

# Monitoring Report MY06

**Sandy Bridge Restoration Site  
DMS Contract 6400  
DMS Project Number 96920**

**DWR #: 15-0414  
USACE Action ID: 201500827  
Rutherford County, North Carolina**



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

**Monitoring Data Collected: 2022  
Date Submitted: December 2022**

## Monitoring and Design Firm

Prepared by:



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

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



January 19, 2023

Mr. Harry Tsomides  
North Carolina Division of Mitigation Services  
5 Ravenscroft Dr. #102  
Asheville, NC 28801

Re: Response to Sandy Bridge Farm MY06 Report Comments

Dear Mr. Tsomides,

KCI has reviewed the comments prepared by the DMS for the Sandy Bridge Farm MY06 Report and has prepared the following responses:

- Please carry out asset table credits to 3 significant digits (e.g., 6.653 wmu, etc).  
*KCI Response: This change has been made.*
- Please include assessment dates on stream and vegetation visual assessment tables.  
*KCI Response: This change has been made.*
- It is stated that “Future monitoring will show how the channel has adjusted to the varying backwater conditions and how the stream has processed the sediment from these (bank full) events.” Given that the project is now entering its seventh year of monitoring, can KCI elaborate on this and summarize how the site is processing sediments? Does KCI feel that the site will adequately process sediments in future years?  
*KCI Response: This sentence has been deleted. During the periods when the site is free of beaver dams, it has done a good job of processing the accumulated sediment, as demonstrated by the comparison of the cross-sections across monitoring years that is presented in the report.*
- Some of the 2022 visual assessment metrics are exactly the same numbers as reported in 2021 (e.g., aggraded LF; riffle conditions, low stem density acres, etc). Please review / remeasure / update as necessary to reflect the 2022 site conditions.  
*KCI Response: The November 17, 2022 visual assessment of the site found no change in the areas of aggradation and low stem density from those reported in the MY05 report. KCI will reevaluate these areas again during the 2023 visual assessment of the site and adjust accordingly.*
- KCI indicates that a supplemental planting of approximately 300 live stakes was completed in April 2022. This planting consisted of live stakes cut from black willow, elderberry, silky dogwood, sycamore, and cottonwood trees on site. What is the planting area and density of this live stake planting? Were there roughly equal quantities of each species? Can KCI comment on the survivability after the 2022 growing season?

*KCI Response: Additional details about the supplemental planting have been added to the report. KCI was not able to get a good gauge on the survivability after the 2022 growing season but will make a point of investigating this during the spring 2023 site visits.*

- Please update the Monitoring Phase Performance Bond as necessary.  
*KCI Response: This will be done as necessary.*

#### DIGITAL SUPPORT FILE COMMENTS

- The label for wetlands violates the naming convention, all segments must have a unique ID.  
*KCI Response: The wetland shapefiles have been updated.*
- Please submit shapefiles corresponding to the problem areas for stream and vegetation indicated on the visual assessment tables.  
*KCI Response: These have been included in the digital deliverables.*

Please contact me if you have any questions or would like clarification concerning these responses.

Sincerely,



Adam Spiller  
Project Manager

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## **PROJECT SUMMARY**

The Sandy Bridge Farm Restoration Site (SBFRS) was completed in March 2017 and restored a total of 6.85 acres of riparian wetland (1.29 acres of wetland rehabilitation and 5.56 acres of wetland reestablishment) and 1,626 linear feet of stream. The SBFRS is a riparian system located in the Broad River Basin (03050105 8-digit cataloging unit) in Rutherford County, North Carolina that had been substantially modified to maximize the use of the area for grazing. The completed project will restore impacted agricultural lands to a functioning stream and wetland ecosystem with enhanced water quality, restored hydrology, and improved fish and wildlife habitat.

The SBFRS is protected by a 9.5 acre permanent conservation easement, held by the State of North Carolina. The site is located off of Rock Road, approximately 3 miles north of Rutherfordton, North Carolina. The project site is bounded by interspersed pastureland and forested land to the east, agricultural land and Rock Road to the north-northwest, and Catheys Creek to the southwest.

The North Carolina Ecosystem Enhancement Program's (NCEEP) publication in 2009 identified HUC 03050105070020 (Catheys Creek) as a Targeted Local Watershed (TLW). The goals and priorities for SBRFS are based on the information presented in the Broad River Basin Restoration Priorities: to restore wetland and stream functions, to maintain and enhance water quality, to restore hydrology, and to improve fish and wildlife habitat (NCEEP 2009). The project goals, which reflect those from the approved Mitigation Plan, are in line with the following basin priorities:

- Reduce sources of sediment and nutrients by restoring riparian buffer vegetation, excluding livestock, and restoring natural geomorphology.
- Prioritize project implementation in the Catheys Creek local watershed planning area.

The goals for the project are to:

- Restore a channelized stream to a meandering C-type channel with a floodplain.
- Buffer and reduce sediment impacts to the project stream.
- Restore a Piedmont Alluvial Forest Community.
- Restore a wetland hydroperiod to drained and livestock-impacted land.

The project goals will be addressed through the following objectives:

- Relocate a channelized stream to its historic landscape position.
- Install an appropriately-sized channel cross-section.
- Install bedform diversity with pools, riffles, and habitat structures.
- Demarcate the project easement boundaries and fence out livestock.
- Plant the site with native trees and shrubs and an herbaceous seed mix that supports the development of a Piedmont Alluvial Forest.
- Fill field ditches and redevelop wetland microtopography to slow the flow of surface and subsurface drainage.

To restore the site, select ditches across the site were modified or filled and incoming surface inputs and seeps were integrated to create a stream/wetland complex. Additionally, Tributary 1 to Catheys Creek was improved with Priority 1 stream restoration to re-meander the stream and elevate the groundwater table. The entire site was planted as a Piedmont Alluvial Forest community (Schafale 2012). The site was constructed as designed with no modification from the design plan.

The majority of monitoring components were installed in March 2017. Nine groundwater monitoring wells were installed to evaluate the attainment of jurisdictional wetland hydrology. A stream gauge was installed on Tributary 1 to Catheys Creek to record the occurrence of bankfull events. To determine the success of the planted mitigation areas, eight 10 m x 10 m permanent vegetation monitoring plots were established. The location of the planted stems relative to the origin within these plots, as well as the species, was recorded and planted stems were grouped into size categories (0-10 cm, 10-50 cm, 50-100 cm, >137 cm). Any volunteers found within the plots were also grouped into size categories by species, but separate from the planted stems. Six permanent photo reference points were established and will be taken annually. Four permanent cross-sections (two sets of coupled riffles and pools) were also established and a detailed longitudinal profile of the stream was taken. Wolman pebble counts were performed at both 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 by the end of each monitoring year. During a site visit with the IRT on December 6, 2017, it was requested that KCI install three additional groundwater monitoring wells and two additional vegetation plots. On March 30, 2018 the three additional groundwater monitoring wells were installed along the area of the filled, pre-construction stream channel. On September 10, 2018, the two additional vegetation plots were installed near the southern end of the site.

Vegetative success criteria for the site is 320 woody stems/acre after three years, 260 woody stems/acre after five years, and 210 woody stems/acre after seven years. The baseline monitoring counted an average of 647 woody stems/acre. To meet the hydrologic success criteria, the upper 12 inches of the soil profile must have continuously saturated or inundated conditions for at least 10% of the growing season during normal weather conditions. The soil survey for Rutherford County estimates the growing season begins April 4 and ends November 6 (217 days), meaning the water table must be within 12 inches of the surface for at least 22 consecutive days during the growing season. A minimum of two bankfull events must also be recorded during the monitoring period. Bank height ratios should not exceed 1.2 and the entrenchment ratios should be 2.2 or greater. Visual assessments will also be used to identify problem areas.

### **MONITORING RESULTS**

The site was planted in March 2017 with tree tube protection installed around many of the planted stems. Over the years, beaver have been present at the site and have impacted site vegetation. Although there is still a good quantity of woody stems, beaver activity has taken out some stems that had grown larger. Even with the beaver impacts, in general, the site is well vegetated, with widespread herbaceous coverage and many healthy planted stems. A supplemental planting of the site occurred in March 2020. 524 one-gallon size trees were planted in the wetland rehabilitation area and 1,875 bare root trees were planted in the central portion of the site and around the stream. The planting in the wetland rehabilitation area was done as a means of addressing a small area of low growth and vigor caused by dense herbaceous vegetation. The planting in the central portion of the site was done to mitigate damage done by the beavers. An additional supplemental planting of approximately 300 live stakes was completed in April 2022. This planting consisted of live stakes cut from black willow, elderberry, silky dogwood, sycamore, and cottonwood trees on site in approximately equal quantities of each. This planting focused on the areas most heavily impacted by the beavers and covered an area of approximately 2.5 acres (120 stems/acre).

Monitoring of the vegetation plots did not take place during the sixth monitoring year, as stipulated in the mitigation plan, but four vegetation transects were sampled during Monitoring Year 6. These transects were each 100 feet long and were sampled using the point intercept method. Sampling points were located every 5 feet and only woody stems were recorded. Two of

the transects (Transects 1 and 2) were located in the beaver affected areas, while the other two transects were located outside of the beaver affected areas. Transects 1 and 2 had percent covers of 20% and 45%, respectively, while Transects 3 and 4 had percent covers of 90% and 85%. Across all four transects, 47 stems and 15 species were recorded, with an average height of 24 feet. Please see Appendix C – Vegetation Data for additional information about the sampled transects.

Daily rainfall data were obtained from the NC State Climate Office for a local weather station in Rutherfordton, NC. In 2022 the month of September experienced above average rainfall, while the months of January, March, April, May, July, and November experienced average rainfall. The months of February, June, August, and October experienced below average rainfall for the site. Overall, the area experienced slightly below average rainfall during the 2022 growing season. During the site's sixth growing season, 11 of the 12 groundwater monitoring wells had continuous saturation within 12 inches of the ground surface for 10% (22 days) or more of the 217 day growing season (April 4 to November 6). The gauge that did not meet (Gauge 10) has only met in 1 of the 4 years that it has recorded data. Due to this low level of success, KCI has begun investigating the area around the gauge to flesh out the extent of the low performing area. The next two closest gauges to Gauge 10 have each met the success criteria in every year except one (Gauge 2 has met 5/6 years and Gauge 11 has met 3/4 years). Soils around these three gauges were investigated and described, and an initial analysis shows that the low performing area is less than 0.5 acres in size. During MY07, a more thorough investigation of this area will be performed to determine the exact size. Please see Appendix E – Hydrologic Data for complete descriptions of the soils in this area.

The stream gauge has recorded multiple bankfull events in each year since construction, including 3 bankfull events in 2022. In June 2018, several large beaver dams were discovered towards the lower half of the stream. These dams were removed in early August 2018. KCI has been continuously monitoring for further signs of beaver activity, trapping beavers on-site and removing dams when they are found. In August 2020 KCI contracted with USDA APHIS-WS to provide ongoing beaver management. Additional dams were removed in November 2018, June 2019, August 2019, and October 2019, June 2020, September 2020, December 2020, and November 2021. New dams were not built on the site until August 2022. These dams will be removed once the beavers on-site have been trapped and removed from the site. See Appendix B and Appendix D for more information.

Due to the history of beaver dams on-site, there has been more aggradation in the stream channel than has been anticipated. KCI has been removing the beavers and dams routinely, but when the dams are built sediment has deposited in the channel. The fifth-year cross-section survey showed bed aggradation in all four cross-sections as well as aggradation on the banks of Cross-sections 1 and 2. When the beaver dams are removed for an extended period of time, there is evidence of the accumulated sediment washing out of the stream. An example of this can be seen when comparing the MY02 and MY03 surveys of XS2. During MY02, a mid-channel bar had formed within this cross-section but after the removal of the beaver dams and a period of several months without them being rebuilt, this bar was completely absent from the MY03 survey. Comparing the MY04 and MY05 surveys of XS4 also shows this pattern. Starting in MY03, a large beaver dam was located at the head of the riffle just downstream of XS4. This dam was removed multiple times during 2019 and 2020. After being removed in September 2020, this dam was not rebuilt, but a new dam was constructed upstream of XS4. Comparing the MY04 survey to the MY05 survey shows that fine sediment has washed out of the system and the thalweg elevation in this cross-section has dropped approximately half a foot. KCI believes that if given enough time without backwater conditions, this trend will hold true for the entire site. It is also important to



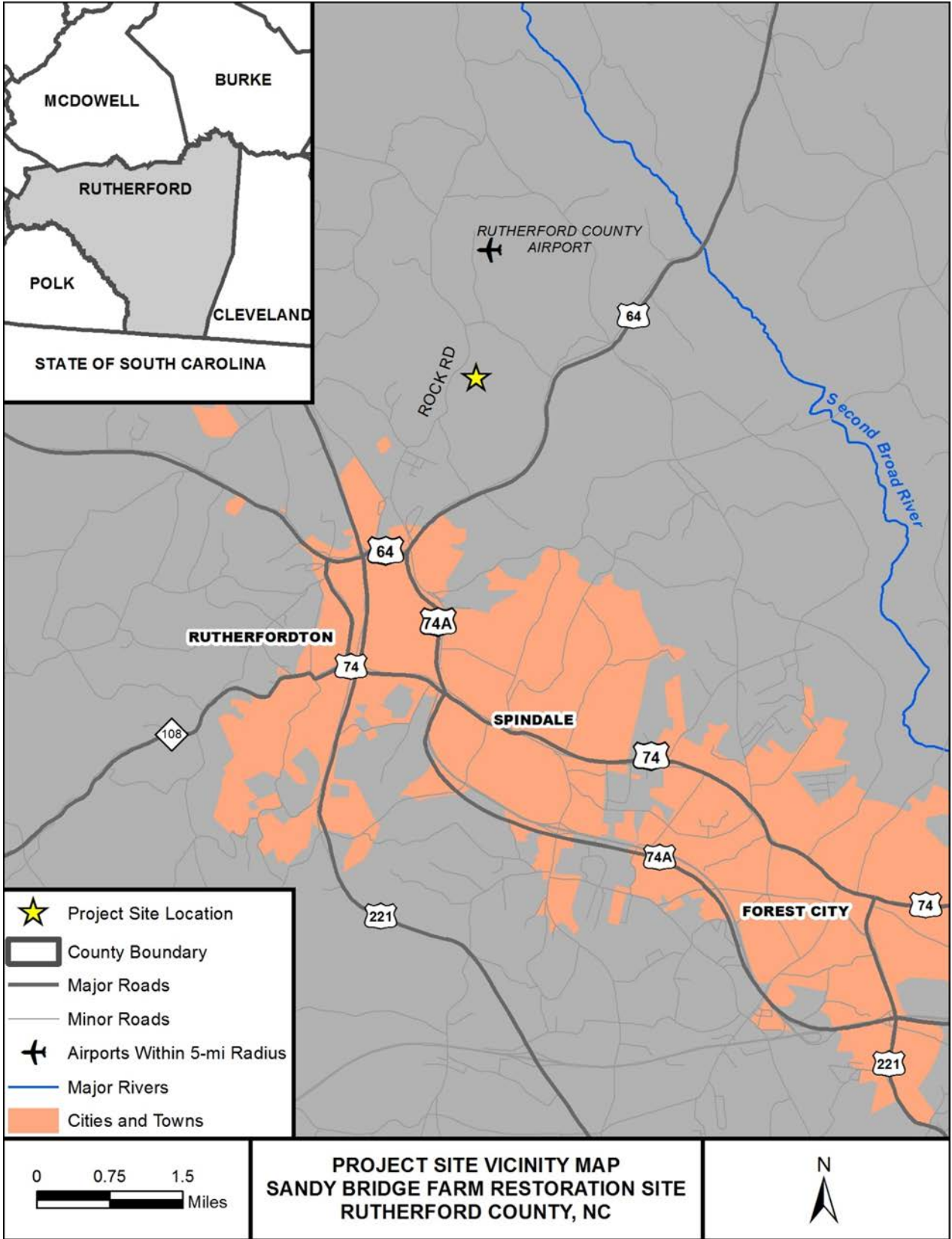
note that even with the rebuilding of the dams, the stream flow has stayed within the restored channel and no evidence of other channels forming in this system has been noted.

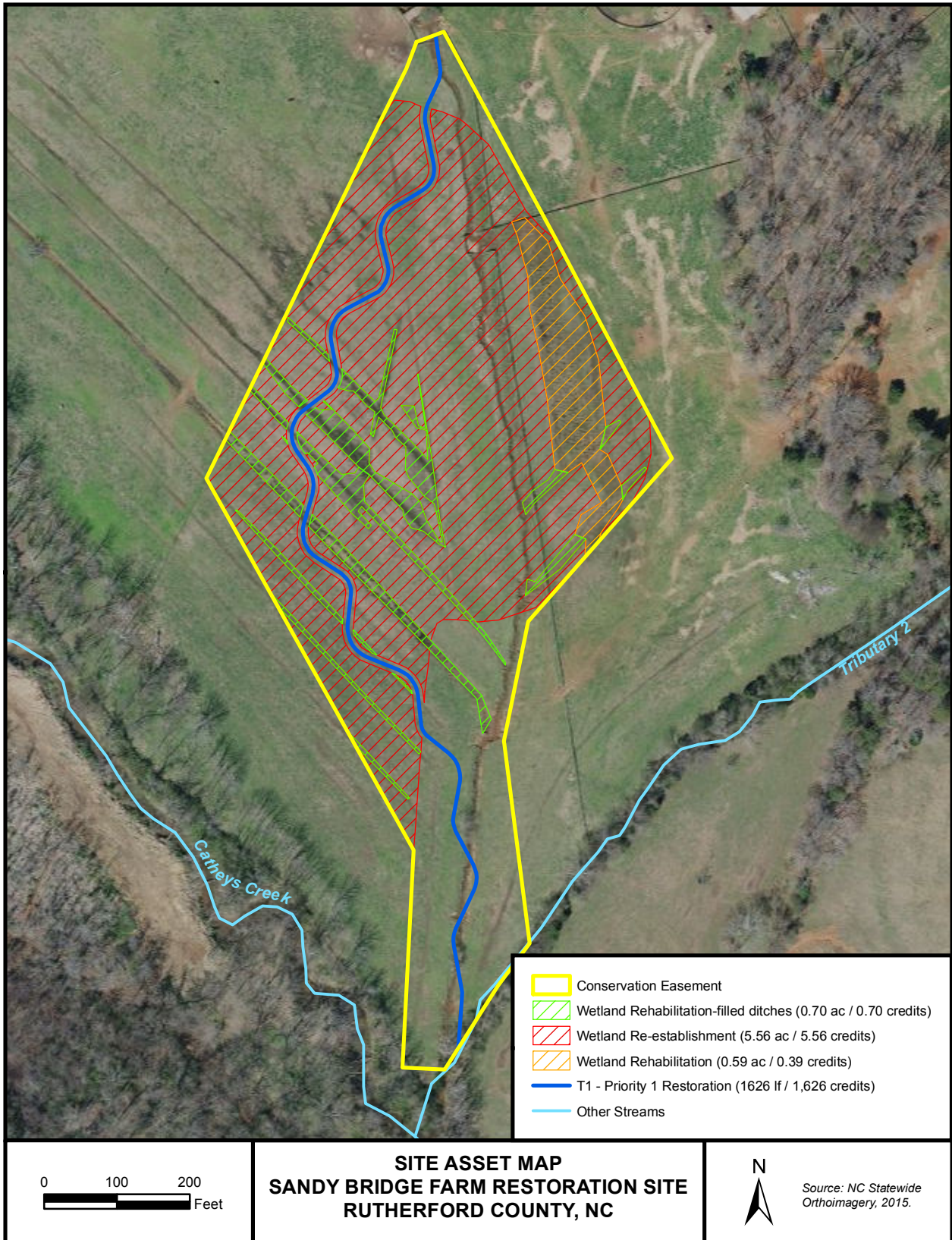
The monitored cross-section data have been calculated by adjusting the bankfull elevation to maintain the baseline bankfull area for each cross-section. A total cross-sectional metric has been added to the cross-section data to indicate the cross-sectional area below the baseline bankfull elevation. In instances where there has been some lateral aggradation and narrowing, the data show the cross-section having a significantly higher bankfull width and higher width/depth ratio as compared to previous years. The comparison of cross-section plots between monitoring events illustrates that these adjustments do not indicate a problematic change in cross-section condition but are part of the processing of sediment through the site as described above. KCI will continue to monitor and treat the beavers to ensure that sediment continues to move through the site.

The right bank of the stream flowing adjacent to the project's southern boundary had been experiencing significant erosion due to several areas of obstruction in the center of this channel that were diverting water into the banks. Although this stream is not part of the project, and is located outside of the easement bounds, the erosion on the right bank had encroached into the easement. In November 2019, KCI repaired and stabilized this area. This work involved removing the mid-channel obstructions and sloping back the eroding bank. 150 live stakes were planted along this bank in March 2020. During this work, several farm gates that had become buried in the project stream bank were removed and a small swale was dug to direct water into the site from fields adjacent to the eastern boundary of the site. This swale was designed to drain ponded conditions in these fields and dissipate the water throughout the wetlands on-site. See Appendix B for more information.

## **REFERENCES**

- NCDENR, Ecosystem Enhancement Program. 2009. Broad River Basin Restoration Priorities 2009. Raleigh, NC. Last accessed 1/2016 at:  
[http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=705d1b58-cb91-451e-aa58-4ef128b1e5ab&groupId=60329](http://portal.ncdenr.org/c/document_library/get_file?uuid=705d1b58-cb91-451e-aa58-4ef128b1e5ab&groupId=60329)
- NCDENR, Ecosystem Enhancement Program. 2014. NCDENR, Ecosystem Enhancement Program. 2014. Stream and Wetland Mitigation Monitoring Guidelines. Last accessed 1/2016 at:  
[http://portal.ncdenr.org/c/document\\_library/get\\_file?p\\_l\\_id=60409&folderId=18877169&name=DLFE-86604.pdf](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](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](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.





- Conservation Easement
- Wetland Rehabilitation-filled ditches (0.70 ac / 0.70 credits)
- Wetland Re-establishment (5.56 ac / 5.56 credits)
- Wetland Rehabilitation (0.59 ac / 0.39 credits)
- T1 - Priority 1 Restoration (1626 lf / 1,626 credits)
- Other Streams

0      100      200  
 ─────────── Feet

**SITE ASSET MAP**  
**SANDY BRIDGE FARM RESTORATION SITE**  
**RUTHERFORD COUNTY, NC**



Source: NC Statewide  
 Orthoimagery, 2015.

# **APPENDIX A**

## Background Tables

Table 1. Project Components and Mitigation Credits Sandy Bridge Farm Restoration Site, DMS Project #96920									
Mitigation Credits									
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Credits	1,626		6.653						
Project Components									
Project Component -or- Reach ID	Stationing/ Location	Existing Footage/ Acreage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage/ Acreage	Mitigation Ratio	Credits		
Tributary 1	10+00 to 26+26	1,470 lf	PI	Restoration	1,626 lf	1:1	1,626		
Wetland Reestablishment				Restoration	5.560 ac	1:1	5.560		
Wetland Rehabilitation*		0.79 ac		Restoration	0.697 ac	1:1	0.697		
Wetland Rehabilitation		0.59 ac		Restoration	0.594 ac	1.5:1	0.396		
Component Summation									
Restoration Level	Stream (linear feet)	Riparian Wetlands (Acres)		Non-Riparian Wetlands (Acres)	Buffer (square feet)	Upland (Acres)			
		Riverine	Non-Riverine						
Restoration	1,626 lf								
Reestablishment		5.560 ac							
Rehabilitation		1.291 ac							
Enhancement									
Creation									
Preservation									
High Quality Preservation									

R= Restoration RE= Restoration Equivalent of Creation or Enhancement  
 \*=wetland rehabilitation associated with filled ditches

<b>Table 2. Project Activity &amp; Reporting History Sandy Bridge Farm Restoration Sites, DMS Project #96920</b>		
<b>Activity or Report</b>	<b>Data Collection Complete</b>	<b>Actual Completion or Delivery</b>
Mitigation Plan		June 2016
Final Design - Construction Plans		June 2016
Construction Grading Completed		Aug 29, 2016
Planting Completed		March 11, 2017
Baseline Monitoring/Report	March 2017	April 2017
<i>Vegetation Monitoring</i>	<i>March 21, 2017</i>	
<i>Stream Survey</i>	<i>March 20, 2017</i>	
Year 1 Monitoring	November 2017	December 2017
<i>Vegetation Monitoring</i>	<i>October 26, 2017</i>	
<i>Stream Survey</i>	<i>November 6, 2017</i>	
Additional Groundwater Gauges Installed		March 30, 2018
Beaver Dam Removal		August 20, 2018
Additional Vegetation Plots Installed		September 10, 2018
Beaver Dam Removal		November 6, 2018
Year 2 Monitoring	November 2018	December 2018
<i>Vegetation Monitoring</i>	<i>September 10, 2018</i>	
<i>Stream Survey</i>	<i>XS1 and 2: June 28, 2018 XS3 and 4: September 11, 2018</i>	
Beaver Dam Removal		June 14, 2019
Beaver Dam Removal		August 8, 2019
Beaver Dam Removal		October 17, 2019
Non-project Reach Repair		November 21, 2019
Year 3 Monitoring	November 2019	December 2019
<i>Vegetation Monitoring</i>	<i>July 11, 2019</i>	
<i>Stream Survey</i>	<i>June 19, 2019</i>	
Supplemental Planting		March 27, 2020
Beaver Dam Removal		June 12, 2020
Beaver Dam Removal		September 15, 2020
Beaver Dam Removal		December 18, 2020
Year 4 Monitoring	November 2020	December 2020
<i>Stream Survey</i>	<i>November 4, 2020</i>	
Beaver Dam Removal		November 17, 2021
Year 5 Monitoring	November 2021	December 2021
<i>Vegetation Monitoring</i>	<i>July 6, 2021</i>	
<i>Stream Survey</i>	<i>July 6, 2022</i>	
Supplemental Live Stake Planting		April 12, 2022
Year 6 Monitoring	November 2022	December 2022
<i>Vegetation Transects</i>	<i>October 17, 2022</i>	

<b>Table 3. Project Contacts</b> <b>Sandy Bridge Farm Restoration Sites, DMS Project #96920</b>	
<b>Design Firm</b>	KCI Associates of North Carolina, PC 4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 783-9214 Fax: (919) 783-9266
<b>Construction Contractor</b>	KCI Environmental Technologies and Construction 4505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 783-9214
<b>Planting Contractor</b>	Conservation Services Inc. 1620 N. Delphine Ave. Waynesboro, VA 22980 Contact: Mr. David Coleman Phone: (540) 941-0067
<b>Monitoring Performers</b>	KCI Associates of North Carolina, PC 4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

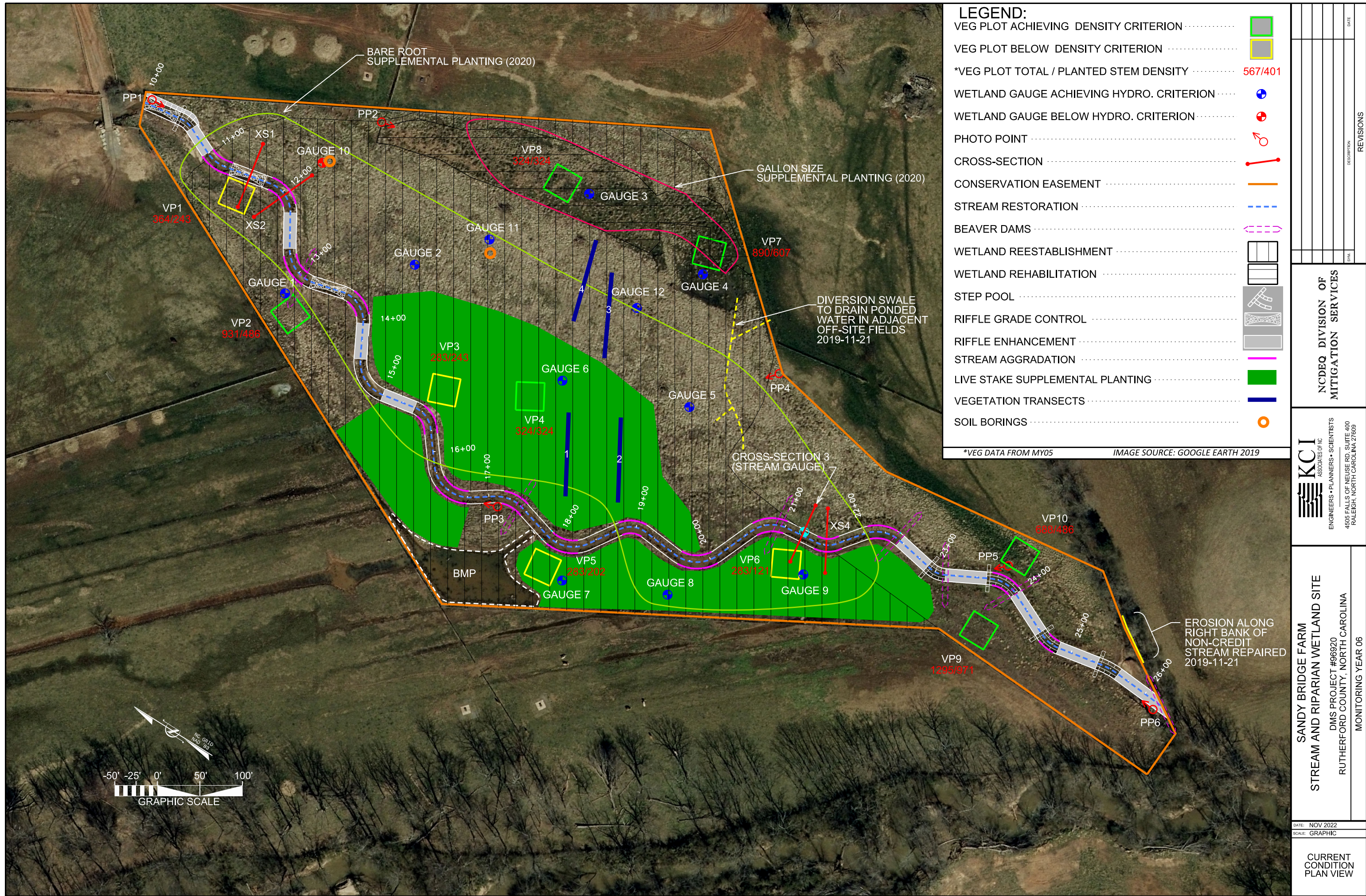


<b>Table 4. Project Information Sandy Bridge Farm Restoration Site, DMS Project #96920</b>			
<b>Project Name</b>	Sandy Bridge Farm Restoration Site		
<b>County</b>	Rutherford County		
<b>Project Area (acres)</b>	9.45 acres		
<b>Project Coordinates (lat. and long.)</b>	35.407997° N, -81.937000° W		
<b>Project Watershed Summary Information</b>			
<b>Physiographic Province</b>	Piedmont		
<b>River Basin</b>	Broad		
<b>USGS Hydrologic Unit 8-digit</b>	03050105	<b>USGS Hydrologic Unit 14-digit</b>	03050105070020
<b>DWQ Sub-basin</b>	9-41-13-(0.5)		
<b>Project Drainage Area (acres)</b>	837 acres		
<b>Project Drainage Area Percentage of Impervious Area</b>	8%		
<b>CGIA Land Use Classification</b>	Mixed Hardwoods/Conifers 42% (350.0 ac), Managed Herbaceous Cover 39% (329.3 ac), Mountain Conifers 12% (99.5 ac), Mixed Shrubland 5% (43.5 ac), Low Intensity Developed 1% (11.0 ac)		
<b>Existing Reach Summary Information</b>			
<b>Parameters</b>	<b>T1</b>		
Length of reach (linear feet)	1,470 lf		
Valley classification	Valley Type VIII		
Drainage area (acres)	837 acres		
NCDWQ Water Quality Classification	WS-V (Water Supply – upstream)		
Morphological Description (stream type)	Ditched channel		
Evolutionary trend	Channelized		
Mapped Soil Series	Wehadkee-Chewacla Association		
Drainage class	Poorly drained; Somewhat poorly drained		
Soil Hydric status	Drained hydric		
Slope	0-1%		
FEMA classification	Zone AE		
Existing vegetation community	N/A (Pasture)		
Percent composition of exotic invasive vegetation	5%		
<b>Existing Wetland Summary Information</b>			
<b>Parameters</b>			
Size of Wetland (acres)	0.59 acres (Wetland Rehabilitation Area)		
Wetland Type	Headwater Seep		
Mapped Soil Series	Wehadkee-Chewacla Association		
Drainage class	Poorly drained; Somewhat poorly drained		
Soil Hydric Status	Drained Hydric		
Source of Hydrology	Seepage/ Precipitation		
Hydrologic Impairment	Ditching and Grazing		
Existing vegetation community	Emergent Wetland		
Percent composition of exotic invasive vegetation	5%		

<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	DWR# 15-0414 USACE Action ID# 201500827	Jurisdictional Determination
Waters of the United States – Section 401	Yes	DWR# 15-0414 USACE Action ID# 201500827	Jurisdictional Determination
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	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

# **APPENDIX B**

## Visual Assessment Data



**LEGEND:**

- VEG PLOT ACHIEVING DENSITY CRITERION ..... ■
- VEG PLOT BELOW DENSITY CRITERION ..... ■
- \*VEG PLOT TOTAL / PLANTED STEM DENSITY ..... 567/401
- WETLAND GAUGE ACHIEVING HYDRO. CRITERION ..... ●
- WETLAND GAUGE BELOW HYDRO. CRITERION ..... ●
- PHOTO POINT ..... ♂
- CROSS-SECTION ..... —
- CONSERVATION EASEMENT ..... —
- STREAM RESTORATION ..... - - -
- BEAVER DAMS ..... - - -
- WETLAND REESTABLISHMENT ..... ▭
- WETLAND REHABILITATION ..... ▭
- STEP POOL ..... ▭
- RIFFLE GRADE CONTROL ..... ▭
- RIFFLE ENHANCEMENT ..... ▭
- STREAM AGGRADATION ..... —
- LIVE STAKE SUPPLEMENTAL PLANTING ..... ■
- VEGETATION TRANSECTS ..... —
- SOIL BORINGS ..... ○

\*VEG DATA FROM MY05      IMAGE SOURCE: GOOGLE EARTH 2019

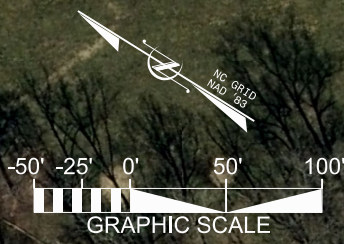
NO.	DATE	REVISIONS

**NCDEQ DIVISION OF  
MITIGATION SERVICES**

**KCI**  
ASSOCIATES OF NC  
ENGINEERS • PLANNERS • SCIENTISTS  
4505 FALLS OF NEUSE RD, SUITE 400  
RALEIGH, NORTH CAROLINA 27609

**SANDY BRIDGE FARM  
STREAM AND RIPARIAN WETLAND SITE**  
DMS PROJECT #96920  
RUTHERFORD COUNTY, NORTH CAROLINA  
MONITORING YEAR 06

DATE: NOV 2022  
SCALE: GRAPHIC  
**CURRENT  
CONDITION  
PLAN VIEW**



**Table 5** Visual Stream Morphology Stability Assessment  
**Sandy Bridge Farm Stream Restoration Site, DMS Project#96920**  
**Reach ID** **Reach 1**

Assessed Length

1626

Assesment Date: 11/17/2022

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)			15	544	67%	
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%	
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	5	20				25%
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	5				20
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		20	20				100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	20	20				100%
2. Thalweg centering at downstream of meander (Glide)		20	20	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%	
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.	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)	6	6				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%

**Table 6** **Vegetation Condition Assessment**  
**Sandy Bridge Farm Stream Restoration Site, DMS Project# 96920**

**Planted Acreage** 9.5 Assesment Date: 11/17/2022

<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	1	0.77	8.1%
<b>Total</b>				1	0.77	8.1%
<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	1	1.16	12.2%
<b>Cumulative Total</b>				2	1.93	20.3%
<b>Easement Acreage</b> 9.5						
<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



PP1 – MY-00 – 3/21/17



PP1 – MY-06 – 11/18/22



PP2 – MY-00 – 3/21/17



PP2 – MY-06 – 11/18/22



PP3 – MY-00 – 3/21/17



PP3 – MY-06 – 11/18/22



PP4 – MY-00 – 3/21/17



PP4 – MY-06 – 11/18/22



PP5– MY-00 – 3/21/17



PP5– MY-06 – 11/18/22



PP6– MY-00 – 3/21/17



PP6– MY-06 – 11/18/22



# **APPENDIX C**

## Vegetation Data

Site: Sandy Bridge

Date: 10/17/2022

Crew: TS/KB

Transect Spacing:

	Point	Species	Height (ft)	Species	Height (ft)
Transect # 1  Start Cord.  Length 100'  Pt. Spacing 5'  Notes	5	N/A			
	10	N/A			
	15	N/A			
	20	N/A			
	25	N/A			
	30	N/A			
	35	N/A			
	40	N/A			
	45	N/A			
	50	N/A			
	55	Red Maple	20		
	60	Cottonwood	20		
	65	N/A			
	70	N/A			
	75	N/A			
	80	N/A			
	85	N/A			
	90	N/A			
95	Red Maple	8			
100	Red Maple	15			
Transect # 2  Start Cord.  Length 100'  Pt. Spacing 5'  Notes	5	River Birch	6.5		
	10	Cottonwood	12		
	15	River Birch	7	Black Willow	10
	20	N/A			
	25	River Birch	10'		
	30	N/A			
	35	N/A			
	40	River Birch	10'		
	45	N/A			
	50	N/A			
	55	N/A			
	60	N/A			
	65	Buttonbush	5'		
	70	N/A			
	75	Black Willow	25'		
	80	Black Willow	25'		
	85	Black Willow	25'		
	90	N/A			
95	N/A				
100	N/A				

Site: Sandy Bridge

Date: 10/17/2022

Crew: TS/KB

Transect Spacing:

	Point	Species	Height (ft)	Species	Height (ft)
Transect #	5	Red Maple	25		
3	10	Red Maple	30		
	15	Red Maple	30	Boxelder	15
Start Cord.	20	Red Maple	30	Boxelder	10
	25	Red Maple	30	Red Maple	20
Length	30	Red Maple	30	Boxelder/Silky Dogwood	15/10
	35	Silky Dogwood	10	Sycamore	30
100'	40	Silky Dogwood	10	Sycamore/Red Maple	30/20
	45	Sycamore	30		
Pt. Spacing	50	Red Maple	25		
	55	N/A			
5'	60	Persimmon	7		
	65	Green Ash	20		
Notes	70	Green Ash	25	Persimmon	5.5
	75	Swamp Chestnut Oak	25		
	80	N/A			
	85	Boxelder	20	Sycamore	25
	90	Boxelder/Sycamore	20/25	Sycamore/Redmaple	30/28
	95	Sycamore	30	Red Maple	25
	100	Sycamore	30	Riverbirch	30
Transect #	5	American Elm	6	Red Maple/Sycamore	30/30
4	10	Green Ash	4.5	Red Maple	20
	15	Red Maple	20	Red Maple	25
Start Cord.	20	Red Maple	25		
	25	Willow Oak	25		
Length	30	Willow Oak	25	Sycamore	30
	35	Sycamore	30	Red Maple	28
100'	40	Sycamore	30		
	45	Willow Oak	30	Red Maple	30
Pt. Spacing	50	Willow Oak	30	Red Maple	30
	55	Witch Hazel	6	Willow Oak	30
5'	60	Swamp Chestnut Oak	25		
	65	Witch Hazel	5.5		
Notes	70	N/A			
	75	N/A			
	80	N/A			
	85	Willow Oak	30		
	90	Willow Oak	30		
	95	River Birch	35		
	100	River Birch	35		

# **APPENDIX D**

## Stream Measurement and Geomorphology Data

<b>Table 8. Baseline Stream Data Summary</b>																
<b>Sandy Bridge Farm Stream Restoration Site, DMS Project #96920</b>																
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>	<b>As-built</b>				
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Proposed	Min	Mean	Max	n	
Bankfull Width (ft)	31.5	32.9	330	34.0	4	14.8	16.7		18.6	2	15.0	15.4	17.2	18.9	2	
Floodprone Width (ft)	60.9	72.9	69.3	92.0	4	>40	>47		>55	2	>38	>60	>68	>70	2	
Bankfull Mean Depth (ft)	2.1	2.2	2.2	2.5	4	1.3	1.5		1.7	2	0.9	0.7	0.8	0.9	2	
Bankfull Max Depth (ft)	3.1	3.4	3.4	3.7	4	1.9	2.2		2.4	2	1.3	1.5	1.5	1.5	2	
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	66.6	73.2	71.2	84.0	4	25.0	25.1		25.1	2	12.7	13.2	13.5	13.8	2	
Width/Depth Ratio	13.5	14.8	14.9	16.0	4	8.8	11.3		13.8	2	17.7	17.3	22.1	27.0	2	
Entrenchment Ratio	1.9	2.2	2.2	2.7	4	>2.5	>2.5		>2.5	2	>2.5	3.8	4.0	4.1	2	
Bank Height Ratio	1.1	1.4	1.3	1.7	4	1.2	1.4		1.5	2	1.0	1.0	1.0	1.0	2	
<b>Pattern</b>																
Channel Beltwidth (ft)						60				1	35-60	35		60	2	
Radius of Curvature (ft)						16			87	1	30-50	30		50	2	
Rc:Bankfull width (ft/ft)						0.9			5.9	1	2.0-3.3	2.0		3.3	2	
Meander Wavelength (ft)						66			191	1	134-160	134		160	2	
Meander Width Ratio						4.1				1	8.9-10.7	8.9		10.7	2	
Riffle Length (ft)												23	40	56	20	
Riffle Slope (ft/ft)	0.000			0.010	2	0.013			0.035	2	0.002-0.008	0.000	0.006	0.014	20	
Pool Length (ft)	*					14			33	2	17-55	11	22	39	20	
Pool Spacing (ft)	*					50			105	2	55-90	25.9	78.3	102.2	19	
<b>Substrate and Transport Parameters</b>																
SC% / Sa% / G% / C% / B% / Be%	18%/39%/43%/1%/0%/0%										66%/2%/22%/10%/1%/0%					
d16 / d35 / d50 / d84 / d95 (mm)	0.076/1.2/3.3/5.2/9.4/18										0.062/0.5/17.5/25.5/40/90					
Channel length (ft)	1,470										1,626	1,626				
Drainage Area (SM)	1.31					1.49					1.31	1.31				
Rosgen Classification	E4-G4					C4					C4	C4				
Sinuosity	1.0					1.3					1.2	1.2				
Water Surface Slope (ft/ft)	0.0043					0.0050					0.0038	0.0027				

\*No data shown due to channelization/lack of bed diversity

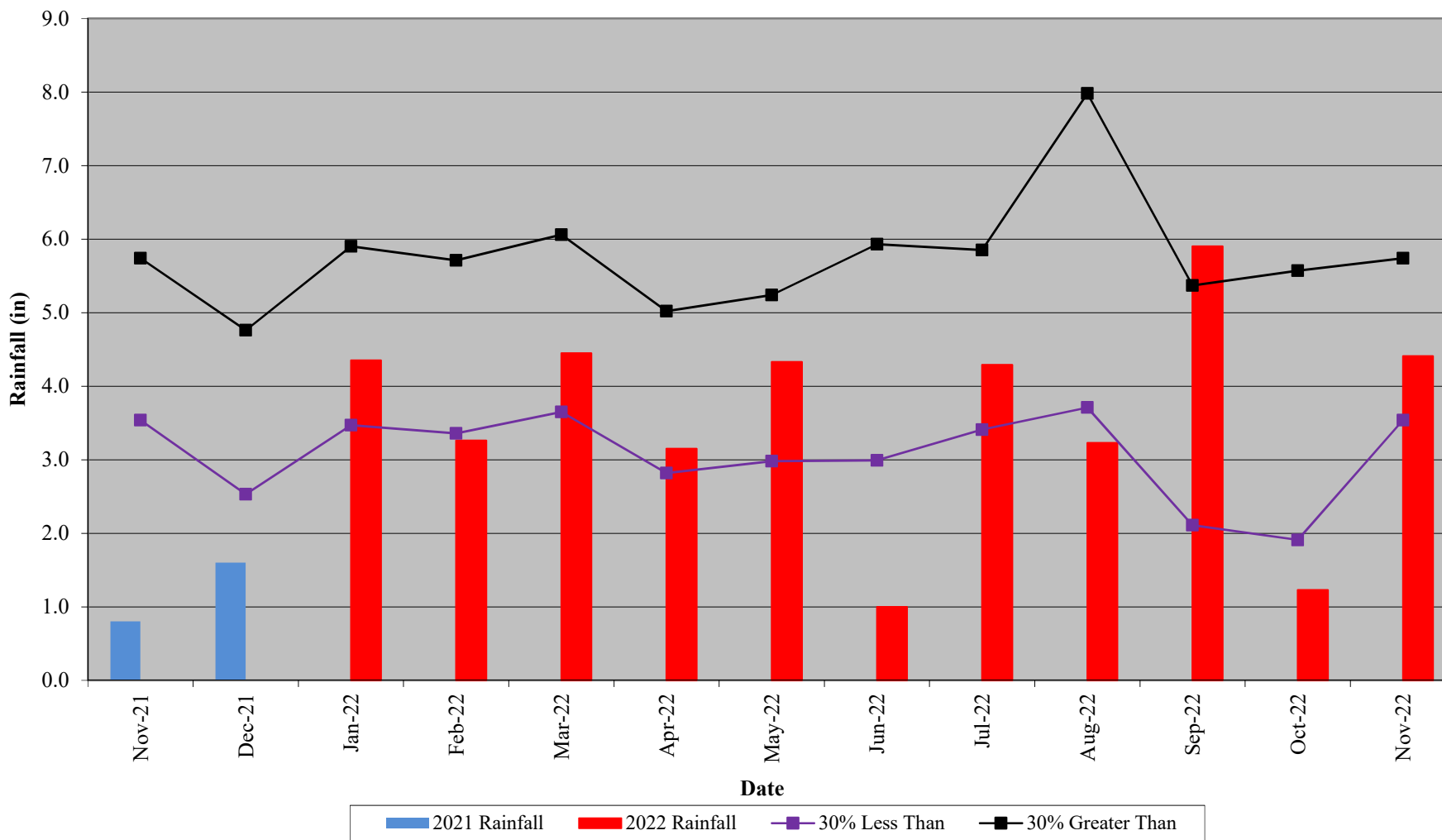
<b>Table 9. Cross-Section Morphology Data Tables</b>														
<b>Sandy Bridge Farm Stream Restoration Site, DMS Project #96920</b>														
Dimension and Substrate	Cross-Section 1 (Riffle) Station 14+75							Cross-Section 2 (Pool) Station 16+40						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation	866.7	866.9	867.3	867.4	867.9	867.8		866.7	866.7	867.5	867.7	868.2	868.5	
Bankfull Width (ft)	15.4	15.7	18.1	13.8	9.9	10.5		18.8	19.6	18.6	21.0	13.6	13.5	
Floodprone Width (ft)	>80	>80	>80	>80	>80	>80		-	-	-	-	-	-	
Bankfull Mean Depth (ft)	0.9	0.9	0.8	1.0	1.4	1.3		1.4	1.4	1.4	1.3	2.0	2.0	
Bankfull Max Depth (ft)	1.5	1.7	2.0	2.1	2.2	2.1		2.7	2.7	2.2	2.7	2.4	2.5	
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	13.8	13.8	13.8	13.8	13.8	13.8		26.8	26.8	26.8	26.8	26.8	26.8	
Total Cross-Sectional Area (ft <sup>2</sup> )	13.8	10.9	7.2	7.1	4.8	4.2		26.8	26.2	12.9	10.9	7.4	4.1	
Bankfull Width/Depth Ratio	17.3	17.9	23.6	13.4	7.1	8.1		-	-	-	-	-	-	
Bankfull Entrenchment Ratio	4.1	5.1	4.4	5.9	6.9	9.3		-	-	-	-	-	-	
Bankfull Bank Height Ratio	1.0	1.0	0.8	0.8	1.0	1.1		-	-	-	-	-	-	
d50 (mm)	35	26	0.7	0.6	4.4	0.6		-	-	-	-	-	-	
Dimension and Substrate	Cross-Section 3 (Riffle) Station 101+73							Cross-Section 4 (Pool) Station 105+67						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation	865.3	865.3	865.2	865.2	865.2	865.4		865.3	865.16	865.1	865.4	865.6	865.8	
Bankfull Width (ft)	15.7	17.3	15.4	16.7	16.2	15.6		18.7	18.1	17.1	20.4	35.1	20.5	
Floodprone Width (ft)	>70	>70	>70	>70	>70	>70		-	-	-	-	-	-	
Bankfull Mean Depth (ft)	0.8	0.8	0.9	0.8	0.8	0.8		1.5	1.6	1.7	1.4	0.8	1.4	
Bankfull Max Depth (ft)	1.5	1.6	1.6	1.7	1.7	1.5		3.0	3.1	3.0	1.9	1.6	2.3	
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	13.1	13.1	13.1	13.1	13.1	13.1		28.8	28.8	28.8	28.8	28.8	28.8	
Total Cross-Sectional Area (ft <sup>2</sup> )	13.1	12.4	15.1	15.1	14.4	12.2		28.8	30.7	32.1	20.7	17.8	18.1	
Bankfull Width/Depth Ratio	18.8	22.8	18.0	19.7	20.0	18.5		-	-	-	-	-	-	
Bankfull Entrenchment Ratio	4.6	4.2	4.7	4.5	4.5	4.7		-	-	-	-	-	-	
Bankfull Bank Height Ratio	1.0	1.0	1.0	0.9	1.0	0.8		-	-	-	-	-	-	
d50 (mm)	0.062	0.062	0.062	0.062	0.52	0.24		-	-	-	-	-	-	

Calculations are based on a fixed bankfull area established during the baseline survey, and the resulting bankfull elevation. Total Cross-Sectional Area represents the cross-sectional area measured from the baseline bankfull elevation.

# **APPENDIX D**

## Hydrologic Data

**Sandy Bridge Farm Restoration Site**  
**30-70 Percentile Graph**  
**WETS Station Name: Lake Lure 2, NC**





**Table 10. Verification of Bankfull Events  
Sandy Bridge Farm Restoration Site, DMS Project #96920**

<b>Date of Occurrence</b>	<b>Method</b>	<b>Photo Number</b>
April 6, 2017	Onsite stream gauge	
April 24, 2017	Onsite stream gauge	
May 29, 2017	Onsite stream gauge	
August 3, 2017	Onsite stream gauge	
August 14, 2017	Onsite stream gauge	
August 15, 2017	Onsite stream gauge	
September 5, 2017	Onsite stream gauge	
October 23, 2017	Onsite stream gauge, photos taken on site	1
February 7, 2018	Onsite stream gauge, photos taken on site	2
February 11, 2018	Onsite stream gauge	
April 15, 2018	Onsite stream gauge	
April 24, 2018	Onsite stream gauge	
May 19, 2018	Onsite stream gauge	
May 30, 2018	Onsite stream gauge	
September 16, 2018	Onsite stream gauge	
October 11, 2018	Onsite stream gauge	3
January 4, 2019	Onsite stream gauge	
January 20, 2019	Onsite stream gauge	
January 24, 2019	Onsite stream gauge	
February 18, 2019	Onsite stream gauge	
February 21, 2019	Onsite stream gauge	
February 22, 2019	Onsite stream gauge	
April 8, 2019	Onsite stream gauge	
May 11, 2019	Onsite stream gauge	
June 18, 2019	Onsite stream gauge	
October 31, 2019	Onsite stream gauge	
January 12, 2020	Onsite stream gauge	
January 24, 2020	Onsite stream gauge	
February 6, 2020	Onsite stream gauge	
February 13, 2020	Onsite stream gauge	
March 25, 2020	Onsite stream gauge	
April 13, 2020	Onsite stream gauge	
January 1, 2021	Onsite stream gauge	
February 15, 2021	Onsite stream gauge	
March 18, 2021	Onsite stream gauge	
March 26, 2021	Onsite stream gauge	
March 31, 2021	Onsite stream gauge	
April 10, 2021	Onsite stream gauge	
August 17, 2021	Onsite stream gauge	4
March 23, 2022	Onsite stream gauge	
April 18, 2022	Onsite stream gauge	
May 27, 2022	Onsite stream gauge	

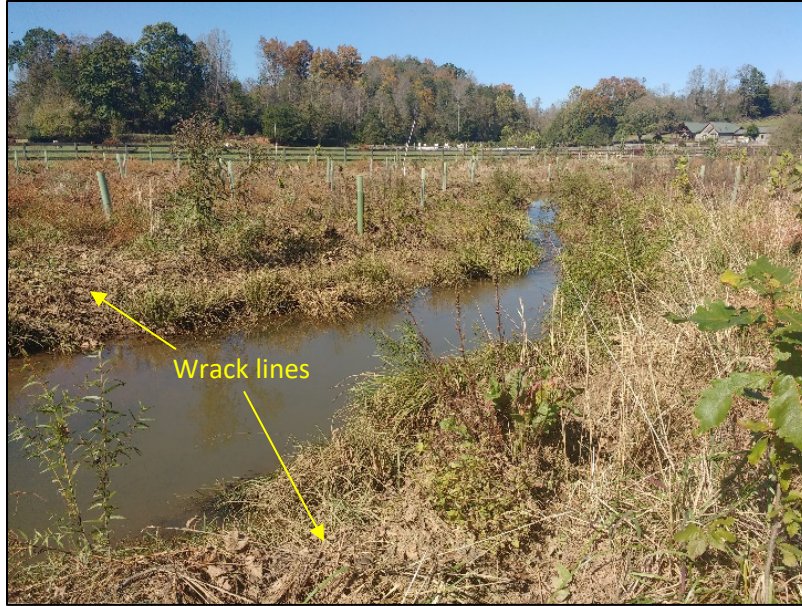


Photo 1. Sediment on plants and wrack lines above bankfull, 10/26/2017



Photo 2. Bankfull event on site, 2/7/2018

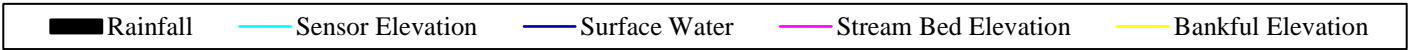
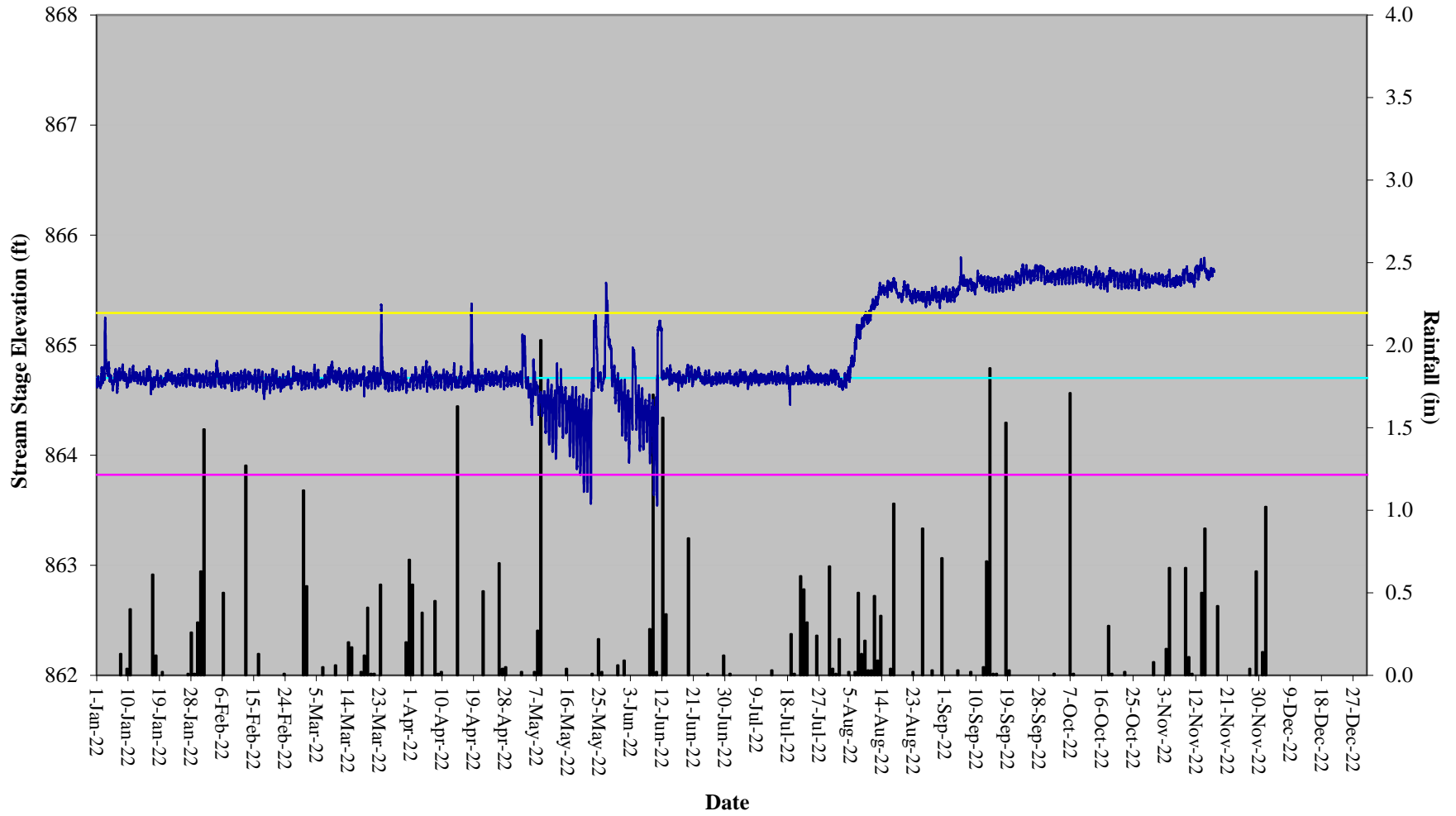


Photo 3. Wrack lines above bankfull, 11/7/2018

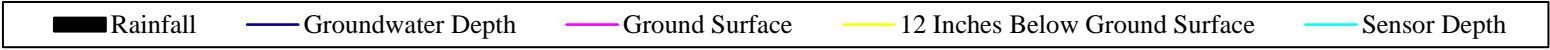
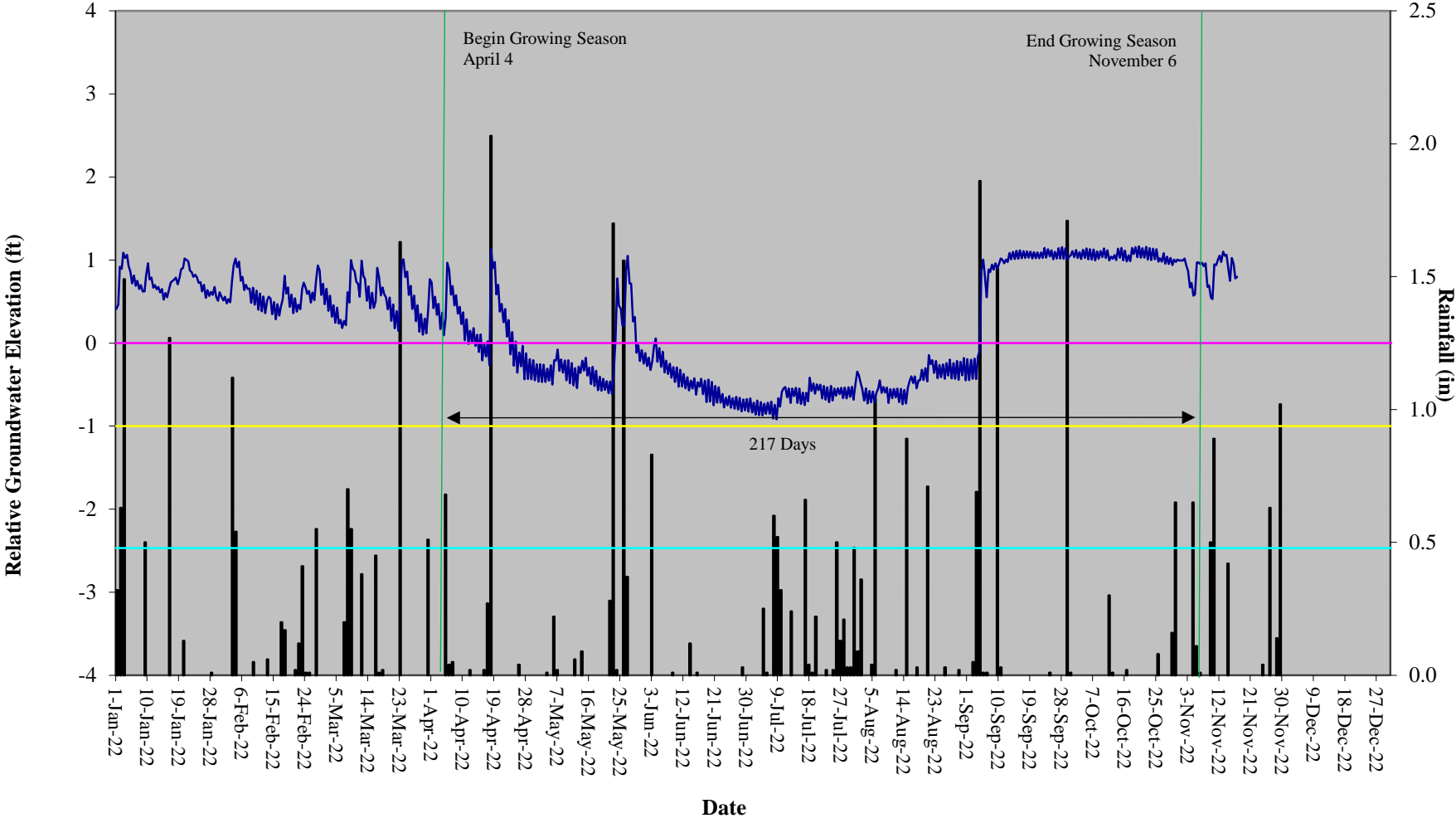


Photo 4. Wrack lines above bankfull, 9/13/2021

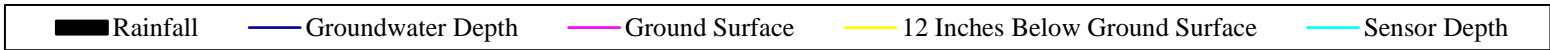
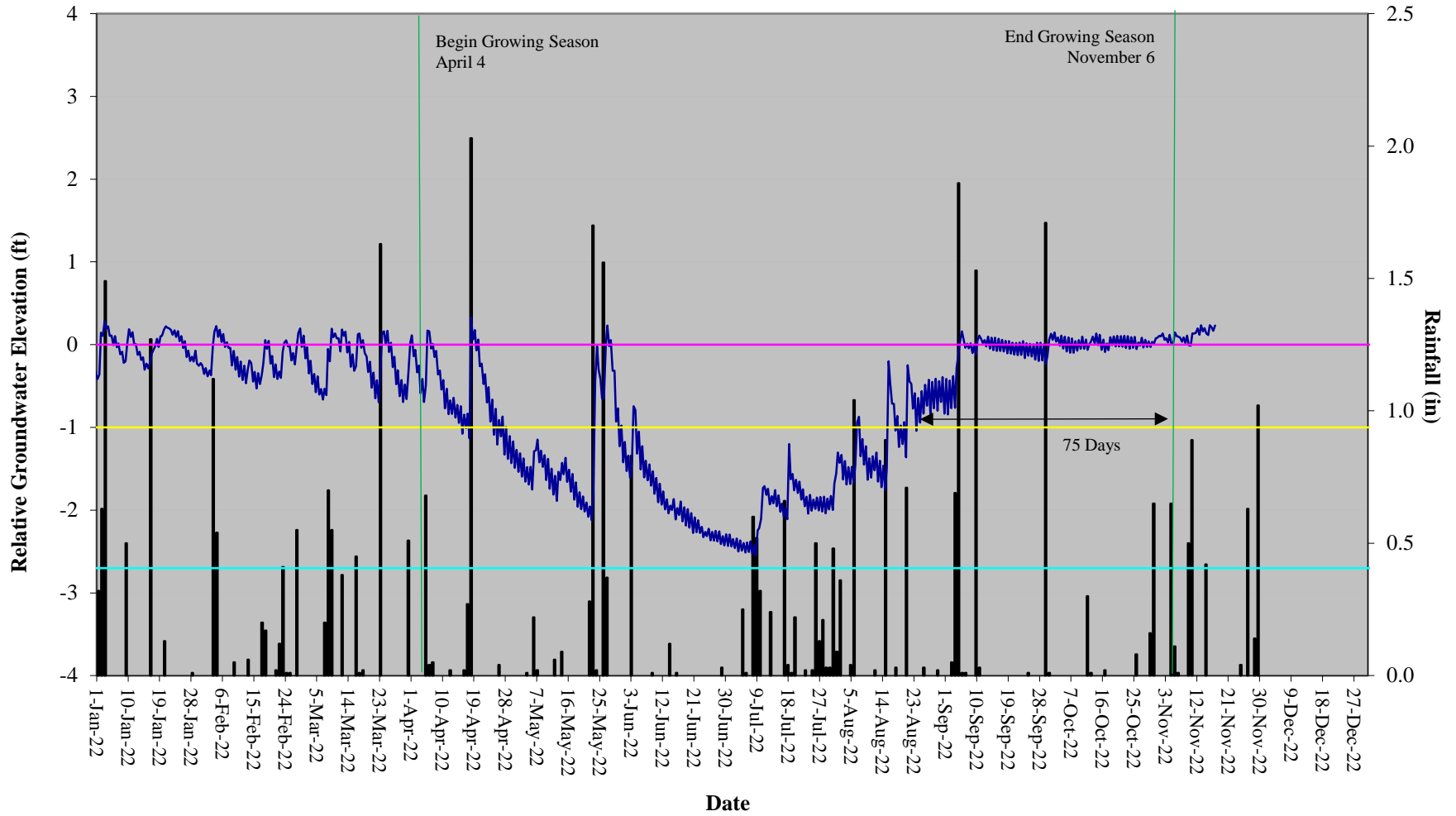
# Sandy Bridge Farm Restoration Site Hydrograph Stream Gauge



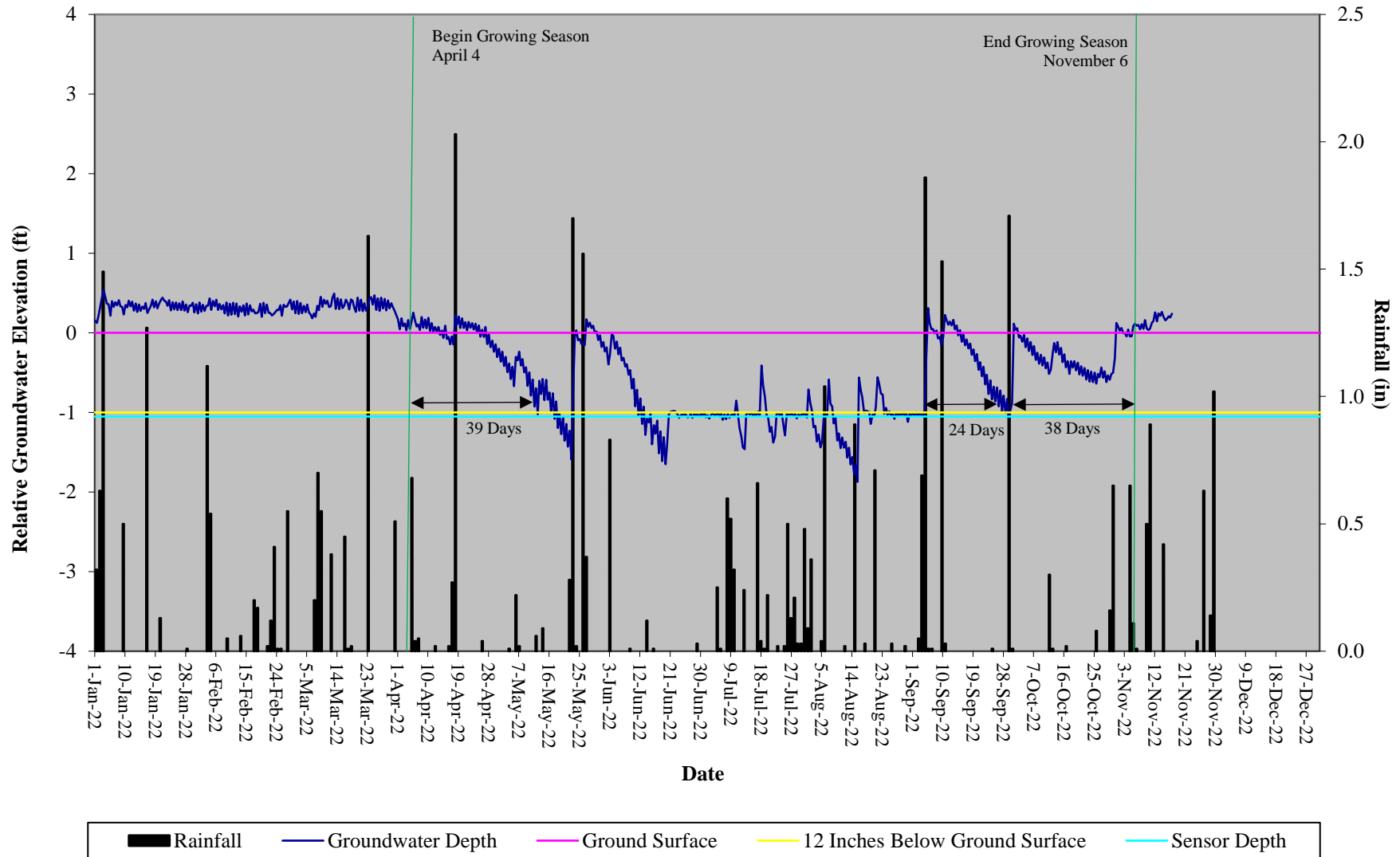
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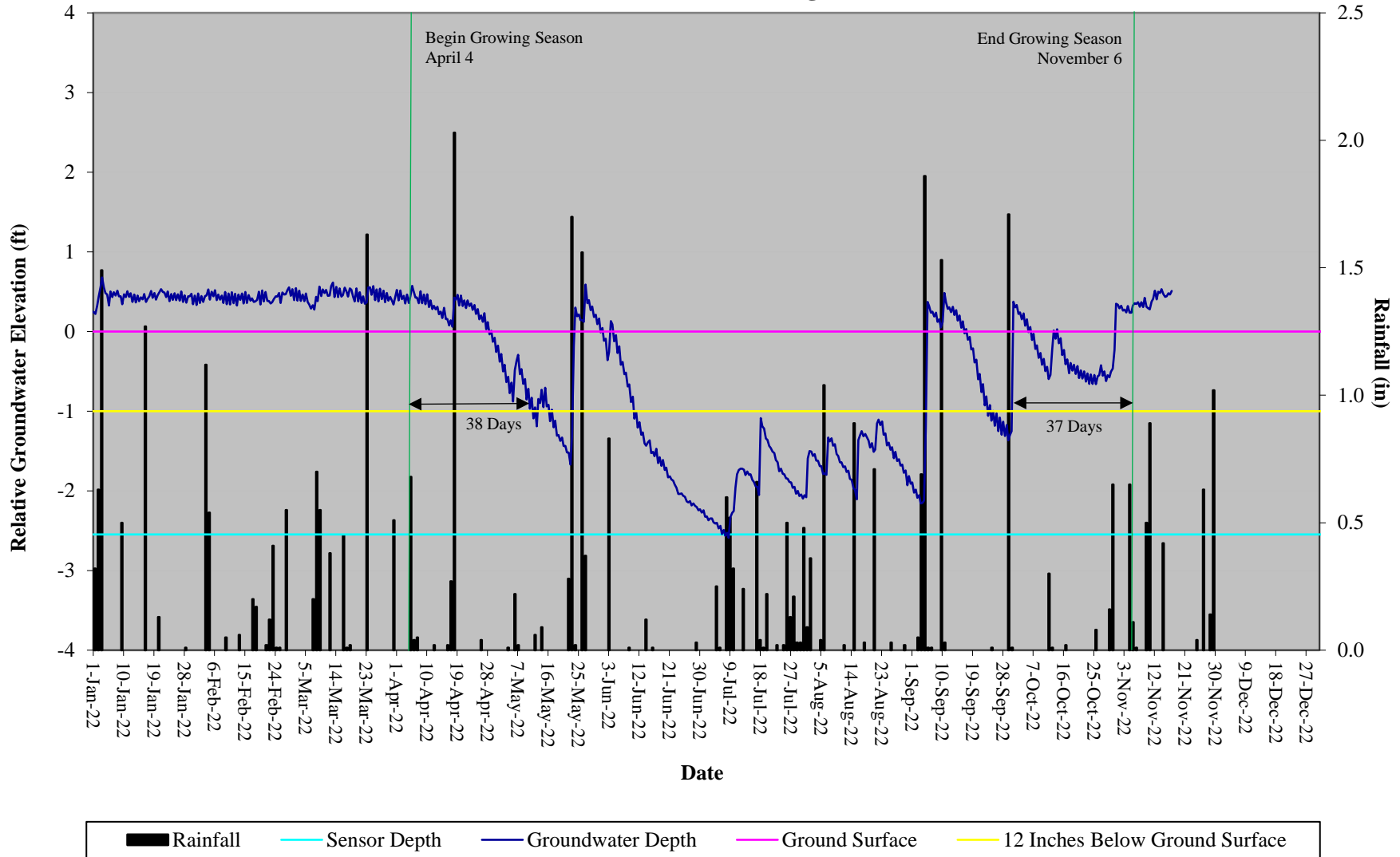
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## Sandy Bridge Farm Restoration Site Hydrograph Wetland Gauge 3

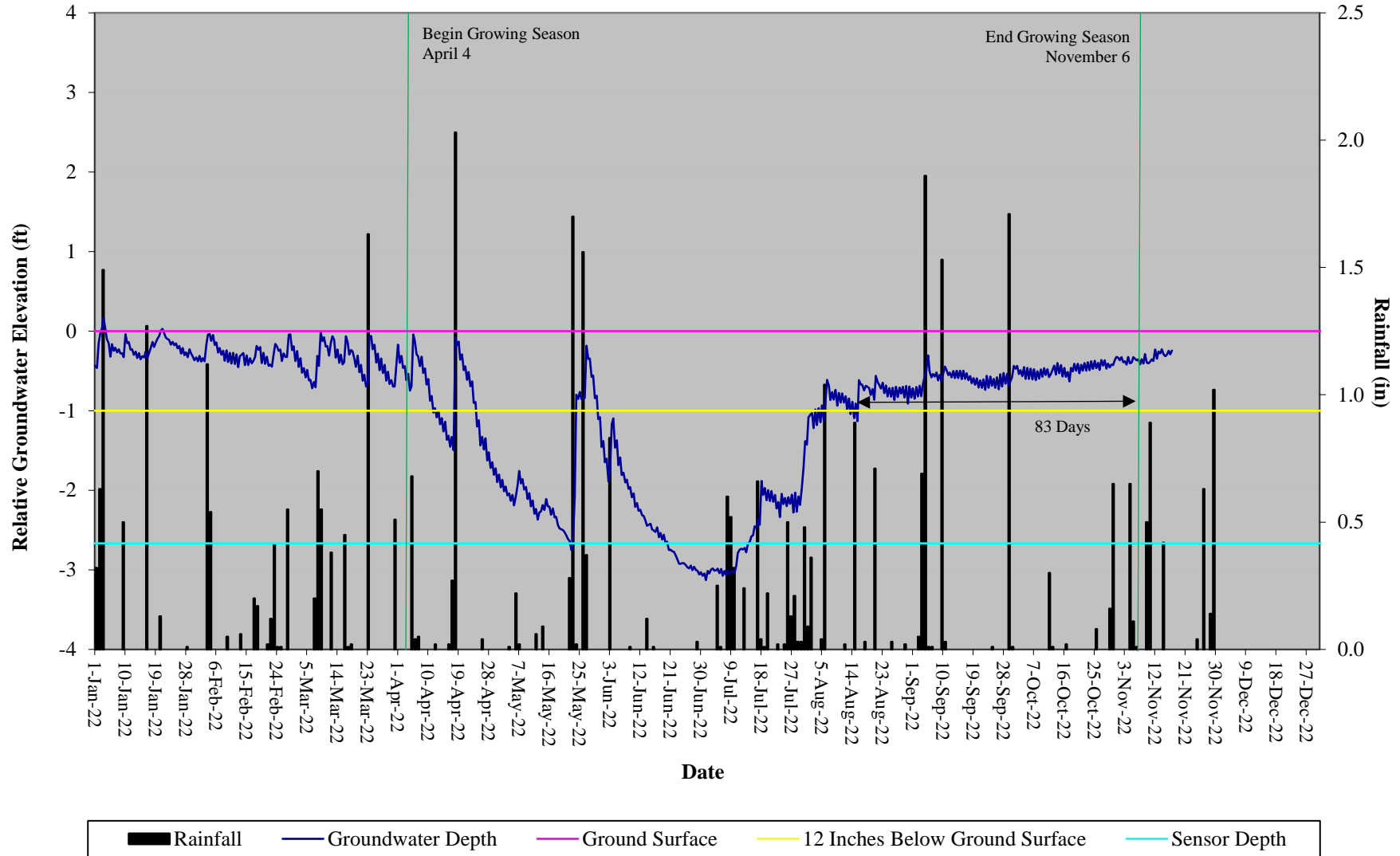


## Sandy Bridge Farm Restoration Site Hydrograph Wetland Gauge 4

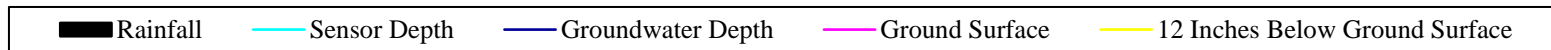
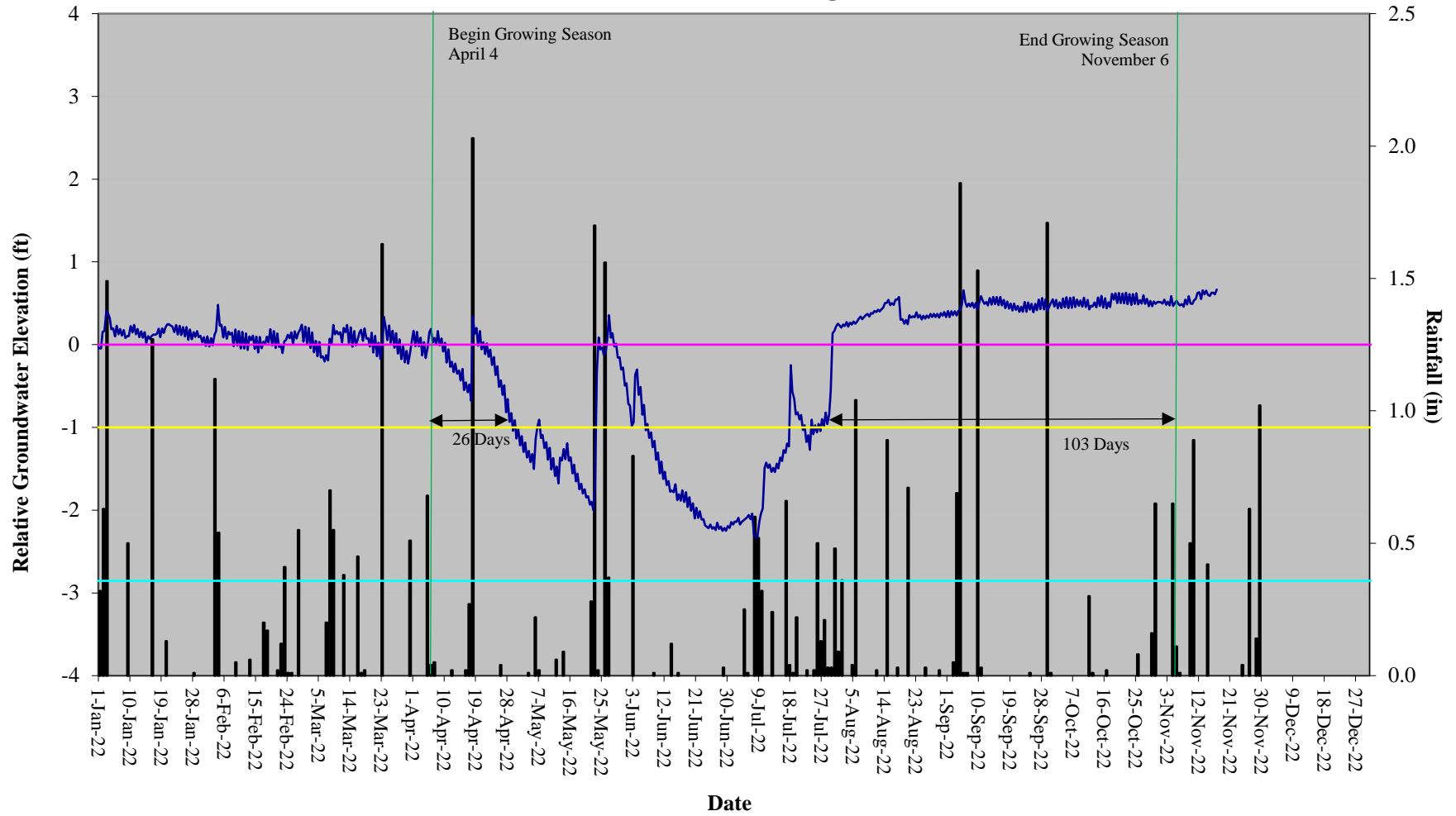




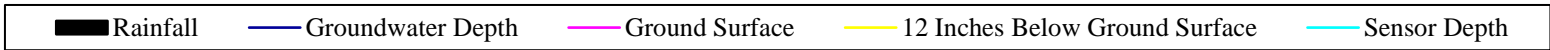
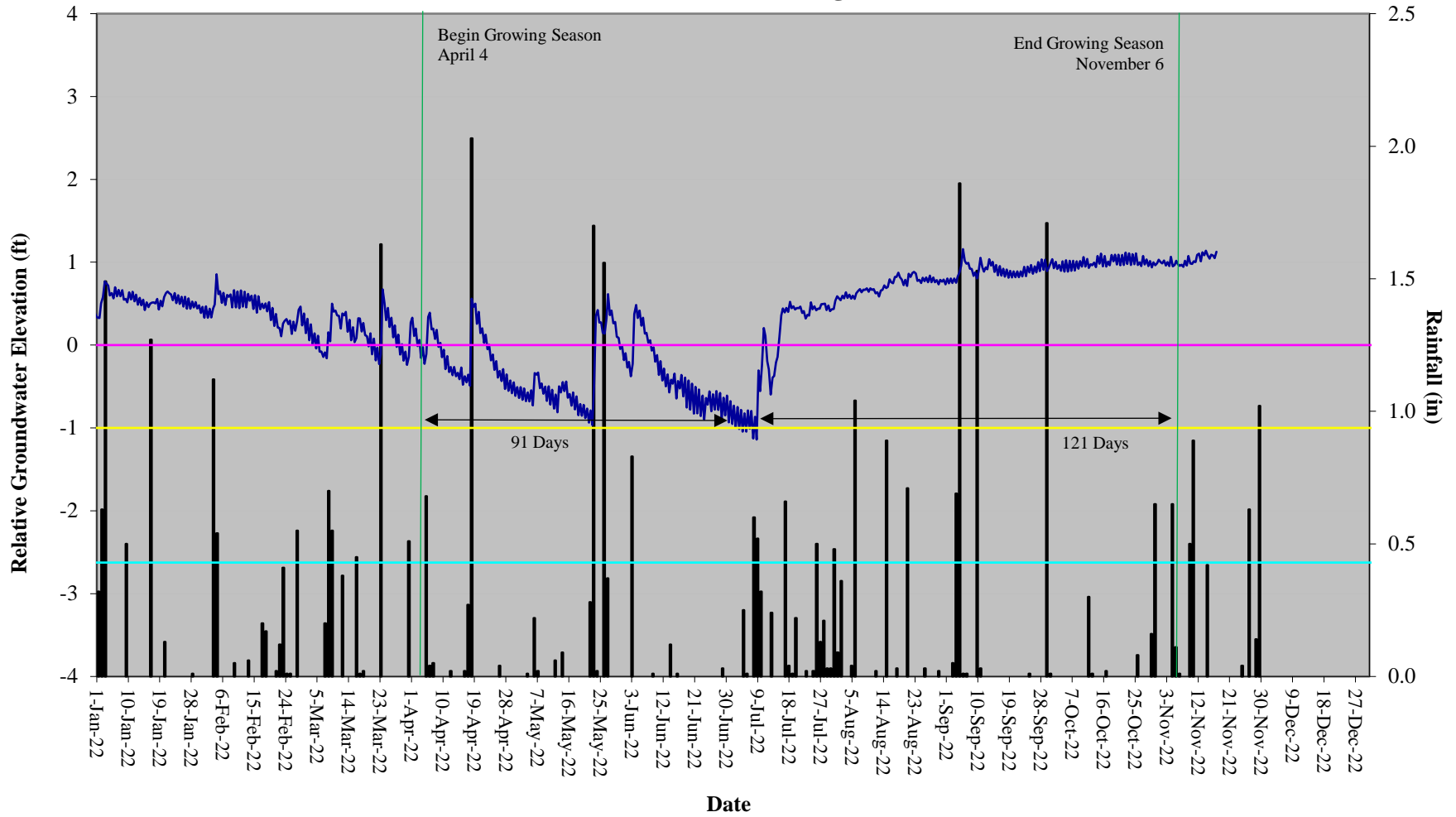
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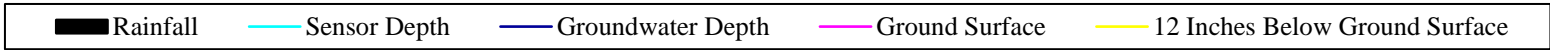
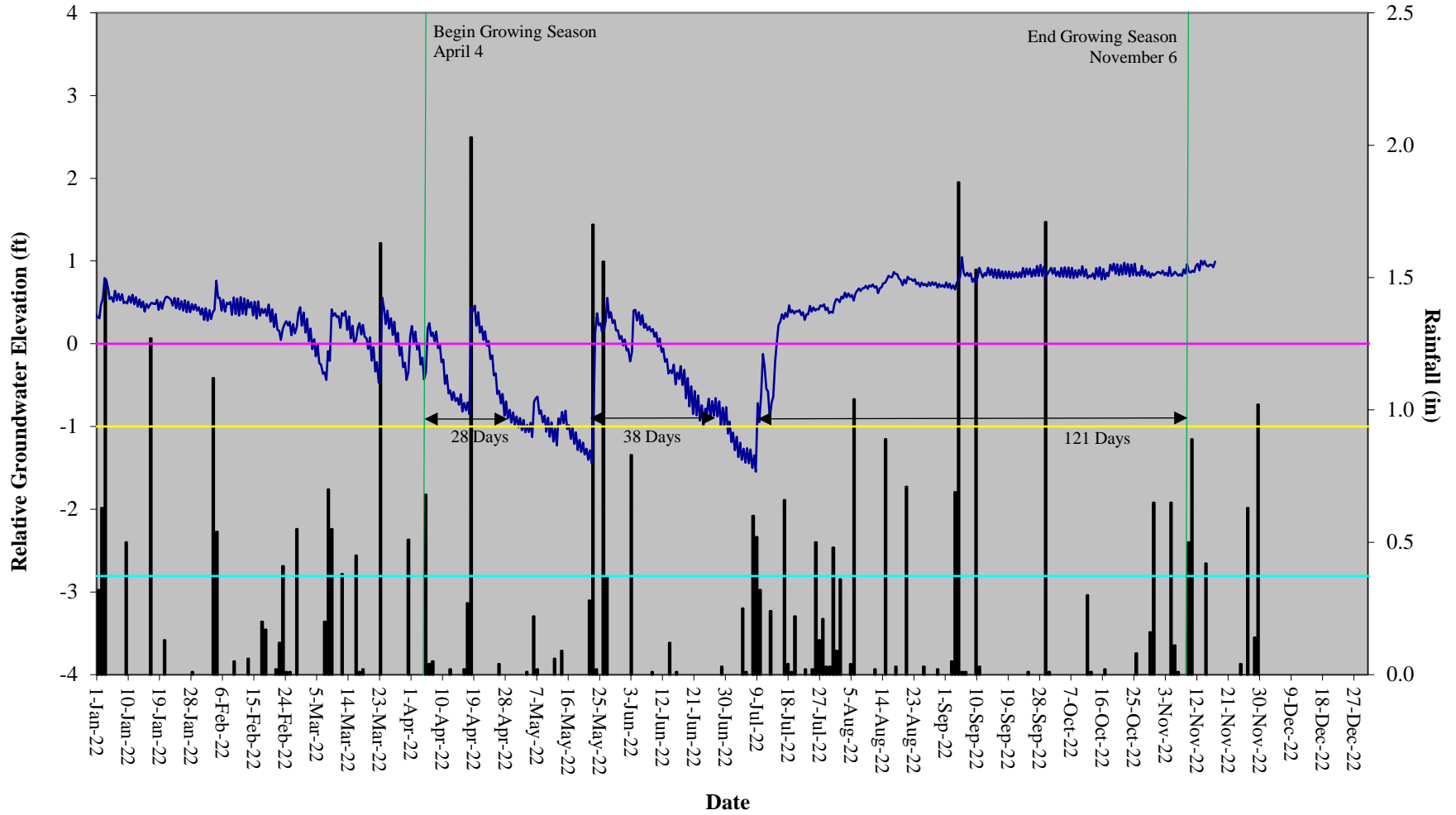
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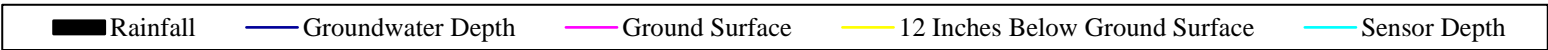
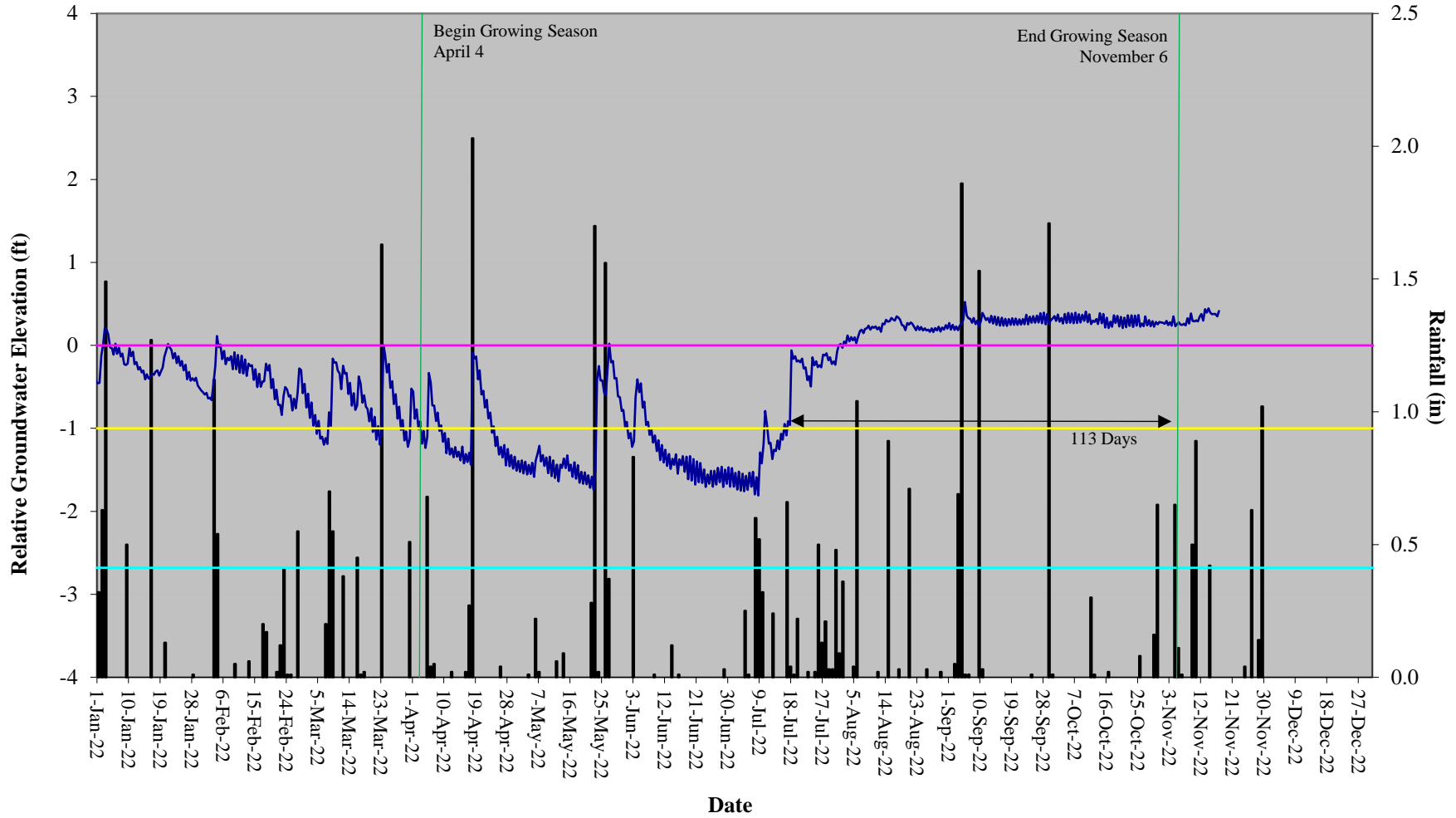
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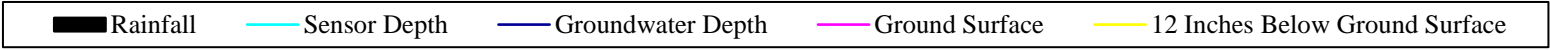
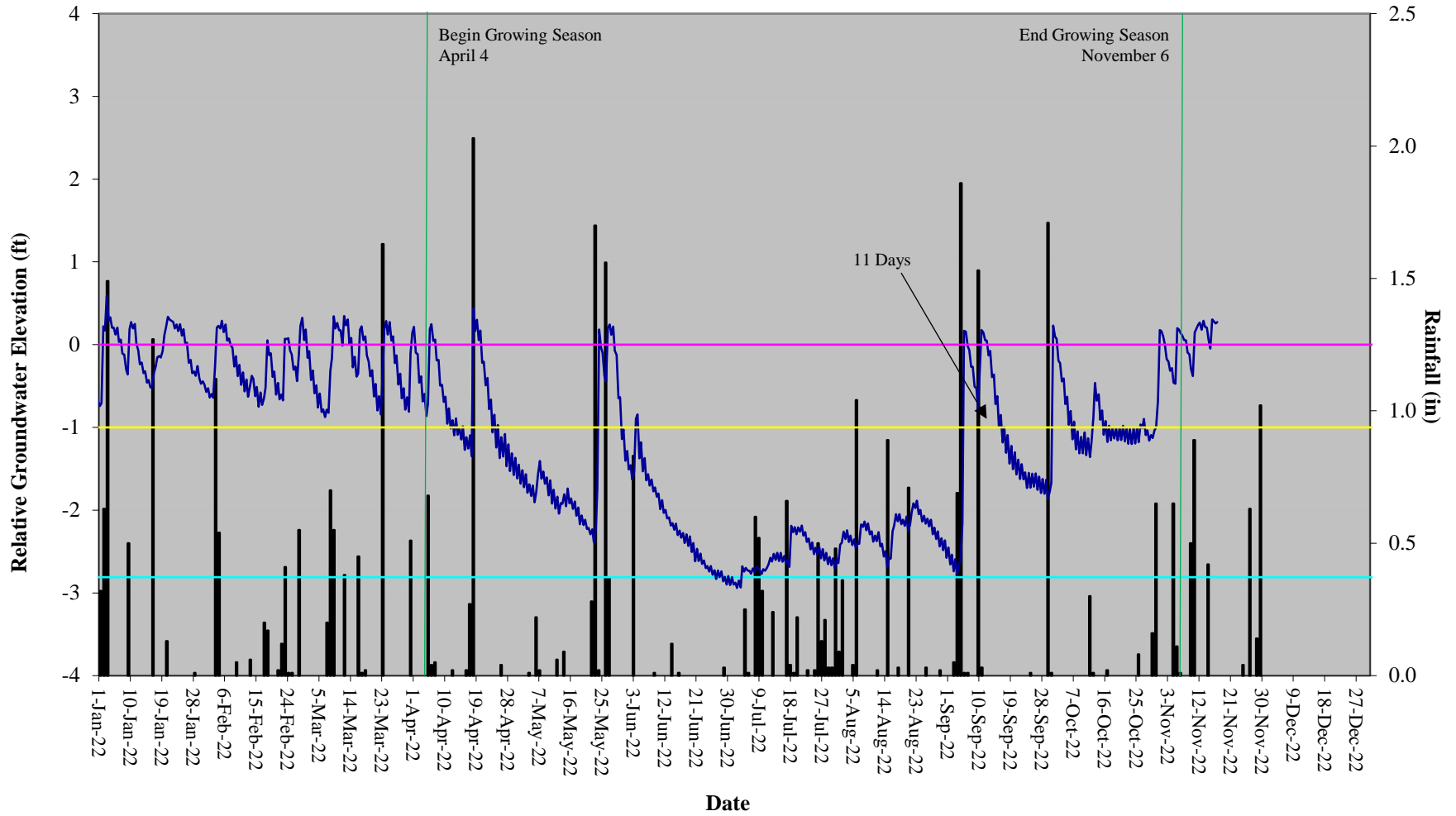
# Sandy Bridge Farm Restoration Site Hydrograph Wetland Gauge 8



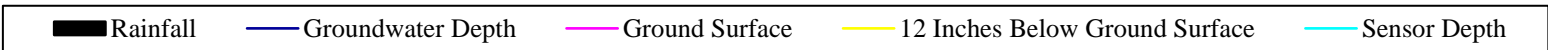
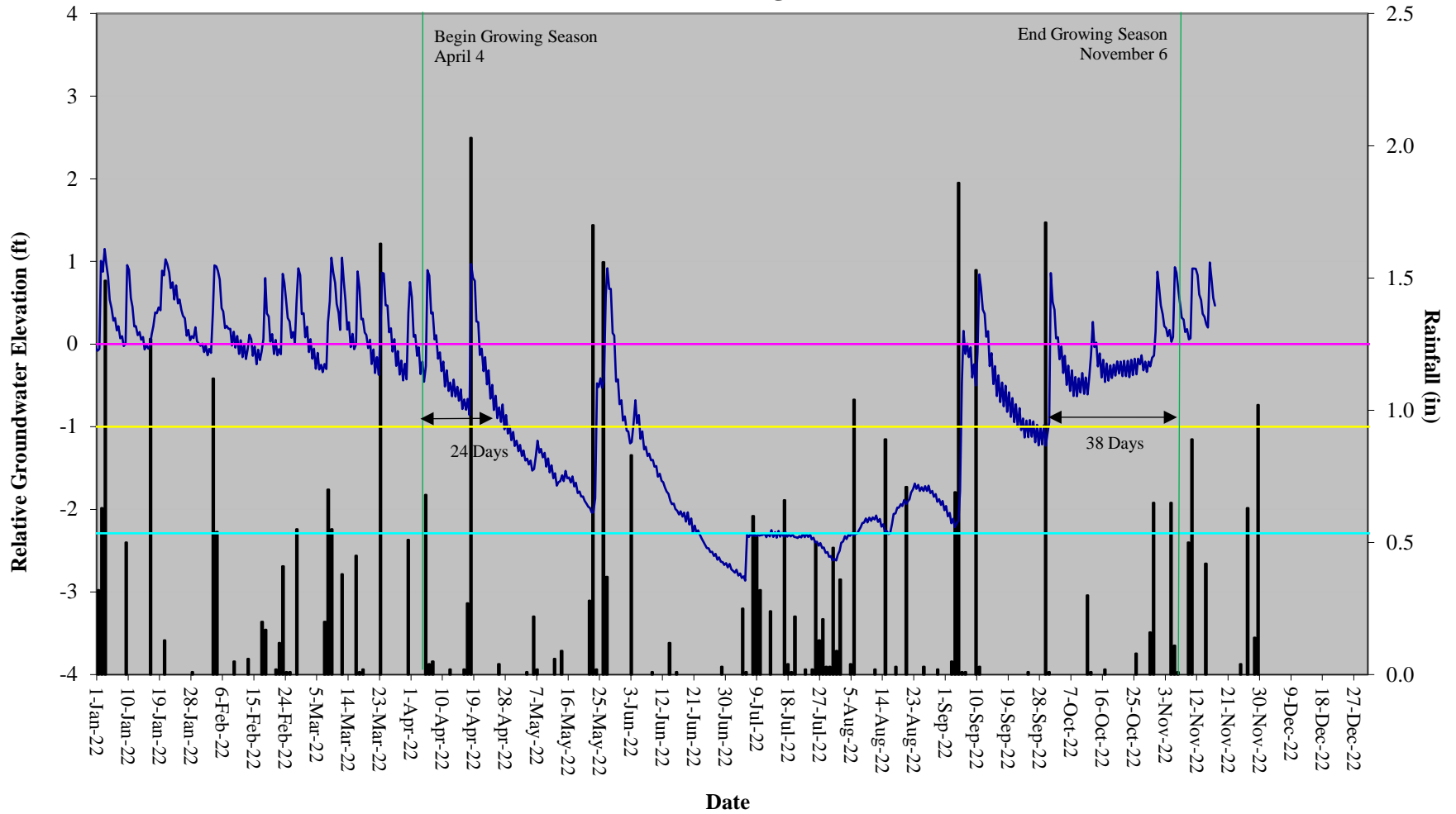
# Sandy Bridge Farm Restoration Site Hydrograph Wetland Gauge 9



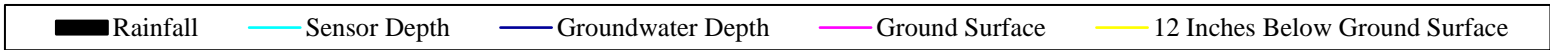
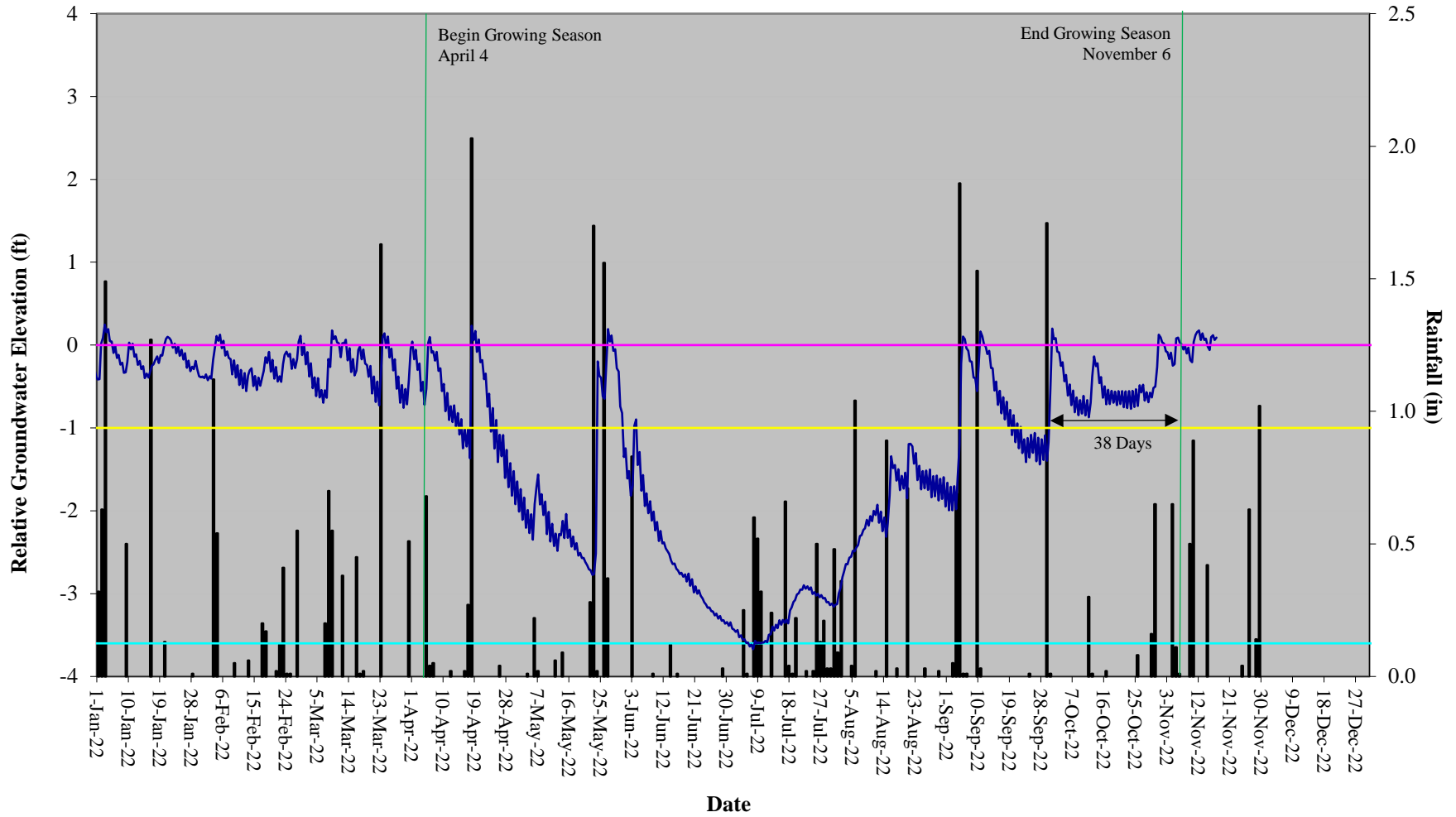
# Sandy Bridge Farm Restoration Site Hydrograph Wetland Gauge 10



# Sandy Bridge Farm Restoration Site Hydrograph Wetland Gauge 11



## Sandy Bridge Farm Restoration Site Hydrograph Wetland Gauge 12





**Table 11. Wetland Hydrology Criteria Attainment  
Sandy Bridge Farm Restoration Site, DMS Project #96920**

	<b>Greater than 10% Continuous Saturation/Max Consecutive Days During Growing Season (Percentage)</b>						
<b>Gauge #</b>	<b>MY-01 2017</b>	<b>MY-02 2018</b>	<b>MY-03 2019</b>	<b>MY-04 2020</b>	<b>MY-05 2021</b>	<b>MY-06 2022</b>	<b>MY-07 2023</b>
Gauge 1	Yes/30 (13.8%)	Yes/40 (18.4%)	Yes/46 (21.2%)	Yes/215 (99.1%)	Yes/217 (100.0%)	Yes/217 (100.0%)	
Gauge 2	No/11 (5.1%)	Yes/35 (16.1%)	Yes/32 (14.7%)	Yes/126 (58.1%)	Yes/60 (27.6%)	Yes/75 (34.6%)	
Gauge 3	Yes/110 (50.7%)	Yes/78 (35.9%)	Yes/162 (74.7%)	Yes/158 (72.8%)	Yes/55 (25.3%)	Yes/39 (18.0%)	
Gauge 4	Yes/47 (21.7%)	Yes/105 (48.4%)	Yes/156 (71.9%)	Yes/158 (72.8%)	Yes/82 (37.8%)	Yes/38 (17.5%)	
Gauge 5	No/11 (5.1%)	Gauge malfunction	Yes/44 (20.3%)	Yes/158 (72.8%)	Yes/84 (38.7%)	Yes/83 (38.2%)	
Gauge 6	Yes/30 (13.8%)	Yes/63 (29.0%)	Yes/49 (22.6%)	Yes/209 (96.3%)	Yes/96 (44.2%)	Yes/103 (47.5%)	
Gauge 7	Yes/22 (10.1%)	Yes/105 (48.4%)	Yes/162 (74.7%)	Yes/214 (98.6%)	Yes/217 (100.0%)	Yes/121 (55.8%)	
Gauge 8	Yes/29 (13.4%)	Yes/43 (19.8%)	Yes/39 (18.0%)	Yes/209 (96.3%)	Yes/96 (44.2%)	Yes/121 (55.8%)	
Gauge 9	No/15 (6.9%)	Yes/87 (40.1%)	Yes/40 (18.4%)	Yes/197 (90.8%)	Yes/95 (43.8%)	Yes/113 (52.1%)	
Gauge 10*		No/8 (3.7%)	Yes/22 (10.1%)	Gauge malfunction	No/14 (6.5%)	No/11 (5.1%)	
Gauge 11*		No/8 (3.7%)	Yes/25 (11.5%)	Gauge malfunction	Yes/52 (24.0%)	Yes/38 (17.5%)	
Gauge 12*		Yes/38 (17.5%)	Yes/24 (11.1%)	Yes/217 (100%)	Yes/34 (15.7%)	Yes/38 (17.5%)	

\*=Gauge installed March 30, 2018



## SOIL PROFILE DESCRIPTION

**Client:** KCI Associates of North Carolina, P.A. **Date:** October 17, 2022

**Project:** Sandy Bridge Farm **Project #:** \_\_\_\_\_

**County:** Rutherford **State:** NC

**Location:** GW-10 **Site/Lot:** \_\_\_\_\_

**Soil Series:** Chewacla Loam

**Soil Classification:** Fine-loamy, mixed, active, thermic Fluvaquentic Dystrudepts

**AWT:** 20" **SHWT:** 9" **Slope:** 0-2% **Aspect:** Concave

**Elevation:** ~865' **Drainage:** Somewhat Poorly Drained **Permeability:** Moderate

**Vegetation:** Planted wetland restoration site

**Borings terminated at** 28 **Inches**

HORIZON	DEPTH (IN)	MATRIX	MOTTLES	PERCENTAGE	LOCATION	TEXTURE	STRUCTURE	NOTES
	0-9	10YR 4/3	5YR 4/6	10	PL	cL		
	9-14	10YR 4/2	5YR 4/6	10	PL	scL		
	14-17	10YR 4/2	5YR 4/6	10	PL	sc		
	17-18	10YR 4/2	5YR 4/6	30	PL	sc		
	18-24	10YR 4/2				c		
	24-28+	10YR 4/2				sc		some fine gravel

COMMENTS:

**DESCRIBED BY:** Tommy Seelinger

**DATE:** 10/17/2022



## SOIL PROFILE DESCRIPTION

**Client:** KCI Associates of North Carolina, P.A. **Date:** October 17, 2022

**Project:** Sandy Bridge Farm **Project #:** \_\_\_\_\_

**County:** Rutherford **State:** NC

**Location:** GW-11 **Site/Lot:** \_\_\_\_\_

**Soil Series:** Chewacla Loam

**Soil Classification:** Fine-loamy, mixed, active, thermic Fluvaquentic Dystrudepts

**AWT:** 12" **SHWT:** 0" **Slope:** 0-2% **Aspect:** Concave

**Elevation:** ~865' **Drainage:** Somewhat Poorly Drained **Permeability:** Moderate

**Vegetation:** Planted wetland restoration site

**Borings terminated at** 24 **Inches**

HORIZON	DEPTH (IN)	MATRIX	MOTTLES	PERCENTAGE	LOCATION	TEXTURE	STRUCTURE	NOTES
	0-7	10YR 4/2	7.5YR 5/3	5	M		scL	
	7-11	10YR 4/2	7.5YR 5/3	5	M		cL	
	11-13	10YR 4/2	7.5YR 5/3	20	M		sc	
	13-15	7.5YR 4/6	10YR 4/2	10	M		sL	
	15-17	7.5YR 4/6	10YR 4/2	10	M		s	
	17-20	7.5YR 5/6	10YR 4/2	20	M		sc	some coarse gravel
	20-24+	10YR 4/2	10YR 4/1	40	M		c	

COMMENTS:

**DESCRIBED BY:** Tommy Seelinger

**DATE:** 10/17/2022