

Browns Summit Creek Restoration Project Year 7 Monitoring Report/Closeout 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: 7 of 7
 Year of Data Collection: 2023
 Year of Completed Construction (including planting): 2017
 Submission Date: November 2023

Submitted To: NCDEQ - Division of Mitigation Services
 1652 Mail Service Center
 Raleigh, NC 27699-1652

January 18, 2024

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

Subject: Response to Task 13 Draft Year 7 Monitoring/Closeout 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 7 Monitoring/Closeout Report Comments dated December 22, 2023 regarding the Browns Summit Creek Mitigation Project. We have revised the Year 7 Monitoring/Closeout Report document in response to this review.

Report

Comment: Figure 4.1 and 4.2: Please include the additional wetlands on the CCPV and note the wetland be removed from credit.

Response: Revision made as requested.

Comment: Appendix C: The mitigation plan states vegetation at year 7 should average between 7 and 10ft in height (not including some shrub species). Please include vegetation height data (average per plot minimum) and discuss in the narrative.

Response: 6 of the 14 vegetation plots did not meet the 7 to 10 ft average height. However, the average height throughout the plots is 8.2 ft. Table 8 in Appendix C and the narrative have been revised as requested.

Comment: Appendix D: One of the photos associated with cross-section 8 is not displaying correctly; please update

Response: Revision made as requested.

Comment: Appendix E: DMS encourages Michael Baker to include gauge data for the entirety of the growing season in the final submittal.

Response: Michael Baker understands the importance of gauge data through the entirety of the growing season. We aim to download gauge data as close to the end of the growing season as possible; however, in MY7 our download date was sufficient to capture success.

Comment: Appendix E, Rainfall Graph: Please update rainfall data to include any monthly rainfall up to final submission.

Response: Revisions have been made as requested.

Digital files

Comment: Please submit a comprehensive wetland shapefile with areas removed, areas added, including restoration level and credit ratio.

Response: Wetland file has been revised and included in the e-submission folder.

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 7 Monitoring/Closeout Report, please contact me at 919-464-5003 or via email at Andrew.Powers@mbakerintl.com.

Sincerely,



Andrew Powers

Michael Baker Engineering, Inc.

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Guilford County, North Carolina

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Cape Fear River Basin: 03030002-010020

Report Prepared and Submitted by Michael Baker Engineering, Inc.

NC Professional Engineering License # F-1084



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*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. 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 storm water and for sediment to settle out of the water column;
- Construct a step pool BMP channel to capture and disperse storm flow volume and velocity 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 7 monitoring, visual site inspections were conducted throughout the year. The survey data of the seventeen cross-sections indicates that those stream transects are stable and any minor fluctuations in their geometry from previous years are within what might be expected for natural, stable streams. All reaches are geomorphically stable and performing as designed, as confirmed by the visual stability assessment. All stream riffle beds are vertically stable, the pools are maintaining depth, stream banks are stable and vegetating, and in-stream structures are physically intact and performing as designed. No Stream Problem Areas (SPAs) were identified. Small areas of invasive species (Privet and Multiflora Rose) were treated on R1 and R2 during June and October 2023. In March 2023, Michael Baker added soil amendments to MY6 VPA to improve the soil quality so that the native grasses surrounding the area will grow. Throughout the seven years of the project this area has been a slow to establish herbaceous vegetation. Although, with soil amendments and minor supplemental planting and seeding the area has improve. These areas can be found on the CCPV in Appendix B.

During Year 7 monitoring, the R1 crest gauge recorded one bankfull event of 1.00 ft. The fall overbank event did not give an accurate reading partially due to an infestation of ants within the cork at the bottom of the gauge. The site has already met the bankfull flow requirement of two bankfull events during two separate monitoring years previously (MY1 and MY2).

Nine 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. BSAW 9 was installed during MY7 to gather additional data to support the wetland boundary adjustment. Eight of the nine are performing successfully. One well did not meet success (BSAW2). BSAW2 historically has not met criteria; therefore, Michael Baker proposed a wetland boundary line adjustment during MY6. The adjusted wetland boundary report can be found in Appendix F.

As the observed monthly rainfall data for the project presented in Appendix E figure 8 demonstrates, the past 12 months (3 out of 12 months) have been dryer as compared to historic averages for Guilford County. A total of 40.43 inches of rainfall was observed for the project using the North Carolina Multi-Sensor Precipitation Estimates (MPE) station, while Guilford County averages 45.84 inches of annual rainfall. The bulk of this excess rainfall came over the spring of 2023, while the summer and fall of 2023 were well below the monthly average.

In summation, the past seven monitoring years have demonstrated that the Browns Summit Creek Restoration Project has met the performance standards and success criteria for vegetation, stream flow, and channel stability. The vegetation plot data shows that over the seven years there has been consistent vegetation density, height, and vigor throughout the site. The only vegetation concern noted during the monitoring phase was for a relatively small portion of the total project buffer with poor growth, but it has been successfully ameliorated. The as-built stem density averages 705 stems/acre and after seven years the stem density averages 468 stems/acre. This meets the closeout success criteria and demonstrates that the site has established good woody vegetation within its riparian buffer. 6 of the 14 vegetation plots did not meet the average height requirement. The stunted heights in some vegetation plots are likely due to poor soils when the floodplain was graded. However, volunteer species and herbaceous grasses have established within the plots and surrounding buffer area. Lastly, the average height of all the vegetation plots is 8.2 feet, which falls between the success criteria. The stream flow gauges on T1, T3, and Reach 4 Lower have demonstrated substantial seasonal flow throughout the monitoring phase. All but one wetland monitoring gauge (BSAW 2) have successfully passed every year throughout the monitoring phase. The site has received multiple overbank events throughout the monitoring phase and endured a couple hurricanes. Finally, the cross-sections throughout the seven monitoring years show channel stability with little erosion or aggradation, with all their final morphological parameters within an appropriate range. Additional photographs have been provided in Appendix B to show a comparison of a few historic and current photos of the site.

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 7 monitoring activities for the post-construction monitoring period. 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 7 visual site assessment was collected in October 2023. 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 (MY1).

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 during two separate years.

2.1.3 Photographic Documentation

Visual inspection of the site was conducted at a minimum of twice a year. Representative photographs for Monitoring Year 7 were taken along each Reach in October 2023 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 7 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 vegetation planting success criteria were achieved, vegetation-monitoring quadrants were installed and 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. Fourteen plots were established at random locations within the easement area at this site and evaluated using Monitoring Levels 1 and 2. Individual quadrants are 100 square meters for woody tree species.

2.3 Wetland Assessment

Nine (9) 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.

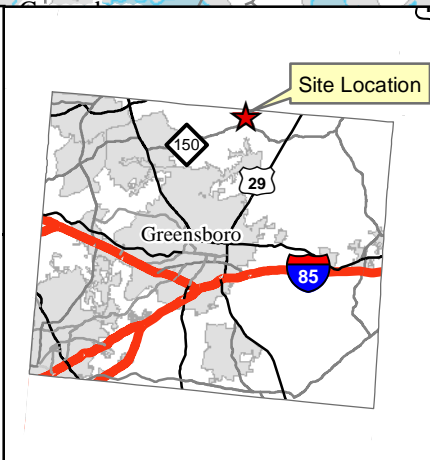
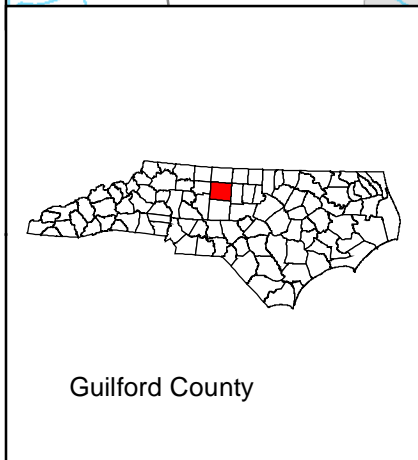
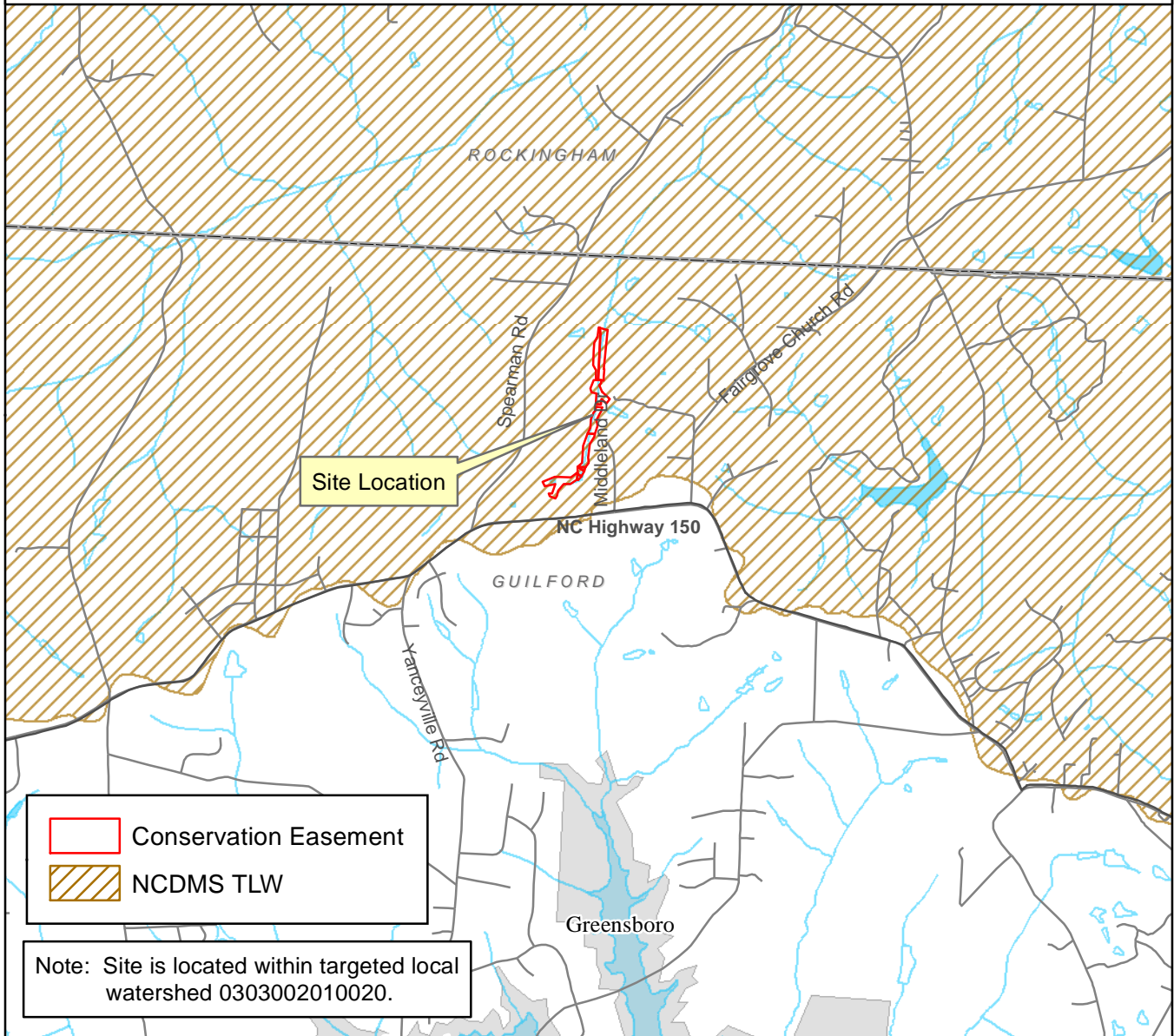


Figure 1
Project Vicinity Map
Browns Summit (DMS# 96313)

NCDEQ - Division
of Mitigation Services

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0.5 0 0.5
Miles

Conservation Easement

Restoration Feature Approach

Restoration

Enhancement I

Enhancement II

No Credit

Wetland Mitigation Types

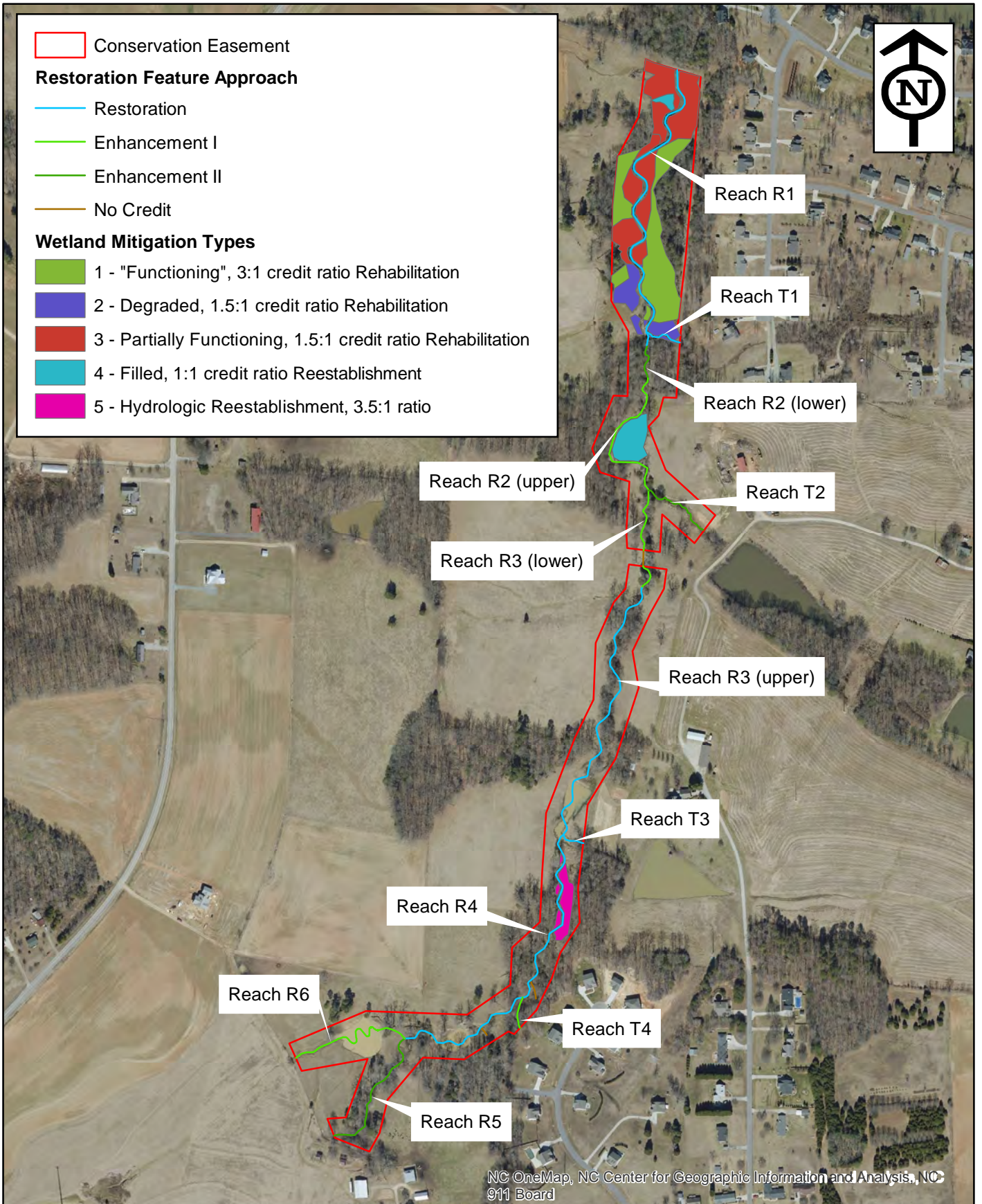
1 - "Functioning", 3:1 credit ratio Rehabilitation

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



Michael Baker
INTERNATIONAL

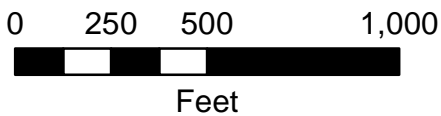
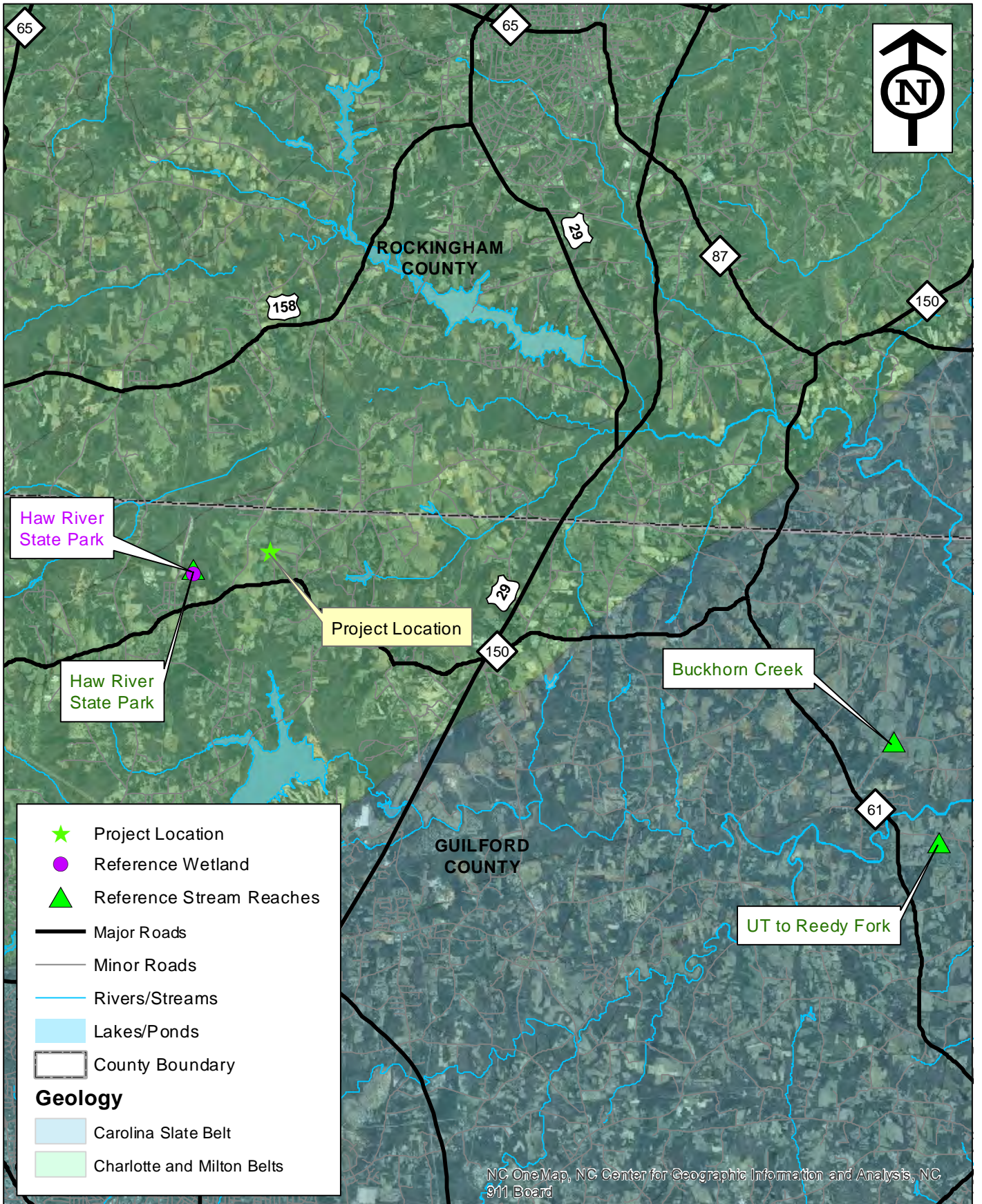


Figure 2
Restoration Summary Map
Browns Summit Site
(DMS #96313)



Michael Baker
INTERNATIONAL

2 1 0 2
Miles

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	January 30, 2023
Invasive Treatment	May 5, 2022		
Year 7 Monitoring	December 1, 2023	Oct-23	
Invasive Treatment	June 8 and October 10, 2023		

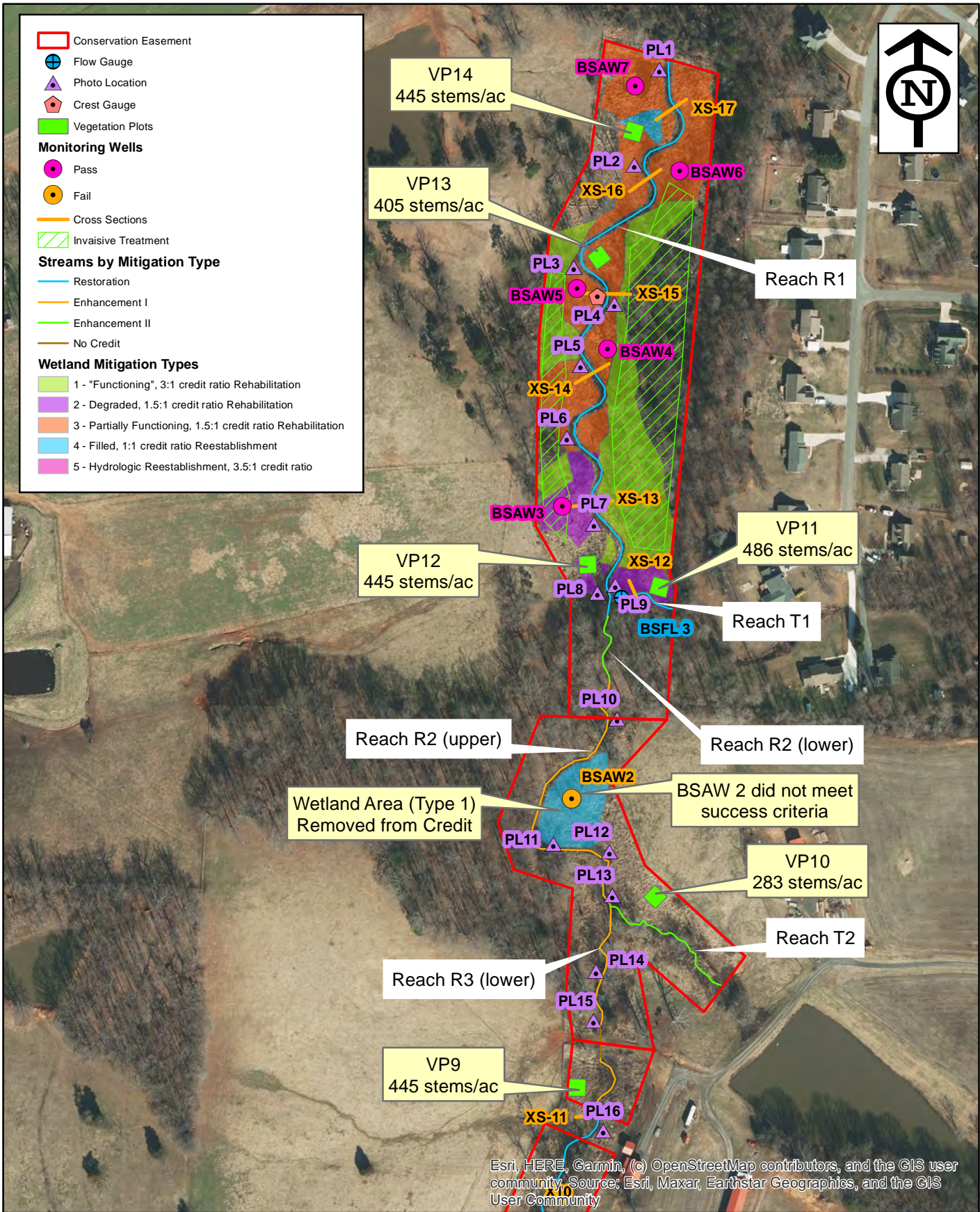
* Monitoring schedule completion dates updated based on completion of construction.

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



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

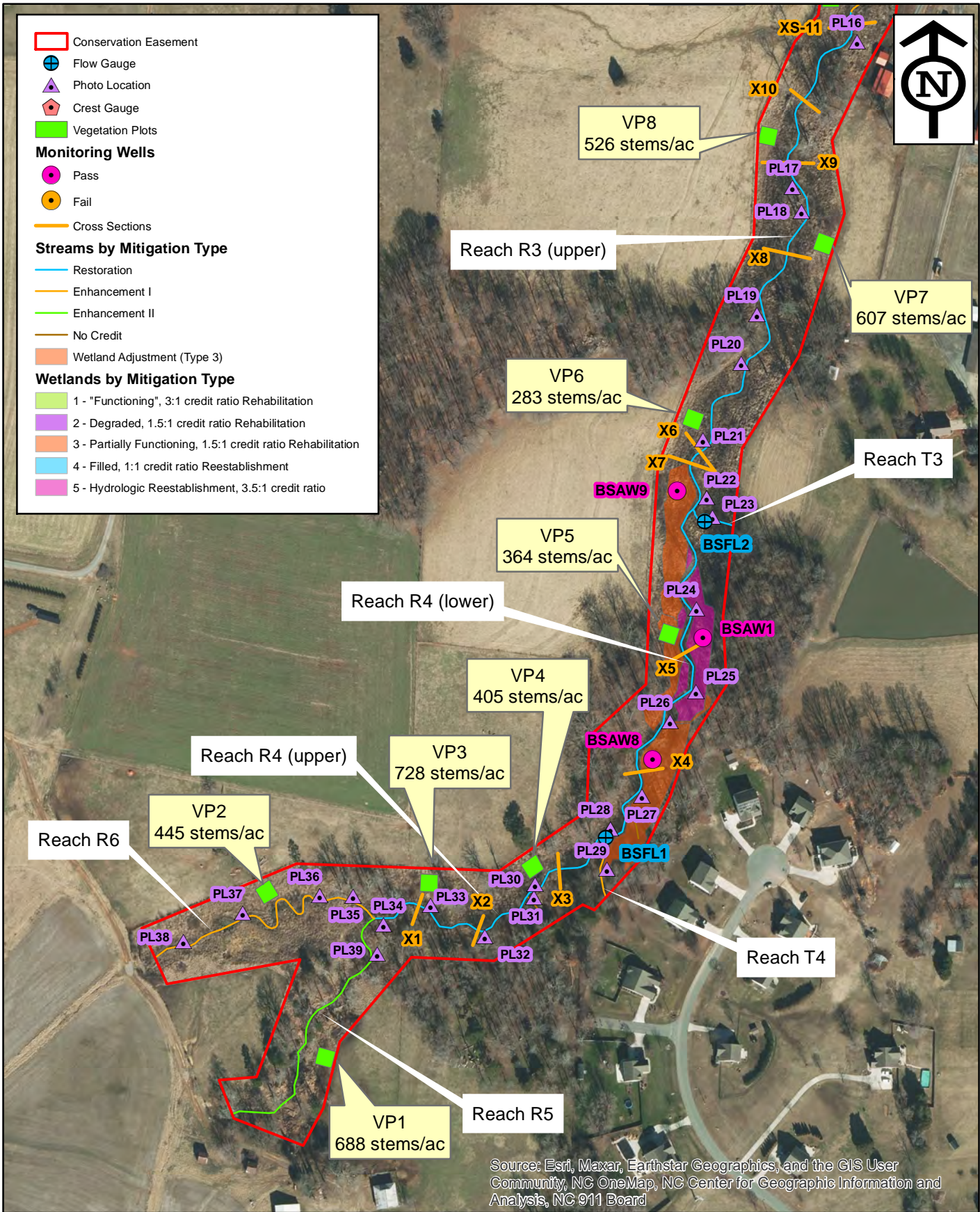


Table 5. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID		R1								
Assessed Length		1,290								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	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 <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.	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 ≥ 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 not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	5	5			100%				
	4. Habitat	Pool forming structures maintaining - Max Pool Depth : Mean Bankfull Depth ratio \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 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.	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 not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	7	7			100%				
	4. Habitat	Pool forming structures maintaining - Max Pool Depth : Mean Bankfull Depth ratio \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 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.	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 not 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 ≥ 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 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.	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 not 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 ≥ 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 \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		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 ≥ 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 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		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 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.	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 ≥ 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 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.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	1	1			100%			
	4. Habitat	Pool forming structures maintaining - Max Pool Depth : Mean Bankfull Depth ratio \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 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.	8	8			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	8	8			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	8	8			100%			

Table 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 October 31, 2023 (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 October 31, 2023 (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 October 31, 2023 (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 October 31, 2023 (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 October 31, 2023 (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 October 31, 2023 (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



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

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take October 31, 2023 (All photos are viewing upstream)



Photo Point 37 – Station 11+90, Reach 6



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



Photo Point 39 – Station 15+00, Reach 5

Browns Summit Creek Restoration Project – Additional Photos



Reach 1 bottom of the project (Asbuilt)



Reach 1 bottom of the project (Year 7)



Reach 1 riffle with adjacent wetlands (Asbuilt)



Reach 1 riffle with adjacent wetlands (Year 7)



Reach 2 Upper enhancement 1 (Asbuilt)



Reach 2 Upper enhancement 1 (Year 7)

Browns Summit Creek Restoration Project – Additional Photos



Reach 3 Upper (Asbuilt)



Reach 3 Upper (Year 7)



BMP on Reach 6 (Asbuilt)



BMP on Reach 6 (Year 7)



Wetland on left floodplain of Reach 1 (Asbuilt)



Wetland on left floodplain of Reach 1 (Year 7)

Browns Summit Creek Restoration Project – Vegetation Plot Photo Stations

Photos taken October 10, 2023



Vegetation Plot 1



Vegetation Plot 2



Vegetation Plot 3



Vegetation Plot 4



Vegetation Plot 5



Vegetation Plot 6

Browns Summit Creek Restoration Project – Vegetation Plot Photo Stations

Photos taken October 10, 2023



Vegetation Plot 7



Vegetation Plot 8



Vegetation Plot 9



Vegetation Plot 10



Vegetation Plot 11



Vegetation Plot 12

Browns Summit Creek Restoration Project – Vegetation Plot Photo Stations

Photos taken October 10, 2023



Vegetation Plot 13



Vegetation Plot 14

Appendix C

Vegetation Plot Data

Table 7. CVS Density Per Plot		Current Plot Data (MY7 2023)																								
Browns Summit Creek Restoration Project: DMS Project No ID. 96313		CVS Project Code 140048. Project Name: Browns Summit																								
Scientific Name	Common Name	140048-01-0001			140048-01-0002			140048-01-0003			140048-01-0004			140048-01-0005			140048-01-0006			140048-01-0007			140048-01-0008			
		Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	
Acer negundo	Boxelder	1		1	3		3	3		3									3	3		1	1		1	
Acer rubrum	Red maple		10	10								10	10						3	3						
Alnus serrulata	Tag Alder																		3	3						
Baccharis	High-tide Bush				2	2													1	1						
Betula nigra	River Birch	3		3	3		2	2		2				3		3	3		3	3	2	3	5	1		1
Callicarpa americana	Beautyberry																									
Carpinus caroliniana	Ironwood							3		3	2		2	1		1					1		1	1		1
Celtis laevigata	Sugarberry																									
Cornus amomum	Silky Dogwood																									
Diospyros virginiana	Poosumwood	1		1				2		2																
Euonymus americanus	Strawberry-bush																									
Fraxinus pennsylvanica	Green Ash	4		4	2		2	2		2	4		4	3		3	2		2		4		4	4	2	6
Hamamelis virginiana	Witch hazel																							2	2	2
Ilex opaca	American Holly																									
Ilex verticillata	Winterberry							1		1																
Juniperus virginiana	Cedar				2	2																				
Liquidambar styraciflua	Sweet Gum, Red Gum		3	3				5	5		10	10		10	10											
Liriodendron tulipifera	Tulip poplar	1	2	3	2		2							1	1	2		3	3	3	4	7				
Nyssa sylvatica	Black Gum										1		1										1			1
Pinus echinata	Shortleaf Pine				10	10					3	3						4	4							
Platanus occidentalis	Sycamore	2		2	1		1	4		4				1	1	2	2	2	2	2	2	4	1			1
Quercus alba	White Oak																									
Quercus lyrata	Overcup Oak	1		1																	1		1	2		2
Quercus michauxii	Swamp Chestnut Oak	2		2				1		1											1		1			
Quercus phellos	Willow Oak	2		2																						
Rhus copallinum	Sumac																									
Salix nigra	Black Willow														2	2										
Sambucus canadensis	Common Elderberry																									
Ulmus americana	Elm										1	1	2								1		1			
Viburnum dentatum	Arrow-wood																									
Viburnum nudum	Southern Wild Raisin, Possumhaw																									
	Stem count	17	15	32	11	14	25	18	5	23	10	24	34	9	14	23	7	14	21	15	10	25	13	2	15	
	size (ares)	1			1			1			1			1			1			1			1			
	size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			
	Species count	9	3	11	5	3	8	8	1	9	6	4	9	5	4	7	3	5	8	8	4	9	8	1	8	
	Stems per ACRE	688	607	1295	445	567	1012	728	202	931	405	971	1376	364	567	931	283	567	850	607	405	1012	526	81	607	

		Current Plot Data (MY7 2023)															Annual Means									
Scientific Name	Common Name	140048-01-0009			140048-01-0010			140048-01-0011			140048-01-0012			140048-01-0013			140048-01-0014			MY7 (2023)			MY5 (2021)			
		Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	
Acer negundo	Boxelder	1		1												1		1	10		10	11		11		
Acer rubrum	Red maple																			24	24		28	28		
Alnus serrulata	Tag Alder																			3	3		1	1		
Baccharis	High-tide Bush																			3	3		4	4		
Betula nigra	River Birch				3	3	6	2	1	3	5	1	6	2		2	3		3	8	40	32	19	51		
Callicarpa americana	Beautyberry																									
Carpinus caroliniana	Ironwood	1		1										2		2			11		11	14		14		
Celtis laevigata	Sugarberry																					1		1		
Cornus amomum	Silky Dogwood																									
Diospyros virginiana	Poosumwood			1							1		1			1		1	5	1	6	5	1	6		
Euonymus americanus	Strawberry-bush																		1		1	1		1		
Fraxinus pennsylvanica	Green Ash	1		1	1		1	2		2	3		3			2		2	34	2	36	33	4	37		
Hamamelis virginiana	Witch hazel	2		2	1		1												5		5	5		5		
Ilex opaca	American Holly																					1		1		
Ilex verticillata	Winterberry																		1		1	1		1		
Juniperus virginiana	Cedar																			2	2		2	2		
Liquidambar styraciflua	Sweet Gum, Red Gum		2	2													1	1		31	31		20	20		
Liriodendron tulipifera	Tulip poplar																		7	10	17	7	9	16		
Nyssa sylvatica	Black Gum							1		1				1		1		2		2	6	6	6	6		
Pinus echinata	Shortleaf Pine																			17	17		11	11		
Platanus occidentalis	Sycamore	5	2	7	1		1	2		2	1		1			1		2	23	6	29	27	4	31		
Quercus alba	White Oak																									
Quercus lyrata	Overcup Oak							2		2	1		1	2	1	3			9	1	10	8	1	9		
Quercus michauxii	Swamp Chestnut Oak							1		1				2		2			7		7	7	1	8		
Quercus phellos	Willow Oak							1		1				1		1			4		4	4	1	5		
Rhus copallinum	Sumac																						1	1		
Salix nigra	Black Willow																	1		1	1	2	3	1	3	4
Sambucus canadensis	Common Elderberry								1	1										1	1	1	1	3	4	
Ulmus americana	Elm	1		1	1		1												4	1	5	4		4		
Viburnum dentatum	Arrow-wood																					2		2	2	
Viburnum nudum	Southern Wild Raisin, Possumhaw							1		1									2		2	5		5		
	Stem count	11	4	16	7	3	10	12	2	14	11	1	12	10	1	11	11	1	13	162	112	274	175	110	285	
	size (ares)	1			1			1			1			1			1			14			14			
	size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.35			0.35			
	Species count	6	2	8	5	1	5	8	2	9	5	1	5	6	1	6	7	1	8	17	15	24	20	4	21	
	Stems per ACRE	445	162	647	283	121	405	486	81	567	445	40	486	405	40	445	445	40	526	468	324	792	506	12	824	

		Annual Means								
Scientific Name	Common Name	MY3 (2019)			MY2 (2018)			MY1 (2017)		
		Planted	Vol	T	Planted	Vol	T	Planted	Vol	T
Acer negundo	Boxelder	13		13	12		12	15		15
Acer rubrum	Red maple									
Alnus serrulata	Tag Alder									
Baccharis	High-tide Bush									
Betula nigra	River Birch	26		26	29		29	33		33
Callicarpa americana	Beautyberry									1
Carpinus caroliniana	Ironwood	14		14	14		14	23		23
Celtis laevigata	Sugarberry	3		3	3		3	4		4
Cornus amomum	Silky Dogwood		1	1		1	1			
Diospyros virginiana	Poosumwood	4		4	5	1	6	5		5
Euonymus americanus	Strawberry-bush	3		3	3		3	6		6
Fraxinus pennsylvanica	Green Ash	29	1	30	32		32	36		37
Hamamelis virginiana	Witch hazel	5		5	6		6	8		8
Ilex opaca	American Holly	5		5	5		5	10		10
Ilex verticillata	Winterberry	1		1	1		1	2		2
Juniperus virginiana	Cedar									
Liquidambar styraciflua	Sweet Gum, Red Gum									
Liriodendron tulipifera	Tulip poplar	8	14	22	7	1	8	12		12
Nyssa sylvatica	Black Gum	7		7	7		7	10		10
Pinus echinata	Shortleaf Pine									
Platanus occidentalis	Sycamore	23	4	27	23	1	24	29		29
Quercus alba	White Oak	1		1	1		1	1		1
Quercus lyrata	Overcup Oak	11		11	12		12	15		15
Quercus michauxii	Swamp Chestnut Oak	8		8	10		10	13		13
Quercus phellos	Willow Oak	1		1	1		1	1		1
Rhus copallinum	Sumac									
Salix nigra	Black Willow									
Sambucus canadensis	Common Elderberry									
Ulmus americana	Elm	6		6	6		6	7		7
Viburnum dentatum	Arrow-wood	5		5	5		5	8		8
Viburnum nudum	Southern Wild Raisin, Possumhaw	6		6	5		5	6		6
	Stem count	179	20	199	187	4	191	244	0	246
	size (ares)	14			14			14		
	size (ACRES)	0.35			0.35			0.35		
	Species count	20	4	21	20	4	21	20	0	21
	Stems per ACRE	517	12	575	705	12	552	705	0	711

Color for Density
Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

Table 8. Vegetation Plot Summary
Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Browns Summit (#140048)							
Year 7							
Vegetation Plot Summary Information							
Plot #	Riparian Buffer Stems ¹	Stream/ Wetland Stems ²	Live Stakes	Invasives	Volunteers ³	Total ⁴	Unknown Growth Form
1	n/a	17	0	0	15	32	32
2	n/a	11	0	0	14	25	25
3	n/a	18	0	0	5	23	23
4	n/a	10	0	0	24	34	34
5	n/a	9	0	0	14	23	23
6	n/a	7	0	0	14	21	21
7	n/a	15	0	0	10	25	25
8	n/a	13	0	0	2	15	15
9	n/a	11	0	0	4	15	15
10	n/a	7	0	0	3	10	10
11	n/a	12	0	0	2	14	14
12	n/a	11	0	0	1	12	12
13	n/a	10	0	0	1	11	11
14	n/a	11	0	0	1	12	12

Wetland/Stream Vegetation Totals (per acre)					
Plot #	Stream/ Wetland Stems ²	Volunteers ³	Total ⁴	Average Plot Height (Ft)	Success Criteria Met?
1	688	607	1295	14.8	Yes
2	445	567	1012	4.6	Yes
3	728	202	930	9.8	Yes
4	405	971	1376	6.1	Yes
5	364	567	931	8.2	Yes
6	283	567	850	4.7	Yes
7	607	405	1012	12.9	Yes
8	526	81	607	4.4	Yes
9	445	162	607	7.9	Yes
10	283	121	404	9.0	Yes
11	486	81	567	4.9	Yes
12	445	40	485	10.7	Yes
13	405	40	445	4.7	Yes
14	445	40	485	11.6	Yes
Project Avg	468	318	786	8.2	Yes

Stem Class characteristics

- ¹Buffer Stems Native planted hardwood trees. Does NOT include shrubs. No pines. No vines.
- ²Stream/ Wetland Stems Native planted woody stems. Includes shrubs, does NOT include live stakes. No vines
- ³Volunteers Native woody stems. Not planted. No vines.
- ⁴Total Planted + volunteer native woody stems. Includes live stakes. Excl. exotics. Excl. vines.

Color for Density

- Exceeds requirements by 10%
- Exceeds requirements, but by less than 10%
- Fails to meet requirements, by less than 10%
- Fails to meet requirements by more than 10%

Appendix D

Stream Survey Data

Permanent Cross-section 1
(Year 7 Data - Collected September 2023)

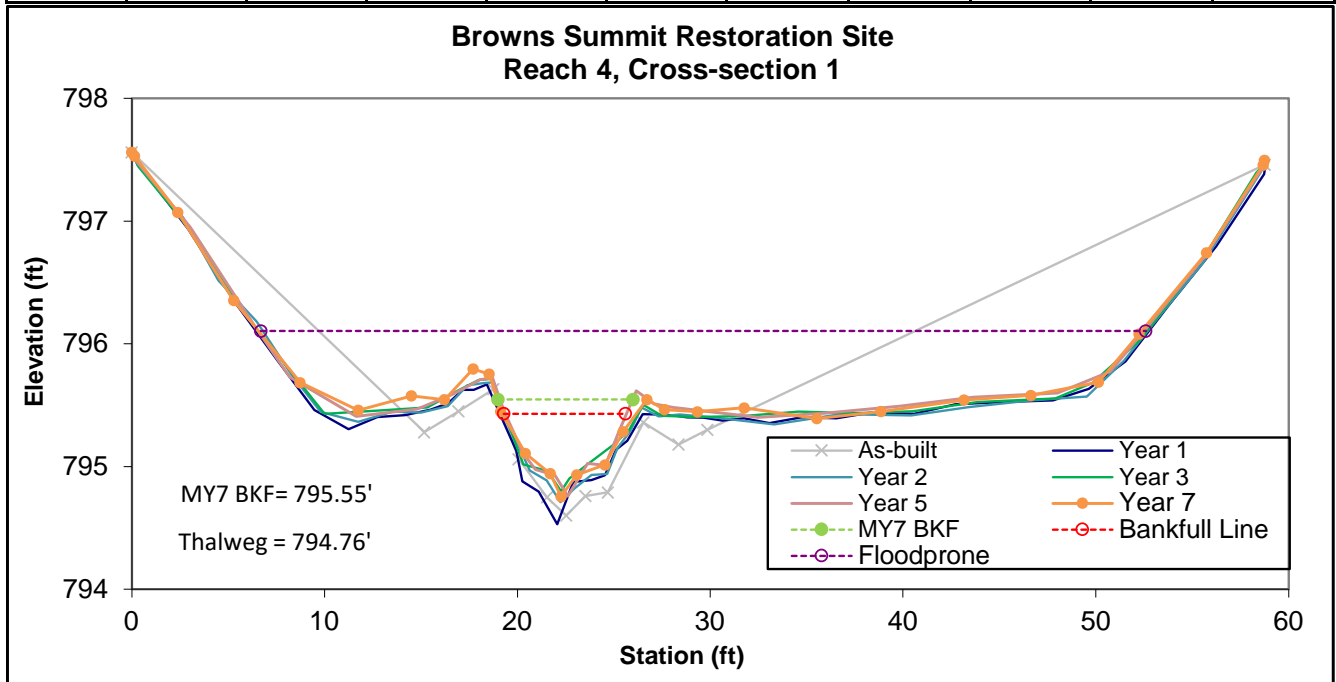


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	2.4	7.0	0.4	0.7	19.4	1.0	6.6	795.43	795.55



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 2
(Year 7 Data - Collected September 2023)

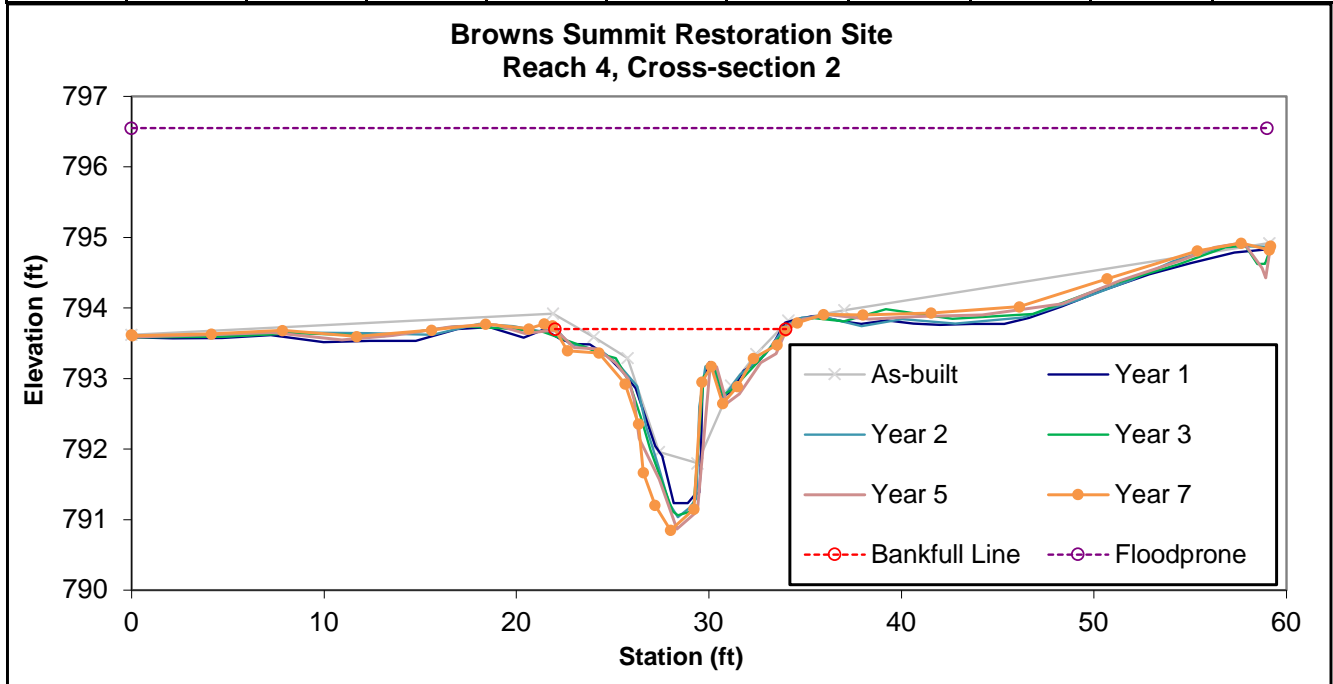


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	12.5	12.1	1.0	2.9	11.7	--	--	793.70	793.67



Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 3
(Year 7 Data - Collected September 2023)

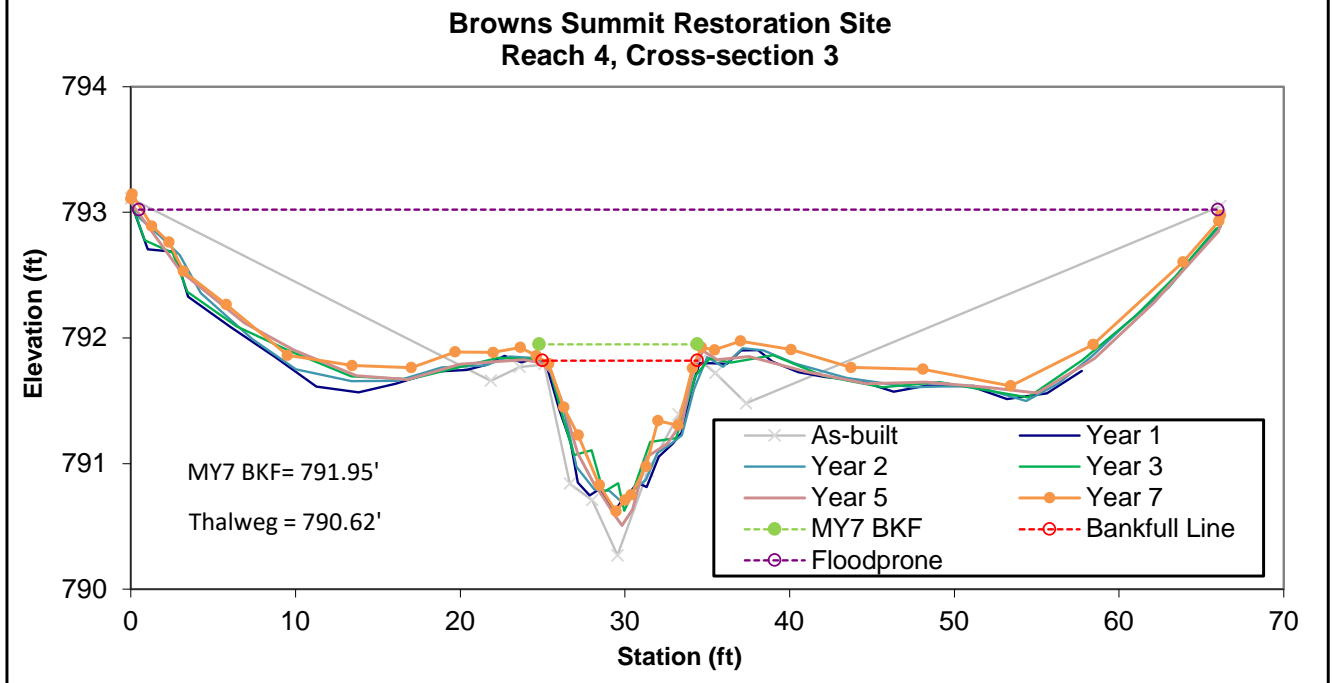


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	6.0	8.9	0.7	1.2	13.3	0.9	7.3	791.82	791.79



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 4
(Year 7 Data - Collected September 2023)

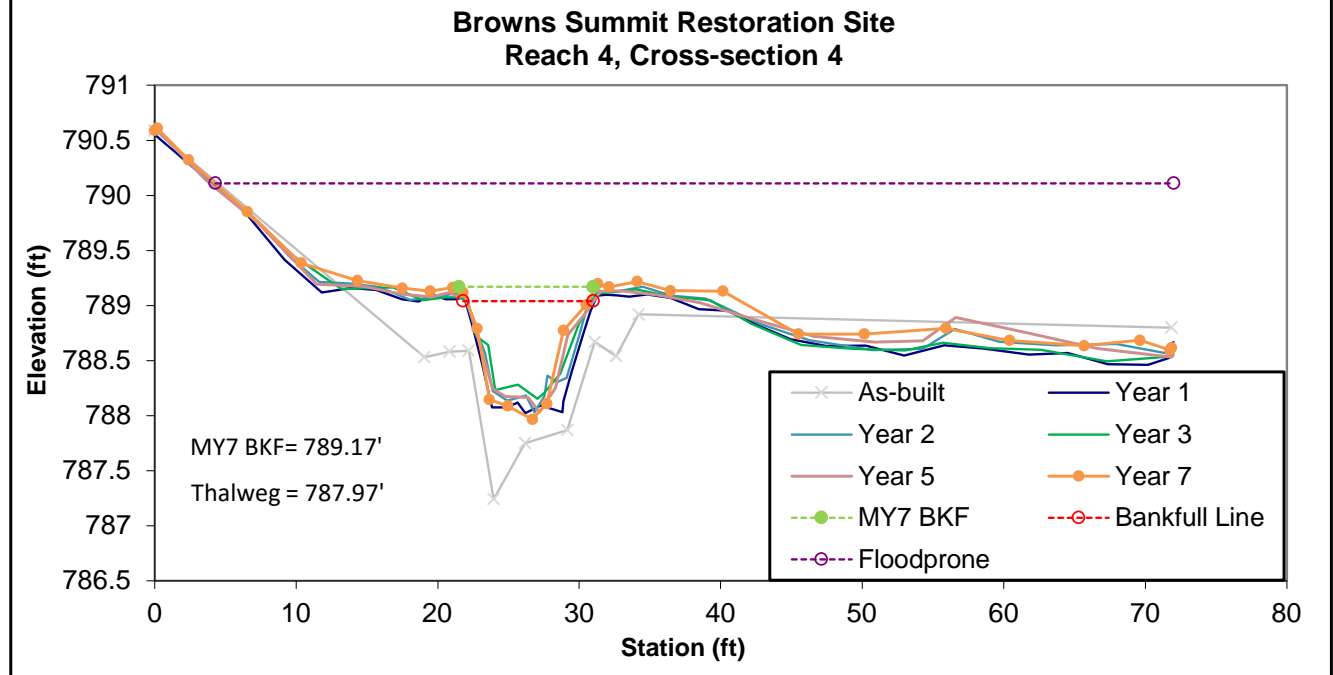


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	5.5	8.6	0.6	1.1	13.4	1.0	7.9	789.04	789.120



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 5
(Year 7 Data - Collected September 2023)

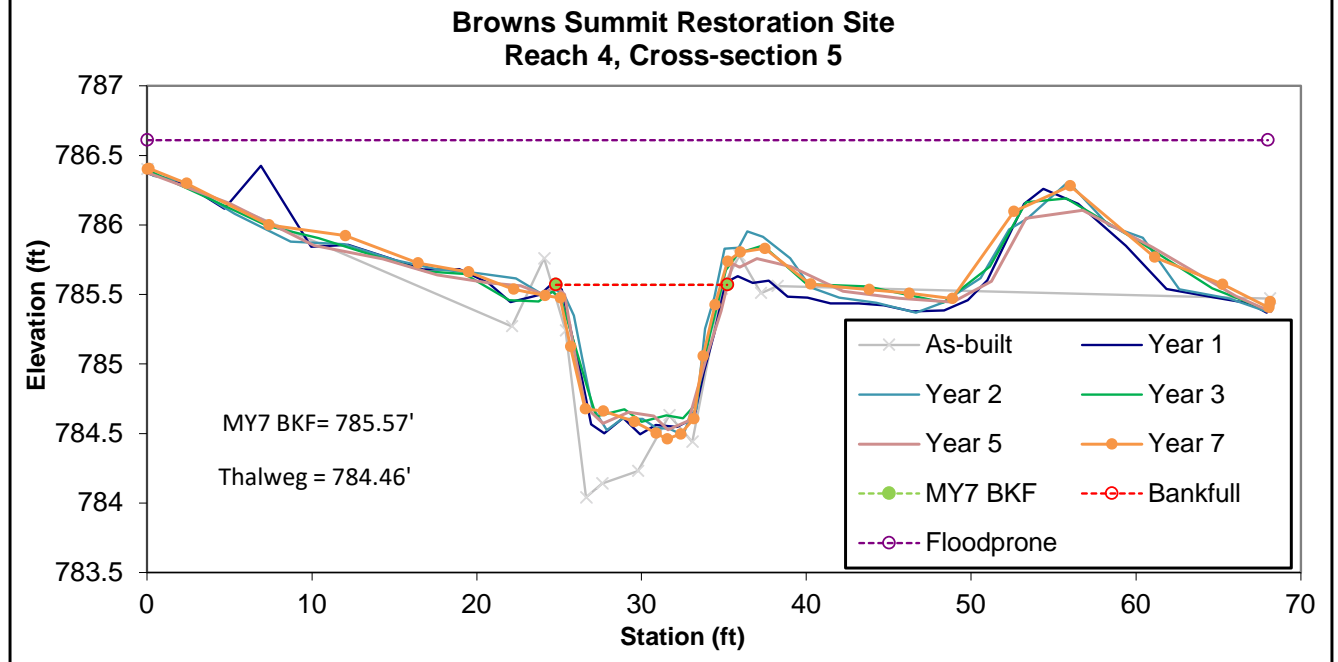


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	8.2	12.6	0.7	1.1	19.3	0.9	5.4	785.57	785.47



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 6
(Year 7 Data - Collected September 2023)

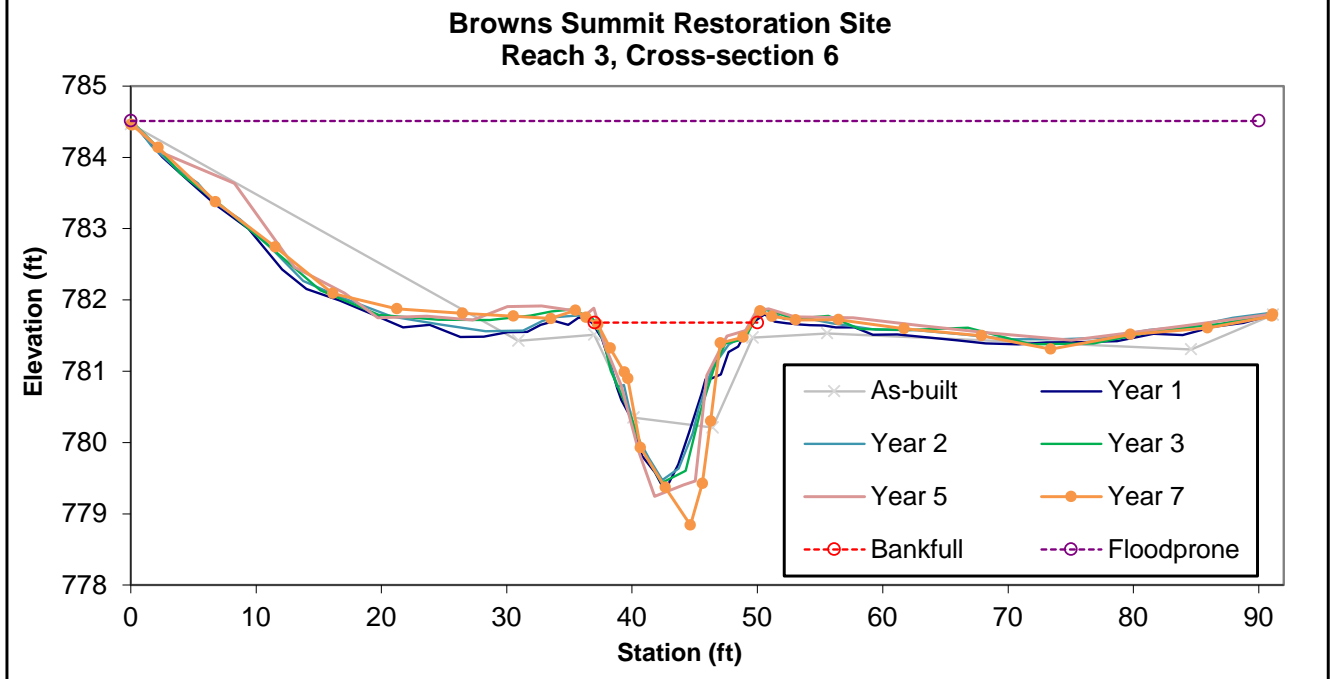


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	16.2	12.3	1.3	2.8	9.4	--	--	781.68	781.84



Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 7
(Year 7 Data - Collected September 2023)

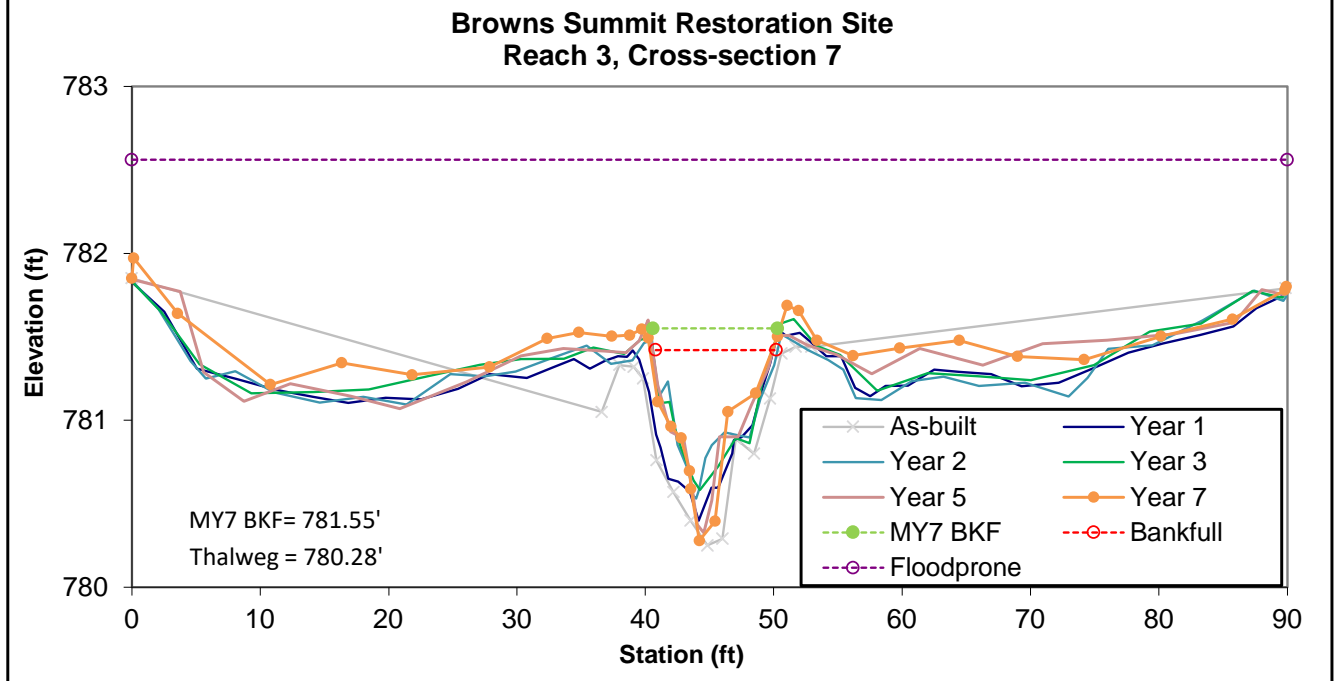


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	4.9	9.5	0.5	1.1	18.6	1.0	9.4	781.42	781.49



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 8
(Year 7 Data - Collected September 2023)

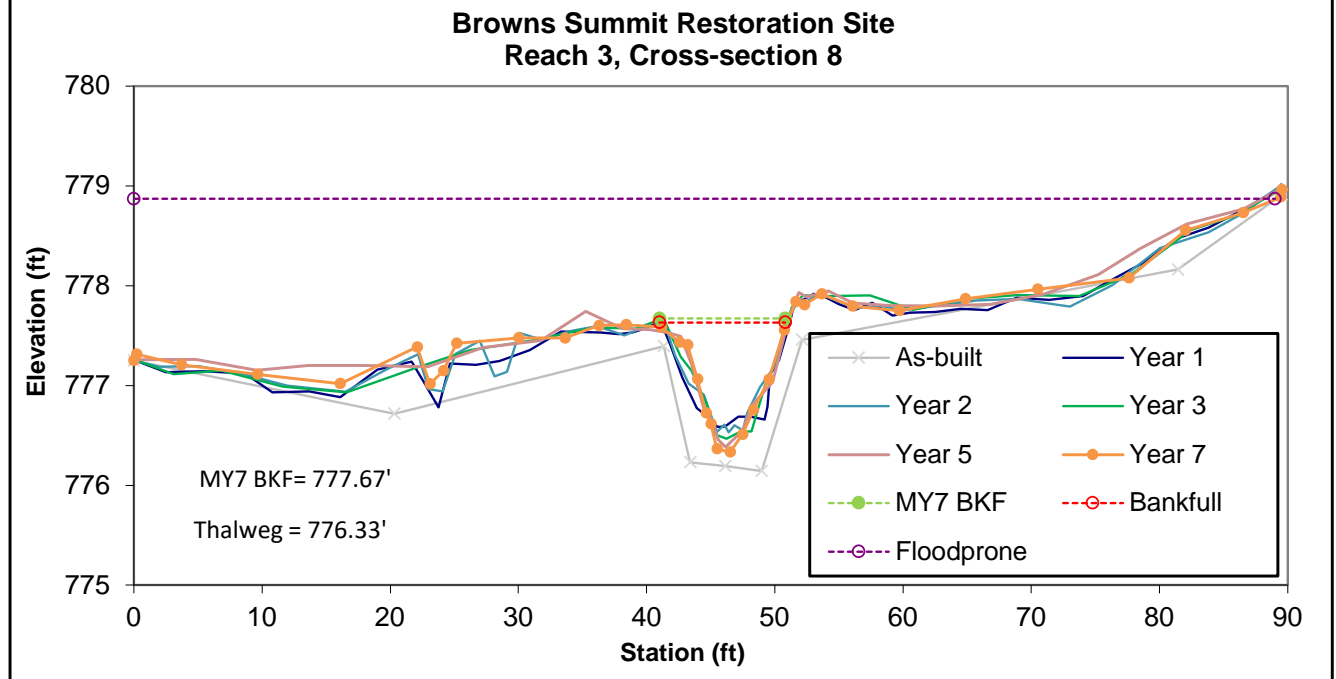


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	6.7	12.6	0.5	1.3	23.7	0.8	7.1	777.63	777.41



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 9
(Year 7 Data - Collected September 2023)

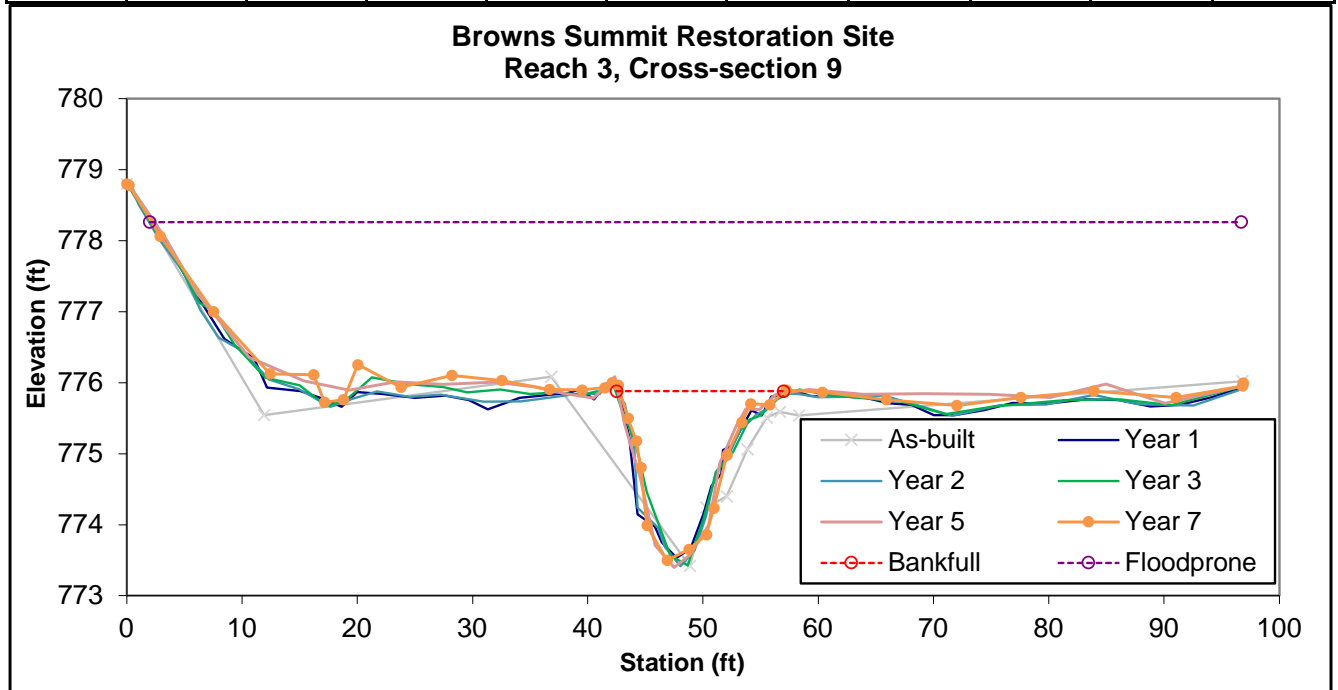


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	17.2	14.3	1.2	2.4	12	--	--	775.88	775.70

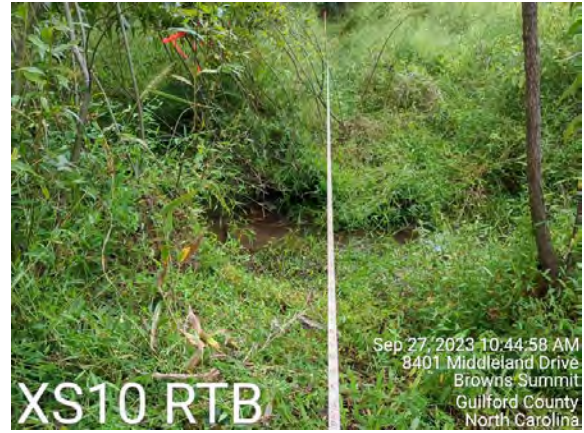


Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 10
 (Year 7 Data - Collected September 2023)

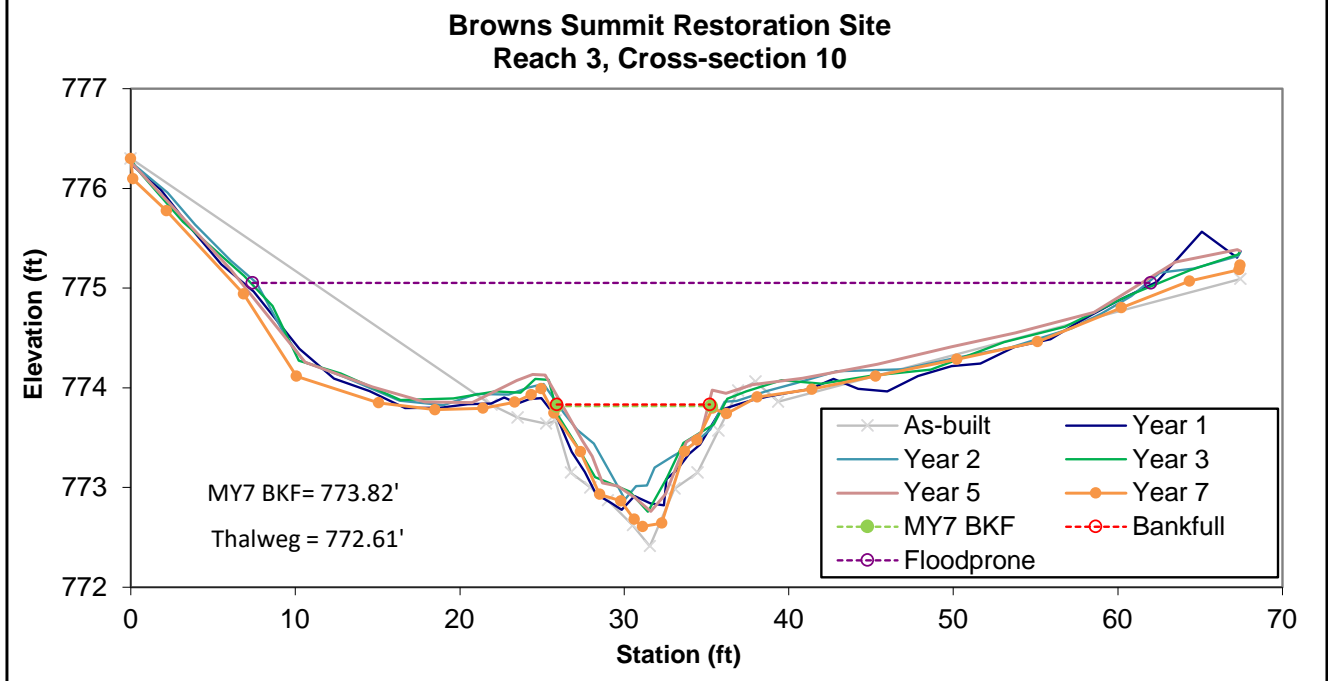


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	7.1	11.8	0.6	1.2	19.6	1.0	4.9	773.83	773.79



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 11
(Year 7 Data - Collected September 2023)

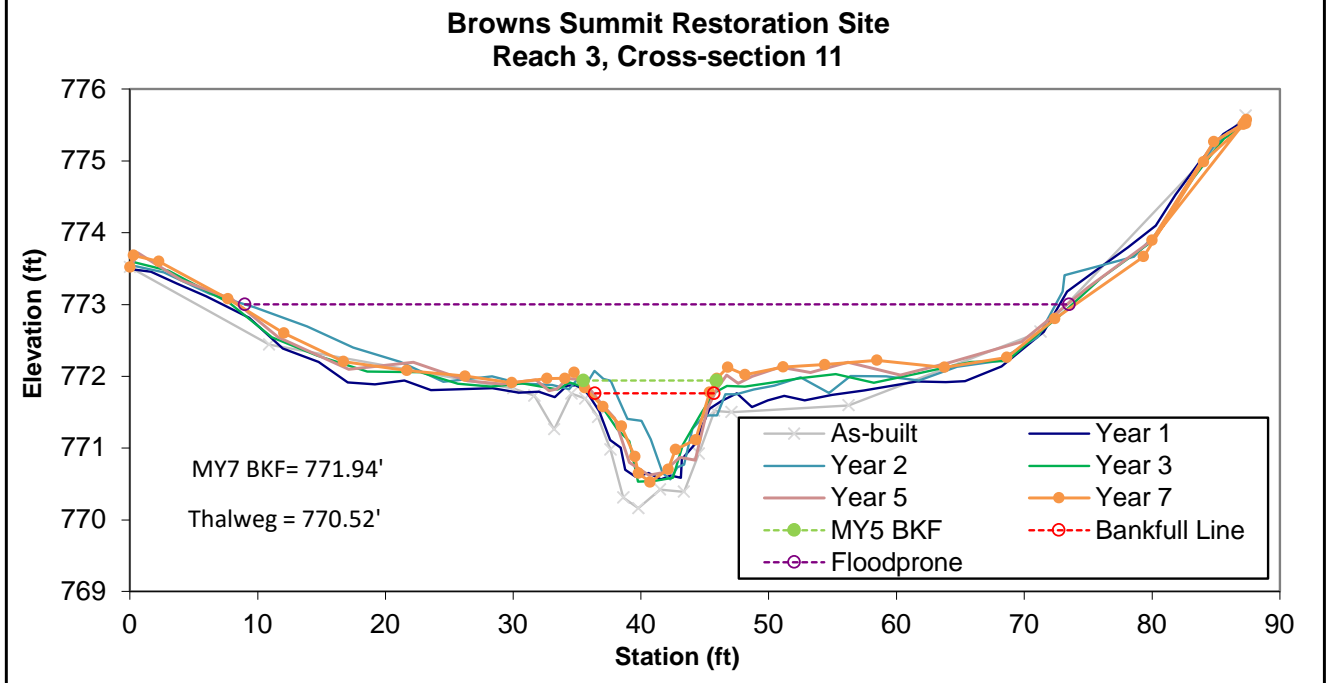


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	6.2	9.3	0.7	1.2	14	1.0	7.0	771.76	771.97



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 12
(Year 7 Data - Collected October 2023)

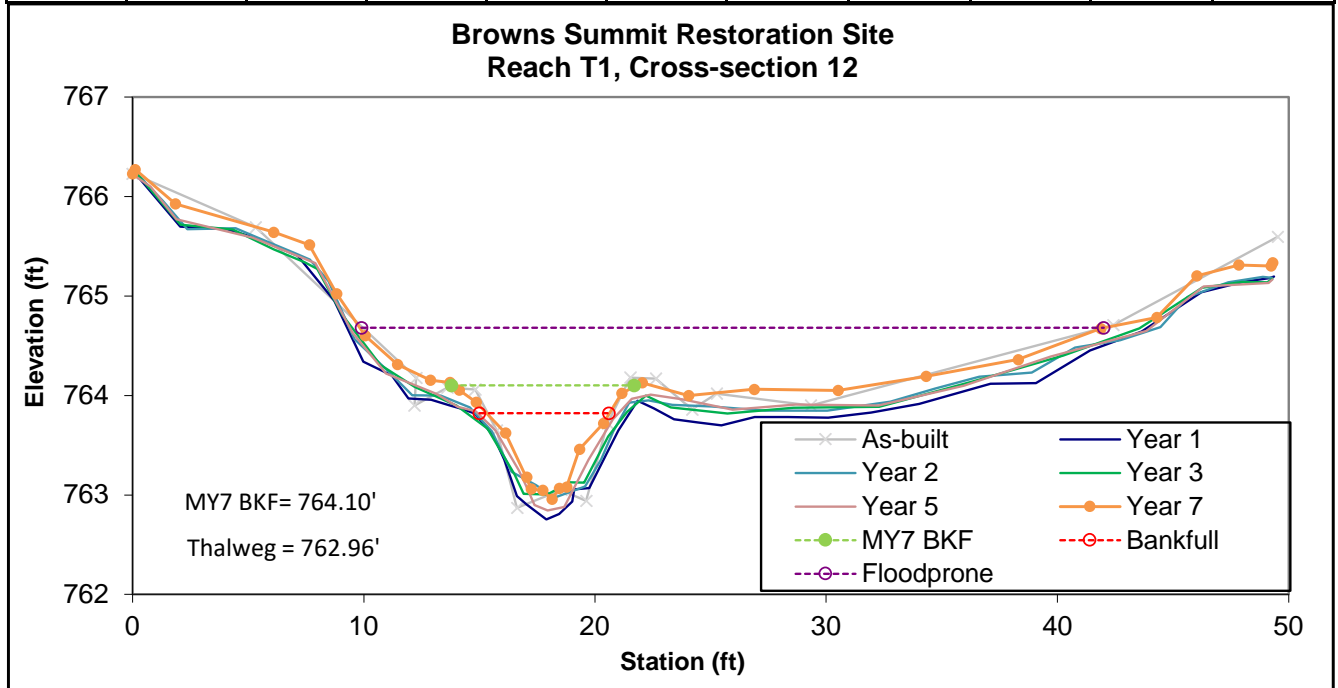


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	2.3	5	0.5	0.9	10.8	1.1	6.4	763.82	764.02



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 13
(Year 7 Data - Collected September 2023)

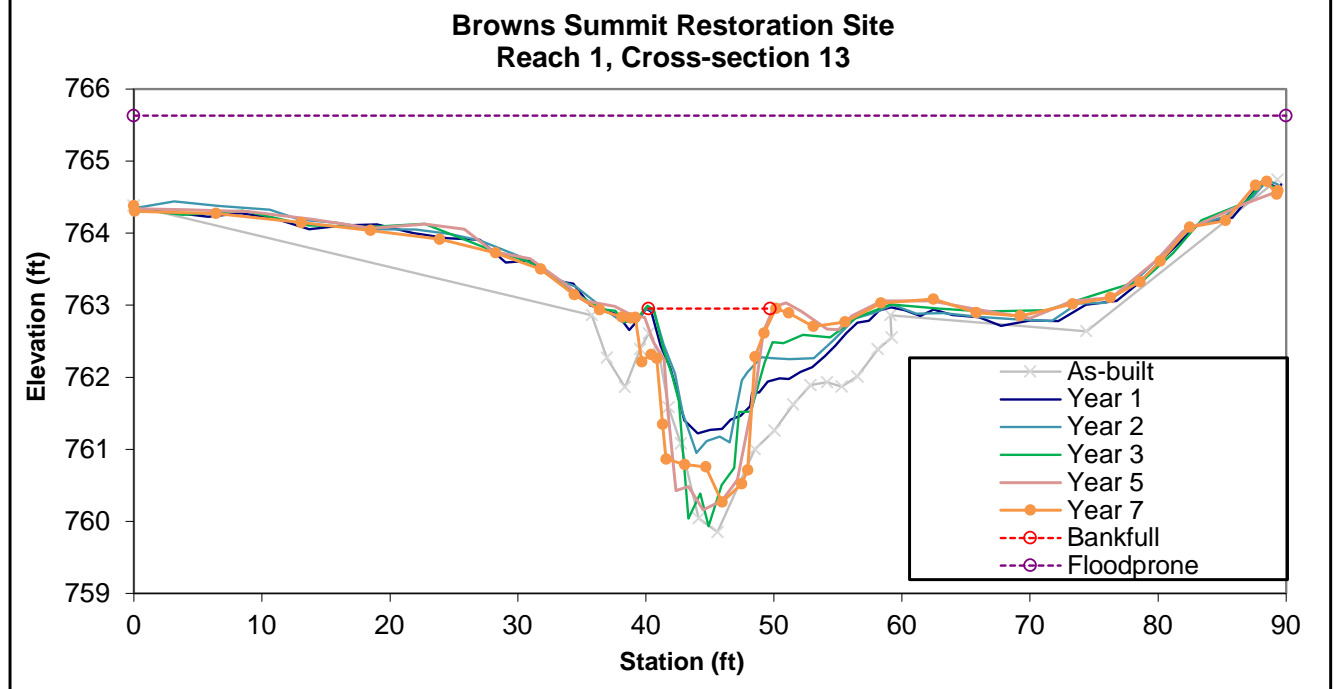


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	18.2	11.3	1.6	2.7	7.0	--	--	762.95	762.83

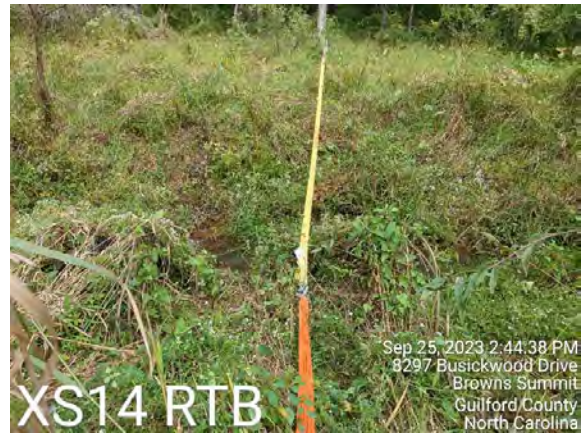


Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 14
 (Year 7 Data - Collected September 2023)

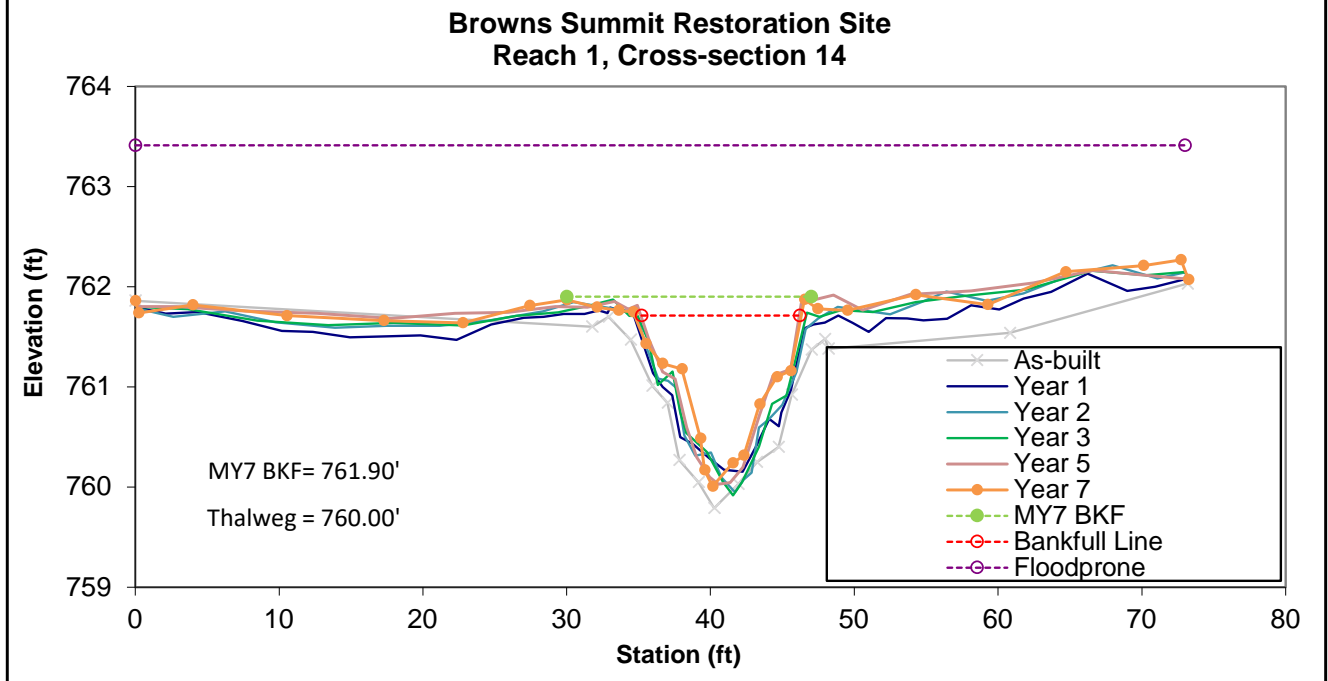


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	9.9	11.6	0.9	1.7	13.6	1.0	6.3	761.71	761.75



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 15
(Year 7 Data - Collected September 2023)

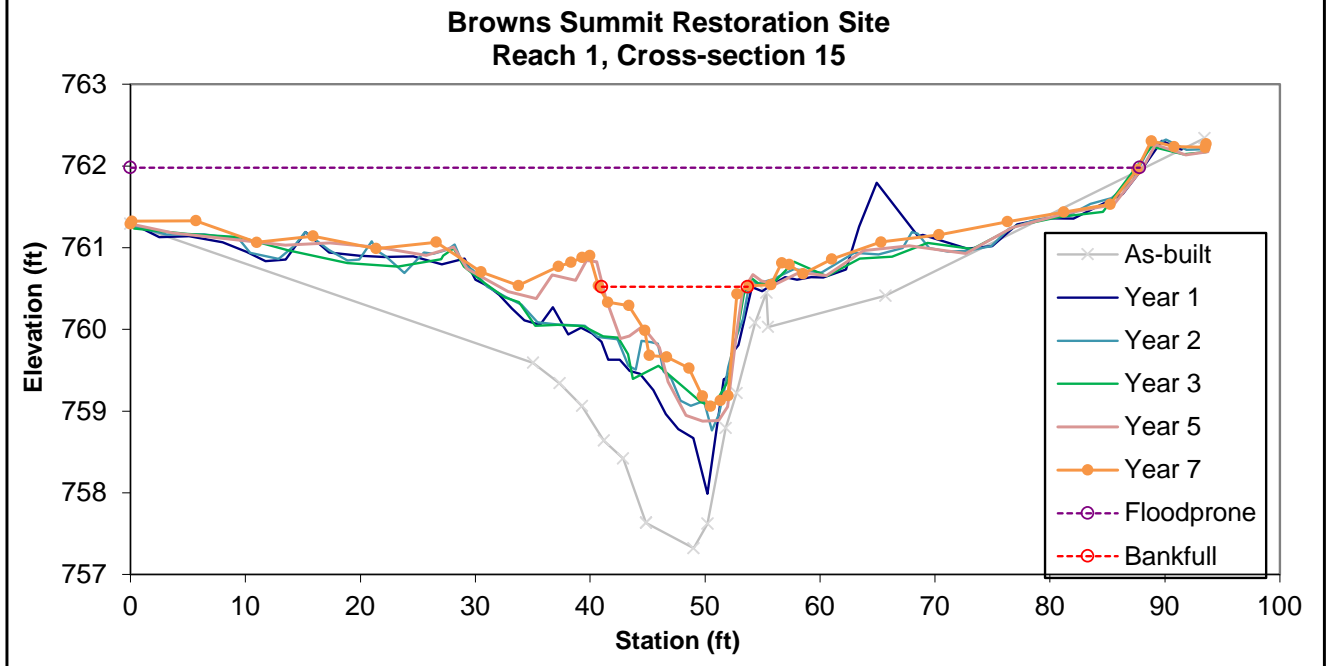


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	9.4	12.9	0.7	1.5	17.7	--	--	760.52	760.81



Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 16
(Year 7 Data - Collected September 2023)

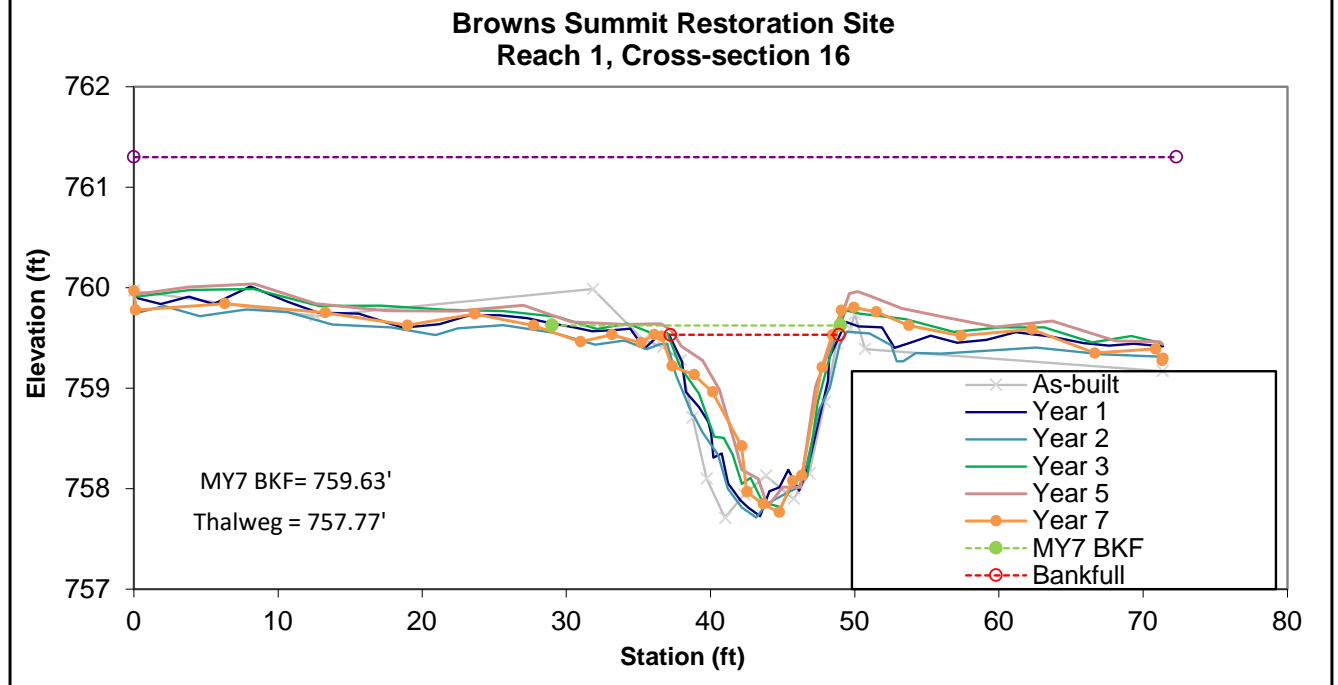


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	10.9	12.5	0.9	1.8	14.4	0.9	5.7	759.53	759.52

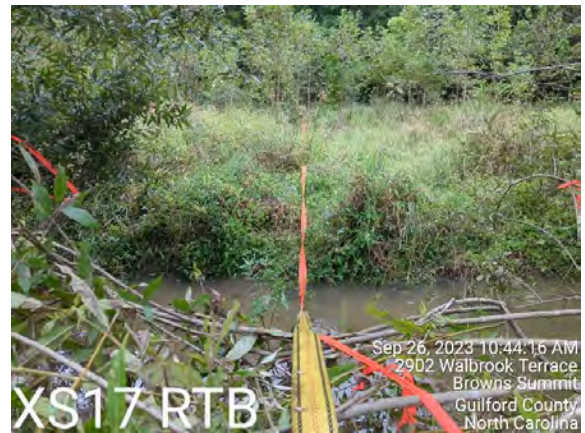


Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Permanent Cross-section 17
(Year 7 Data - Collected September 2023)

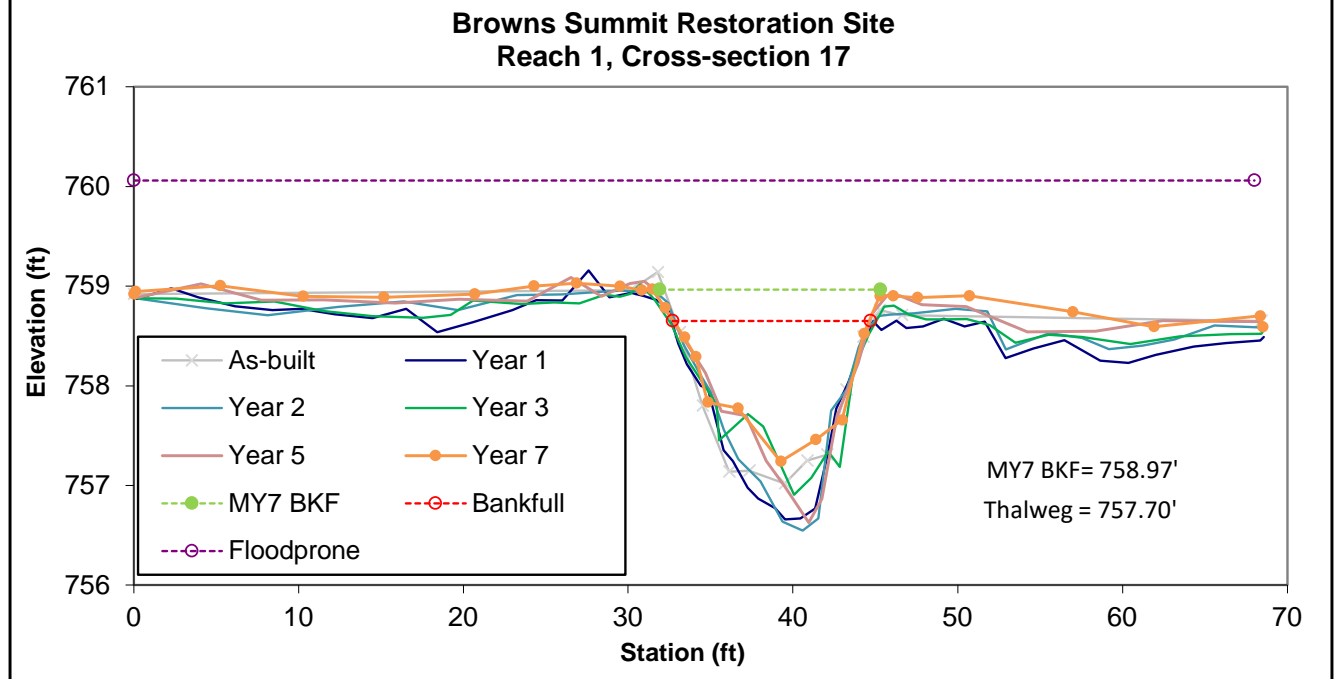


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	10.4	11.9	0.9	1.4	13.5	1.0	5.8	758.65	758.90



Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Table 10. Baseline Stream Summary
Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach 1																												
Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Composite																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
BF Width (ft)	----	----	----	----	----	12.3	----	----	----	----	----	----	----	----	----	----	----	12.9	----	----	----	----	12.6	13.0	12.6	13.8	0.6	3
Floodprone Width (ft)	----	----	----	----	----	>100	----	----	----	----	----	----	----	----	----	----	----	>100	----	----	----	----	100.0	100.0	100.0	100.0	0.0	3
BF Mean Depth (ft)	----	----	----	----	----	1.3	----	----	----	----	----	----	----	----	----	----	----	1.2	----	----	----	----	0.9	1.1	1.1	1.2	0.1	3
BF Max Depth (ft)	----	----	----	----	----	2.1	----	----	----	----	----	----	----	----	----	----	----	1.5	----	----	----	----	1.7	1.7	1.7	1.7	0.0	3
BF Cross-sectional Area (ft²)	----	12.0	16.5	----	----	16.3	----	----	----	----	----	----	----	----	----	----	----	15.2	----	----	----	----	12.5	13.4	13.2	14.5	0.8	3
Width/Depth Ratio	----	----	----	----	----	9.3	----	----	----	----	10	----	12	----	----	----	----	11.0	----	----	----	----	10.9	12.7	12.0	15.2	1.8	3
Entrenchment Ratio	----	----	----	----	----	8.7	----	----	----	----	----	----	>2.2	----	----	----	----	>6.7	----	----	----	----	5.3	5.5	5.4	5.7	0.2	3
Bank Height Ratio	----	----	----	----	----	1	----	----	----	----	1	----	1	----	----	----	----	1	----	----	----	----	1	1	1	1	0	3
d50 (mm)	----	----	----	----	----	0.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																												
Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	50.0	----	----	75.0	----	----	72.6	88.2	75.3	136.9	24.7	5
Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	26.0	----	----	39.0	----	----	25.9	34.5	35.4	42.0	5.3	7
Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	2	----	3	----	----	----	2.0	----	----	3.0	----	----	2.0	2.7	2.7	3.2	0.4	7
Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	140	----	----	170	----	----	130.2	162.0	161.3	190.9	24.9	5
Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	3.5	----	10	----	----	----	4	----	----	6	----	----	5.6	6.8	5.8	10.5	1.9	5
Profile																												
Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	5.4	20.5	13.0	47.7	14.6	13
Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.013	----	----	----	----	0.001	0.019	0.010	0.091	0.023	13
Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	50	----	----	87	----	----	41.4	63.2	59.1	100.8	18.2	12
Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	1.2	----	2.5	----	----	----	----	2.7	----	----	----	----	2.8	2.8	2.8	2.8	0.0	2
Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																												
Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	0.3/0.5/0.8/5.8/10.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	114	----	----	----	----	----	----	----	----	----	----	----	88	----	----	----	----	----	----	----	----	----	----
Stream Power (transport capacity) W/m²	----	----	----	----	----	25.7	----	----	----	----	----	----	----	----	----	----	----	20.3	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																												
Drainage Area (SM)	----	----	0.68	----	----	----	0.68	----	----	----	----	----	----	----	----	----	----	----	0.68	----	----	----	----	----	0.68	----	----	----
Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rosgen Classification	----	----	----	----	----	E	----	----	----	----	----	E5	----	----	----	----	----	E5	----	----	----	----	----	----	----	C	----	----
BF Velocity (fps)	----	3.6	4.1	----	----	3.56	----	----	----	----	4	----	6	----	----	----	3.20	----	----	----	----	----	----	----	----	----	----	----
BF Discharge (cfs)	----	43.2	67.4	----	----	58	----	----	----	----	----	----	----	----	----	----	49	----	----	----	----	----	----	----	----	----	----	----
Valley Length	----	----	----	----	----	----	1086.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1036.3	----	----
Channel length (ft)	----	----	----	----	----	----	1217	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1279.7	----	----
Sinuosity	----	----	----	----	----	1.12	----	----	----	----	1.3	----	1.6	----	----	----	1.40	----	----	----	----	----	----	----	----	1.2	----	----
Water Surface Slope (Channel) (ft/ft)	----	----	----	----	----	0.0058	----	----	----	----	----	----	----	----	----	----	0.0058	----	----	----	----	----	----	----	----	----	----	----
BF slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.0043	----	----
Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

* 1999 Regional Curve and Esitmate from Revised Regional Curve. See Mitigation Plan for more information.

Table 10 continued. Baseline Stream Summary

Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach 2																															
Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built								
											Composite																				
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n			
Dimension and Substrate - Riffle																															
	BF Width (ft)	----	----	----	----	10.06	----	----	----	----	----	----	----	----	----	----	----	11.0	----	----	----	----	----	----	----	----	----	----			
	Floodprone Width (ft)	----	----	----	----	22.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----		
	BF Mean Depth (ft)	----	----	----	----	1.1	----	----	----	----	----	----	----	----	----	----	----	1.0	----	----	----	----	----	----	----	----	----	----	----		
	BF Max Depth (ft)	----	----	----	----	2.0	----	----	----	----	----	----	----	----	----	----	----	1.3	----	----	----	----	----	----	----	----	----	----	----		
	BF Cross-sectional Area (ft²)	----	----	----	----	11.1	----	----	----	----	----	----	----	----	----	----	----	11.1	----	----	----	----	----	----	----	----	----	----	----		
	Width/Depth Ratio	----	----	----	----	9.1	----	----	----	----	10	----	----	12	----	----	----	11	----	----	----	----	----	----	----	----	----	----	----		
	Entrenchment Ratio	----	----	----	----	2.2	----	----	----	----	----	----	>2.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----		
	Bank Height Ratio	----	----	----	----	2	----	----	----	----	1	----	----	1	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----		
	d50 (mm)	----	----	----	----	0.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----		
Pattern																															
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	22	----	----	33.0	----	----	----	----	----	----	----	----	----	----	
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	2	----	----	3	----	----	2	----	----	3.0	----	----	----	----	----	----	----	----	----	----	
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	3.5	----	----	10	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Profile																															
	Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	1.2	----	----	2.5	----	----	----	2.2	----	----	----	----	----	----	----	----	----	----	----	----	
	Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																															
	Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	d16 / d35 / d50 / d84 / d95	----	----	----	----	----	0.2/0.4/0.6/2.9/6.9	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	100.0	----	----	----	----	----	----	----	----	----	----	----	90	----	----	----	----	----	----	----	----	----	----	----	----	
	Stream Power (transport capacity) W/m²	----	----	----	----	20.4	----	----	----	----	----	----	----	----	----	----	----	19.1	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																															
	Drainage Area (SM)	----	0.47	----	----	----	0.47	----	----	----	----	----	----	----	----	----	----	0.47	----	----	----	----	----	----	----	0.47	----	----	----	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Rosgen Classification	----	----	----	----	Bc	----	----	----	----	----	E5	----	----	----	----	----	E5	----	----	----	----	----	----	----	----	----	----	----	----	
	BF Velocity (fps)	----	3.50	4.03	----	3.87	----	----	----	----	4	----	----	6	----	----	----	2.91	----	----	----	----	----	----	----	----	----	----	----	----	
	BF Discharge (cfs)	----	32.4	51.6	----	43	----	----	----	----	----	----	----	----	----	----	----	32.3	----	----	----	----	----	----	----	----	----	----	----	----	
	Valley Length	----	----	----	----	----	----	643.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Channel length (ft)	----	----	----	----	----	----	868.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Sinuosity	----	----	----	----	1.35	----	----	----	----	1.3	----	----	1.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Water Surface Slope (Channel) (ft/ft)	----	----	----	----	0.0054	----	----	----	----	----	----	----	----	----	----	----	0.0054	----	----	----	----	----	----	----	----	----	----	----	----	----
	BF slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

* 1999 Regional Curve and Esitmate from Revised Regional Curve. See Mitigation Plan for more information.

Table 10 continued. Baseline Stream Summary
 Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach 3																												
Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Composite																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
	BF Width (ft)	----	----	----	----	8.5	----	----	----	----	----	----	----	----	----	----	----	10.3	----	----	----	----	9.3	10.7	10.9	11.6	0.9	4
	Floodprone Width (ft)	----	----	----	----	17.8	----	----	----	----	----	----	----	----	----	----	----	>23	----	----	----	----	51.6	73.4	76.1	89.9	15.7	4
	BF Mean Depth (ft)	----	----	----	----	1.15	----	----	----	----	----	----	----	----	----	----	----	0.9	----	----	----	----	0.6	0.8	0.8	0.9	0.2	4
	BF Max Depth (ft)	----	----	----	----	1.8	----	----	----	----	----	----	----	----	----	----	----	1.2	----	----	----	----	1.1	1.3	1.3	1.3	0.1	4
	BF Cross-sectional Area (ft²)	----	6.5	9.3	----	9.7	----	----	----	----	----	----	----	----	----	----	----	9.7	----	----	----	----	6.8	7.9	7.6	9.8	1.2	4
	Width/Depth Ratio	----	----	----	----	7.15	----	----	----	----	10	----	12	----	----	----	----	11.0	----	----	----	----	10.8	15.0	15.1	19.2	3.9	4
	Entrenchment Ratio	----	----	----	----	2.0	----	----	----	----	----	----	>2.2	----	----	----	----	>2.2	----	----	----	----	4.4	6.9	7.5	8.2	1.5	4
	Bank Height Ratio	----	----	----	----	2	----	----	----	----	1	----	1	----	----	----	----	1	----	----	----	----	1	1	1	1	0	4
	d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																												
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	35	----	----	56.0	----	----	37.4	54.0	59.9	64.7	11.9	3
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	20	----	30.0	----	----	----	20.0	27.8	25.8	37.2	6.3	10
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	2	----	3	----	----	----	2	----	3.0	----	----	----	1.9	2.6	2.4	3.5	0.6	10
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	90	----	----	130.0	----	----	----	90.4	108.9	101.0	137.2	17.2	5
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	3.5	----	10	----	----	----	----	----	----	----	----	----	3.5	5.1	5.6	6.1	1.1	3
Profile																												
	Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.018	----	----	----	----	0.005	0.021	0.019	0.040	0.010	13
	Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	47	----	70.0	----	----	----	----	20.1	55.2	59.2	81.3	18.3	13
	Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	1.2	----	2.5	----	----	----	----	2	----	----	----	----	1.3	1.8	1.8	2.2	0.5	2
	Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																												
	Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	d16 / d35 / d50 / d84 / d95	----	----	----	----	----	0.1/0.2/0.4/10.4/22.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	141	----	----	----	----	----	----	----	----	----	----	----	116	----	----	----	----	----	----	----	----	----	----
	Stream Power (transport capacity) W/m²	----	----	----	----	30.7	----	----	----	----	----	----	----	----	----	----	26.2	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																												
	Drainage Area (SM)	----	----	0.38	----	----	0.38	----	----	----	----	----	----	----	----	----	----	----	0.38	----	----	----	----	----	0.38	----	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rosgen Classification	----	----	----	----	Bc	----	----	----	----	----	E5	----	----	----	----	----	E5	----	----	----	----	----	----	----	C	----	
	BF Velocity (fps)	----	3.42	3.97	----	3.5	----	----	----	----	4	----	6	----	----	----	3.3	----	----	----	----	----	----	----	----	----	----	
	BF Discharge (cfs)	----	25.7	41.7	----	34.5	----	----	----	----	----	----	----	----	----	----	31.9	----	----	----	----	----	----	----	----	----	----	
	Valley Length	----	----	----	----	----	1441.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1323.2	----	----	
	Channel length (ft)	----	----	----	----	----	1586.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1495.2	----	----	
	Sinuosity	----	----	----	----	1.10	----	----	----	----	1.3	----	1.6	----	----	----	1.20	----	----	----	----	----	----	----	1.13	----	----	
	Water Surface Slope (Channel) (ft/ft)	----	----	----	----	0.0082	----	----	----	----	----	----	----	----	----	----	0.0082	----	----	----	----	----	----	----	----	----	----	
	BF slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.010	----	----	
	Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

* 1999 Regional Curve and Estimate from Revised Regional Curve. See Mitigation Plan for more information.

Table 10 continued. Baseline Stream Summary
 Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach 4																												
Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design (lower/upper)						As-built					
											Composite																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
	BF Width (ft)	----	----	----	----	7.60	----	----	----	----	----	----	----	----	----	----	----	9.2 / 8.1	----	----	----	----	7.2	9.3	9.1	11.8	1.7	4
	Floodprone Width (ft)	----	----	----	----	9.1	----	----	----	----	----	----	----	----	----	----	----	>19 / >17	----	----	----	----	31.3	57.9	66.0	68.1	15.4	4
	BF Mean Depth (ft)	----	----	----	----	0.86	----	----	----	----	----	----	----	----	----	----	----	0.7 / 0.6	----	----	----	----	0.5	0.8	0.9	1.1	0.2	4
	BF Max Depth (ft)	----	----	----	----	1.39	----	----	----	----	----	----	----	----	----	----	----	0.9 / 0.8	----	----	----	----	0.8	1.4	1.5	1.7	0.3	4
	BF Cross-sectional Area (ft²)	----	----	----	----	6.5	----	----	----	----	----	----	----	----	----	----	----	6.5 / 5.0	----	----	----	----	3.3	7.7	7.4	12.7	3.4	4
	Width/Depth Ratio	----	----	----	----	8.8	----	----	----	----	10.0	----	----	14.0	----	----	----	13.0	----	----	----	----	11.0	12.3	11.3	15.4	1.8	4
	Entrenchment Ratio	----	----	----	----	1.2	----	----	----	----	----	----	----	>2.2	----	----	----	>2.2	----	----	----	----	4.4	5.9	5.8	7.6	1.3	3
	Bank Height Ratio	----	----	----	----	7	----	----	----	----	1	----	----	1	----	----	----	1	----	----	----	----	1	1	1	1	0	3
	d50 (mm)	----	----	----	----	0.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																												
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	30-42/22-43	----	----	----	----	36.9	43.0	42.8	49.7	4.7	4
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	2	----	----	3	----	----	----	18-28/16-25	----	----	----	----	17.2	24.5	25.1	34.3	4.9	10
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	3.1 / 2.0	----	----	----	----	1.8	2.6	2.7	3.7	0.5	10
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	120.0 / 80.0	----	----	----	----	63.1	94.5	93.0	123.0	20.2	9
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	3.5	----	----	8	----	----	----	12.0 / 2.7	----	----	----	----	4.0	4.6	4.6	5.3	0.5	4
Profile																												
	Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.019	----	----	----	----	0.013	0.021	0.018	0.036	0.008	7
	Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	36-64/29-52	----	----	----	----	31.2	58.1	56.1	87.8	18.7	6
	Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2.0 / 1.9	----	----	----	----	2.0	2.0	2.0	2.0	0.0	1
	Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																												
	Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	0.2/0.3/0.4/0.9/1.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	208	----	----	----	----	----	----	----	----	----	141	----	----	----	----	----	----	----	----	----	
	Stream Power (transport capacity) W/m²	----	----	----	----	----	----	45.1	----	----	----	----	----	----	----	----	----	30.7	----	----	----	----	----	----	----	----	----	
Additional Reach Parameters																												
	Drainage Area (SM)	----	----	0.22	----	----	----	0.22	----	----	----	----	----	----	----	----	----	----	----	0.22	----	----	----	----	0.22	----	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rosgen Classification	----	----	----	----	Gc	----	----	----	----	----	C5	----	----	----	----	----	C5	----	----	----	----	----	----	----	E	----	
	BF Velocity (fps)	3.29	3.90	----	----	3.69	----	----	----	----	3.5	----	----	5.0	----	----	----	3.8 / 4.1	----	----	----	----	----	----	----	----	----	
	BF Discharge (cfs)	17.9	29.8	----	----	24	----	----	----	----	----	----	----	----	----	----	----	24.8 / 21.1	----	----	----	----	----	----	----	----		
	Valley Length	----	----	----	----	----	----	1173.9	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1173.9	----	----	
	Channel length (ft)	----	----	----	----	----	----	1350.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1263.4	----	----	
	Sinuosity	----	----	----	----	1.15	----	----	----	----	1.2	----	----	1.5	----	----	----	1.13/1.22	----	----	----	----	----	----	1.08	----	----	
	Water Surface Slope (Channel) (ft/ft)	----	----	----	----	0.016	----	----	----	----	----	----	----	----	----	----	----	0.011 / 0.016	----	----	----	----	----	----	----	----	----	
	BF slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.0	----	----	
	Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

* 1999 Regional Curve and Estimate from Revised Regional Curve. See Mitigation Plan for more information.

Table 10 continued. Baseline Stream Summary
 Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach 5																												
Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Composite																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
	BF Width (ft)	----	----	----	----	7.38	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Floodprone Width (ft)	----	----	----	----	11.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	BF Mean Depth (ft)	----	----	----	----	0.44	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	BF Max Depth (ft)	----	----	----	----	0.67	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	BF Cross-sectional Area (ft²)	----	----	----	----	3.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Width/Depth Ratio	----	----	----	----	16.77	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Entrenchment Ratio	----	----	----	----	1.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Bank Height Ratio	----	----	----	----	6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																												
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Profile																												
	Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																												
	Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Stream Power (transport capacity) W/m²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																												
	Drainage Area (SM)	----	----	0.04	----	----	----	0.04	----	----	----	----	----	----	----	----	----	----	0.04	----	----	----	----	----	----	0.04	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rosgen Classification	----	----	----	----	Bc	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BF Velocity (fps)	----	----	----	----	3.97	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BF Discharge (cfs)	----	----	----	----	12.7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Valley Length	----	----	----	----	----	----	470.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	470	----	----	
	Channel length (ft)	----	----	----	----	----	----	536.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	520	----	----	
	Sinuosity	----	----	----	----	1.14	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.11	----	----	
	Water Surface Slope (Channel) (ft/ft)	----	----	----	----	0.017	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BF slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

* 1999 Regional Curve and Estimate from Revised Regional Curve. See Mitigation Plan for more information.

Table 10 continued. Baseline Stream Summary
 Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach 6																												
Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
	BF Width (ft)	----	----	----	----	9.09	----	----	----	----	----	----	----	----	----	----	6.1	----	----	----	----	----	----	----	----	----	----	
	Floodprone Width (ft)	----	----	----	----	12.7	----	----	----	----	----	----	----	----	----	----	13.0	----	----	----	----	----	----	----	----	----	----	
	BF Mean Depth (ft)	----	----	----	----	0.48	----	----	----	----	----	----	----	----	----	----	0.5	----	----	----	----	----	----	----	----	----	----	
	BF Max Depth (ft)	----	----	----	----	0.8	----	----	----	----	----	----	----	----	----	----	0.6	----	----	----	----	----	----	----	----	----	----	
	BF Cross-sectional Area (ft²)	----	----	----	----	4.4	----	----	----	----	----	----	----	----	----	----	3.1	----	----	----	----	----	----	----	----	----	----	
	Width/Depth Ratio	----	----	----	----	18.94	----	----	----	----	12.0	----	----	18.0	----	----	14.0	----	----	----	----	----	----	----	----	----	----	
	Entrenchment Ratio	----	----	----	----	1.4	----	----	----	----	1.4	----	----	2.2	----	----	<2.2	----	----	----	----	----	----	----	----	----	----	
	Bank Height Ratio	----	----	----	----	5	----	----	----	----	1	----	----	1	----	----	1	----	----	----	----	----	----	----	----	----	----	
	d50 (mm)	----	----	----	----	0.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Pattern																												
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Profile																												
	Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.06	----	----	----	----	----	----	----	----	----	----	
	Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	30	----	----	54.0	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.7	----	----	----	----	----	----	----	----	----	----	
	Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Substrate and Transport Parameters																												
	Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	d16 / d35 / d50 / d84 / d95	----	----	----	----	0.2/0.3/0.4/0.9/1.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Stream Power (transport capacity) W/m²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Additional Reach Parameters																												
	Drainage Area (SM)	----	----	0.10	----	----	----	0.10	----	----	----	----	----	----	----	----	----	----	0.10	----	----	----	----	0.10	----	----	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rosgen Classification	----	----	----	----	Bc	----	----	----	----	B5c	----	----	----	----	----	B5c	----	----	----	----	----	----	----	----	----	----	
	BF Velocity (fps)	----	----	----	----	3.75	----	----	----	----	4	----	----	6.0	----	----	5.2	----	----	----	----	----	----	----	----	----	----	
	BF Discharge (cfs)	----	----	----	----	16.5	----	----	----	----	----	----	----	----	----	----	16	----	----	----	----	----	----	----	----	----	----	
	Valley Length	----	----	----	----	----	----	468.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Channel length (ft)	----	----	----	----	----	----	501.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	468.2	----	----	----	
	Sinuosity	----	----	----	----	1.07	----	----	----	----	1.1	----	----	1.3	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Water Surface Slope (Channel) (ft/ft)	----	----	----	----	0.014	----	----	----	----	----	----	----	----	----	----	0.016	----	----	----	----	----	----	----	----	----	----	
	BF slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

* 1999 Regional Curve and Esitmate from Revised Regional Curve. See Mitigation Plan for more information.

Table 10 continued. Baseline Stream Summary

Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach T1

Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Composite																	
											Min	Mean	Med	Max	SD	n												
Dimension and Substrate - Riffle																												
	BF Width (ft)	----	----	----	----	6.80	----	----	----	----	----	----	----	----	----	----	7.0	----	----	----	----	----	7.7	7.7	7.7	7.7	0.0	1
	Floodprone Width (ft)	----	----	----	----	89.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	39.9	39.9	39.9	39.9	0.0	1
	BF Mean Depth (ft)	----	----	----	----	0.67	----	----	----	----	----	----	----	----	----	----	0.5	----	----	----	----	----	0.7	0.7	0.7	0.7	0.0	1
	BF Max Depth (ft)	----	----	----	----	1.53	----	----	----	----	----	----	----	----	----	----	0.7	----	----	----	----	----	1.2	1.2	1.2	1.2	0.0	1
	BF Cross-sectional Area (ft ²)	----	----	----	----	4.5	----	----	----	----	----	----	----	----	----	3.8	----	----	----	----	----	5.1	5.1	5.1	5.1	0.0	1	
	Width/Depth Ratio	----	----	----	----	10.15	----	----	----	----	10.0	----	----	14.0	----	13.0	----	----	----	----	----	11.7	11.7	11.7	11.7	0.0	1	
	Entrenchment Ratio	----	----	----	----	13.1	----	----	----	----	----	----	>2.2	----	----	----	----	----	----	----	----	5.2	5.2	5.2	5.2	0.0	1	
	Bank Height Ratio	----	----	----	----	2	----	----	----	----	1	----	----	1	----	----	----	----	----	----	----	1	1	1	1	0	1	
	d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																												
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	29.6	29.6	29.6	29.6	0.0	1	
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	14	----	----	21.0	----	----	16.3	17.4	17.4	18.5	1.1	2	
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	2	----	----	3	----	----	----	----	----	----	----	2.1	2.3	2.3	2.4	0.1	2	
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	60.0	----	----	----	----	----	56.0	57.9	57.9	59.7	1.8	2	
	Meander Width Ratio	----	----	----	----	----	----	----	----	3.5	----	----	8	----	----	4.0	----	----	----	----	----	3.8	3.8	3.8	3.8	0.0	1	
Profile																												
	Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.029	----	----	----	----	----	----	----	----	----	----	
	Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	27	----	----	35.0	----	----	18.2	23.8	26.6	34.6	7.6	3	
	Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.2	----	----	----	----	----	----	----	----	----	----	
	Pool Volume (ft ³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Substrate and Transport Parameters																												
	Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Reach Shear Stress (competency) lb/ft ²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Stream Power (transport capacity) W/m ²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																												
	Drainage Area (SM)	----	0.09	----	----	----	----	0.09	----	----	----	----	----	----	----	----	----	0.09	----	----	----	----	----	----	0.09	----	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rosgen Classification	----	----	----	----	E	----	----	----	----	----	C5	----	----	----	----	C5	----	----	----	----	----	----	----	----	----	----	
	BF Velocity (fps)	----	----	----	----	3.76	----	----	----	----	3.5	----	----	5.0	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BF Discharge (cfs)	----	----	----	----	16.9	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Valley Length	----	----	----	----	----	----	114.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	114.2	----	----	
	Channel length (ft)	----	----	----	----	----	----	121.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	139.6	----	----	
	Sinuosity	----	----	----	----	1.06	----	----	----	----	1.2	----	----	1.5	----	----	1.12	----	----	----	----	----	----	----	1.22	----	----	
	Water Surface Slope (Channel) (ft/ft)	----	----	----	----	0.024	----	----	----	----	----	----	----	----	----	0.019	----	----	----	----	----	----	----	----	----	----	----	
	BF slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

* 1999 Regional Curve and Estimate from Revised Regional Curve. See Mitigation Plan for more information.

Table 10 continued. Baseline Stream Summary
 Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach T2																												
Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Composite																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
	BF Width (ft)	----	----	----	----	18.00	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Floodprone Width (ft)	----	----	----	----	23.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	BF Mean Depth (ft)	----	----	----	----	0.22	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	BF Max Depth (ft)	----	----	----	----	0.78	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	BF Cross-sectional Area (ft ²)	----	----	----	----	4.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Width/Depth Ratio	----	----	----	----	81.82	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Entrenchment Ratio	----	----	----	----	1.3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Bank Height Ratio	----	----	----	----	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pattern																												
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Profile																												
	Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Volume (ft ³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Substrate and Transport Parameters																												
	Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Reach Shear Stress (competency) lb/ft ²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Stream Power (transport capacity) W/m ²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Additional Reach Parameters																												
	Drainage Area (SM)	----	0.07	----	----	----	0.07	----	----	----	----	----	----	----	----	----	----	0.07	----	----	----	----	----	----	0.07	----	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rosgen Classification	----	----	----	----	F	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BF Velocity (fps)	----	----	----	----	3.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BF Discharge (cfs)	----	----	----	----	14.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Valley Length	----	----	----	----	----	----	252.7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	252.7	----	----	
	Channel length (ft)	----	----	----	----	----	----	283.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	284.2	----	----	
	Sinuosity	----	----	----	----	1.12	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.12	----	----	
	Water Surface Slope (Channel) (ft/ft)	----	----	----	----	0.022	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BF slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

* 1999 Regional Curve and Estimate from Revised Regional Curve. See Mitigation Plan for more information.

Table 10 continued. Baseline Stream Summary
 Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Parameter		USGS Gauge	Regional Curve*			Pre-Existing Condition					Reference Reach(es) Data					Design					As-built									
											Composite																			
			LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	
Dimension and Substrate - Riffle																														
	BF Width (ft)	----					2.93												5.8											
	Floodprone Width (ft)	----					66.5												15.0											
	BF Mean Depth (ft)	----					1.12												0.5											
	BF Max Depth (ft)	----					1.76												0.6											
	BF Cross-sectional Area (ft²)	----					3.3												2.8											
	Width/Depth Ratio	----					2.62					12.0			18.0				12.0											
	Entrenchment Ratio	----					22.7					1.4			2.2				<2.2											
	Bank Height Ratio	----					2					1			1				1											
	d50 (mm)	----																												
Pattern																														
	Channel Beltwidth (ft)	----																												
	Radius of Curvature (ft)	----																												
	Rc:Bankfull width (ft/ft)	----																	2							3.0				
	Meander Wavelength (ft)	----																												
	Meander Width Ratio	----																												
Profile																														
	Riffle Length (ft)	----																												
	Riffle Slope (ft/ft)	----																	0.033						0.017	0.025	0.017	0.017	0.007	2
	Pool Length (ft)	----																												
	Pool to Pool Spacing (ft)	----																	36											
	Pool Max Depth (ft)	----																	0.9											
	Pool Volume (ft³)	----																												
Substrate and Transport Parameters																														
	Ri% / Ru% / P% / G% / S%	----																												
	SC% / Sa% / G% / B% / Be%	----																												
	d16 / d35 / d50 / d84 / d95	----																												
	Reach Shear Stress (competency) lb/ft²	----																												
	Max part size (mm) mobilized at bankfull (Rosgen Curve)	----																												
	Stream Power (transport capacity) W/m²	----																												
Additional Reach Parameters																														
	Drainage Area (SM)	----		0.06					0.06																		0.06			
	Impervious cover estimate (%)	----																												
	Rosgen Classification	----																												
	BF Velocity (fps)	----					3.6					4			6.0					2.3										
	BF Discharge (cfs)	----					11.7													6.4										
	Valley Length	----							44.3																			80.5		
	Channel length (ft)	----							47.0																			88.0		
	Sinuosity	----					1.06					1.1			1.3					1.20								1.09		
	Water Surface Slope (Channel) (ft/ft)	----					0.02													0.014										
	BF slope (ft/ft)	----																												
	Bankfull Floodplain Area (acres)	----																												
	BEHI VL% / L% / M% / H% / VH% / E%	----																												
	Channel Stability or Habitat Metric	----																												
	Biological or Other	----																												

* 1999 Regional Curve and Esitmate from Revised Regional Curve. See Mitigation Plan for more information.

Table 10 continued. Baseline Stream Summary																														
Browns Summit Creek Restoration Project: DMS Project No ID. 96313																														
Reach T4																														
Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built							
											Composite																			
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n		
Dimension and Substrate - Riffle																														
	BF Width (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	5.8	----	----	----	----	----	----	----	----	----	----		
	Floodprone Width (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	12.0	----	----	----	----	----	----	----	----	----	----		
	BF Mean Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.5	----	----	----	----	----	----	----	----	----	----		
	BF Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.6	----	----	----	----	----	----	----	----	----	----		
	BF Cross-sectional Area (ft²)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2.8	----	----	----	----	----	----	----	----	----	----		
	Width/Depth Ratio	----	----	----	----	----	----	----	----	----	12.0	----	----	18.0	----	----	----	12.0	----	----	----	----	----	----	----	----	----	----		
	Entrenchment Ratio	----	----	----	----	----	----	----	----	----	1.4	----	----	2.2	----	----	----	<2.2	----	----	----	----	----	----	----	----	----	----		
	Bank Height Ratio	----	----	----	----	----	----	----	----	----	1	----	----	1	----	----	----	1	----	----	----	----	----	----	----	----	----	----		
	d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----		
Pattern																														
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Profile																														
	Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.051	----	----	----	----	----	----	0.007	0.047	0.048	0.072	0.023	11
	Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	14	----	----	----	----	----	12.3	16.1	14.6	21.6	3.5	11	
	Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.9	----	----	----	----	----	----	----	----	----	----	----	
	Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Substrate and Transport Parameters																														
	Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Reach Shear Stress (competency) lb/ft²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Stream Power (transport capacity) W/m²	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
Additional Reach Parameters																														
	Drainage Area (SM)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rosgen Classification	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	B5c	----	----	----	----	----	----	----	----	B5c	----	----	
	BF Velocity (fps)	----	----	----	----	----	----	----	----	----	4	----	----	6.0	----	----	----	3.7	----	----	----	----	----	----	----	----	----	----	----	
	BF Discharge (cfs)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	10.4	----	----	----	----	----	----	----	----	----	----	----	
	Valley Length	----	----	----	----	----	----	117.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	143.34	----	----		
	Channel length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	119.18	----	----		
	Sinuosity	----	----	----	----	----	----	----	----	----	1.1	----	----	1.3	----	----	----	1.20	----	----	----	----	----	----	----	0.8314497	----	----		
	Water Surface Slope (Channel) (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.047	----	----	----	----	----	----	----	----	----	----	----	
	BF slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Bankfull Floodplain Area (acres)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	BEHI VL% / L% / M% / H% / VH% / E%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Channel Stability or Habitat Metric	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Biological or Other	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

* 1999 Regional Curve and Esitmate from Revised Regional Curve. See Mitigation Plan for more information.

Table 11a. Morphology and Hydraulic Monitoring Summary																													
Browns Summit Creek Restoration Project: DMS Project No ID. 96313																													
Table 11a continued. Morphology and Hydraulic Monitoring Summary																													
Browns Summit Creek Restoration Project: DMS Project No ID. 96313																													
Stream Reach	Reach T1							Reach 1							Reach 1							Reach 1							
	Cross-section X-12 (Riffle)							Cross-section X-13 (Pool)							Cross-section X-14 (Riffle)							Cross-section X-15 (Pool)							
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY7	
Based on fixed baseline bankfull elevation																													
BF Width (ft)	7.7	6.7	6.4	6.9	-	6.1	5.0	19.6	18.7	17.3	17.6	-	12.0	11.3	13.80	14.7	13.1	12.2	-	11.0	11.6	29.4	24.3	22.8	22.4	-	12.4	12.9	
BF Mean Depth (ft)	0.7	0.6	0.5	0.5	-	0.5	0.5	1.2	0.9	0.6	1.0	-	1.5	1.6	0.90	0.9	0.9	1.0	-	1.0	0.9	1.1	0.9	0.7	0.7	-	1.0	0.7	
Width/Depth Ratio	11.7	11	12.1	14.1	-	11.5	10.8	16.4	20.6	29	16.9	-	8.0	7.0	15.2	17.3	14	12.5	-	11.3	13.6	26.1	28.3	31.8	30.8	-	12.6	17.7	
BF Cross-sectional Area (ft ²)	5.1	4.1	3.4	3.4	-	3.2	2.3	23.5	17.1	10.3	18.3	-	17.9	18.2	12.5	12.5	12.3	11.8	-	10.7	9.9	33.2	20.8	16.3	16.3	-	12.1	9.4	
BF Max Depth (ft)	1.2	1.1	0.8	0.8	-	1.0	0.9	2.8	1.7	2.0	3.0	-	2.8	2.7	1.70	1.6	0.9	1.8	-	1.7	1.7	2.80	2.5	1.8	1.5	-	1.6	1.5	
Width of Floodprone Area (ft)	39.9	49.4	34.7	33.4	-	33.4	32.2	-	-	-	-	-	-	-	100.0	73.1	73.2	73.1	-	73.1	73.2	100.0	93.8	92.5	87.5	-	87.5	87.7	
Entrenchment Ratio (MY1 will provide standard)*	5.2	5.4	5.4	4.9	-	5.5	6.4	-	-	-	-	-	-	-	5.3	5.0	5.6	6.0	-	6.6	6.3	-	-	-	-	-	-	-	-
Bank Height Ratio (MY1 will provide standard)*	1.0	1.0	1.0	1.1	-	0.9	1.1	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	-	1.0	1.0	-	-	-	-	-	-	-	-
Wetted Perimeter (ft)	8.5	7.18	6.7	7.2	-	6.4	5.4	21.0	19.4	18.1	20.2	-	14.3	13.9	14.4	15.4	13.9	13.0	-	11.8	12.3	30.5	25.7	23.7	23.0	-	13.3	13.8	
Hydraulic Radius (ft)	0.6	0.57	0.5	0.5	-	0.5	0.4	1.1	0.9	0.6	0.9	-	1.3	1.3	0.9	0.8	0.9	0.9	-	0.9	0.8	1.1	0.8	0.7	0.7	-	0.9	0.7	
Cross Sectional Area between end pins (ft ²)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
d50 (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stream Reach	Reach 1																												
	Cross-section X-16 (Riffle)							Cross-section X-17 (Riffle)																					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY7															
Based on fixed baseline bankfull elevation																													
BF Width (ft)	12.6	11.9	19.7	11.6	-	11.1	12.5	12.60	12.2	12.1	12.6	-	12.0	11.9															
BF Mean Depth (ft)	1.1	1.09	0.7	1.0	-	0.9	0.9	1.20	1.2	1.1	1.0	-	1.0	0.9															
Width/Depth Ratio	12.0	10.9	26.6	11.3	-	12.7	14.4	10.9	10.3	10.6	13.0	-	11.7	13.5															
BF Cross-sectional Area (ft ²)	13.2	13	14.6	12.0	-	9.8	10.9	14.5	14.6	13.9	12.2	-	12.2	10.4															
BF Max Depth (ft)	1.70	1.8	1.8	1.7	-	1.7	1.8	1.70	2	2.1	1.7	-	2.0	1.4															
Width of Floodprone Area (ft)	100.0	71.4	71.3	71.3	-	71.3	71.4	100.0	68.6	68.5	68.5	-	68.5	68.5															
Entrenchment Ratio (MY1 will provide standard)*	5.7	6	3.6	6.1	-	6.4	5.7	5.4	5.6	5.7	5.5	-	5.7	5.8															
Bank Height Ratio (MY1 will provide standard)*	1.0	1.0	1.0	1.0	-	0.9	0.9	1.0	1.0	1.0	1.0	-	1.0	1.0															
Wetted Perimeter (ft)	13.5	13.0	20.4	12.4	-	12.0	13.4	13.3	13.1	13.2	13.7	-	12.8	12.4															
Hydraulic Radius (ft)	1.0	1.0	0.9	1	-	0.8	0.8	1.1	1.1	1.1	0.9	-	1.0	0.8															
Cross Sectional Area between end pins (ft ²)	-	-	-	-	-	-	-	-	-	-	-	-	-	-															
d50 (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-															

Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by

Table 11b. Stream Reach Morphology Summary

Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach 4

Parameter	Baseline (Poor survey quality)						MY-1 (Utilize for comparison)						MY-2						MY-3						MY-5						MY-7					
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Dimension and Substrate - Riffle only																																				
Bankfull Width (ft)	7.2	9.3	9.1	11.8	1.7	4	8.1	10.2	10.0	12.5	1.7	4	7	9.5	9.7	11.6	1.8	4	7	10.33	9.9	14.5	2.8	4	6.30	8.80	9.25	10.40	1.54	4	7	9.275	8.75	12.6	2.051	4
Floodprone Width (ft)	31.3	57.9	66.0	68.1	15.4	4	58.8	66.6	67.7	72.0	4.9	4	46.3	61.93	66.55	68.3	9.1	4	45.7	61.43	65.85	68.3	9.1	4	45.70	61.43	65.85	68.30	9.14	4	45.8	61.75	66.55	68.1	9.26	4
Bankfull Mean Depth (ft)	0.5	0.8	0.9	1.1	0.2	4	0.4	0.6	0.7	0.8	0.1	4	0.4	0.6	0.65	0.7	0.1	4	0.4	0.525	0.55	0.6	0.1	4	0.40	0.63	0.65	0.80	0.15	4	0.4	0.6	0.65	0.7	0.122	4
¹ Bankfull Max Depth (ft)	0.8	1.4	1.5	1.7	0.3	4	0.9	1.1	1.1	1.2	0.1	4	0.7	0.975	1.05	1.1	0.2	4	0.6	0.925	0.95	1.2	0.2	4	0.70	1.00	1.00	1.30	0.21	4	0.7	1.025	1.1	1.2	0.192	4
Bankfull Cross Sectional Area (ft ²)	3.3	7.7	7.4	12.7	3.4	4	3.4	6.4	7.0	8.2	1.8	4	3	5.75	6.25	7.5	1.7	4	2.5	5.40	5.65	7.8	1.9	4	2.40	5.58	6.05	7.80	2.02	4	2.4	5.525	5.75	8.2	2.07	4
Width/Depth Ratio	11.0	12.3	11.3	15.4	1.8	4	12.6	17.0	17.0	21.5	3.6	4	13.6	15.98	16.3	17.7	1.5	4	15.3	20.25	19.4	26.9	4.2	4	13.60	14.60	14.25	16.30	1.07	4	13.3	16.35	16.35	19.4	3	4
Entrenchment Ratio (MY1 will provide standard)*	4.4	6.2	6.4	7.6	1.2	4	5.3	6.2	6.1	7.4	0.8	4	5.9	6.6	6.4	7.7	0.7	4	4.7	6.175	6.25	7.5	1.0	4	6.60	7.05	7.10	7.40	0.32	4	5.4	6.8	6.95	7.9	0.93	4
Bank Height Ratio (MY1 will provide standard)*	1	1	1	1	0	4	1	1	1	1	0	4	1	1	1	1	0	4	0.9	0.9	0.9	0.9	0	4	0.90	0.98	0.95	1.10	0.08	4	0.9	0.95	0.95	1	0.05	4
Profile																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
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Additional Reach Parameters																																				
Rosgen Classification																																				
Channel Thalweg length (ft)																																				
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Biological or Other																																				

Shaded cells indicate that these will typically not be filled in.

¹ = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.

² = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

³ = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

⁴ = Of value/needed only if the n exceeds 3

Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth.

Table 11b continued. Stream Reach Morphology Summary

Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach 3

Parameter	Baseline (Poor survey quality)						MY-1 (Utilize for comparison)						MY-2						MY-3						MY-5						MY-7					
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Dimension and Substrate - Riffle only																																				
Bankfull Width (ft)	9.3	10.7	10.9	11.6	0.9	4	10.1	11.2	11.5	11.7	0.7	4	9.7	10.0	9.9	10.5	0.3	4.0	9.3	9.7	9.6	10.3	0.4	4.0	8.9	10.4	9.5	13.9	2.0	4.0	9.3	10.8	10.7	12.6	1.4	4.0
Floodprone Width (ft)	51.6	73.4	76.1	89.9	15.7	4	67.5	83.5	88.4	89.9	9.3	4	50.9	73.6	76.8	89.9	16.3	4.0	52.3	73.8	76.4	89.9	15.5	4.0	52.3	73.8	76.4	89.9	15.5	4.0	57.8	75.7	77.5	89.9	14.3	4.0
Bankfull Mean Depth (ft)	0.6	0.8	0.8	0.9	0.2	4	0.5	0.6	0.7	0.7	0.1	4	0.5	0.6	0.6	0.7	0.1	4.0	0.5	0.6	0.7	0.7	0.1	4.0	0.5	0.6	0.6	0.7	0.1	4.0	0.5	0.6	0.6	0.7	0.1	4.0
¹ Bankfull Max Depth (ft)	1.1	1.3	1.3	1.3	0.1	4	1.0	1.1	1.1	1.2	0.1	4	0.9	1.1	1.1	1.2	0.1	4.0	0.8	1.1	1.2	1.2	0.2	4.0	1.1	1.1	1.1	1.2	0.0	4.0	1.1	1.2	1.2	1.3	0.1	4.0
Bankfull Cross Sectional Area (ft ²)	6.8	7.9	7.6	9.8	1.2	4	6.2	7.1	7.0	8.0	0.6	4	4.5	5.4	5.4	6.4	0.8	4.0	4.8	6.0	6.3	6.7	0.8	4.0	4.8	6.0	6.2	6.9	0.9	4.0	4.9	6.2	6.5	7.1	0.8	4.0
Width/Depth Ratio	10.8	15.0	15.1	19.2	3.9	4	14.2	18.0	18.2	21.3	2.6	4	15.1	18.9	19.7	21.0	2.4	4.0	13.5	16.1	16.2	18.3	2.1	4.0	13.1	18.5	16.3	28.3	6.0	4.0	14.0	19.0	19.1	23.7	3.4	4.0
Entrenchment Ratio (MY1 will provide standard)*	4.4	6.9	7.5	8.2	1.5	4	4.5	6.6	6.7	8.5	1.6	4	5.1	7.4	7.6	9.3	1.8	4.0	5.1	7.7	8.0	9.7	1.9	4.0	5.9	7.2	6.6	9.6	1.4	4.0	4.9	7.1	7.1	9.4	1.6	4.0
Bank Height Ratio (MY1 will provide standard)*	1	1	1	1	0	4	1	1	1	1	0	4	0.9	1.0	1.0	1.0	0.0	4.0	1.0	1.0	1.0	1.1	0.0	4.0	0.9	1.0	1.0	1.1	0.1	4.0	0.8	1.0	1.0	1.0	0.1	4.0
Profile																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
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Shaded cells indicate that these will typically not be filled in.

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3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

4. = Of value/needed only if the n exceeds 3

Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth.

Table 11b continued. Stream Reach Morphology Summary																																							
Browns Summit Creek Restoration Project: DMS Project No ID. 96313																																							
Reach 1																																							
Parameter	Baseline (Poor survey quality)						MY-1 (Utilize for comparison)						MY-2						MY-3						MY-5						MY-7								
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n			
Dimension and Substrate - Riffle only																																							
Bankfull Width (ft)	12.6	13.0	12.6	13.8	0.6	3	11.9	12.9	12.2	14.7	1.3	3	12.1	15.0	13.1	19.7	3.4	3.0	11.6	12.1	12.2	12.6	0.4	3.0	11.0	11.4	11.1	12.0	0.4	3.0	11.6	12.0	11.9	12.5	0.4	3.0			
Floodprone Width (ft)	100.0	100.0	100.0	100.0	0.0	3	68.6	71.0	71.4	73.1	1.9	3	68.5	71.0	71.3	73.2	1.9	3.0	68.5	71.0	71.3	73.1	1.9	3.0	68.5	71.0	71.4	73.2	1.9	3.0	68.5	71.0	71.4	73.2	1.9	3.0			
Bankfull Mean Depth (ft)	0.9	1.1	1.1	1.2	0.1	3	0.9	1.1	1.1	1.2	0.1	3	0.7	0.9	0.9	1.1	0.2	3.0	1.0	1.0	1.0	1.0	0.0	3.0	0.9	1.0	1.0	1.0	0.0	3.0	0.9	0.9	0.9	0.9	0.0	3.0			
¹ Bankfull Max Depth (ft)	1.7	1.7	1.7	1.7	0.0	3	1.6	1.8	1.8	2.0	0.2	3	0.9	1.6	1.8	2.1	0.5	3.0	1.7	1.7	1.7	1.8	0.0	3.0	1.7	1.8	1.7	2.0	0.1	3.0	1.4	1.6	1.7	1.8	0.2	3.0			
Bankfull Cross Sectional Area (ft ²)	12.5	13.4	13.2	14.5	0.8	3	12.5	13.4	13.0	14.6	0.9	3	12.3	13.6	13.9	14.6	1.0	3.0	11.8	12.0	12.0	12.2	0.2	3.0	9.8	10.9	10.7	12.2	1.0	3.0	9.9	10.4	10.4	10.9	0.4	3.0			
Width/Depth Ratio	10.9	12.7	12.0	15.2	1.8	3	10.3	12.8	10.9	17.3	3.2	3	10.6	17.1	14.0	26.6	6.9	3.0	11.3	12.3	12.5	13.0	0.7	3.0	11.3	11.9	11.7	12.7	0.6	3.0	13.5	13.8	13.6	14.4	0.4	3.0			
Entrenchment Ratio (MY1 will provide standard)*	5.3	5.5	5.4	5.7	0.2	3	5.0	5.5	5.6	6.0	0.4	3	3.6	5.0	5.6	5.7	1.0	3.0	5.5	5.9	6.0	6.1	0.3	3.0	5.7	6.2	6.4	6.6	0.4	3.0	5.7	5.9	5.8	6.3	0.3	3.0			
Bank Height Ratio (MY1 will provide standard)*	1	1	1	1	0	3	1	1	1	1	0	3	1.0	1.0	1.0	1.0	0.0	3.0	1.0	1.0	1.0	1.0	0.0	3.0	0.9	1.0	1.0	1.0	0.0	3.0	0.9	1.0	1.0	1.0	0.0	3.0			
Profile																																							
Riffle Length (ft)																																							
Riffle Slope (ft/ft)																																							
Pool Length (ft)																																							
Pool Max depth (ft)																																							
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Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing it the current max depth.

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			
Year 7 Monitoring (2023)			
3/16/2023	1.00	1/13/2023	Crest Gauge Measurement

Table 15. 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	22.9	105.5	106.5	209.0	229.0	213.0	77.0	54.0	74.8	80.5	88.6	97.0	90.3	72.0	43.2	176.5	190.0	209.0	229.0	213.0	170.0	102.0
Type 4 (1:1 Ratio - Success Criteria 12% of Growing Season)																												
BSAW2	3.2	6.8	7.2	6.8	10.2	9.3	6.4	7.5	16.0	17.0	16.0	24.0	22.0	15.0	13.8	38.8	18.4	42.4	17.8	24.2	19.5	32.5	91.5	43.5	100.0	42.0	57.0	46.0
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	64.0	112.5	115.0	196.0	229.0	213.0	93.0	151.0	91.7	97.9	87.7	97.0	90.3	89.4	83.5	216.5	231.0	207.0	229.0	213.0	211.0	197.0
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	85.2	229.0	236.0	209.0	229.0	173.0	233.0	201.0	97.0	100.0	88.6	97.0	89.8	98.7	85.2	229.0	236.0	209.0	229.0	212.0	233.0	201.0
BSAW5	34.1	48.7	88.6	97.0	90.3	98.7	85.2	80.5	115.0	209.0	229.0	213.0	233.0	201.0	73.7	86.0	88.6	97.0	90.3	98.7	85.2	174.0	203.0	209.0	229.0	213.0	233.0	201.0
BSAW6	46.0	48.7	48.7	50.4	90.3	34.3	51.7	108.5	115.0	115.0	119.0	213.0	81.0	122.0	89.4	91.9	71.6	94.9	90.3	86.9	78.4	211.0	217.0	169.0	224.0	213.0	205.0	185.0
BSAW7	51.1	48.7	88.6	97.0	90.3	52.1	85.6	120.5	115.0	209.0	229.0	213.0	123.0	202.0	91.1	91.7	88.6	97.0	90.3	97.0	85.6	215.0	216.5	209.0	229.0	213.0	229.0	202.0
BSAW8				97.0	90.3	98.7	85.6				229.0	213.0	233.0	202.0				97.0	90.3	98.7	85.6				229.0	213.0	233.0	202.0
BSAW9*							19.1							45.0							32.2							76.0

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.
* BSAW9 was installed on 3/16/2023 (see the CCPV in Appendix B for the location of the well).

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 (2023)

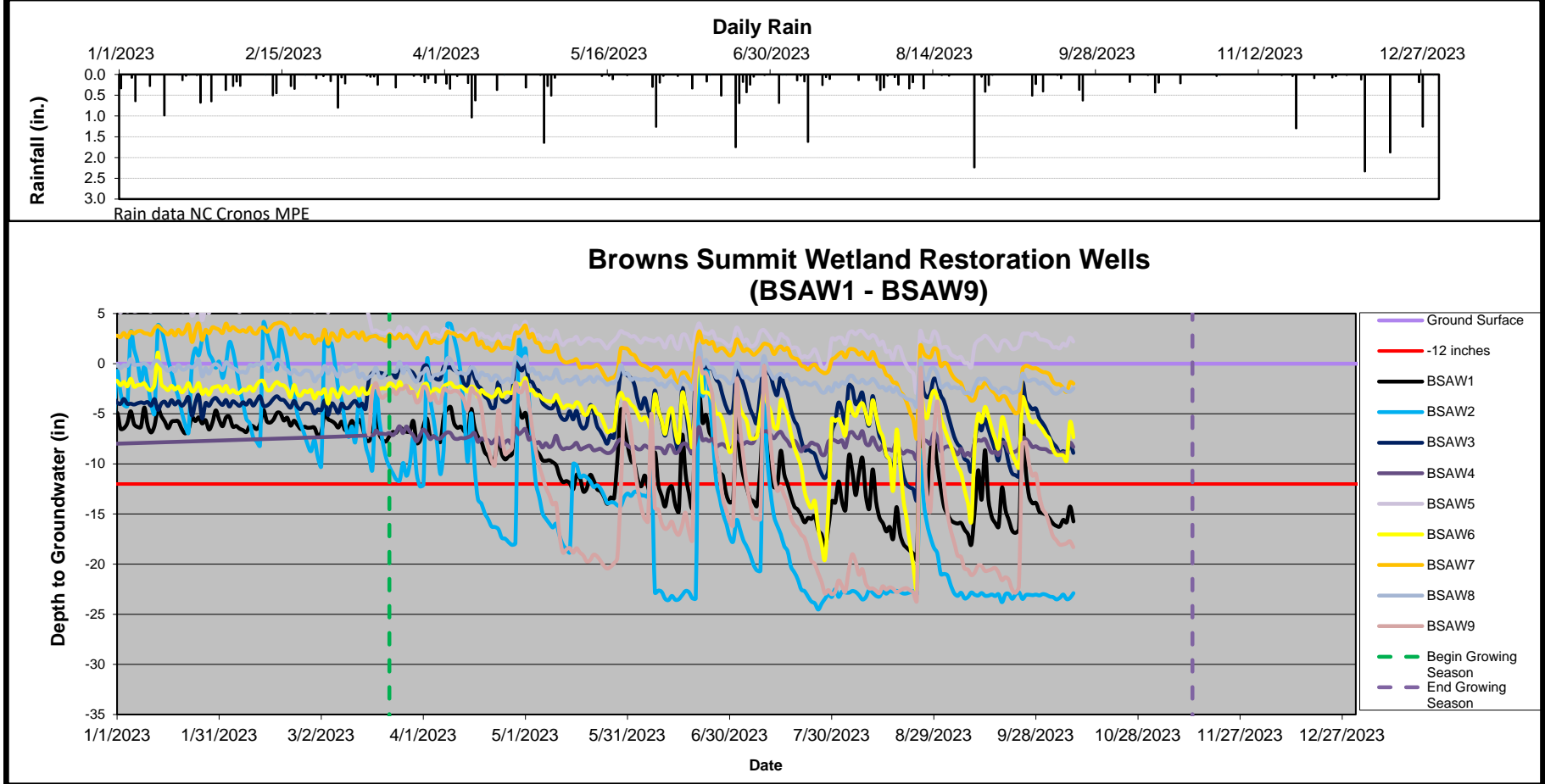


Figure 7. Wetland Restoration Graphs (2023)

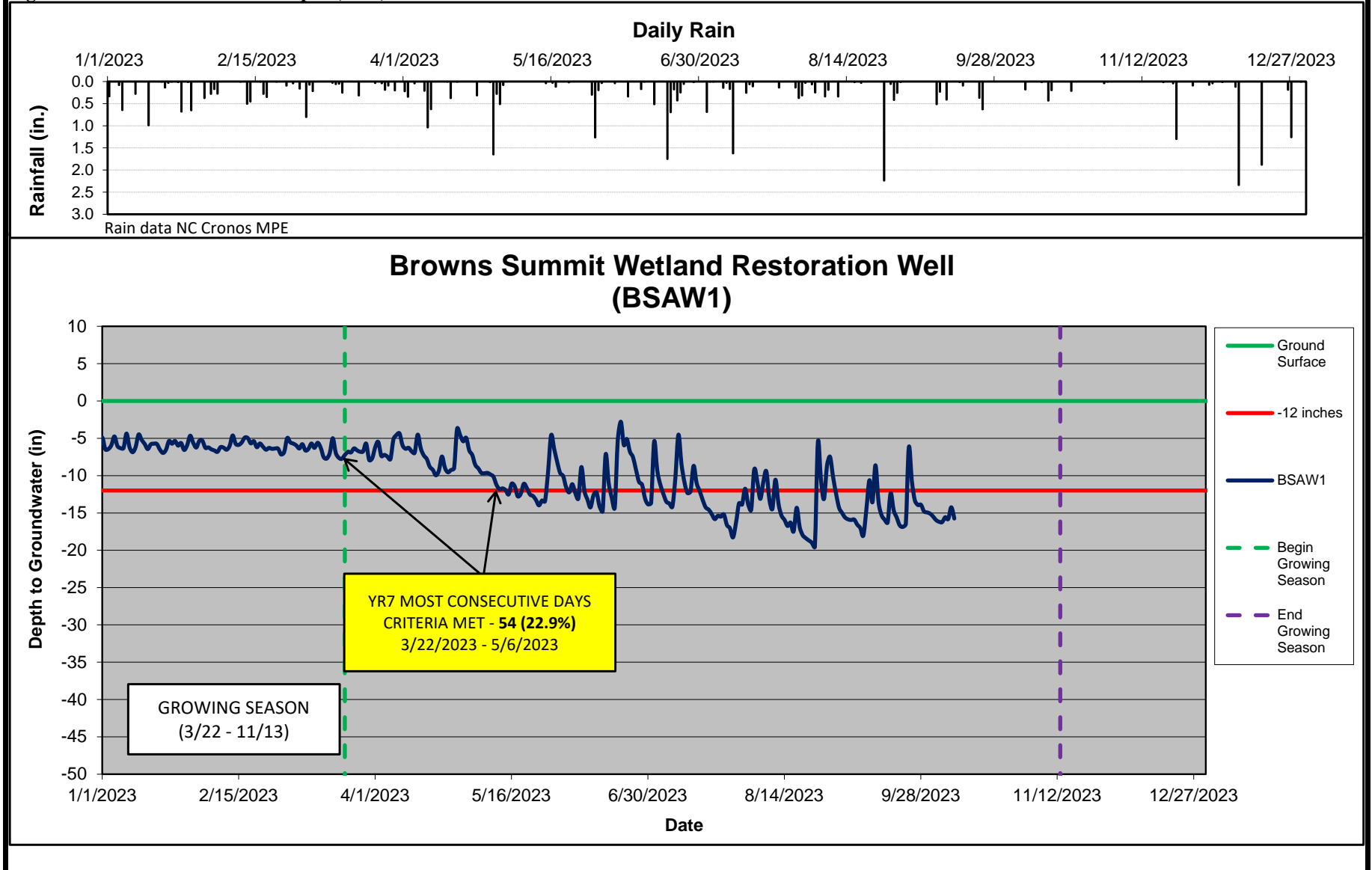


Figure 7. Wetland Restoration Graphs (2023)

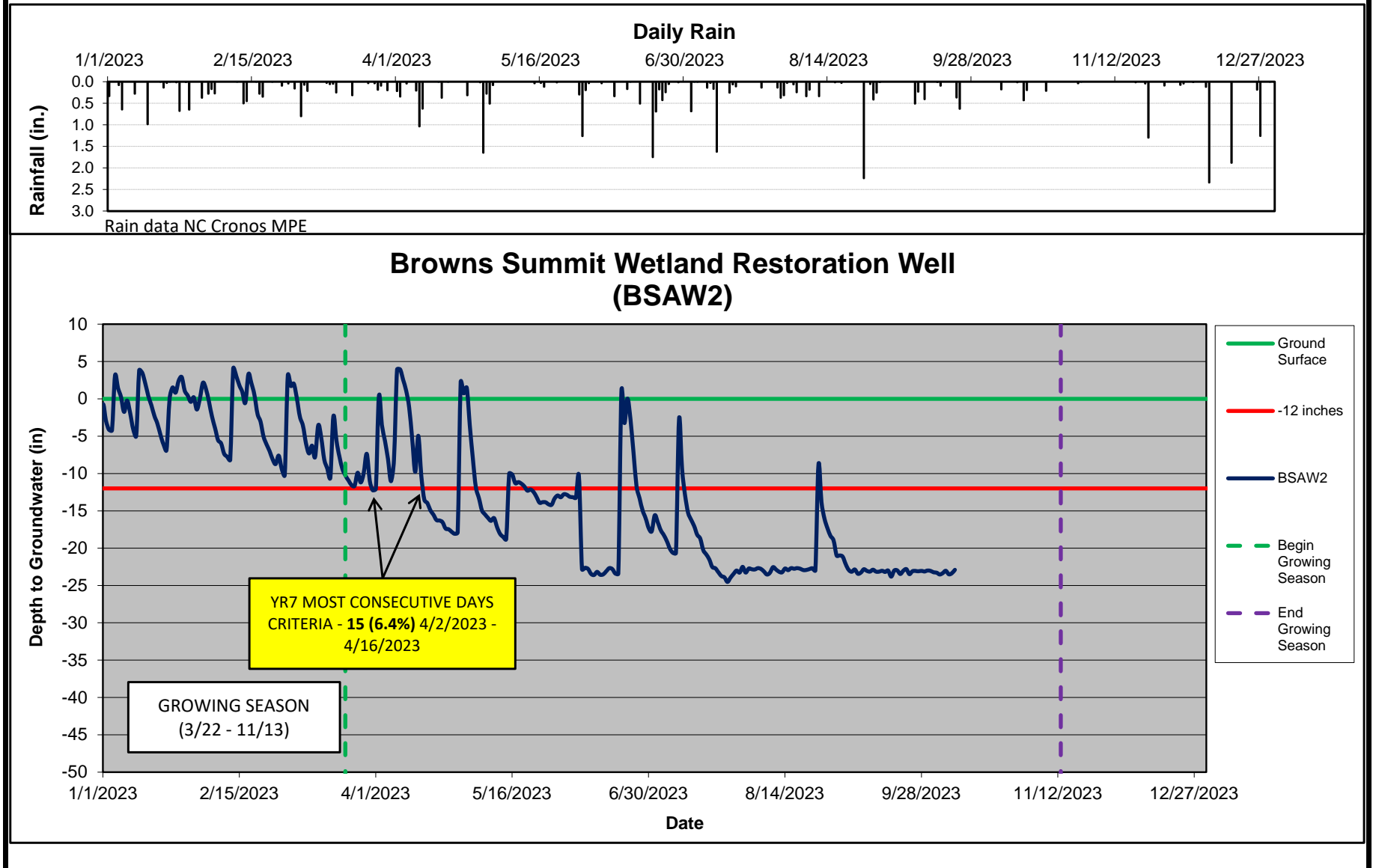


Figure 7. Wetland Restoration Graphs (2023)

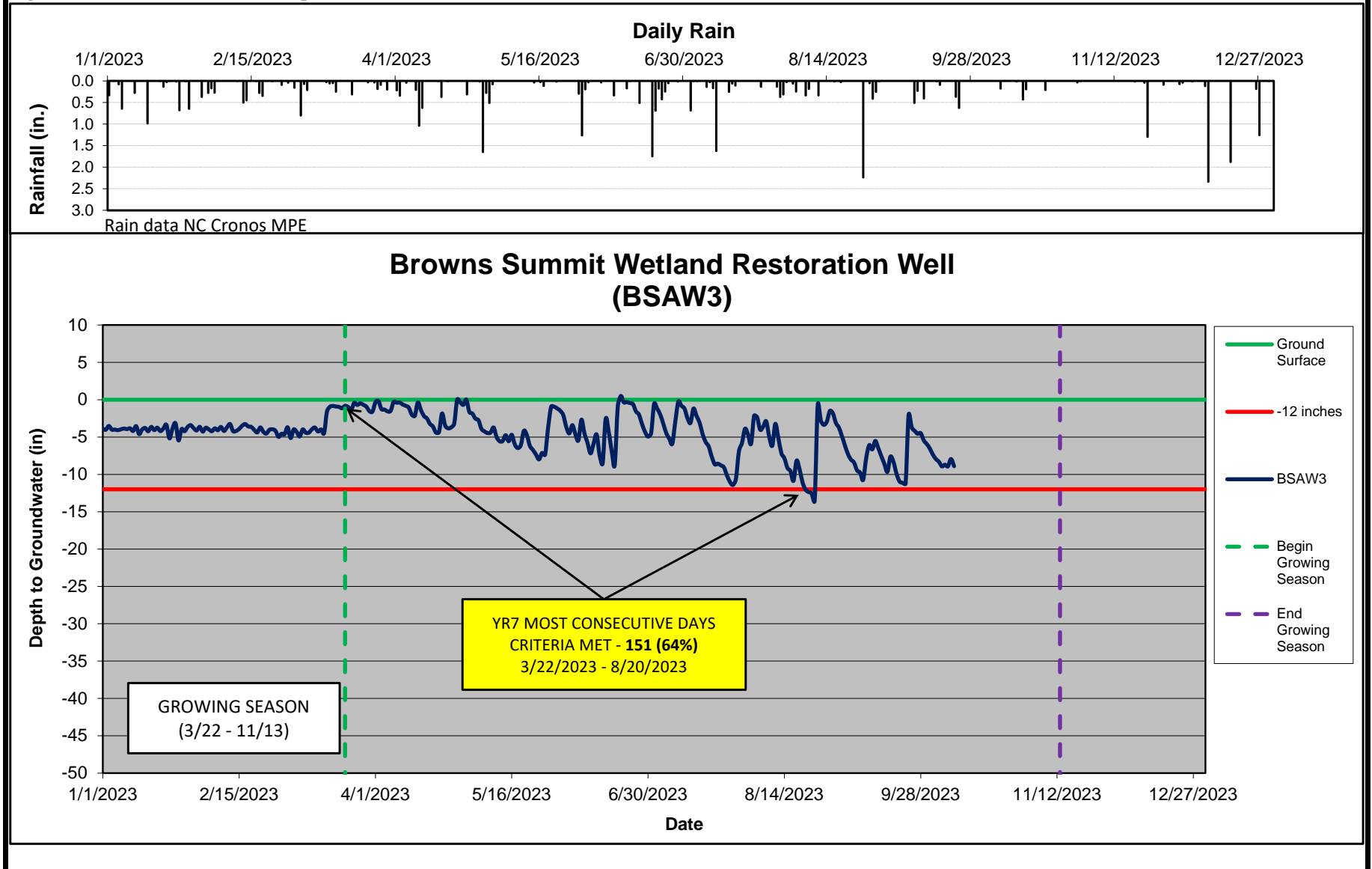


Figure 7. Wetland Restoration Graphs (2023)

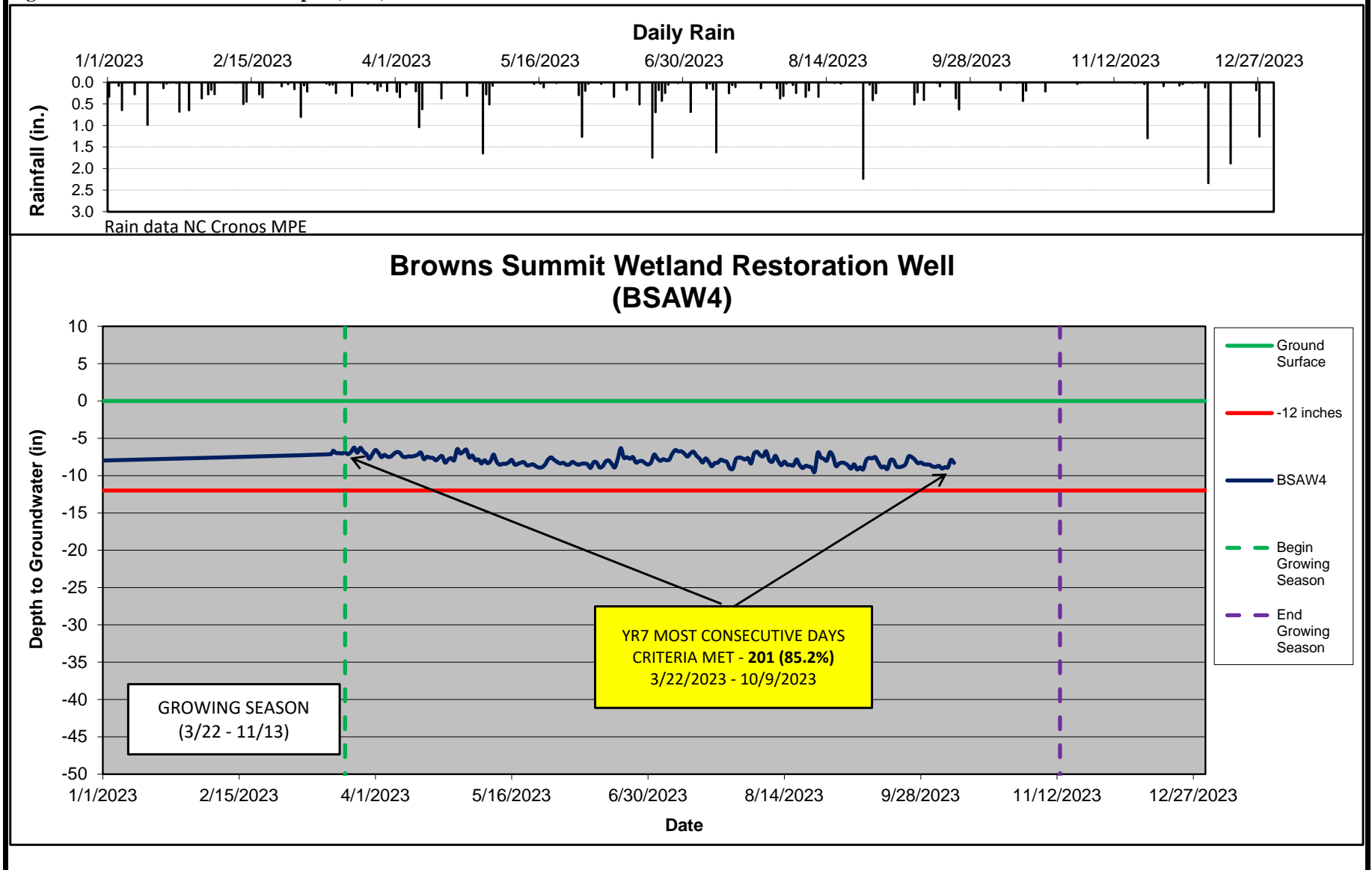


Figure 7. Wetland Restoration Graphs (2023)

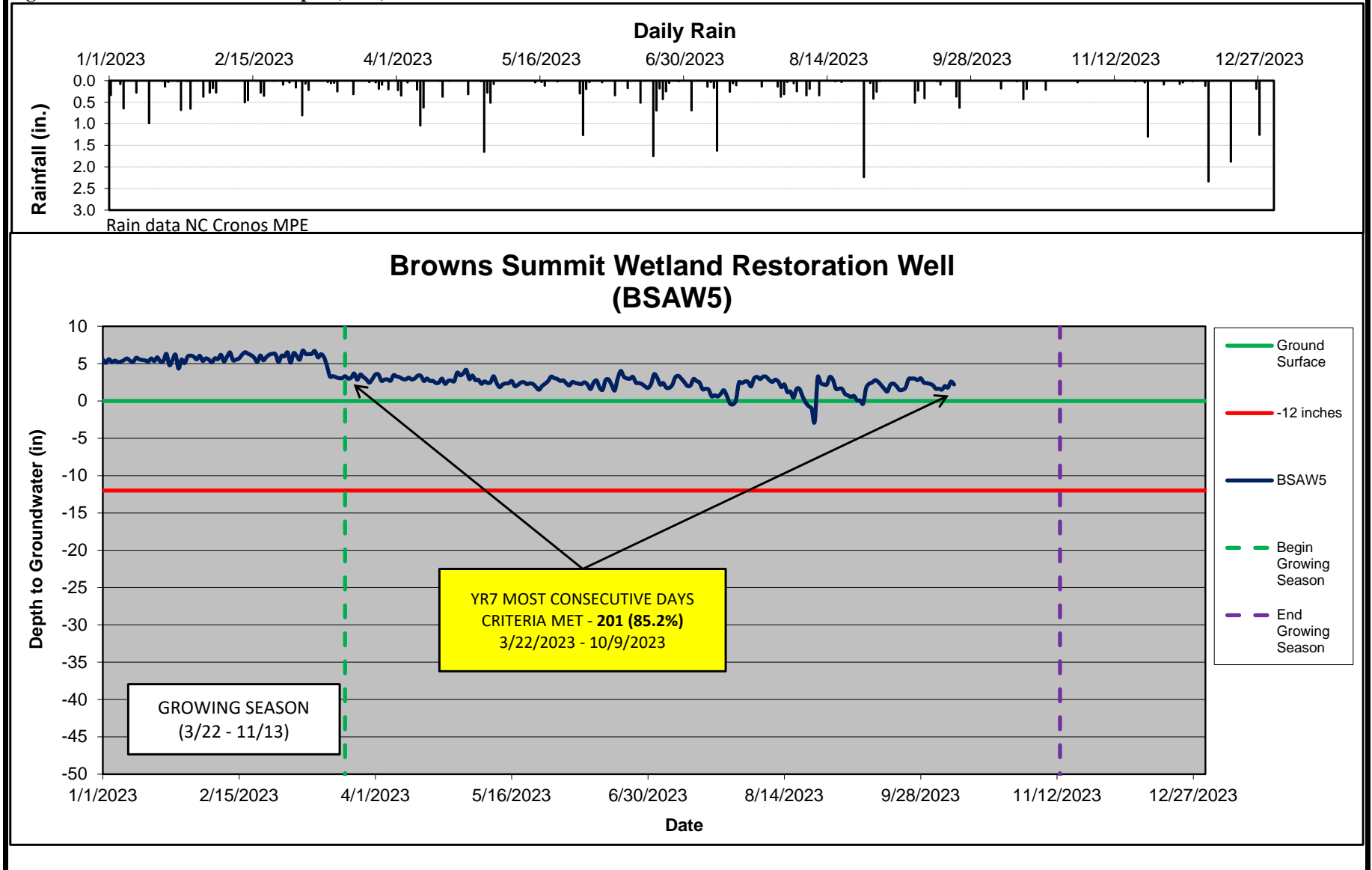


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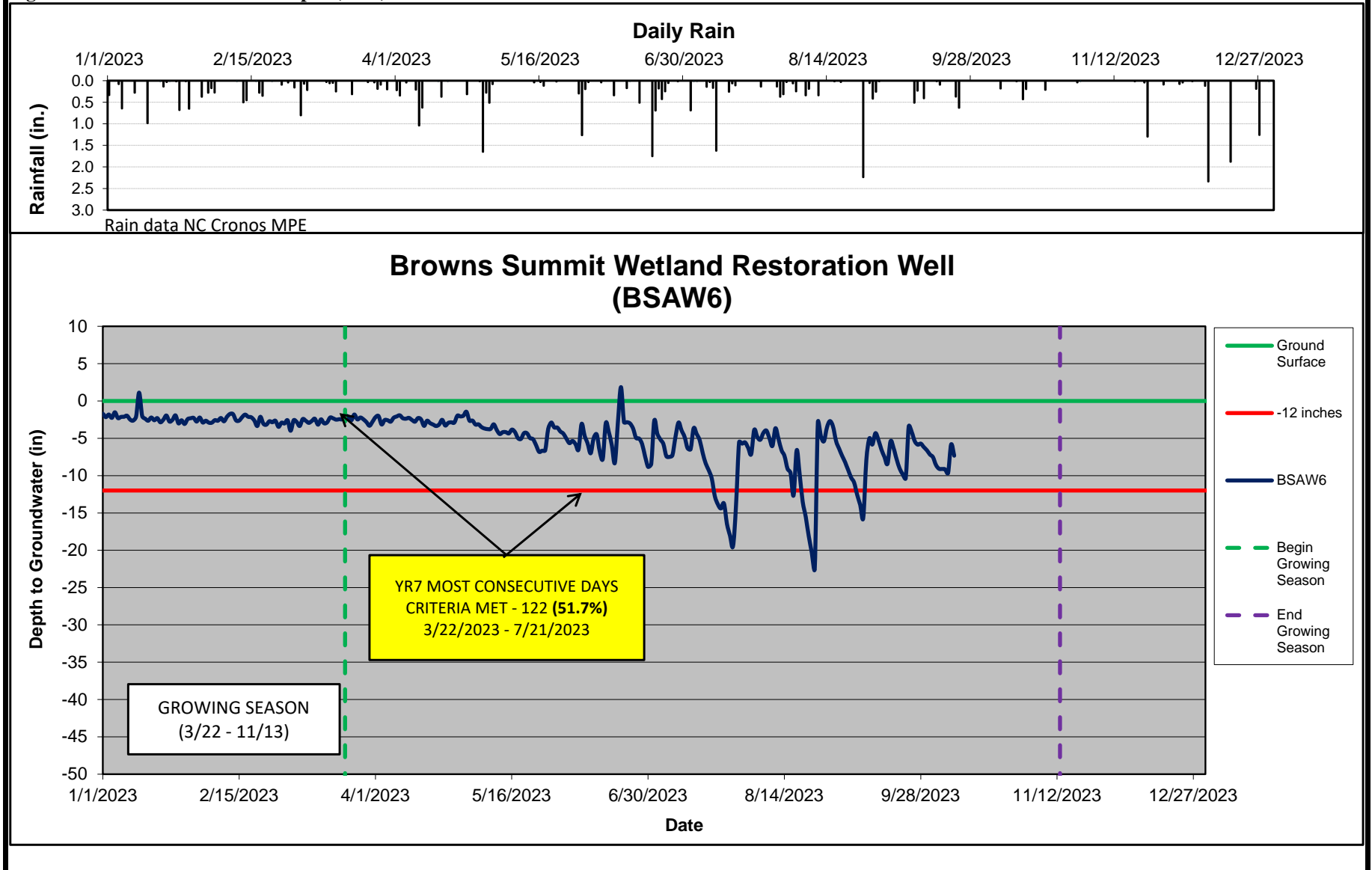


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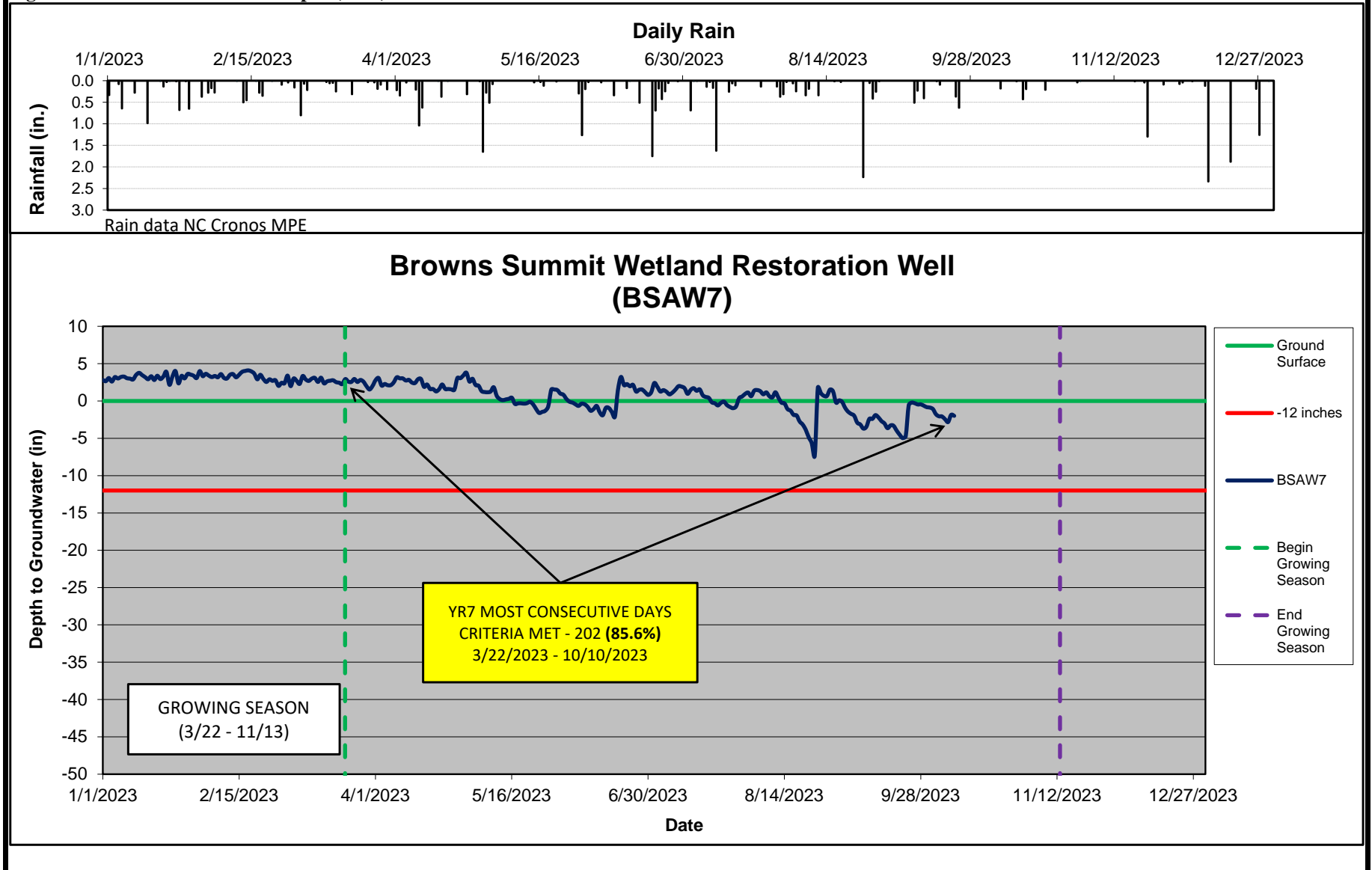


Figure 7. Wetland Restoration Graphs (2023)

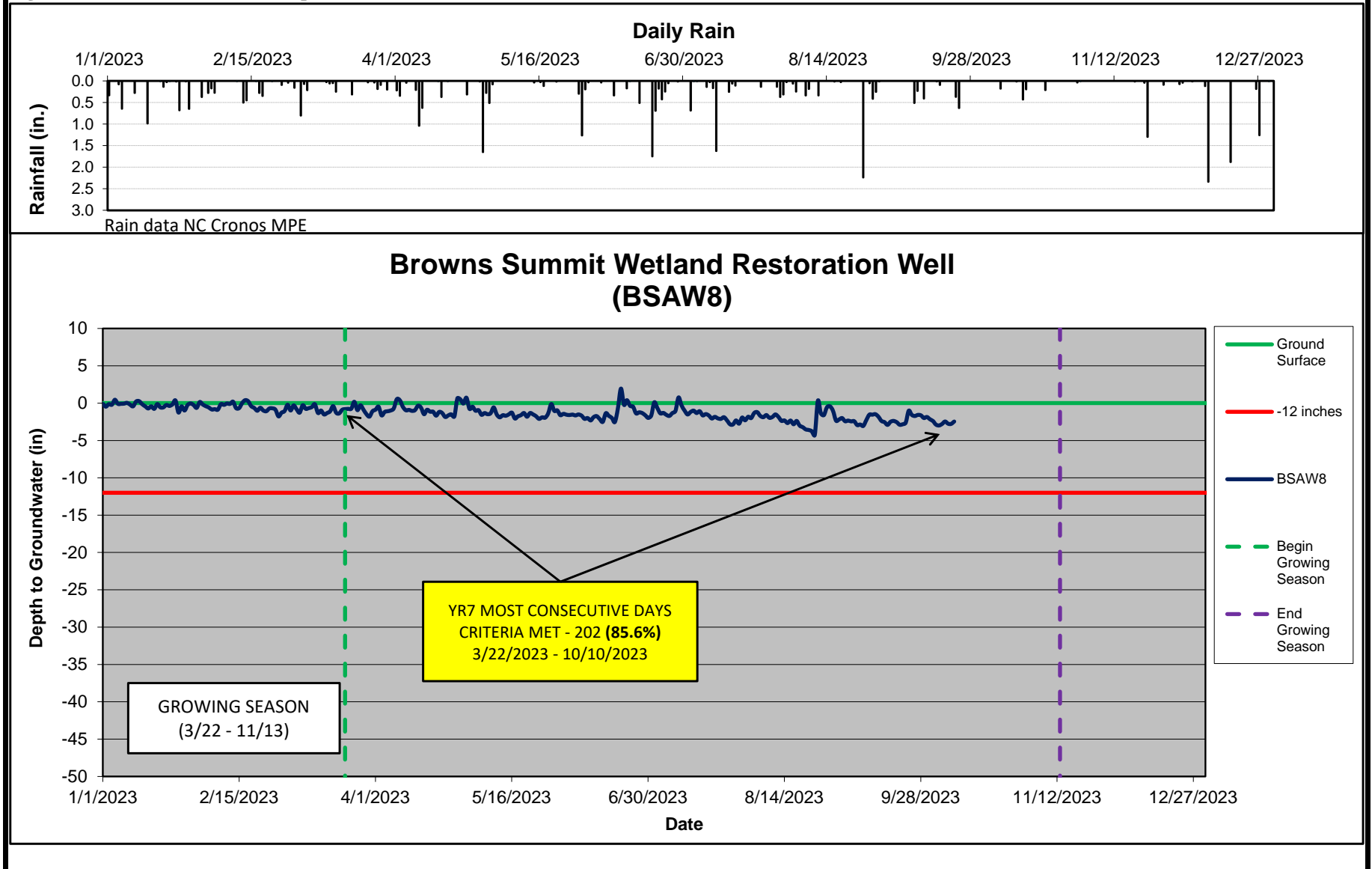
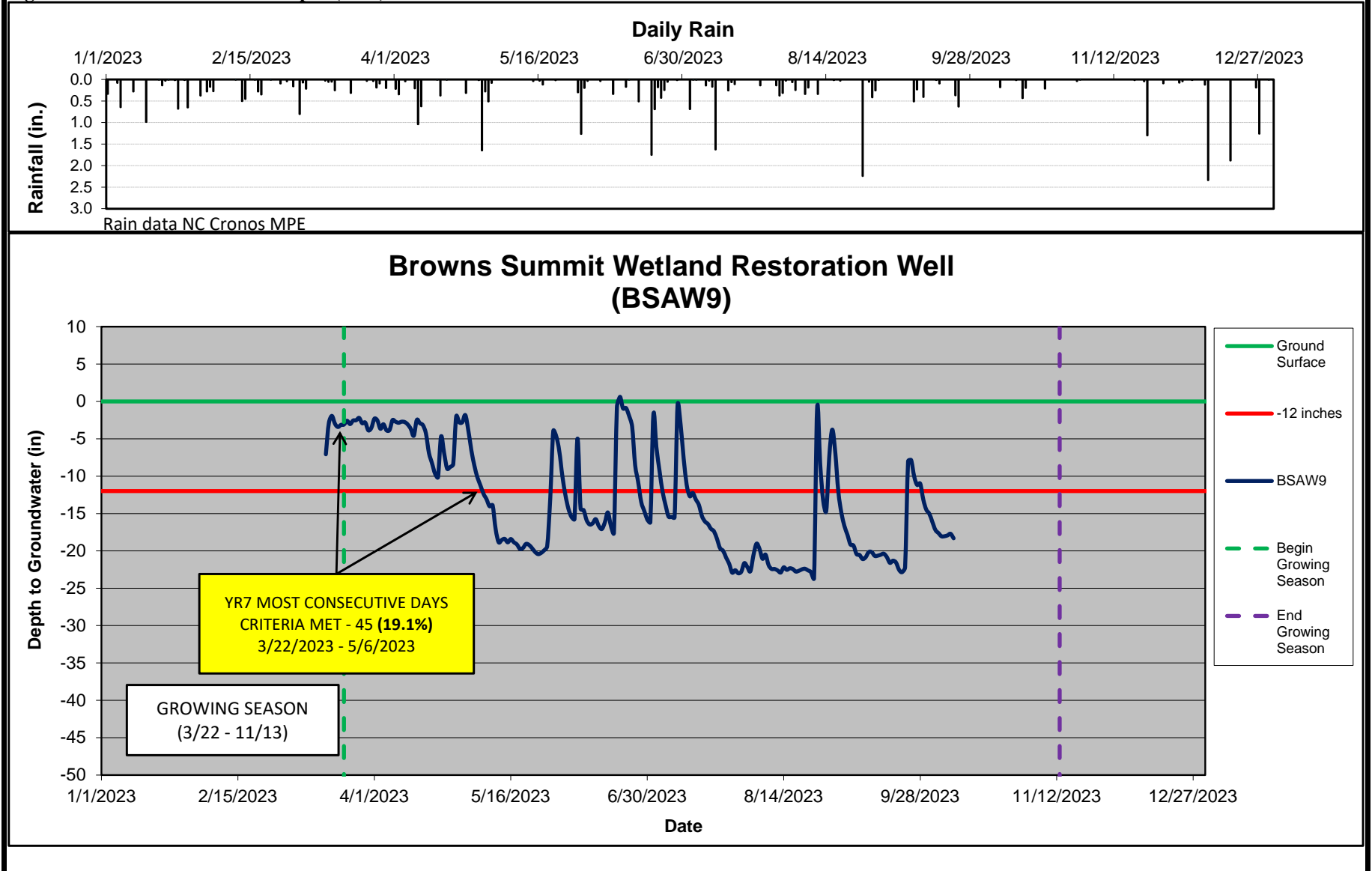
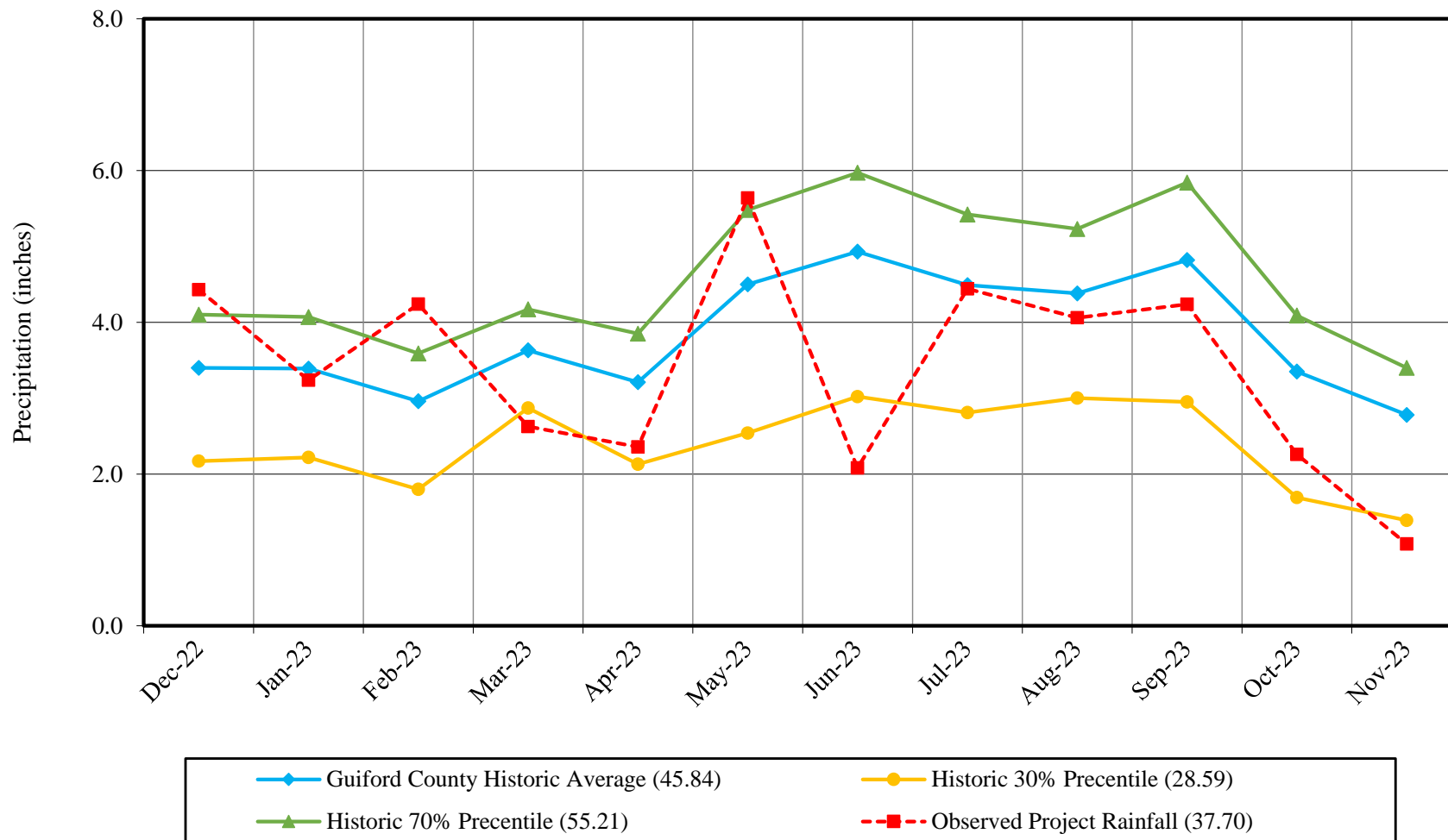


Figure 7. Wetland Restoration Graphs (2023)



Browns Summit Creek Restoration Project MY7 Observed Rainfall versus Historic Averages



Browns Summit Creek Restoration Project – Hydrology Monitoring Stations Photos
Photos taken on (10/10/2023) unless noted different



Manual Crest Gauge – Reading 3/16/23 (1.00')



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 (10/10/2023) 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



Wetland Well 9 – Reach 4, Station 27+50

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.

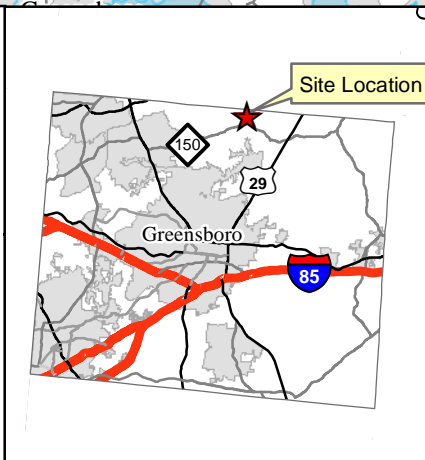
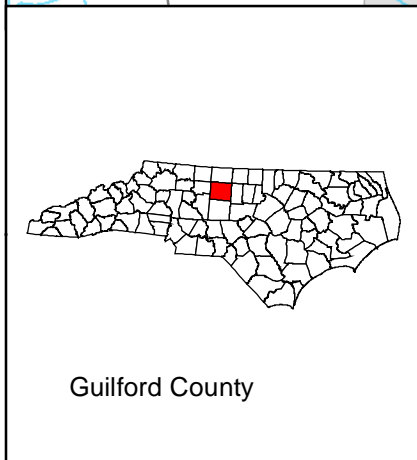
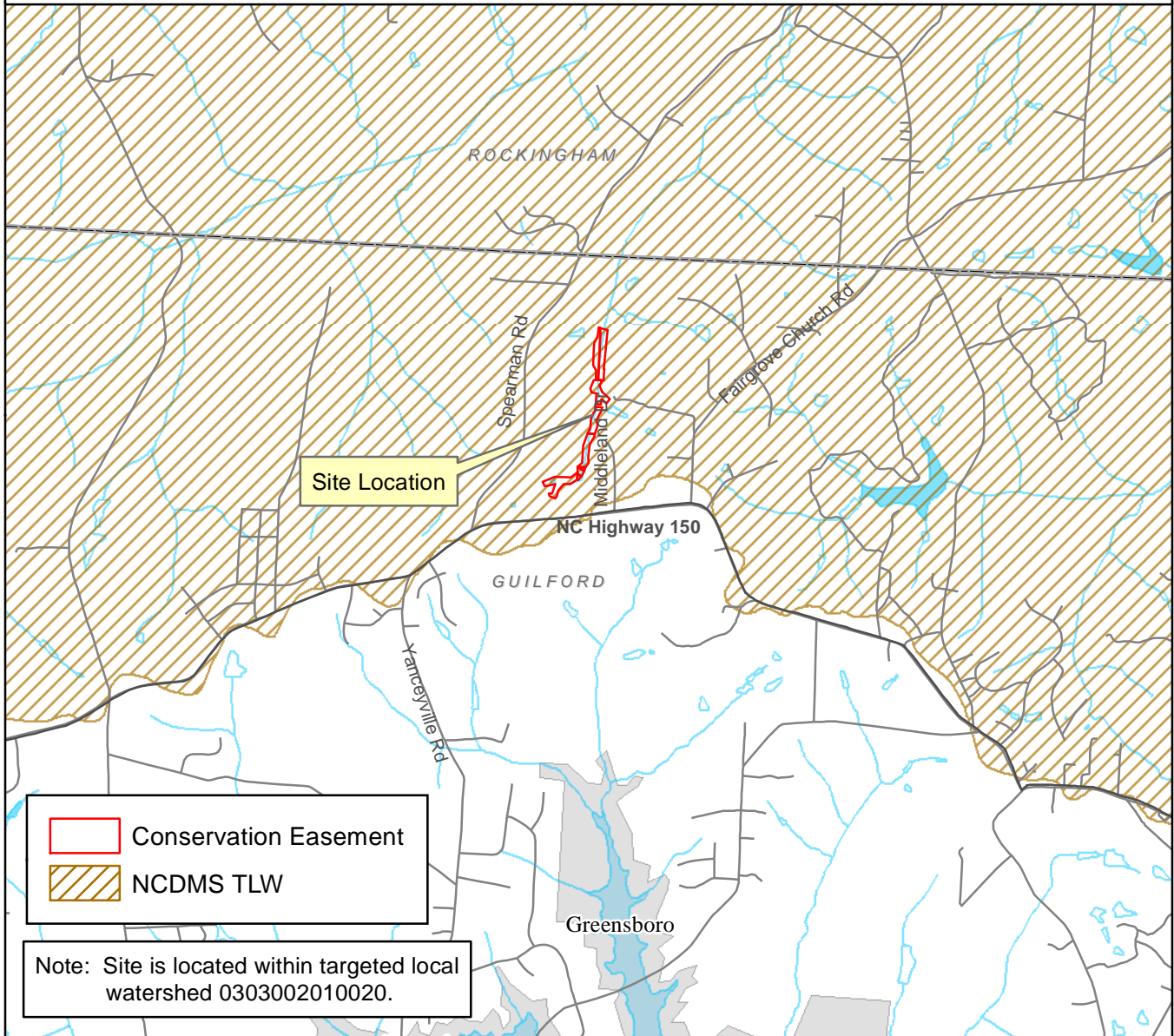


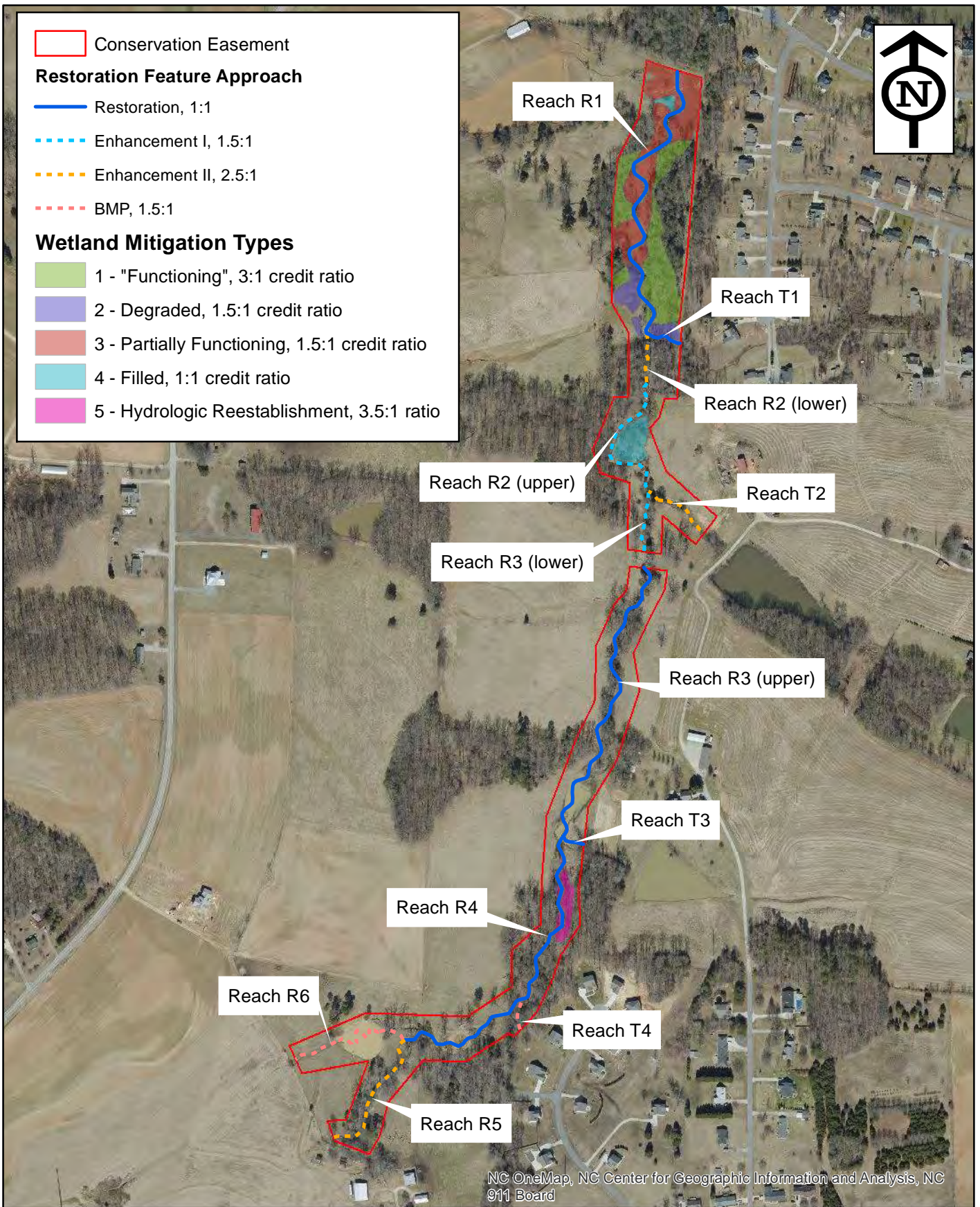
Figure 1
Project Vicinity Map
Browns Summit (DMS# 96313)

NCDEQ - Division
of Mitigation Services

Michael Baker
INTERNATIONAL

0.5 0 0.5
Miles

- Conservation Easement
- Restoration Feature Approach**
- Restoration, 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

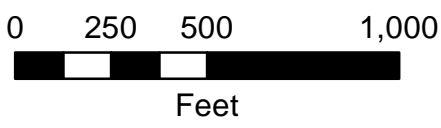
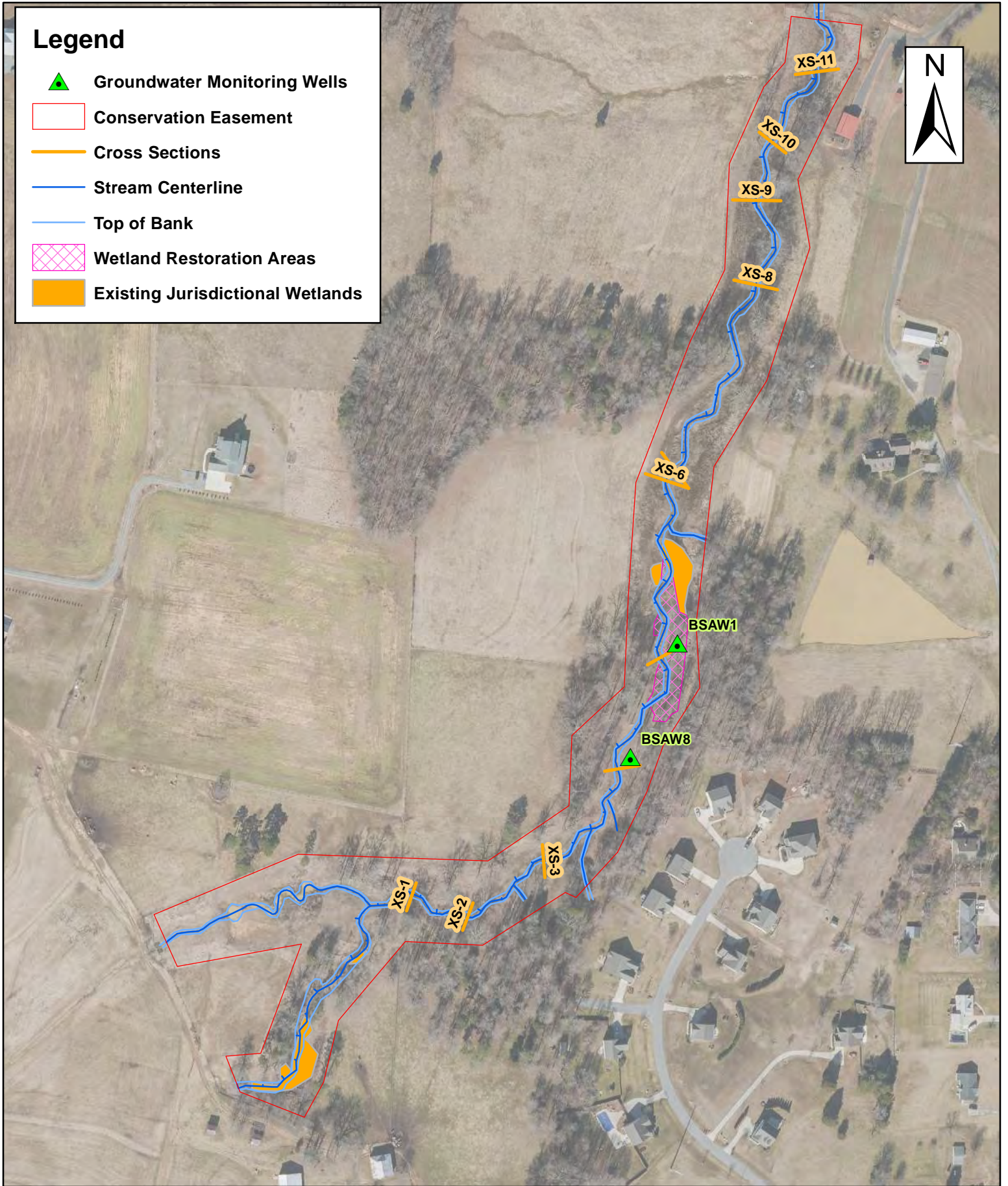



Figure 2
Restoration Summary Map
Browns Summit Site
(DMS #96313)

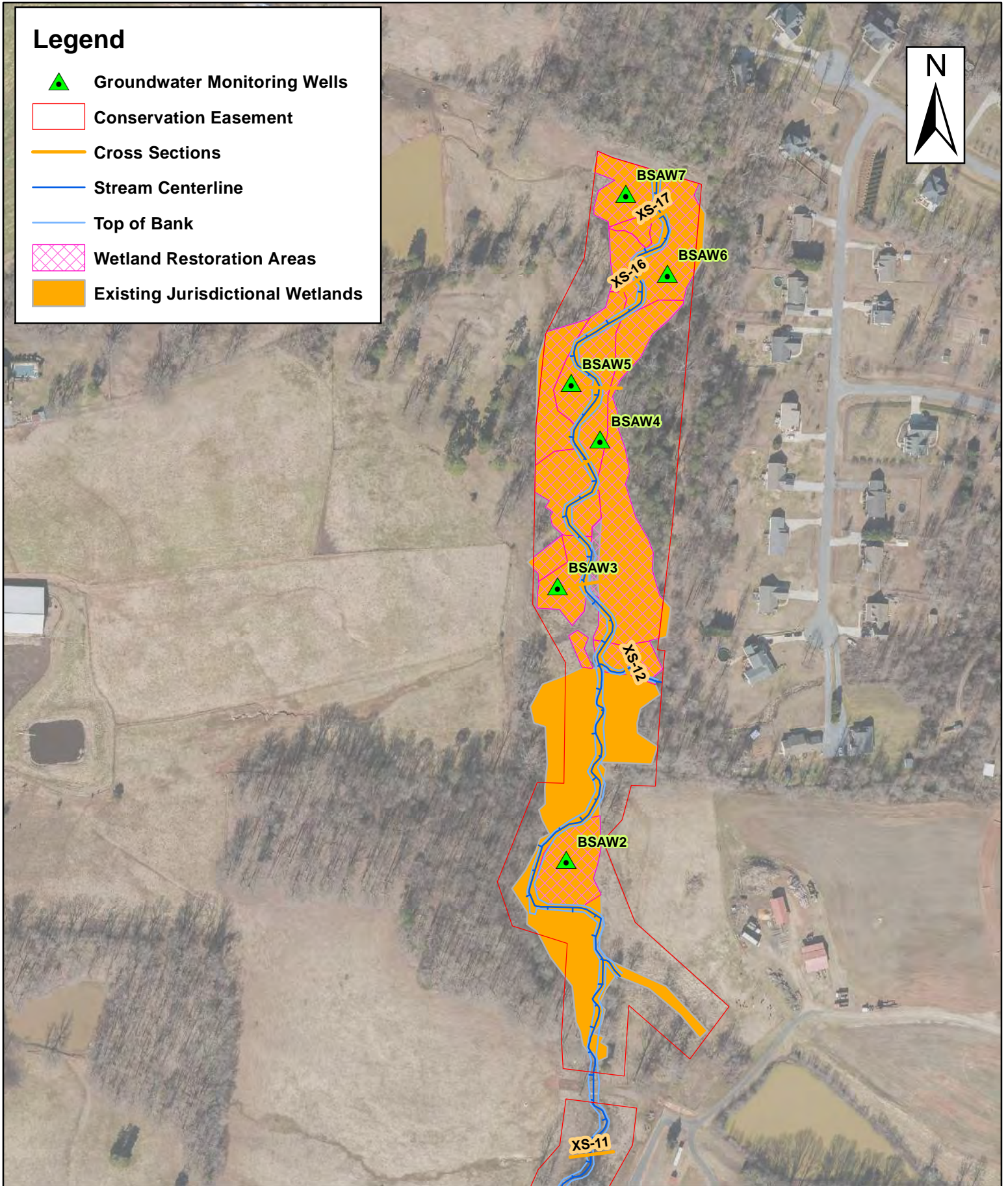
Legend

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






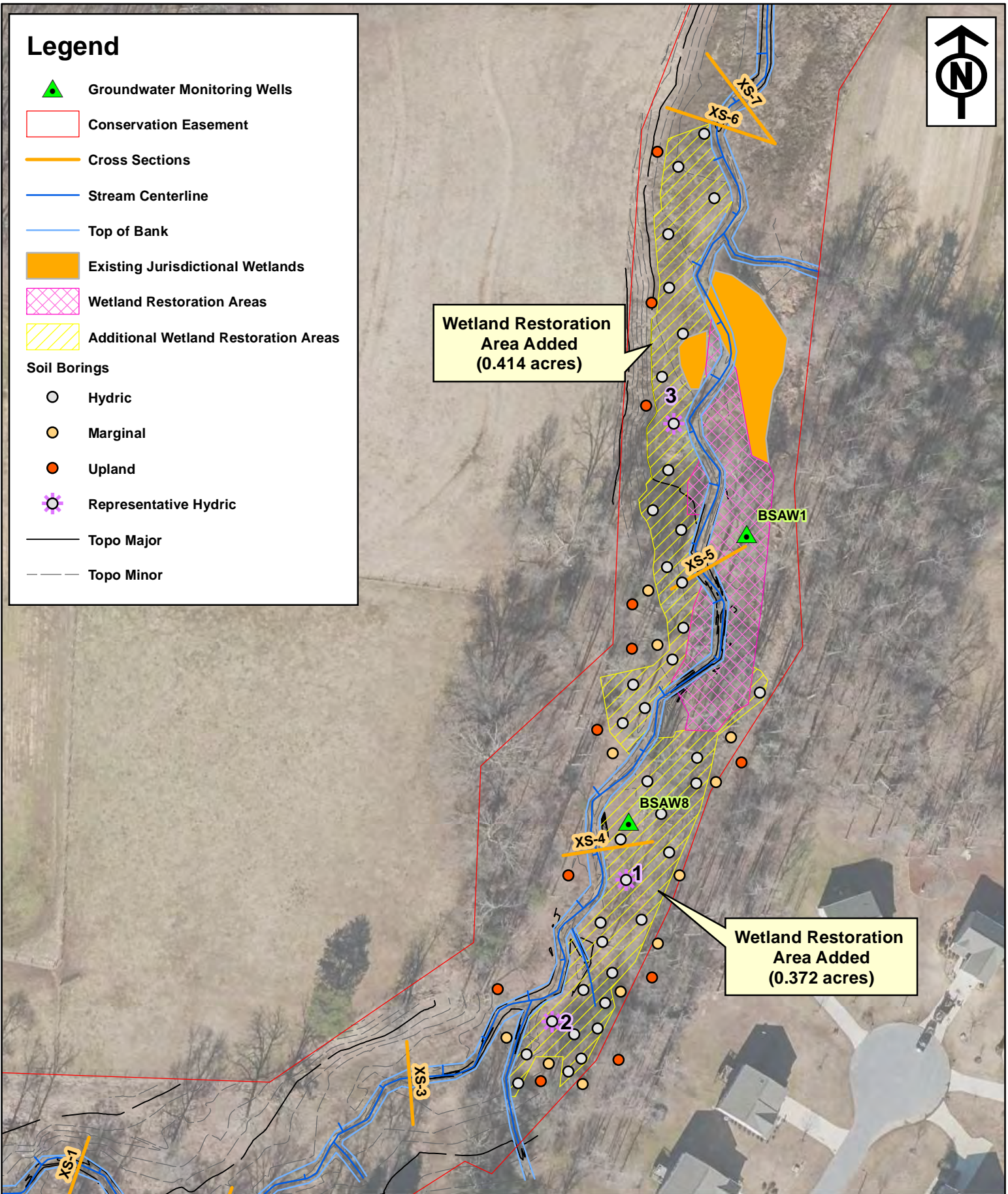
Legend

-  Groundwater Monitoring Wells
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-  Stream Centerline
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-  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

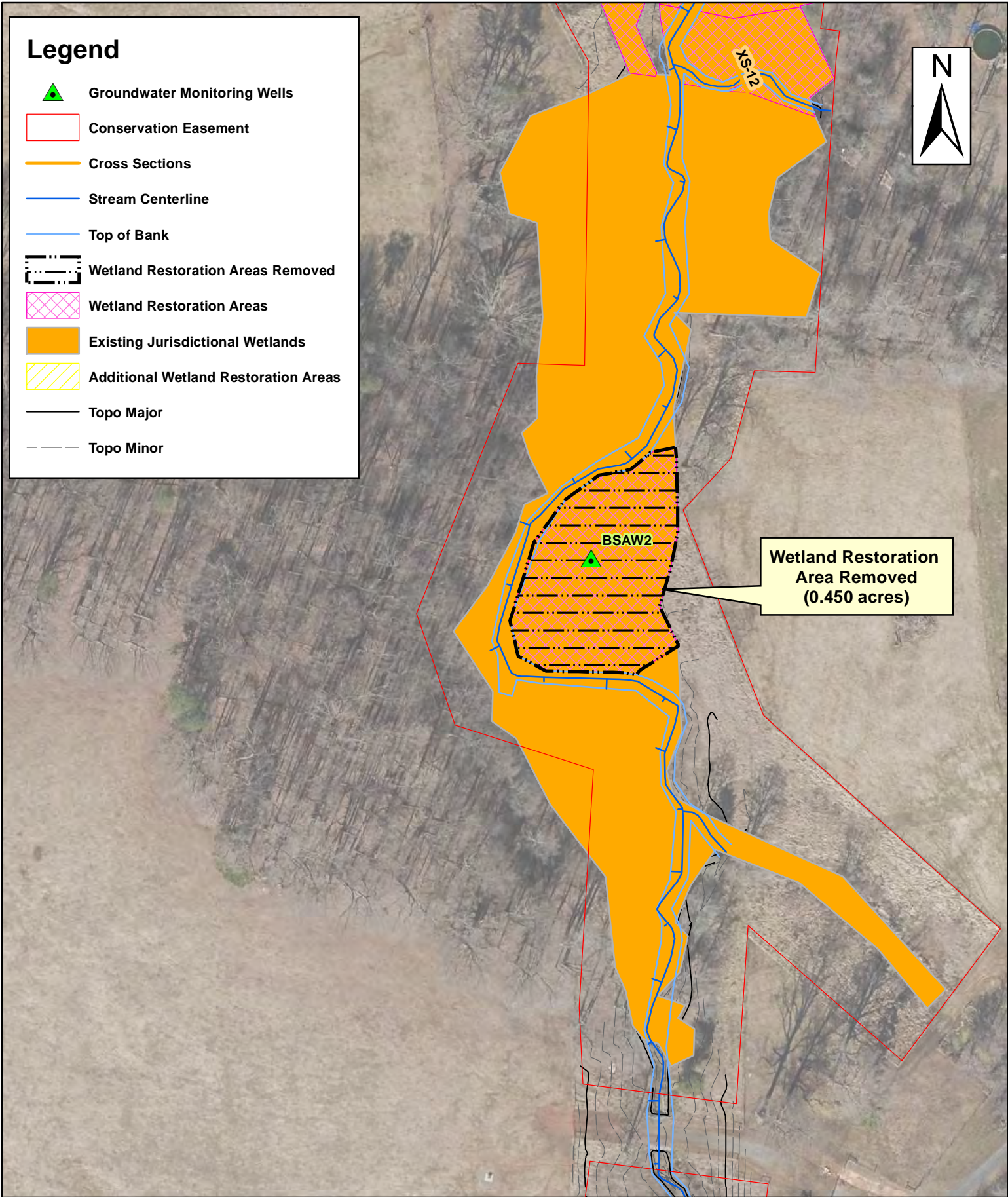


Wetland Restoration Area Added (0.414 acres)

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.

