

Mitigation Project Name Browns Summit  
 DMS ID 96313  
 River Basin Cape Fear  
 Cataloging Unit 03030002

County Guilford  
 Date Project Instituted 3/6/2014  
 Date Prepared 5/22/2018

USACE Action ID 2014-01642  
 NCDWR Permit No 2014-0332

Credit Release Milestone	Stream Credits						Wetland Credits							
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riverine	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Date (Wetland)
Potential Credits (Mitigation Plan)		5,266.670					2,790							
Potential Credits (As-Built Survey)		5,300.867					2,500							
1 (Site Establishment)	N/A				N/A	N/A	N/A						N/A	N/A
2 (Year 0 / As-Built)	30%	1,590.260			2017	12/11/2017	30%	0.750					2017	12/11/2017
3 (Year 1 Monitoring)	10%	530.087			2018	4/25/2018	10%	0.250					2018	4/25/2018
4 (Year 2 Monitoring)	10%				2019		10%						2019	
5 (Year 3 Monitoring)	10%				2020		15%						2020	
6 (Year 4 Monitoring)	5%				2021		5%						2021	
7 (Year 5 Monitoring)	10%				2022		15%						2022	
8 (Year 6 Monitoring)	5%				2023		5%						2023	
9 (Year 7 Monitoring)	10%				2024		10%						2024	
Stream Bankfull Standard	10%						N/A						N/A	
Total Credits Released to Date		2,120.347					1,000							

DEBITS (released credits only)

		Ratios	1	1.5	2.5	5	1.77566	3	2	5	1	3	2	5	1	3	2	5
			Stream Restoration	Stream Enhancement I	Stream Enhancement II	Stream Preservation	Riparian Restoration	Riparian Creation	Riparian Enhancement	Riparian Preservation	Nonriparian Restoration	Nonriparian Creation	Nonriparian Enhancement	Nonriparian Preservation	Coastal Marsh Restoration	Coastal Marsh Creation	Coastal Marsh Enhancement	Coastal Marsh Preservation
As-Built Amounts (feet and acres)			3,903.000	1,525.000	953.000		4.440											
As-Built Amounts (mitigation credits)			3,903.000	1,016.667	381.200		2.500											
Percentage Released			40%	40%	40%		40%											
Released Amounts (feet / acres)			1,561.200	610.000	381.200		1.776											
Released Amounts (credits)			1,561.200	406.667	152.480		1.000											
NCDWR Permit	USACE Action ID	Project Name																
2013-0918	2005-21386	NCDOT TIP U-2525B / C - Greensboro Eastern Loop, Guilford County	1,170.900	457.500	285.900													
	2016-00402	SR 2022 - Bridge 108 - Division 7, Guilford County					0.065											
	2017-00079	SR 2109 - Bridge 112 (B-5731) - Division 7, Guilford County					0.107											
2017-1102	2017-00185	SR 1308 - Bridge 310117 - Division 5, Durham County					0.320											
	2017-00077	SR 2351 - Bridge 17 (B-5715) - Division 7, Rockingham County					0.089											
	2015-02591	SR 1838 / SR 2220 Improvements - Division 5, Orange / Durham Counties					0.107											
2013-0918	2005-21386	NCDOT TIP U-2525B / C - Greensboro Eastern Loop, Guilford County	390.300	152.500	95.300													
2017-1466	2009-02019	NCDOT TIP U-4734 - Division 9					1.089											
Remaining Amounts (feet / acres)			0.000	0.000	0.000		0.000											
Remaining Amounts (credits)			0.000	0.000	0.000		0.000											

Contingencies (if any): None

Brown Summit



Signature of Wilmington District Official Approving Credit Release

9/6/18

Date

- 1 - For NCDMS, no credits are released during the first milestone
- 2 - For NCDMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCDMS Portal, provided the following criteria have been met:
  - 1) Approval of the final Mitigation Plan
  - 2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
  - 3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
  - 4) Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required
- 3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met



# Final

## Browns Summit Creek Restoration Project Year 2 Monitoring Report

Guilford County, North Carolina

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

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

Cape Fear River Basin: 03030002-010020



Project Info:            Monitoring Year: 2 of 7  
                                 Year of Data Collection: 2018  
                                 Year of Completed Construction (including planting): 2017  
                                 Submission Date: December 2018

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



December 31, 2018

Jeff Schaffer  
NCDENR, Division of Mitigation Services  
1652 Mail Service Center  
Raleigh, NC 27699-1652

Subject: Response to Task 8 Draft Year 2 Monitoring Report Comments for Brown's Summit  
(DMS #96313) Cape Fear River Basin; CU 03030002; Guilford County, North  
Carolina Contract No.005792

Dear Mr. Schaffer:

Please find enclosed our responses to the Year 2 Monitoring Report Comments dated December 20, 2018 regarding the Browns Summit Creek Mitigation Project. We have revised the Year 2 Monitoring Report document in response to this review.

1. Digital files:
  - a. BrownsSummit\_96313\_AB\_VegPlots shapefile is missing spatial reference information.
  - b. The shapefile submitted for Wetland Monitoring Wells has MY1 information instead of MY2.  
**Response: The digital submittal has been revised per comments and provided in the same format as previously submitted**
2. Section 1:
  - a. Page 2: In first full paragraph Baker states that Stream Problem Area on Reach 6 will be repaired. Please state when repairs will occur.
  - b. Page 2: In second full paragraph Baker states that there are three areas of invasive species of vegetation. Please state when treatments will begin.
  - c. Page 3: In first paragraph, report states that BSAW2 did not meet hydrologic success of 12% in years 1 and 2. Baker should keep a watch on this well and maybe do a little investigative work through out that wetland area to determine potential causes. Good thing is that it is trending up. 3.2% in MY1 and 6.8% in MY2.  
**Response: Changes have been made in the final report. All SPA and VPA are scheduled to be treated and repaired beginning January 2019.**
3. Section 4.1, page 5: The report states that that BSAW2 did not meet hydrologic success of 12% in years 1 and 2. Baker should keep a watch on this well and maybe do a little investigative work through out that wetland area to determine potential causes. Good thing is that it is trending up. 3.2% in MY1 and 6.8% in MY2.  
**Response: We have noticed that this year has given BSAW2 the best results thus far and a positive trend towards passing. However, because BSAW2 failed we plan on doing further research to hopefully result BSAW2 passing in the future.**



4. Appendix A, Table 1:
  - a. Verify total Stream Mitigation Credits. DMS calculated credits at 5,301 (5,300.867). It may possibly be a rounding error. Take credit calculation out to 3 digits before rounding.
  - b. Verify total Riparian Wetland Credits. DMS calculated credits at 2.50 as did Baker's electronic version.

***Response: Looking further into Stream Mitigation Credits and Riparian Wetland Credits (Table 1) we realized the discrepancy between DMS and Bakers Credits was due to rounding errors. Changes have been made to Table 1 and reflect the DMS calculated credits.***

5. Appendix B, CCPV: Section 2.1.4 references two stream problem areas (SPAs). Please point these areas out on the CCPV.

***Response: The CCPV has been revised per comment above.***

6. Appendix D, Table 11: During our review of the Bank Height Ratios (BHR) in Table 11, DMS staff performs a visual comparison of the MY 3 data to As-Built/Baseline cross-sections. DMS noted/realized that by displaying the As-built Bankfull Cross-Sectional Area alone, the calculation for the BHR can be difficult to reconcile. We noted possible discrepancies in the BHR calculations for cross-sections 1, 7, 8 and 12 given this disconnect. Using the new BHR calculation methodology where the As-Built Bankfull Area is held constant, please display the Year 5 bankfull elevation as another data series just for the sake of clarity between the BHR calculation and the overlay. It appears that the BHR calculations were done correctly, but just please add the MY5 bankfull data series with its elevation for the sake of clarity to the reader.

***Response: MY5 Bankfull data series have been added and clarification to the cross-sections.***

Three hard copies and on pdf copy along with updated digital files (via FTP) are being provided. If you have any questions concerning the Year 2 Monitoring Report, please contact me at 919-481-5703 or via email at [Katie.McKeithan@mbakerintl.com](mailto:Katie.McKeithan@mbakerintl.com).

Sincerely,



Kathleen McKeithan, PE, CPESC, CPSWQ, CFM

Michael Baker Engineering, Inc.

# **Final**

## **Browns Summit Creek Restoration Project Year 2 Monitoring Report**

Guilford County, North Carolina

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

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

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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# 1. EXECUTIVE SUMMARY

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

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

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

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

To accomplish these goals, the following objectives were identified:

- Restore existing incised, eroding, and channelized streams by creating stable dimension and connecting them to their relic floodplains;
- Re-establish and rehabilitate site wetlands that have been impacted by cattle, spoil pile disposal, channelization, subsequent channel incision, and wetland vegetation loss;
- Prevent cattle from accessing the conservation easement boundary by installing permanent fencing and thus reduce excessive stream bank erosion and undesired nutrient inputs;
- Increase aquatic habitat value by improving bedform diversity, riffle substrate and in-stream cover; creating natural scour pools; adding woody debris and reducing sediment loading from accelerated stream bank erosion;



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

The Year 2 monitoring survey data of seventeen cross-sections indicates that the Site is geomorphically stable and performing at 100 percent for all the parameters evaluated. Certain cross-sections (located in Appendix D) have shown minor fluctuations in their geometry as compared to their as-built conditions; however, visually the site has remained stable with very little fluctuation. The as-built (MY0) cross section survey was conducted by the construction contractor's sub and has not provided the level of detail that is normally provided. Therefore, the fluctuations shown on the MY0 and MY2 overlay graphs found in Appendix D is much more pronounced than what is actually observed in the field. MY1 and MY2 is a better representation of the cross-section surveys. Moving forward the cross-section survey will be to the appropriate level of detail as is reflected in the MY1 cross-sections. These fluctuations do not represent a trend towards instability based off visual field evaluations. All reaches are stable and performing as designed. The data collected are within the lateral/vertical stability and in-stream structure performance categories. Hurricane Florence washed out the uppermost riffle on R6 and shifted some stone around on the step-pool structure below the BMP as indicated on the CCPV in Appendix B. This has been noted as a Stream Problem Area (SPA) and will be repaired in January 2019.

During Year 2 monitoring, all plots except one meet the planted acreage performance categories (Appendix B and C). Due to the high flows pushing think herbaceous vegetation over, plot 12 trees may not have survived. This area will be evaluated for replanting once the frost has set the herbaceous layer back. The average density of total planted stems, based on data collected from the fourteen monitoring plots following Year 2 monitoring in November of 2018, was 541 stems per acre not including volunteer species. Thus, the Year 2 vegetation data demonstrate that the Site is on track to meet the minimum success interim criteria of 320 trees per acre by the end of Year 3. Additionally, there were three areas within the conservation easement of invasive species vegetation observed during the Year 2 monitoring. These areas totaled to 1.26 acres and have been shown on the CCPV Appendix B. We have made note of these areas and plan to start treatments in January 2019 until the growing season starts in March.

Year 2 flow monitoring demonstrated that all flow gauges (BSFL1, BSFL2 and BSFL3) met the stated success criteria of 30 days or more of consecutive flow through R4, T3 and T1 respectively. Flow gauge BSFL1 documented 122 days of consecutive flow in R4, while flow gauge BSFL2 documented 158 days of consecutive flow in T3, and BSFL3 documented 319 days of consecutive flow in T1. The gauges demonstrated similar patterns relative to rainfall events observed in the vicinity of the Site as shown in the flow gauge graphs in Appendix E.

During Year 2 monitoring, the R1 crest gauge documented one post-construction bankfull event from February 2018, second event in September of 2018 (Hurricane Florence), and the third event October 2018 . The site has meet the bankfull flow requirement of two bankfull events within two separate monitoring years (MY1 and MY2).

Seven wells were installed in the wetland restoration areas. Six of the seven are performing successfully. One well did not meet success (BSAW2). However, the well shows hydrology coming to within twelve inches of the ground surface relatively consistently. It is anticipated that wetland hydrology will improve with additional monitoring.

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 2 monitoring activities for the post-construction monitoring period.

## **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 2 vegetation plot and cross-section data was collected in October 2018 and the visual site assessment was collected in November 2018. Visual Assessment is contained in Appendix B, vegetation plot data are found in Appendix C, and the stream survey data are in Appendix D.

### **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 wasn't 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 MY1 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 is provided in Appendix D and the 2018 sealed site longitudinal profile is provided in Appendix F.

Additionally, per DMS request, bankfull 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 bankfull ratio is calculated and recorded. After bankfull 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 from this point forward to the monitoring year 1 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. During Year 2 monitoring, three above bankfull stage events were documented: February 2018, September of 2018, and October 2018 (Hurricane Florence). The crest gauge readings are presented in Appendix E. Thus, the site has met the bankfull flow requirements of two bankfull events within two separate years.

Year 2 flow monitoring demonstrated that all flow gauges (BSFL1, BSFL2 and BSFL3) met the stated success criteria of 30 days or more of consecutive flow through R4, T3 and T1 respectively. Flow gauge BSFL1 documented 122 days of consecutive flow in R4, while flow gauge BSFL2 documented 158 days of consecutive flow in T3, and BSFL3 documented 319 days of consecutive flow in T1. The gauges demonstrated similar patterns relative to rainfall events observed in the vicinity of the Site as shown in the flow gauge graphs in Appendix E.

### **2.1.3 Photographic Documentation**

Reference photograph transects were taken at each permanent cross-section. The survey tape was centered in the photographs of the bank. Representative photographs and Stream Problem Area



photographs for Monitoring Year 2 were taken along each Reach in October 2018 and are provided in Appendix B. Photographs of each Vegetation Plot taken in November 2018 can be found 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 the integrity and overall performance of in-stream structures throughout the Project reaches as a whole. Habitat parameters and pool depth maintenance are also measured and scored. During Year 2 monitoring, Michael Baker staff walked the entire length of each of the Project reaches several times throughout the year, noting geomorphic conditions of the stream bed profile (riffle/pool facets), both stream banks, and engineered in-stream structures. Representative photographs were taken per the Site's Mitigation Plan, and the locations of any SPAs were documented in the field for subsequent mapping on the CCPV figures. Two SPAs were discovered during Year 2 monitoring. Hurricane Florence washed out the uppermost riffle on R6 and shifted some stone around on the step-pool structure below the BMP as indicated on the CCPV in Appendix B. It was also noted that trees and debris have fallen and damaged the easement fencing in areas that could possible give cattle access to the easement. A fencing contractor is being contracted for these fencing issues to be repaired. The landowner temporarily fixed the event within hours of the hurricane and no cattle damage occurred within the easement. 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.

### **3.1 Vegetation Assessment**

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

Based on the recent Year 2 data collected from the vegetation monitoring plots, the planted stem density is 541 stems per acre. Overall, the vegetation data demonstrate that the Site is on track for meeting the minimum success criteria of 320 trees per acre by the end of Year 3; however, one area did fail due to high flows bending thick herbaceous vegetation and the trees within it over. This area will be evaluated for replanting this winter once the herbaceous vegetation has died back some.

Additionally, there were noted areas of invasive species vegetation, Chinese Privet (*Ligustrum sinense*), observed during the Year 2 monitoring. These areas are identified in the monitoring year 2 CCPV. We are scheduled to treat these area in the spring of monitoring year 3.

Year 2 vegetation assessment information is provided in Appendix B and C.

### **4.1 Wetland Assessment**

Seven (7) groundwater monitoring wells were installed in the wetland mitigation area to document hydrologic conditions of the restored wetland area. Six of the seven wells are showing successful hydrology. BSAW2 is currently unsuccessful; however, the well is showing a similar wetting cycle to the other wells and will be monitored closely during 2019. Visually, the wetland areas are performing very well with saturated soils and hydrophytic vegetation.

### 3. REFERENCES

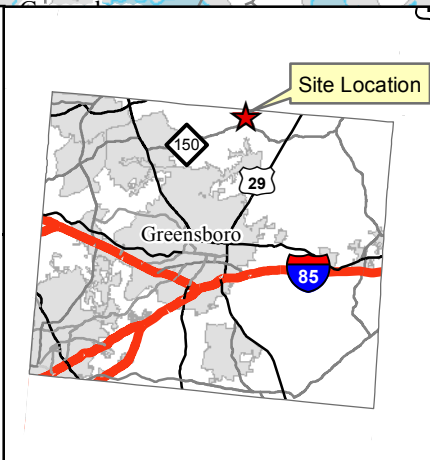
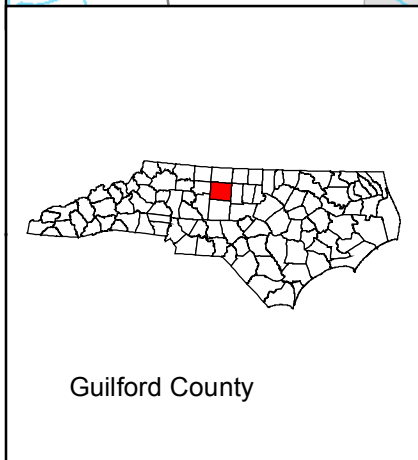
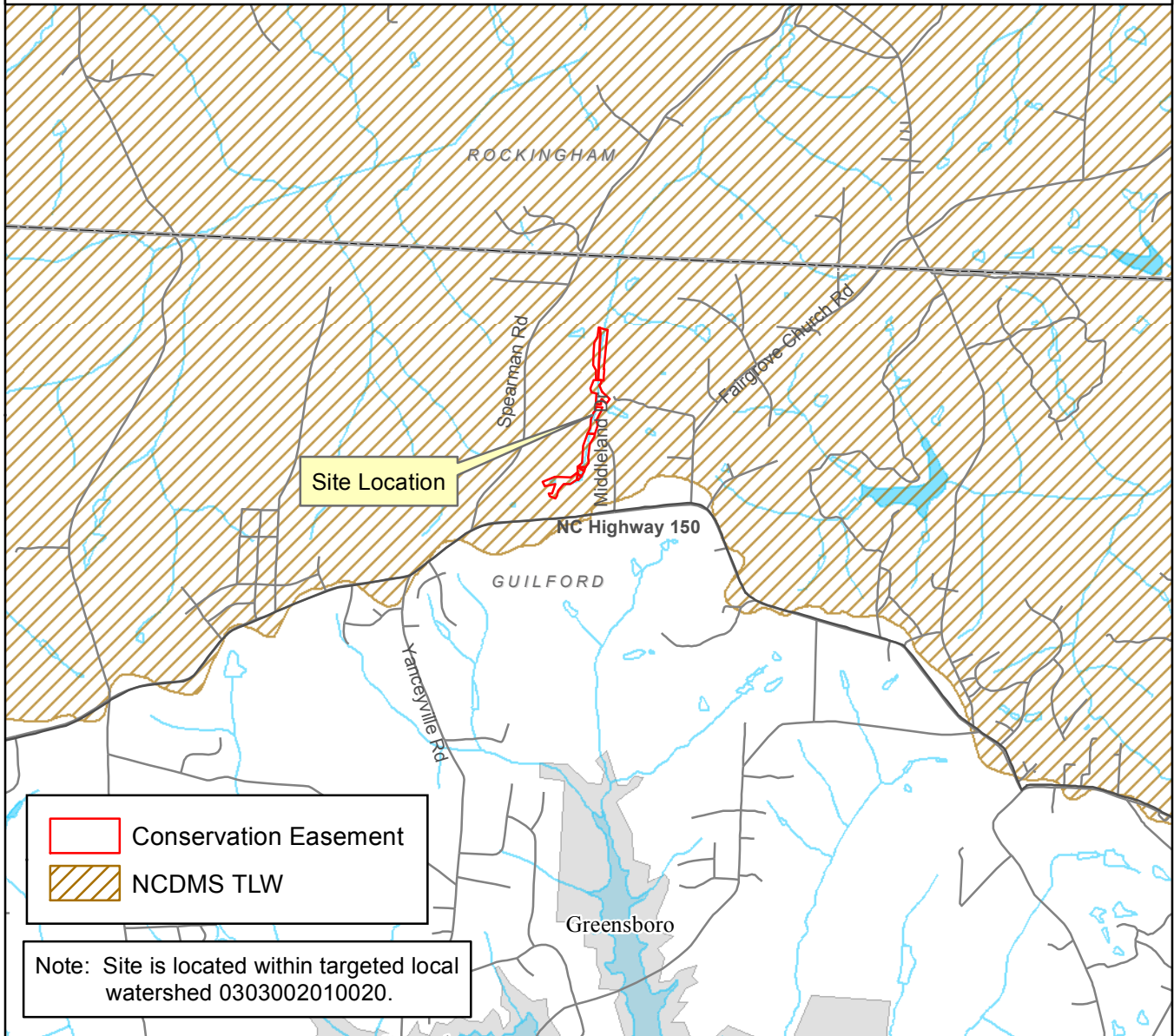
- Carolina Vegetation Survey (CVS) and NC Division of Mitigation Services (DMS). CVS-DMS Data Entry Tool v. 2.3.1. University of North Carolina, Raleigh, NC.
- Lee, M., Peet R., Roberts, S., Wentworth, T. 2007. CVS-DMS Protocol for Recording Vegetation, Version 4.1.
- North Carolina Division of Mitigation 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.

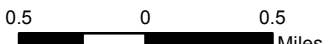


**Figure 1**  
**Project Vicinity Map**  
**Browns Summit (DMS# 96313)**

NCDEQ - Division  
of Mitigation Services



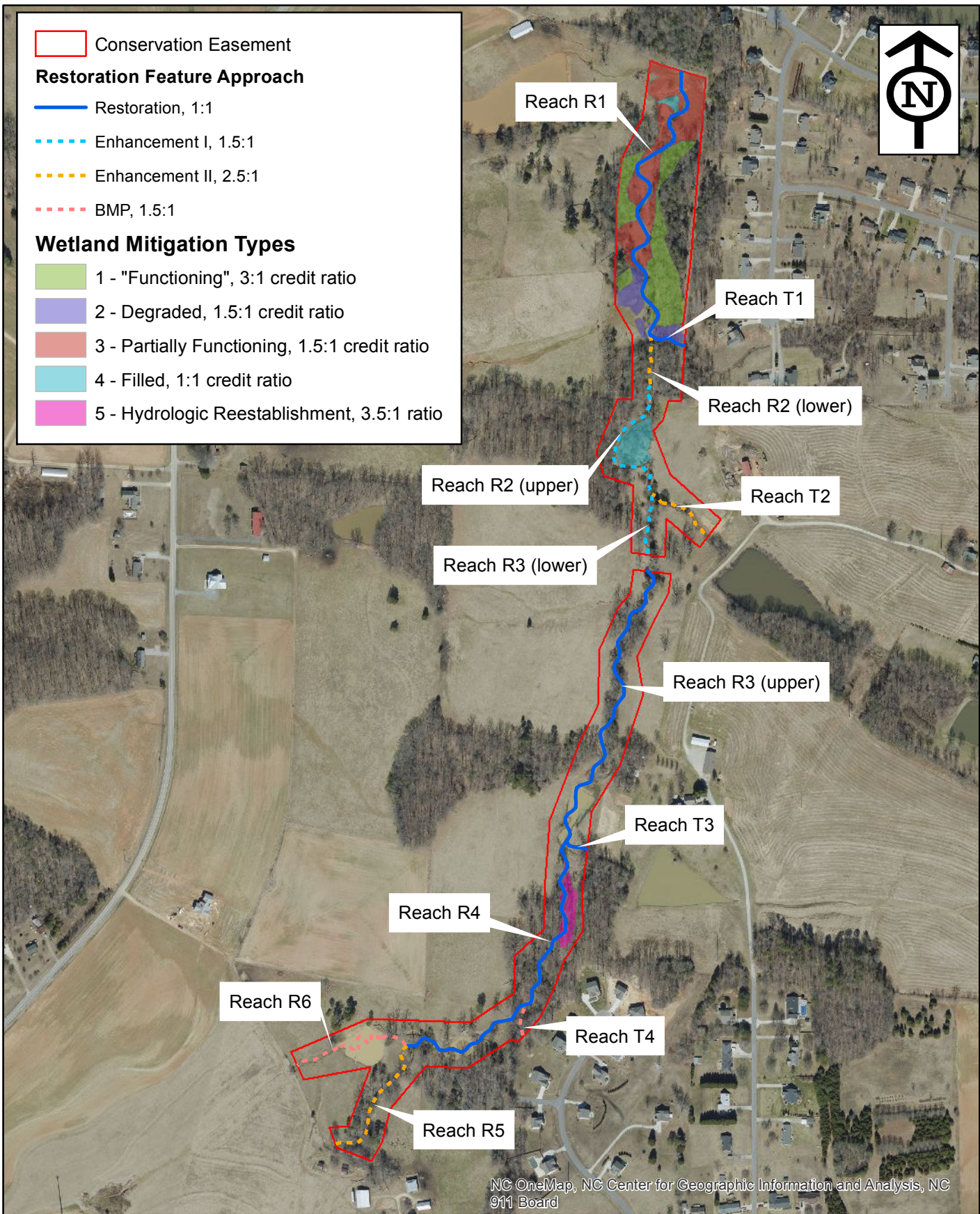
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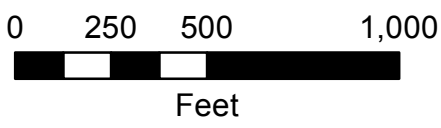


- Conservation Easement
- Restoration Feature Approach**
- Restoration, 1:1
  - Enhancement I, 1.5:1
  - Enhancement II, 2.5:1
  - BMP, 1.5:1
- Wetland Mitigation Types**
- 1 - "Functioning", 3:1 credit ratio
  - 2 - Degraded, 1.5:1 credit ratio
  - 3 - Partially Functioning, 1.5:1 credit ratio
  - 4 - Filled, 1:1 credit ratio
  - 5 - Hydrologic Reestablishment, 3.5:1 ratio



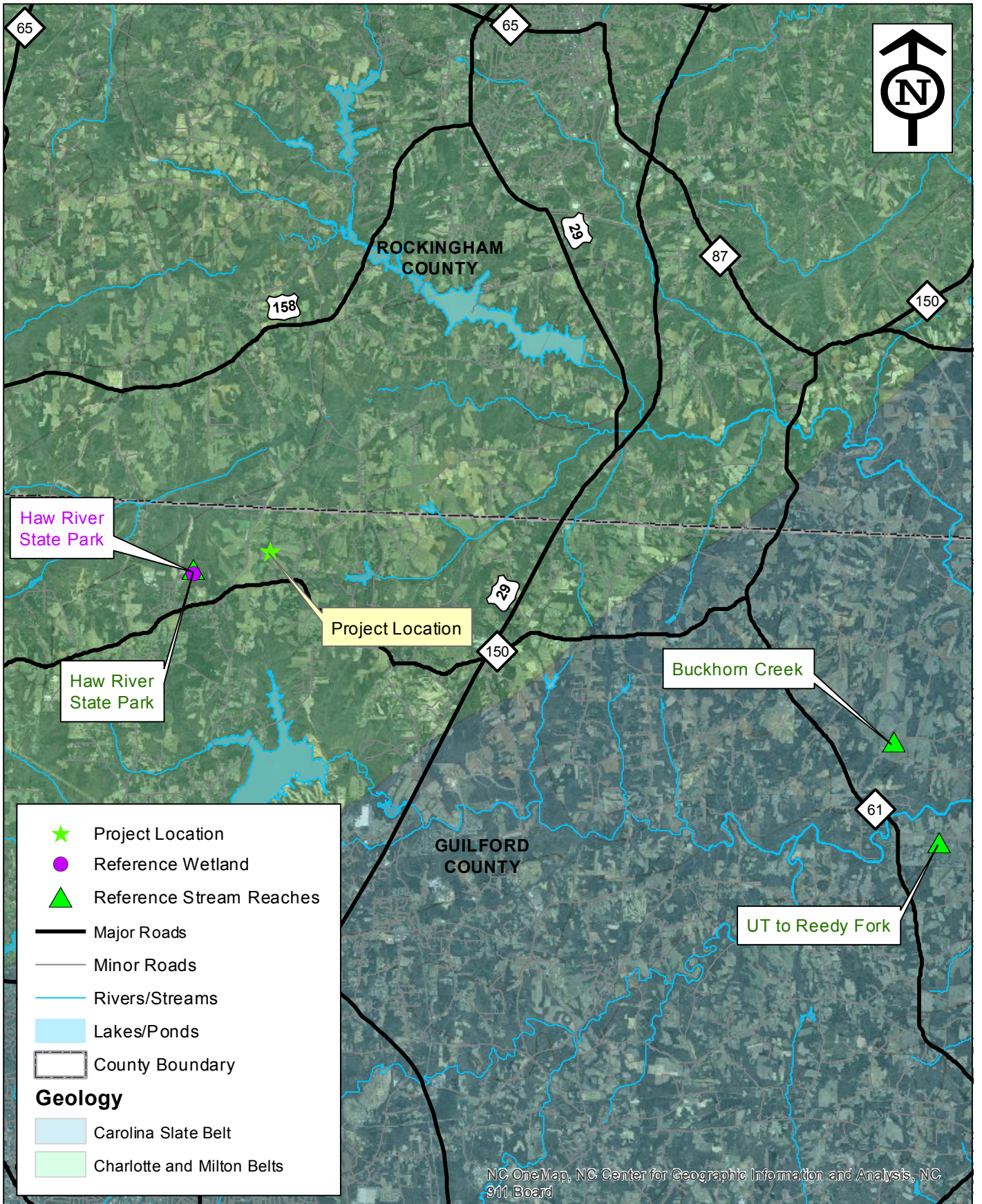
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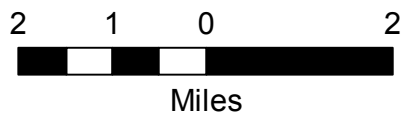


**Figure 2**  
**Restoration Summary Map**  
**Browns Summit Site**  
**(DMS #96313)**





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**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	Phosphorus Nutrient Offset
Type	R, EI, EII	R	E			
Totals	5,301 SMU	2.50	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	4.44				
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						

<b>Table 2. Project Activity and Reporting History</b>			
<b>Browns Summit Creek Restoration Project: DMS Project No ID. 96313</b>			
<b>Activity or Report</b>	<b>Scheduled Completion</b>	<b>Data Collection Complete</b>	<b>Actual Completion or Delivery</b>
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	September 15, 2017
Year 1 Monitoring	December 1, 2017	November 2017	December 1, 2017
Year 2 Monitoring	December 1, 2018	November 2018	December 31, 2018
Year 3 Monitoring	December 1, 2019		
Year 4 Monitoring	December 1, 2020		
Year 5 Monitoring	December 1, 2021		
Year 6 Monitoring	December 1, 2022		
Year 7 Monitoring	December 1, 2023		
* Monitoring schedule completion dates updated based on completion of construction.			

<b>Table 3. Project Contacts</b>	
<b>Browns Summit Creek Restoration Project: DMS Project No ID. 96313</b>	
<b>Designer</b>	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 <u>Contact:</u> Katie McKeithan, Tel. 919-481-5703
<b>Construction Contractor</b>	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Bill Wright, Tel. 919-818-6686
<b>Planting Contractor</b>	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Bill Wright, Tel. 919-818-6686
<b>Seeding Contractor</b>	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Bill Wright, Tel. 919-818-6686
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
<b>Monitoring Performers</b>	
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



<b>Table 4. Project Attributes</b>					
<b>Browns Summit Creek Restoration Project: DMS Project No ID. 96313</b>					
<b>Project Information</b>					
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				
<b>Project Watershed Summary Information</b>					
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%)				
<b>Reach Summary Information</b>					
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%
<b>Regulatory Considerations</b>					
Regulation	Applicable	Resolved	Supporting Documentation		
Waters of the United States – Section 404	Yes	Yes	Categorical Exclusion (Appendix B)		
Waters of the United States – Section 401	Yes	Yes	Categorical Exclusion (Appendix B)		
Endangered Species Act	No	N/A	Categorical Exclusion (Appendix B)		
Historic Preservation Act	No	N/A	Categorical Exclusion (Appendix B)		
Coastal Area Management Act (CAMA)	No	N/A	Categorical Exclusion (Appendix B)		
FEMA Floodplain Compliance	No	N/A	Categorical Exclusion (Appendix B)		
Essential Fisheries Habitat	No	N/A	Categorical Exclusion (Appendix B)		

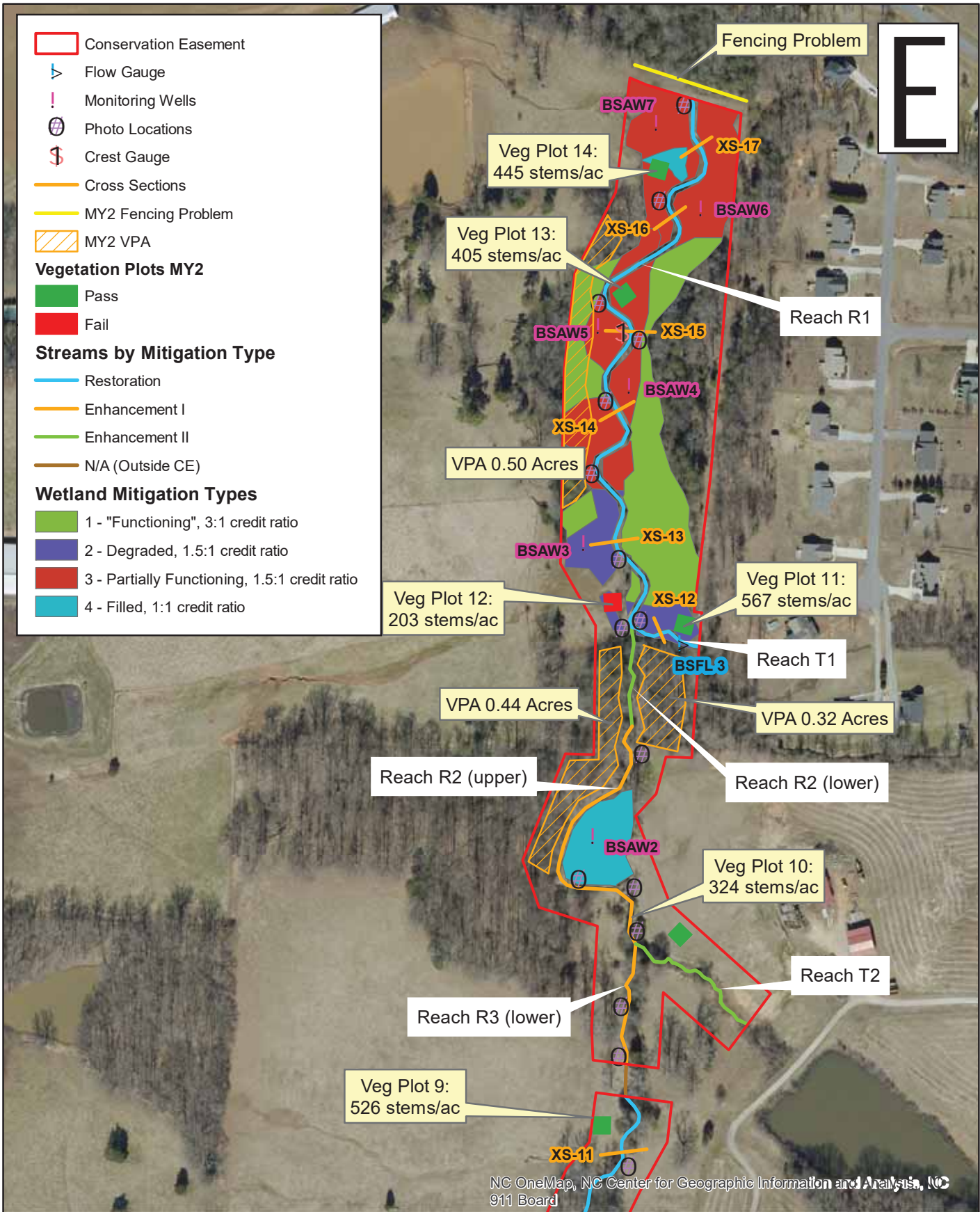


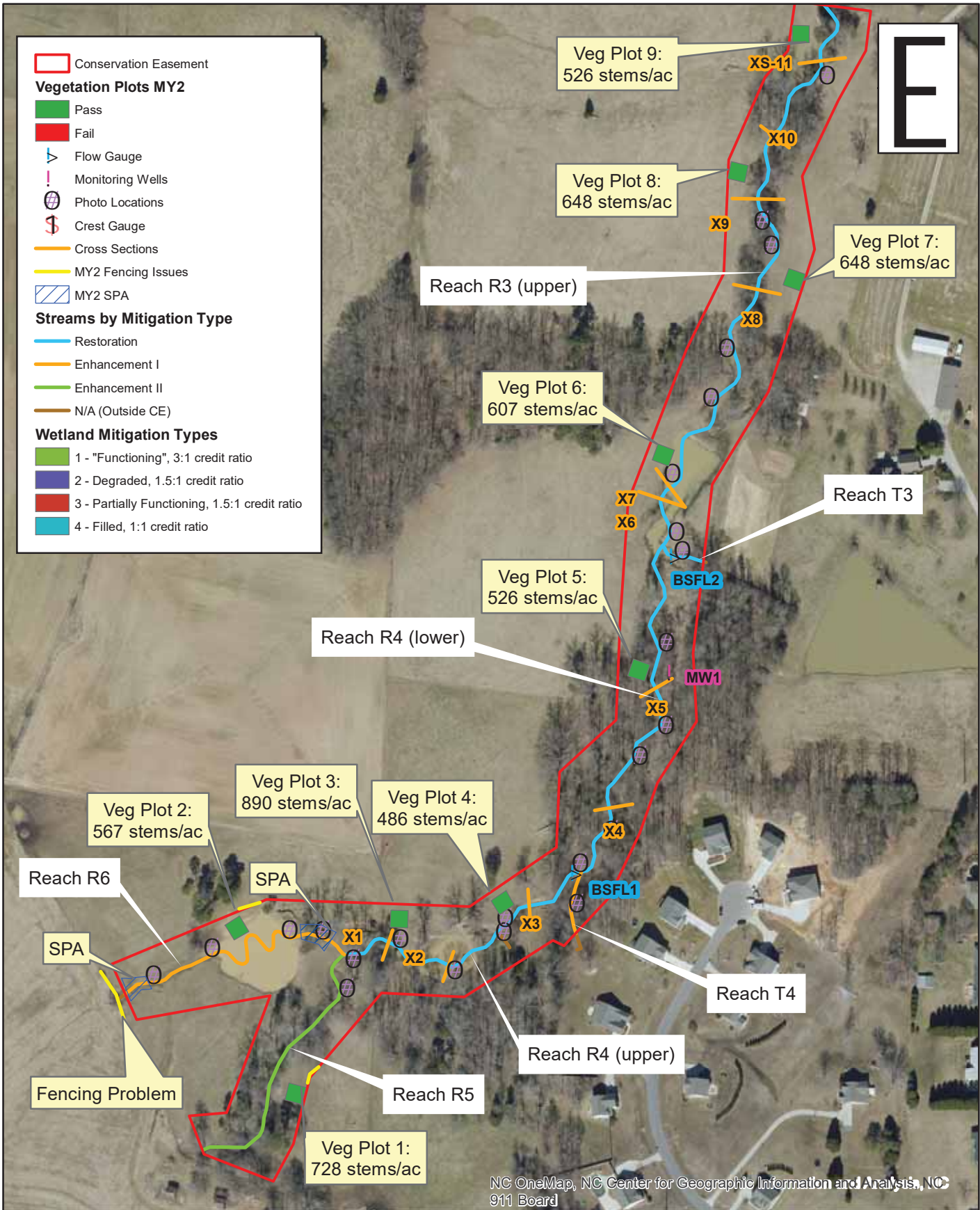


# **Appendix B**

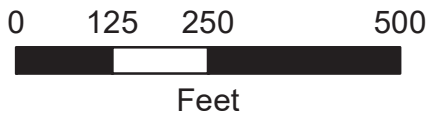
## **Visual Assessment Data**







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

Table 5. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID R1										
Assessed Length 1,290										
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
<b>Totals</b>					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 not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	20	20			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	20	20			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID R2 (downstream section)										
Assessed Length 134										
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
<b>Totals</b>					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 not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	0	0			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	0	0			100%			



Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID R2 (upstream section)										
Assessed Length 614										
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
<b>Totals</b>					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%			
<b>Totals</b>					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%			
<b>Totals</b>					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 $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	15	15			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID R4										
Assessed Length 1,296										
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody	Footage with Stabilizing Woody	Adjusted % for Stabilizing Woody
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does 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%			
<b>Totals</b>					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 $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	14	14			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID		R5								
Assessed Length		536								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
<b>Totals</b>					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 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%			
<b>Totals</b>					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.	7	9			78%			
	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)	9	9			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	9	9			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID T1										
Assessed Length 145										
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
<b>Totals</b>					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%			
<b>Totals</b>					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%			
<b>Totals</b>					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%			
<b>Totals</b>					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 $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	8	8			100%			

**Table 6. Vegetation Conditions Assessment**

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

**Planted Acreage<sup>1</sup> 20.24**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
<b>1. Bare Areas</b>	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	0	0.00	0.0%
<b>2. Low Stem Density Areas</b>	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Pattern and Color	0	0.00	0.0%
<b>Total</b>				<b>0</b>	<b>0.00</b>	<b>0.0%</b>
<b>3. Areas of Poor Growth Rates or Vigor</b>	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
<b>Cumulative Total</b>				<b>0</b>	<b>0.00</b>	<b>0.0%</b>

**Easement Acreage<sup>2</sup> 20.24**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
<b>4. Invasive Areas of Concern<sup>4</sup></b>	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	3	1.26	6.2%
<b>5. Easement Encroachment Areas<sup>3</sup></b>	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

**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.

**2** = The acreage within the easement boundaries.

**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.

**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 Microstegium 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 *red italics* are of particular interest given their



**Browns Summit Creek Restoration Project – Longitudinal Stream Photo Stations**  
Photos take October 22, 2018 (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 – Longitudinal Stream Photo Stations**  
Photos take October 22, 2018 (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 – Longitudinal Stream Photo Stations**  
Photos take October 22, 2018 (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 – Longitudinal Stream Photo Stations**

Photos take October 22, 2018 (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 – Longitudinal Stream Photo Stations**  
Photos take October 22, 2018 (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 – Longitudinal Stream Photo Stations

Photos take October 22, 2018 (All photos are viewing upstream)



Photo Point 31 – Station 19+10, Step Pools



Photo Point 32 – Station 18+00, Reach 4



Photo Point 33 – Station 16+75, Reach 4



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



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



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



**Browns Summit Creek Restoration Project – Longitudinal Stream Photo Stations**  
Photos take October 22, 2018 (All photos are viewing upstream)



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



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



Photo Point 39 – Station 15+00, Reach 5



# Browns Summit Creek Restoration Project – Vegetation Plot Photo Stations

Photos take October 22, 2018



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 take October 22, 2018



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 take October 22, 2018



Vegetation Plot 13



Vegetation Plot 14



## Browns Summit Creek Restoration Project – Problem Areas Photos

Photos taken October 22, 2018 unless otherwise noted



SPA 1 – Reach 6, Station 10+25



SPA 2 – Reach 6, Station 15+00



VPA 1 – Reach 1, Left Bank (March 22, 2018)



VPA 2 – Reach 1, Right Bank (April 25, 2018)



# **Appendix C**

## **Vegetation Plot Data**



Table 7. CVS Density Per Plot																									
Browns Summit Creek Restoration Project: DMS Project No ID. 96313																									
CVS Project Code 140048. Project Name: Browns Summit																									
		Current Plot Data (MY1 2017)																							
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
<i>Acer negundo</i>	Boxelder maple	1		1	2		2	3		3				1		1						2		2	
<i>Betula nigra</i>	River Birch	5		5	5		5	3		3				4		4	3		3	2		2	1	1	
<i>Callicarpa americana</i>	American Beautyberry																								
<i>Carpinus caroliniana</i>	American hornbeam				1		1	3		3	2		2	1		1				1		1	1	1	
<i>Celtis laevigata</i>	Sugarberry																								
<i>Cornus ammomum</i>	Silky Dogwood																								
<i>Diospyros virginiana</i>	American Persimmon	1		1				1	1	2							1		1						
<i>Euonymus americanus</i>	Strawberry-bush							1		1															
<i>Fraxinus pennsylvanica</i>	Green Ash	4		4	2		2	2		2	4		4	3		3	2		2	4		4	3	3	
<i>Hamamelis virginiana</i>	Witch-hazel													1		1						2		2	
<i>Ilex opaca</i>	American Holly													1		1				1		1	2	2	
<i>Ilex verticillata</i>	Winterberry							1		1															
<i>Liriodendron tulipifera</i>	Tulip	1		1	2		2				1		1	1		1	1		1	1		1		1	
<i>Nyssa sylvatica</i>	Black Gum							1		1	1		1									1		1	
<i>Platanus occidentalis</i>	Sycamore	2		2	2		2	5		5							6		6	1	1	2	2	2	
<i>Quercus alba</i>	White Oak																								
<i>Quercus lyrata</i>	Overcup Oak	1		1													2		2	1		1	1	1	
<i>Quercus michauxii</i>	Swamp Chestnut Oak	2		2				2		2				1		1			4		4				
<i>Quercus phellos</i>	Willow Oak	1		1																					
<i>Ulmus americana</i>	American Elm										2		2						1		1				
<i>Viburnum dentatum</i>	Arrow-wood										2		2									1		1	
<i>Viburnum nudum</i>	Possumhaw										1		1												
	Stem count	18		18	14		14	22	1	23	12	1	13	13		13	15		15	16	1	17	16	16	
	size (ares)	1		1	1		1	1		1	1		1	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	0.02		0.02	0.02		0.02	0.02		0.02	0.02	0.02	
	Species count	9	0	9	9	0	9	11	1	11	9	1	9	10	0	10	6	0	6	9	1	9	11	0	11
	Stems per ACRE	728	0	728	567	0	567	890	40	931	486	40	526	526	0	526	607	0	607	647	40	688	647	0	647
		Current Plot Data (MY1 2017)																	Annual Means						
		140048-01-0009			140048-01-0010			140048-01-0011			140048-01-0012			140048-01-0013			140048-01-0014			MY2 (2018)			MY1 (2017)		
		Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	PnoLS	P-all	T	Planted	Vol	T
<i>Acer negundo</i>	Boxelder maple	1		1				1		1							1		1	12		12	15		15
<i>Betula nigra</i>	River Birch				1		1	1		1				1		1	3		3	29		29	33		33
<i>Callicarpa americana</i>	American Beautyberry																						1		1
<i>Carpinus caroliniana</i>	American hornbeam	1		1	1		1							3		3				14		14	23		23
<i>Celtis laevigata</i>	Sugarberry							2		2	1		1						3		3	4		4	4
<i>Cornus ammomum</i>	Silky Dogwood																		1		1				
<i>Diospyros virginiana</i>	American Persimmon										1		1				1		1	5	1	6	5		5
<i>Euonymus americanus</i>	Strawberry-bush				1		1							1		1			3		3	6		6	6
<i>Fraxinus pennsylvanica</i>	Green Ash	1		1	1		1	2		2	1		1				3		3	32		32	36	1	37
<i>Hamamelis virginiana</i>	Witch-hazel	2		2							1		1						6		6	8		8	8
<i>Ilex opaca</i>	American Holly							1		1									5		5	10		10	10
<i>Ilex verticillata</i>	Winterberry																		1		1	2		2	2
<i>Liriodendron tulipifera</i>	Tulip																1		1	7	1	8	12		12
<i>Nyssa sylvatica</i>	Black Gum	1		1				2		2							1		1	7		7	10		10
<i>Platanus occidentalis</i>	Sycamore	4		4	1		1												23	1	24	29		29	29
<i>Quercus alba</i>	White Oak				1		1												1		1	1		1	1
<i>Quercus lyrata</i>	Overcup Oak							2		2				4		4	1		1	12		12	15		15
<i>Quercus michauxii</i>	Swamp Chestnut Oak							1		1									10		10	13		13	13
<i>Quercus phellos</i>	Willow Oak																		1		1	1		1	1
<i>Ulmus americana</i>	American Elm	2		2	1		1												6		6	7		7	7
<i>Viburnum dentatum</i>	Arrow-wood							1		1				1		1			5		5	8		8	8
<i>Viburnum nudum</i>	Possumhaw	1		1	1		1	1		1	1		1						5		5	6		6	6
	Stem count	13		13	8		8	14		14	5	1	5	10		10	11	1	12	187	4	191	244	2	246
	size (ares)	1		1	1		1	1		1	1		1	1		1	1		14		14	14		14	14
	size (ACRES)	0.02		0.02	0.02		0.02	0.02		0.02	0.02		0.02	0.02		0.02	0.02		0.35		0.35	0.35		0.35	0.35
	Species count	12	0	12	9	0	9	11	0	11	11	0	12	7	0	7	9	1	9	20	4	21	20	2	21
	Stems per ACRE	526	0	526	324	0	324	567	0	567	202	0	202	405	0	405	445	40	486	541	12	552	705	6	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%																								
	Inclues volunteer stems																								

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

**Browns Summit (#140048)**

**Year 1**

**Vegetation Plot Summary Information**

Plot #	Riparian Buffer Stems <sup>1</sup>	Stream/ Wetland Stems <sup>2</sup>	Live Stakes	Invasives	Volunteers <sup>3</sup>	Total <sup>4</sup>	Unknown Growth Form
1	n/a	18	0	0	0	18	0
2	n/a	14	0	0	0	14	0
3	n/a	22	0	0	0	22	0
4	n/a	12	0	0	0	12	0
5	n/a	13	0	0	0	13	0
6	n/a	15	0	0	0	15	0
7	n/a	16	0	0	0	16	0
8	n/a	16	0	0	0	16	0
9	n/a	13	0	0	0	13	0
10	n/a	8	0	0	0	8	0
11	n/a	14	0	0	0	14	0
12	n/a	5	0	0	1	5	0
13	n/a	10	0	0	0	10	0
14	n/a	11	0	0	1	12	0

**Wetland/Stream Vegetation Totals**

(per acre)

Plot #	Stream/ Wetland Stems <sup>2</sup>	Volunteers <sup>3</sup>	Total <sup>4</sup>	Success Criteria Met?
1	18	0	728	Yes
2	14	0	567	Yes
3	22	0	890	Yes
4	12	0	486	Yes
5	13	0	526	Yes
6	15	0	607	Yes
7	16	0	648	Yes
8	16	0	648	Yes
9	13	0	526	Yes
10	8	0	324	Yes, Barely
11	14	0	567	Yes
12	5	1	203	No
13	10	0	405	Yes
14	12	1	445	Yes
<b>Project Avg</b>	<b>13</b>	<b>0.1</b>	<b>541</b>	<b>Yes</b>

**Stem Class characteristics**

<sup>1</sup>Buffer Stems Native planted hardwood trees. Does NOT include shrubs. No pines. No vines.

<sup>2</sup>Stream/ Wetland

Stems Native planted woody stems. Includes shrubs, does NOT include live stakes. No vines

<sup>3</sup>Volunteers Native woody stems. Not planted. No vines.

<sup>4</sup>Total Planted + volunteer native woody stems. Includes live stakes. Excl. exotics. Excl. vines.

<b>Table 9. Stem Count for Each Species Arranged by Plot</b>															
<b>Browns Summit Creek Restoration Project: DMS Project No ID. 96313</b>															
<b>Botanical Name</b>	<b>Common Name</b>	<b>Browns Summit Creek Vegetation Plots</b>													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Acer negundo</i>	Boxelder maple	1	2	3		1			2	1		1			1
<i>Betula nigra</i>	River Birch	5	5	3		4	3	2	1		1	1		1	3
<i>Callicarpa americana</i>	American Beautyberry														
<i>Carpinus caroliniana</i>	American hornbeam		1	3	2	1		1	1	1	1			3	
<i>Celtis laevigata</i>	Sugarberry											2	1		
<i>Cornus amomum</i>	Silky dogwood														1
<i>Diospyros virginiana</i>	American Persimmon	1		2			1						1		1
<i>Euonymus americanus</i>	Strawberry-bush			1							1			1	
<i>Fraxinus pennsylvanica</i>	Green Ash	4	2	2	4	3	2	4	3	1	1	2	1		3
<i>Hamamelis virginiana</i>	Witch-hazel					1			2	2			1		
<i>Ilex opaca</i>	American Holly					1		1	2			1			
<i>Ilex verticillata</i>	Winterberry			1											
<i>Liriodendron tulipifera</i>	Tulip	1	2		1	1	1	1							1
<i>Nyssa sylvatica</i>	Black Gum			1	1				1	1		2			1
<i>Platanus occidentalis</i>	Sycamore	2	2	5			6	2	2	4	1				
<i>Quercus alba</i>	White Oak										1				
<i>Quercus lyrata</i>	Overcup Oak	1					2	1	1			2		4	1
<i>Quercus michauxii</i>	Swamp Chestnut Oak	2		2		1		4				1			
<i>Quercus phellos</i>	Willow Oak	1													
<i>Ulmus americana</i>	American Elm				2			1		2	1				
<i>Viburnum dentatum</i>	Arrow-wood				2				1			1		1	
<i>Viburnum nudum</i>	Possumhaw				1					1	1	1	1		
<b>Initial count of planted bareroot material</b>		18	22	24	17	18	19	18	19	18	20	17	16	21	18
<b>Stems/plot</b>		18	14	23	13	13	15	17	16	13	8	14	5	10	12
<b>Stems/acre</b>		728	567	931	526	526	607	688	648	526	324	567	202	405	486
<b>Average Stems / Acre for Year 2 (Planted + Volunteer)</b>		552													





# **Appendix D**

## **Stream Survey Data**



**Permanent Cross-section 1**  
(Year 2 Data - Collected October 2018)

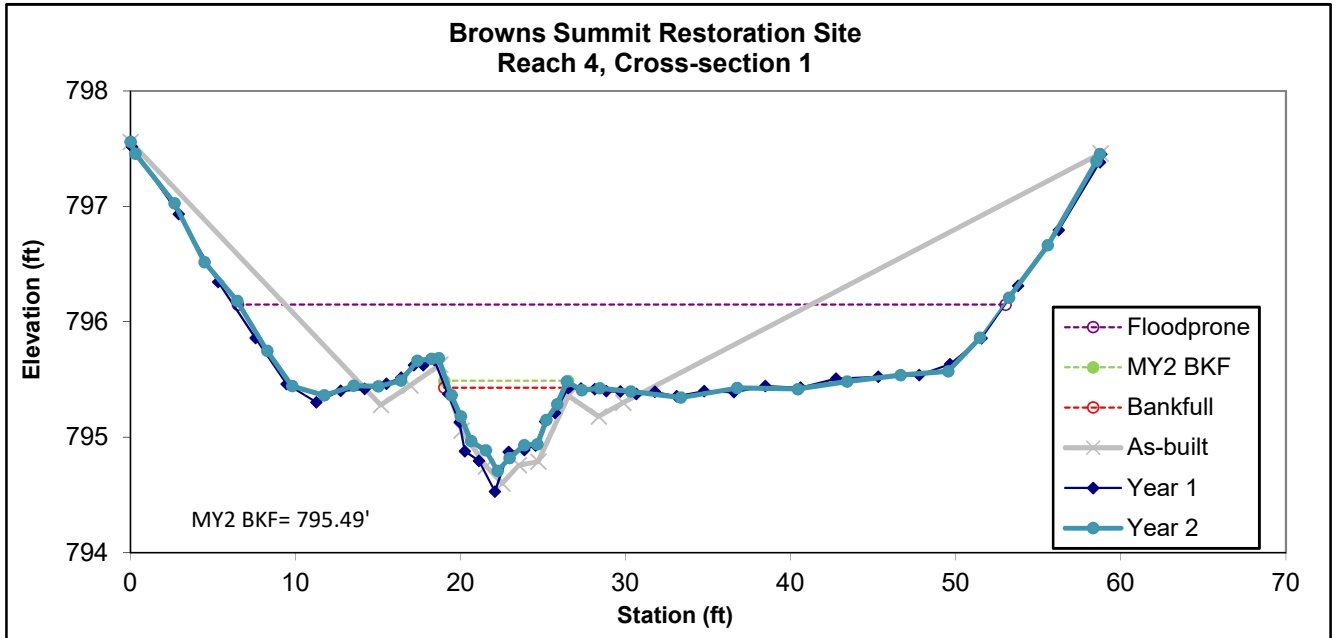


Looking at the Left Bank



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	3	7	0.4	0.7	16.5	1.0	6.6	795.43	795.48



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 2 Data - Collected October 2018)

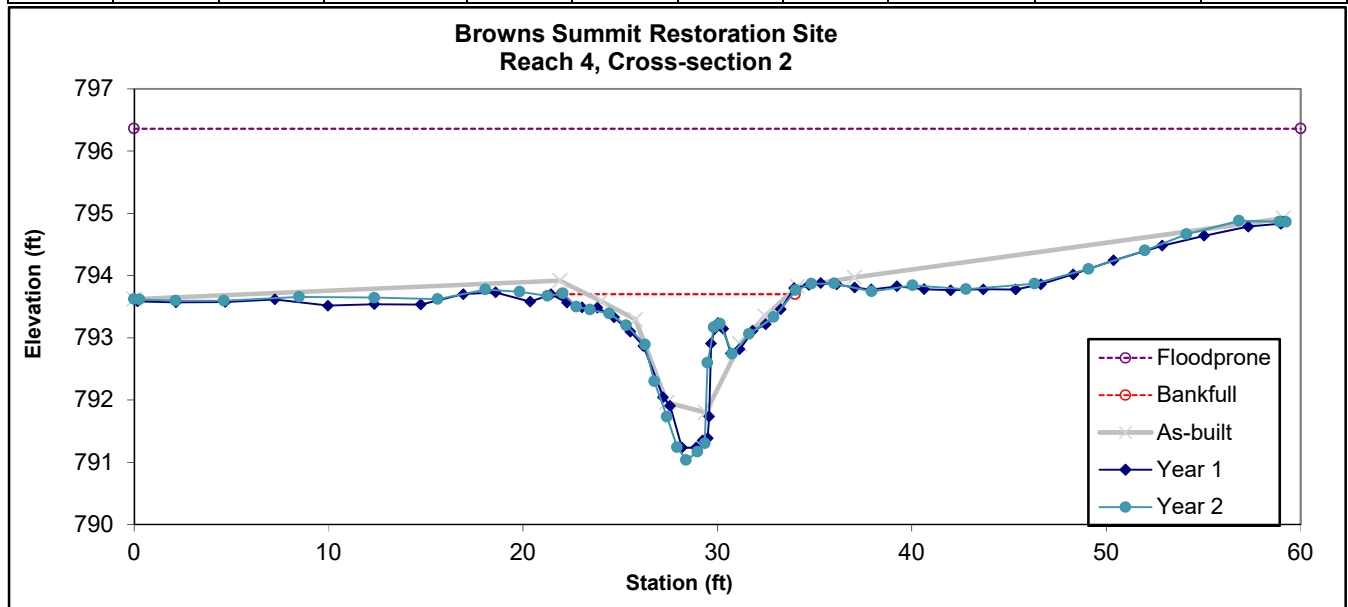


Looking at the Left Bank



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		10.5	12.3	0.9	2.7	14.4	-	-	793.70	793.71



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 3**  
(Year 2 Data - Collected October 2018)

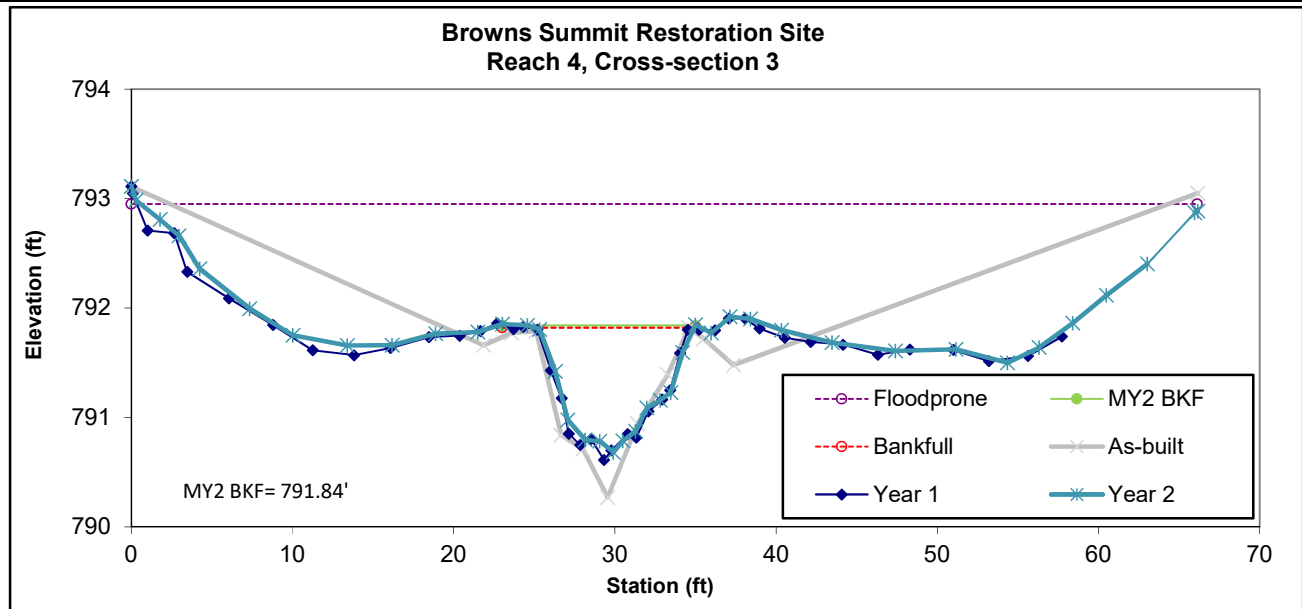


Looking at the Left Bank



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
Rifle	C	6.9	10.6	0.7	1.1	16.1	1.0	6.2	791.82	791.80



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 2 Data - Collected October 2018)

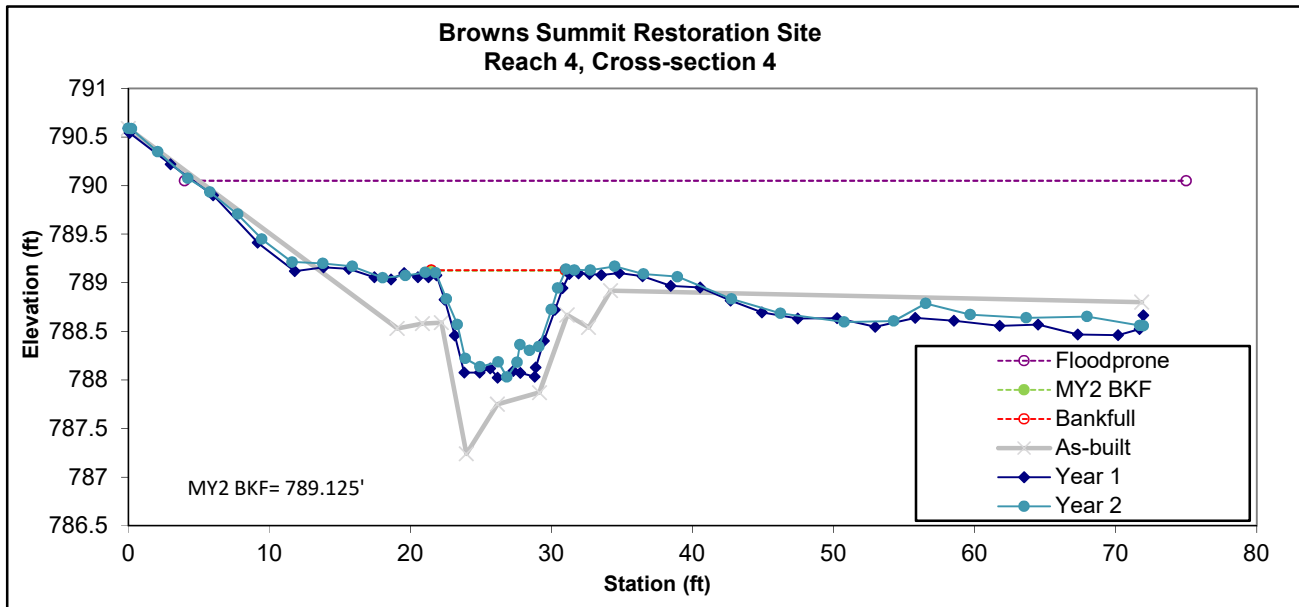


Looking at the Left Bank



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	5.6	8.8	0.6	1	13.6	1.0	7.7	789.13	789.13



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 2 Data - Collected October 2018)

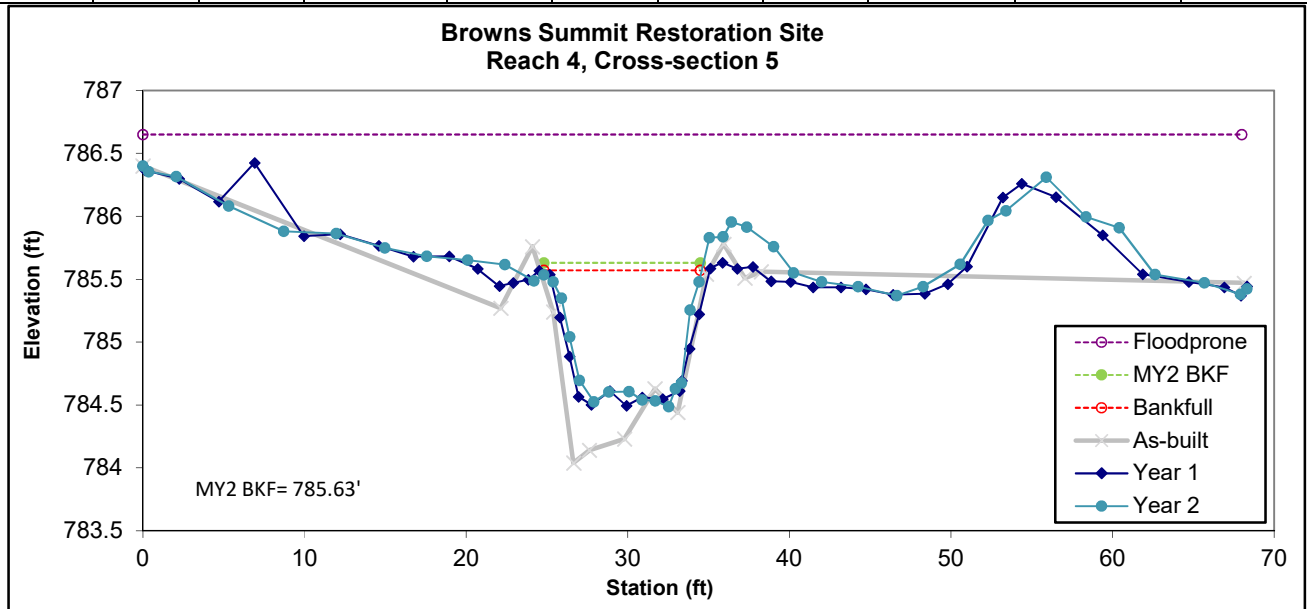


Looking at the Left Bank



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	7.5	11.6	0.7	1.1	17.7	1.0	5.9	785.57	785.60

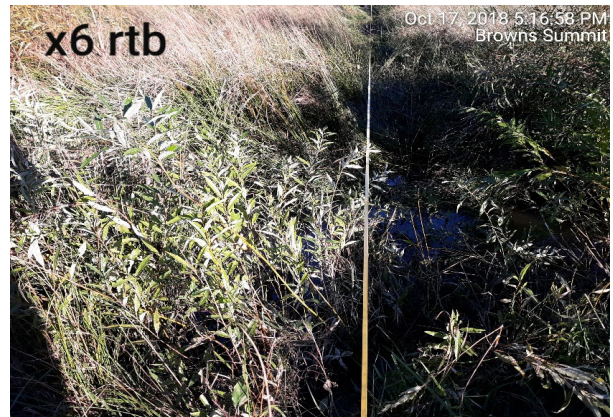


Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

**Permanent Cross-section 6**  
(Year 2 Data - Collected October 2018)

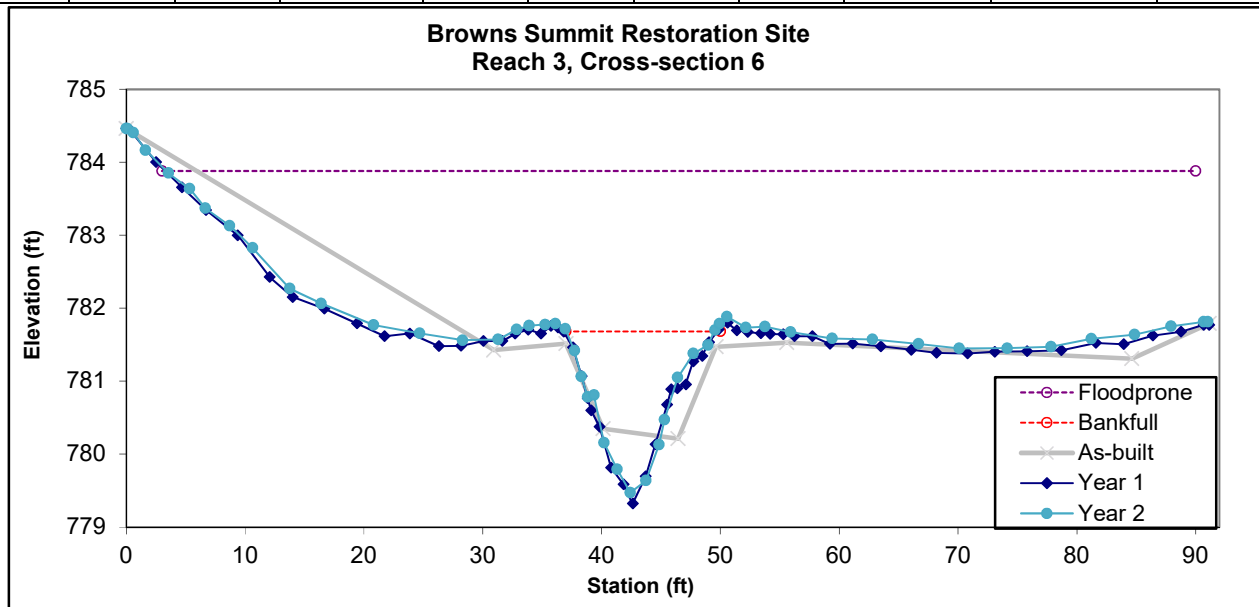


Looking at the Left Bank



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		13.7	12.4	1.1	2.2	11.2	-	-	781.68	781.70



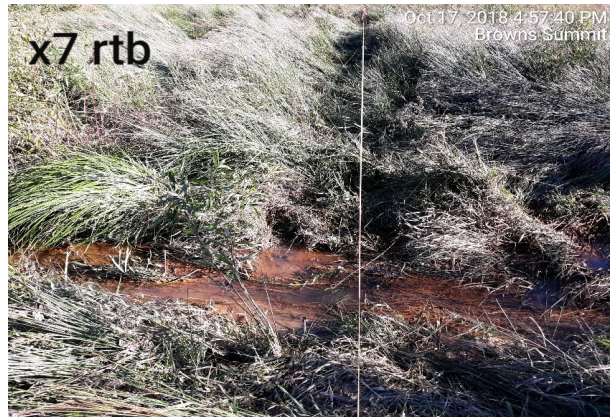
Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.



**Permanent Cross-section 7**  
(Year 2 Data - Collected October 2018)

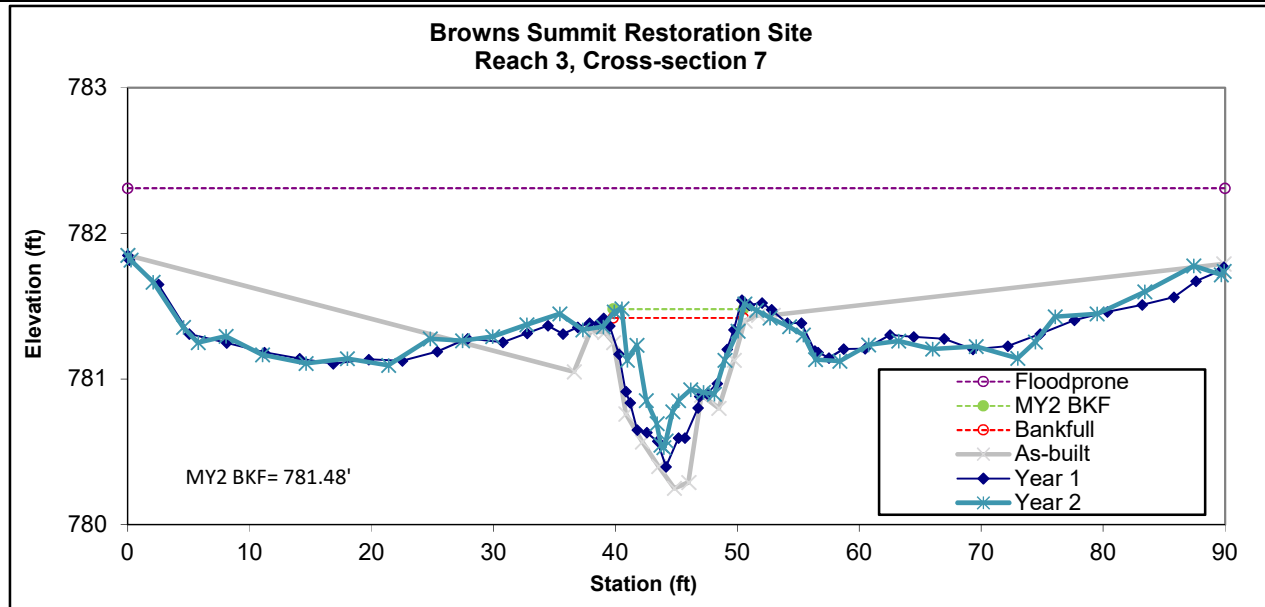


Looking at the Left Bank



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	4.5	9.7	0.5	0.9	21.0	1.0	9.3	781.42	781.48



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 2 Data - Collected October 2018)

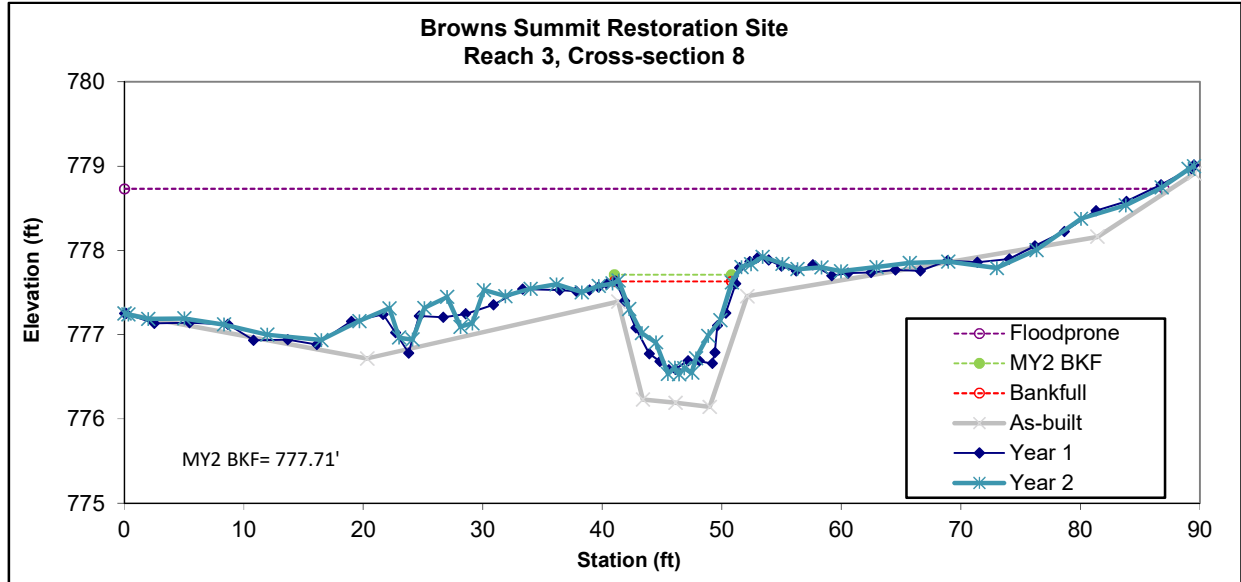


Looking at the Left Bank



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	6.4	9.8	0.7	1.1	15.1	1.0	8.8	777.63	777.64



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 2 Data - Collected October 2018)

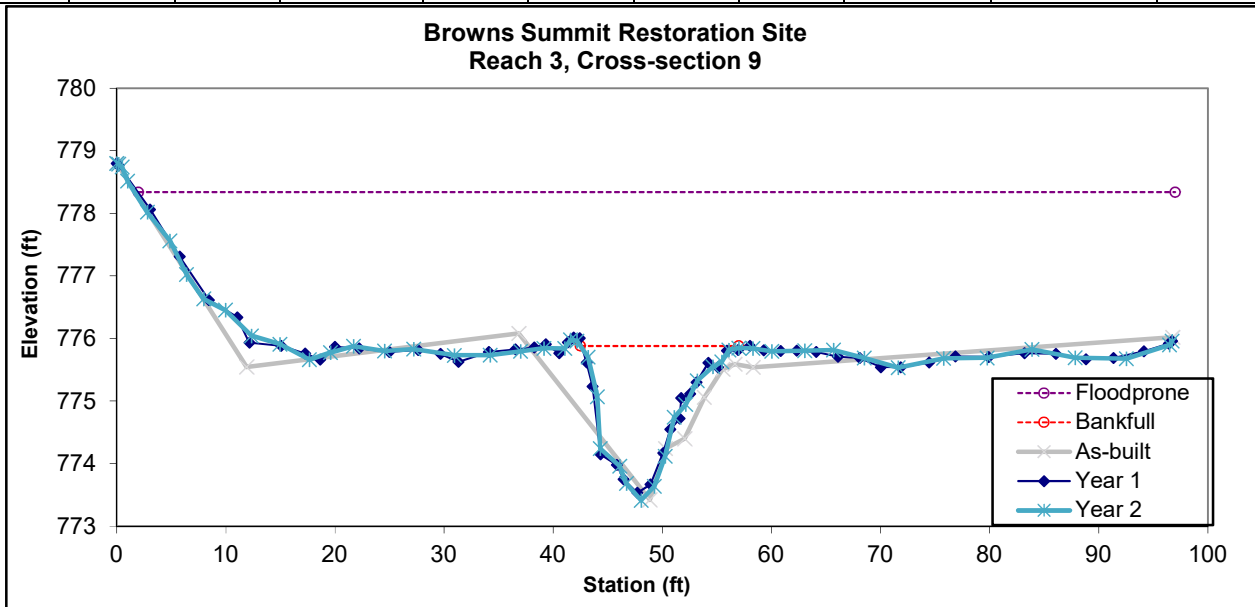


Looking at the Left Bank



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		17.3	14.5	1.2	2.5	12.1	-	-	775.88	775.90



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.

**Permanent Cross-section 10**  
(Year 2 Data - Collected October 2018)

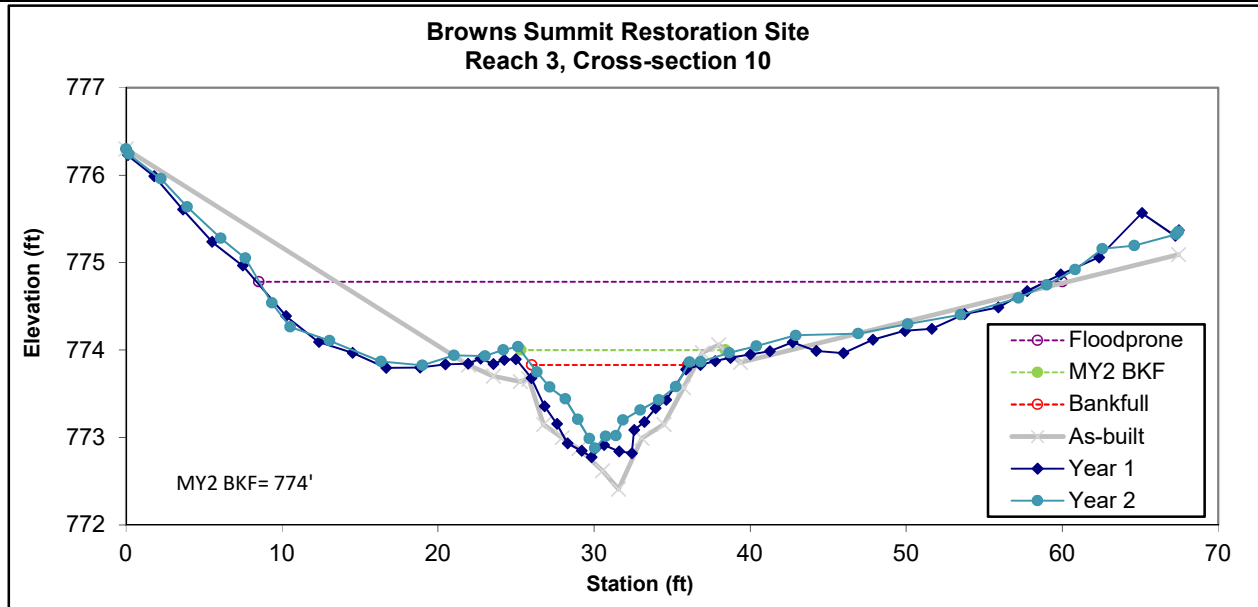


Looking at the Left Bank



Looking at the Right Bank

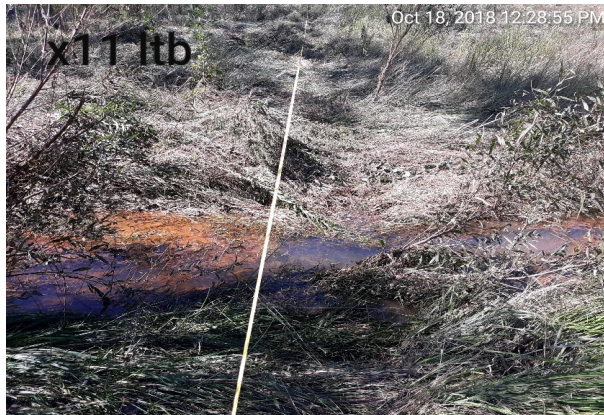
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	4.8	10	0.5	1	20.8	1.0	5.1	773.83	774.00



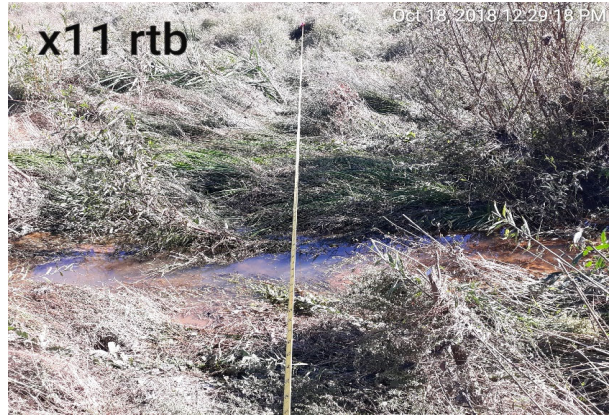
Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.



**Permanent Cross-section 11**  
(Year 2 Data - Collected October 2018)

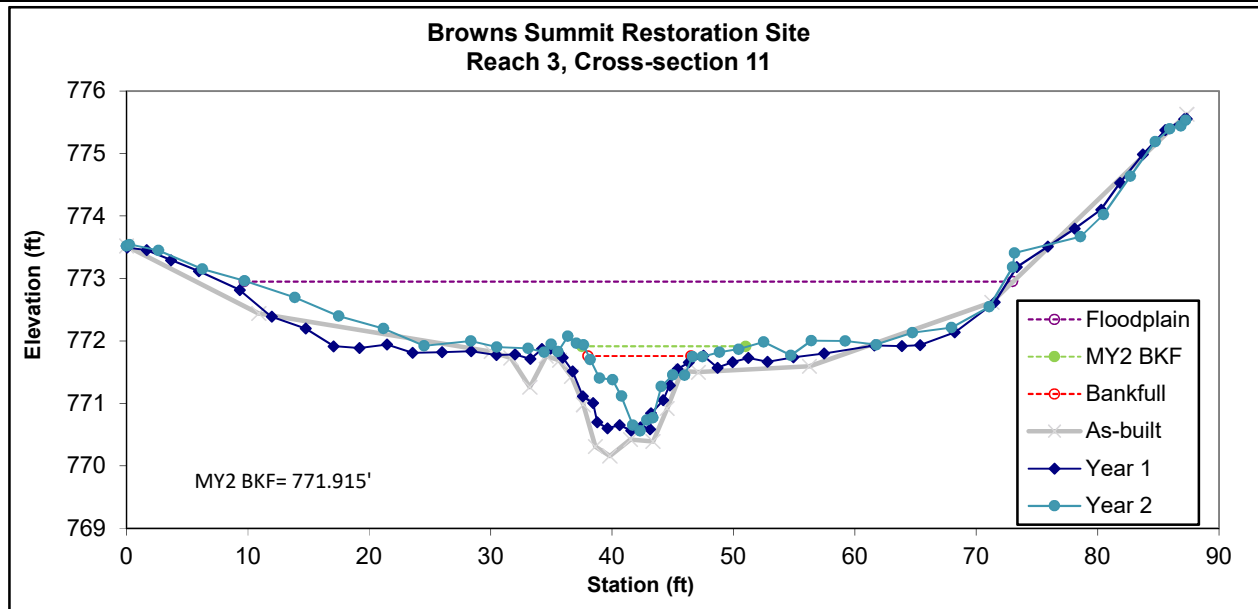


Looking at the Left Bank



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	10.5	0.6	1.2	18.5	1.0	6.2	771.76	771.75



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 12**  
(Year 2 Data - Collected October 2018)

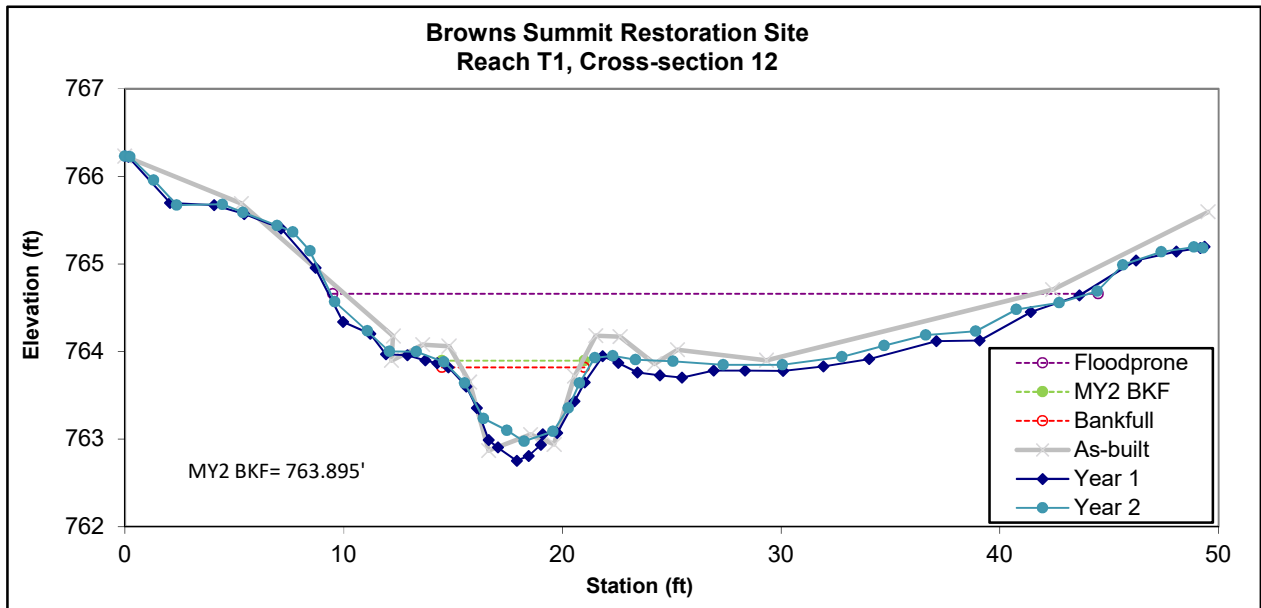


Looking at the Left Bank



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	3.4	6.4	0.5	0.8	12.1	1.0	5.4	763.82	763.90



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.



**Permanent Cross-section 13**  
(Year 2 Data - Collected October 2018)

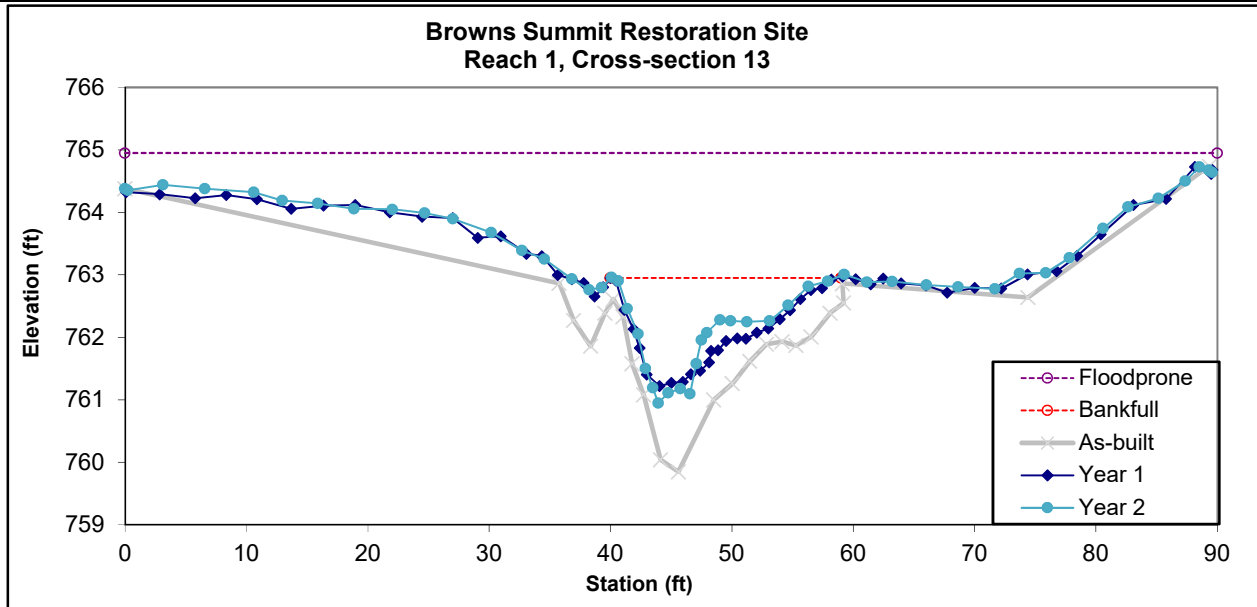


Looking at the Left Bank



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		15.1	18.4	0.8	2	22.4	-	-	762.95	762.95



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 14**  
(Year 2 Data - Collected October 2018)

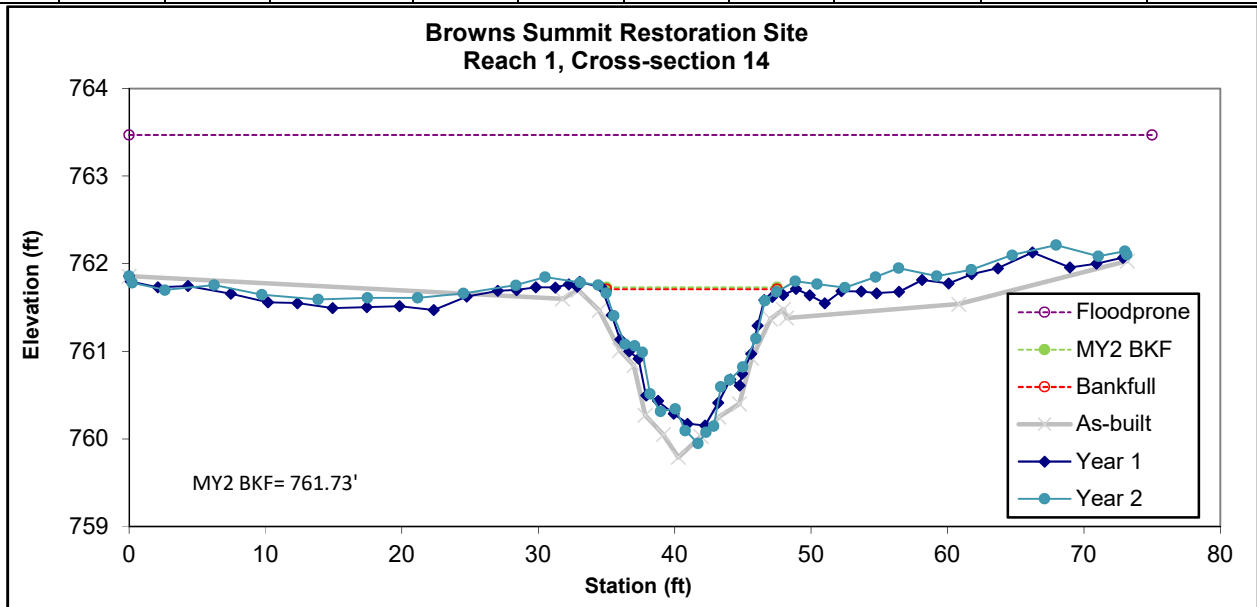


Looking at the Left Bank



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	12.3	13.1	0.9	1.8	14.0	1.0	5.6	761.71	761.70



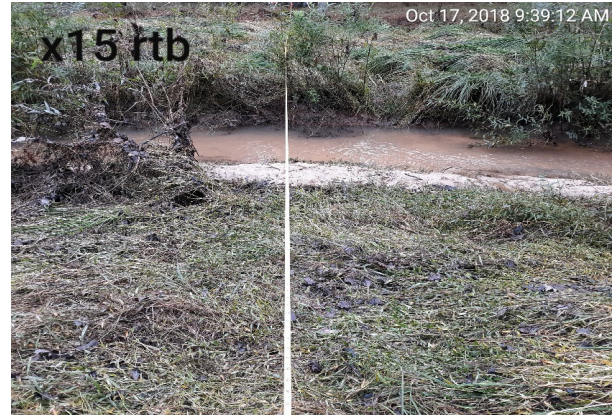
Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.



**Permanent Cross-section 15**  
(Year 2 Data - Collected October 2018)

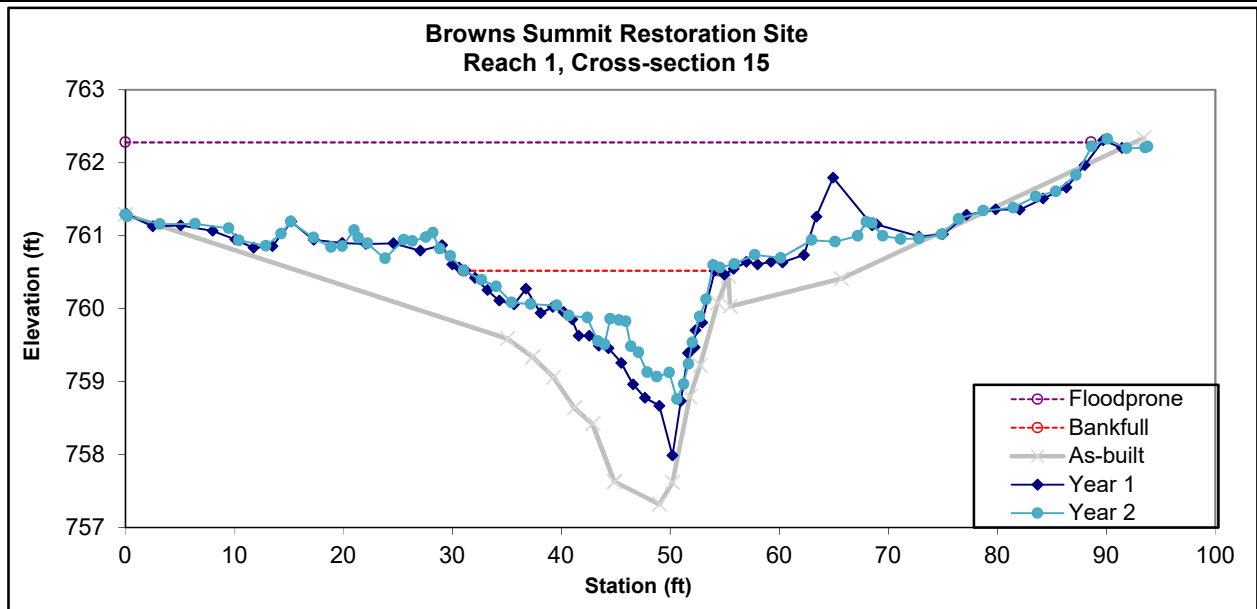


Looking at the Left Bank



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		16.3	22.8	0.7	1.8	31.8	-	-	760.52	760.70



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 16**  
(Year 2 Data - Collected October 2018)

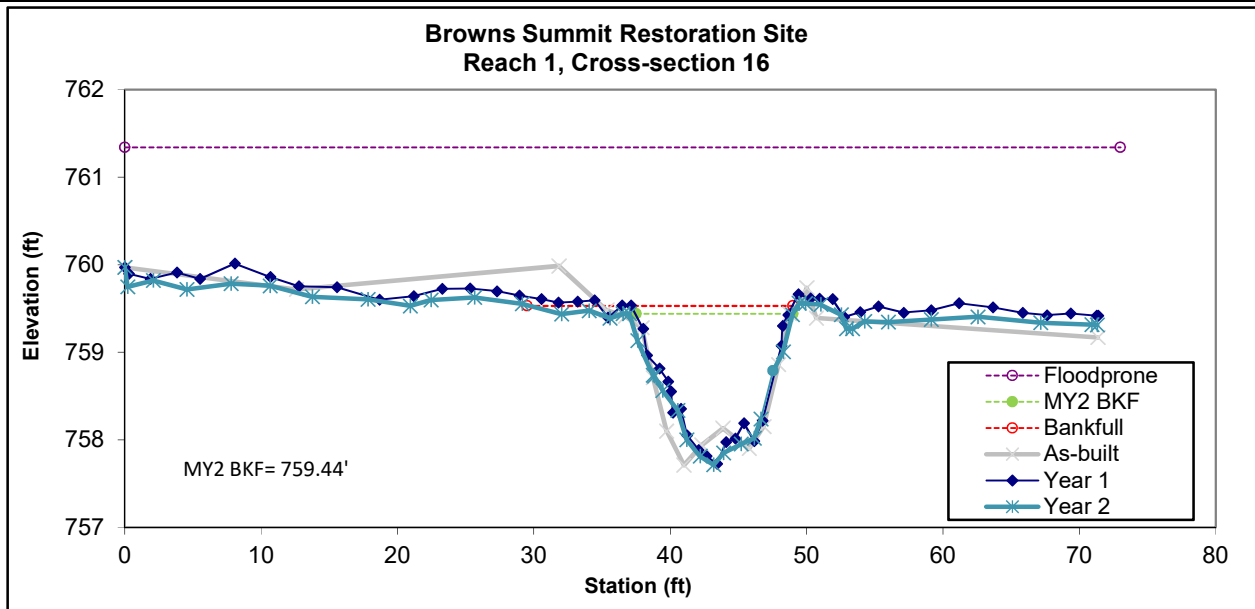


Looking at the Left Bank



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	14.6	19.7	0.7	1.8	26.6	1.0	3.6	759.53	759.44



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 2 Data - Collected October 2018)

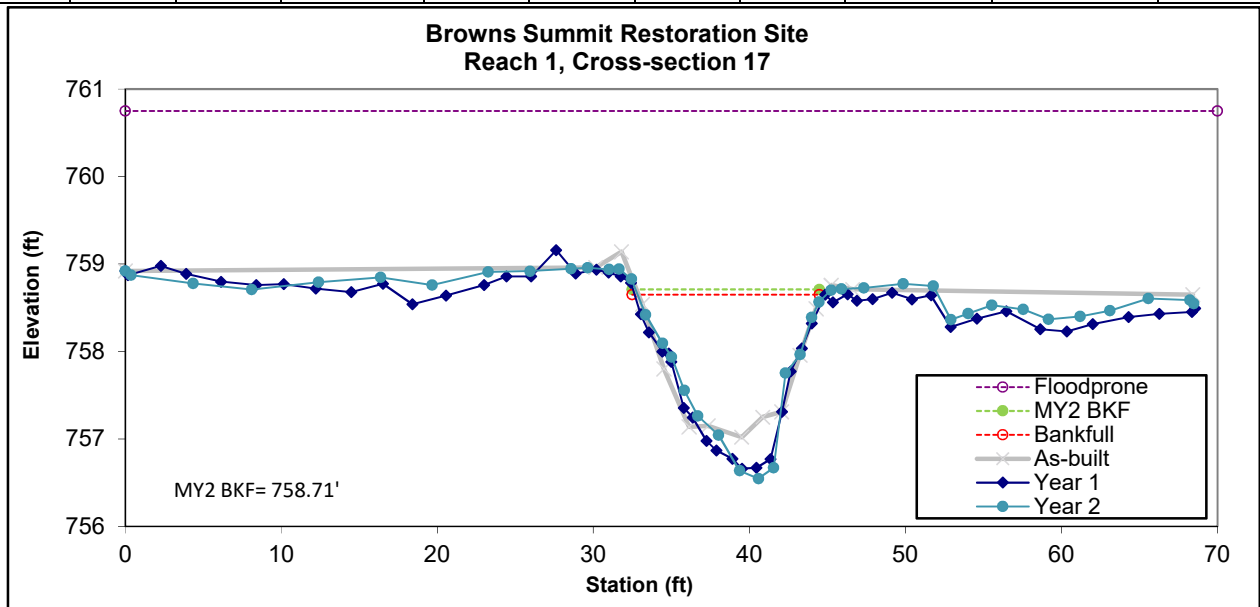


Looking at the Left Bank



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	E	13.9	12.1	1.1	2.1	10.6	1	5.7	758.65	758.71



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.



Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH 1

HORIZONTAL: 1" = 40'  
VERTICAL: 1" = 4'

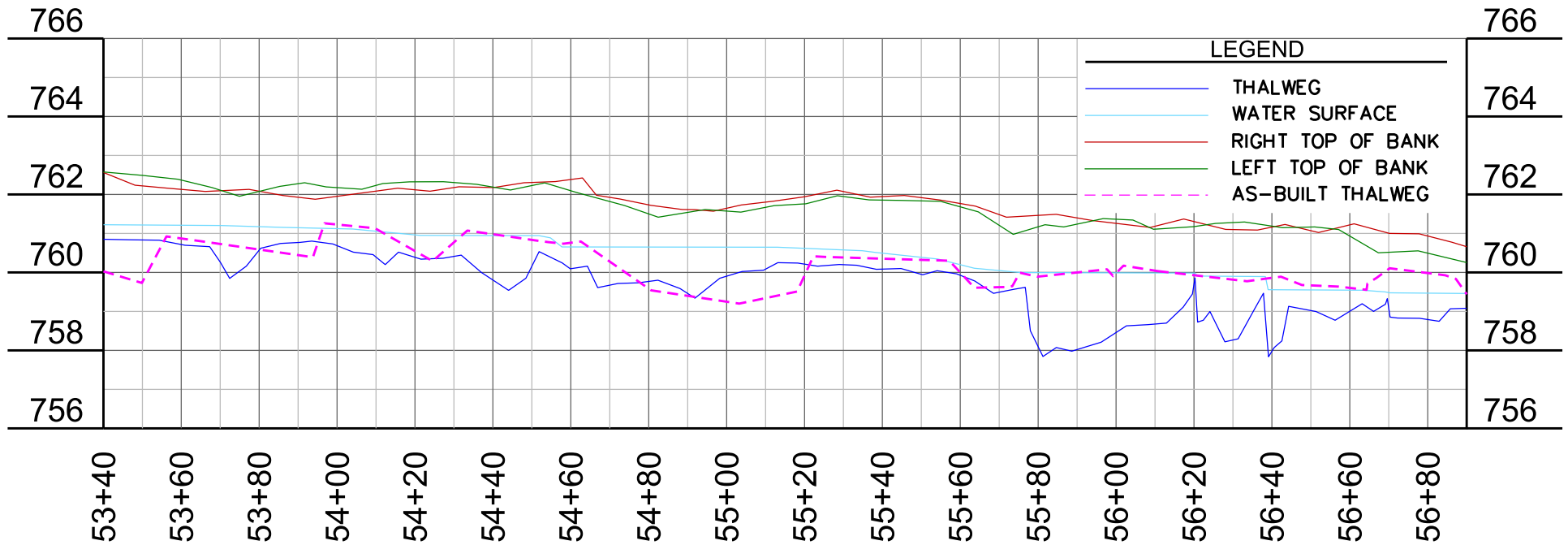
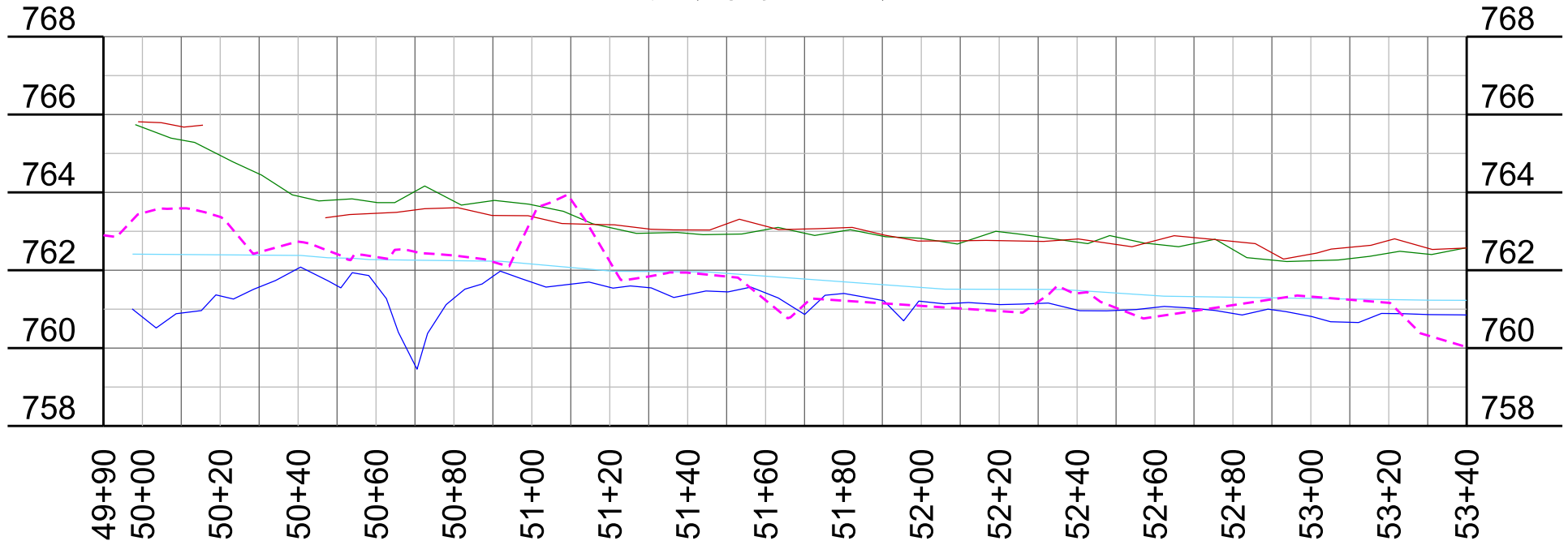


Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH 1

HORIZONTAL: 1" = 40'

VERTICAL: 1" = 4'

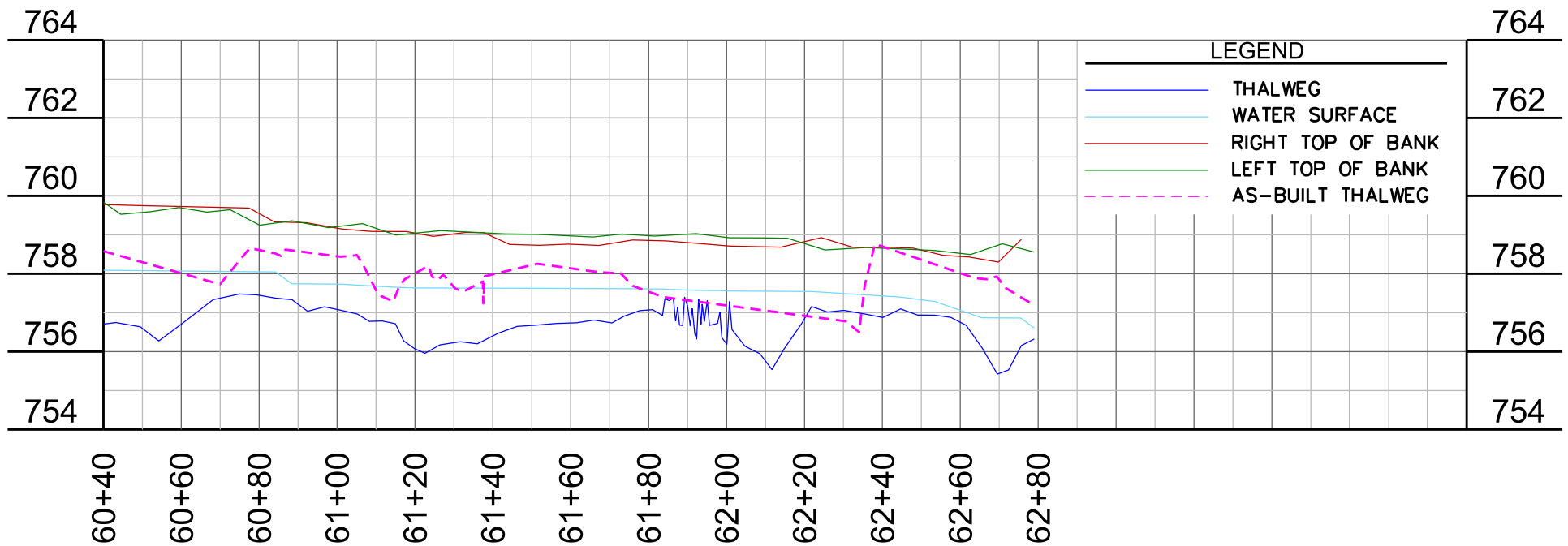
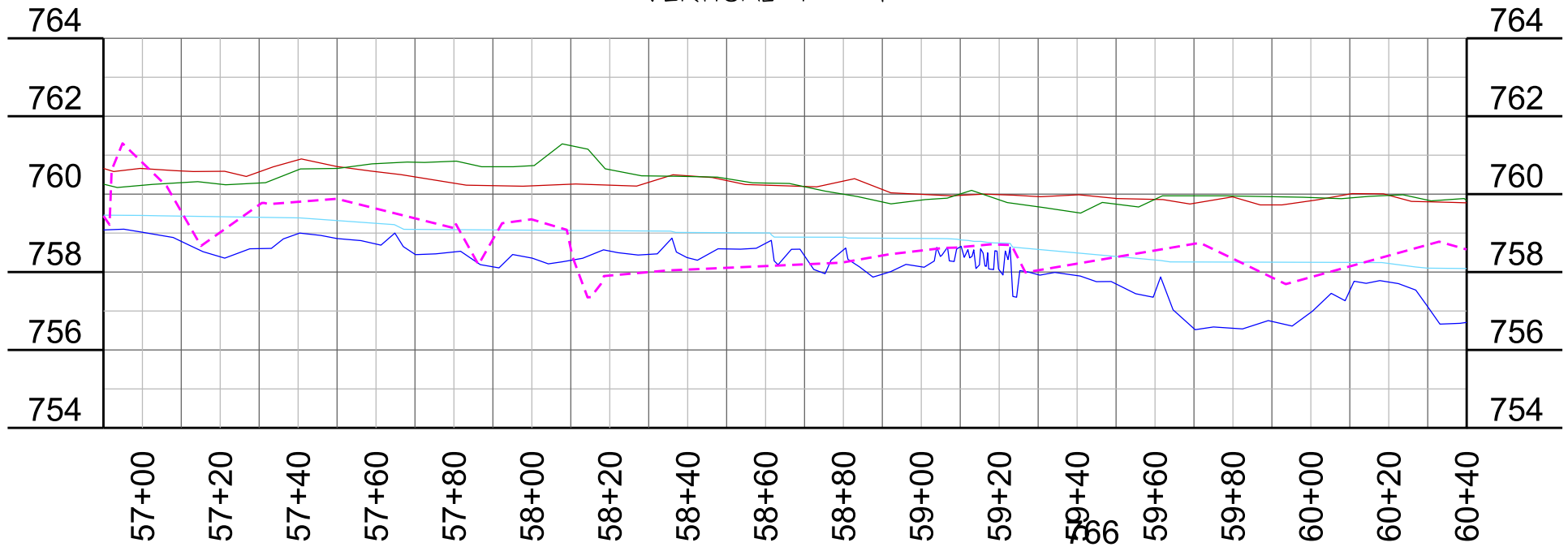
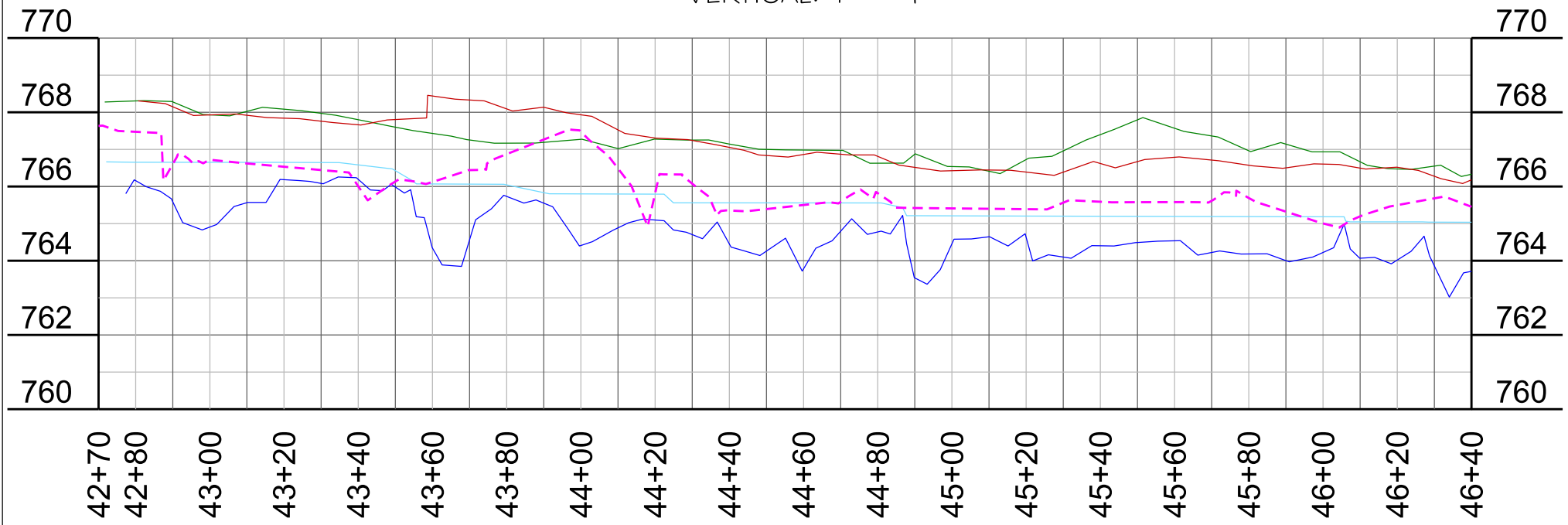


Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH 2

HORIZONTAL: 1" = 40'  
VERTICAL: 1" = 4'



LEGEND

- THALWEG
- WATER SURFACE
- RIGHT TOP OF BANK
- LEFT TOP OF BANK
- - - AS-BUILT THALWEG

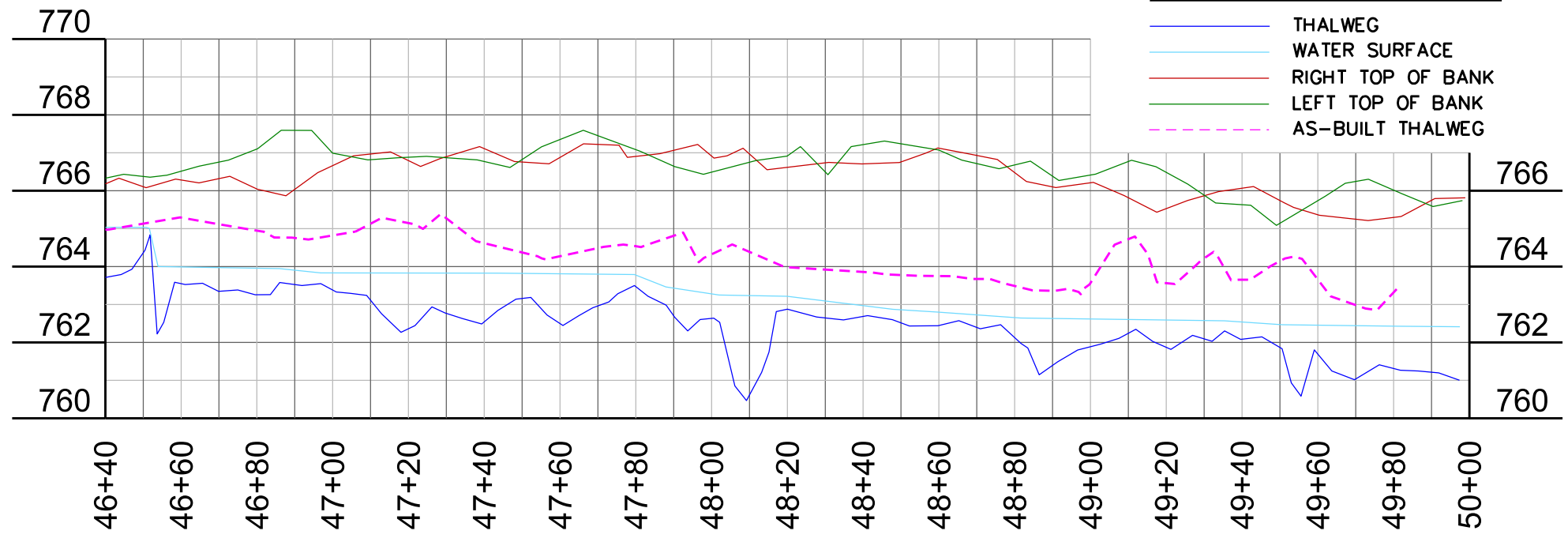




Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH 3

HORIZONTAL: 1" = 40'  
VERTICAL: 1" = 4'

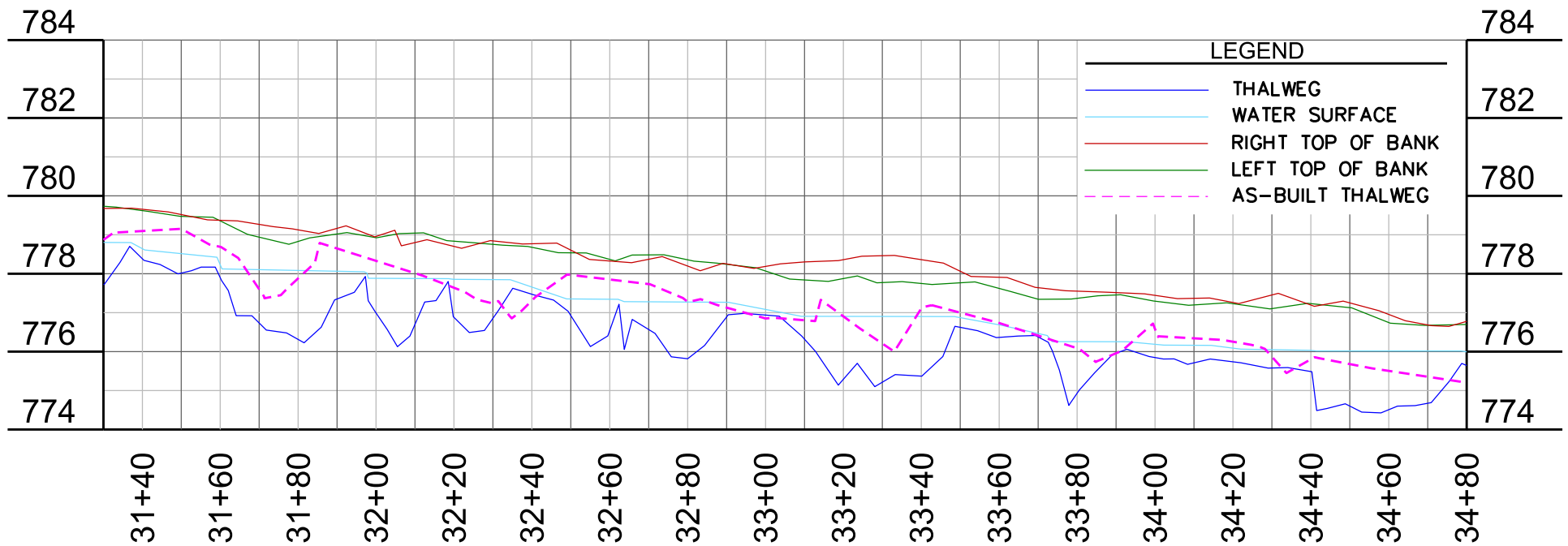
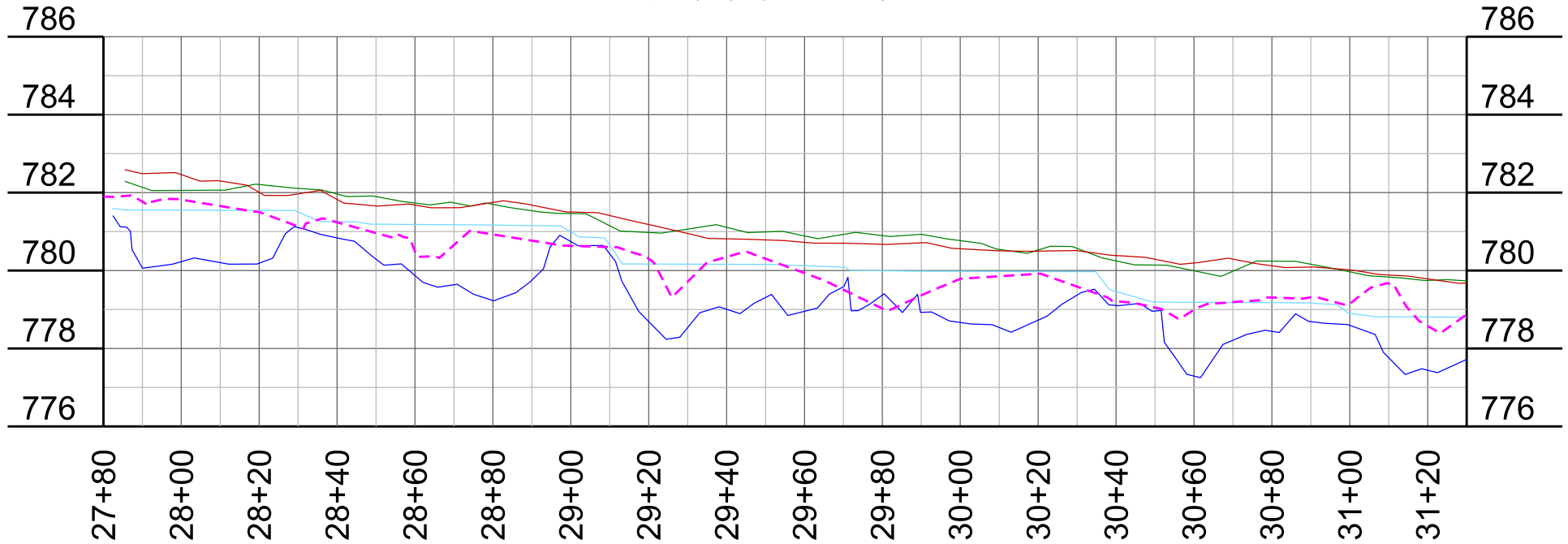
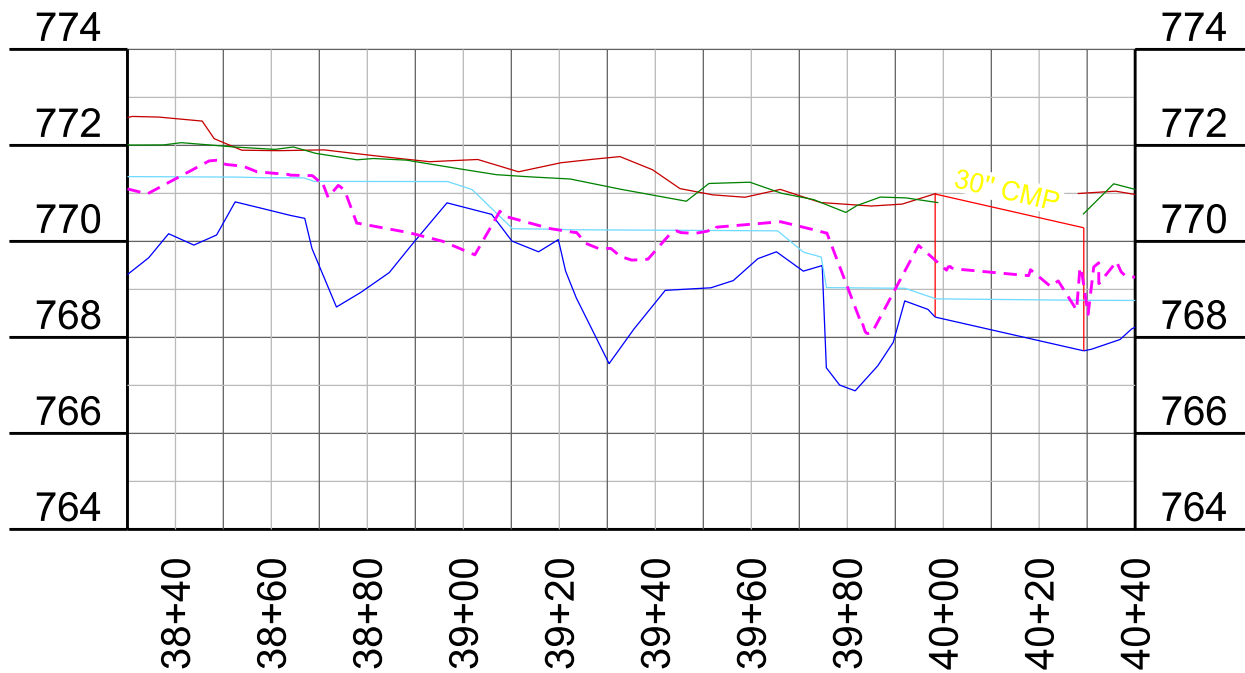
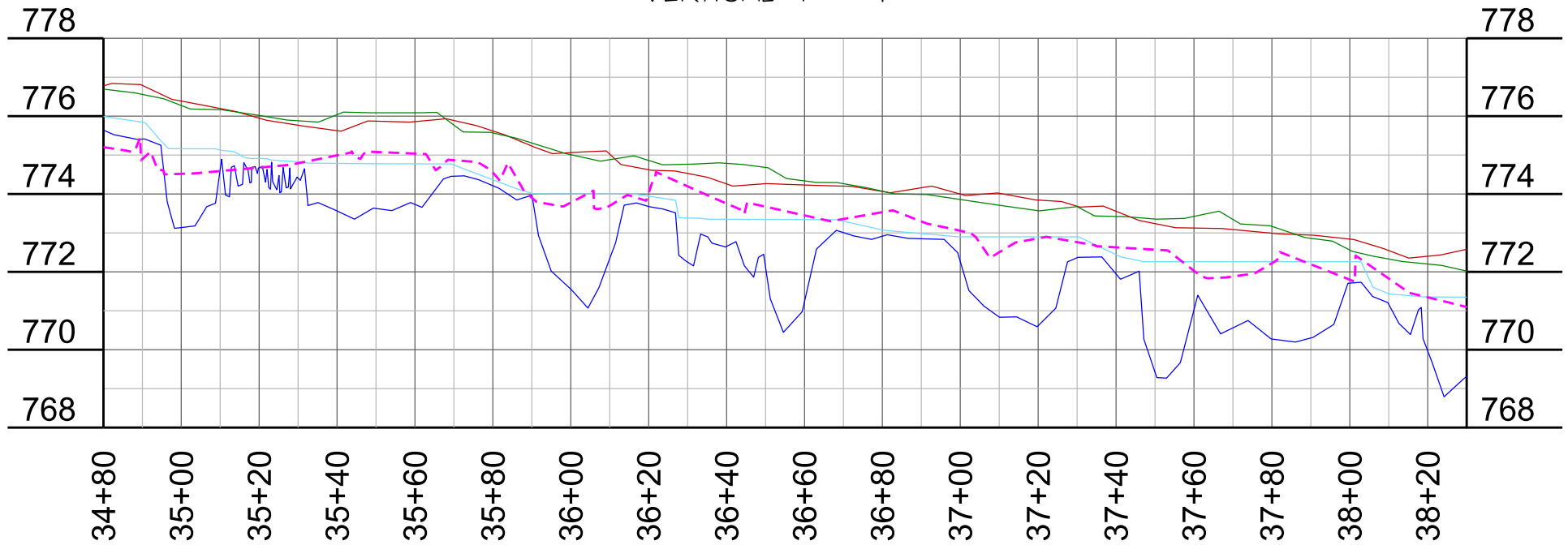


Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH 3

HORIZONTAL: 1" = 40'

VERTICAL: 1" = 4'

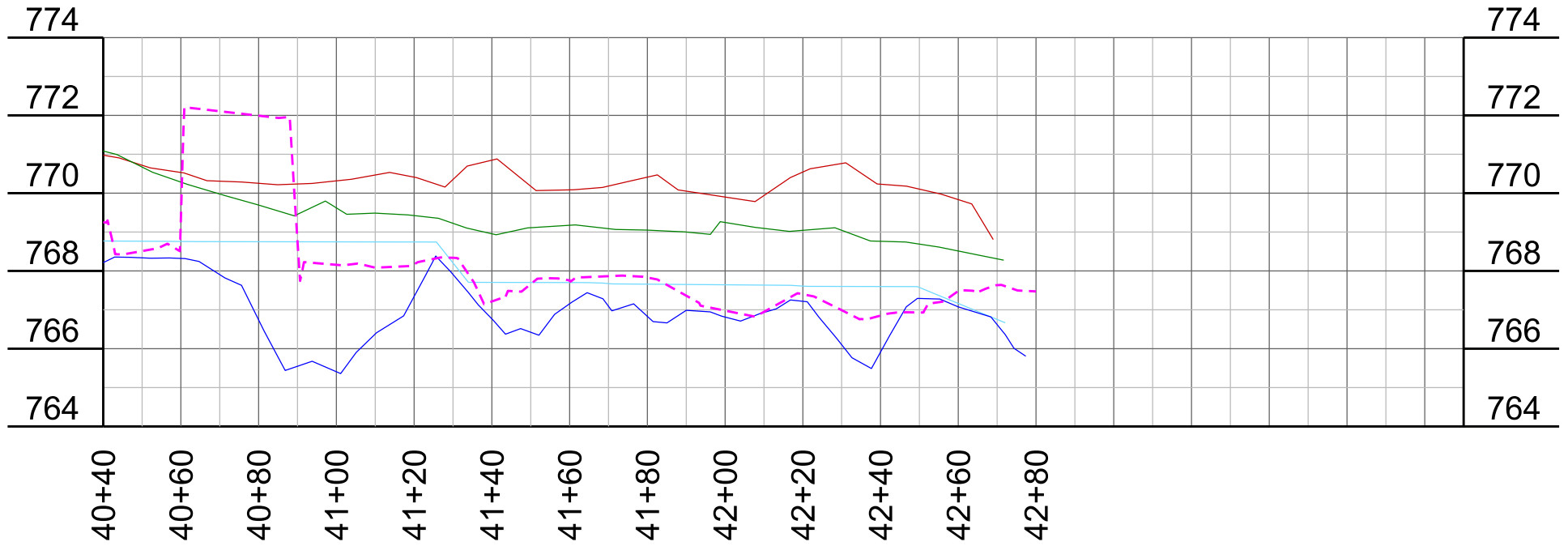


- LEGEND
- THALWEG
  - WATER SURFACE
  - RIGHT TOP OF BANK
  - LEFT TOP OF BANK
  - - - AS-BUILT THALWEG

Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH 3

HORIZONTAL: 1" = 40'  
VERTICAL: 1" = 4'



## LEGEND

- THALWEG
- WATER SURFACE
- RIGHT TOP OF BANK
- LEFT TOP OF BANK
- AS-BUILT THALWEG



Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH 4

HORIZONTAL: 1" = 40'  
VERTICAL: 1" = 4'

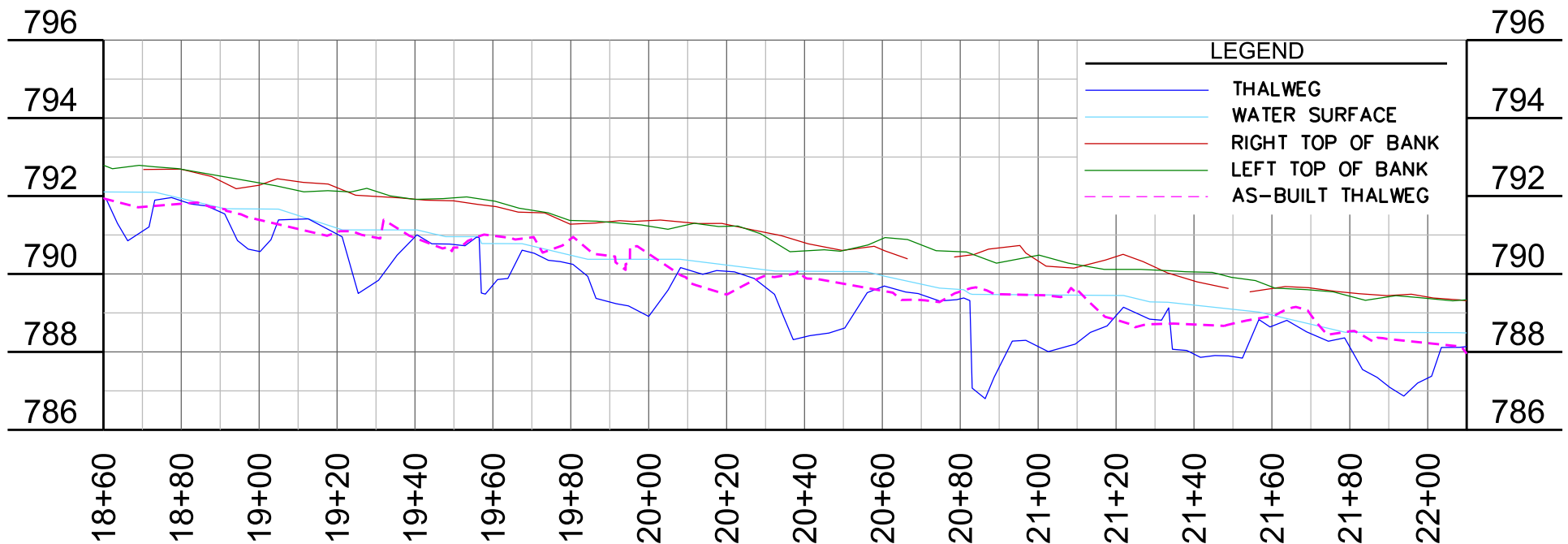
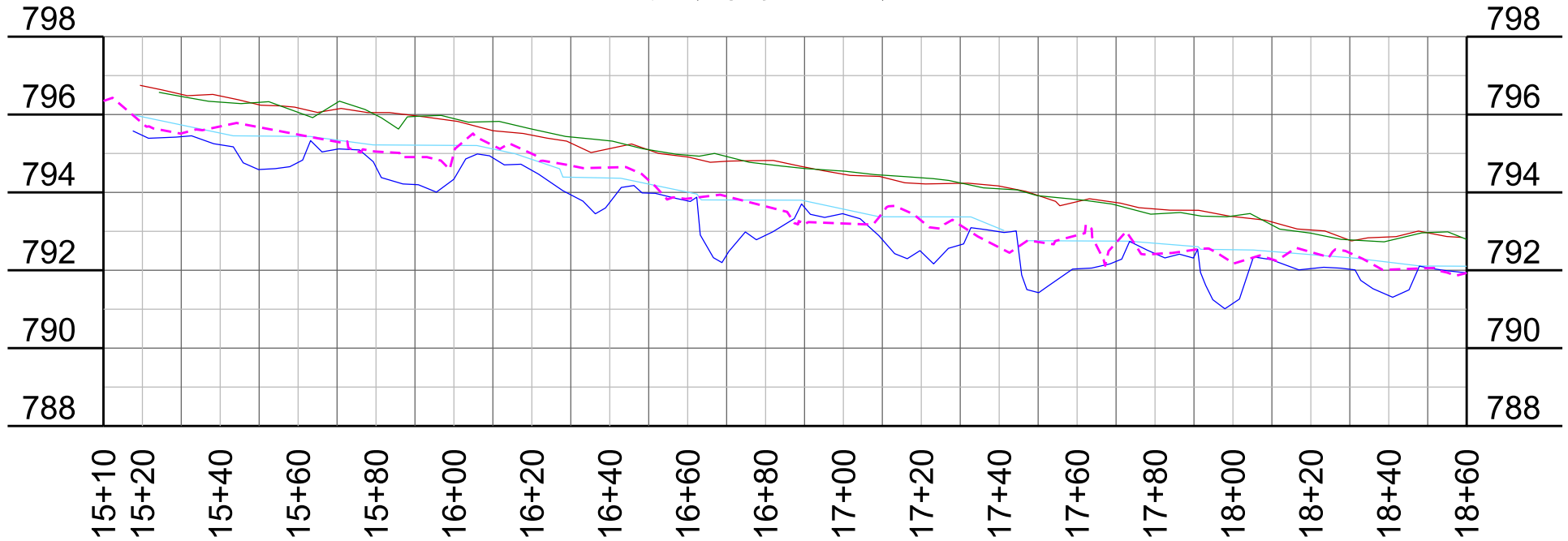


Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH 4

HORIZONTAL: 1" = 40'  
VERTICAL: 1" = 4'

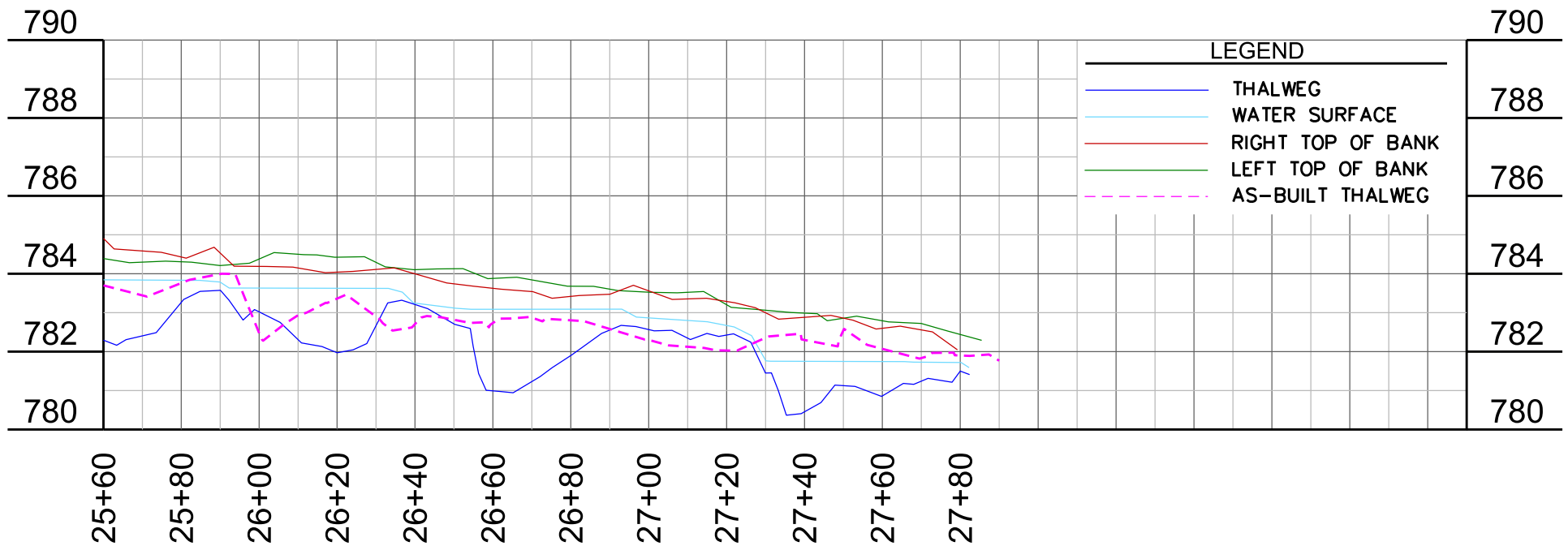
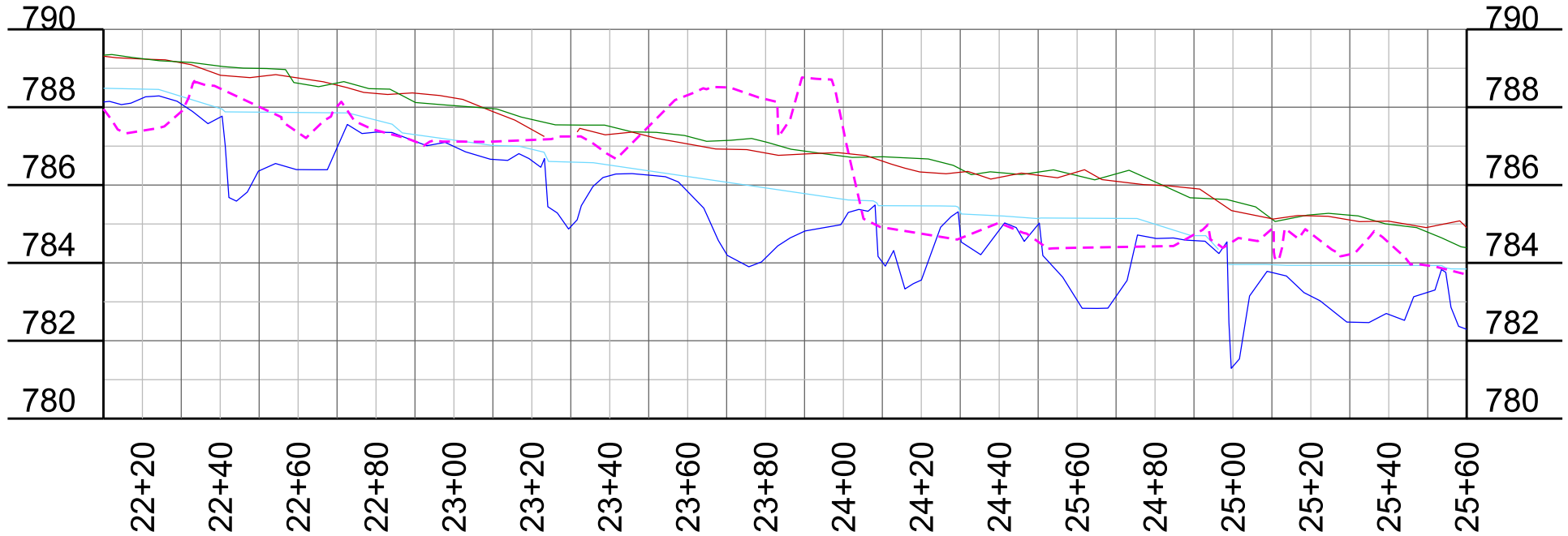
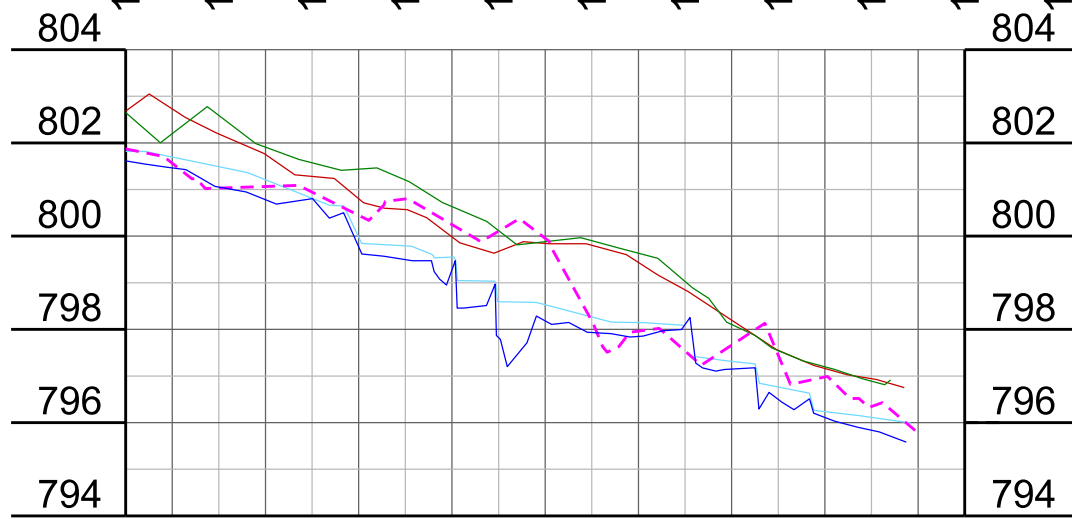
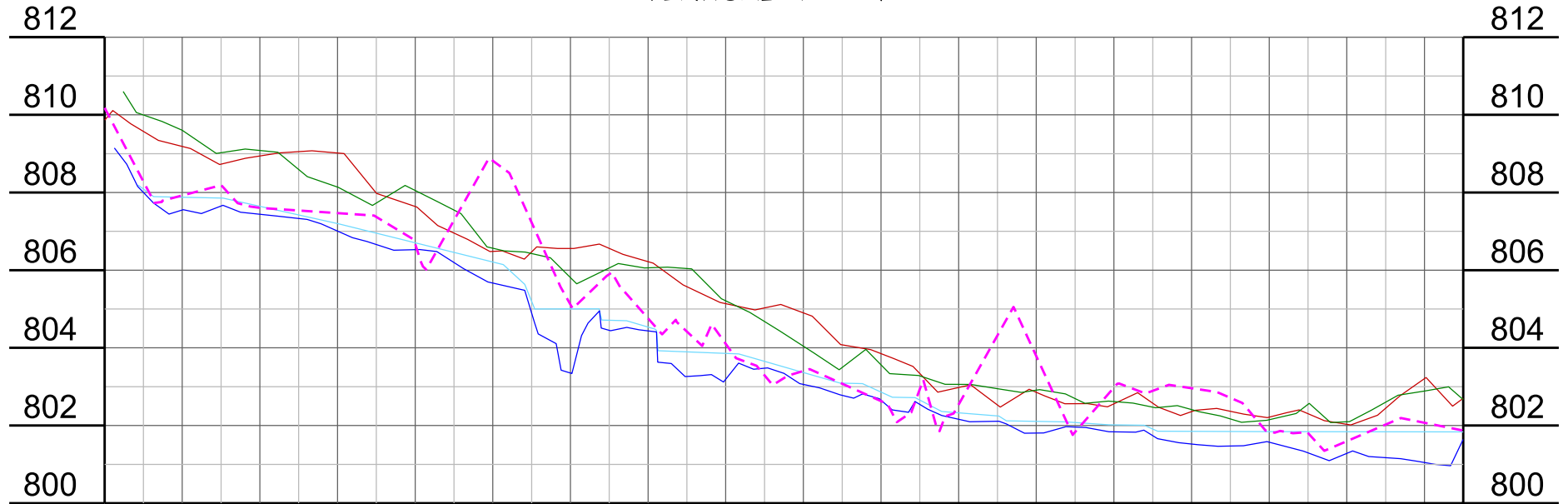


Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH 5

HORIZONTAL: 1" = 40'

VERTICAL: 1" = 4'



- LEGEND
- THALWEG
  - WATER SURFACE
  - RIGHT TOP OF BANK
  - LEFT TOP OF BANK
  - - - AS-BUILT THALWEG

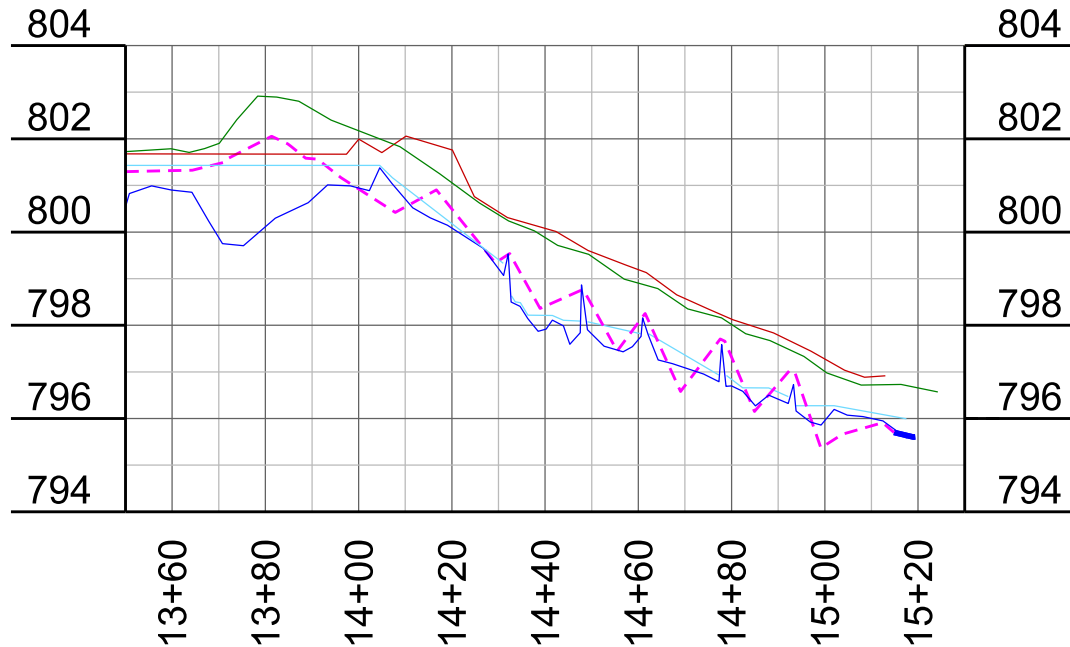
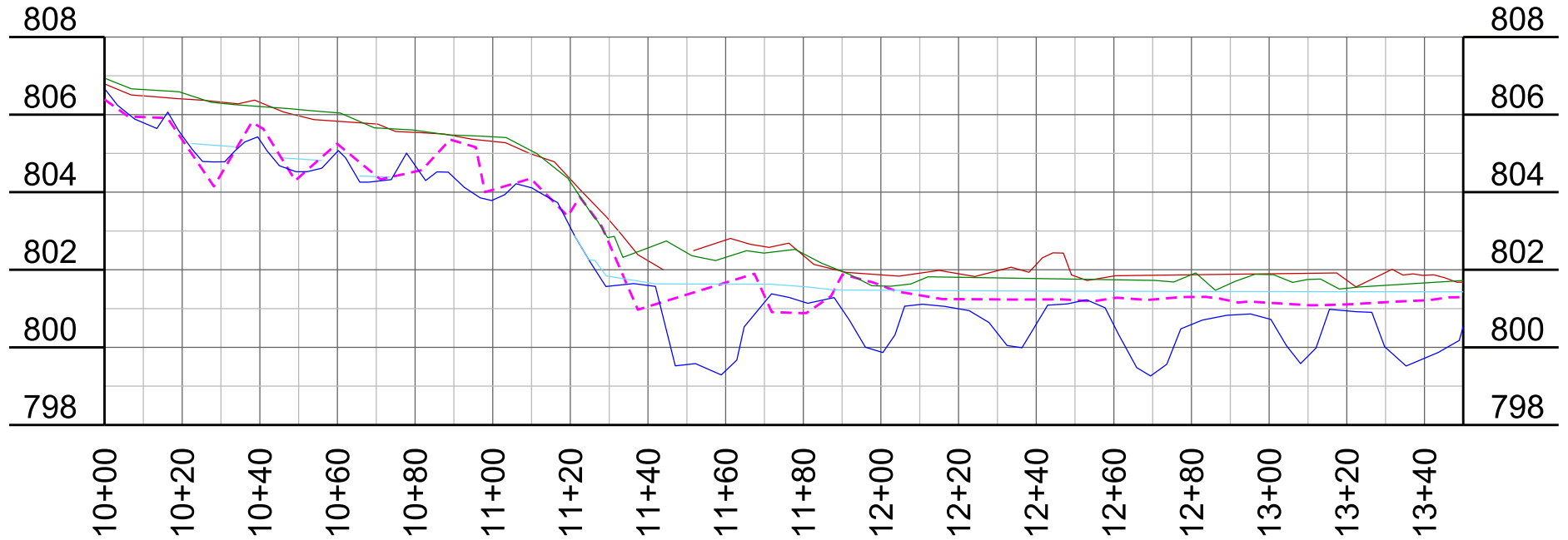


Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH 6

HORIZONTAL: 1" = 40'

VERTICAL: 1" = 4'



### LEGEND

- THALWEG
- WATER SURFACE
- RIGHT TOP OF BANK
- LEFT TOP OF BANK
- - - AS-BUILT THALWEG

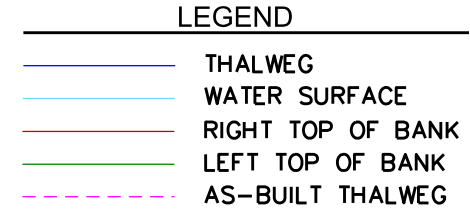
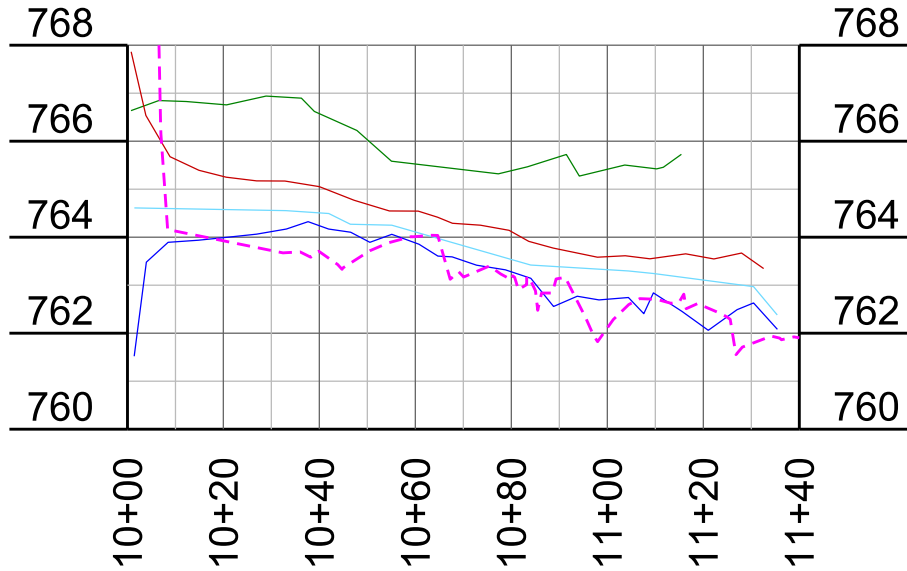
Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH T1 and T2

HORIZONTAL: 1" = 40'

VERTICAL: 1" = 4'

## T1



## T2

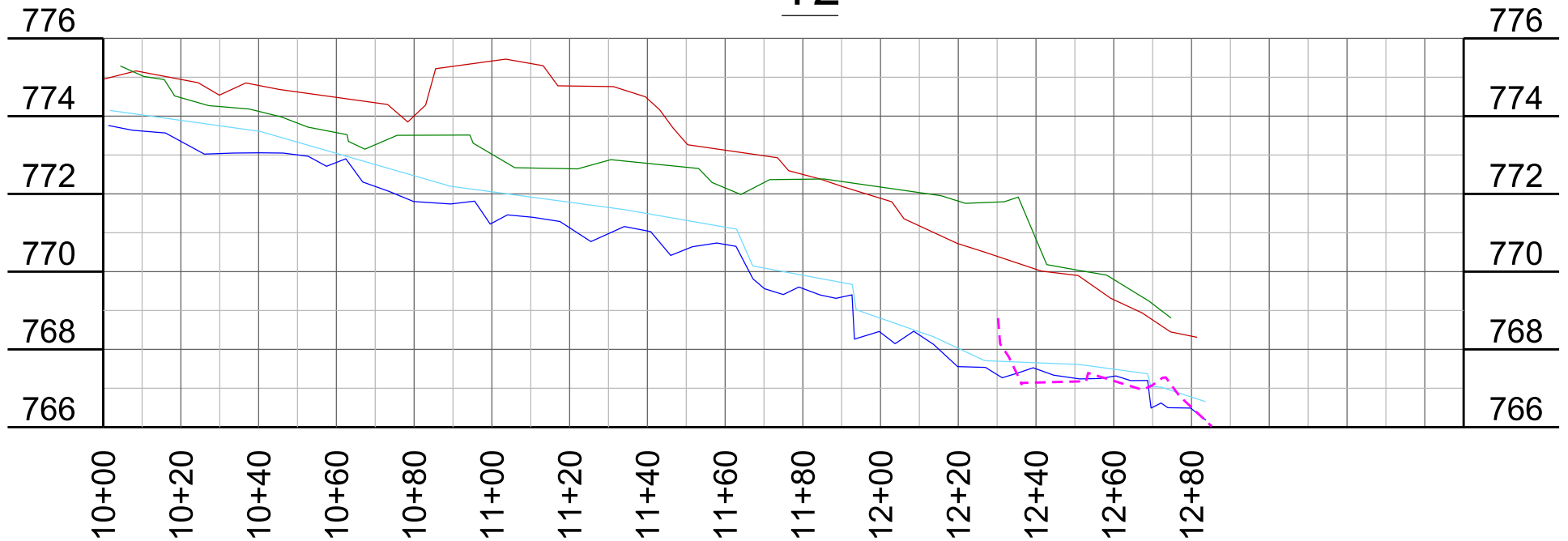
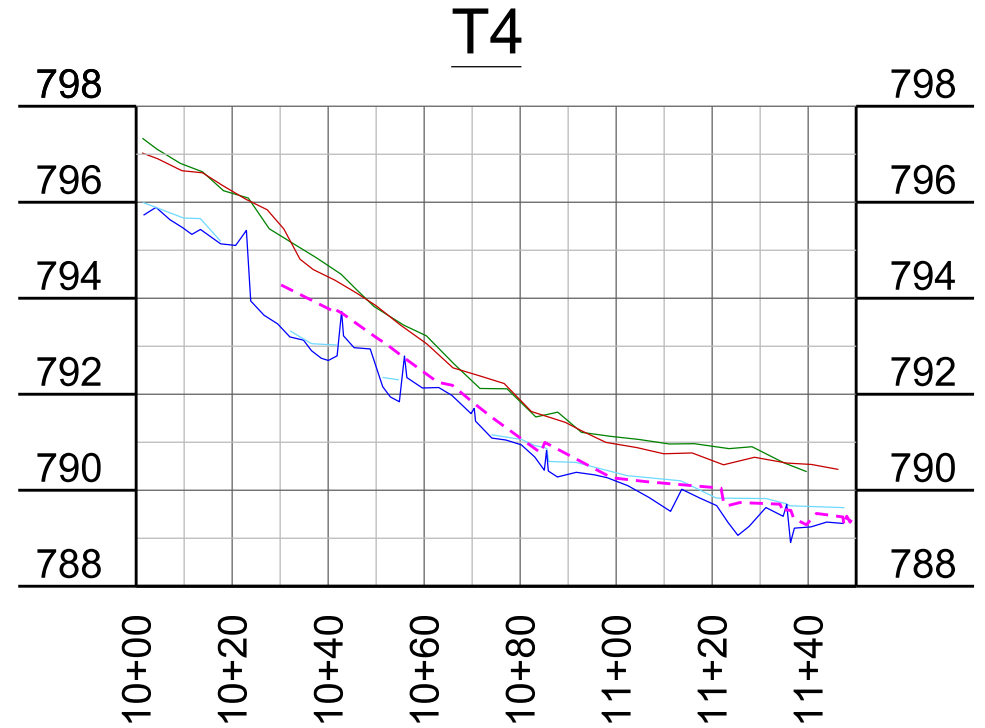
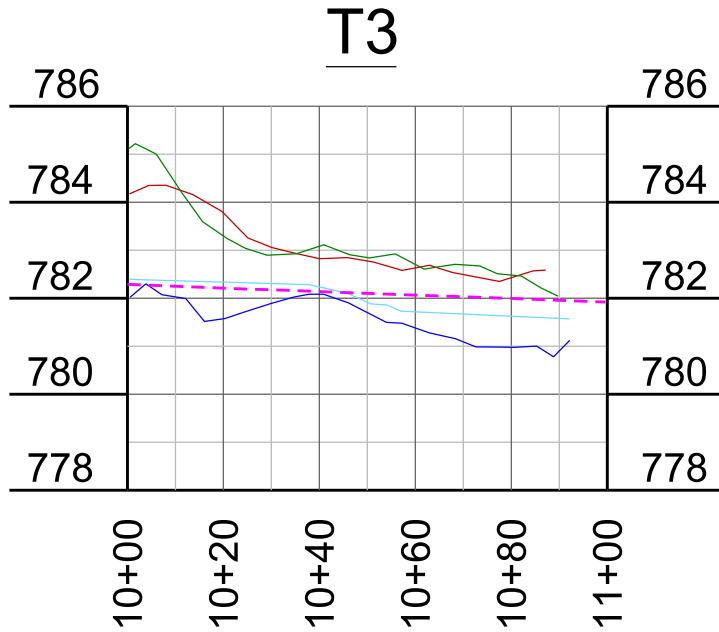


Figure 5.1  
Longitudinal Profile by Reach

# LONGITUDINAL PROFILE- REACH T3 and T4

HORIZONTAL: 1" = 40'

VERTICAL: 1" = 4'



#### LEGEND

- THALWEG
- WATER SURFACE
- RIGHT TOP OF BANK
- LEFT TOP OF BANK
- - - AS-BUILT THALWEG



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
<b>Dimension and Substrate - Riffle</b>																												
	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	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Pattern</b>																												
	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
<b>Profile</b>																												
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Substrate and Transport Parameters</b>																												
	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	----	----	----	----	----	----	----	----	----	----
<b>Additional Reach Parameters</b>																												
	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 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 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
<b>Dimension and Substrate - Riffle</b>																												
	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	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
<b>Pattern</b>																												
	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	----	----	----	----	----	----	----	----	----	----	----	----	----	
<b>Profile</b>																												
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
<b>Substrate and Transport Parameters</b>																												
	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	----	----	----	----	----	----	----	----	----	
<b>Additional Reach Parameters</b>																												
	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
<b>Dimension and Substrate - Riffle</b>																												
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Pattern</b>																												
	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
<b>Profile</b>																												
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Substrate and Transport Parameters</b>																												
	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 (Rosen Curve)	----	----	----	----	141	----	----	----	----	----	----	----	----	----	----	----	116	----	----	----	----	----	----	----	----	----	----
	Stream Power (transport capacity) W/m²	----	----	----	----	30.7	----	----	----	----	----	----	----	----	----	----	----	26.2	----	----	----	----	----	----	----	----	----	----
<b>Additional Reach Parameters</b>																												
	Drainage Area (SM)	----	----	0.38	----	----	----	0.38	----	----	----	----	----	----	----	----	----	----	0.38	----	----	----	----	----	0.38	----	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rosen 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
<b>Dimension and Substrate - Riffle</b>																												
	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	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Pattern</b>																												
	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
<b>Profile</b>																												
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Substrate and Transport Parameters</b>																												
	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	----	----	----	----	----	----	----	----	----	----
<b>Additional Reach Parameters</b>																												
	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
<b>Dimension and Substrate - Riffle</b>																												
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Pattern</b>																												
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Profile</b>																												
	Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Volume (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Substrate and Transport Parameters</b>																												
	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	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Additional Reach Parameters</b>																												
	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
<b>Dimension and Substrate - Riffle</b>																												
	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	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
<b>Pattern</b>																												
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
<b>Profile</b>																												
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
<b>Substrate and Transport Parameters</b>																												
	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	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
<b>Additional Reach Parameters</b>																												
	Drainage Area (SM)	----	----	0.10	----	----	----	0.10	----	----	----	----	----	----	----	----	----	----	0.10	----	----	----	----	0.10	----	----		
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----		
	Rosgen Classification	----	----	----	----	Bc	----	----	----	----	4	----	6.0	----	----	----	B5c	----	----	----	----	----	----	----	----	----		
	BF Velocity (fps)	----	----	----	----	3.75	----	----	----	----	4	----	6.0	----	----	----	5.2	----	----	----	----	----	----	----	----	----		
	BF Discharge (cfs)	----	----	----	----	16.5	----	----	----	----	16	----	16	----	----	----	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 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 T1																												
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
<b>Dimension and Substrate - Riffle</b>																												
	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 (ft²)	----	----	----	----	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Pattern</b>																												
	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	
<b>Profile</b>																												
	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 (ft³)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Substrate and Transport Parameters</b>																												
	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	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Additional Reach Parameters</b>																												
	Drainage Area (SM)	----	0.09	----	----	----	----	0.09	----	----	----	----	----	----	----	----	----	----	0.09	----	----	----	----	----	0.09	----	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rosgen Classification	----	----	----	----	E	----	----	----	----	----	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
<b>Dimension and Substrate - Riffle</b>																												
	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 <sup>2</sup> )	----	----	----	----	4.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Width/Depth Ratio	----	----	----	----	81.82	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Entrenchment Ratio	----	----	----	----	1.3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Bank Height Ratio	----	----	----	----	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	d50 (mm)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Pattern</b>																												
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Profile</b>																												
	Riffle Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Riffle Slope (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Length (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool to Pool Spacing (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Max Depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Pool Volume (ft <sup>3</sup> )	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Substrate and Transport Parameters</b>																												
	Ri% / Ru% / P% / G% / S%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	SC% / Sa% / G% / B% / Be%	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	d16 / d35 / d50 / d84 / d95	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Reach Shear Stress (competency) lb/ft <sup>2</sup>	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Max part size (mm) mobilized at bankfull (Rosgen Curve)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Stream Power (transport capacity) W/m <sup>2</sup>	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Additional Reach Parameters</b>																												
	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																													
Reach T3																													
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	
<b>Dimension and Substrate - Riffle</b>																													
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
<b>Pattern</b>																													
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2	----	----	3.0	----	----	----	----	----	----	----	----	
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Profile</b>																													
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Substrate and Transport Parameters</b>																													
	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	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Additional Reach Parameters</b>																													
	Drainage Area (SM)	----	0.06	----	----	----	0.06	----	----	----	----	----	----	----	----	----	----	0.06	----	----	----	----	----	----	0.06	----	----	----	
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
	Rosgen Classification	----	----	----	----	E	----	----	----	----	----	B5c	----	----	----	----	----	B5c	----	----	----	----	----	----	----	----	----	----	
	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 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 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	
<b>Dimension and Substrate - Riffle</b>																													
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
<b>Pattern</b>																													
	Channel Beltwidth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Rc:Bankfull width (ft/ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Wavelength (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Profile</b>																													
	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)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Substrate and Transport Parameters</b>																													
	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	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
<b>Additional Reach Parameters</b>																													
	Drainage Area (SM)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Impervious cover estimate (%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Rosgen Classification	----	----	----	----	----	----	----	----	----	----	B5c	----	----	----	----	----	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 Estimate 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																														
Stream Reach		Reach 4																												
		Cross-section X-1 (Riffle)						Cross-section X-2 (Pool)						Cross-section X-3 (Riffle)																
Dimension and substrate		Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	
Based on fixed baseline bankfull elevation																														
BF Width (ft)		7.2	8.1	7.0					11.6	12.8	12.3					9.5	12.49	10.6												
BF Mean Depth (ft)		0.5	0.4	0.4					0.9	0.8	0.9					0.9	0.58	0.7												
Width/Depth Ratio		15.4	19.4	16.5					12.7	15.6	14.4					11	21.5	16.1												
BF Cross-sectional Area (ft²)		3.3	3.4	3.0					10.5	10.5	10.5					8.2	7.25	6.9												
BF Max Depth (ft)		0.8	0.9	0.7					2	2.5	2.7					1.6	1.21	1.1												
Width of Floodprone Area (ft)		31.3	58.8	46.3					-	-	-					66.2	66.1	65.6												
Entrenchment Ratio (MY1 will provide standard)*		4.4	5.9	6.6					-	-	-					7.0	5.3	6.2												
Bank Height Ratio (MY1 will provide standard)*		1	1.0	1.0					-	-	-					1.0	1.0	1.0												
Wetted Perimeter (ft)		7.4	8.5	7.2					12.6	15.3	15.0					10.1	13.0	11.0												
Hydraulic Radius (ft)		0.5	0.4	0.4					0.8	0.7	0.7					0.8	0.6	0.6												
Cross Sectional Area between end pins (ft²)		-	-	-					-	-	-					-	-	-												
d50 (mm)		-	-	-					-	-	-					-	-	-												
Stream Reach		Reach 4												Reach 3																
		Cross-section X-4 (Riffle)						Cross-section X-5 (Riffle)						Cross-section X-6 (Pool)						Cross-section X-7 (Riffle)										
Dimension and substrate		Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	
Based on fixed baseline bankfull elevation																														
BF Width (ft)		8.7	9.16	8.8					11.8	10.93	11.6					12.5	12.9	12.4					11.2	11.5	9.7					
BF Mean Depth (ft)		0.8	0.73	0.6					1.1	0.75	0.7					0.9	1.1	1.1					0.6	0.5	0.5					
Width/Depth Ratio		11.6	12.55	13.6					11	14.57	17.7					14	11.6	11.2					18.6	21.3	21.0					
BF Cross-sectional Area (ft²)		6.6	6.72	5.6					12.7	8.18	7.5					11.2	14.4	13.7					6.8	6.2	4.5					
BF Max Depth (ft)		1.4	1.0	1.0					1.7	1.08	1.1					1.3	2.4	2.2					1.1	1.0	0.9					
Width of Floodprone Area (ft)		65.8	72.0	67.5					68.1	69.3	68.3					-	-	-					89.9	89.9	89.9					
Entrenchment Ratio (MY1 will provide standard)*		7.6	7.4	7.7					5.8	6.3	5.9					-	-	-					8	7.8	9.3					
Bank Height Ratio (MY1 will provide standard)*		1.0	1.0	1.0					1.0	1.0	1.0					-	-	-					1.0	1.0	1.0					
Wetted Perimeter (ft)		9.4	6.94	9.2					12.8	11.47	12					13.0	13.92	13.4					11.6	11.8	10.1					
Hydraulic Radius (ft)		0.7	0.7	0.6					1.0	0.71	0.6					0.9	1.03	1.0					0.6	0.5	0.4					
Cross Sectional Area between end pins (ft²)		-	-	-					-	-	-					-	-	-					-	-	-					
d50 (mm)		-	-	-					-	-	-					-	-	-					-	-	-					
Stream Reach		Reach 3																												
		Cross-section X-8 (Riffle)						Cross-section X-9 (Pool)						Cross-section X-10 (Riffle)						Cross-section X-11 (Riffle)										
Dimension and substrate		Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	
Based on fixed baseline bankfull elevation																														
BF Width (ft)		10.60	10.05	9.8					17.60	15.3	14.5					11.60	11.5	10					9.30	11.7	10.5					
BF Mean Depth (ft)		0.90	0.71	0.7					1.00	1.1	1.2					0.60	0.6	0.5					0.90	0.7	0.6					
Width/Depth Ratio		11.5	14.15	15.1					17.7	13.5	12.1					19.2	19.2	20.8					10.8	17.2	18.5					
BF Cross-sectional Area (ft²)		9.8	7.16	6.4					17.5	17.2	17.3					7.0	6.9	4.8					8.1	8.0	6.0					
BF Max Depth (ft)		1.30	1.05	1.1					2.20	2.4	2.5					1.30	1.1	1					1.30	1.2	1.2					
Width of Floodprone Area (ft)		86.6	89.5	88.3					-	-	-					51.6	67.5	50.9					65.6	87.3	65.2					
Entrenchment Ratio (MY1 will provide standard)*		8.2	8.5	9.0					-	-	-					4.4	4.5	5.1					7.0	5.5	6.2					
Bank Height Ratio (MY1 will provide standard)*		1.0	1.0	0.9					-	-	-					1.0	1.0	1.0					1.0	1.0	1.0					
Wetted Perimeter (ft)		11.2	11.3	10.6					18.2	11.3	15.9					12.0	11.9	10.2					9.9	12.3	11.0					
Hydraulic Radius (ft)		0.9	0.6	0.6					1.0	0.6	1.1					0.6	0.6	0.5					0.8	0.7	0.5					
Cross Sectional Area between end pins (ft²)		-	-	-					-	-	-					-	-	-					-	-	-					
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 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																				
	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	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Based on fixed baseline bankfull elevation																												
BF Width (ft)	7.7	6.7	6.4					19.6	18.7	17.3					13.80	14.7	13.1					29.4	24.3	22.8				
BF Mean Depth (ft)	0.7	0.6	0.5					1.2	0.9	0.6					0.90	0.9	0.9					1.1	0.9	0.7				
Width/Depth Ratio	11.7	11	12.1					16.4	20.6	29					15.2	17.3	14					26.1	28.3	31.8				
BF Cross-sectional Area (ft²)	5.1	4.1	3.4					23.5	17.1	10.3					12.5	12.5	12.3					33.2	20.8	16.3				
BF Max Depth (ft)	1.2	1.1	0.8					2.8	1.7	2.0					1.70	1.6	0.9					2.80	2.5	1.8				
Width of Floodprone Area (ft)	39.9	49.4	34.7					-	-	-					100.0	73.1	73.2					100.0	93.8	92.5				
Entrenchment Ratio (MY1 will provide standard)*	5.2	5.4	5.4					-	-	-					5.3	5.0	5.6					-	-	-				
Bank Height Ratio (MY1 will provide standard)*	1.0	1.0	1.0					-	-	-					1.0	1.0	1.0					-	-	-				
Wetted Perimeter (ft)	8.5	7.18	6.7					21.0	19.4	18.1					14.4	15.4	13.9					30.5	25.7	23.7				
Hydraulic Radius (ft)	0.6	0.57	0.5					1.1	0.9	0.6					0.9	0.8	0.9					1.1	0.8	0.7				
Cross Sectional Area between end pins (ft²)	-	-	-					-	-	-					-	-	-					-	-	-				
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	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Based on fixed baseline bankfull elevation																												
BF Width (ft)	12.6	11.9	19.7					12.60	12.2	12.1																		
BF Mean Depth (ft)	1.1	1.09	0.7					1.20	1.2	1.1																		
Width/Depth Ratio	12.0	10.9	26.6					10.9	10.3	10.6																		
BF Cross-sectional Area (ft²)	13.2	13	14.6					14.5	14.6	13.9																		
BF Max Depth (ft)	1.70	1.8	1.8					1.70	2	2.1																		
Width of Floodprone Area (ft)	100.0	71.4	71.3					100.0	68.6	68.5																		
Entrenchment Ratio (MY1 will provide standard)*	5.7	6	3.6					5.4	5.6	5.7																		
Bank Height Ratio (MY1 will provide standard)*	1.0	1.0	1.0					1.0	1.0	1.0																		
Wetted Perimeter (ft)	13.5	13.0	20.4					13.3	13.1	13.2																		
Hydraulic Radius (ft)	1.0	1.0	0.9					1.1	1.1	1.1																		
Cross Sectional Area between end pins (ft²)	-	-	-					-	-	-																		
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						MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD <sup>4</sup>	n	Min	Mean	Med	Max	SD <sup>4</sup>	n	Min	Mean	Med	Max	SD <sup>4</sup>	n	Min	Mean	Med	Max	SD <sup>4</sup>	n	Min	Mean	Med	Max	SD <sup>4</sup>	n	Min	Mean	Med	Max	SD <sup>4</sup>	n
<b>Dimension and Substrate - Riffle only</b>																																				
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																		
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																		
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																		
<sup>1</sup> 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																		
Bankfull Cross Sectional Area (ft <sup>2</sup> )	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																		
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																		
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																		
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																		
<b>Profile</b>																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
<b>Pattern</b>																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
<b>Additional Reach Parameters</b>																																				
Rosgen Classification																																				
Channel Thalweg length (ft)																																				
Sinuosity (ft)																																				
Water Surface Slope (Channel) (ft/ft)																																				
BF slope (ft/ft)																																				
<sup>3</sup> Ri% / Ru% / P% / G% / S%																																				
<sup>3</sup> SC% / Sa% / G% / C% / B% / Be%																																				
<sup>3</sup> d16 / d35 / d50 / d84 / d95 /																																				
<sup>2</sup> % of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
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						MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD <sup>2</sup>	n	Min	Mean	Med	Max	SD <sup>2</sup>	n	Min	Mean	Med	Max	SD <sup>2</sup>	n	Min	Mean	Med	Max	SD <sup>2</sup>	n	Min	Mean	Med	Max	SD <sup>2</sup>	n	Min	Mean	Med	Max	SD <sup>2</sup>	n
<b>Dimension and Substrate - Riffle only</b>																																				
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																		
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																		
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																		
<sup>1</sup> 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																		
Bankfull Cross Sectional Area (ft <sup>2</sup> )	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																		
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																		
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																		
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																		
<b>Profile</b>																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
<b>Pattern</b>																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
<b>Additional Reach Parameters</b>																																				
Rosgen Classification																																				
Channel Thalweg length (ft)																																				
Sinuosity (ft)																																				
Water Surface Slope (Channel) (ft/ft)																																				
BF slope (ft/ft)																																				
<sup>3</sup> Ri% / Ru% / P% / G% / S%																																				
<sup>3</sup> SC% / Sa% / G% / C% / B% / Be%																																				
<sup>3</sup> d16 / d35 / d50 / d84 / d95 /																																				
<sup>2</sup> % of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
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 1

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD <sup>4</sup>	n	Min	Mean	Med	Max	SD <sup>4</sup>	n	Min	Mean	Med	Max	SD <sup>4</sup>	n	Min	Mean	Med	Max	SD <sup>4</sup>	n	Min	Mean	Med	Max	SD <sup>4</sup>	n	Min	Mean	Med	Max	SD <sup>4</sup>	n
<b>Dimension and Substrate - Riffle only</b>																																				
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																		
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																		
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																		
<sup>1</sup> 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																		
Bankfull Cross Sectional Area (ft <sup>2</sup> )	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																		
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																		
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																		
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																		
<b>Profile</b>																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
<b>Pattern</b>																																				
Channel Beltwidth (ft)																																				
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Meander Wavelength (ft)																																				
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Channel Thalweg length (ft)																																				
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Water Surface Slope (Channel) (ft/ft)																																				
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<sup>3</sup> Ri% / Ru% / P% / G% / S%																																				
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<sup>3</sup> d16 / d35 / d50 / d84 / d95 /																																				
<sup>2</sup> % of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
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 it by the current max depth.



# **Appendix E**

## **Hydrologic Data**



<b>Table 12. Verification of Bankfull Events</b>			
<b>Browns Summit Creek Restoration Project: DMS Project No ID. 96313</b>			
<b>Date of Collection</b>	<b>Reach1 Crest Gauge (feet ABOVE bankfull)</b>	<b>Approximate Date of Occurrence (Source: on-site rain gauge)</b>	<b>Method of Data Collection</b>
<b>Year 1 Monitoring (2017)</b>			
6/7/2017	0.46	4/25/2017	Crest Gauge Measurement
10/3/2017	0.22	8/17/2017	Crest Gauge Measurement
<b>Year 2 Monitoring (2018)</b>			
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



**Table 13. Flow Gauge Success (MY2-2018)**

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

<b>Flow Gauge ID</b>	<b>Consecutive Days of Flow<sup>1</sup></b>	<b>Cumulative Days of Flow<sup>2</sup></b>
<b>R4 Gauge</b>		
BSFL1	122	248
<b>T3 Gauge</b>		
BSFL2	158	303
<b>T1 Gauge</b>		
BSFL3	319	319

**Notes:**

<sup>1</sup>Indicates the number of consecutive days within the monitoring year where flow was measured.

<sup>2</sup>Indicates the number of cumulative days within the monitoring year where flow was measured.

Flow success criteria for the Site is stated as: 30 days of consecutive baseflow for monitoring wells installed in T1 and T3 during a normal rainfall year.

\* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above **0.05** feet in depth.

Table 14. Flow Gauge Success														
Browns Summit Restoration Project: DMS Project ID No. 96313														
Flow Gauge ID	Most Consecutive Days Meeting Criteria <sup>1</sup>							Cumulative Days Meeting Criteria <sup>2</sup>						
	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)
<b>Flow Gauges (Installed March 4, 2017)</b>														
BSFL1	127.0	122.0						171.0	248.0					
BSFL2	166.0	158.0						173.0	303.0					
BSFL3	263.0	319.0						263.0	319.0					
Notes:														
<sup>1</sup> Indicates the number of consecutive days within the monitoring year where flow was measured.														
<sup>2</sup> Indicates the number of cumulative days within the monitoring year where flow was measured.														
<b>Success Criteria per Browns Summit Mitigation Plan (1/13/2016):</b> "Success criteria wil include 30 days of consecutive baseflow for monitoirng wells installed in T1 and T3 during a normal rainfall year."														
Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.														

Figure 6. Flow Gauge Graphs

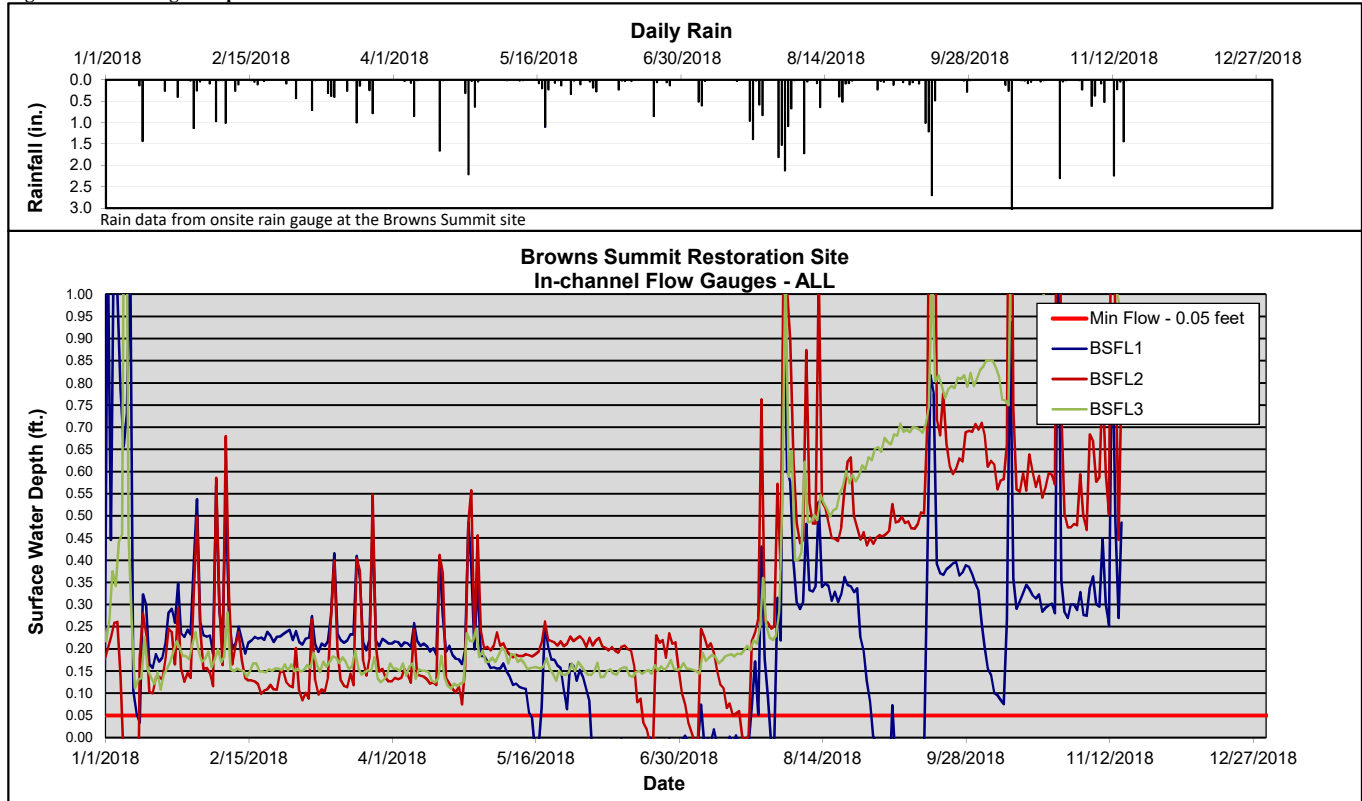
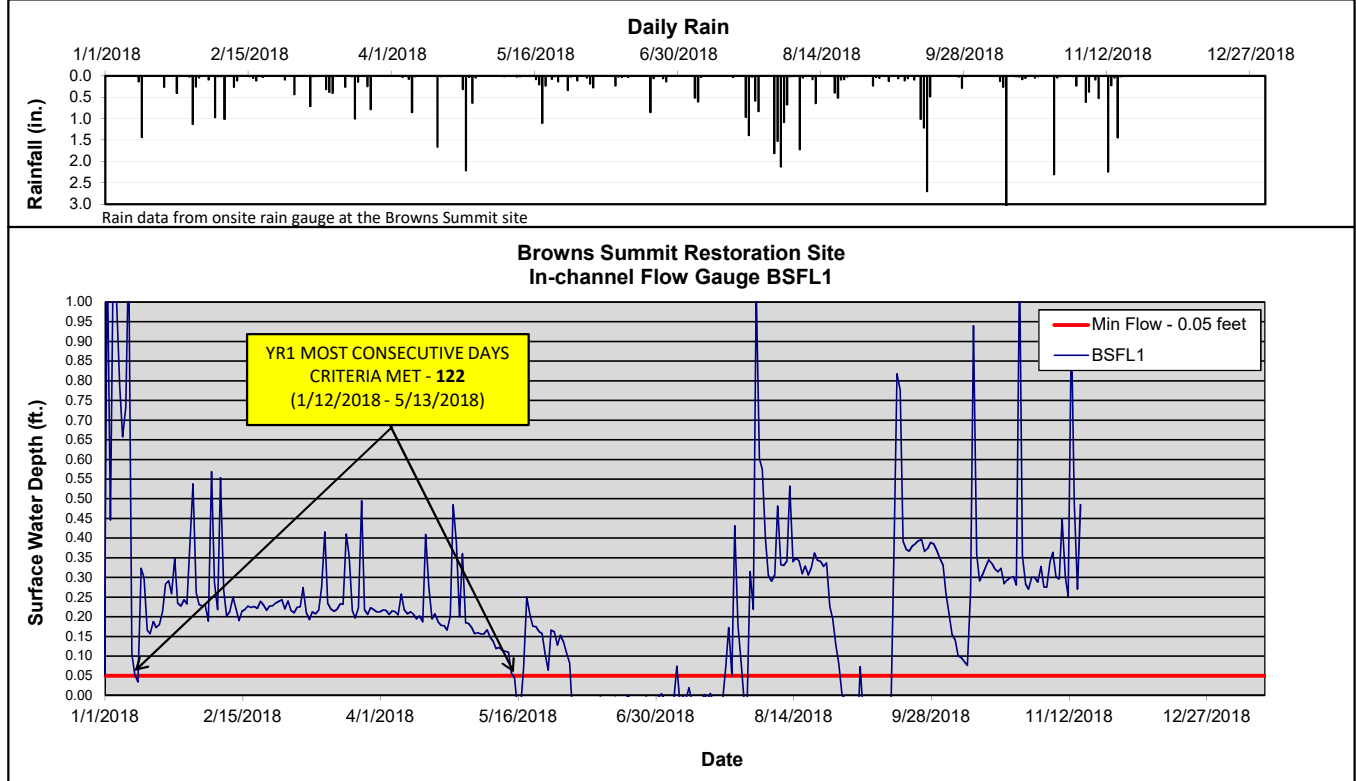


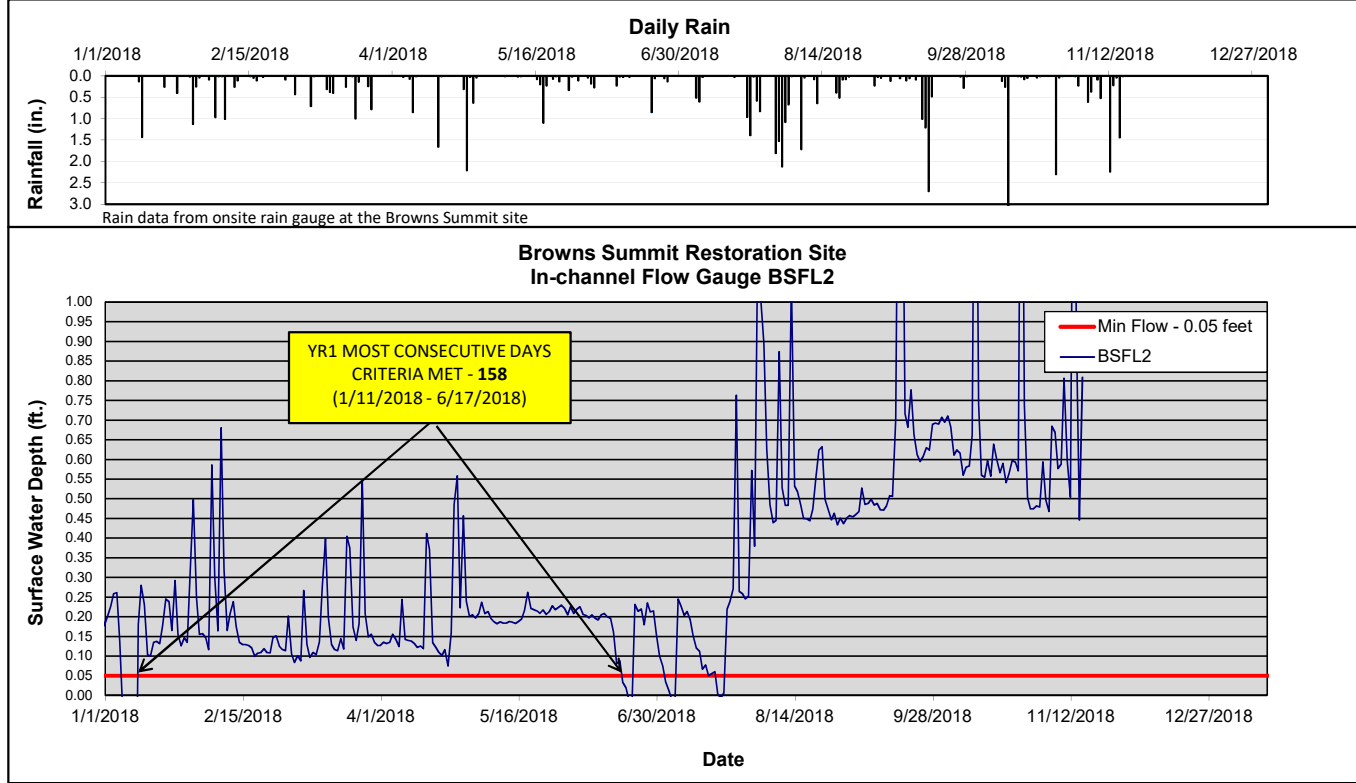
Figure 6. Flow Gauge Graphs Continued



\* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

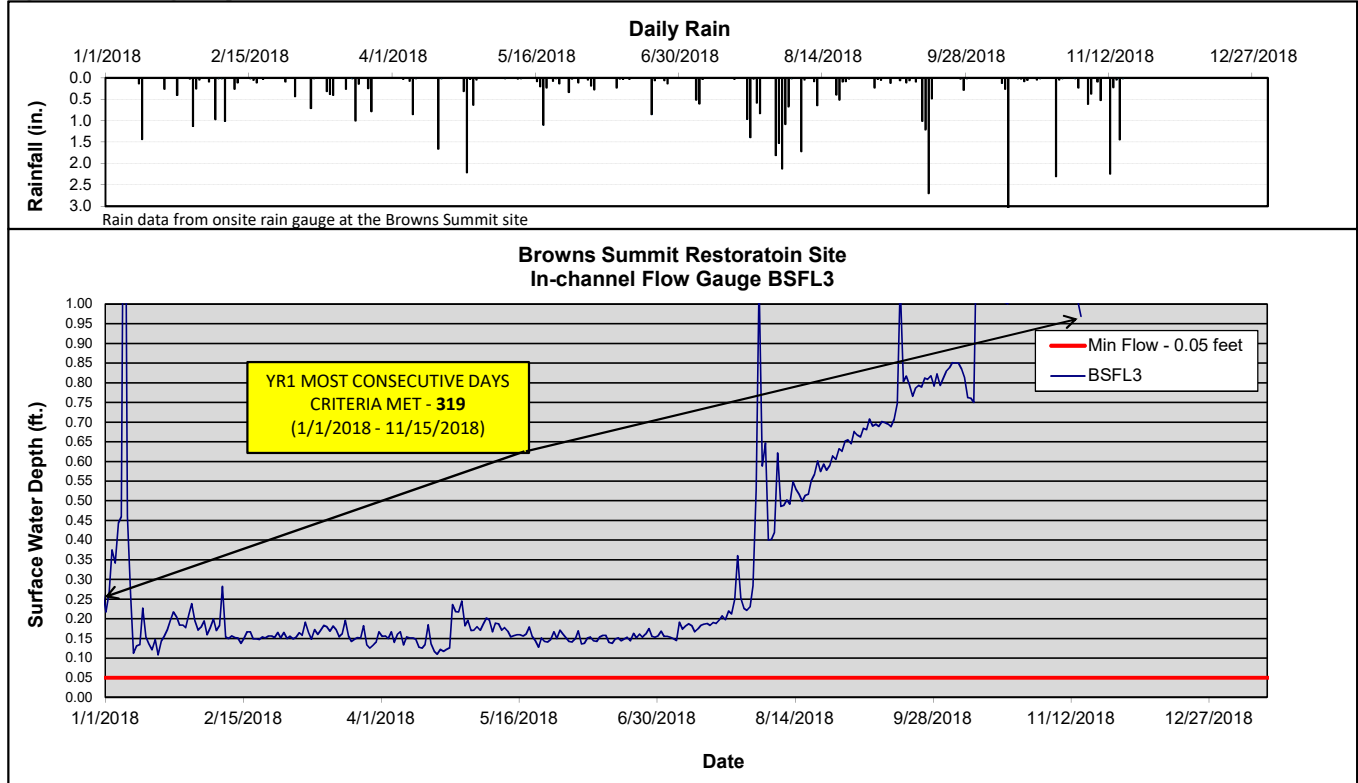


Figure 6. Flow Gauge Graphs Continued



\* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

Figure 6. Flow Gauge Graphs Continued



\* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

Figure 7. Wetland Restoration Graphs (2018) Continued

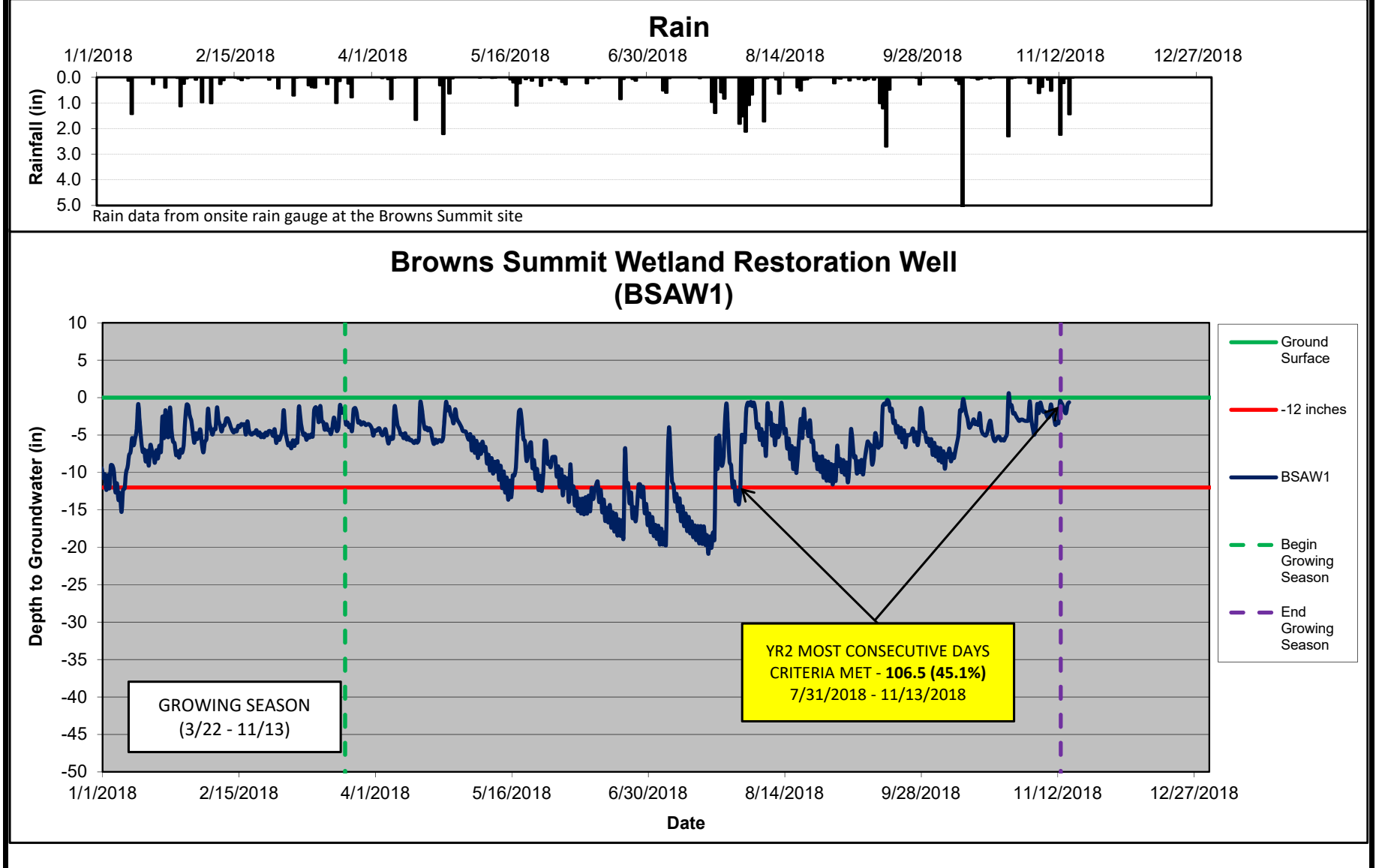
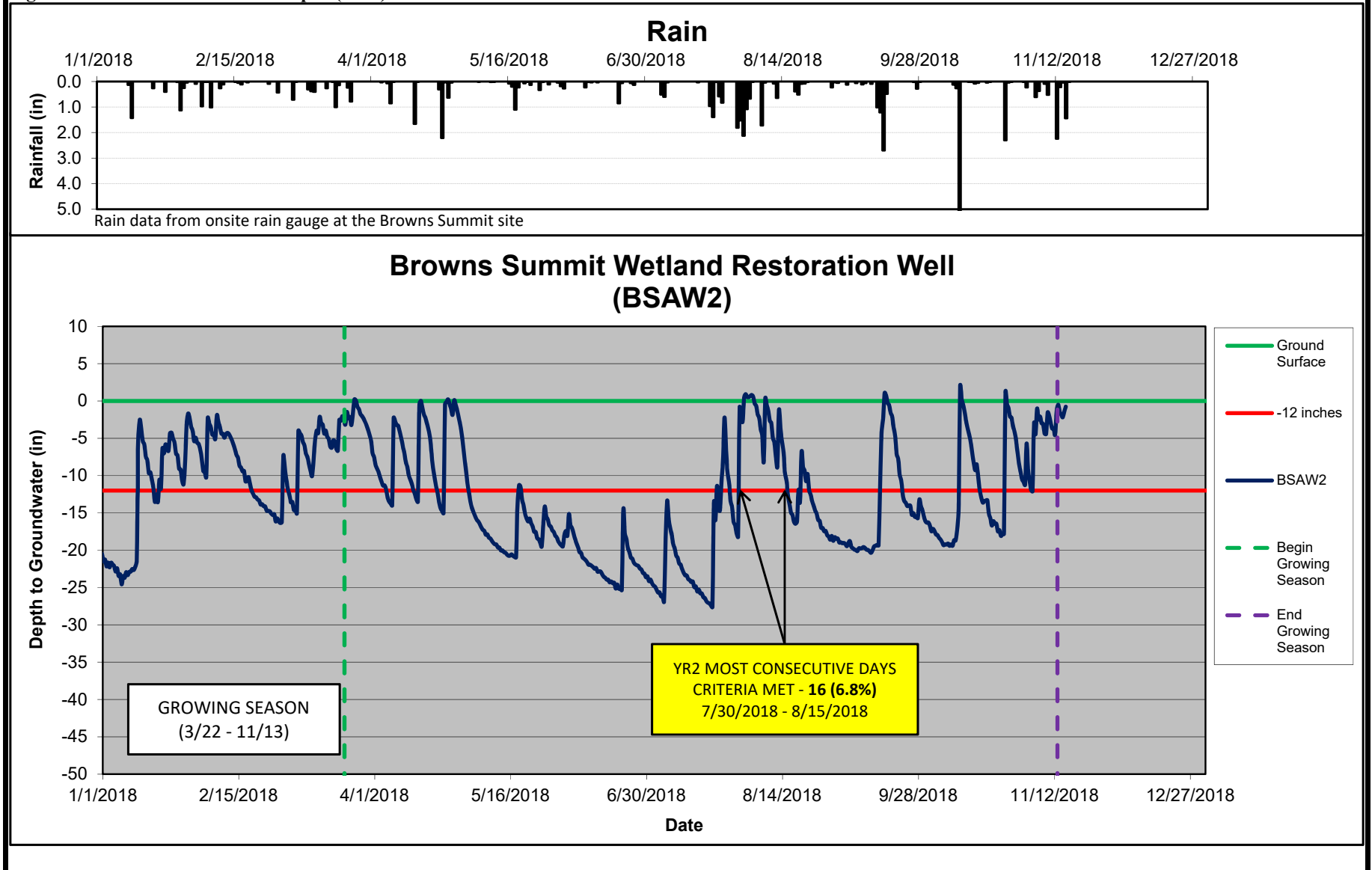


Figure 7. Wetland Restoration Graphs (2018) Continued





**Figure 7. Wetland Restoration Graphs (2018) Continued**

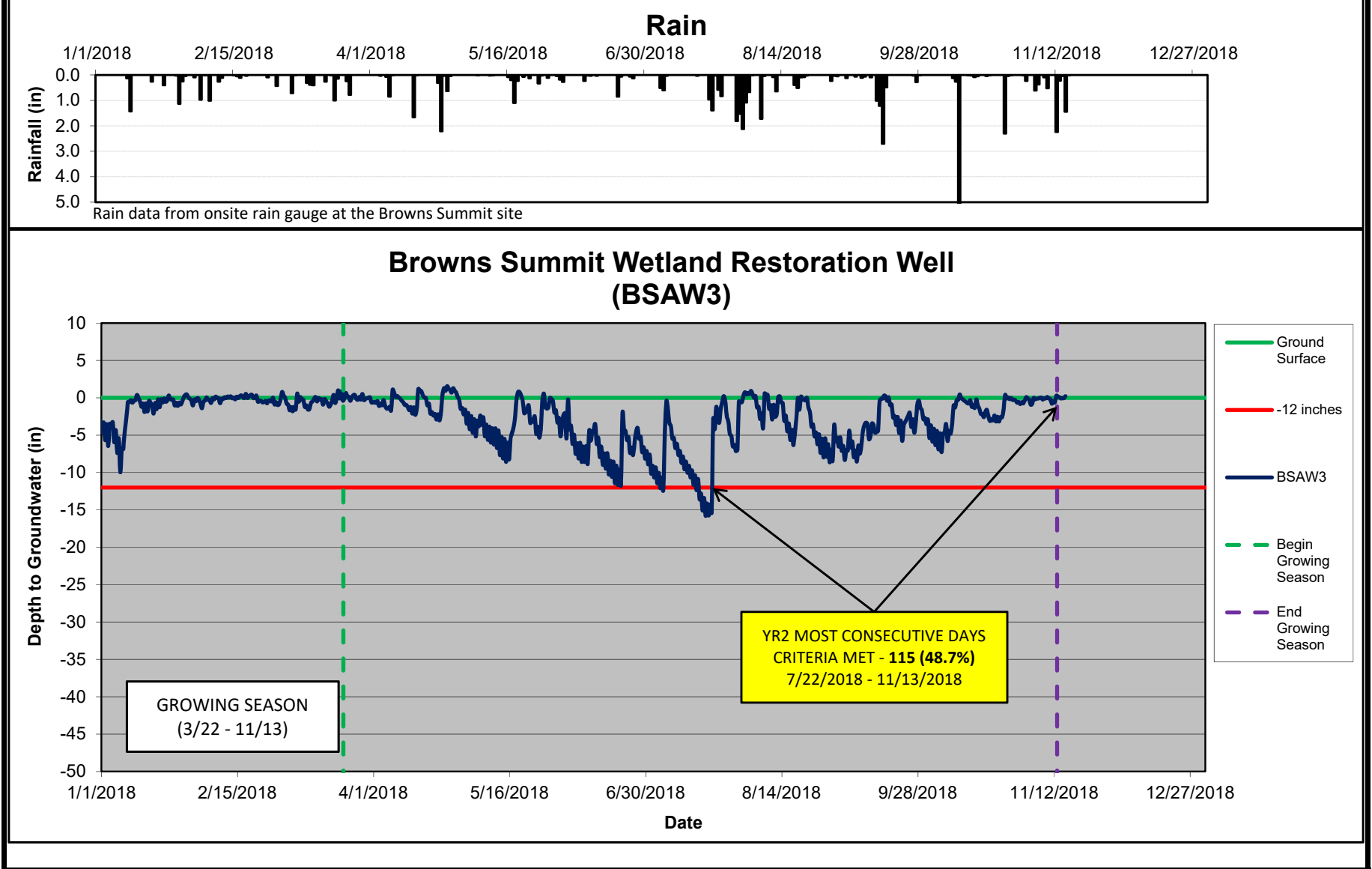


Figure 7. Wetland Restoration Graphs (2018) Continued

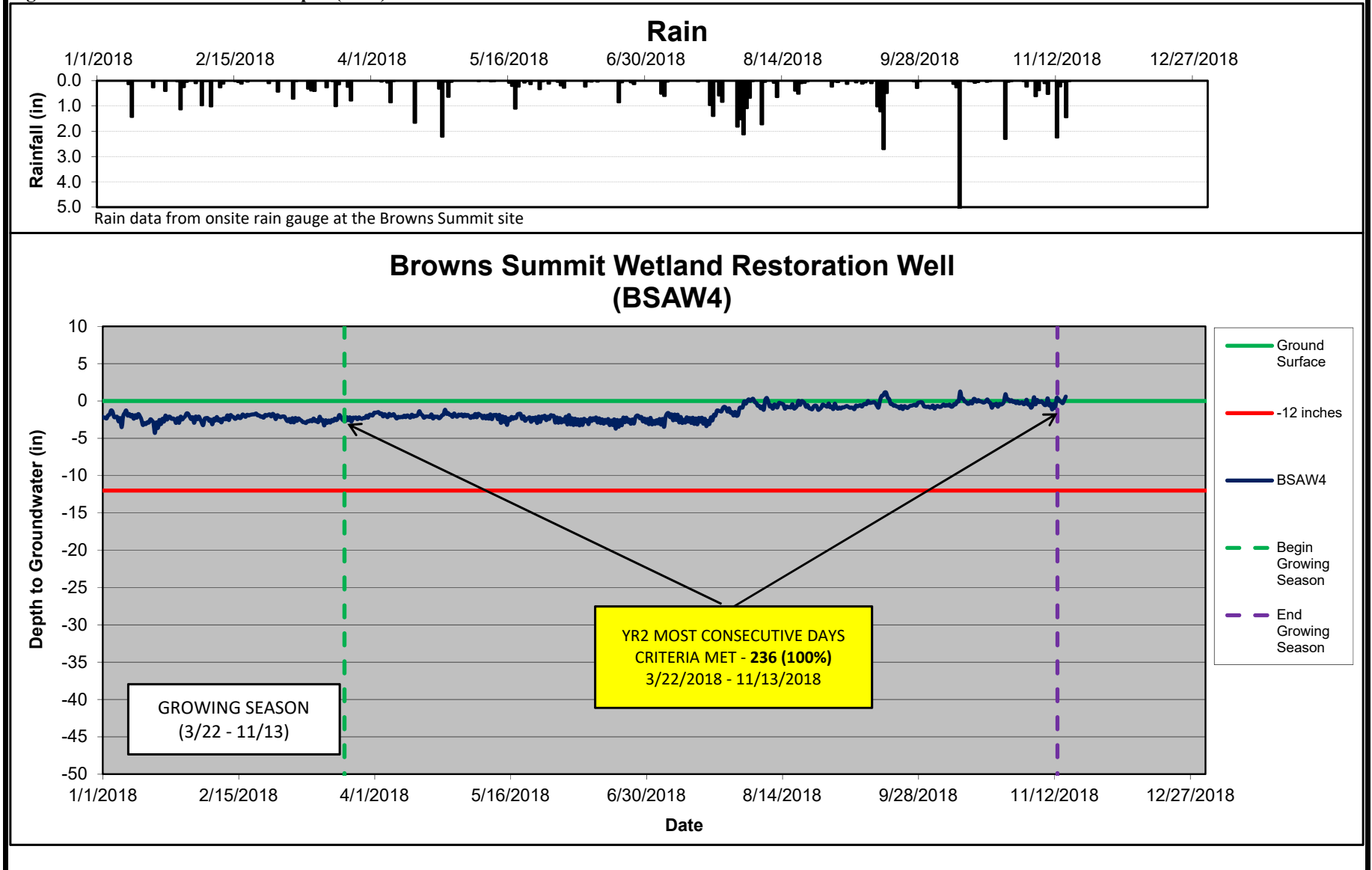


Figure 7. Wetland Restoration Graphs (2018) Continued

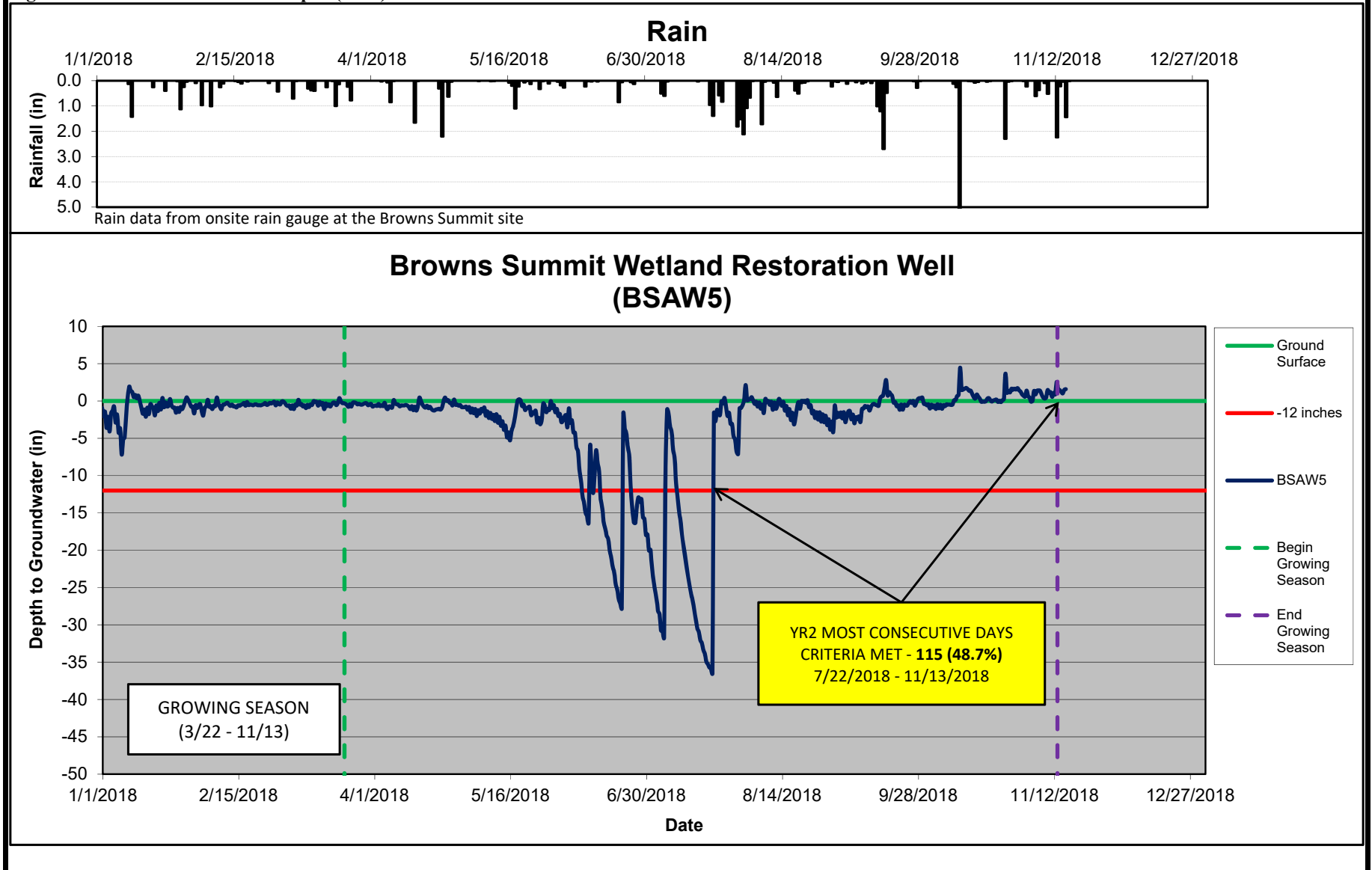


Figure 7. Wetland Restoration Graphs (2018) Continued

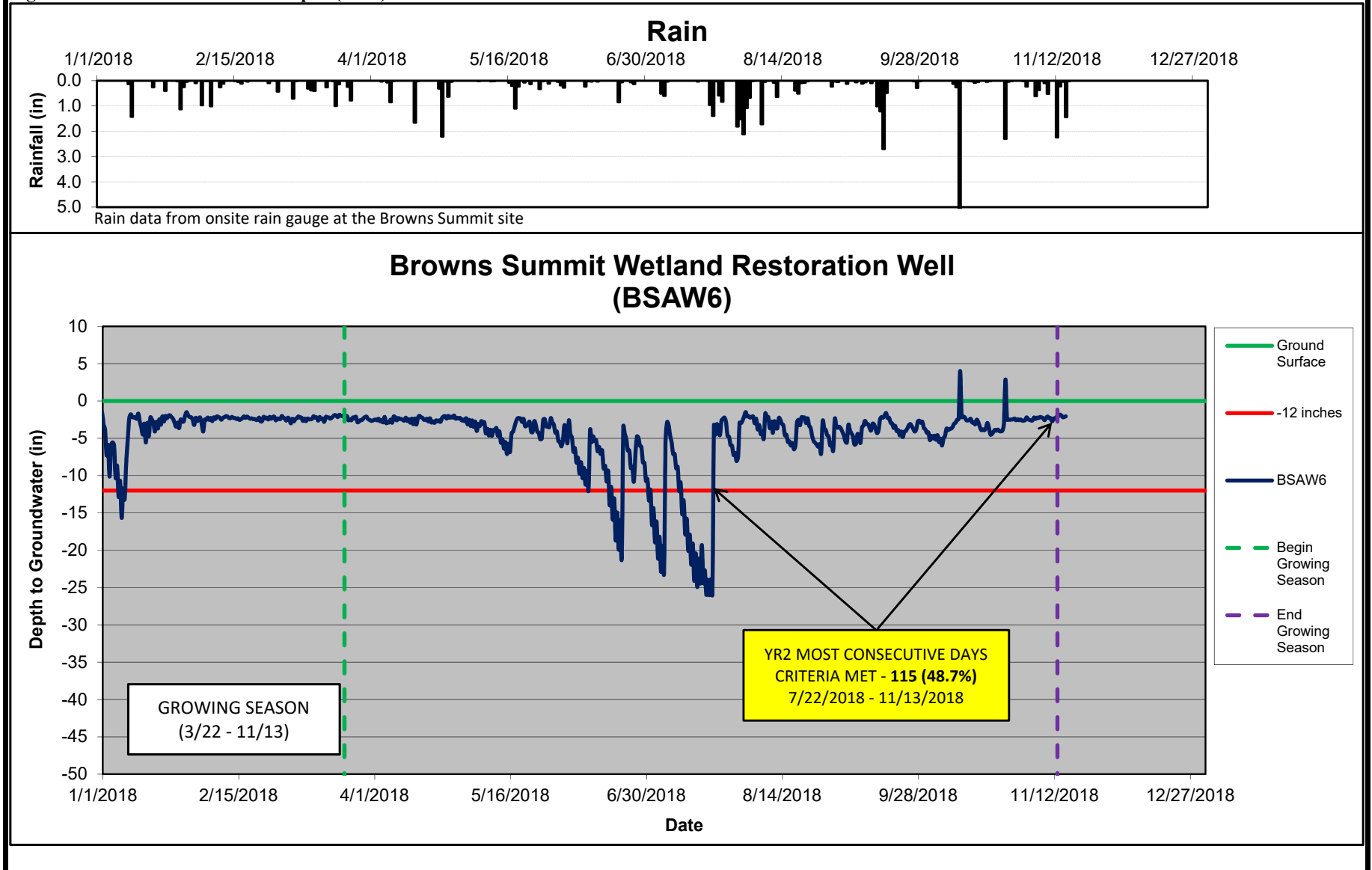




Figure 7. Wetland Restoration Graphs (2018) Continued

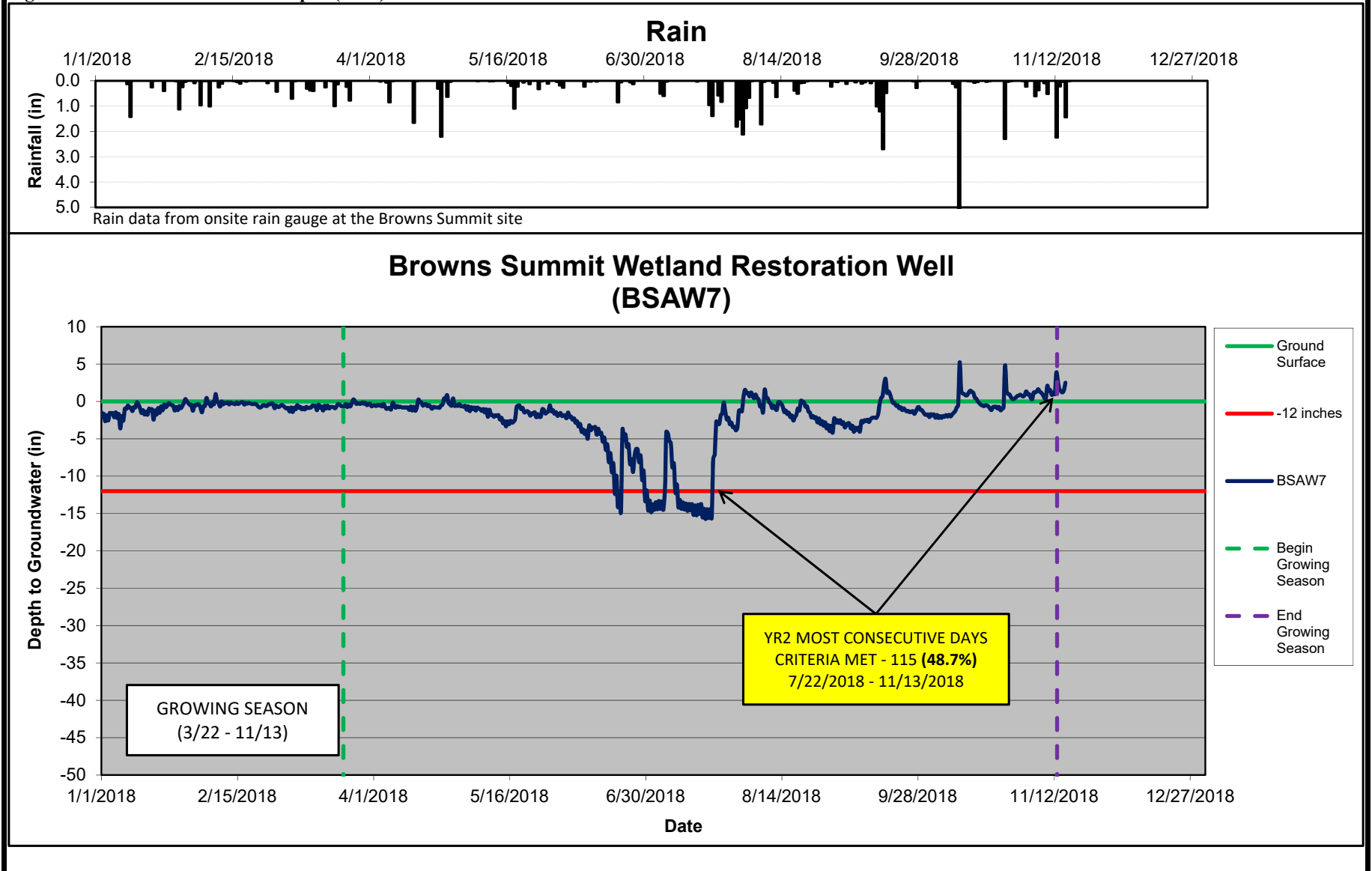
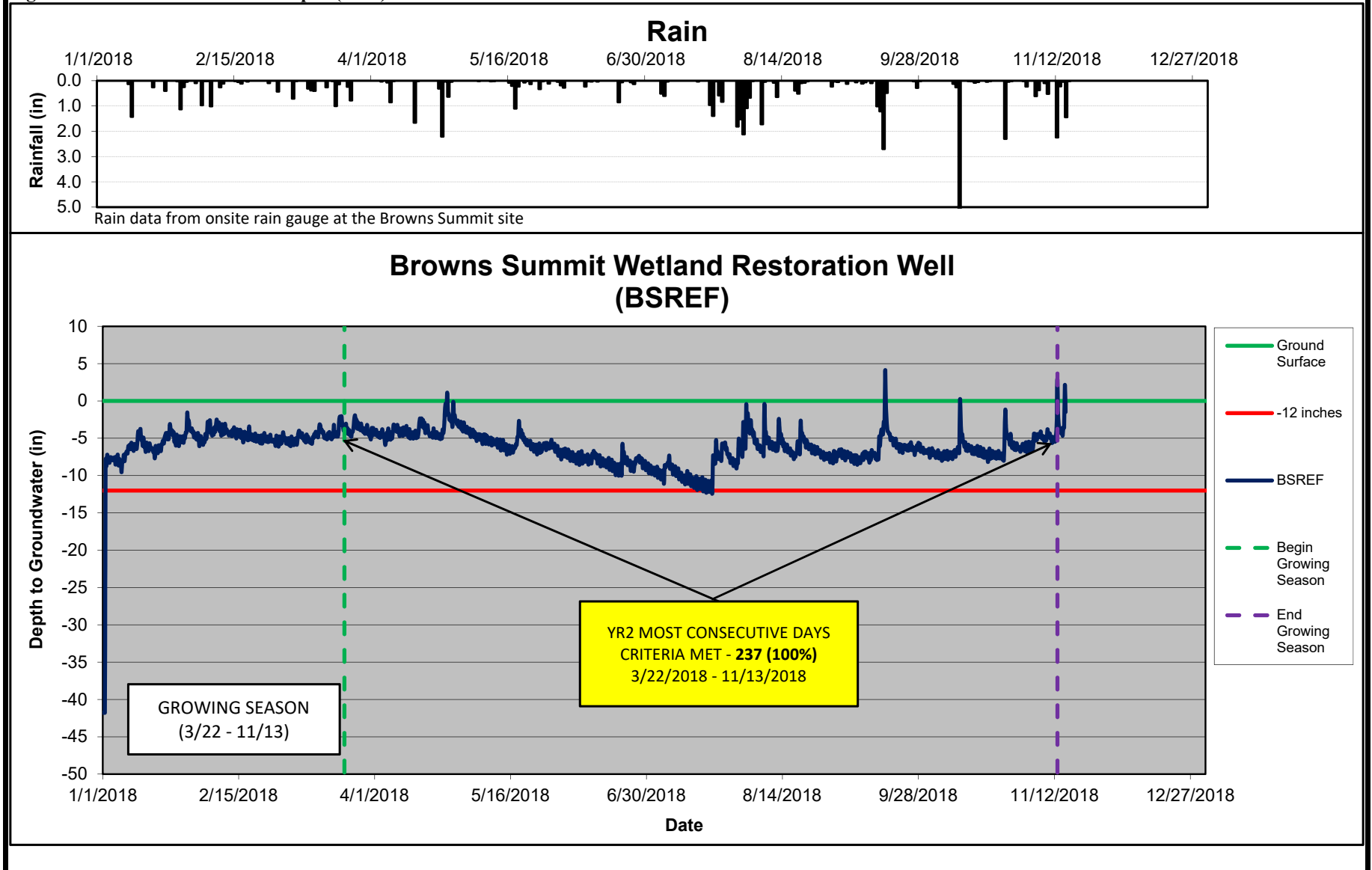


Figure 7. Wetland Restoration Graphs (2018) Continued



**Table 15. Wetland Restoration Area Success (2018)**

Wetland Restoration Area Success					
Browns Summit Restoration Project: DMS Project ID No. 95019					
Well ID	Percentage of Consecutive Days <12 inches from Ground Surface <sup>1</sup>	Most Consecutive Days Meeting Criteria <sup>2</sup>	Minimum Consecutive Days for Success	Percentage of Cumulative Days <12 inches from Ground Surface <sup>3</sup>	Cumulative Days Meeting Criteria <sup>4</sup>
<b>Groundwater Monitoring Wells (Installed March 2017)</b>					
BSAW1 (9% Criteria)	45.1	106.5	21	80.5	190.0
BSAW2 (12% Criteria)	6.8	16.0	28	38.8	91.5
BSAW3 (12% Criteria)	48.7	115.0	28	97.9	231.0
BSAW4 (12% Criteria)	100.0	236.0	28	100.0	236.0
BSAW5 (12% Criteria)	48.7	115.0	28	86.0	203.0
BSAW6 (12% Criteria)	48.7	115.0	28	91.9	217.0
BSAW7 (12% Criteria)	48.7	115.0	28	91.7	216.5

**Notes:**

<sup>1</sup>Indicates 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.

<sup>2</sup>Indicates the most consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

<sup>3</sup>Indicates the cumulative number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

<sup>4</sup>Indicates the number of instances within the monitored growing season when the water table rose to 12 inches or less from the soil surface.

According to the Site Mitigation Plan, the growing season for Guilford County is from March 22 to November 13 and is 236 days long. 12% of the growing season is 28 days and 9% of the growing season is 21 days.

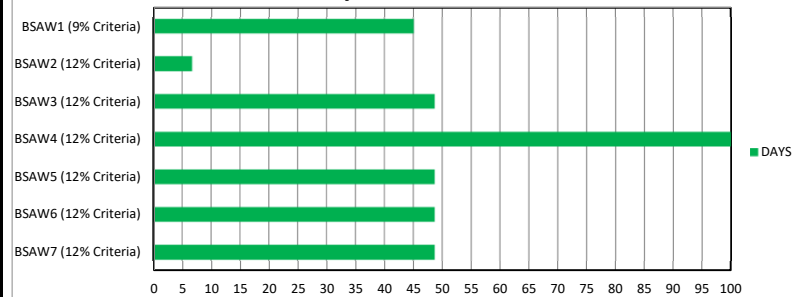
**HIGHLIGHTED** indicates wells that *did not* meet the success criteria for the most consecutive number of days within the monitored growing season with water 12 inches or less from the soil surface.

Growing season for Guilford County is 3/22 - 11/13

\*Growing season is 236 days long; 12% of 236 days = 28 days

\*Growing season is 236 days long; 9% of 236 days = 21 days

**% Consecutive Days <12" from Ground Surface**



**% Cumulative Days <12" from Ground Surface**

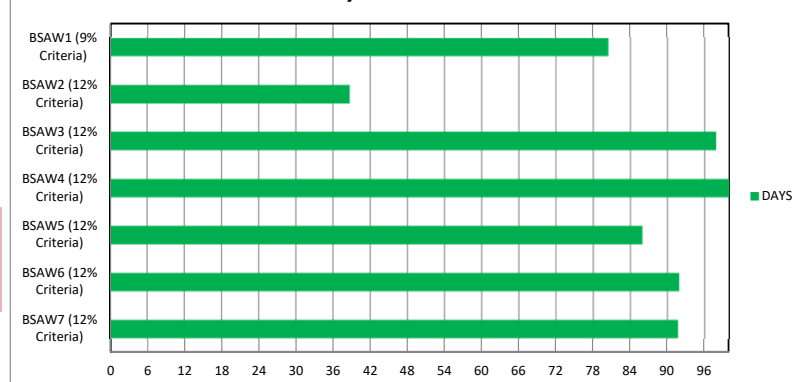


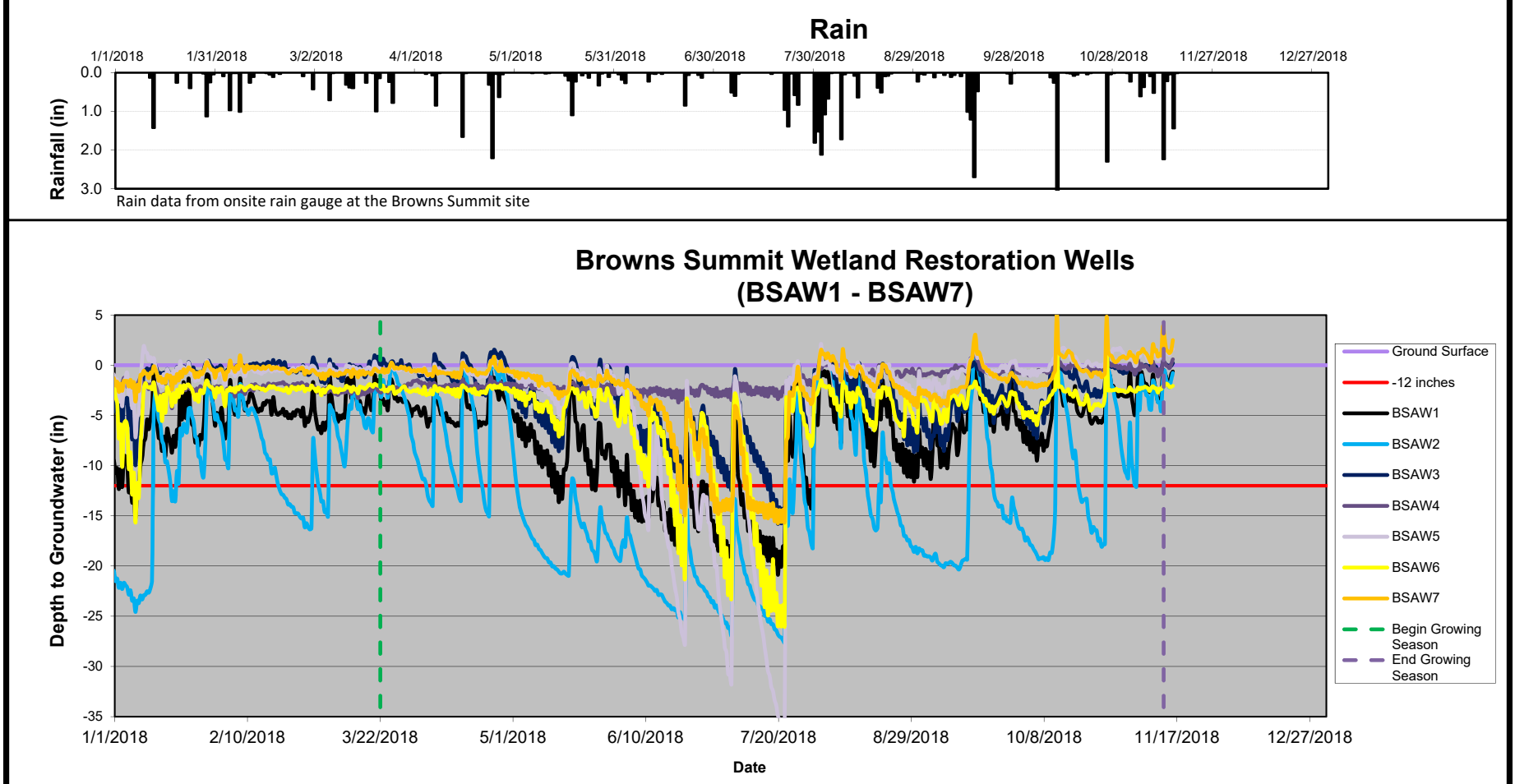
Table 16. Wetland Restoration Area Success																													
Browns Summit Restoration Project: DMS Project ID No. 96313																													
Well ID	Percentage of Consecutive Days <12 inches from Ground Surface <sup>1</sup>							Most Consecutive Days Meeting Criteria <sup>2</sup>							Percentage of Cumulative Days <12 inches from Ground Surface <sup>1</sup>							Cumulative Days Meeting Criteria <sup>3</sup>							
	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)	
<b>Type 5 (3.5:1 Ratio - Success Criteria 9 % of Growing Season)</b>																													
BSAW1	44.7	45.1					105.5	106.5						74.8	80.5							176.5	190.0						
<b>Type 4 (1:1 Ratio - Success Criteria 12% of Growing Season)</b>																													
BSAW2	3.2	6.8					7.5	16.0						13.8	38.8							32.5	91.5						
<b>Type 2 (1.5:1 Ratio - Success Criteria 12% of Growing Season)</b>																													
BSAW3	47.7	48.7					112.5	115.0						91.7	97.9							216.5	231.0						
<b>Type 3 (1.5:1 Ratio - Success Criteria 12% of Growing Season)</b>																													
BSAW4	100.0	100.0					236.0	236.0						100.0	100.0							236.0	236.0						
BSAW5	34.1	48.7					80.5	115.0						73.7	86.0							174.0	203.0						
BSAW6	46.0	48.7					108.5	115.0						89.4	91.9							211.0	217.0						
BSAW7	51.1	48.7					120.5	115.0						91.1	91.7							215.0	216.5						

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

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



Figure 7. Wetland Restoration Graphs (2018)





**Browns Summit Creek Restoration Project – Hydrology Monitoring Stations**

Photos take November 16, 2018 unless otherwise noted



Wetland Well 1 – Reach 4, Station 25+00



Wetland Well 2 – Reach 2, Station 47+00 March 9, 2017



Wetland Well 3 – Reach 1, Station 52+00



Wetland Well 4 – Reach 1, Station 55+00



Wetland Well 5 – Reach 1, Station 58+00



Wetland Well 6 – Reach 1, Station 61+00



# Browns Summit Creek Restoration Project – Hydrology Monitoring Stations

Photos take November 16, 2018 unless otherwise noted



Wetland Well 7 – Reach 1, Station 63+50



Automated Flow Gauge 1 – Reach 4



Automated Flow Gauge 2 – Reach T3



Automated Flow Gauge 3 – Reach T1



Manual Crest Gauge – Reach 1, Reading 11/16/18



Manual Crest Gauge – Reading 10/22/18



## Browns Summit Creek Restoration Project – Hydrology Monitoring Stations

Photos take November 16, 2018 unless otherwise noted



Manual Crest Gauge – Reading 3/23/18



# **Appendix F**

## **Longitudinal Profile**