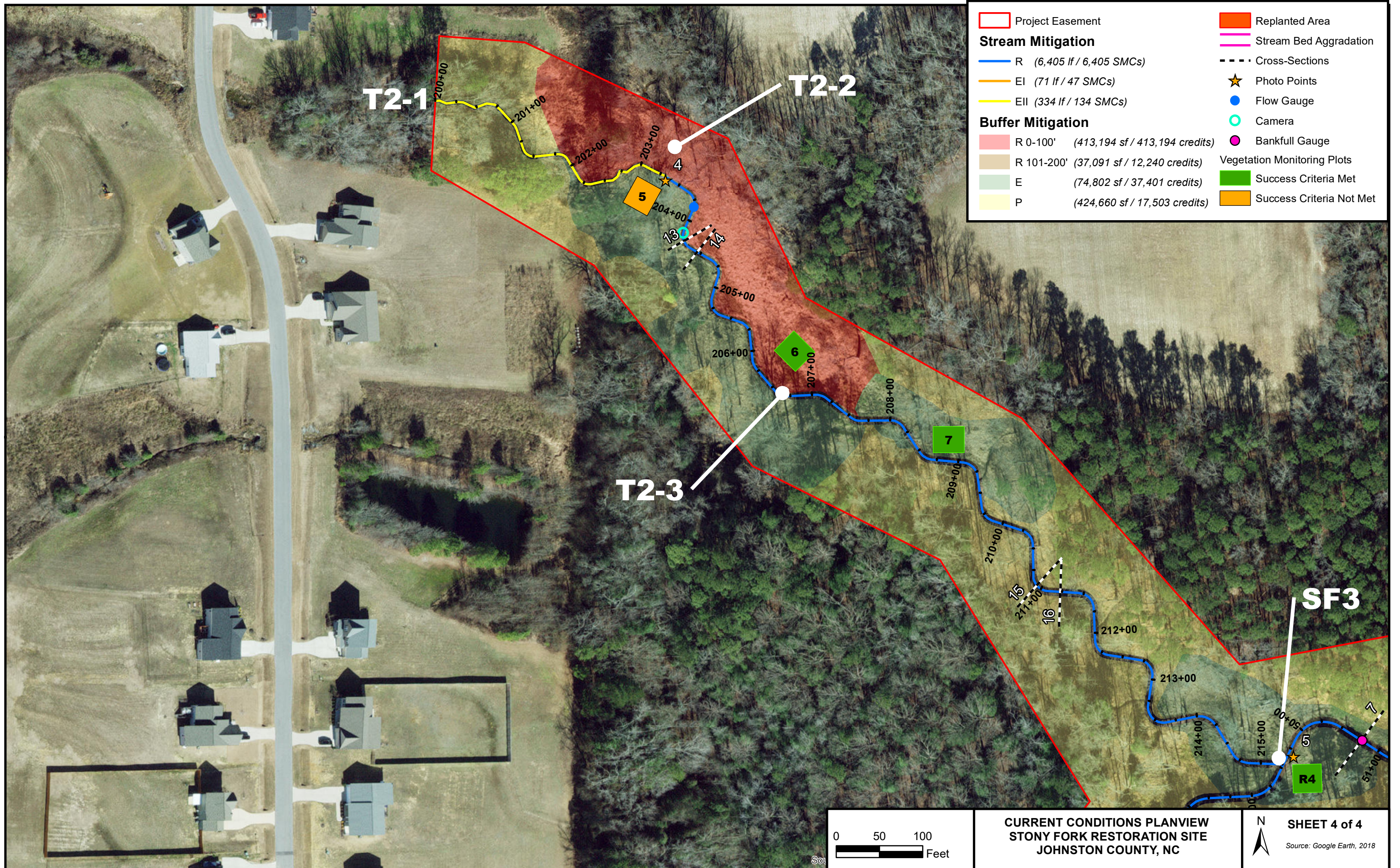


Project Easement	Replanted Area
<b>Stream Mitigation</b>	Stream Bed Aggradation
R (6,405 lf / 6,405 SMCs)	Cross-Sections
EI (71 lf / 47 SMCs)	Photo Points
EII (334 lf / 134 SMCs)	Flow Gauge
<b>Buffer Mitigation</b>	Camera
R 0-100' (413,194 sf / 413,194 credits)	Bankfull Gauge
R 101-200' (37,091 sf / 12,240 credits)	<b>Vegetation Monitoring Plots</b>
E (74,802 sf / 37,401 credits)	Success Criteria Met
P (424,660 sf / 17,503 credits)	Success Criteria Not Met

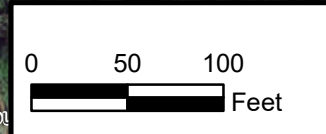


**CURRENT CONDITIONS PLANVIEW**  
**STONY FORK RESTORATION SITE**  
**JOHNSTON COUNTY, NC**

**SHEET 3 of 4**  
 Source: Google Earth, 2018



Project Easement	Replanted Area
<b>Stream Mitigation</b>	Stream Bed Aggradation
R (6,405 lf / 6,405 SMCs)	Cross-Sections
EI (71 lf / 47 SMCs)	Photo Points
EII (334 lf / 134 SMCs)	Flow Gauge
<b>Buffer Mitigation</b>	Camera
R 0-100' (413,194 sf / 413,194 credits)	Bankfull Gauge
R 101-200' (37,091 sf / 12,240 credits)	<b>Vegetation Monitoring Plots</b>
E (74,802 sf / 37,401 credits)	Success Criteria Met
P (424,660 sf / 17,503 credits)	Success Criteria Not Met



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

**SHEET 4 of 4**  
 Source: Google Earth, 2018

Table 5 <u>Visual Stream Morphology Stability Assessment</u>							
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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	18	18			100%
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	17	17		
	2. <u>Length</u> appropriate ( $>$ 30% of centerline distance between tail of upstream riffle and head of downstream 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%	
<b>Totals</b>							
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 <u>NOT</u> 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%
<b>Totals</b>							
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 <u>not</u> 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 $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	5	5			100%

<b>Table 5</b> <u>Visual Stream Morphology Stability Assessment</u> <b>Stony Fork Stream Restoration Site, DMS Project#97085</b> <b>Reach ID</b> SF2 <b>Assessed Length</b> 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	36	36			100%
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	35			35
	4. Thalweg Position		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	35			35
			1. Thalweg centering at upstream of meander bend (Run)	35			35
	2. Thalweg centering at downstream of meander (Glide)		35	35			100%
<b>Totals</b>							0
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 <u>NOT</u> 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%
<b>Totals</b>					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 <u>not</u> 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 $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	8	8			100%



Table 5 <u>Visual Stream Morphology Stability Assessment</u>							
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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	9	9			100%
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	8			8
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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%			
<b>Totals</b>							0
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 <b>NOT</b> 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%
<b>Totals</b>					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 <u>not</u> 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 $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	1	1			100%

<b>Table 5</b> <u>Visual Stream Morphology Stability Assessment</u> <b>Stony Fork Stream Restoration Site, DMS Project#97085</b> <b>Reach ID</b> T1 <b>Assessed Length</b> 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	13	13			100%
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	12	12		
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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%	
<b>Totals</b>					0	0	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 <b>NOT</b> 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%
<b>Totals</b>					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 <u>not</u> 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 $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	4	4			100%

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

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

<b>Table 6    <u>Vegetation Condition Assessment</u></b>						
<b>Stony Fork Stream Restoration Site, DMS Project# 97085</b>						
<b>Planted Acreage    24.4</b>						
<b>Vegetation Category</b>	<b>Definitions</b>	<b>Mapping Threshold</b>	<b>CCPV Depiction</b>	<b>Number of Polygons</b>	<b>Combined Acreage</b>	<b>% of Planted Acreage</b>
<b>1. Bare Areas</b>	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	0	0.00	0.0%
<b>2. Low Stem Density Areas</b>	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%
<b>Total</b>				<b>0</b>	<b>0.00</b>	<b>0.0%</b>
<b>3. Areas of Poor Growth Rates or Vigor</b>	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%
<b>Cumulative Total</b>				<b>0</b>	<b>0.00</b>	<b>0.0%</b>
<b>Easement Acreage    9.5</b>						
<b>Vegetation Category</b>	<b>Definitions</b>	<b>Mapping Threshold</b>	<b>CCPV Depiction</b>	<b>Number of Polygons</b>	<b>Combined Acreage</b>	<b>% of Easement Acreage</b>
<b>4. Invasive Areas of Concern</b>	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	0	0.00	0.0%
<b>5. Easement Encroachment Areas</b>	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

## Photo Reference Photos



PP1U – MY-00 – 5/15/19



PP1U – MY-04 – 12/9/22



PP1D – MY-00 – 5/15/19



PP1D – MY-04 – 12/9/22



PP2U – MY-00 – 5/15/19



PP2U – MY-04 – 12/9/22



PP2D – MY-00 – 5/15/19



PP2D – MY-04 – 12/9/22



PP3U – MY-00 – 5/15/19



PP3U – MY-04 – 12/9/22



PP3D – MY-00 – 5/15/19



PP3D – MY-04 – 12/9/22



PP4U – MY-00 – 5/15/19



PP4U – MY-04 – 12/9/22



PP4D – MY-00 – 5/15/19



PP4D – MY-04 – 12/9/22



PP5U – MY-00 – 5/15/19



PP5U – MY-04 – 12/9/22





PP5D – MY-00 – 5/15/19



PP5D – MY-04 – 12/9/22



PP6U – MY-00 – 5/15/19



PP6U – MY-04 – 12/9/22



PP6D – MY-00 – 5/15/19



PP6D – MY-04 – 12/9/22

## Easement Encroachment Area Photos



Easement Encroachment Area – 11/19/21



Easement Encroachment Area – 2/24/22



Easement Encroachment Area – 11/19/21



Easement Encroachment Area – 2/24/22



Easement Encroachment Area – 12/9/22



Easement Encroachment Area – 12/9/22

**T3 Photos**



T3 – 2/24/22



T3 – 12/9/22



T3 – 2/24/22

# **APPENDIX C**

## Vegetation Plot Data

**Table 7. Replanting Species and Quantities  
Stony Fork Restoration Site, DMS Project #97085**

Common Name	Scientific Name	Quantity	Size
Tulip Poplar	<i>Liriodendron tulipifera</i>	5	1 gallon
Swamp Chestnut Oak	<i>Quercus michauxii</i>	4	1 gallon
Sycamore	<i>Platanus occidentalis</i>	7	1 gallon
River Birch	<i>Betula nigra</i>	7	1 gallon
Persimmon	<i>Diospyros virginiana</i>	6	1 gallon

**Table 8. Stem Count by Plot and Species  
Stony Fork Restoration Site, DMS Project #97085**

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

# **APPENDIX D**

## **Stream Measurement and Geomorphology Data**

<b>Table 9. Cross Section Dimensional Morphology Summary</b>																					
<b>Stony Fork Stream Restoration Site, DMS Project #97085</b>																					
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	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	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 <sup>2</sup> ) 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 <sup>2</sup> ) 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			
Dimension and Substrate	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	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	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 <sup>2</sup> ) 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 <sup>2</sup> ) 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				-	-	-	-			

<b>Table 9. Cross Section Dimensional Morphology Summary</b>																					
<b>Stony Fork Stream Restoration Site, DMS Project #97085</b>																					
	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	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	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 <sup>2</sup> ) 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 <sup>2</sup> ) 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	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	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 <sup>2</sup> ) 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 <sup>2</sup> ) 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				-	-	-	-			



<b>Table 9. Cross Section Dimensional Morphology Summary</b>																					
<b>Stony Fork Stream Restoration Site, DMS Project #97085</b>																					
	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	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	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 <sup>2</sup> ) 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 <sup>2</sup> ) 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	MY5	MY7	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 <sup>2</sup> ) based on AB BKF area	6.0	6.0	6.0	6.0																	
Cross-Sectional Area (ft <sup>2</sup> ) 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																	

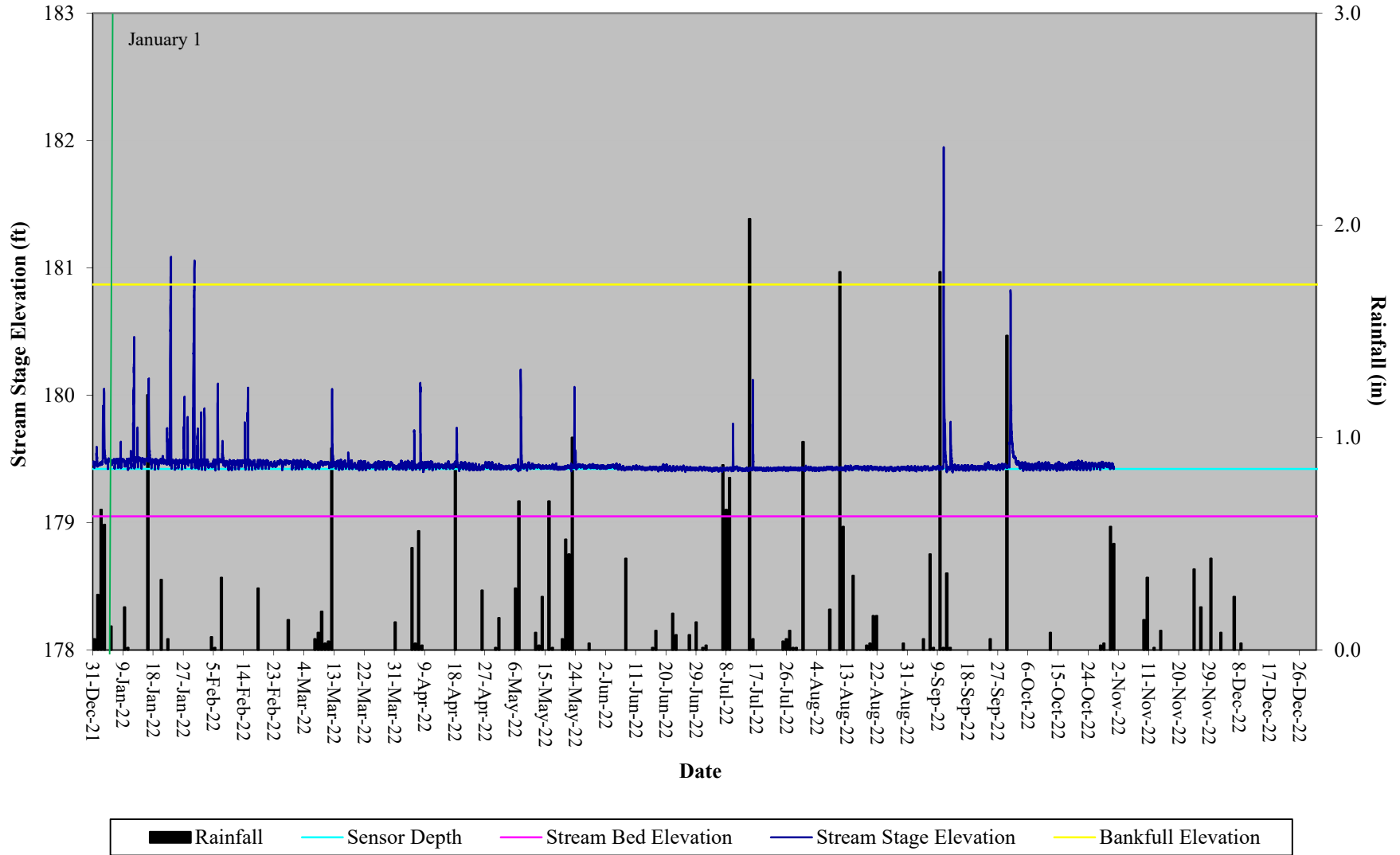
# **APPENDIX E**

## Hydrologic Data

**Table 10. Verification of Bankfull Events  
Stony Fork Restoration Site, DMS Project #97085**

<b>Monitoring Year</b>	<b>Date of Occurrence</b>	<b>Method</b>
MY01	July 12, 2019	Onsite stream gauge
	July 23, 2019	Onsite stream gauge
	August 14, 2019	Onsite stream gauge
	September 5, 2019	Onsite stream gauge
	October 13, 2019	Onsite stream gauge
	October 20, 2019	Onsite stream gauge
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
MY04	January 23, 2022	Onsite stream gauge
	January 30, 2022	Onsite stream gauge
	September 10, 2022	Onsite stream gauge

# Stony Fork Restoration Site Hydrograph Stream Gauge SF Main



**Table 11. Verification of Stream Flow  
Stony Fork Restoration Site, DMS Project #97085**

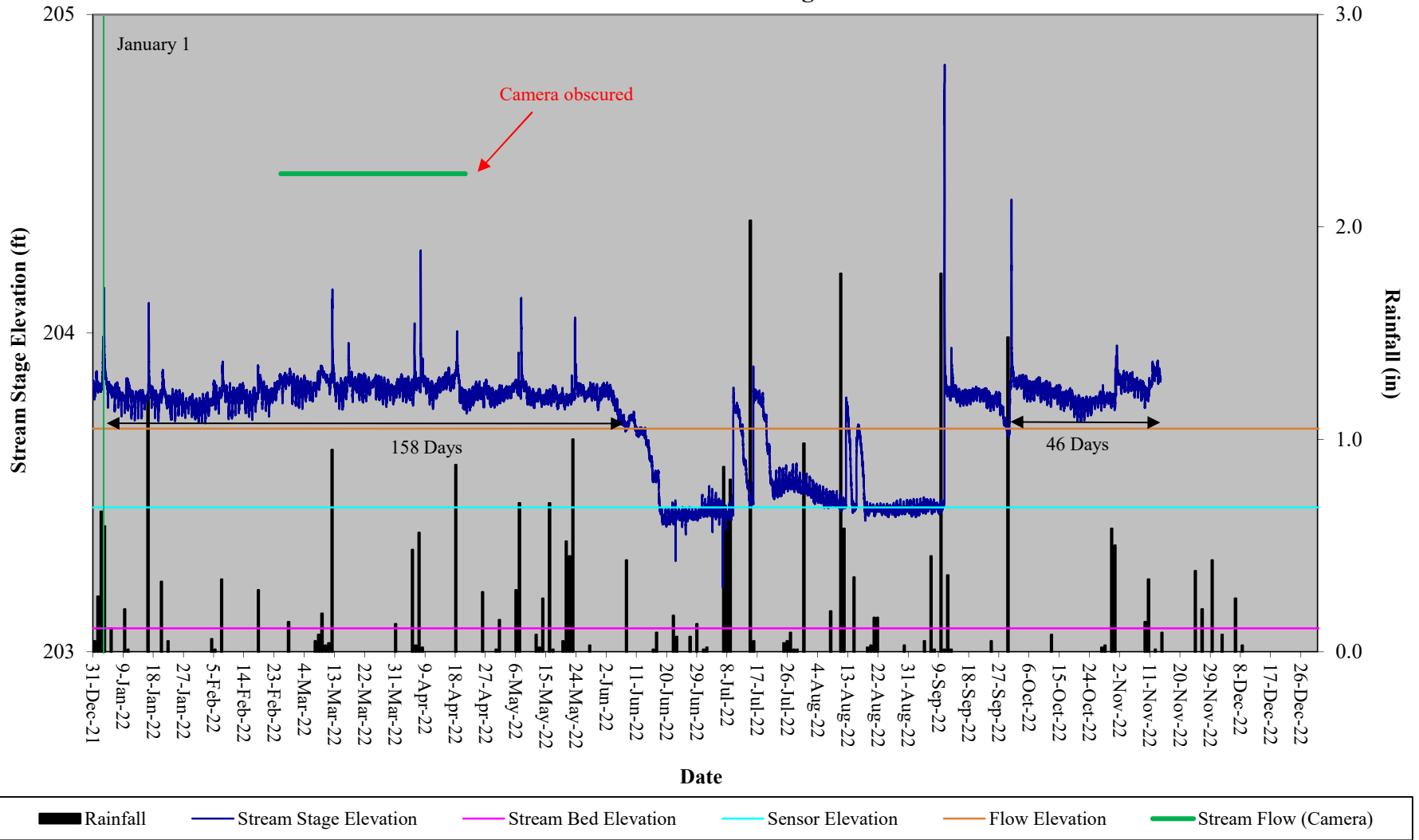
Reach	Gauge		Camera	
	Dates Achieving	Maximum Consecutive Days	Dates Achieving	Maximum Consecutive Days
T1	January 1 – June 7; September 30 – November 14	158	February 25 – April 21	56
T1A	January 1 – June 23; September 10 – November 16	174	January 1 – May 29	149
T2	January 1 – June 4; September 30 – November 14	155	January 1 – April 28	118
T3	September 30 – November 14	46	January 1 – June 3	154

**Table 12. Stream Flow Criteria Attainment  
Stony Fork Restoration Site, DMS Project #97085**

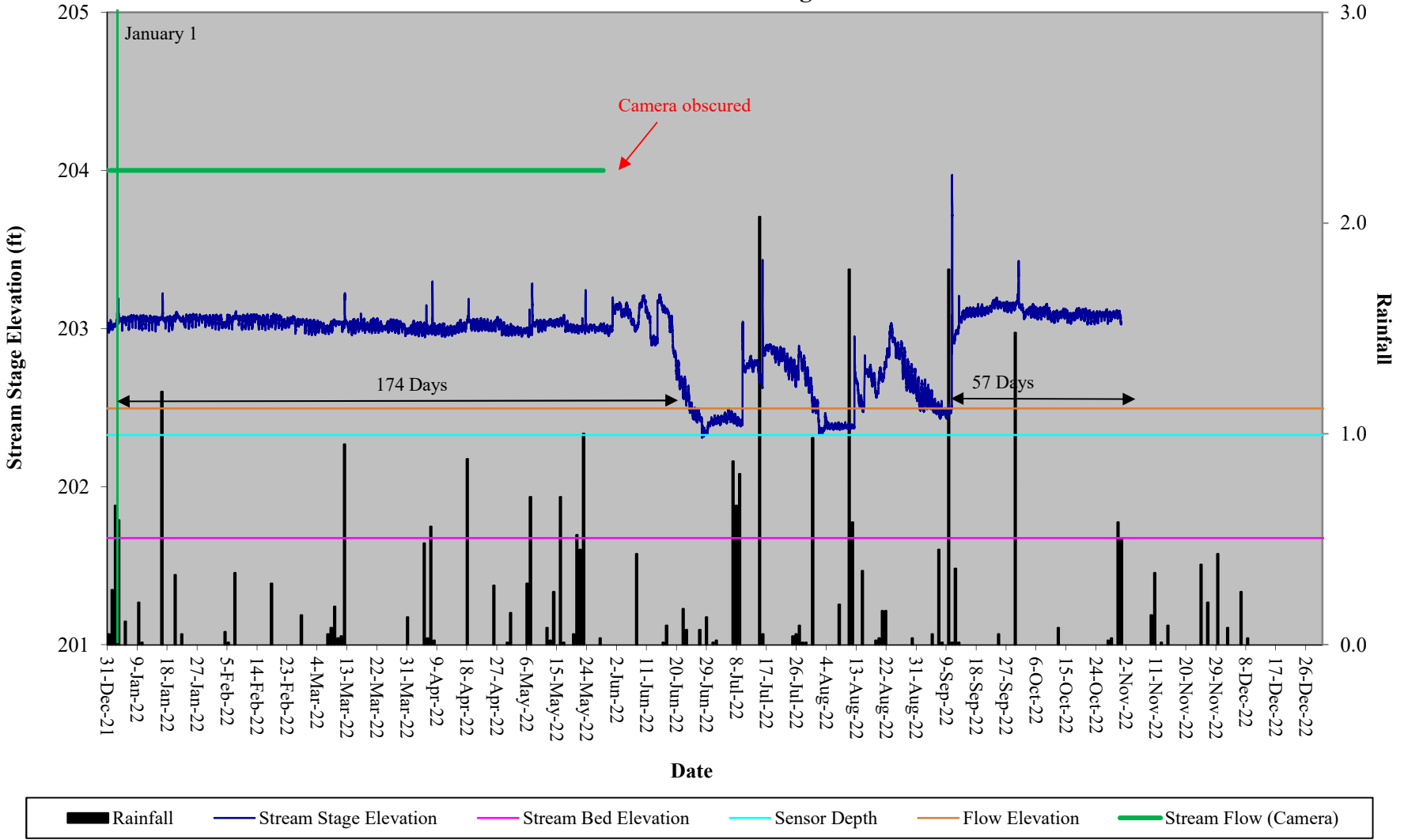
Reach	Greater than 30 Days of Flow/Max Consecutive Days						
	MY-01 2019	MY-02 2019	MY-03 2020	MY-04 2021	MY-05 2022	MY-06 2023	MY-07 2024
T1 (Gauge)	Yes/60	Yes/152	Yes/147	Yes/158			
T1 (Camera)	*	*	Yes/76	Yes/56			
T1A (Gauge)	Yes/182	Yes/152	Yes/259	Yes/174			
T1A (Camera)	Yes/46	Yes/183	Yes/41	Yes/149			
T2 (Gauge)	Yes/85	Yes/152	Yes/115	Yes/155			
T2 (Camera)	Yes/84	Yes/53	Yes/75	Yes/118			
T3 (Gauge)	Yes/55	Yes/152	Yes/256	Yes/46			
T3 (Camera)	Yes/55	*	Yes/106	Yes/154			

\*Camera obscured or malfunctioned for most of the year

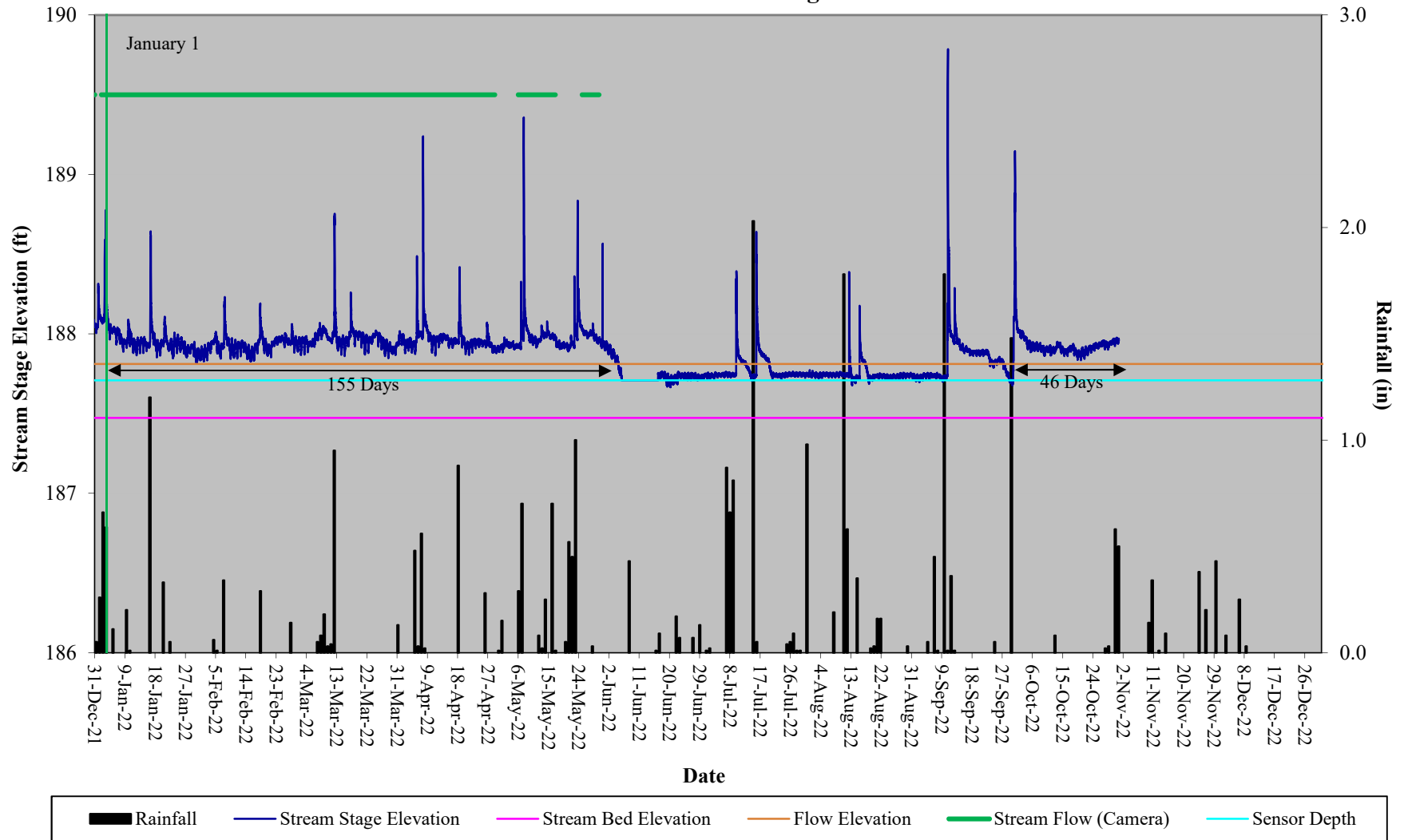
### Stony Fork Restoration Site Hydrograph T1 Stream Flow Gauge



### Stony Fork Restoration Site Hydrograph T1-A Stream Flow Gauge



## Stony Fork Restoration Site Hydrograph T2 Stream Flow Gauge





### Stony Fork Restoration Site Hydrograph T3 Stream Flow Gauge

