

Browns Summit Creek Restoration Project Year 6 Monitoring Report

Guilford County, North Carolina

DMS Project ID No. 96313, DEQ Contract No. 5792

Permits: SAW-2014-01642, DWR No. 14-0332, RFP 16-005568

Cape Fear River Basin: 03030002-010020



Project Info:

Monitoring Year: 6 of 7

Year of Data Collection: 2022

Year of Completed Construction (including planting): 2017

Submission Date: February 2023

Submitted To:

NCDEQ - Division of Mitigation Services

1652 Mail Service Center

Raleigh, NC 27699-1652

February 10, 2023

Emily Dunnigan
Project Manager
NCDEQ - Division of Mitigation Services
217 West Jones St., Raleigh, NC 27603
Raleigh, NC 27603

Subject: Response to Task 12 Draft Year 6 Monitoring Report Comments for Browns Summit
(DMS #96313) Cape Fear River Basin; CU 03030002; Guilford County, North
Carolina Contract No. 005792

Dear Ms. Dunnigan:

Please find enclosed our responses to the Year 6 Monitoring Report Comments dated January 13, 2023 regarding the Browns Summit Creek Mitigation Project. We have revised the Year 6 Monitoring Report document in response to this review.

Comment: Page 2: Revise to remove discussion of contracted WMUs and revise to indicate the adjusted wetland boundary is being proposed.

Response: Revision has been made as requested.

Comment: Section 2.0: The Maintenance Plan in the Approved Mitigation Plan describes the easement marking approach and indicates that any damaged markers will be repaired/replaced as needed. Please indicate in this section if the entire easement boundary has been inspected and meets boundary marking specifications and requirements. Verification that the entire conservation easement boundary has been inspected and is compliant needs to be documented in the report.

Response: Michael Baker inspected the entire easement boundary during November 2022 and deemed compliant with the specifications and requirements.

Comment: Section 2.1.1 Morphological Parameters and Channel Stability: Thank you for detailing the use of survey data from the MY1 report rather than the baseline report.

Response: You are welcome. Michael Baker will continue to report MY1 data to compare current monitoring year data.

Comment: Section 2.3: Add hydroperiod and growing season dates.

Response: Revision has been made as requested.

Comment: Figure 4.1: Color code monitoring wells to indicate which are meeting success/not meeting success.

Response: Revisions have been made as requested.

Comment: Table 6: Suggest removing the bare area/poor growth areas less than the mapping threshold from the table and CCPV.

Response: Revisions have been made to both table 6 and the CCPV as requested.

Digital files:

Comment: Please submit gauge data for stream flow and groundwater gauges.

Response: Gauge data will be included in the digital files as requested.

One hard copy and one pdf copy along with updated digital files submitted via secure eFTP link are being provided. If you have any questions concerning the Year 6 Monitoring Report, please contact me at 919-481-5703 or via email at Katie.McKeithan@mbakerintl.com.

Sincerely,



Kathleen McKeithan, PE, CPESC, CPSWQ, CFM

Michael Baker Engineering, Inc.

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Guilford County, North Carolina

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Report Prepared and Submitted by Michael Baker Engineering, Inc.

NC Professional Engineering License # F-1084



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*Note: Due to monitoring year 4 and 6 requirements vegetation data and cross sections were not required. Therefore, data is intentionally left out of the monitoring report. The table of contents remain the same to keep numbering consistent for remaining monitoring years.

**Note: Per IRT credit release meeting on April 20, 2022, flow gauges have been removed from the site. The table of contents remain the same to keep the numbering consistent among monitoring years.

1. EXECUTIVE SUMMARY

Michael Baker Engineering, Inc. (Michael Baker) restored approximately 3,903 linear feet (LF) of jurisdictional stream and enhanced 2,478 LF of stream (of which 559 is for BMPs) along unnamed tributaries (UT) to the Haw River and restored over 4.44 acres of wetland (existing channel lengths). The unnamed tributary (mainstem) has been referred to as Browns Summit Creek for this project. All of these stream features are in the warm-temperature thermal regime. In addition, Michael Baker constructed two best management practices (BMPs) within the conservation easement boundary. The Browns Summit Creek Restoration Project (project) is located in Guilford County, North Carolina (NC) (Figure 1) approximately three miles northwest of the Community of Browns Summit. The project is located in the NC Division of Water Resources (NCDWR) subbasin 03-06-01 and the NC Division of Mitigation Services (NCDMS) Targeted Local Watershed (TLW) 03030002-010020 (the Haw River Headwaters) of the Cape Fear River Basin. The purpose of the project is to restore and/or enhance the degraded stream, wetland, and riparian buffer functions within the site. A recorded conservation easement consisting of 20.2 acres (Figure 2) will protect all stream reaches, wetlands, and riparian buffers in perpetuity. Examination of the available hydrology and soil data indicate the project will potentially provide numerous water quality and ecological benefits within the Haw River watershed and the Cape Fear River Basin.

Based on the NCDMS 2009 Cape Fear River Basin Restoration Priority (RBRP) Plan, the Browns Summit Creek Restoration Project area is located in an existing targeted local watershed (TLW) within the Cape Fear River Basin ([2009 Cape Fear RBRP](#)), but is not located in a Local Watershed Planning (LWP) area. The restoration strategy for the Cape Fear River Basin targets specific projects, which focuses on developing creative strategies for improving water quality flowing to the Haw River in order to reduce non-point source (NPS) pollution to Jordan Lake.

The primary goals of the project, set in the Mitigation Plan, are to improve ecologic functions and to manage nonpoint source loading to the riparian system as described in the NCDMS 2009 Cape Fear RBRP. These goals are identified below:

- Create geomorphically stable conditions along the unnamed tributaries across the site,
- Implement agricultural BMPs to reduce nonpoint source inputs to receiving waters,
- Address known and obvious water quality and habitat stressors present on site,
- Restore stream and floodplain connectivity, and
- Restore and protect riparian buffer functions and corridor habitat.

To accomplish these goals, the following objectives were identified:

- Restore existing incised, eroding, and channelized streams by creating stable dimension and connecting them to their relic floodplains;
- Re-establish and rehabilitate site wetlands that have been impacted by cattle, spoil pile disposal, channelization, subsequent channel incision, and wetland vegetation loss;
- Prevent cattle from accessing the conservation easement boundary by installing permanent fencing and thus reduce excessive stream bank erosion and undesired nutrient inputs;

- Increase aquatic habitat value by improving bedform diversity, riffle substrate and in-stream cover; creating natural scour pools; adding woody debris and reducing sediment loading from accelerated stream bank erosion;
- Construct a wetland BMP on the upstream extent of Reach R6 to capture and retain and for sediment to settle out of the water column;
- Construct a step pool BMP channel to capture and disperse volumes and velocities by allowing discharge from a low density residential development to spread across the floodplain of Reach R4; thereby, diffusing energies and promoting nutrient uptake within the riparian buffer;
- Plant native species within the riparian corridor to increase runoff filtering capacity, improve stream bank stability and riparian habitat connectivity, and shade the stream to decrease water temperature;
- Control invasive species vegetation within the project area and, if necessary, continue treatments during the monitoring period; and
- Establish a conservation easement to protect the project area in perpetuity.

During Year 6 monitoring, visual site inspections were conducted throughout the year. Small areas of invasive species (Privet and Multiflora Rose) were treated on R1 and R2 during May 2022. Small pockets of privets are scattered throughout R1 and R2 and Michael Baker plans on a follow up treatment in the following monitoring year. One vegetation problem area (VPA) was discovered at the top of R6 left and right floodplain. It is observed that this area is approximately 0.03 acres and has low herbaceous survival and low tree vigor. In May 2022, Michael Baker added soil amendments to improve the soil quality in efforts that the native grasses surrounding the area will grow. Michael Baker plans to continue treating this area along with adding seed. These areas can be found on the CCPV in Appendix B.

During Year 6 monitoring, the R1 crest gauge did not document any bankfull events. This was partially due to ant infestation within the cork at the bottom of the gauge. The gauge was cleaned out and replaced to record bankfull events in future monitoring years. The site has already met the bankfull flow requirement of two bankfull events within two separate monitoring years in previous monitoring years (MY1 and MY2).

Eight wells (total) have been installed in the wetland restoration areas. BSAW8 was installed during MY4 to gather additional data in adjacent wetlands. BSAW8 is located adjacent to wetland type 5 (Hydrologic reestablishment) where BSAW1 is located. BSAW8 data shows the wetland performing well above success criteria. Seven of the eight are performing successfully. One well did not meet success (BSAW2). BSAW2 historically has not met criteria; therefore, Michael Baker is proposing a wetland boundary line adjustment. The adjusted wetland boundary report can be found in Appendix F.

Summary information/data related to the site and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report Appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report and in the Mitigation Plan available on the DMS website. Any raw data supporting the tables and figures in the Appendices is available from DMS upon request.

This report documents the successful completion of the Year 6 monitoring activities for the post-construction monitoring period. Vegetation and stream cross sections are not required for monitoring year 6. The entire conservation easement boundary has been inspected and is compliant with the requirements.

2. METHODOLOGY

The seven-year monitoring plan for the Site includes criteria to evaluate the success of the stream and vegetation components of the Site. The methodology and report template used to evaluate these components adheres to the DMS monitoring report template document Version 1.5 (June 8, 2012), which will continue to serve as the template for subsequent monitoring years. The vegetation-monitoring quadrants follow CVS-DMS monitoring levels 1 and 2 in accordance with CVS-DMS Protocol for Recording Vegetation, Version 4.1 (2007).

Stream survey data was collected to a minimum of Class C Vertical and Class A Horizontal Accuracy using Leica TS06 Total Station and was georeferenced to the NAD83 State Plane Coordinate System, FIPS3200 in US Survey Feet, which was derived from the As-built Survey.

The specific locations of monitoring features, such as vegetation plots, permanent cross-sections, reference photograph stations, crest gauges and flow gauges, are shown on the CCPV map found in Appendix B.

Channel construction began in October 10, 2016 at the upstream extent of the site and worked in the downstream direction (begin on Reach 6 and ended with Reach 1). The construction was completed on March 8, 2017. Planting was installed as major reaches were completed and finalized by March 10, 2017. Minor supplemental planting occurred in March of 2018.

The Monitoring Year 6 visual site assessment was collected in November 2022. Visual Assessment is contained in Appendix B.

2.1 Stream Assessment

Historically, the Browns Summit site has been utilized for agriculture. Cattle have had direct access to the entire site. Ponds were located throughout the project, including within the alignment of R1, R3, R4, and R6. Channelization was clearly confirmed by the historical aerial photo from 1937 and spoil piles were found along several of the reaches. The project involved the restoration and enhancement of the headwater system. Restoration practices involved raising the existing streambed and reconnecting the stream to the relic floodplain to restore natural flow regimes to the system. The existing channels abandoned within the restoration areas were filled to decrease surface and subsurface drainage and to raise the local water table. Permanent cattle exclusion fencing was provided around all proposed reaches and riparian buffers, except along reaches where no cattle are located.

2.1.1 Morphological Parameters and Channel Stability

Cross-sections were classified using the Rosgen Stream Classification System, and all monitored cross-sections fall within the quantitative parameters defined for channels of the design stream type. Morphological survey data are presented in Appendix D.

A longitudinal profile was surveyed for the entire length of channel immediately after construction to document as-built baseline conditions for the Monitoring Year 0 only. Annual longitudinal profiles were not planned to be conducted during subsequent monitoring years unless channel instability has been documented or remedial actions/repairs are required by the U.S. Army Corps of Engineers (USACE) or DMS. However, during preparation of the MY1 monitoring report, it was discovered that the data provided by the construction contractor's survey subcontractor for as-built was of low quality and insufficient. The quality of the sealed as-built survey provided by the contractor was not discovered until the MY1 survey was overlain on top of the MY0 cross sections. The channel in reality had not fluctuated nearly as dramatically as shown in Figure 5 (cross section overlays) and has remained stable and is performing as designed. This has been documented through field inspections throughout

subsequent monitoring years by Michael Baker and DMS staff. Due to the MY0 survey quality discovered during MY1, Michael Baker proposed to utilize the detailed survey data and associated parameters collected during MY1 by a different surveyor as the basis of comparison through the monitoring phase of the project. This will ensure an accurate assessment of success and trends throughout the life of the project. The contractor had the site's longitudinal profile re-surveyed in case future comparisons are required. The longitudinal profile overlay was provided in previous reports.

Additionally, per DMS request, bank height ratio is calculated by adjusting the bankfull line vertically to recreate the as-built cross-sectional area. Once the cross-sectional area is the same bank height ratio is calculated and recorded. After bank height ratio is recorded then previous bankfull elevation is set and the remaining data is calculated. However, in this case, due to a poor as-built survey we are referencing all calculations to the MY1 survey. This will help ensure that the cross-sections best represent the actual characteristics of the stream.

2.1.2 Hydrology

To monitor on-site bankfull events, one crest gauge (crest gauge #1) was installed along R1's left bank at bankfull elevation. The crest gauge readings are presented in Appendix E. The site has met the bankfull flow requirements of two bankfull events within two separate years.

2.1.3 Photographic Documentation

Visual inspection of the site is conducted at a minimum of twice a year. Representative photographs for Monitoring Year 6 were taken along each Reach in March 2022 and are provided in Appendix B.

2.1.4 Visual Stream Morphological Stability Assessment

The visual stream morphological stability assessment involves the qualitative evaluation of lateral and vertical channel stability and integrity and of in-stream structures throughout the project. Habitat parameters and pool depth maintenance are also evaluated and scored. During Year 6 monitoring, Michael Baker staff walked the entire project several times throughout the year, noting geomorphic conditions of the stream bed profile (riffle/pool facets), both stream banks, and in-stream structures. Representative photographs were taken per the Mitigation Plan, and locations of any SPAs were documented in the field for subsequent mapping on the CCPV figures.

A more detailed summary of the results for the visual stream stability assessment can be found in Appendix B, which includes supporting data tables, as well as general stream photos.

2.2 Vegetation Assessment

In order to determine if the success criteria were achieved, vegetation-monitoring quadrants were installed and are monitored across the site in accordance with the CVS-DMS Protocol for Recording Vegetation, Version 4.1 (2007). The vegetation monitoring plots are a minimum of 2 percent of the planted portion of the Site with fourteen plots established randomly within the planted riparian buffer areas per Monitoring Levels 1 and 2. The sizes of individual quadrants are 100 square meters for woody tree species.

2.3 Wetland Assessment

Eight (8) groundwater monitoring wells were installed across the site to document hydrologic conditions of the restored wetland area. The wetland gauges are depicted on the CCPV figures (Figure 2) found in Appendix B. Installation and monitoring of the groundwater stations have been conducted in accordance with the USACE standard methods. The growing season starts March 22 and ends November 13 with a hydroperiod of 237 days.

3. REFERENCES

- Carolina Vegetation Survey (CVS) and NC Division of Mitigation Services (DMS). CVS-DMS Data Entry Tool v. 2.3.1. University of North Carolina, Raleigh, NC.
- Lee, M., Peet R., Roberts, S., Wentworth, T. 2007. CVS-DMS Protocol for Recording Vegetation, Version 4.1.
- North Carolina Division of Mitigation Services (DMS). 2012. Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation. Version 1.5, June 8, 2012.
- North Carolina Division of Mitigation Services (DMS). 2009. Cape Fear River Basin Restoration Priorities.
- Rosgen, D. L. 1994. A Classification of Natural Rivers. *Catena* 22:169-199.
- Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina, third Approximation. North Carolina Natural Heritage Program. Division of Parks and Recreation, NCDEQ. Raleigh, NC.
- U.S. Army Corps of Engineers. 2003. Stream Mitigation Guidelines, April 2003, U.S. Army Corps of Engineers (USACE). Wilmington District.

Appendix A

Project Vicinity Map and Background Tables

To access the site from Raleigh, take Interstate 40 and head west on I-40 towards Greensboro, for approximately 68 miles. Take the exit ramp to E. Lee St. (exit 224) towards Greensboro and continue for 2 miles before turning onto U.S. Highway 29 North. Once on U.S. Highway 29 North, travel north for approximately 10 miles before exiting and turning on to NC-150 West. Continue west on NC-150 for 5 miles. The project site is located along and between NC-150 and Spearman Rd., with access points through residences on Middleland Dr. and Broad Ridge Ct. The subject project site is an environmental restoration site of the NCDEQ Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with DMS.

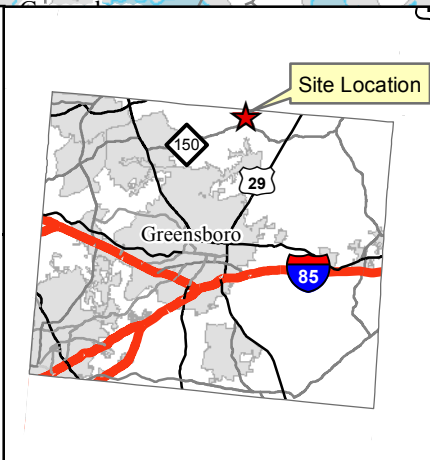
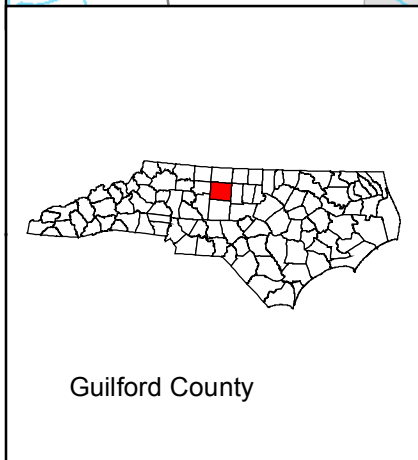
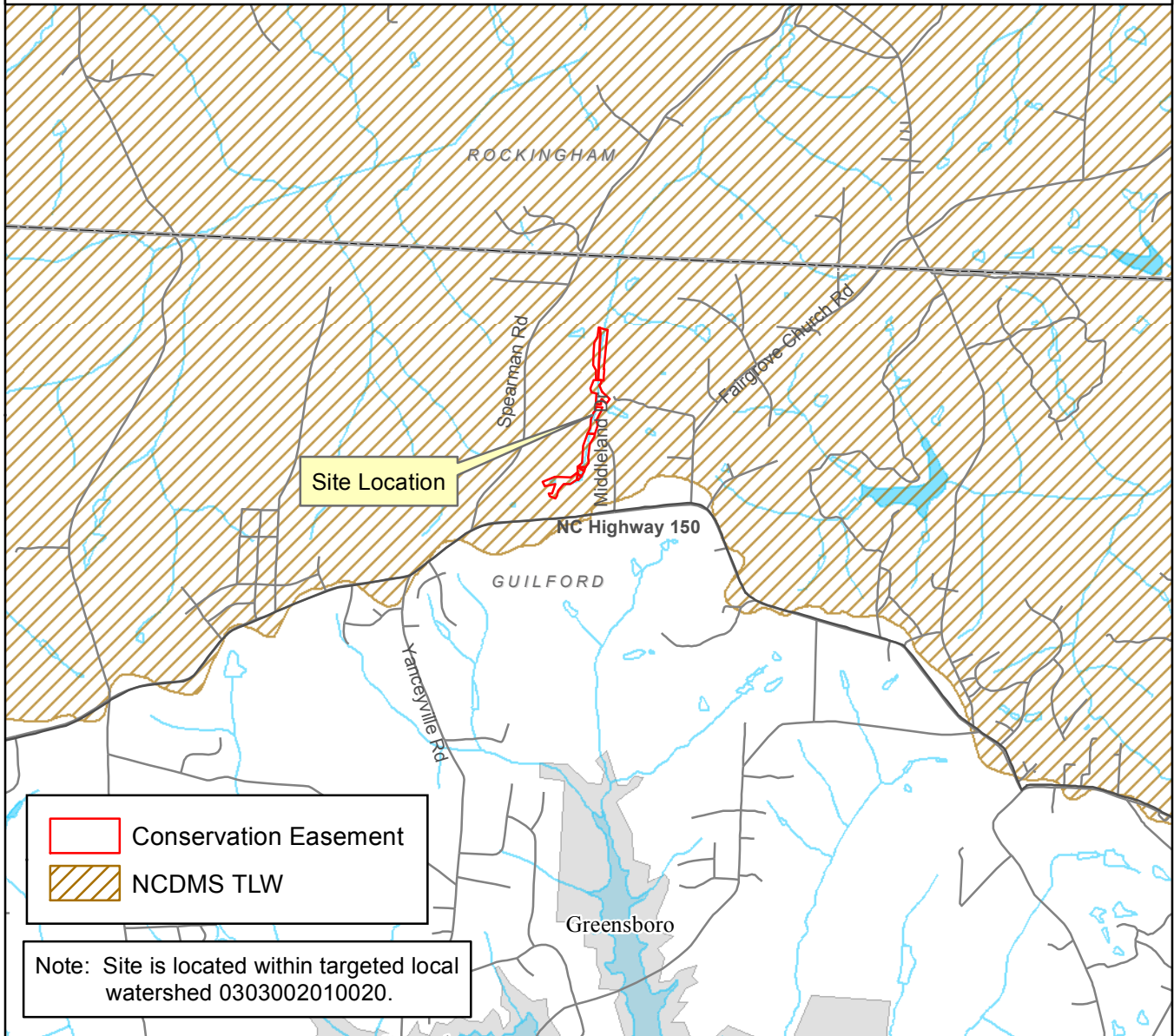



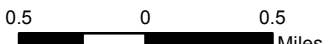
Figure 1
Project Vicinity Map
Browns Summit (DMS# 96313)

NCDEQ - Division
of Mitigation Services



Michael Baker
INTERNATIONAL

0.5 0 0.5



Miles

Conservation Easement

Restoration Feature Approach

Restoration

Enhancement I

Enhancement II

No Credit

Wetland Mitigation Types

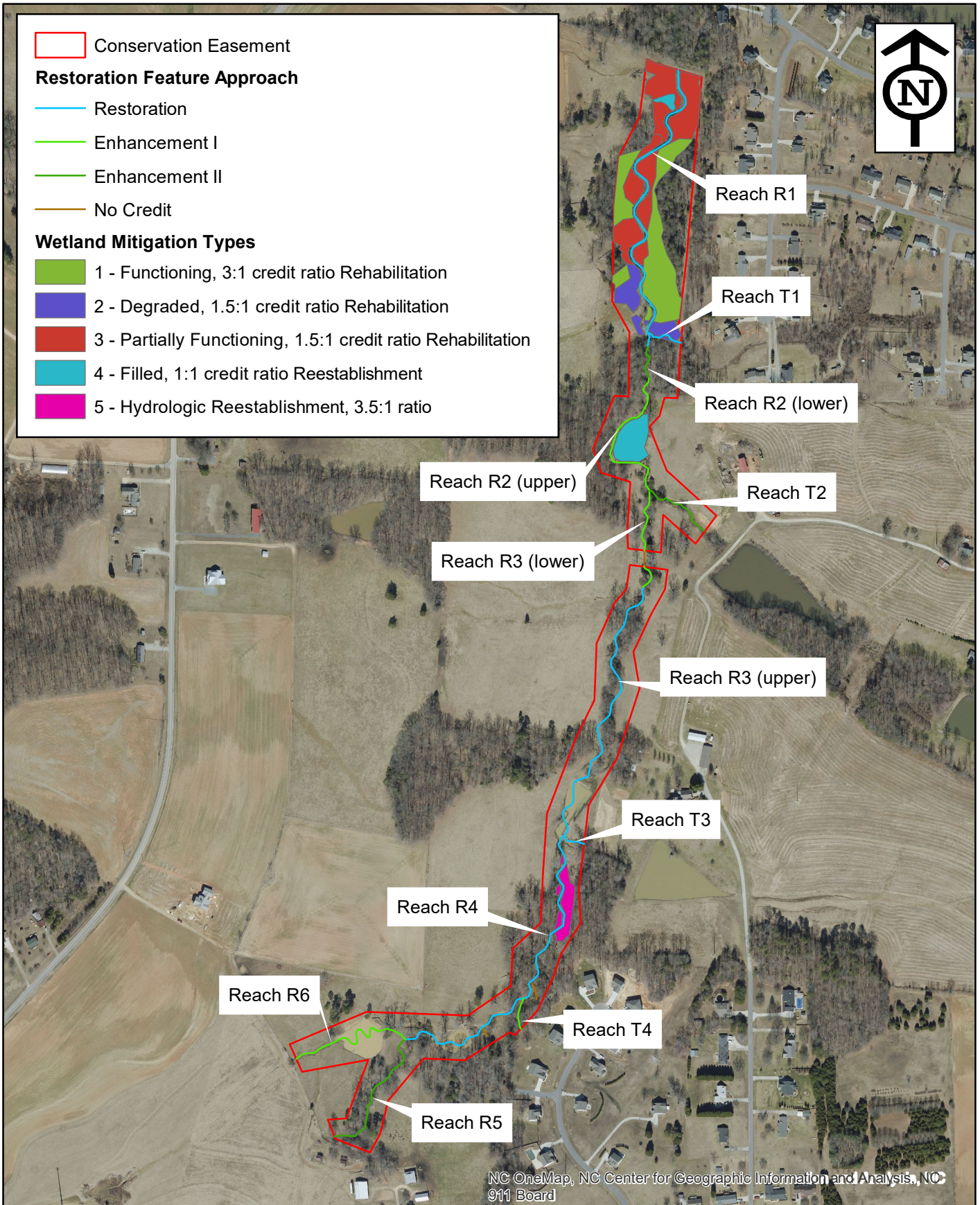
1 - Functioning, 3:1 credit ratio Rehabilitation

2 - Degraded, 1.5:1 credit ratio Rehabilitation

3 - Partially Functioning, 1.5:1 credit ratio Rehabilitation

4 - Filled, 1:1 credit ratio Reestablishment

5 - Hydrologic Reestablishment, 3.5:1 ratio



NC OneMap, NC Center for Geographic Information and Analysis, NC 911 Board

Michael Baker
INTERNATIONAL

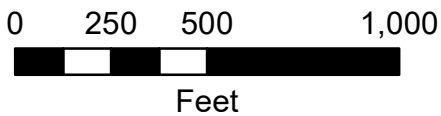
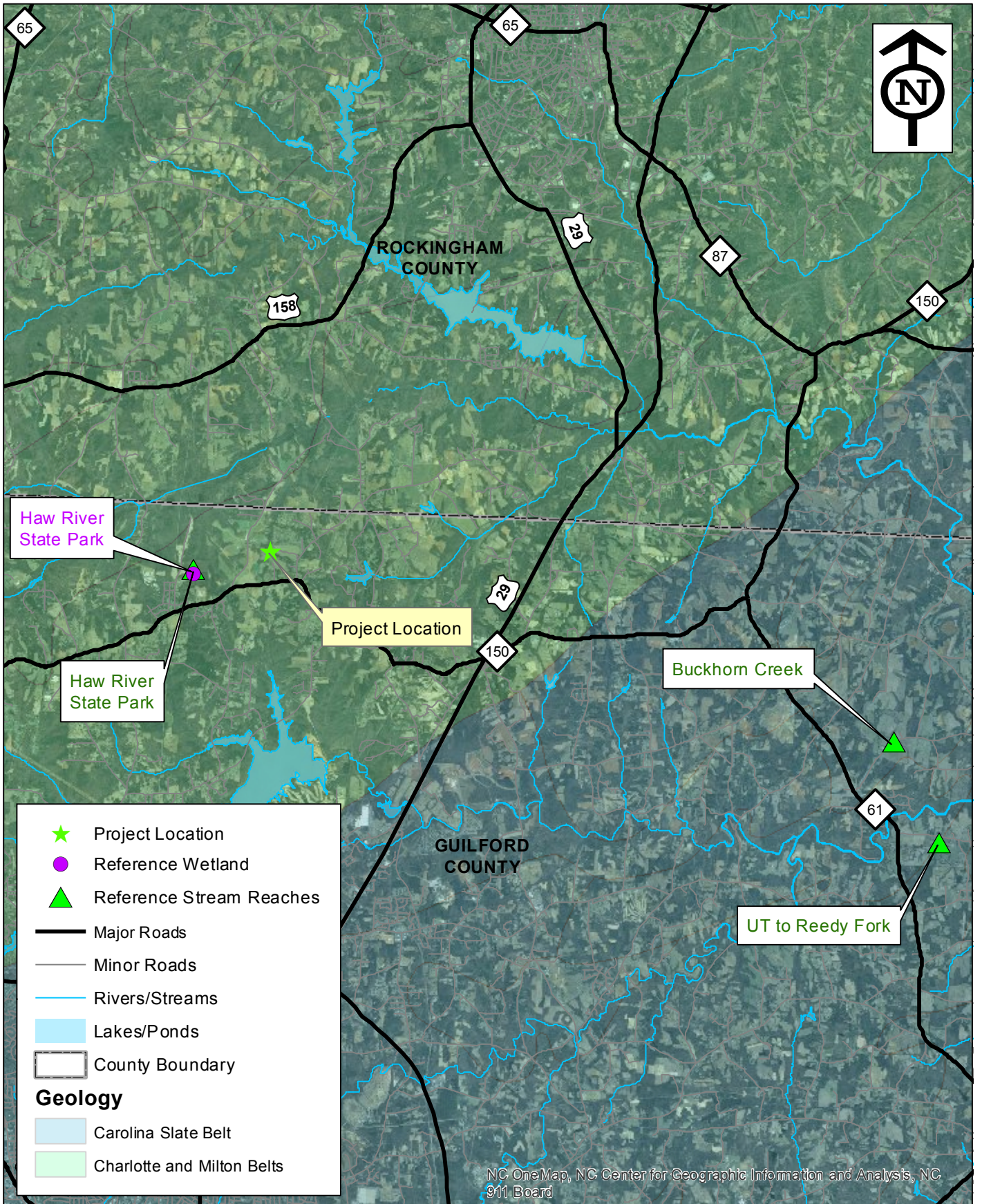


Figure 2
Restoration Summary Map
Browns Summit Site
(DMS #96313)



Michael Baker
INTERNATIONAL

Figure 3
Reference Stream
Locations Map
Browns Summit Site

Table 1. Project Components and Mitigation Credits							
Browns Summit Creek Restoration Project: DMS Project No ID. 96313							
Mitigation Credits							
	Stream	Riparian Wetland		Non-riparian Wetland	Buffer	Nitrogen Nutrient Offset	Phosphorus Nutrient Offset
Type	R, E1, EII	R	E				
Totals	5,300.867 SMU	2.501	0.0				
Project Components							
Project Component or Reach ID	Stationing/ Location (As-Built)*	Existing Footage/ Acreage (LF/AC)*	Approach	Restoration/ Restoration Equivalent (SMU/WMU)	Restoration Footage or Acreage (LF/AC)**	Mitigation Ratio	
R1	51+00.00 - 63+89.87	1,217	Restoration	1,290	1,290	1:1	
R2 (downstream section)	49+65.28 - 51+00.00	167	Enhancement II	54	134	2.5:1	
R2 (upstream section)	43+48.17 - 49+65.28	701	Enhancement I	409	614	1.5:1	
R3 (downstream section) 60' easement break subtracted from stream lengths	39+35.73 - 43+48.17 (CE 40+45.09 - 41+05.52)	362	Enhancement I	235	352	1.5:1	
R3 (upstream section)	28+31.92 - 39+35.73	1,224	Restoration	1,102	1,102	1:1	
R4	15+35.86 - 28+31.92	1,350	Restoration	1,296	1,296	1:1	
R5	10+00 - 15+35.86	536	Enhancement II	214	536	2.5:1	
R6	10+00 - 15+19.39	536	Enhancement I/BMP	295	442 LF (valley length)	1.5:1	
T1	10+00 - 11+44.99	121	Restoration	145	145	1:1	
T2	10+00 - 12+85.21	283	Enhancement II	113	283	2.5:1	
T3	10+04.88 - 10+92.84	83	Restoration	70	70	1:1	
T4	10+30.18 - 11+49.36	47	Enhancement I/BMP	78	117 LF (valley length)	1.5:1	
Wetland Area - Type 1	See Figures	1.57	Rehabilitation	0.51	1.53	3:1	
Wetland Area - Type 2	See Figures	0.49	Rehabilitation	0.29	0.43	1.5:1	
Wetland Area - Type 3	See Figures	2.06	Rehabilitation	1.17	1.75	1.5:1	
Wetland Area - Type 4	See Figures	0.49	Re-establishment	0.46	0.46	1:1	
Wetland Area - Type 5	See Figures	0.27	Re-establishment	0.08	0.27	3.5:1	
*Wetland existing acreage and restoration acreages were swapped in Table 5.1 of the Mitigation Plan.							
**Stations and lengths are taken from the 2017 As-Built survey and may thus differ slightly from the Mitigation Plan.							
Component Summation							
Restoration Level	Stream (LF)	Riparian Wetland (AC)	Non-riparian Wetland (AC)	Buffer (SF)	Upland (AC)		
Restoration	3,903	4.440					
Enhancement I	1,525						
Enhancement II	953						
BMP Elements							
Element	Location	Purpose/Function	Notes				
BMP Elements: BR= Bioretention Cell; SF= Sand Filter; SW= Stormwater Wetland; WDP= Wet Detention Pond; DDP= Dry Detention Pond; FS= Filter Strip; S= Grassed Swale; LS= Level Spreader; NI=Natural Infiltration Area							

Table 2. Project Activity and Reporting History			
Browns Summit Creek Restoration Project: DMS Project No ID. 96313			
Activity or Report	Scheduled Completion	Data Collection Complete	Actual Completion or Delivery
Mitigation Plan Prepared	not specified in proposal	Summer 2015	May 1, 2015
Mitigation Plan Amended	not specified in proposal	Summer 2015	September 17, 2015
Mitigation Plan Approved	December 4, 2014	Winter 2015	November 2, 2015
Final Mitigation Plan with PCN (minor revisions requested in approval letter)	not specified in proposal	Winter 2015	January 29, 2016
Final Design – (at least 90% complete)	not specified in proposal		September 20, 2016
Construction Begins	not specified in proposal		October 10, 2016
Temporary S&E mix applied to entire project area	June 1, 2015		March 10, 2017
Permanent seed mix applied to entire project area	June 2, 2015		March 10, 2017
Planting of live stakes	June 3, 2015		March 10, 2017
Planting of bare root trees	June 3, 2015		March 10, 2017
End of Construction	May 4, 2015		March 8, 2017
Survey of As-built conditions (Year 0 Monitoring-baseline)	June 3, 2015	Spring 2017	July 1, 2017
Baseline Monitoring Report*	May 7, 2017	Spring 2017	November 30, 2017
Year 1 Monitoring	December 1, 2017	November 2017	January 8, 2018
Year 2 Monitoring	December 1, 2018	November 2018	December 31, 2018
Year 3 Monitoring	December 1, 2019	November 2019	February 12, 2020
Year 4 Monitoring	December 1, 2020	November 2020	February 11, 2021
Year 5 Monitoring	December 1, 2021	November 2021	January 27, 2022
Year 6 Monitoring	December 1, 2022	November 2022	
Invasive Treatment	May 5, 2022		
Year 7 Monitoring	December 1, 2023		

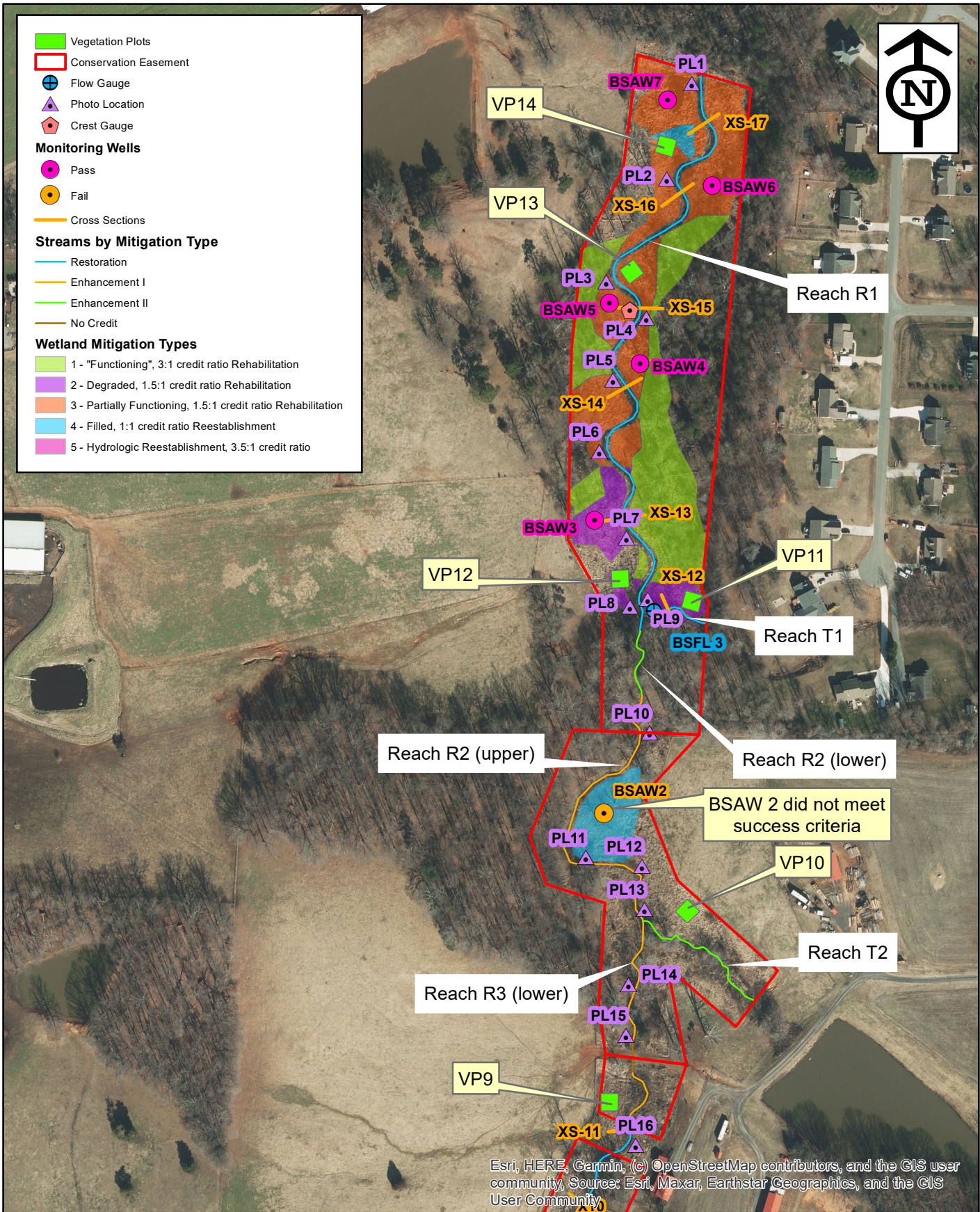
* Monitoring schedule completion dates updated based on completion of construction.

Table 3. Project Contacts	
Browns Summit Creek Restoration Project: DMS Project No ID. 96313	
Designer	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 <u>Contact:</u> Katie McKeithan, Tel. 919-481-5703
Construction Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Stephen Carroll, Tel. 919-428-8368
Planting Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Stephen Carroll, Tel. 919-428-8368
Seeding Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Stephen Carroll, Tel. 919-428-8368
Seed Mix Sources	Green Resources, Rodney Montgomery 336-215-3458
Nursery Stock Suppliers	Dykes and Son, 931-668-8833 Mellow Marsh Farm, 919-742-1200 ArborGen, 843-528-3204
Live Stakes Suppliers	Foggy Mountain Nursery, 336-384-5323
Monitoring Performers	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 <u>Contact:</u> Katie McKeithan, Tel. 919-481-5703
Stream Monitoring Point of Contact	Katie McKeithan, Tel. 919-481-5703
Vegetation Monitoring Point of Contact	Katie McKeithan, Tel. 919-481-5703
Surveyors	Kee Mapping and Surveying, 828-575-9021

Table 4. Project Attributes					
Browns Summit Creek Restoration Project: DMS Project No ID. 96313					
Project Information					
Project Name	Browns Summit Creek Restoration Project				
County	Guilford				
Project Area (acres)	20.2				
Project Coordinates (latitude and longitude)	36.237 N, -79.749 W				
Project Watershed Summary Information					
Physiographic Province	Piedmont				
River Basin	Cape Fear				
USGS Hydrologic Unit 8-digit and 14-digit	03030002 / 03030002010020				
NCDWR Sub-basin	3/6/2001				
Project Drainage Area (acres)	438				
Project Drainage Area Percent Impervious	1%				
CGIA Land Use Classification	2.01.01.01, 2.03.01, 2.99.01, 3.02 / Forest (53%) Agriculture (39%) Impervious Cover (1%) Unclassified (7%)				
Reach Summary Information					
Parameters	Reach R1	Reach R2	Reach R3	Reach R4	Reach R5
Length of Reach (linear feet)	1,290	748	1,454	1,296	536
Valley Classification (Rosgen)	VII	VII	VII	VII	VII
Drainage Area (acres)	438	299	242	138/95	24
NCDWR Stream Identification Score	35.5	35.5	41.5	41.5/25	28.5
NCDWR Water Quality Classification	C; NSW				
Morphological Description (Rosgen stream type)	E	Bc incised	Bc incised	Gc	Bc
Evolutionary Trend	Incised E→G→F	Bc→G→F	Bc→G→F	G→F	Bc→G
Underlying Mapped Soils	CnA	CnA	CnA, PpE2	CnA, CkC	CkC
Drainage Class	Somewhat Poorly Drained	Somewhat Poorly Drained	Somewhat Poorly Drained and Well Drained	Somewhat Poorly Drained and Well Drained	Well Drained
Soil Hydric Status	Hydric	Hydric	Partially Hydric	Partially Hydric	Upland
Average Channel Slope (ft/ft)	0.0069	0.0068	0.0095	0.017	0.023
FEMA Classification	N/A	N/A	N/A	N/A	N/A
Native Vegetation Community	Piedmont Headwater Stream Forest				
Percent Composition of Exotic/Invasive Vegetation	25%	15%	5%	<5%	<5%
Parameters	Reach R6	Reach T1	Reach T2	Reach T3	Reach T4
Length of Reach (linear feet)	442	145	283	70	117
Valley Classification (Rosgen)	VII	VII	VII	VII	VII
Drainage Area (acres)	61	55	47	41	10
NCDWR Stream Identification Score	18	26.75	27.25	19	-
NCDWR Water Quality Classification	C; NSW				
Morphological Description (Rosgen stream type)	Bc incised	E incised	F	E incised	-
Evolutionary Trend	Bc→G→F	E→G→F	Bc→G→F	E→G→F	-
Underlying Mapped Soils	CkC	CnA	CnA, PpE2	CnA	CkC
Drainage Class	Well Drained	Somewhat Poorly Drained	Somewhat Poorly Drained and Well Drained	Somewhat Poorly Drained	Well Drained
Soil Hydric Status	Upland	Hydric	Partially Hydric	Hydric	Upland
Average Channel Slope (ft/ft)	0.014	0.024	0.022	0.02	-
FEMA Classification	N/A	N/A	N/A	N/A	N/A
Native Vegetation Community	Piedmont Headwater Stream Forest				
Percent Composition of Exotic/Invasive Vegetation	5%	10%	10%	10%	10%
Regulatory Considerations					
Regulation	Applicable	Resolved	Supporting Documentation		
Waters of the United States – Section 404	Yes	Yes	Categorical Exclusion (Appendix B)		
Waters of the United States – Section 401	Yes	Yes	Categorical Exclusion (Appendix B)		
Endangered Species Act	No	N/A	Categorical Exclusion (Appendix B)		
Historic Preservation Act	No	N/A	Categorical Exclusion (Appendix B)		
Coastal Area Management Act (CAMA)	No	N/A	Categorical Exclusion (Appendix B)		
FEMA Floodplain Compliance	No	N/A	Categorical Exclusion (Appendix B)		
Essential Fisheries Habitat	No	N/A	Categorical Exclusion (Appendix B)		

Appendix B

Visual Assessment Data



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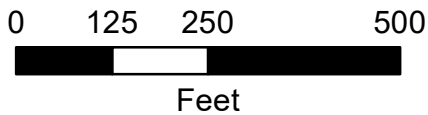
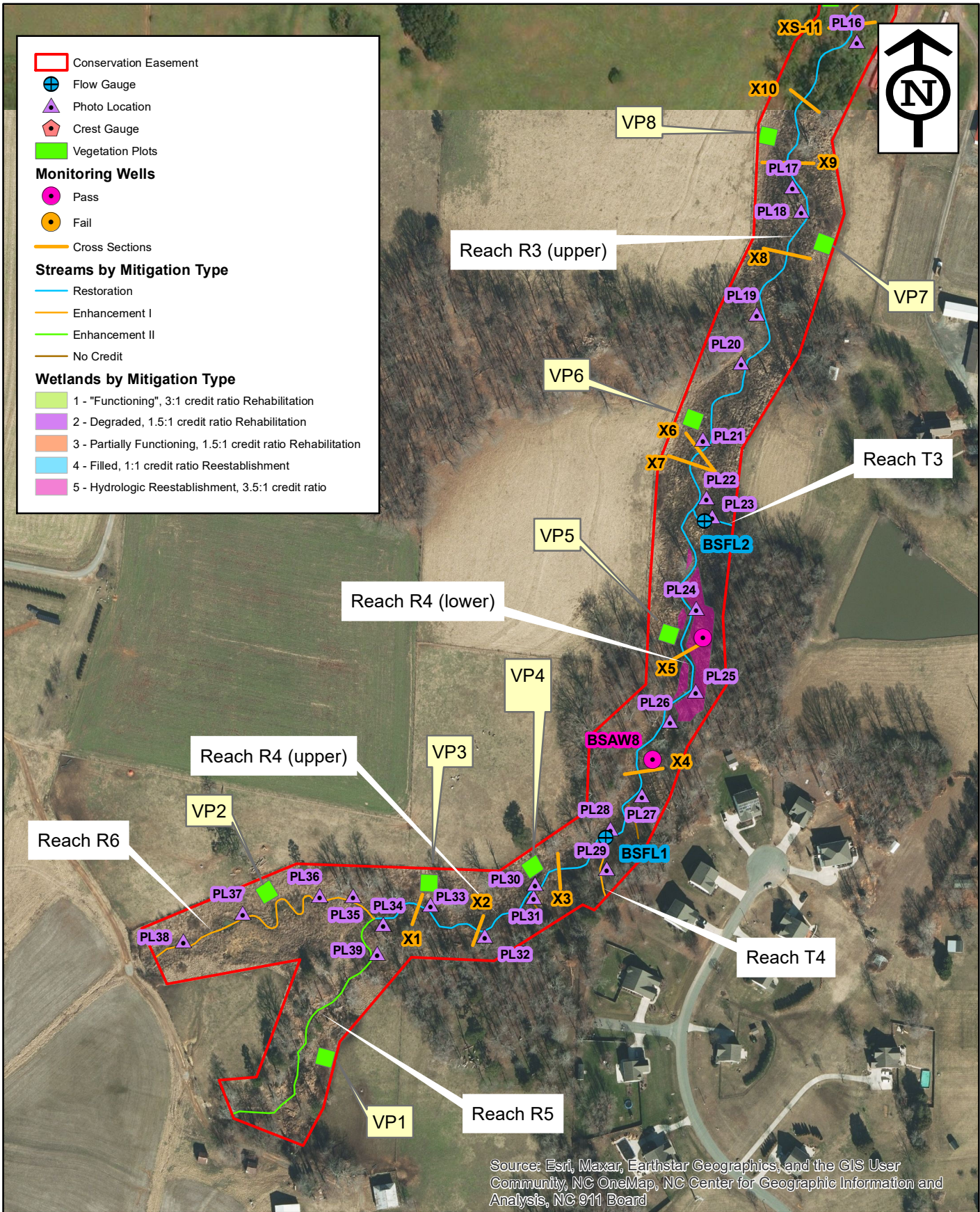


Figure 4.1
Current Conditions
Plan View
Browns Summit Site
(DMS #96313)



Michael Baker
INTERNATIONAL

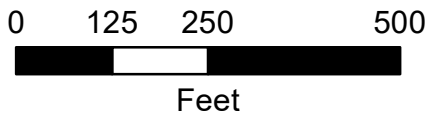


Figure 4.2
Current Conditions
Plan View
Browns Summit Site
(DMS #96313)

Table 5. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID		R1								
Assessed Length		1,290								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
Totals					0	0	100%			
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	20	20			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	11	11			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	20	20			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)	20	20			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.	20	20			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		R2 (downstream section)									
Assessed Length		134									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%				
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%				
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	0	0			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	0	0			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	0	0			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)	0	0			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.	0	0			100%				

Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID		R2 (upstream section)								
Assessed Length		614								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
Totals					0	0	100%			
2. 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.	3	3			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%			

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		R3 (downstream section)									
Assessed Length		352									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody	Footage with Stabilizing Woody	Adjusted % for Stabilizing Woody	
1. 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%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	7	7			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	7	7			100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	7	7			100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	7	7			100%				

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		R3 (upstream section)									
Assessed Length		1,102									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody	Footage with Stabilizing Woody	Adjusted % for Stabilizing Woody	
1. 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%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	15	15			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	10	10			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	15	15			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)	15	15			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.	15	15			100%				

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		R4									
Assessed Length		1,296									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody	Footage with Stabilizing Woody	Adjusted % for Stabilizing Woody	
1. 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%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	14	14			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.	14	14			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)	14	14			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.	14	14			100%				

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		R5									
Assessed Length		536									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%				
	* 2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%				
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	6	6			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	6			100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	6	6			100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	6	6			100%				

Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID		R6								
Assessed Length		442								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. 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%			
Totals					0	0	100%			
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	9	9			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	9	9			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	9	9			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)	9	9			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.	9	9			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		T1									
Assessed Length		145									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%				
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%				
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	6	6			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	6			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.	6	6			100%				

Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID		T2								
Assessed Length		283								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. 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%			
Totals					0	0	100%			
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	2	2			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.	2	2			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID		T3								
Assessed Length		70								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. 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%			
Totals					0	0	100%			
2. 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%			

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		T4									
Assessed Length		117									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. 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%				
Totals					0	0	100%				
2. 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 6. Vegetation Conditions Assessment						
Browns Summit Creek Restoration Project: DMS Project No ID. 96313						
Planted Acreage ¹ 20.24						
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	N/A	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	N/A	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	N/A	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%
Easement Acreage ² 20.24						
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern ⁴	Areas or points (if too small to render as polygons at map scale).	1000 SF	N/A	0	0.00	0.0%
5. Easement Encroachment Areas ³	Areas or points (if too small to render as polygons at map scale).	none	N/A	0	0.00	0.0%
<p>¹ = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.</p> <p>² = The acreage within the easement boundaries.</p> <p>³ = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1,2 or 3) as well as a parallel tally in item 5.</p> <p>⁴ = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern species are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by EEP such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of <i>Microstegium</i> in the herb layer will not likely trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in <i>red italics</i> are of particular interest given their</p>						

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take May 5, 2022 (All photos are viewing upstream)



Photo Point 1 – Station 63+75, Reach 1



Photo Point 2 – Station 61+50, Reach 1



Photo Point 3 – Station 58+75, Reach 1



Photo Point 4 – Station 57+85, Reach 1



Photo Point 5 – Station 56+75, Reach 1



Photo Point 6 – Station 55+00, Reach 1

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take May 5, 2022 (All photos are viewing upstream)



Photo Point 7 – Station 53+50, Reach 1



Photo Point 8 – Station 51+75, Reach 1



Photo Point 9 – Station 11+25, Reach T1



Photo Point 10 – Station 49+00, Reach 2



Photo Point 11 – Station 46+00, Reach 2



Photo Point 12 – Station 44+75, Reach 2

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take May 5, 2022 (All photos are viewing upstream)



Photo Point 13 – Station 43+75, Reach 2/Reach T2



Photo Point 14 – Station 42+25, Reach 3



Photo Point 15 – Station 41+50, Reach 3



Photo Point 16 – Station 36+25, Reach 3



Photo Point 17 – Station 36+00, Reach 3



Photo Point 18 – Station 35+00, Reach 3

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take May 5, 2022 (All photos are viewing upstream)



Photo Point 19 – Station 33+00, Reach 3



Photo Point 20 – Station 32+00, Reach 3



Photo Point 21 – 31+50, Reach 3



Photo Point 22 – Station 28+75, Reach 3/T3



Photo Point 23 – Station 10+25, Reach T3



Photo Point 24 – Station 26+50, Reach 4

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take May 5, 2022 (All photos are viewing upstream)



Photo Point 25 – Station 24+50, Reach 4



Photo Point 26 – Station 24+00, Reach 4



Photo Point 27 – Station 22+50, Reach 4



Photo Point 28 – Station 21+50, Reach 4/T4



Photo Point 29 – Station 11+00, Reach T4



Photo Point 30 – Station 19+50, Reach 4

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take May 5, 2022 (All photos are viewing upstream)



Photo Point 31 – Station 19+10, Step Pools



Photo Point 32 – Station 18+00, Reach 4



Photo Point 33 – Station 16+75, Reach 4



Photo Point 34 – Sta. 15+75, Reaches 4, 5 and 6



Photo Point 35 – Station 15+00, Reach 6, Step Pools



Photo Point 36 – Station 14+50, Reach 6, BMP

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take May 5, 2022 (All photos are viewing upstream)



Photo Point 37 – Station 11+90, Reach 6, BMP



Photo Point 38 – Station 10+50, Reach 6, Step Pools



Photo Point 39 – Station 15+00, Reach 5

Browns Summit Creek Restoration Project – Problem Areas Photos



Invasive treatments on R1 Right floodplain (8/10/2022)



Invasive treatments on R1 left floodplain (8/10/2022)



Invasive treatments on R1 right floodplain (8/10/2022)



Invasive treatments on R1 left floodplain (8/10/2022)



Invasive treatments on R2 (8/10/2022)



Invasive treatments on R3 (8/10/2022)

Appendix C

Vegetation Plot Data

*No Vegetation plot monitoring was required for Year 6.

Appendix D

Stream Survey Data

*No cross-section survey was required for Year 6.

Appendix E

Hydrologic Data

Table 12. Verification of Bankfull Events			
Browns Summit Creek Restoration Project: DMS Project No ID. 96313			
Date of Collection	Reach1 Crest Gauge (feet ABOVE bankfull)	Approximate Date of Occurrence (Source: on-site rain gauge)	Method of Data Collection
Year 1 Monitoring (2017)			
6/7/2017	0.46	4/25/2017	Crest Gauge Measurement
10/3/2017	0.22	8/17/2017	Crest Gauge Measurement
Year 2 Monitoring (2018)			
3/22/2018	0.35	2/7/2018	Crest Gauge Measurement
10/22/2018	0.4	9/16/2018 (Hurricane Florance)	Crest Gauge Measurement
11/16/2018	0.78	10/26/2018	Crest Gauge Measurement
Year 3 Monitoring (2019)			
3/28/2019	0.74	1/24/2019	Crest Gauge Measurement
10/17/2019	0.94	6/8/2019	Crest Gauge Measurement
Year 4 Monitoring (2020)			
2/10/2020	0.91	1/24/2020	Crest Gauge Measurement
11/6/2020	1.49	7/23/2020	Crest Gauge Measurement
Year 5 Monitoring (2021)			
7/1/2021	1.43	6/11/2021	Crest Gauge Measurement
10/21/2021	1.01	9/22/2021	Crest Gauge Measurement
Year 6 Monitoring (2022)			
No Crest Gauge Reading			

Table 16. Wetland Restoration Area Success

Browns Summit Restoration Project: DMS Project ID No. 96313

Well ID	Percentage of Consecutive Days <12 inches from Ground Surface ¹							Most Consecutive Days Meeting Criteria ²							Percentage of Cumulative Days <12 inches from Ground Surface ¹							Cumulative Days Meeting Criteria ³							
	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)	Year 6 (2022)	Year 7 (2023)	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)	Year 6 (2022)	Year 7 (2023)	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)	Year 6 (2022)	Year 7 (2023)	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)	Year 6 (2022)	Year 7 (2023)	
Type 5 (3.5:1 Ratio - Success Criteria 9% of Growing Season)																													
BSAW1	44.7	45.1	88.6	97.0	90.3	32.6		105.5	106.5	209.0	229.0	213.0	77.0		74.8	80.5	88.6	97.0	90.3	72.0		176.5	190.0	209.0	229.0	213.0	170.0		
BSAW8				97.0	90.3	98.7							229.0	213.0	233.0											229.0	213.0	233.0	
Type 4 (1:1 Ratio - Success Criteria 12% of Growing Season)																													
BSAW2	3.2	6.8	7.2	6.8	10.2	9.3		7.5	16.0	17.0	16.0	24.0	22.0		13.8	38.8	18.4	42.4	17.8	24.2		32.5	91.5	43.5	100.0	42.0	57.0		
Type 2 (1.5:1 Ratio - Success Criteria 12% of Growing Season)																													
BSAW3	47.7	48.7	83.1	97.0	90.3	39.4		112.5	115.0	196.0	229.0	213.0	93.0		91.7	97.9	87.7	97.0	90.3	89.4		216.5	231.0	207.0	229.0	213.0	211.0		
Type 3 (1.5:1 Ratio - Success Criteria 12% of Growing Season)																													
BSAW4	97.0	100.0	88.6	97.0	73.3	98.7		229.0	236.0	209.0	229.0	173.0	233.0		97.0	100.0	88.6	97.0	89.8	98.7		229.0	236.0	209.0	229.0	212.0	233.0		
BSAW5	34.1	48.7	88.6	97.0	90.3	98.7		80.5	115.0	209.0	229.0	213.0	233.0		73.7	86.0	88.6	97.0	90.3	98.7		174.0	203.0	209.0	229.0	213.0	233.0		
BSAW6	46.0	48.7	48.7	50.4	90.3	34.3		108.5	115.0	115.0	119.0	213.0	81.0		89.4	91.9	71.6	94.9	90.3	86.9		211.0	217.0	169.0	224.0	213.0	205.0		
BSAW7	51.1	48.7	88.6	97.0	90.3	52.1		120.5	115.0	209.0	229.0	213.0	123.0		91.1	91.7	88.6	97.0	90.3	97.0		215.0	216.5	209.0	229.0	213.0	229.0		

Notes:
¹Indicates the percentage of most consecutive or cumulative number of days within the monitored growing season with a water 12 inches or less from the soil surface.
²Indicates the most consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surface.
³Indicates the cumulative number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

According to the Baseline Monitoring Report, the growing season for Guilford County is from March 22 to November 13 and is 229 days long. 12% of the growing season is 28 days and 9% of the growing season is 21 days.

Figure 7. Wetland Restoration Graphs (2022)

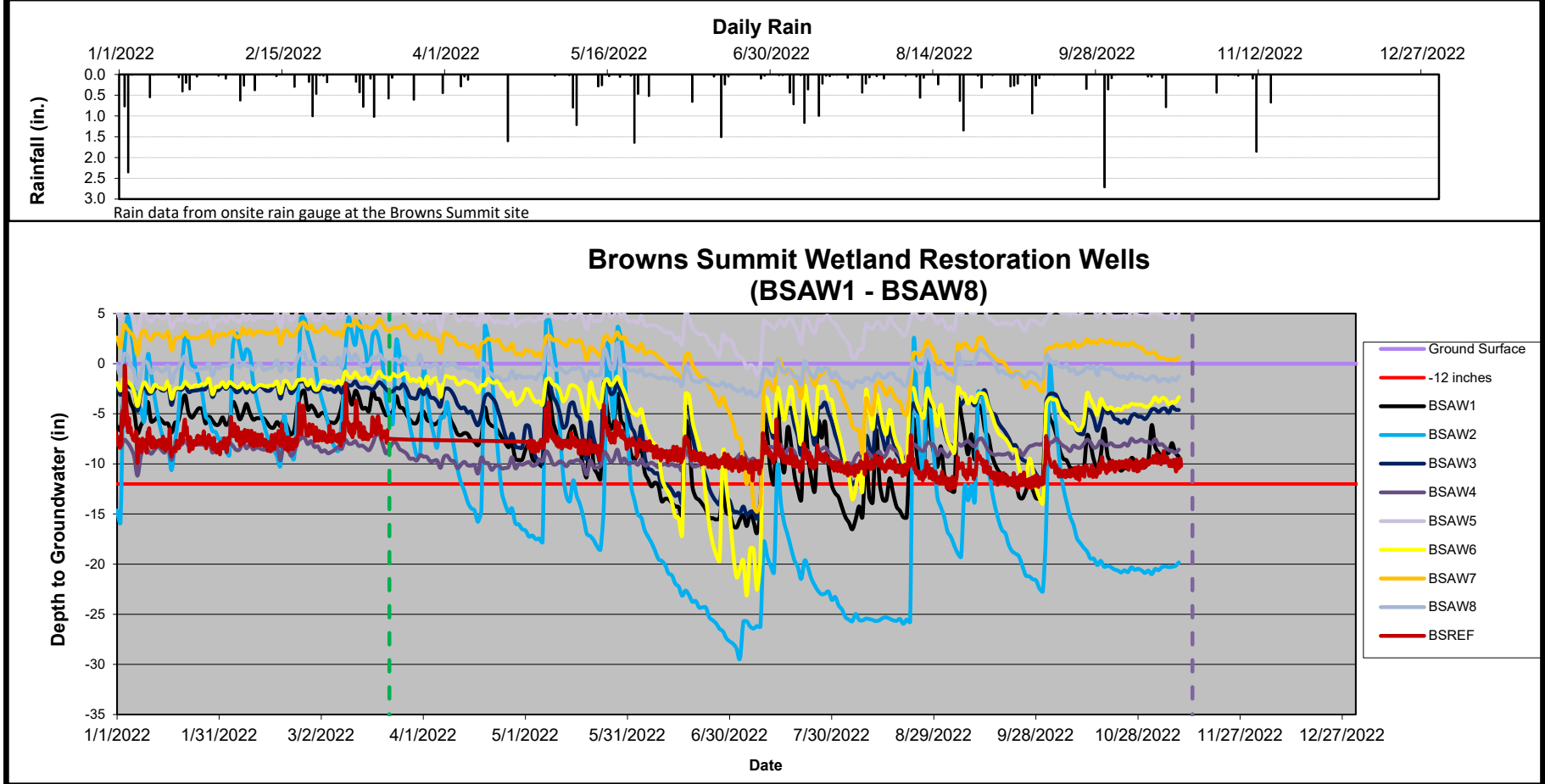


Figure 7. Wetland Restoration Graphs (2022) Continued

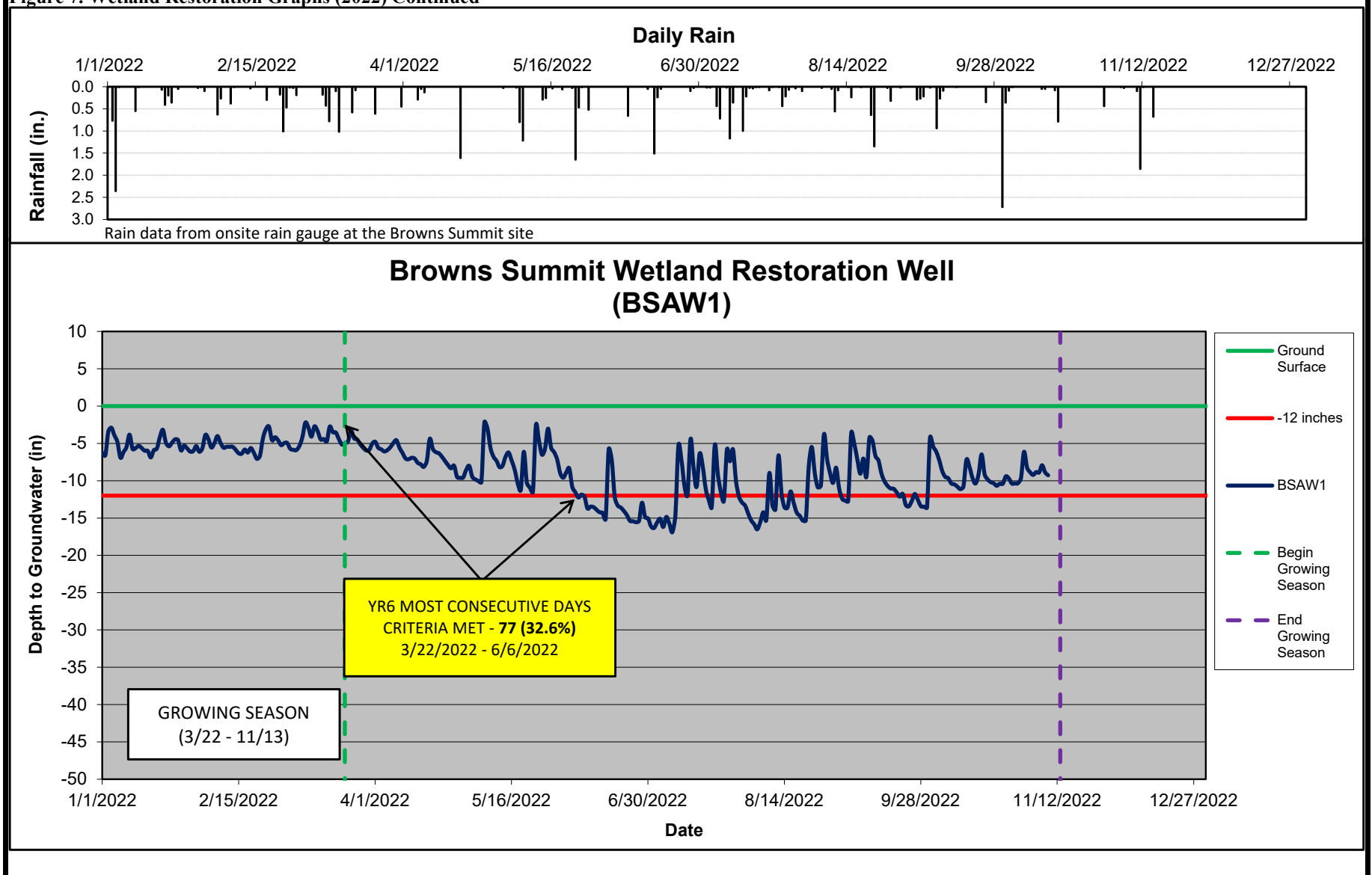


Figure 7. Wetland Restoration Graphs (2022) Continued

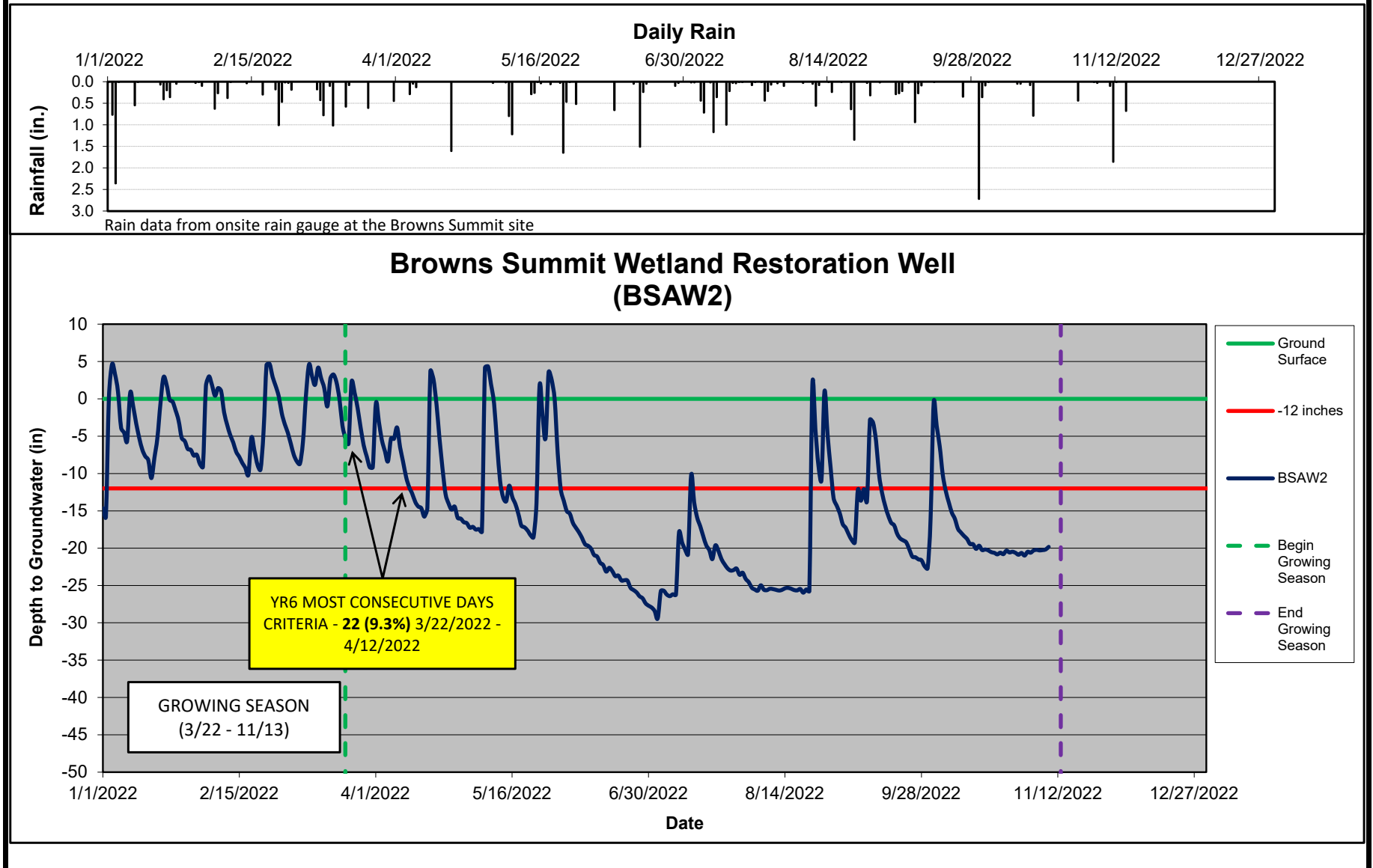


Figure 7. Wetland Restoration Graphs (2022) Continued

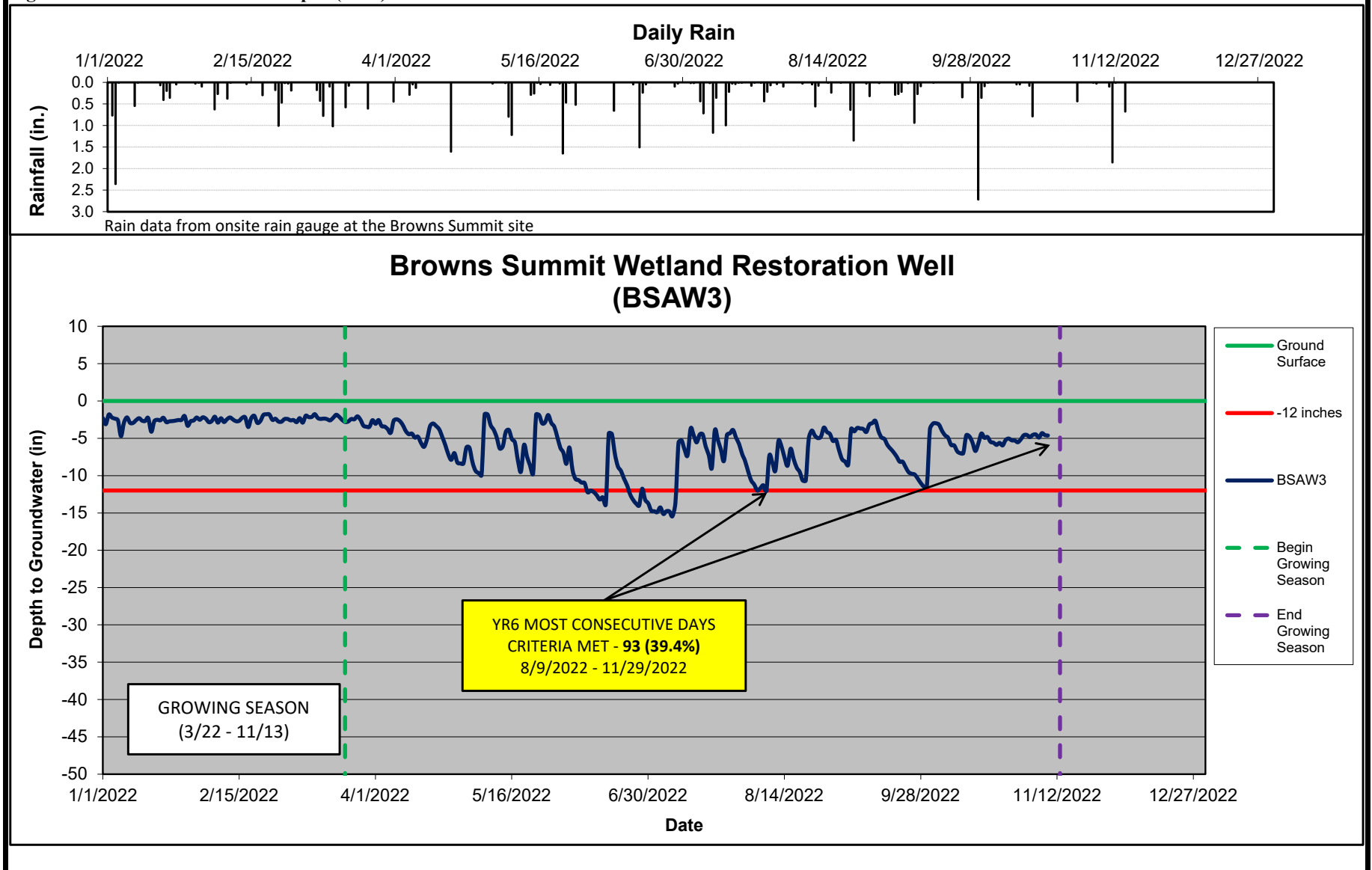


Figure 7. Wetland Restoration Graphs (2022) Continued

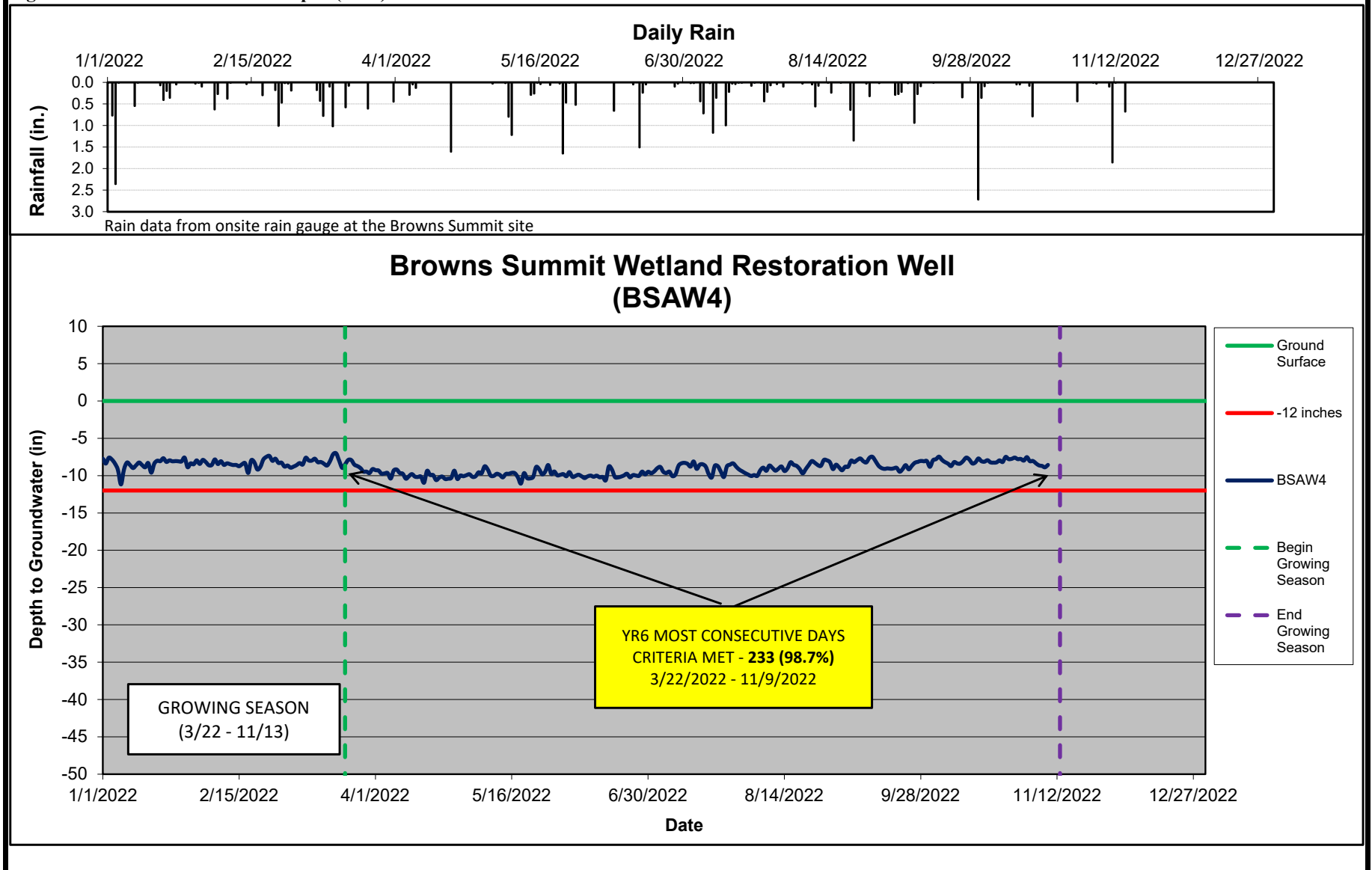


Figure 7. Wetland Restoration Graphs (2022) Continued

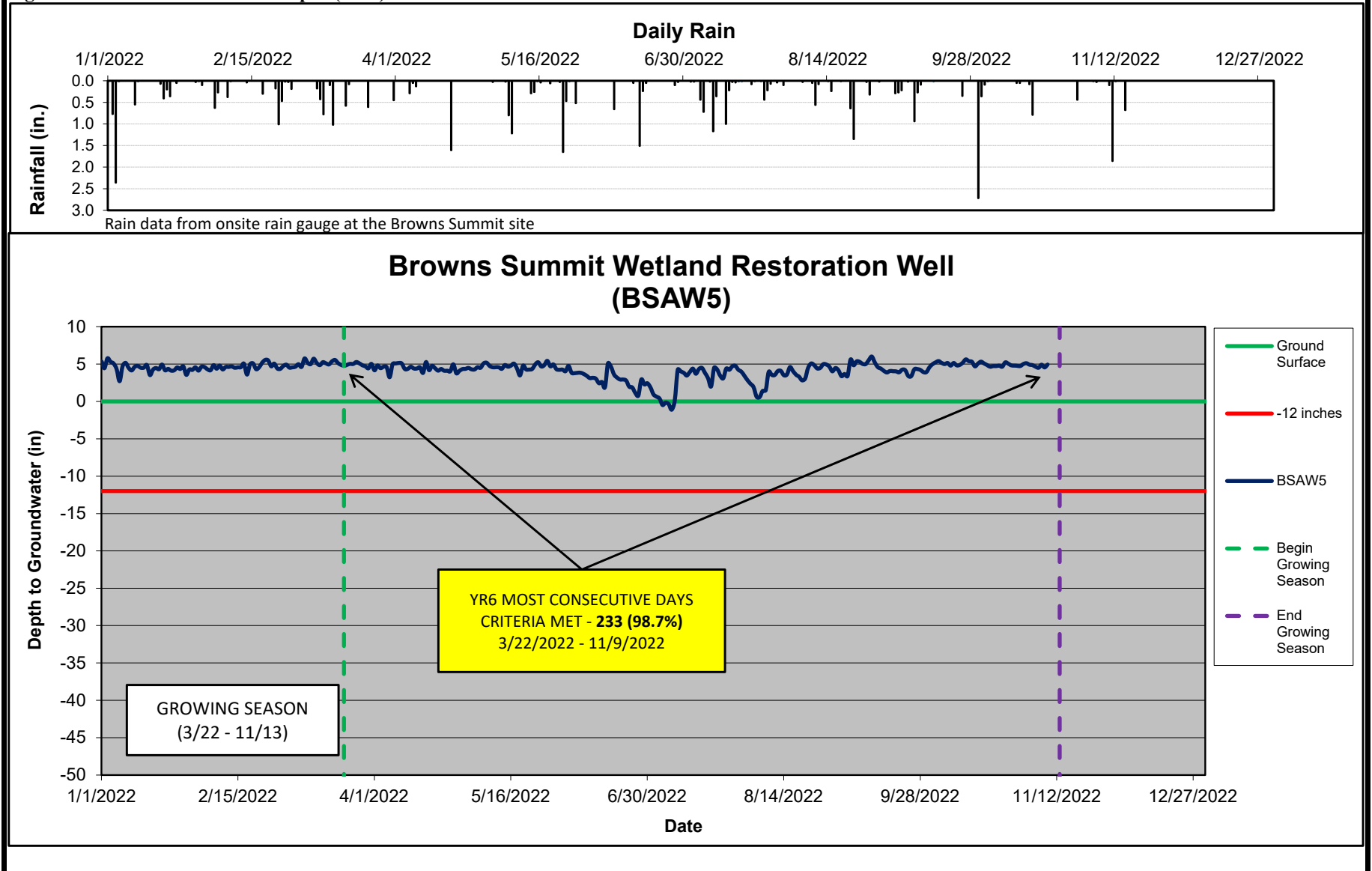


Figure 7. Wetland Restoration Graphs (2022) Continued

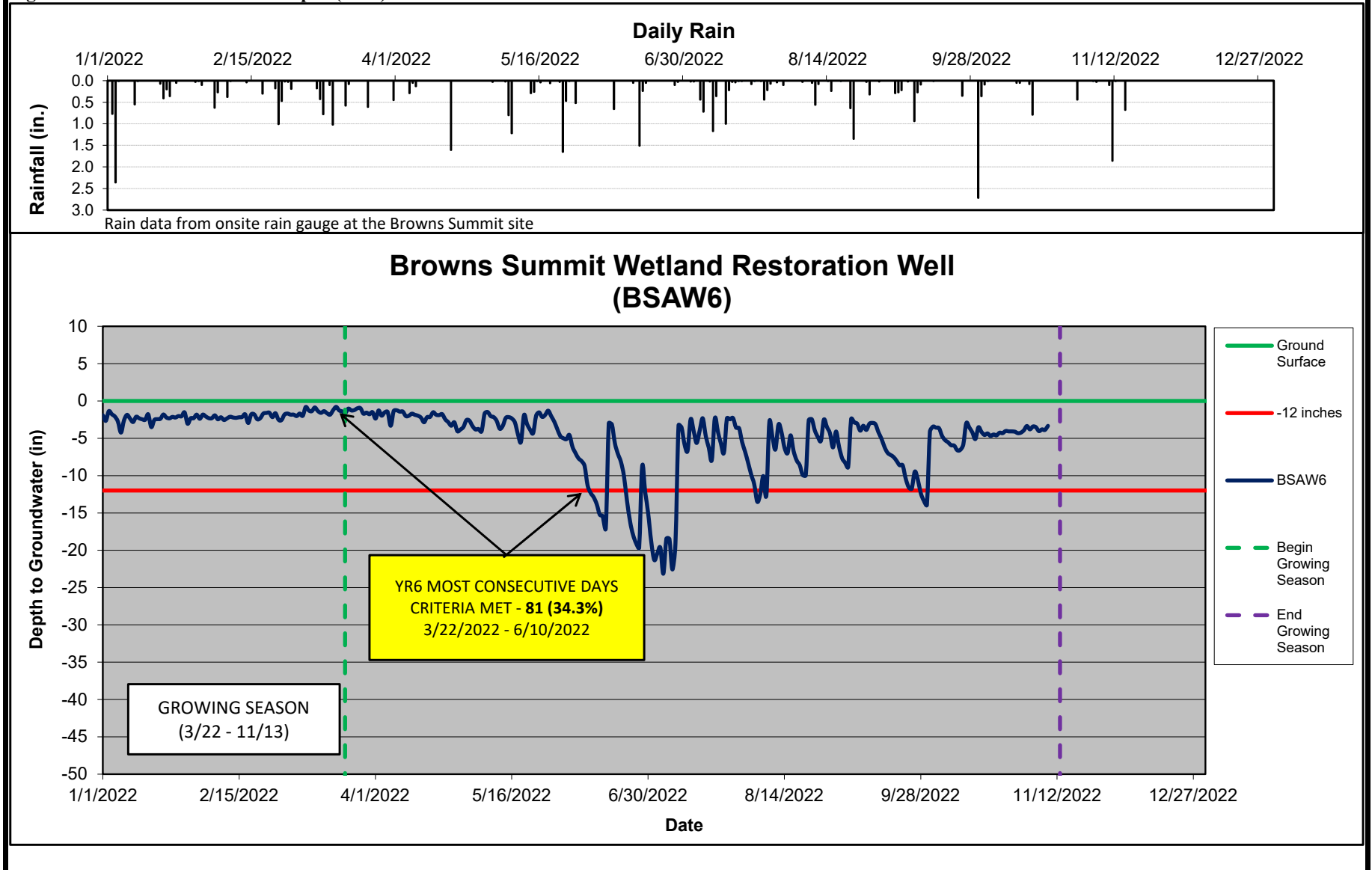


Figure 7. Wetland Restoration Graphs (2022) Continued

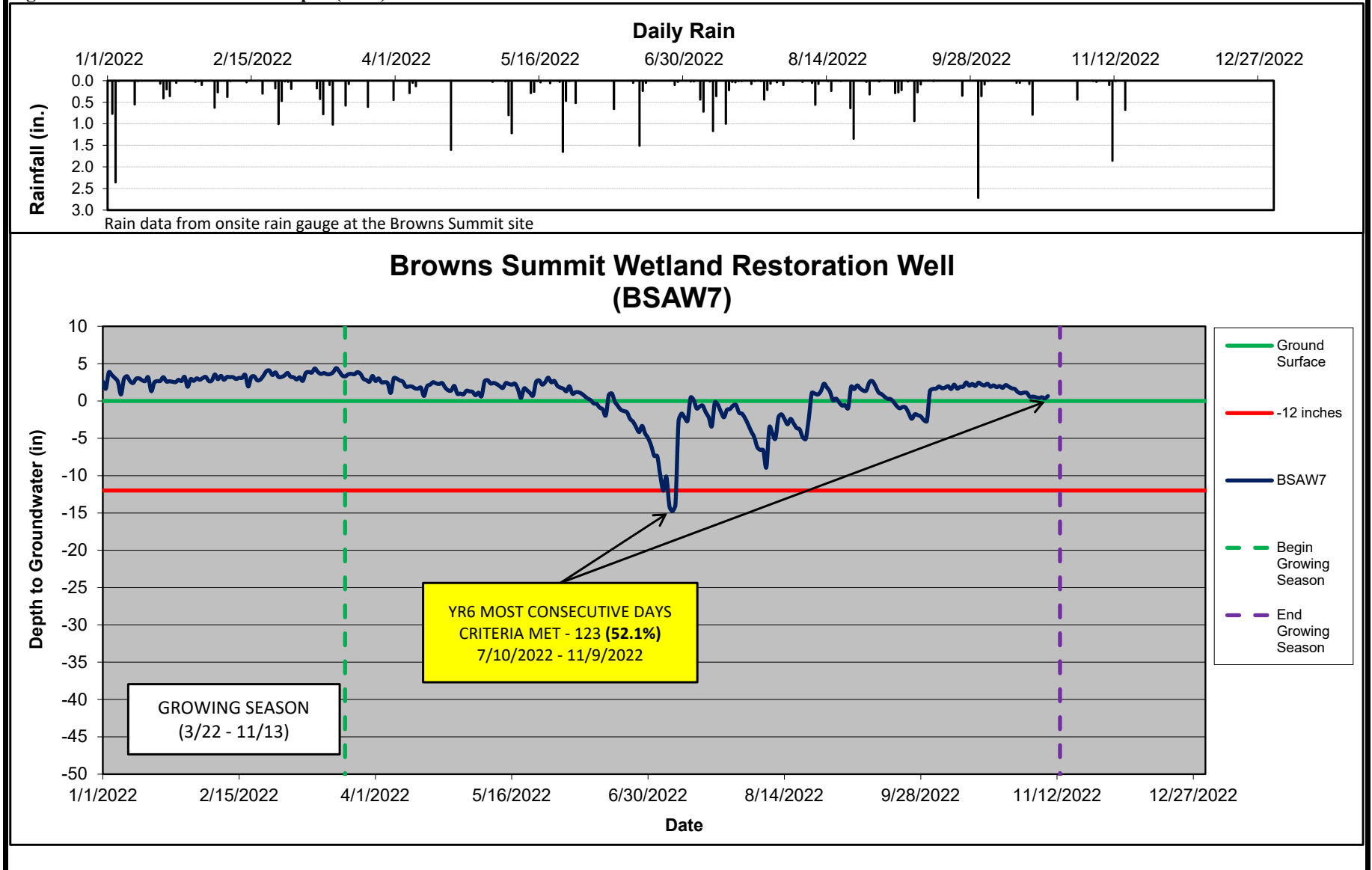


Figure 7. Wetland Restoration Graphs (2022) Continued

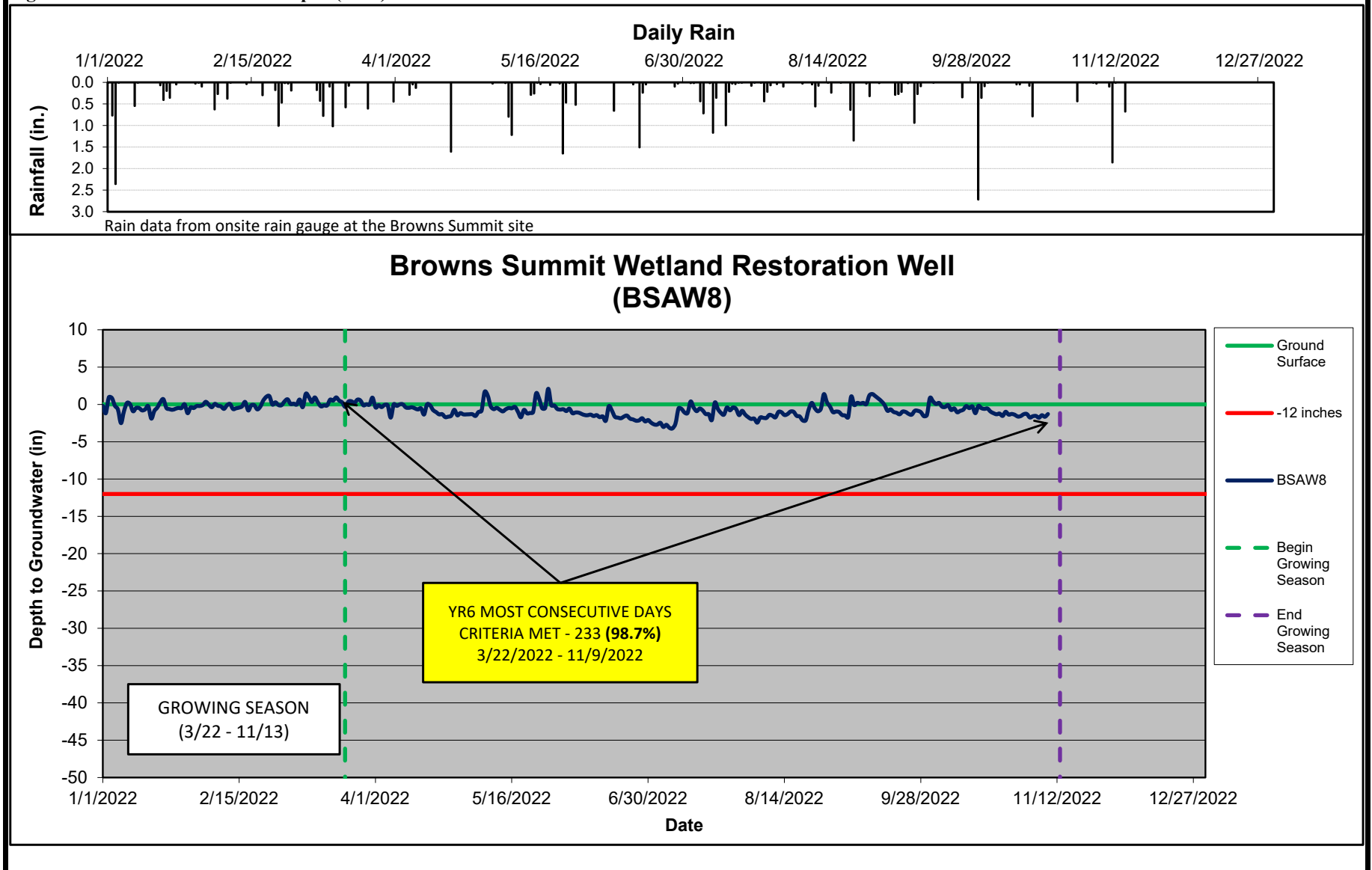


Figure 7. Wetland Restoration Graphs (2022) Continued

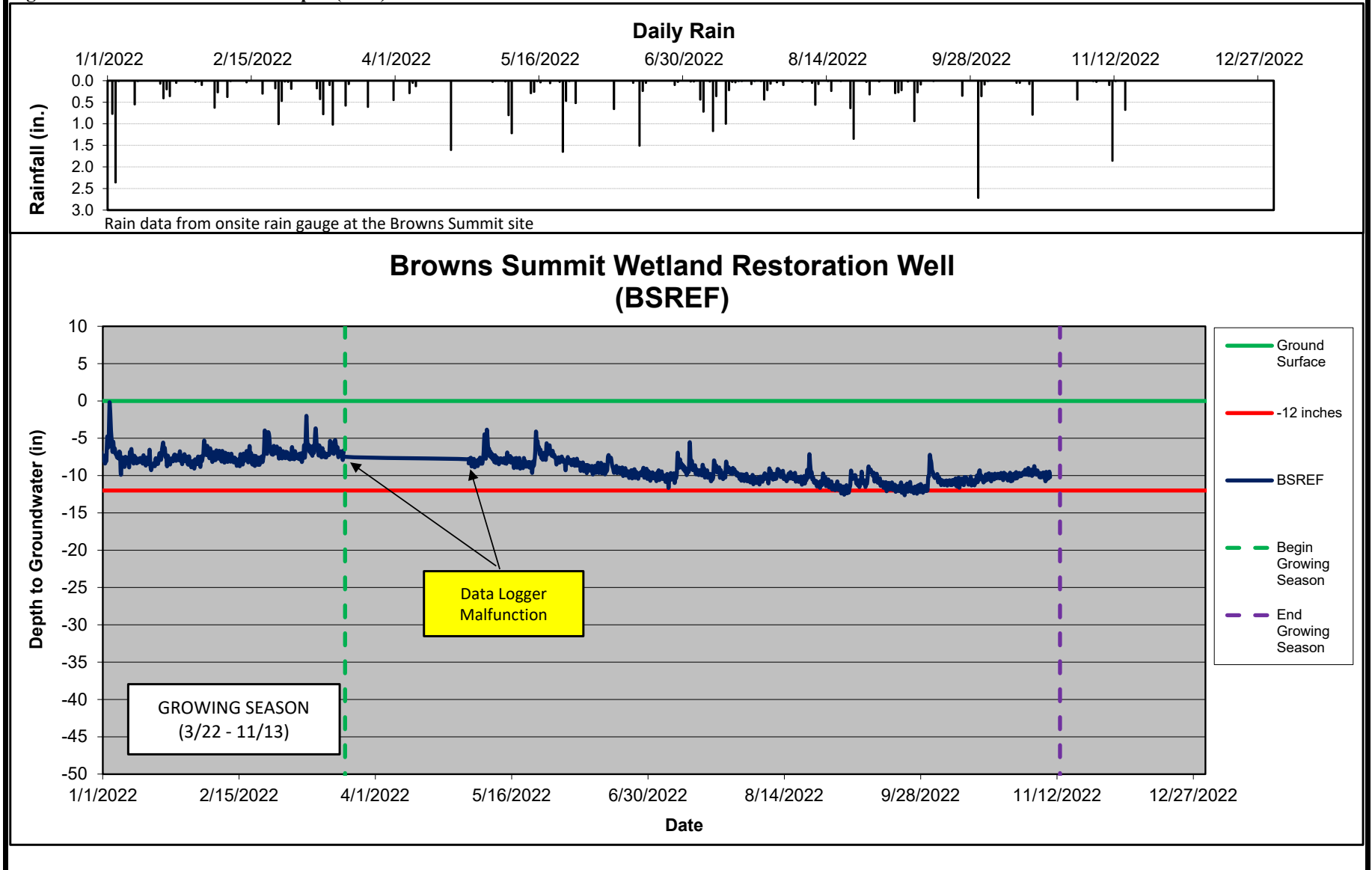
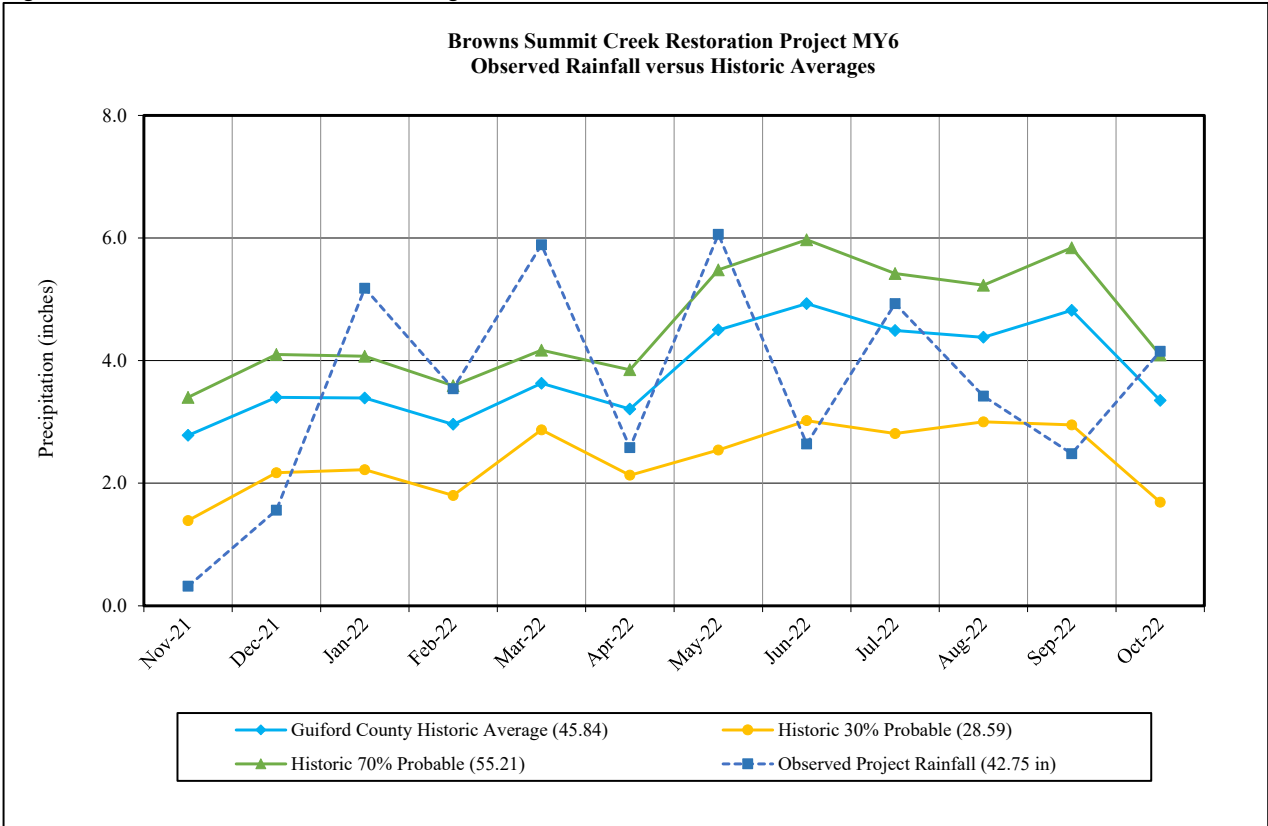


Figure 8. Observed Rainfall Versus Historic Averages



Browns Summit Creek Restoration Project – Hydrology Monitoring Stations Photos
Photos taken on (11/8/2022) unless noted different



Manual Crest Gauge – Reading 3/22/22 (No Reading)



Manual Crest Gauge



Wetland Well 1 – Reach 4, Station 25+00



Wetland Well 2 – Reach 2, Station 47+00



Wetland Well 3 – Reach 1, Station 52+00



Wetland Well 4 – Reach 1, Station 55+00

Browns Summit Creek Restoration Project – Hydrology Monitoring Stations Photos
Photos taken on (11/8/2022) unless noted different



Wetland Well 5 – Reach 1, Station 58+00



Wetland Well 6 – Reach 1, Station 61+00



Wetland Well 7 – Reach 1, Station 63+50



Wetland Well 8 – Reach 4, Station 23+00

Appendix F

Adjusted Wetland Boundary Report

Browns Summit Creek Restoration Project
 NCDMS Project ID No. 96313, NCDEQ Contract No. 5792
 USACE Action ID: SAW-2014-01642 NCDWR No. 14-0332
 Cape Fear River Basin: 03030002-010020
 Recorded By: Terry Burhans, PWS, CPSS

WETLAND BOUNDARY ADJUSTMENT MEMORANDUM

This memorandum as suggested by the interagency Review Team (IRT) serves as a wetland boundary adjustment to restored wetlands proposed in the original Browns Summit Creek Restoration Project. The Browns Summit Creek Restoration Project Stream and Wetland Mitigation Plan, prepared by Michael Baker Engineering in January of 2016, originally proposed to restore 3,3846 linear feet (LF) of jurisdictional stream, enhance 2,535 LF of stream and restore a total of 4.44 acres of wetland within the Haw River Headwaters Targeted Local Watershed (TLW) 03030002-010020. The location of the project is shown on the Project Vicinity Map (Figure 1). Credit Ratios for the original proposed features are included in the attached Restoration Summary Map (Figure 2).

Background

During the development and continued monitoring of the Browns Summit Creek Restoration Project, Eight (8) groundwater monitoring wells total have been installed within the proposed wetland mitigation areas. BSAW8 was installed during MY4 to gather additional data in adjacent wetlands. BSAW8, shown on the Wetland Areas Map (Figure 3) is located adjacent to wetland type 5 (Hydrologic reestablishment) where BSAW1 is located. BSAW8 data shows the wetland performing well above success criteria. Seven of the eight are performing successfully. One well, BSAW2 historically has not met criteria; therefore, Michael Baker plans to adjust the boundary of the proposed wetland restoration around this well and extend wetland boundaries in other areas where restoration has occurred within the conservation easement at a lower credit ratio to equal the contracted WMUs and avoid a loss of credits (Table 1).

TABLE 1. Adjusted Wetland Areas	Area	Ratio	Credits
Original Wetlands (Riparian, Restoration)			
R (1 – functioning wetlands)	1.53	3:1	0.51
R (2- degraded wetlands)	0.43	1.5:1	0.29
R (3 - partially functioning wetlands)	1.76	1.5:1	1.17
R (4 – filled wetlands)	0.45	1:1	0.45
R (5 – hydric soils)	0.27	3.5:1	0.08
<i>Original Proposed Totals</i>	4.44		2.50
Adjusted Wetlands (Riparian, Restoration)			
R (1 – functioning wetlands)	1.53	3:1	0.51
R (2- degraded wetlands)	0.43	1.5:1	0.29
R (3 - partially functioning wetlands)	2.55	1.5:1	1.70
R (4 – filled wetlands)	0	1:1	0.00
R (5 – hydric soils)	0.27	3.5:1	0.08
<i>Adjusted Totals</i>	4.78		2.58
Riparian Wetland Credit Difference			+0.08

Field Investigations

Field investigations were conducted in November of 2022 to verify the presence of indicators of wetland soil, wetland hydrology and hydrophytic vegetation in the proposed added wetland restoration areas. Soil bores were performed to confirm the locations and presence of hydric, marginal and upland soils on the landscape. The presence of hydric soils, combined with hydrology and vegetation and GIS analysis aided in the determination of

the adjusted restored wetland boundary within the conservation easement.

Adjusted Wetland Restoration Areas

As noted above, an area of filled wetlands around monitoring well BSAW2 has not met ground water hydrology establishment criteria. As such, area around this well that was previously proposed as a restoration wetland (type 4 – filled wetland) has been removed as credit toward Riparian wetland mitigation units (1:1 ratio). Alternatively, areas identified during field investigations on November 10, 2022 were determined to qualify as having at least partially functioning restored wetlands (restoration type R-3; credit 1.5:1). Soils within these wetland restoration areas were hydric and the areas expressed wetland hydrology indicators such as surface water, saturation, iron deposits, water-stained leaves, hydrogen sulfide odor and oxidized rhizospheres along living roots. Additionally, likely-hydrophytic vegetation was also noted including sedges (*Carex lurida*), black willow (*Salix nigra*), green bulrush (*Scirpus atrovirens*), American sycamore (*Platanus occidentalis*), and Smooth alder (*Alnus serrulata*). These areas identified on the November 10, 2022 field visit were deemed to qualify for a wetland restoration ratio of 1.5:1 toward WMUs. Table 1 summarizes the net gain of 0.08 WMUs after Wetland Boundary Readjustment.

It should be noted that these adjusted wetland areas are located within the existing Conservation Easement and had not previously been included as wetland areas in any existing jurisdictional determinations, nor had they been proposed as wetland restoration areas with the original project proposal. These areas are also fenced off from cattle in the vicinity.

Best Regards

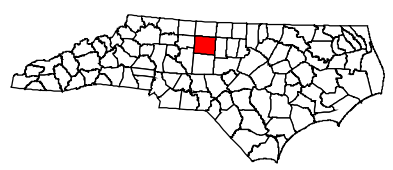
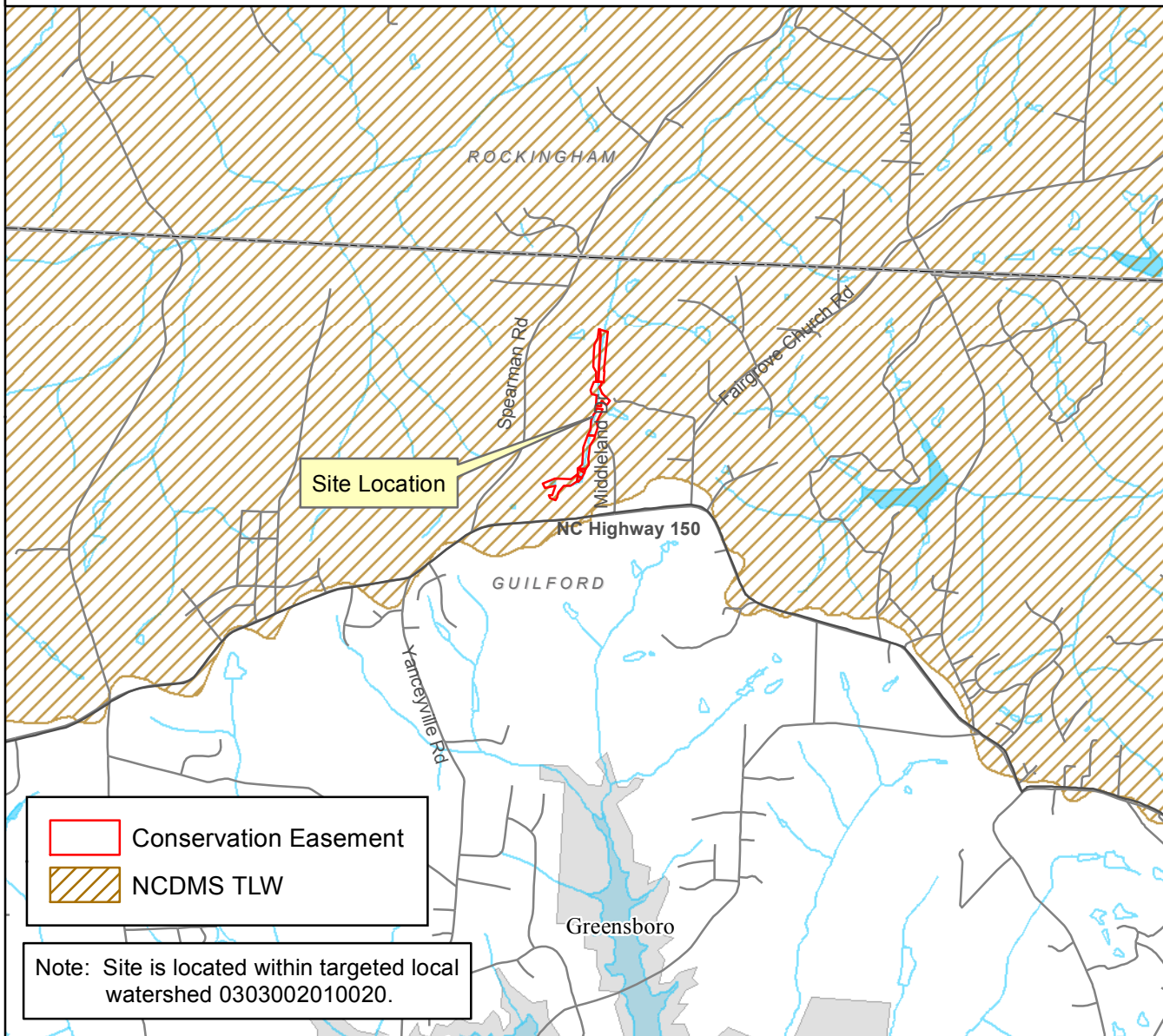


Terry Burhans, PWS, CPSS

Inclusions

Figure 1 Project Vicinity Map 3
 Figure 2 Restoration Summary Map 4
 Figure 3 Wetland Areas Map 5
 Figure 4 Adjusted Wetland Restoration Areas Map 7
 Site Photographs 9
 Soil Description Form 14

To access the site from Raleigh, take Interstate 40 and head west on I-40 towards Greensboro, for approximately 68 miles. Take the exit ramp to E. Lee St. (exit 224) towards Greensboro and continue for 2 miles before turning onto U.S. Highway 29 North. Once on U.S. Highway 29 North, travel north for approximately 10 miles before exiting and turning on to NC-150 West. Continue west on NC-150 for 5 miles. The project site is located along and between NC-150 and Spearman Rd., with access points through residences on Middleland Dr. and Broad Ridge Ct. The subject project site is an environmental restoration site of the NCDEQ Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with DMS.



Guilford County

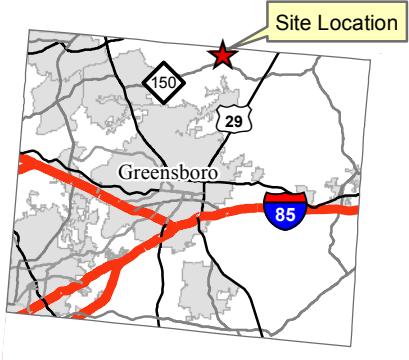
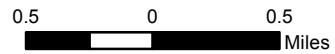


Figure 1
Project Vicinity Map
Browns Summit (DMS# 96313)

NCDEQ - Division
of Mitigation Services



Michael Baker
INTERNATIONAL





Conservation Easement

Restoration Feature Approach

— Restoration, 1:1

- - - Enhancement I, 1.5:1

- - - Enhancement II, 2.5:1

- - - BMP, 1.5:1

Wetland Mitigation Types

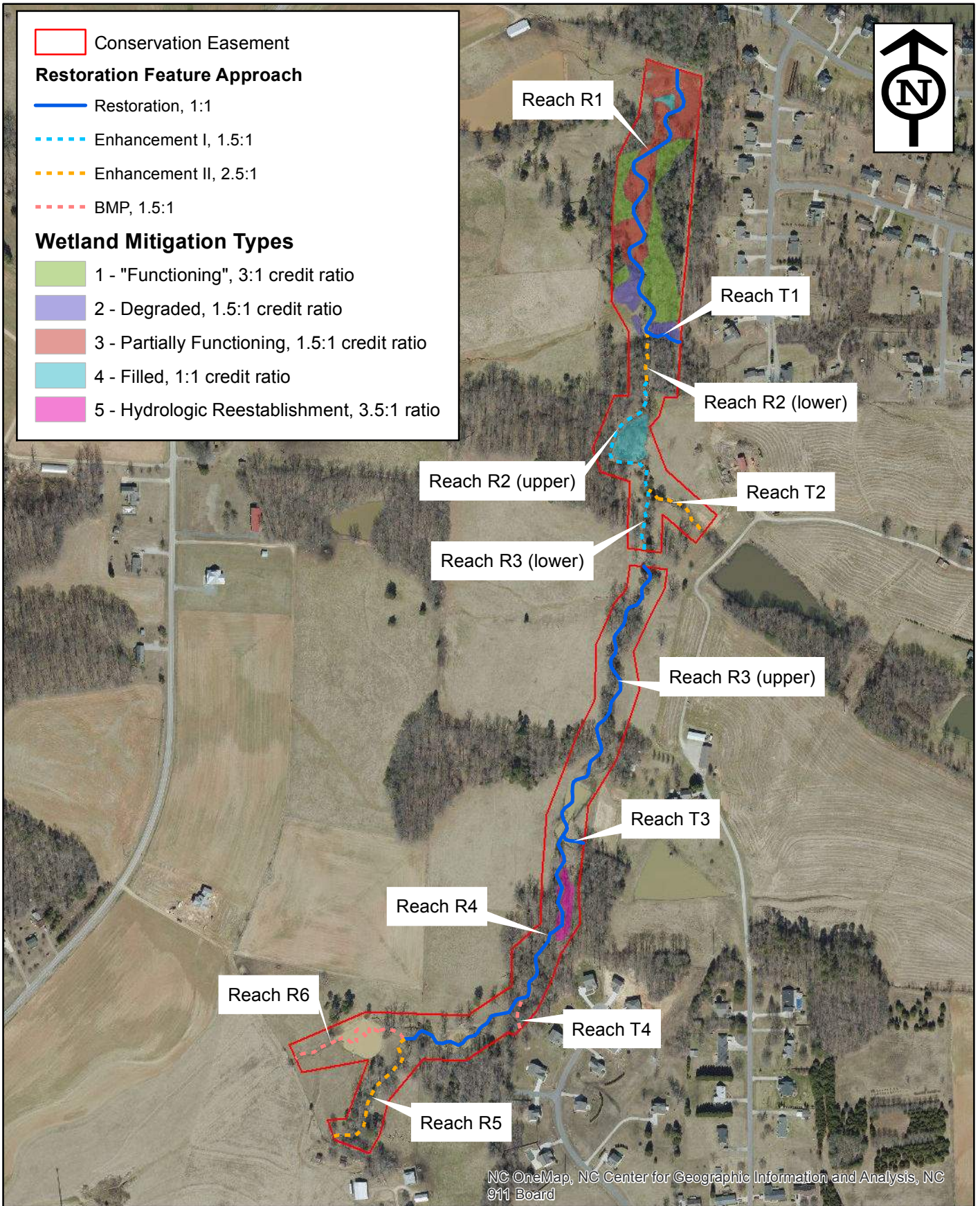
1 - "Functioning", 3:1 credit ratio

2 - Degraded, 1.5:1 credit ratio

3 - Partially Functioning, 1.5:1 credit ratio

4 - Filled, 1:1 credit ratio

5 - Hydrologic Reestablishment, 3.5:1 ratio



NC OneMap, NC Center for Geographic Information and Analysis, NC 911 Board

Michael Baker
INTERNATIONAL

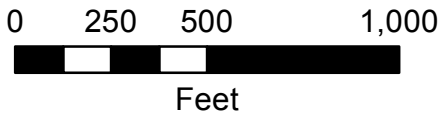
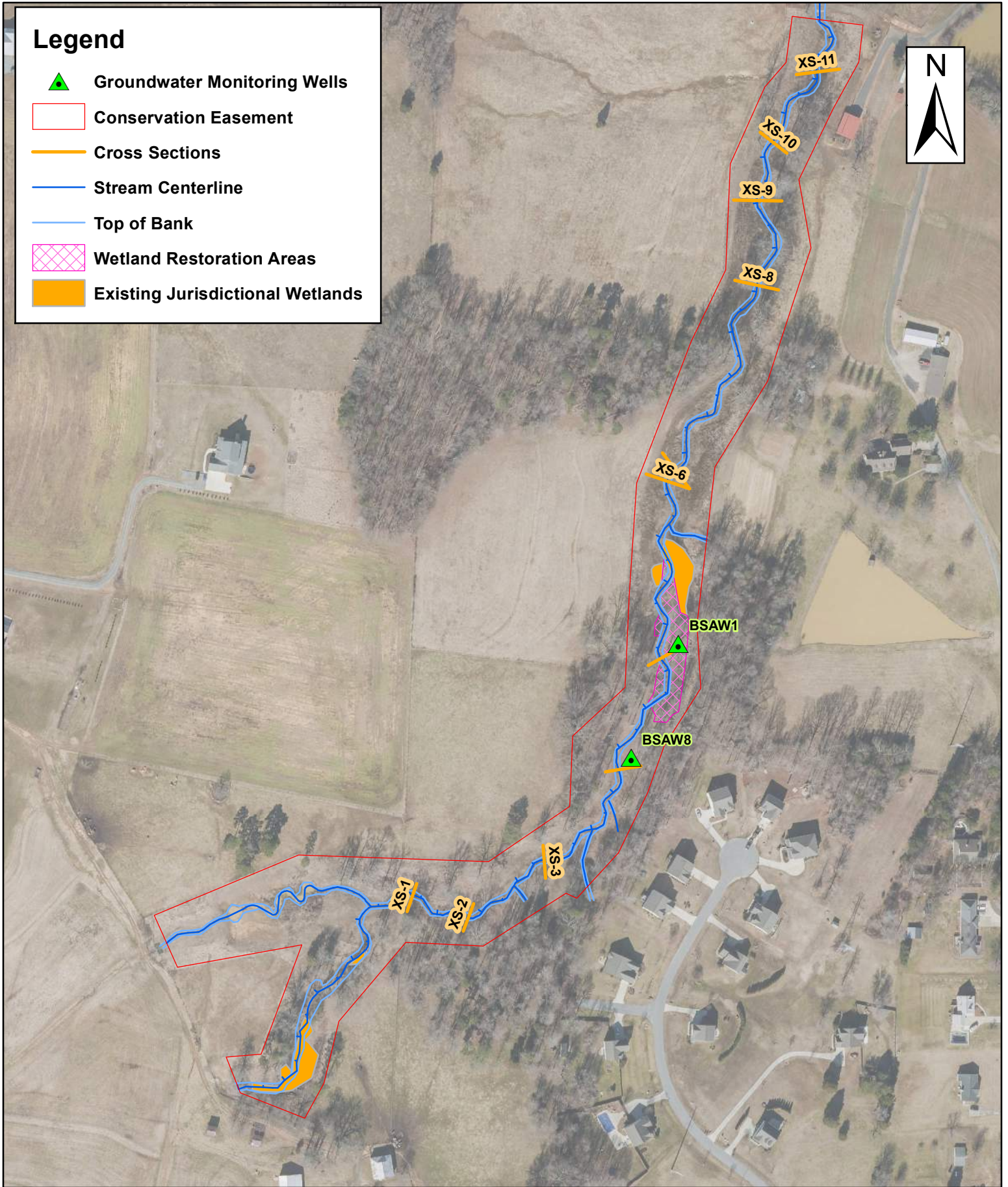


Figure 2
Restoration Summary Map
Browns Summit Site
(DMS #96313)

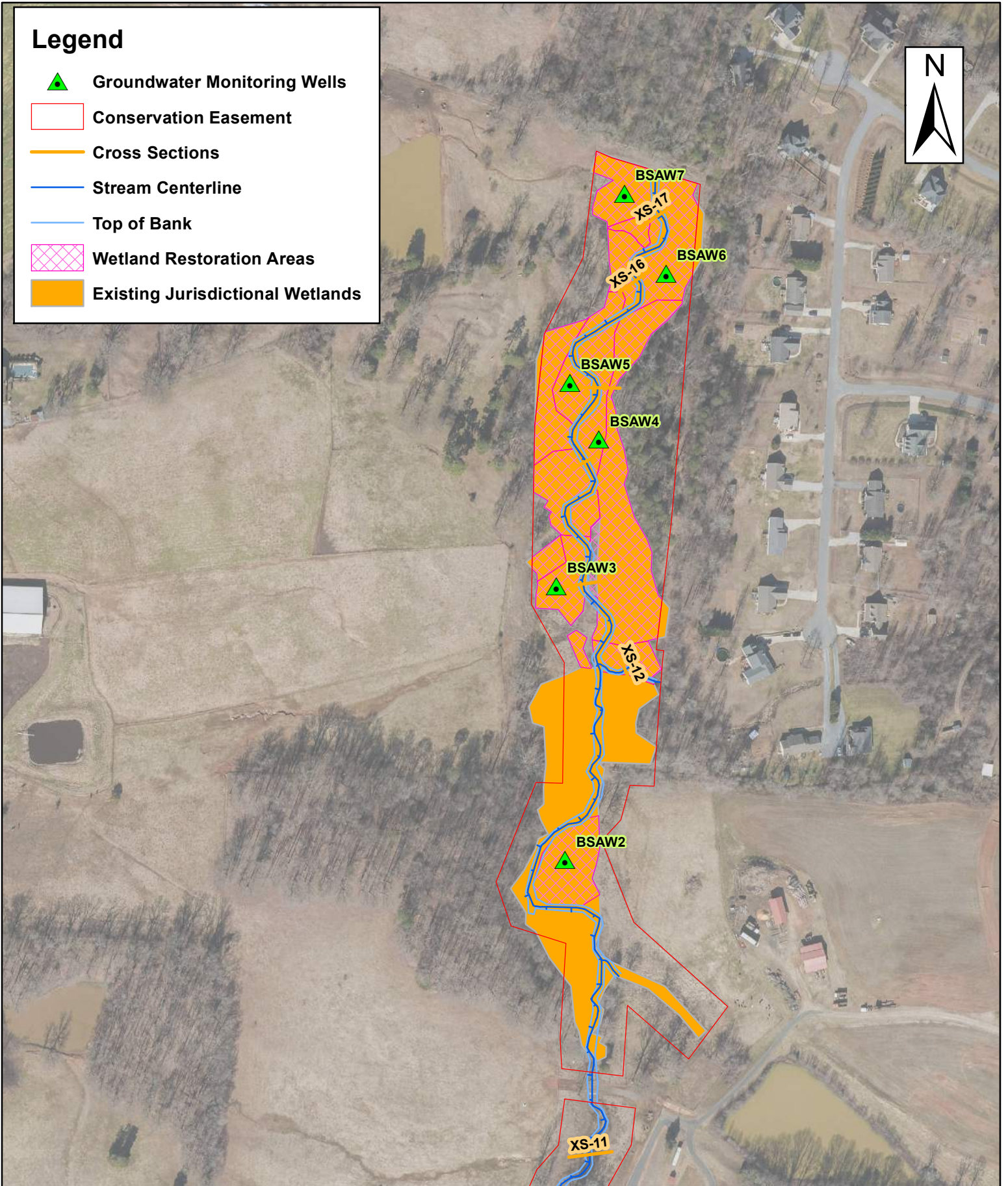
Legend

-  Groundwater Monitoring Wells
-  Conservation Easement
-  Cross Sections
-  Stream Centerline
-  Top of Bank
-  Wetland Restoration Areas
-  Existing Jurisdictional Wetlands



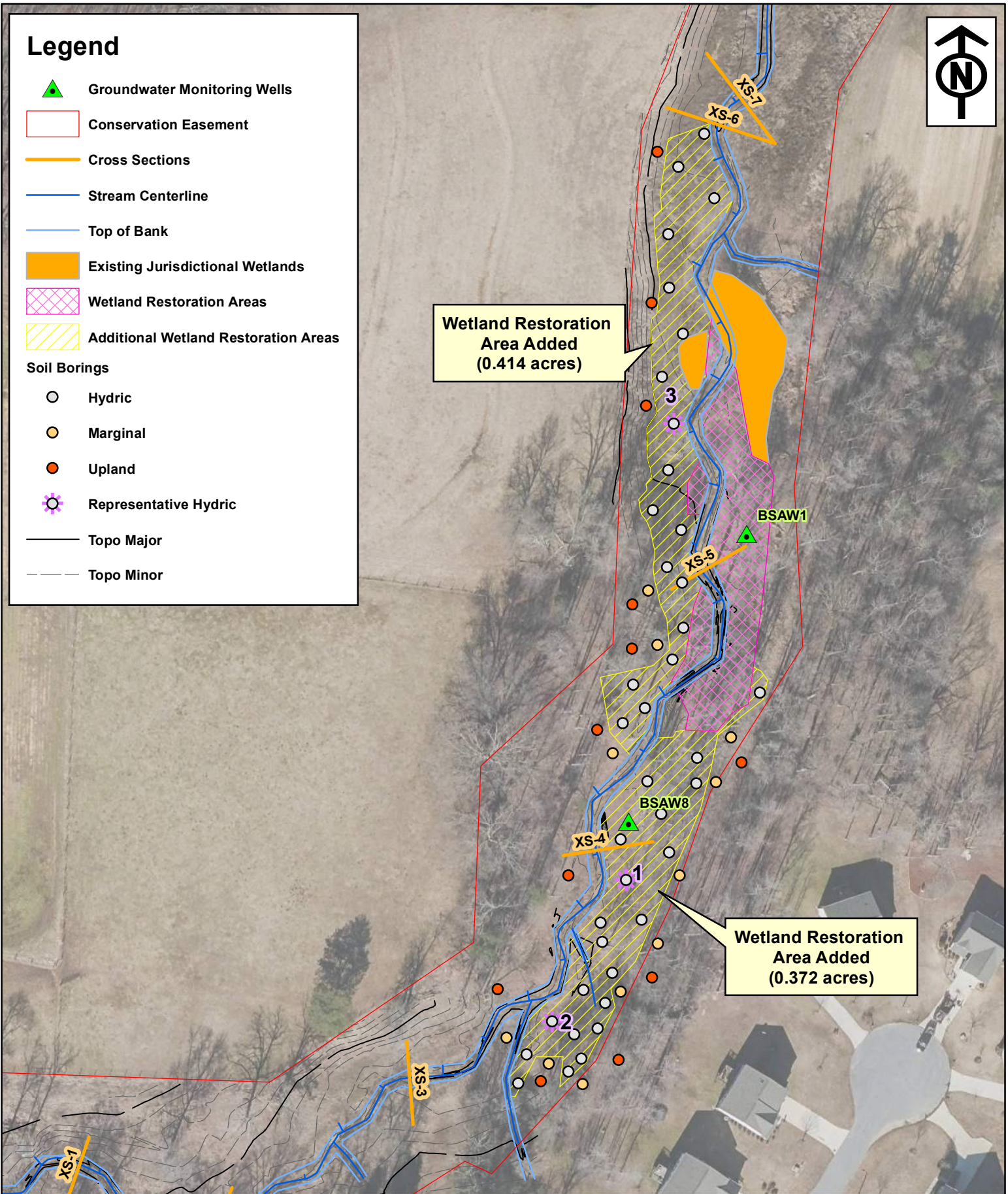
Legend

-  Groundwater Monitoring Wells
-  Conservation Easement
-  Cross Sections
-  Stream Centerline
-  Top of Bank
-  Wetland Restoration Areas
-  Existing Jurisdictional Wetlands



Legend

-  Groundwater Monitoring Wells
 -  Conservation Easement
 -  Cross Sections
 -  Stream Centerline
 -  Top of Bank
 -  Existing Jurisdictional Wetlands
 -  Wetland Restoration Areas
 -  Additional Wetland Restoration Areas
- Soil Borings
-  Hydric
 -  Marginal
 -  Upland
 -  Representative Hydric
-  Topo Major
 -  Topo Minor

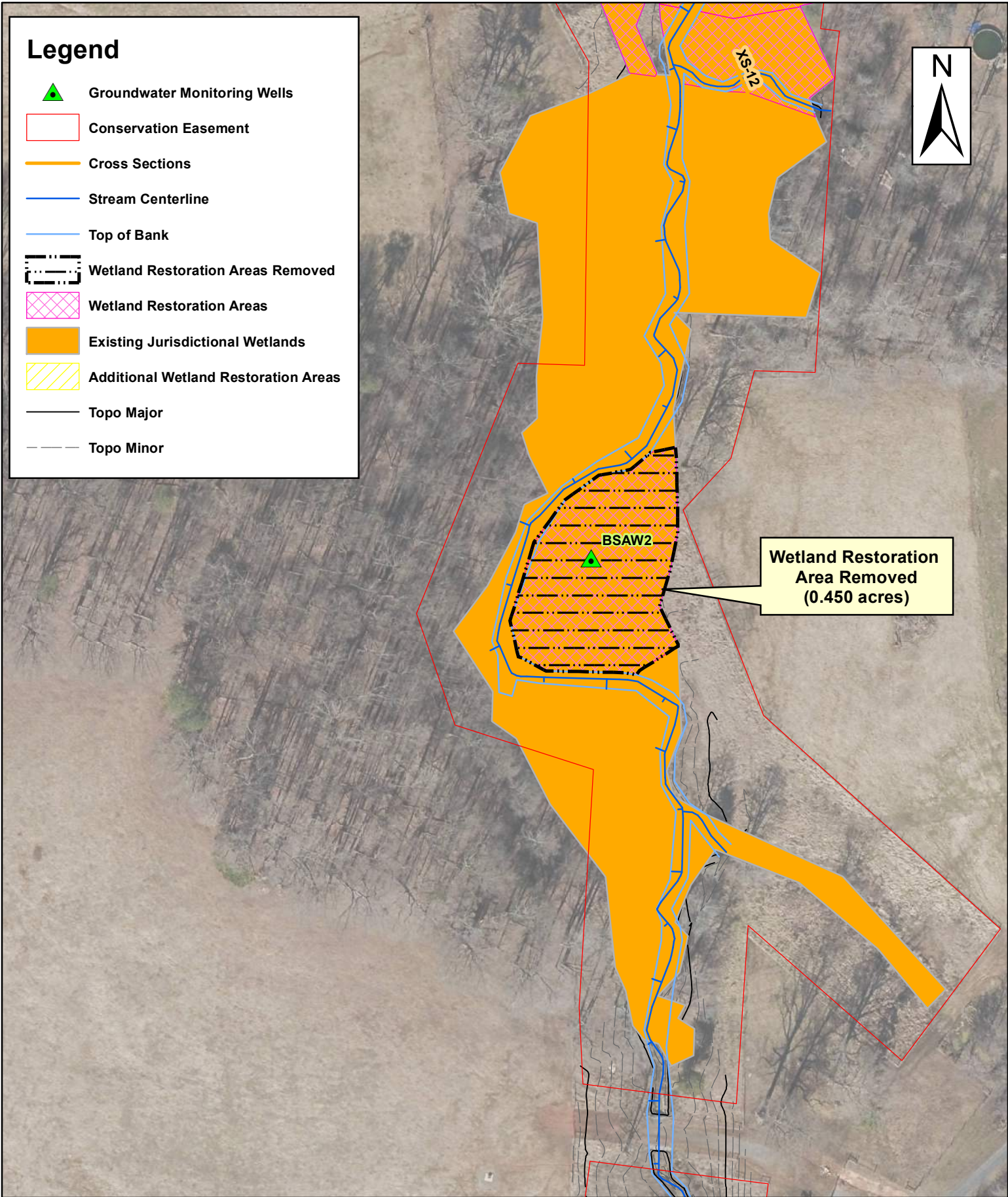


Wetland Restoration Area Added (0.414 acres)

Wetland Restoration Area Added (0.372 acres)

Legend

-  Groundwater Monitoring Wells
-  Conservation Easement
-  Cross Sections
-  Stream Centerline
-  Top of Bank
-  Wetland Restoration Areas Removed
-  Wetland Restoration Areas
-  Existing Jurisdictional Wetlands
-  Additional Wetland Restoration Areas
-  Topo Major
-  Topo Minor



Brown Summit Creek Restoration Project

NCDMS Project ID No. 96313, NCDEQ Contract No. 5792 USACE Action ID: SAW-2014-01642

NCDWR No. 14-0332 Cape Fear River Basin: 03030002-010020



Photo 1. A view North along added wetland restoration area.



Photo 2. Hydric Soil present throughout added wetland restoration area.



Photo 3. Hydric Soil present throughout added wetland restoration area.



Photo 4. Hydric Soil present throughout added wetland restoration area.



Photo 5. Hydric Soil present throughout added wetland restoration area.



Photo 6. Hydric Soil present throughout added wetland restoration area.



Photo 7. Hydric Soil present throughout added wetland restoration area.



Photo 8. Hydric Soil present throughout added wetland restoration area.



Photo 9. Hydric Soil present throughout added wetland restoration area.



Photo 10. Hydric Soil present throughout added wetland restoration area.

