Browns Summit Creek Restoration Project
Year 3 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: 3 of 7 Year of Data Collection: 2019 Year of Completed Construction (including planting): 2017 Submission Date: December 2019
Submitted To:	NCDEQ - Division of Mitigation Services 1652 Mail Service Center Raleigh, NC 27699-1652

Mitigation Project Name	**Browns Summitt**	**County**	**Guilford**	**USACE Action ID**	**2014-01642**
DMS ID	**96313**	**Date Project Instituted**	**3/6/2014**	**NCDWR Permit No**	**2014-0332**
River Basin	**Cape Fear**	**Date Prepared**	**6/26/2019**		
Cataloging Unit	**03030002**				

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	N/A
2 (Year 0 / As-Built)	**30%**	1,590.260			2017	12/11/2017	**30%**	0.750			**30%**		2017	12/11/2017
3 (Year 1 Monitoring)	**10%**	530.087			2018	4/25/2018	**10%**	0.250			**10%**		2018	4/25/2018
4 (Year 2 Monitoring)	**10%**	530.087			2019	4/26/2019	**10%**	0.250			**15%**		2019	4/26/2019
5 (Year 3 Monitoring)	**10%**				2020		**15%**				**20%**		2020	
6 (Year 4 Monitoring)	**5%**				2021		**5%**				**10%**		2021	
7 (Year 5 Monitoring)	**10%**				2022		**15%**				**15%**		2022	
8 (Year 6 Monitoring)	**5%**				2023		**5%**				**N/A**		2023	
9 (Year 7 Monitoring)	**10%**				2024		**10%**				**N/A**		2024	
Stream Bankfull Standard	**10%**	530.087				4/26/2019	**N/A**				**N/A**			
Total Credits Released to Date		**3,180.520**						**1.250**						

NOTES:

Contingencies (if any): None

Signature of Wilmington District Official Approving Credit Release

27 Sept 2019

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) Reciept of necessary DA permit authorization or written DA approval for porjects 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

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 Enhancment 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				**60%**	**60%**	**60%**		**50%**											
Released Amounts (feet / acres)				**2,341.800**	**915.000**	**571.800**		**2.220**											
Released Amounts (credits)				**2,341.800**	**610.000**	**228.720**		**1.250**											
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											
2007-1470	2007-02903	NCDOT TIP R-2635 - Knightdale Bypass		62.189															
	2005-21270	NCDOT TIP P-3414		9.943															
2013-0918	2005-21386	NCDOT TIP U-2525B / C - Greensboro Eastern Loop, Guilford County		486.468	305.000	190.600		0.443											
2013-0223	2001-21125	NCDOT TIP U-2524C / D - Greensboro Western Loop						0.001											
2012-0539	2012-00941	NCDOT TIP U-2803 - SR 1919 Improvements		222.000															
Remaining Amounts (feet / acres)				**0.000**	**0.000**	**0.000**		**0.000**											
Remaining Amounts (credits)				**0.000**	**0.000**	**0.000**		**0.000**											

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Report Prepared and Submitted by Michael Baker Engineering, Inc.

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February 11, 2020

Jeremiah Dow
NCDENR, Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652

Subject: Response to Task 9 Draft Year 3 Monitoring Report Comments for Browns Summit (DMS #96313) Cape Fear River Basin; CU 03030002; Guilford County, North Carolina Contract No. 005792

Dear Mr. Dow:

Please find enclosed our responses to the Year 3 Monitoring Report Comments dated January 17, 2020 regarding the Browns Summit Creek Mitigation Project. We have revised the Year 3 Monitoring Report document in response to this review.

1. Digital files:

a. *Features for R1-R6 and T3 within the DMS geodatabase do not match the reported feet within the asset table. Please provide DMS with design phase features for these project components that accurately capture the creditable feet reported within the asset table.*
Response: DMS has commented that they would like the GIS shapefiles for all projects and noted that for some projects the lengths were not matching with the credit/asset table. Michael Baker spoke with DMS Science and Analysis staff about this issue. We are happy to provide processed shapefiles derived from the as-built survey CAD files for all project features. That is, we have taken the final as-built CAD files, converted them into GIS, and modified them so that each feature segment is combined or split by reach or wetland type and that the attribute table is clear and has a length or acre value approximate to the credit/asset table. But due both to rounding issues in length and credit calculations, as well as to inherent program differences between CAD and GIS, some small differences may exist between the two. We have had this issue come up before on other projects. But the as-built CAD files used to create the PE/PLS signed/sealed plan sheets are the legal standard by which we determine all our credits/assets. The GIS shapefiles are secondary files we derive from the CAD to more easily make maps in our reports. So while small differences between the two (of a few feet here or there) are likely to occur on some reaches, particularly longer ones and ones with breaks such as for crossings, Michael Baker has not regarded this as of particular importance. The CAD files are what have generated all official feature measurements. DMS accepted that small differences would be acceptable for the creditable features but did want the processed as-built shapefiles for each project and Michael Baker has agreed to provide them. Also, Reach 6 and T4 are calculated from valley length and not stream centerline. This explains the discrepancy between the Table 1 stream lengths and the GIS attribute table.

b. *Vegetation folder does not contain a CVS file. Please provide.*
Response: The CVS file has been added to the E-Submission files per DMS request. Please note, the X/Y portion of the CVS entry tool has always been used for internal purposes at Michael Baker. X/Y has been

used to identify the plant plot and number (e.g. 4-15 means plot 4, plant 15) and not for internal plant location, as CVS does not otherwise provide an easy way to carry over clear plant ID numbering from year to year. Thus, the plot dimensions recorded in CVS are correct for each veg plot, though we understand that may have confusing by looking at our X/Y entry data. Michael Baker spoke with DMS Science and Analysis staff about this issue. They have allowed our existing projects to continue with the X/Y entry tool for our own purposes but for future projects we will enter the X/Y grid plot coordinates as the CVS program originally intended. We will also provide DMS with a copy of our plot maps showing individual plant locations within each plot. And to be clear, the CVS field protocol is being followed throughout our projects with the sole exception of this X/Y grid plot entry tool. All planted stems are identified and marked (and mapped internally) at the as-built stage and tracked and assessed throughout the monitoring phase.

c. *Missing raw data for in stream flow and wetland gauge figures, and also missing raw precipitation data.*
Response: Raw data for stream flow, wetland gauges and Precipitation has been added to the e-submission files per DMS request.

2. Appendix A:
a. *Figure 2 – Please label "Wetland Mitigation Types" in the map legend as Re-establishment or Rehabilitation.*
Response: Figure 2 "Restoration Summary" has been revised to add wetland mitigation types to the map legend.

b. *Table 1 – Please take credit calculations out to 3 digits.*
Response: Table 1 has been revised to show credit calculations out to 3 digits per DMS request.

3. *Appendix B: a. Figures 4.1 & 4.2 – See comment 4a. Please add wetland mitigation type (re-establishment or rehabilitation) to the map legend. Also, please indicate graphically, or with a label on the map, that BSAW2 did not meet success criteria. It would also be helpful to differentiate the veg problem areas between invasive and low stem density areas with differing colors or labels.*
Response: Figures 4.1 and 4.2 have been revised to show wetland mitigation type, a note detailing that BSAW2 did not meet success criteria and veg problem areas broken down to distinguish the two different types.

4. *Appendix C: a. Table 8 – Please remove the color coding key at the bottom of the table since it is not used.*
Response: Table 8 has been revised by removing the color coding key from the bottom of the table.

5. *Appendix D: a. Please verify BHRs. For example: On XS-1 it appears that there was some slight aggradation but the BHR is 1.1 in the report when a <1 BHR seems more appropriate. The bankfull line adjusted vertically based on MY1 cross sectional area (green line) being above the actual identified MY3 low top of bank (red line) would typically imply aggradation (see x-section 4). Also, BHRs of below one (1) can be reported as <1.*
Response: Figure 5 has been revised with updated BHR numbers and bankfull lines per DMS request. The numerical data has been maintained to simplify formulas utilized to create Table 11a and 11b (e.g. "<1" does not allow us to run formulas to pick up min, mean, med, max and standard deviation).

6. Appendix E:
a. *Table 15 – We recommend a footnote that brings attention to the BSAW2 malfunction on 7/3/19.*
Response: A footnote has been added to Table 15 stating "BSAW2 malfunctioned (7/3/2019) but has been replaced on (10/30/2019) to capture well data during monitoring year 4".

b. Table 16 – *Same as comment "a" above.*
Response: A footnote has been added to Table 15 stating "BSAW2 malfunctioned (7/3/2019) but has been replaced on (10/30/2019) to capture well data during monitoring year 4".

One hard copy and one pdf copy along with updated digital files (via FTP) are being provided. If you have any questions concerning the Year 3 Monitoring Report, please contact me at 919-481-5703 or via email at Katie.McKeithan@mbakerintl.com.

Sincerely,

Kathleen McKeithan

Kathleen McKeithan, PE, CPESC, CPSWQ, CFM

Michael Baker Engineering, Inc.

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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 3 monitoring survey data of seventeen cross-sections indicates that the Site is geomorphically stable and performing at 100 percent for all the parameters evaluated. Cross-sections (located in Appendix D) only show minor fluctuations in their geometry as compared to previous monitoring years and 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 did not provide the level of detail/quality that is normally provided. Therefore, the As-built data is shown in a light grey and should not be utilized for comparison. Moving forward the cross-section survey will be to the appropriate level of detail as is reflected in the MY1 cross-sections. The data collected are within the lateral/vertical stability and in-stream structure performance categories. One Stream Problem Area (SPA) was discovered at station 47+50 during Year 3 monitoring. High water in the channel has scoured around the side and into the pool of the log weir causing undermining and bank instability, this SPA is indicated on the CCPV in Appendix B and will continue to be monitored and repaired in Year 4. It was also noted in MY2 report 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 was contracted for these fencing issues and repairs have been made

During Year 3 monitoring, all plots meet the planted acreage performance categories (Appendix B and C). Due to hard soils and poor nutrition two areas around the BMP on reach 6 have been reported as low vigor. These trees are not as healthy or tall as they should be at MY3. This area will be evaluated for replanting and soil amendments over the coming winter (2019) to spring (2020). The average density of total planted stems, based on data collected from the fourteen monitoring plots following Year 3 monitoring in October of 2019, was 517 stems per acre not including volunteer species. Thus, the Year 3 vegetation data demonstrate that the Site is meeting the minimum success interim criteria of 320 trees per acre by the end of Year 3. Additionally, there is one area within the conservation easement of invasive species vegetation observed during the Year 3 monitoring. This area totaled to 0.19 acres and has been shown on the CCPV Appendix B. Invasive species treatments were conducted in both the spring and fall of MY3 to control the VPAs that were reported in MY2. Additional treatments are planned for April, 2020.

Year 3 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 140 days of consecutive flow in R4, while flow gauge BSFL2 documented 198 days of consecutive flow in T3, and BSFL3 documented 289 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 3 monitoring, the R1 crest gauge documented two post-construction bankfull event from January 2019 and second event in June of 2019. The site had already meet the bankfull flow requirement of two bankfull events within two separate monitoring years in previous monitoring years (MY1 and MY2).

Seven wells were installed in the wetland restoration areas. Six of the seven are preforming successfully. One well did not meet success (BSAW2). However, the well shows hydrology coming to within twelve inches of the ground surface relatively consistently and holding for longer periods than previous years. Unfortunately, BSAW 2 failed to log after July 3, 2019 due to equipment malfunction which did lose critical data. If 2019 data followed 2018 data with an increased in saturation from July to November, the well may have passed. The well has since then been replaced (October 30, 2019) to continue logging for the following monitoring years. 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 3 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 3 vegetation plot and cross-section data were collected in October 2019 and the visual site assessment was collected in November 2019. 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 incase future comparisons are required. The longitudinal profile overlay was provided in previous reports.

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. The crest gauge readings are presented in Appendix E. Thus, the site has meet the bankfull flow requirements of two bankfull events within two separate years.

Year 3 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. 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 3 were taken along each Reach in November 2019 and are provided in Appendix B. Photographs of each Vegetation Plot taken in October 2019 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 3 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.

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.

Year 3 vegetation assessment including planted species and invasive species 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. The wetland gauges are depicted on the CCPV figures (Figure 2) found in Appendix B. Installation and monitoring of the groundwater stations have been conducted in accordance with the USACE standard methods.

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.

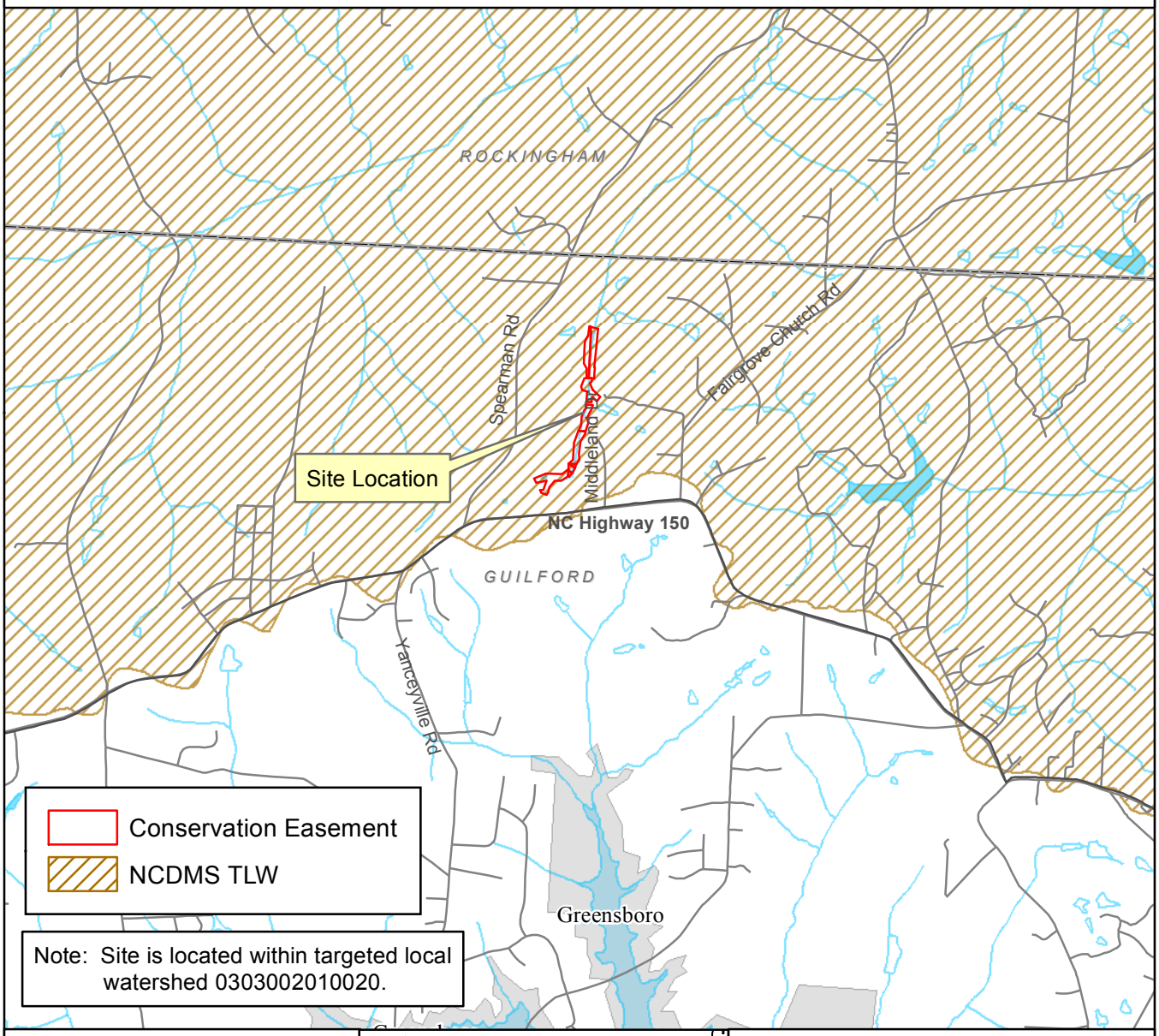
Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina, third Approximation. North Carolina Natural Heritage Program. Division of Parks and Recreation, NCDEQ. Raleigh, NC.

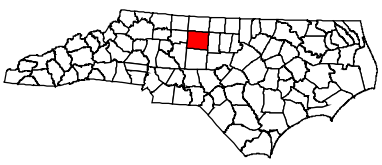
U.S. Army Corps of Engineers. 2003. Stream Mitigation Guidelines, April 2003, U.S. Army Corps of Engineers (USACE). Wilmington District.

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.





Guilford County

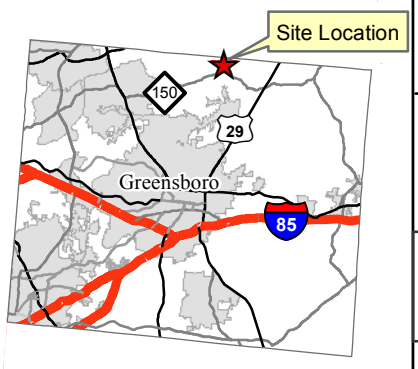


Figure 1
Project Vicinity Map
Browns Summit (DMS# 96313)

NCDEQ - Division of Mitigation Services

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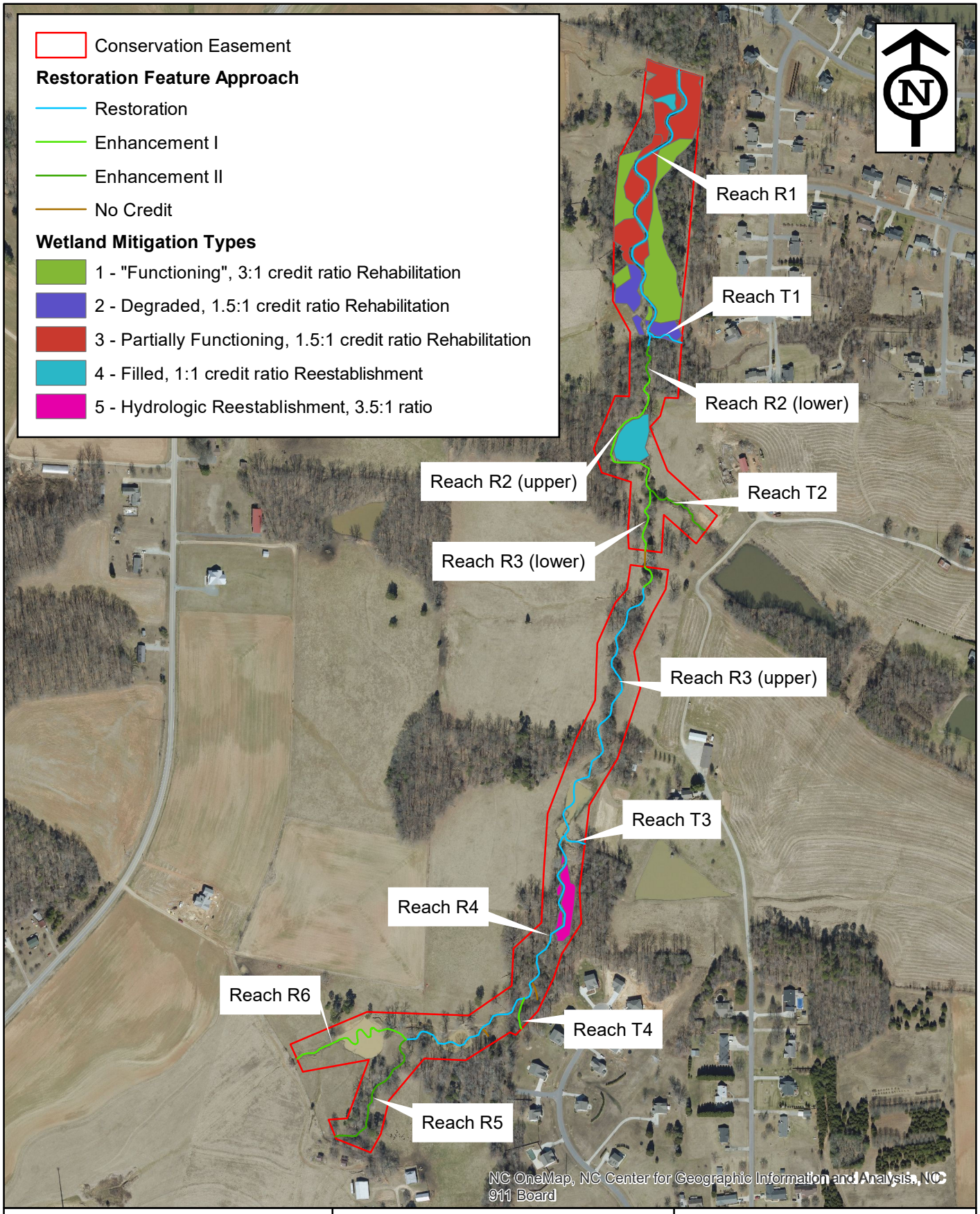
0.5 0 0.5 Miles



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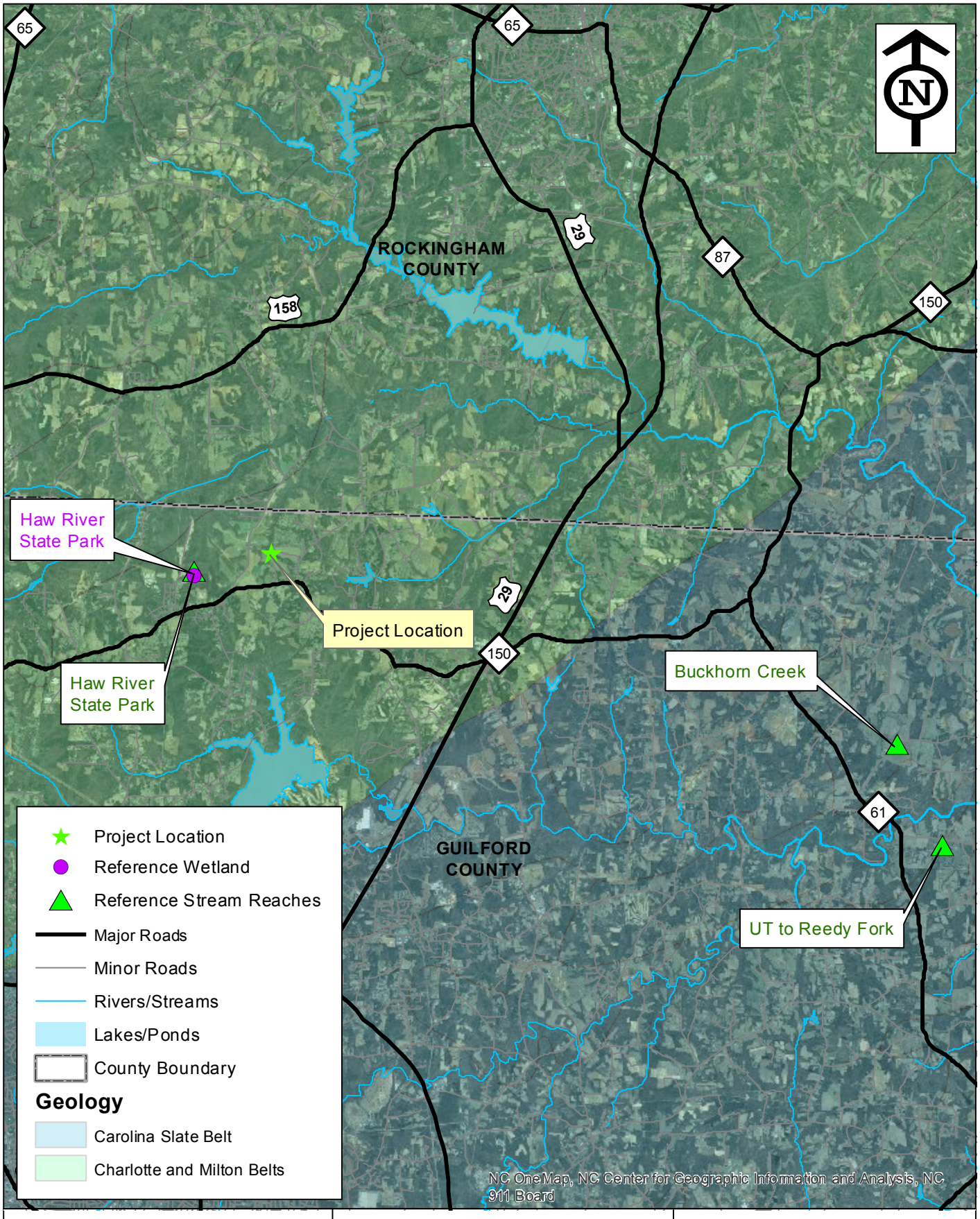
0 250 500 1,000

Feet

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



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2 1 0 2
Miles

Figure 3
Reference Stream Locations Map
Browns Summit Site

Table 1. Project Components and Mitigation Credits

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

Mitigation Credits

	Stream	Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorus Nutrient Offset	
Type	R, E1, EII	R	E						
Totals	5,301 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) Credits	Mitigation Restoration Footage or Acreage (LF/AC)**	Asbuilt Footage or Acreage (LF/AC)	Mitigation Ratio
R1	51+00.00 - 63+89.87	1,217	Restoration	1,290.000	1,290	1,290	1:1
R2 (downstream section)	49+65.28 - 51+00.00	167	Enhancement II	53.600	134	135	2.5:1
R2 (upstream section)	43+48.17 - 49+65.28	701	Enhancement I	409.333	614	617	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	234.667	352	352	1.5:1
R3 (upstream section)	28+31.92 - 39+35.73	1,224	Restoration	1,102.000	1,102	1,104	1:1
R4	15+35.86 - 28+31.92	1,350	Restoration	1,296.000	1,296	1,296	1:1
R5	10+00 - 15+35.86	536	Enhancement II	214.400	536	536	2.5:1
R6	10+00 - 15+19.39	536	Enhancement I/BMP	294.667	442 LF (valley length)	442 (valley length)	1.5:1
T1	10+00 - 11+44.99	121	Restoration	145.000	145	145	1:1
T2	10+00 - 12+85.21	283	Enhancement II	113.200	283	285	2.5:1
T3	10+04.88 - 10+92.84	83	Restoration	70.000	70	88	1:1
T4	10+30.18 - 11+49.36	47	Enhancement I/BMP	78.000	117 LF (valley length)	119	1.5:1
Wetland Area - Type 1	See Figures	1.57	Rehabilitation	0.510	1.53	1.53	3:1
Wetland Area - Type 2	See Figures	0.49	Rehabilitation	0.287	0.43	0.43	1.5:1
Wetland Area - Type 3	See Figures	2.06	Rehabilitation	1.167	1.75	1.75	1.5:1
Wetland Area - Type 4	See Figures	0.49	Re-establishment	0.460	0.46	0.46	1:1
Wetland Area - Type 5	See Figures	0.27	Re-establishment	0.077	0.27	0.27	3.5:1

*Wetland existing acrage and restoration acrages 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

Table 2. Project Activity and Reporting History			
Browns Summit Creek Restoration Project: DMS Project No ID. 96313			
Activity or Report	**Scheduled Completion**	**Data Collection Complete**	**Actual Completion or Delivery**
Mitigation Plan Prepared	not specified in proposal	Summer 2015	May 1, 2015
Mitigation Plan Amended	not specified in proposal	Summer 2015	September 17, 2015
Mitigation Plan Approved	December 4, 2014	Winter 2015	January 0, 1900
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 1, 2018
Year 3 Monitoring	December 1, 2019	November 2019	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.			

Table 3. Project Contacts Browns Summit Creek Restoration Project: DMS Project No ID. 96313	
Designer	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 Contact: 0
Construction Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Stephen Carroll, Tel. 919-428-8368
Planting Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Stephen Carroll, Tel. 919-428-8368
Seeding Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Stephen Carroll, Tel. 919-428-8368
Seed Mix Sources	Green Resources, Rodney Montgomery 336-215-3458
Nursery Stock Suppliers	Dykes and Son, 931-668-8833 Mellow Marsh Farm, 919-742-1200 ArborGen, 843-528-3204
Live Stakes Suppliers	Foggy Mountain Nursery, 336-384-5323
Monitoring Performers	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 Contact:
Stream Monitoring Point of Contact	Katie McKeithan, Tel. 919-481-5703
Vegetation Monitoring Point of Contact	Katie McKeithan, Tel. 919-481-5703
Surveyers	Kee Mapping and Surveying, 828-575-9021

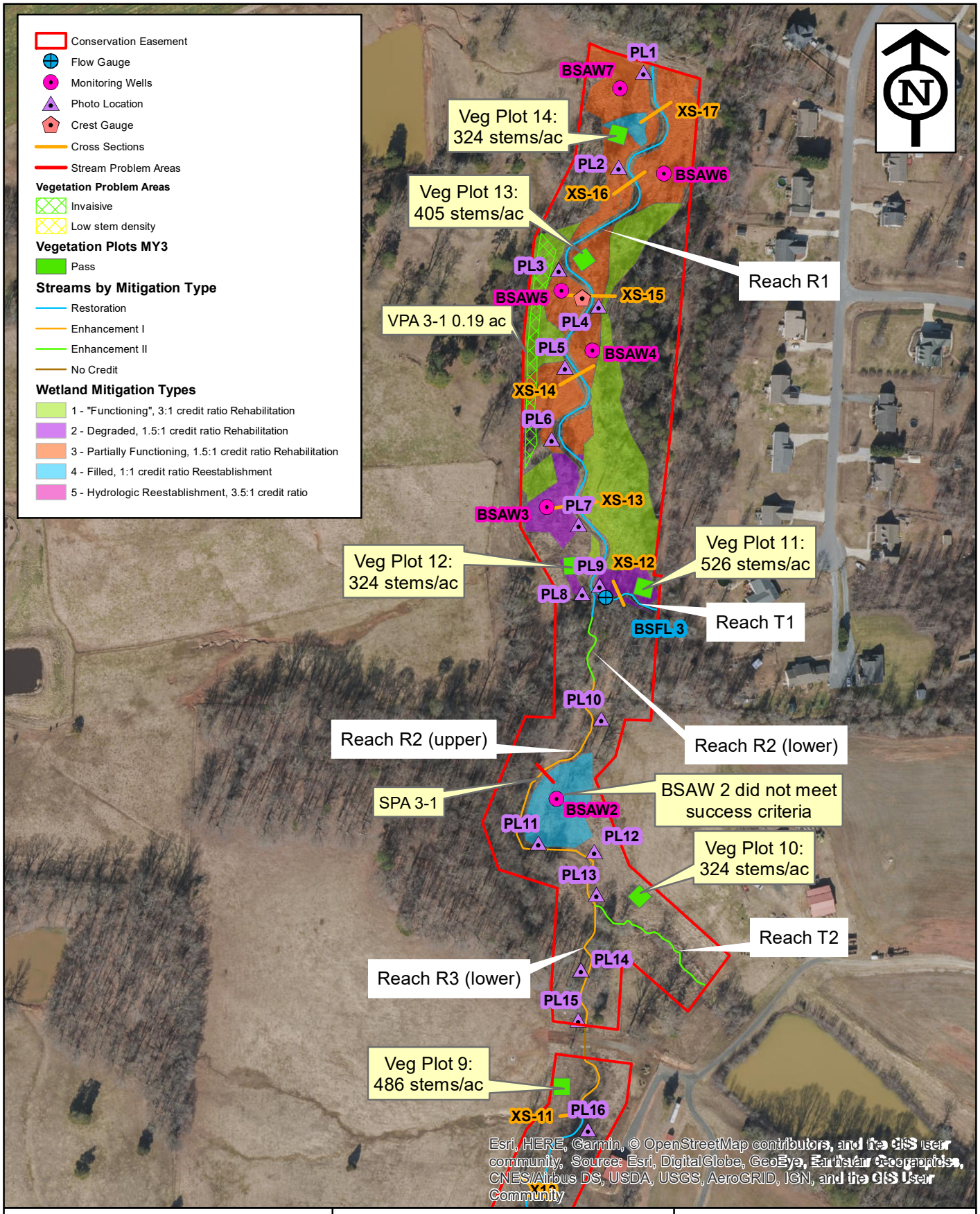
Table 4. Project Attributes
Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Project Information					
Project Name	Browns Summit Creek Restoration Project				
County	Guilford				
Project Area (acres)	20.2				
Project Coordinates (latitude and longitude)	36.237 N, -79.749 W				
Project Watershed Summary Information					
Physiographic Province	Piedmont				
River Basin	Cape Fear				
USGS Hydrologic Unit 8-digit and 14-digit	03030002 / 03030002010020				
NCDWR Sub-basin	3/6/2001				
Project Drainage Area (acres)	438				
Project Drainage Area Percent Impervious	1%				
CGIA Land Use Classification	2.01.01.01, 2.03.01, 2.99.01, 3.02 / Forest (53%) Agriculture (39%) Impervious Cover (1%) Unclassified (7%)				
Reach Summary Information					
Parameters	**Reach R1**	**Reach R2**	**Reach R3**	**Reach R4**	**Reach R5**
Length of Reach (linear feet)	1,290	748	1,454	1,296	536
Valley Classification (Rosgen)	VII	VII	VII	VII	VII
Drainage Area (acres)	438	299	242	138/95	24
NCDWR Stream Identification Score	35.5	35.5	41.5	41.5/25	28.5
NCDWR Water Quality Classification	C; NSW				
Morphological Description (Rosgen stream type)	E	Bc incised	Bc incised	Gc	Bc
Evolutionary Trend	Incised E→Gc→F	Bc→G→F	Bc→G→F	G→F	Bc→G
Underlying Mapped Soils	CnA	CnA	CnA, PpE2	CnA, CkC	CkC
Drainage Class	Somewhat Poorly Drained	Somewhat Poorly Drained	Somewhat Poorly Drained and Well Drained	Somewhat Poorly Drained and Well Drained	Well Drained
Soil Hydric Status	Hydric	Hydric	Partially Hydric	Partially Hydric	Upland
Average Channel Slope (ft/ft)	0.0069	0.0068	0.0095	0.017	0.023
FEMA Classification	N/A	N/A	N/A	N/A	N/A
Native Vegetation Community	Piedmont Headwater Stream Forest				
Percent Composition of Exotic/Invasive Vegetation	25%	15%	5%	<5%	<5%
Parameters	**Reach R6**	**Reach T1**	**Reach T2**	**Reach T3**	**Reach T4**
Length of Reach (linear feet)	442	145	283	70	117
Valley Classification (Rosgen)	VII	VII	VII	VII	VII
Drainage Area (acres)	61	55	47	41	10
NCDWR Stream Identification Score	18	26.75	27.25	19	-
NCDWR Water Quality Classification	C; NSW				
Morphological Description (Rosgen stream type)	Bc incised	E incised	F	E incised	-
Evolutionary Trend	Bc→G→F	E→G→F	Bc→G→F	E→G→F	
Underlying Mapped Soils	CkC	CnA	CnA, PpE2	CnA	CkC
Drainage Class	Well Drained	Somewhat Poorly Drained	Somewhat Poorly Drained and Well Drained	Somewhat Poorly Drained	Well Drained
Soil Hydric Status	Upland	Hydric	Partially Hydric	Hydric	Upland
Average Channel Slope (ft/ft)	0.014	0.024	0.022	0.02	-
FEMA Classification	N/A	N/A	N/A	N/A	N/A
Native Vegetation Community	Piedmont Headwater Stream Forest				
Percent Composition of Exotic/Invasive Vegetation	5%	10%	10%	10%	10%

Regulatory Considerations			
Regulation	**Applicable**	**Resolved**	**Supporting Documentation**
Waters of the United States – Section 404	Yes	Yes	Categorical Exclusion (Appendix B)
Waters of the United States – Section 401	Yes	Yes	Categorical Exclusion (Appendix B)
Endangered Species Act	No	N/A	Categorical Exclusion (Appendix B)
Historic Preservation Act	No	N/A	Categorical Exclusion (Appendix B)
Coastal Area Management Act (CAMA)	No	N/A	Categorical Exclusion (Appendix B)
FEMA Floodplain Compliance	No	N/A	Categorical Exclusion (Appendix B)
Essential Fisheries Habitat	No	N/A	Categorical Exclusion (Appendix B)

Appendix B

Visual Assessment Data



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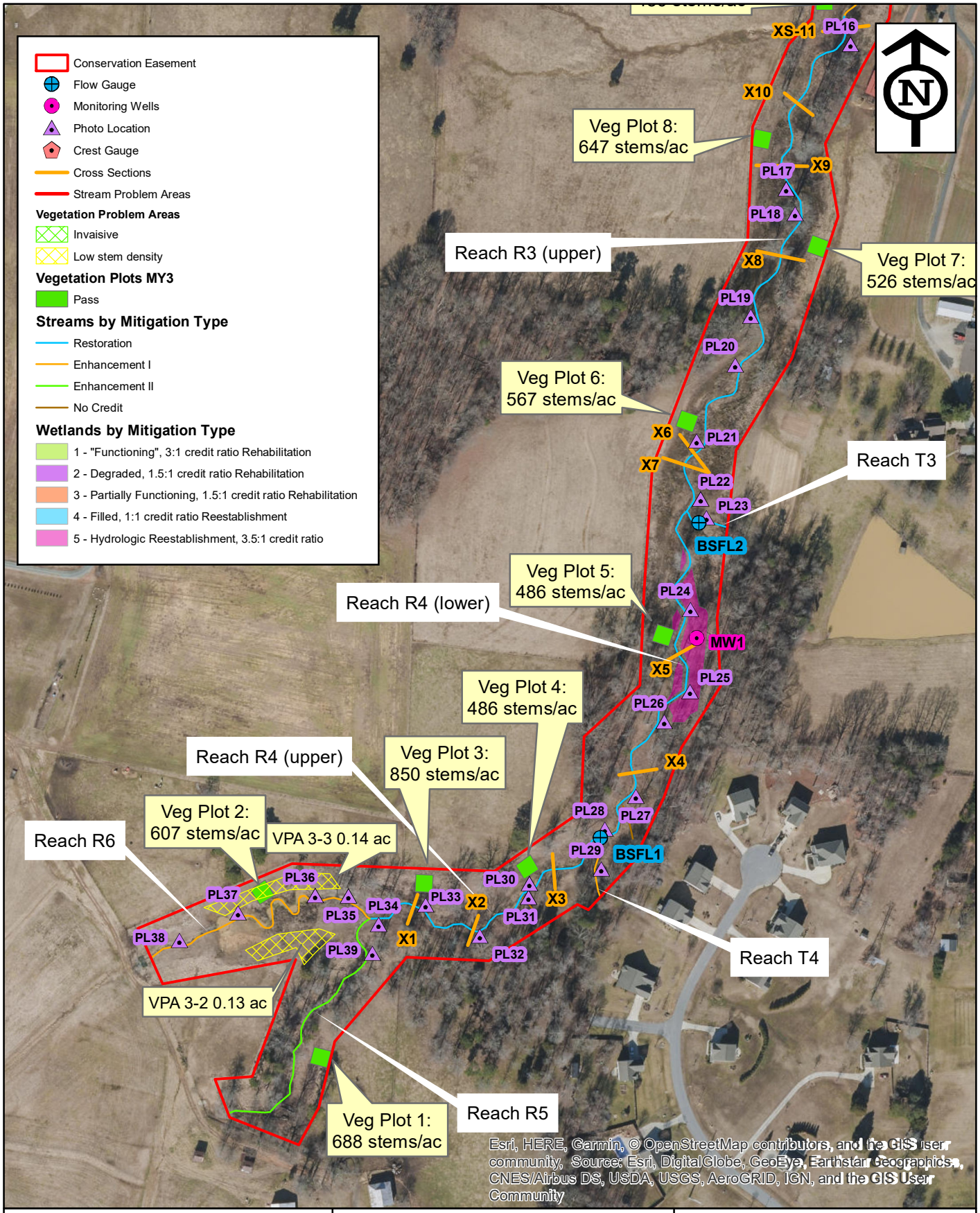
Feet

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



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Feet

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 Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
				Totals	0	0	100%			
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	20	20			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	11	11			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	20	20			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does 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 ≥ 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 Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
				Totals	0	0	100%			
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	0	0			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	0	0			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	0	0			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does 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 ≥ 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 Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
				Totals	0	0	100%			
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	5	5			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	2	3			67%			
	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 ≥ 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 Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody	Footage with Stabilizing Woody	Adjusted % for Stabilizing Woody
1. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
				Totals	0	0	100%			
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	7	7			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	7	7			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	7	7			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 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 Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody	Footage with Stabilizing Woody	Adjusted % for Stabilizing Woody
1. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
				Totals	0	0	100%			
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	15	15			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	10	10			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	15	15			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	15	15			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 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 Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody	Footage with Stabilizing Woody	Adjusted % for Stabilizing Woody
1. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
				Totals	0	0	100%			
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	14	14			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	4	4			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	14	14			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	14	14			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	14	14			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment
Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach ID R5
Assessed Length 536

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

Table 5 continued. Visual Stream Morphology Stability Assessment
Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach ID R6
Assessed Length 442

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
				Totals	0	0	100%			
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	9	9			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	9	9			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	9	9			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does 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 ≥ 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 Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
				Totals	0	0	100%			
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	6	6			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	6			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	6	6			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	6	6			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment
Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach ID T2
Assessed Length 283

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

Table 5 continued. Visual Stream Morphology Stability Assessment
Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Reach ID T3
Assessed Length 70

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
				Totals	0	0	100%			
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 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 Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
				Totals	0	0	100%			
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	8	8			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	8	8			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	8	8			100%			

Table 6. Vegetation Conditions Assessment
Browns Summit Creek Restoration Project: DMS Project No ID. 96313

Planted Acreage[1] 20.24

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	N/A	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	N/A	0	0.00	0.0%
			Total	0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Yellow Hatching	2	0.27	1.3%
			Cumulative Total	2	0.27	1.3%

Easement Acreage[2] 20.24

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Areas or points (if too small to render as polygons at map scale).	1000 SF	Yellow Hatching	1	0.19	0.9%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	N/A	0	0.00	0.0%

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 spcies 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 likley 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 extreme risk/threat level for mapping as points where isolated specimens are found, particularly ealry in a

Browns Summit Creek Restoration Project – Longitudinal Stream Photo Stations
Photos take October 17, 2019 (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 17, 2019 (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 17, 2019 (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 17, 2019 (All photos are viewing upstream)

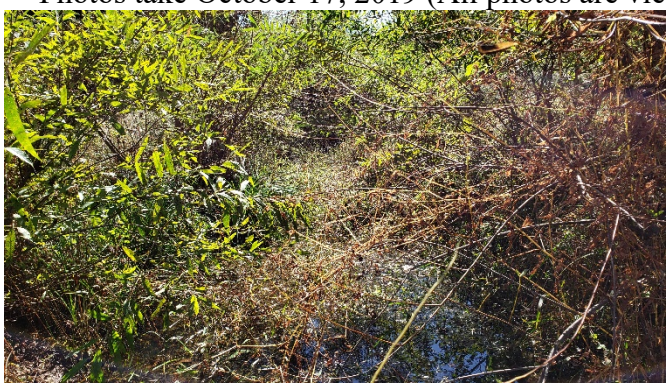


Photo Point 19 – Station 33+00, Reach 3

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 17, 2019 (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 17, 2019 (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 17, 2019 (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 taken October 17, 2019

Vegetation Plot 1

Vegetation Plot 2

Vegetation Plot 3

Vegetation Plot 4

Vegetation Plot 5

Vegetation Plot 6

Browns Summit Creek Restoration Project – Vegetation Plot Photo Stations
Photos taken October 17, 2019

Vegetation Plot 7

Vegetation Plot 8

Vegetation Plot 9

Vegetation Plot 10

Vegetation Plot 11

Vegetation Plot 12

Browns Summit Creek Restoration Project – Vegetation Plot Photo Stations
Photos taken October 17, 2019

Vegetation Plot 13

Vegetation Plot 14

Browns Summit Creek Restoration Project – Problem Areas Photos

SPA 3-1 – Reach 2, Station 47+50 (March 12, 2019)

SPA 3-1 – Reach 2, Station 47+50 (March 12, 2019)

VPA 3-1 – Reach 1, Left Bank (October 17, 2019)

VPA 3-1 – Reach 1, Left Bank (October 17, 2019)

VPA 3-2 – Reach 5, Left Bank (July 3, 2019)

VPA 3-3 – Reach 5, Right Bank (July 3, 2019)

Appendix C

Vegetation Plot Data

Table 7. CVS Density Per Plot
#REF!

CVS Project Code 140048. Project Name: Browns Summit

		Current Plot Data (MY3 2019)																							
		140048-01-0001			140048-01-0002			140048-01-0003			140048-01-0004			140048-01-0005			140048-01-0006			140048-01-0007			140048-01-0008		
Scientific Name	Common Name	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T
Acer negundo	Boxelder maple	1		1	2		2	3		3				1		1							2		2
Betula nigra	River Birch	4		4	4		4	3		3				4		4	3		3	1		1	1		1
Callicarpa americana	American Beautyberry																								
Carpinus caroliniana	American hornbeam				1		1	3		3	2		2	1		1				1		1	1		1
Celtis laevigata	Sugarberry																								
Cornus ammomum	Silky Dogwood																								
Diospyros virginiana	American Persimmon	1		1				1		1							1		1						
Euonymus americanus	Strawberry-bush							1		1															
Fraxinus pennsylvanica	Green Ash	4		4	2		2	2		2	4		4	3		3	2		2	4		4	3		3
Hamamelis virginiana	Witch-hazel																						2		2
Ilex opaca	American Holly													1		1							2		2
Ilex verticillata	Winterberry							1		1															
Liriodendron tulipifera	Tulip	1	3	4	2		2							1	1	2	1		1	1	10	11			
Nyssa sylvatica	Black Gum							1		1	1		1										1		1
Platanus occidentalis	Sycamore	2		2	3		3	4	1	5							5		5	2	3	5	2		2
Quercus alba	White Oak																								
Quercus lyrata	Overcup Oak	1		1													2		2	1		1	1		1
Quercus michauxii	Swamp Chestnut Oak	2		2				2		2				1		1				2		2			
Quercus phellos	Willow Oak	1		1																					
Ulmus americana	American Elm										2		2							1		1			
Viburnum dentatum	Arrow-wood										2		2										1		1
Viburnum nudum	Possumhaw				1		1				1		1												
Stem count		17		20	15		15	21	1	22	12		12	12	1	13	14		14	13	13	26	16		16
size (ares)		1			1			1			1			1			1			1			1		
size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
Species count		9	1	9	9	0	9	11	1	11	9	0	9	10	1	10	6	0	6	9	2	9	11	0	11
Stems per ACRE		688	40	809	607	0	607	850	40	890	486	0	486	486	40	526	567	0	567	526	81	1052	647	0	647

		Current Plot Data (MY3 2019)																		Annual Means								
		140048-01-0009			140048-01-0010			140048-01-0011			140048-01-0012			140048-01-0013			140048-01-0014			MY3 (2019)			MY2 (2018)			MY1 (2017)		
Scientific Name	Common Name	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T	Planted	Vol	T
Acer negundo	Boxelder maple	1		1				1		1	1		1				1		1	13		13	12		12	15		15
Betula nigra	River Birch				1		1	1		1	1		1	1		1	2		2	26		26	29		29	33		33
Callicarpa americana	American Beautyberry																										1	1
Carpinus caroliniana	American hornbeam	1		1	1		1							3		3				14		14	14		14	23		23
Celtis laevigata	Sugarberry							2		2	1		1							3		3	3		3	4		4
Cornus ammomum	Silky Dogwood																	1	1		1	1		1	1			
Diospyros virginiana	American Persimmon										1		1							4		4	5	1	6	5		5
Euonymus americanus	Strawberry-bush				1		1							1		1				3		3	3		3	6		6
Fraxinus pennsylvanica	Green Ash	1		1	1		1	1		1	1		1				1	1	2	29	1	30	32		32	36	1	37
Hamamelis virginiana	Witch-hazel	2		2							1		1							5		5	6		6	8		8
Ilex opaca	American Holly							1		1	1		1							5		5	5		5	10		10
Ilex verticillata	Winterberry																			1		1	1		1	2		2
Liriodendron tulipifera	Tulip																2		2	8	14	22	7	1	8	12		12
Nyssa sylvatica	Black Gum							2		2							2		2	7		7	7		7	10		10
Platanus occidentalis	Sycamore	4		4	1		1													23	4	27	23	1	24	29		29
Quercus alba	White Oak				1		1													1		1	1		1	1		1
Quercus lyrata	Overcup Oak							2		2				4		4				11		11	12		12	15		15
Quercus michauxii	Swamp Chestnut Oak							1		1										8		8	10		10	13		13
Quercus phellos	Willow Oak																			1		1	1		1	1		1
Ulmus americana	American Elm	2		2	1		1													6		6	6		6	7		7
Viburnum dentatum	Arrow-wood							1		1				1		1				5		5	5		5	8		8
Viburnum nudum	Possumhaw	1		1	1		1	1		1	1		1							6		6	5		5	6		6
Stem count		12		12	8		8	13		13	8	1	8	10		10	8	2	10	179	20	199	187	4	191	244	2	246
size (ares)		1			1			1			1			1			1			14			14			14		
size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02			0.35			0.35			0.35		
Species count		12	0	12	9	0	9	11	0	11	11	0	12	7	0	7	9	2	9	20	4	20	20	4	21	20	2	21
Stems per ACRE		486	0	486	324	0	324	526	0	526	324	0	324	405	0	405	324	81	405	517.4195	517.4195	575.2317	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 3

Vegetation Plot Summary Information

Plot #	Riparian Buffer Stems[1]	Stream/ Wetland Stems[2]	Live Stakes	Invasives	Volunteers[3]	Total[4]	Unknown Growth Form
1	n/a	17	0	0	3	**20**	0
2	n/a	15	0	0	0	**15**	0
3	n/a	21	0	0	1	**22**	0
4	n/a	12	0	0	0	**12**	0
5	n/a	12	0	0	1	**13**	0
6	n/a	14	0	0	0	**14**	0
7	n/a	13	0	0	13	**26**	0
8	n/a	16	0	0	0	**16**	0
9	n/a	12	0	0	0	**12**	0
10	n/a	8	0	0	0	**8**	0
11	n/a	13	0	0	0	**13**	0
12	n/a	8	0	0	0	**8**	0
13	n/a	10	0	0	0	**10**	0
14	n/a	8	0	0	2	**10**	0

Wetland/Stream Vegetation Totals

(per acre)

Plot #	Stream/ Wetland Stems[2]	Volunteers[3]	Total[4]	Success Criteria Met?
1	17	121	809	Yes
2	15	0	607	Yes
3	21	40	890	Yes
4	12	0	486	Yes
5	12	40	526	Yes
6	14	0	567	Yes
7	13	526	1052	Yes
8	16	0	647	Yes
9	12	0	486	Yes
10	8	0	324	Yes, barely
11	13	0	526	Yes
12	8	0	324	Yes, barely
13	10	0	405	Yes
14	8	81	405	Yes
Project Avg	**0**	**58**	**575**	Yes

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

Table 9. Stem Count for Each Species Arranged by Plot

#REF!

Botanical Name	Common Name	Browns Summit Creek Vegetation Plots													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Acer negundo	Boxelder maple	1	2	3		1			2	1		1	1		1
Betula nigra	River Birch	4	4	3		4	3	1	1		1	1	1	1	2
Callicarpa americana	American Beautyberry														
Carpinus caroliniana	American hornbeam		1	3	2	1		1	1	1	1			3	
Celtis laevigata	Sugarberry											2	1		
Cornus amomum	Silky dogwood														
Diospyros virginiana	American Persimmon	1		1			1						1		
Euonymus americanus	Strawberry-bush			1							1			1	
Fraxinus pennsylvanica	Green Ash	4	2	2	4	3	2	4	3	1	1	1	1		1
Hamamelis virginiana	Witch-hazel								2	2			1		
Ilex opaca	American Holly					1			2			1	1		
Ilex verticillata	Winterberry			1											
Liriodendron tulipifera	Tulip	1	2			1	1	1							2
Nyssa sylvatica	Black Gum			1	1				1			2			2
Platanus occidentalis	Sycamore	2	3	4			5	2	2	4	1				
Quercus alba	White Oak										1				
Quercus lyrata	Overcup Oak	1					2	1	1			2		4	
Quercus michauxii	Swamp Chestnut Oak	2		2		1		2				1			
Quercus phellos	Willow Oak	1													
Ulmus americana	American Elm				2			1		2	1				
Viburnum dentatum	Arrow-wood				2				1			1		1	
Viburnum nudum	Possumhaw		1		1					1	1	1	1		
Initial count of planted bareroot material		18	22	24	17	18	19	18	19	18	20	17	16	21	18
Stems/plot		17	15	21	12	12	14	13	16	12	8	13	8	10	8
Stems/acre		688	607	850	486	486	567	526	648	486	324	526	324	405	324
Average Stems / Acre for Year 3 (Planted + Volunteer)		**517**													

Appendix D

Stream Survey Data

Figure 5 Year 3 Cross-sections

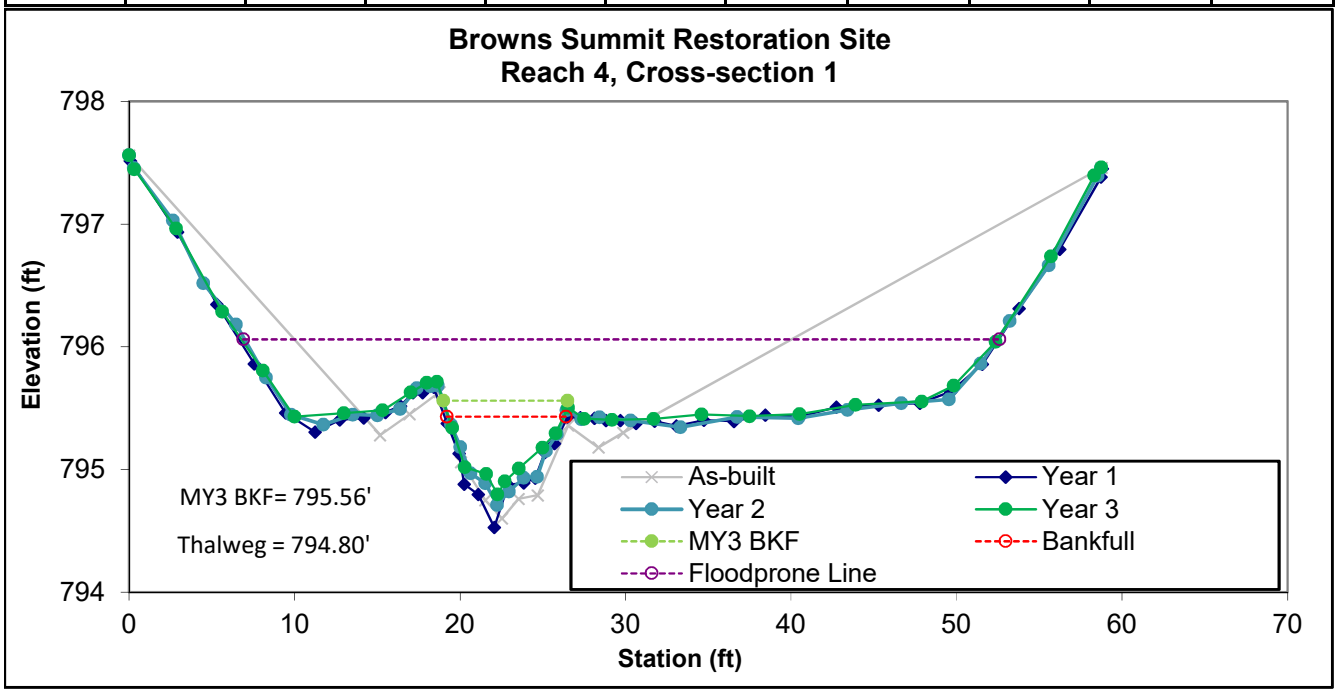
Permanent Cross-section 1

(Year 3 Data - Collected October 2019)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	2.5	7.0	0.4	0.6	19.6	0.9	6.6	795.56	795.50



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 Year 3 Cross-sections

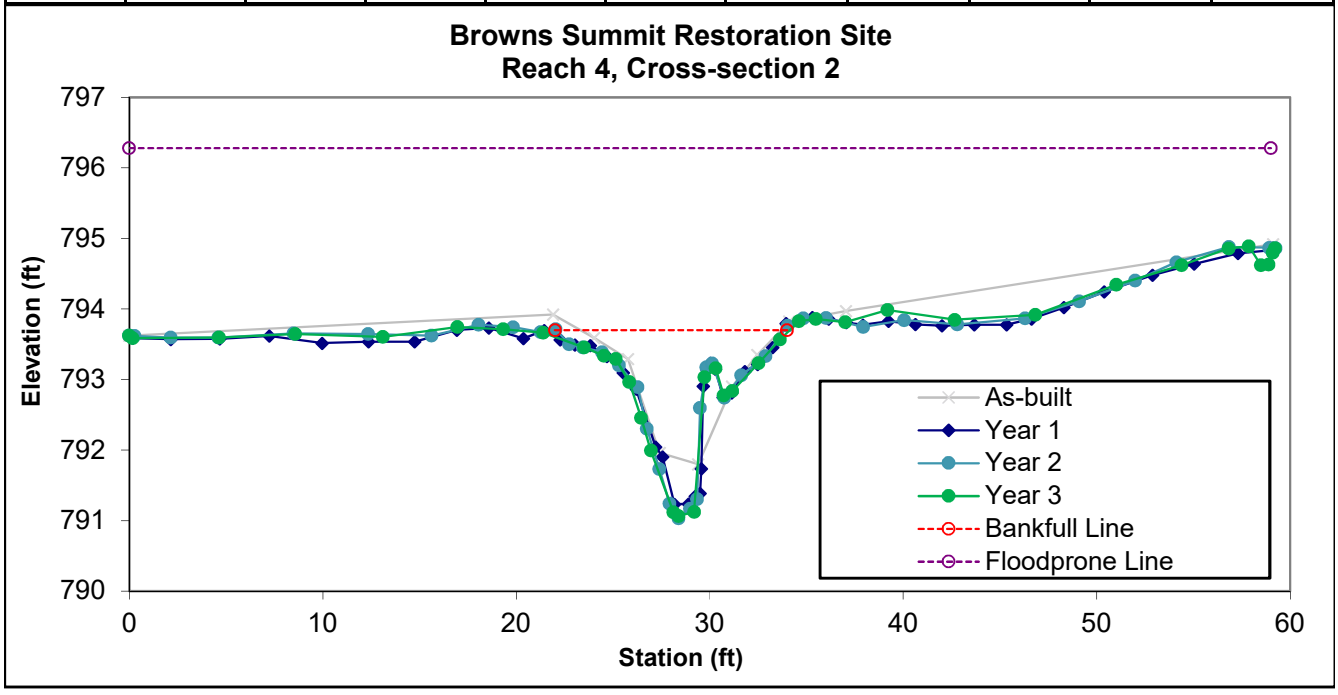
Permanent Cross-section 2

(Year 3 Data - Collected October 2019)

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		11.1	14.3	0.8	2.6	118.3			793.70	793.70



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

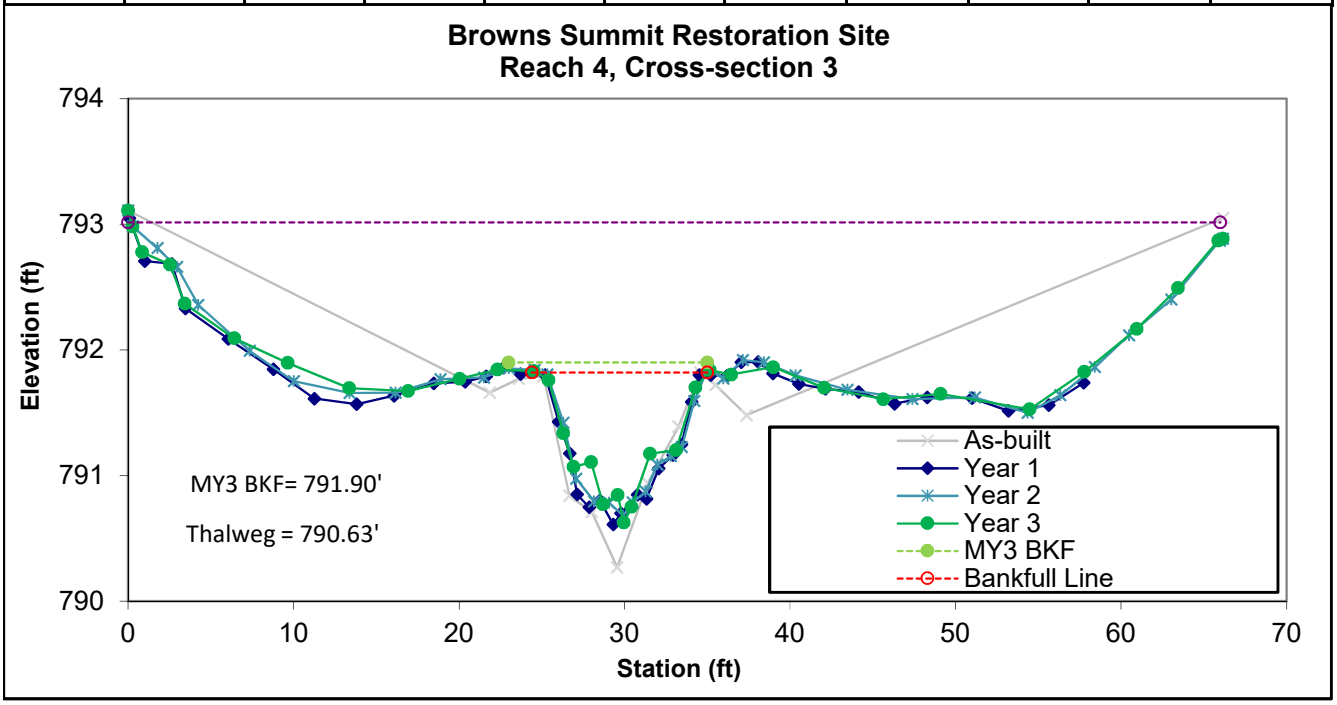
Permanent Cross-section 3

(Year 3 Data - Collected October 2019)

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	6.3	11.0	0.6	1.2	19.2	0.9	5.9	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.

Figure 5 Year 3 Cross-sections

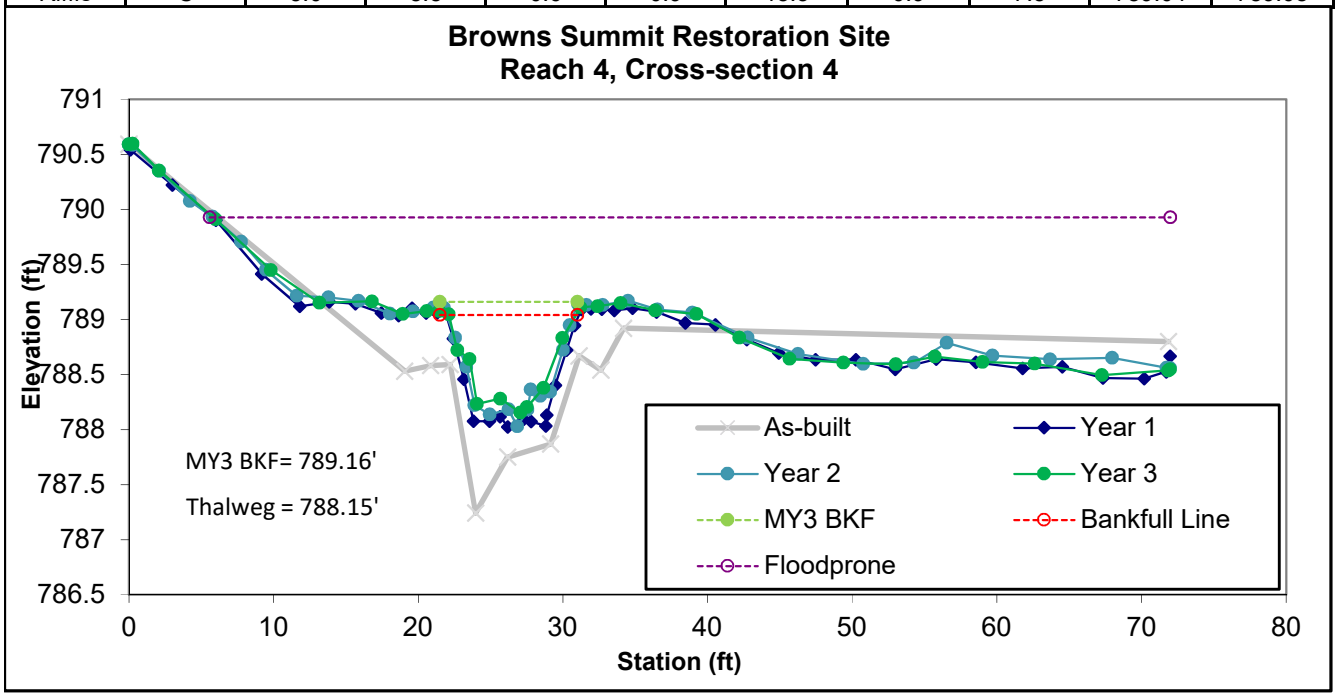
Permanent Cross-section 4

(Year 3 Data - Collected October 2019)

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	5.0	8.8	0.6	0.9	15.3	0.9	7.5	789.04	789.08



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.

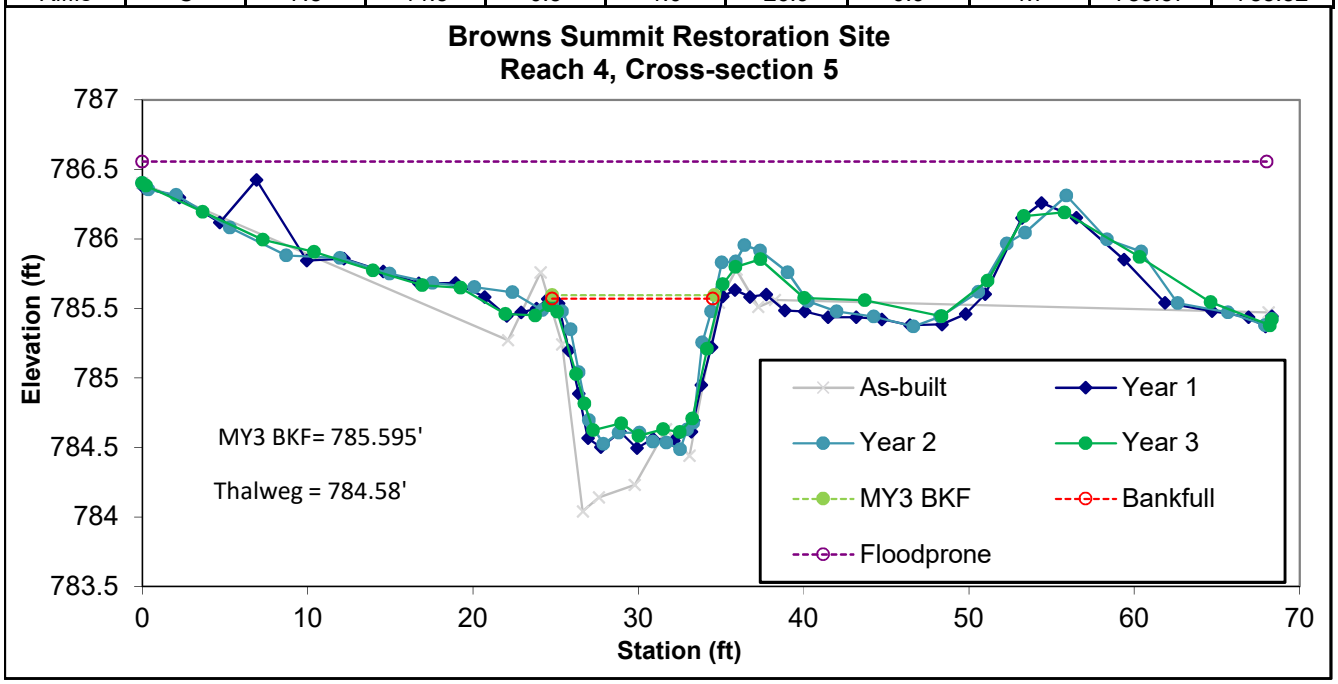
Permanent Cross-section 5

(Year 3 Data - Collected October 2019)

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	7.8	14.5	0.5	1.0	26.9	0.9	4.7	785.57	785.52



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

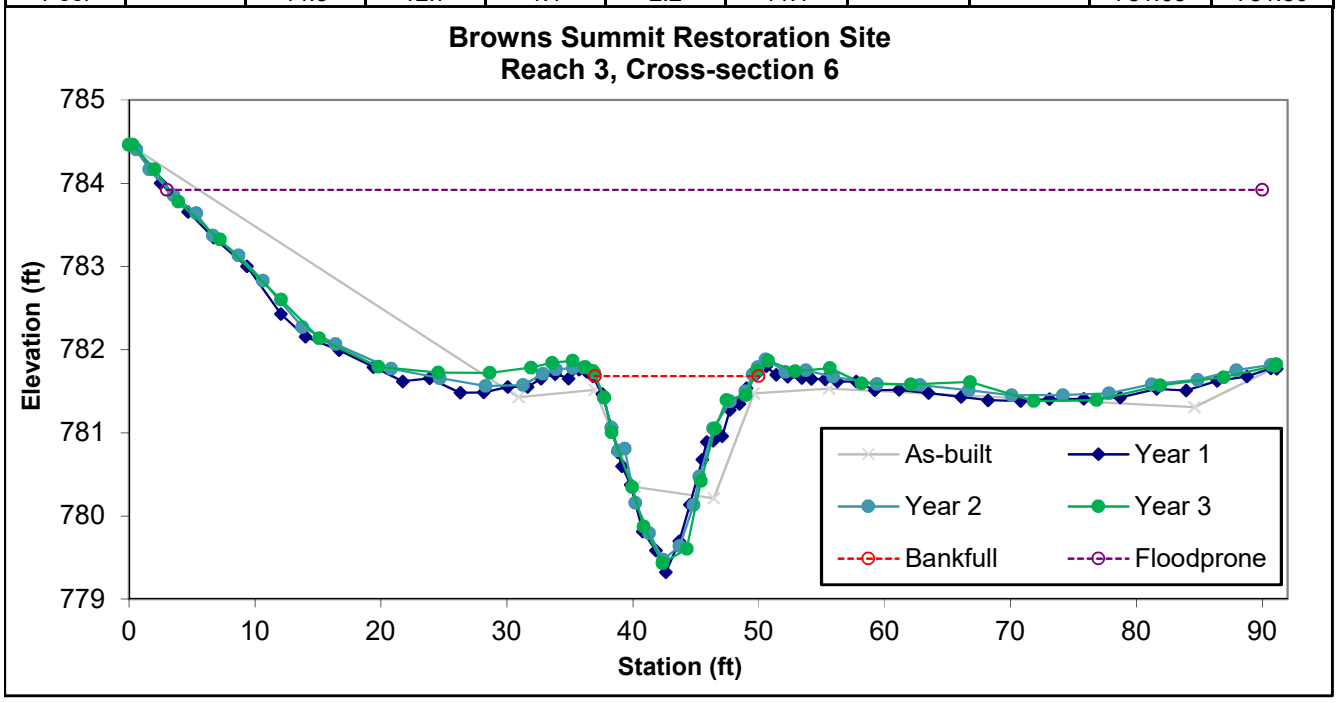
Permanent Cross-section 6

(Year 3 Data - Collected October 2019)

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		14.5	12.7	1.1	2.2	11.1			781.68	781.80



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

Figure 5 Year 3 Cross-sections

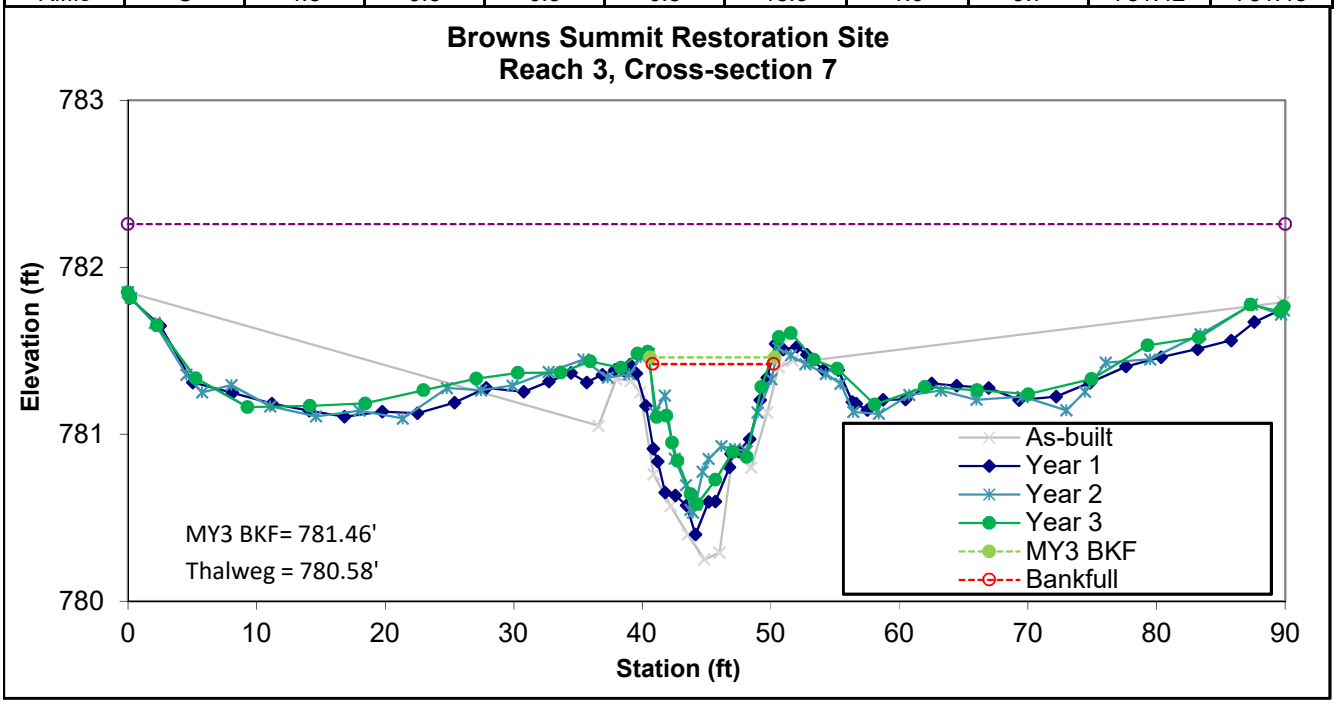
Permanent Cross-section 7

(Year 3 Data - Collected October 2019)

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	9.3	0.5	0.8	18.3	1.0	9.7	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.

Figure 5 Year 3 Cross-sections

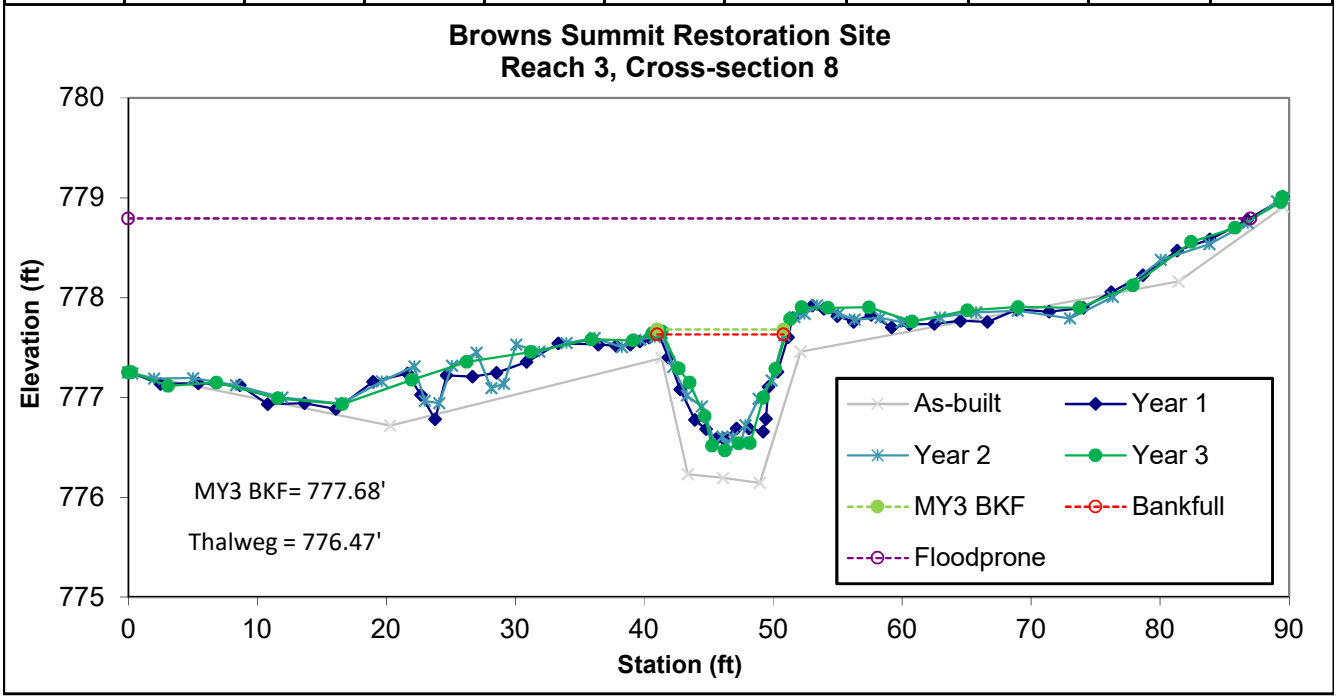
Permanent Cross-section 8

(Year 3 Data - Collected October 2019)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	6.7	9.5	0.7	1.2	13.5	1.0	9.2	777.63	777.66



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.

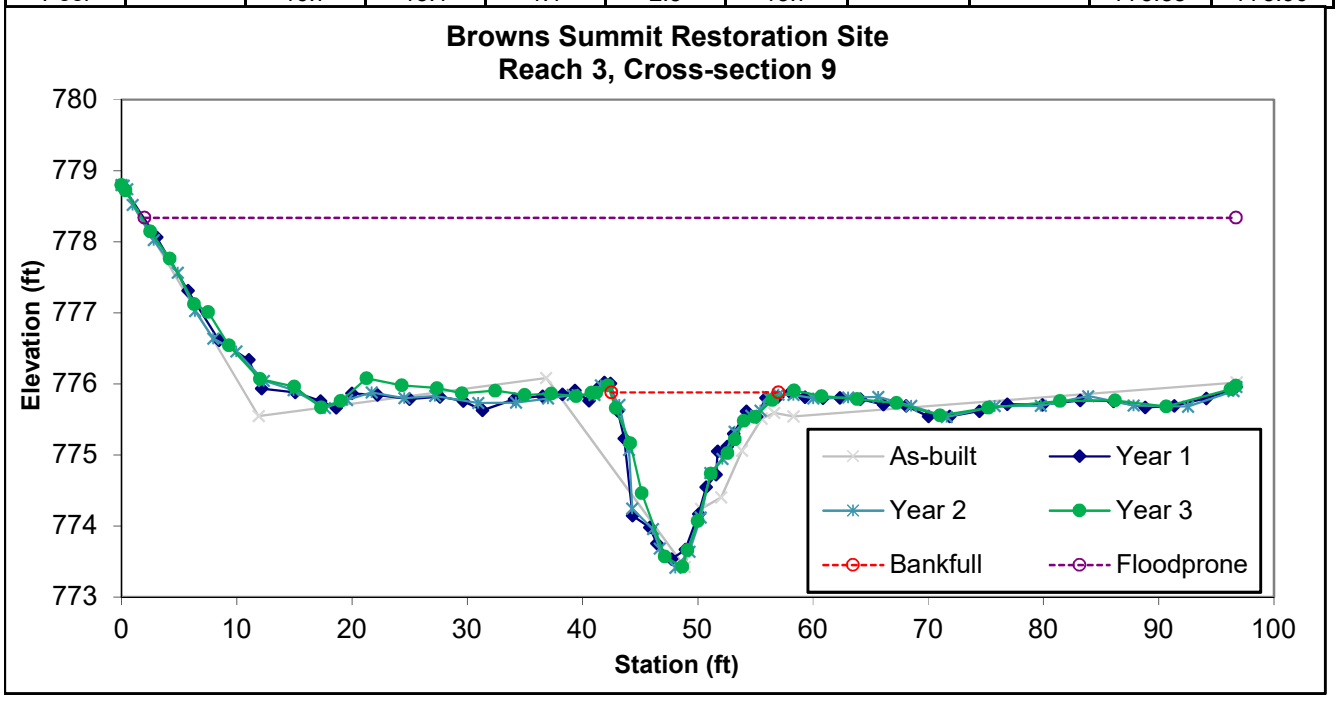
Permanent Cross-section 9

(Year 3 Data - Collected October 2019)

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		16.7	15.1	1.1	2.5	13.7			775.88	775.90



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

Figure 5 Year 3 Cross-sections

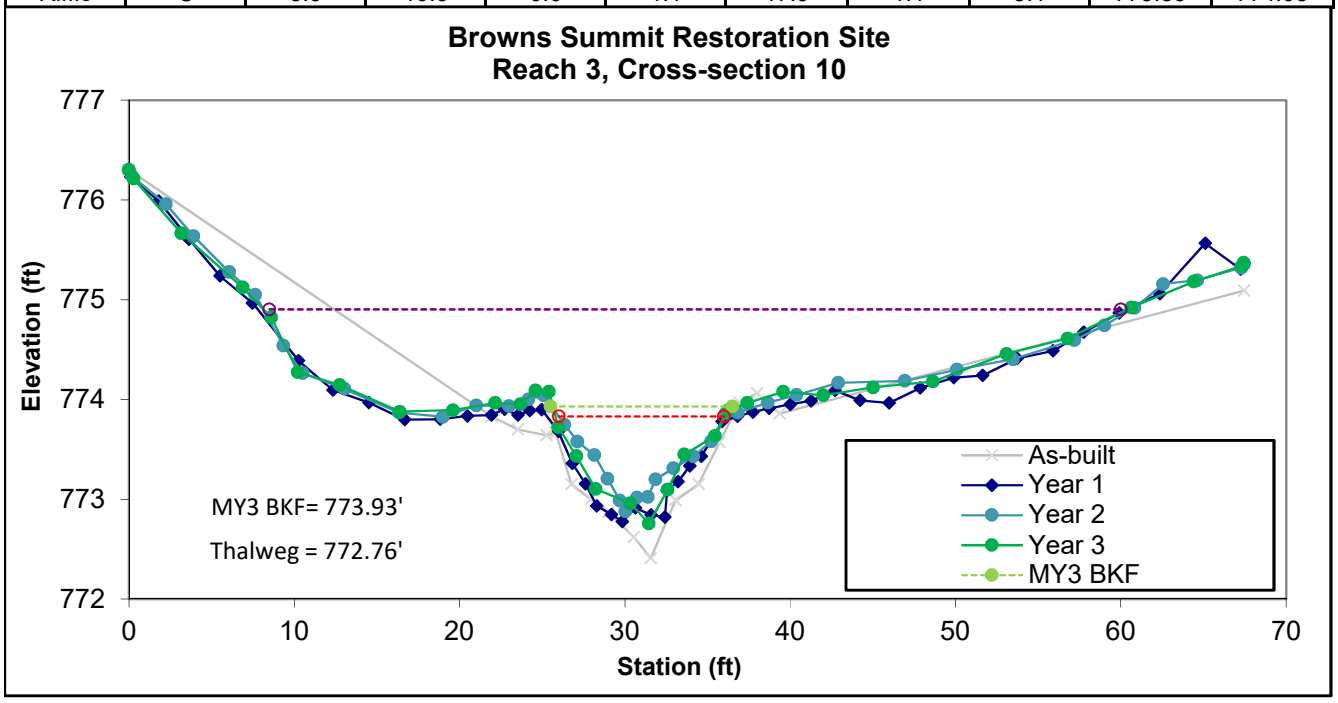
Permanent Cross-section 10

(Year 3 Data - Collected October 2019)

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	5.9	10.3	0.6	1.1	17.9	1.1	5.1	773.83	774.08



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 Year 3 Cross-sections

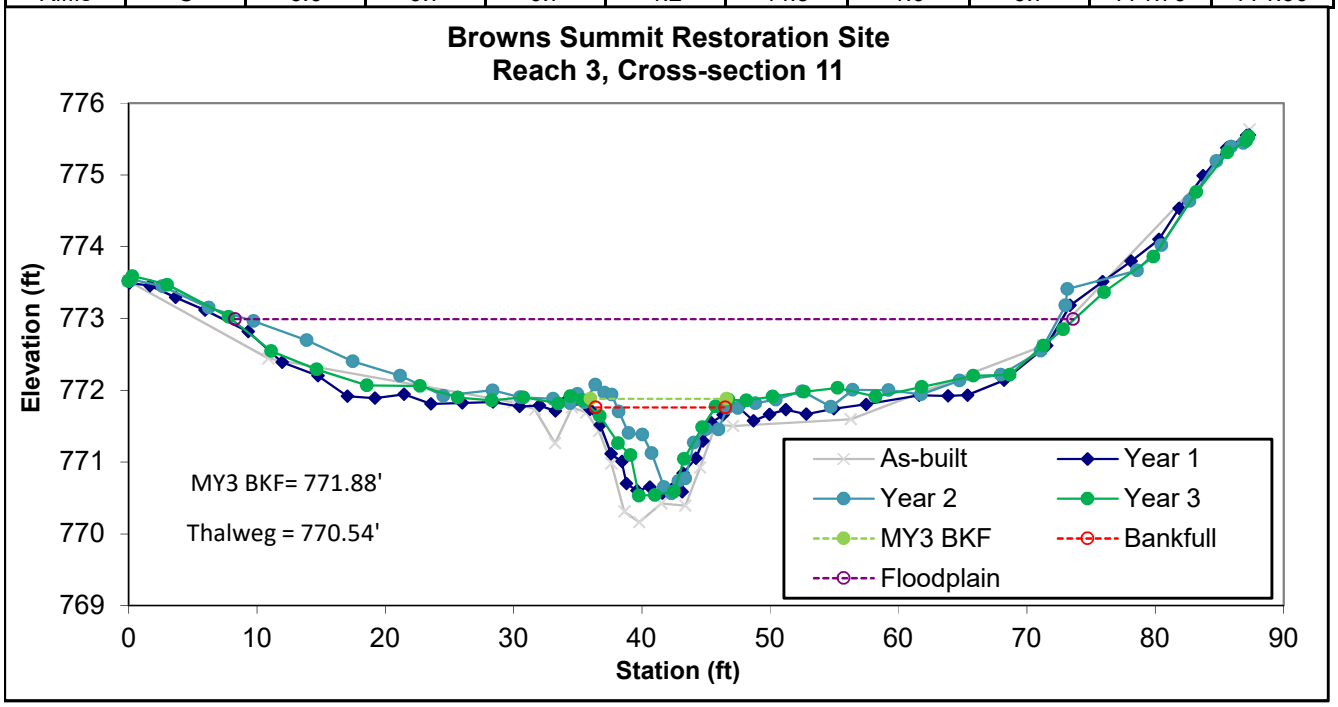
Permanent Cross-section 11

(Year 3 Data - Collected October 2019)

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	6.6	9.7	0.7	1.2	14.5	1.0	6.7	771.76	771.90



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.

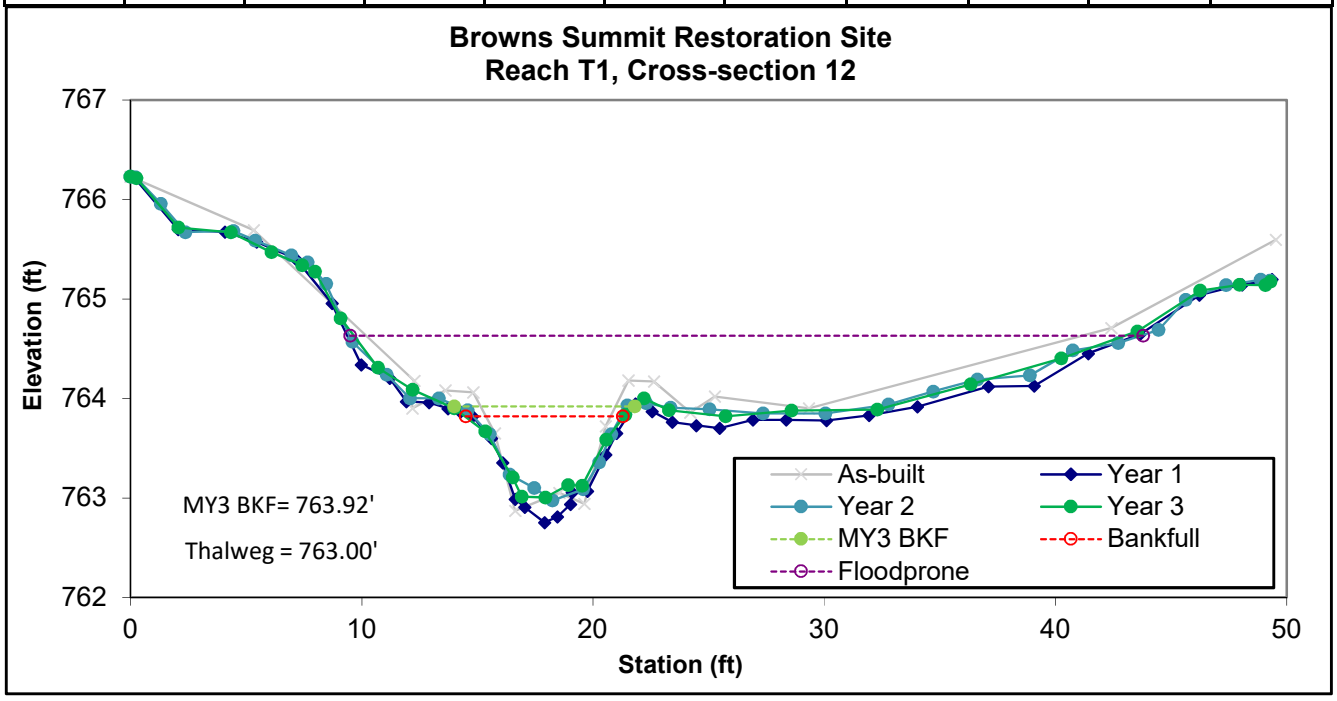
Permanent Cross-section 12

(Year 3 Data - Collected October 2019)

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	6.9	0.5	0.8	14.1	1.1	4.9	763.82	764.00



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.

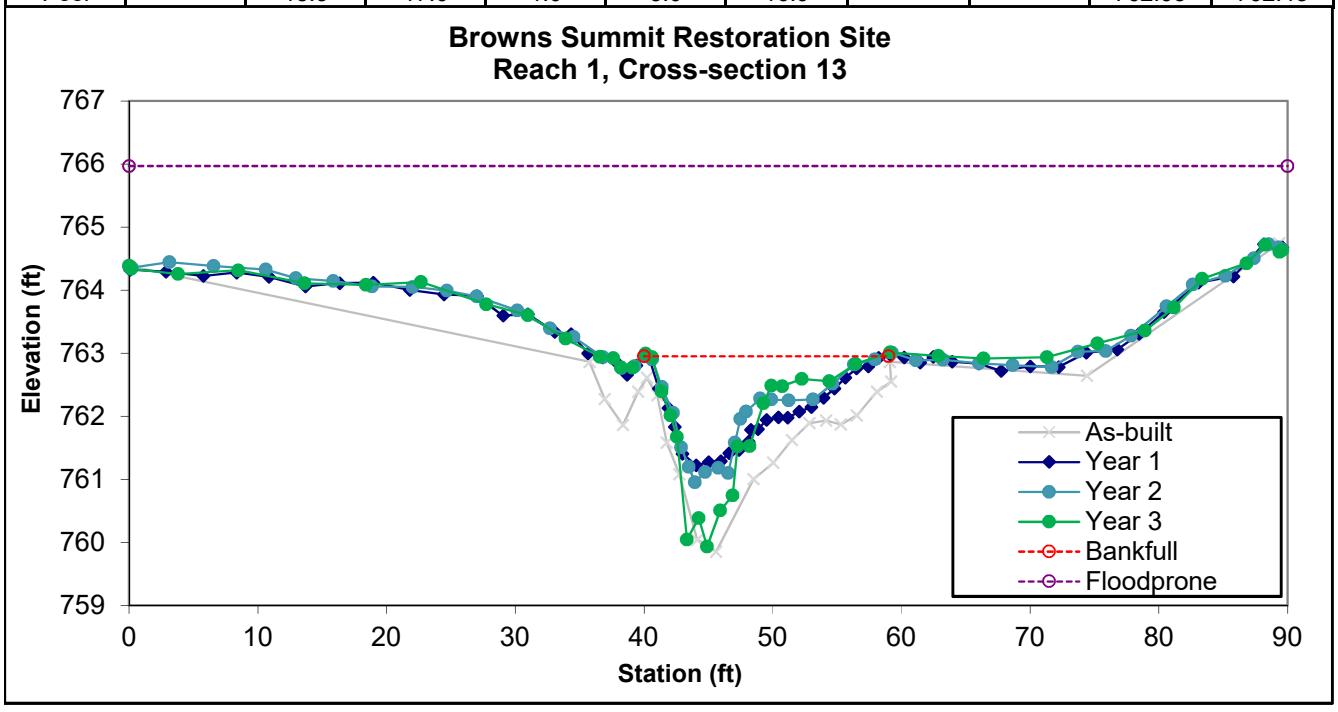
Permanent Cross-section 13

(Year 3 Data - Collected October 2019)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		18.3	17.6	1.0	3.0	16.9			762.95	762.48



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

Figure 5 Year 3 Cross-sections

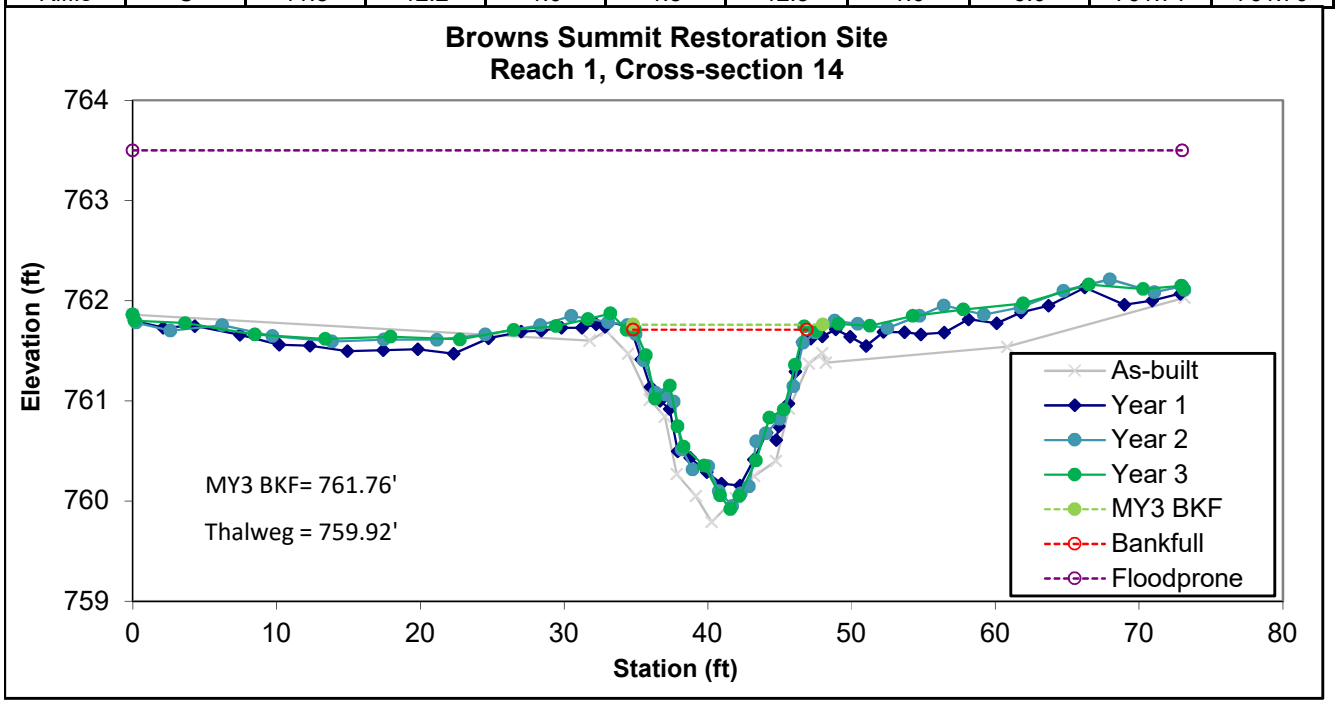
Permanent Cross-section 14

(Year 3 Data - Collected October 2019)

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	11.8	12.2	1.0	1.8	12.5	1.0	6.0	761.71	761.70

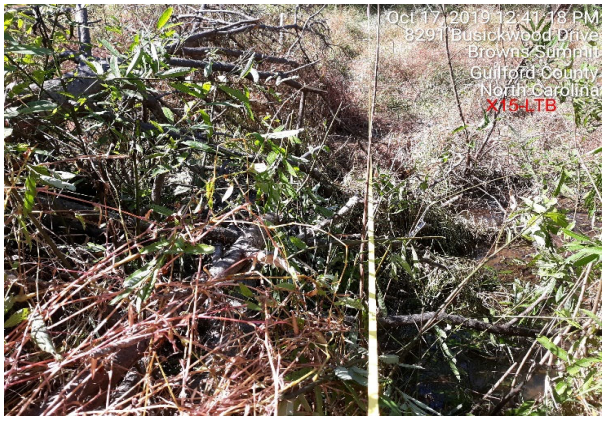


Note: Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing by the current max depth. Note: MY1 data is being utilized as asbuilt data due to poor quality asbuilt survey.

Figure 5 Year 3 Cross-sections

Permanent Cross-section 15

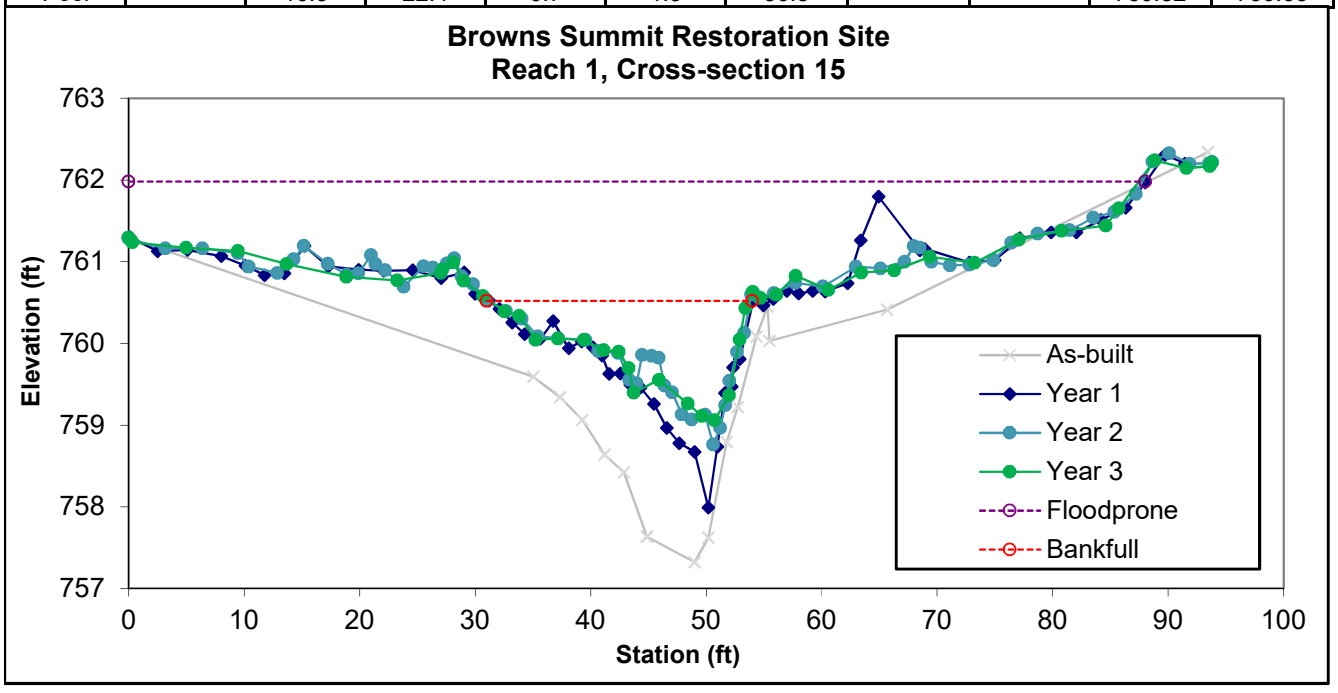
(Year 3 Data - Collected October 2019)



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	22.4	0.7	1.5	30.8			760.52	760.63



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

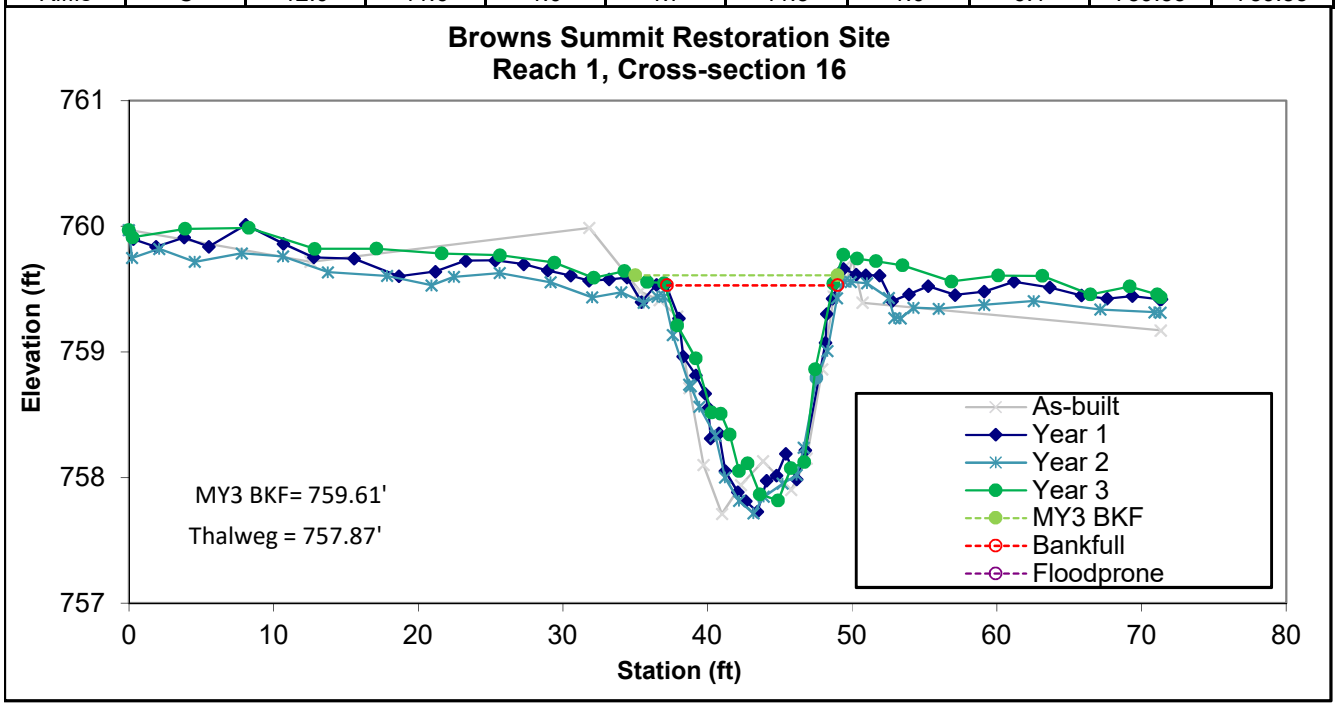
Permanent Cross-section 16

(Year 3 Data - Collected October 2019)

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	12.0	11.6	1.0	1.7	11.3	1.0	6.1	759.53	759.53



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.

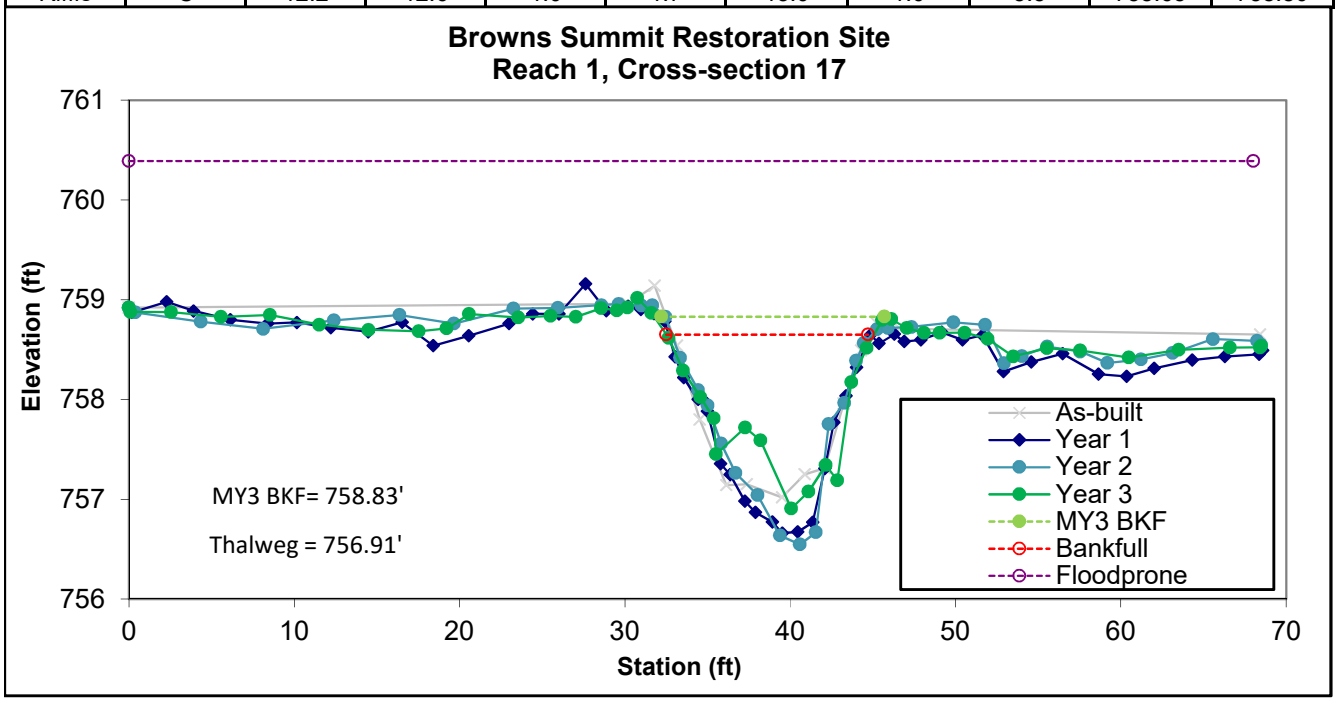
Permanent Cross-section 17

(Year 3 Data - Collected October 2019)

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	12.2	12.6	1.0	1.7	13.0	1.0	5.5	758.65	758.80



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.

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

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

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

Reach 2

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

* 1999 Regional Cruve 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 – Composite						Design						As-built					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
BF Width (ft)	-----	-----	-----	-----	-----	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 (ft^2)	-----	6.5	9.3	-----	-----	9.7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.7	----	----	-----	-----	6.8	7.9	7.6	9.8	1.2	4
Width/Depth Ratio	-----	-----	-----	-----	-----	7.15	-----	-----	-----	-----	10	-----	-----	12	-----	-----	-----	11.0	----	----	-----	-----	10.8	15.0	15.1	19.2	3.9	4
Entrenchment Ratio	-----	-----	-----	-----	-----	2.0	-----	-----	-----	-----	-----	-----	-----	>2.2	-----	-----	-----	>2.2	-----	----	-----	-----	4.4	6.9	7.5	8.2	1.5	4
Bank Height Ratio	-----	-----	-----	-----	-----	2	-----	-----	-----	-----	1	-----	-----	1	-----	-----	-----	1	-----	----	-----	-----	1	1	1	1	0	4
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																												
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	35	-----	-----	56.0	-----	-----	37.4	54.0	59.9	64.7	11.9	3
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	20	-----	-----	30.0	-----	-----	20.0	27.8	25.8	37.2	6.3	10
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2	-----	-----	3	-----	-----	2	-----	-----	3.0	-----	-----	1.9	2.6	2.4	3.5	0.6	10
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	90	-----	-----	130.0	-----	-----	90.4	108.9	101.0	137.2	17.2	5
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.5	-----	-----	10	-----	-----	-----	-----	-----	----	-----	-----	3.5	5.1	5.6	6.1	1.1	3
Profile																												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.018	-----	----	-----	-----	0.005	0.021	0.019	0.040	0.010	13
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	47	-----	-----	70.0	-----	-----	20.1	55.2	59.2	81.3	18.3	13
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.2	-----	-----	2.5	-----	-----	-----	2	-----	----	-----	-----	1.3	1.8	1.8	2.2	0.5	2
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																												
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----			0.1/0.2/0.4/10.4/22.4																					
Reach Shear Stress (competency) lb/ft^2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	141	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	116	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m^2	-----	-----	-----	-----	-----	30.7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	26.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters					-----																							
Drainage Area (SM)	-----	-----	0.38	-----	-----	-----	-----	0.38	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.38	-----	-----	-----	-----	-----	0.38	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	Bc	-----	-----	-----	-----	-----	E5	-----	-----	-----	-----	-----	E5	-----	-----	-----	-----	-----	-----	-----	C	-----	-----
BF Velocity (fps)	-----	3.42	3.97	-----	-----	3.5	-----	-----	-----	-----	4	-----	-----	6	-----	-----	-----	3.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	25.7	41.7	-----	-----	34.5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	31.9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	1441.8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1323.2	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	-----	-----	1586.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1495.2	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----	1.3	-----	-----	1.6	-----	-----	-----	1.20	-----	-----	-----	-----	-----	-----	-----	1.13	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.0082	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.0082	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.010	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* 1999 Regional Cruve 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 4

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

* 1999 Regional Cruve 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 5

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

* 1999 Regional Cruve 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 6

Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Composite																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
BF Width (ft)	-----	-----	-----	-----	-----	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 (ft^2)	-----	-----	-----	-----	-----	4.4	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.1	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Width/Depth Ratio	-----	-----	-----	-----	-----	18.94	-----	-----	-----	-----	12.0	-----	-----	18.0	-----	-----	-----	14.0	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Entrenchment Ratio	-----	-----	-----	-----	-----	1.4	-----	-----	-----	-----	1.4	-----	-----	2.2	-----	-----	-----	<2.2	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Bank Height Ratio	-----	-----	-----	-----	-----	5	-----	-----	-----	-----	1	-----	-----	1	-----	-----	-----	1	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
d50 (mm)	-----	-----	-----	-----	-----	0.4	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																												
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.06	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	30	-----	-----	54.0	-----	-----	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.7	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																												
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----			0.2/0.3/0.4/0.9/1.8																					
Reach Shear Stress (competency) lb/ft^2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m^2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters					-----						-----																	
Drainage Area (SM)	-----	-----	0.10	-----	-----	-----	-----	0.10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.10	-----	-----	-----	-----	-----	0.10	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	Bc	-----	-----	-----	-----	-----	B5c	-----	-----	-----	-----	-----	B5c	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	3.75	-----	-----	-----	-----	4	-----	-----	6.0	-----	-----	-----	5.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	-----	-----	-----	-----	16.5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	468.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	-----	-----	501.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	468.2	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.07	-----	-----	-----	-----	1.1	-----	-----	1.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.014	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.016	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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

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

Reach T1

Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Composite																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
BF Width (ft)	-----	-----	-----	-----	-----	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)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																												
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	29.6	29.6	29.6	29.6	0.0	1
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	14	-----	-----	21.0	-----	-----	16.3	17.4	17.4	18.5	1.1	2
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2	-----	-----	3	-----	-----	-----	-----	-----	----	-----	-----	2.1	2.3	2.3	2.4	0.1	2
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	60.0	-----	----	-----	-----	56.0	57.9	57.9	59.7	1.8	2
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.5	-----	-----	8	-----	-----	-----	4.0	-----	----	-----	-----	3.8	3.8	3.8	3.8	0.0	1
Profile																												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.029	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	27	-----	-----	35.0	-----	-----	18.2	23.8	26.6	34.6	7.6	3
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.2	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft³)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																												
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----																		
Reach Shear Stress (competency) lb/ft²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters					-----						-----																	
Drainage Area (SM)	-----	-----	0.09	-----	-----	-----	-----	0.09	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.09	-----	-----	-----	-----	-----	0.09	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	E	-----	-----	-----	-----	-----	C5	-----	-----	-----	-----	-----	C5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	3.76	-----	-----	-----	-----	3.5	-----	-----	5.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	-----	-----	-----	-----	16.9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	114.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	114.2	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	-----	-----	121.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	139.6	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.06	-----	-----	-----	-----	1.2	-----	-----	1.5	-----	-----	-----	1.12	-----	-----	-----	-----	-----	-----	-----	1.22	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.024	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.019	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* 1999 Regional Cruve 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 T2

Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Composite																	
Dimension and Substrate - Riffle		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
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 (ft²)	-----	-----	-----	-----	-----	4.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Width/Depth Ratio	-----	-----	-----	-----	-----	81.82	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Entrenchment Ratio	-----	-----	-----	-----	-----	1.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Bank Height Ratio	-----	-----	-----	-----	-----	3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																												
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																												
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----																		
Reach Shear Stress (competency) lb/ft²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters					-----						-----																	
Drainage Area (SM)	-----	-----	0.07	-----	-----	-----	-----	0.07	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.07	-----	-----	-----	-----	-----	0.07	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	F	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	3.6	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	-----	-----	-----	-----	14.4	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	252.7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	252.7	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	-----	-----	283.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	284.2	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.12	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.022	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* 1999 Regional Cruve 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 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
Dimension and Substrate - Riffle																												
BF Width (ft)	-----	-----	-----	-----	-----	2.93	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.8	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Floodprone Width (ft)	-----	-----	-----	-----	-----	66.5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	15.0	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
BF Mean Depth (ft)	-----	-----	-----	-----	-----	1.12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.5	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
BF Max Depth (ft)	-----	-----	-----	-----	-----	1.76	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.6	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
BF Cross-sectional Area (ft^2)	-----	-----	-----	-----	-----	3.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.8	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Width/Depth Ratio	-----	-----	-----	-----	-----	2.62	-----	-----	-----	-----	12.0	-----	-----	18.0	-----	-----	-----	12.0	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Entrenchment Ratio	-----	-----	-----	-----	-----	22.7	-----	-----	-----	-----	1.4	-----	-----	2.2	-----	-----	-----	<2.2	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Bank Height Ratio	-----	-----	-----	-----	-----	2	-----	-----	-----	-----	1	-----	-----	1	-----	-----	-----	1	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																												
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2	-----	-----	3.0	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.033	-----	----	-----	-----	0.017	0.025	0.017	0.017	0.007	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	36	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.9	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																												
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----																		
Reach Shear Stress (competency) lb/ft^2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m^2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters											-----																	
Drainage Area (SM)	-----	-----	0.06	-----	-----	-----	-----	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 Cruve and Esitmate from Revised Regional Curve. See Mitigation Plan for more information.

Table 10 continued. Baseline Stream Summary
Browns Summit Creek Restoration Project: DMS Project No ID. 96313
Reach T4

Parameter	USGS Gauge	Regional Curve*			Pre-Existing Condition						Reference Reach(es) Data						Design						As-built					
											Composite																	
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																												
BF Width (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.8	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Floodprone Width (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	12.0	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
BF Mean Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.5	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
BF Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.6	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
BF Cross-sectional Area (ft^2)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.8	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Width/Depth Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	12.0	-----	-----	18.0	-----	-----	-----	12.0	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Entrenchment Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.4	-----	-----	2.2	-----	-----	-----	<2.2	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Bank Height Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1	-----	-----	1	-----	-----	-----	1	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																												
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.051	-----	----	-----	-----	0.007	0.047	0.048	0.072	0.023	11
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	14	-----	----	-----	-----	12.3	16.1	14.6	21.6	3.5	11
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.9	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																												
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----																		
Reach Shear Stress (competency) lb/ft^2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m^2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																												
Drainage Area (SM)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
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 Cruve and Esitmate from Revised Regional Curve. See Mitigation Plan for more information.

Table 11a. Morphology and Hydraulic Monitoring Summary
Browns Summit Creek Restoration Project: DMS Project No ID. 96313

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+								
Based on fixed baseline bankfull elevation																													
BF Width (ft)	7.2	8.1	7.0	7.0				11.6	12.8	12.3	14.30				9.5	12.49	10.6	11.0											
BF Mean Depth (ft)	0.5	0.4	0.4	0.4				0.9	0.8	0.9	0.8				0.9	0.58	0.7	0.6											
Width/Depth Ratio	15.4	19.4	16.5	19.6				12.7	15.6	14.4	18.3				11	21.5	16.1	19.2											
BF Cross-sectional Area (ft^2)	3.3	3.4	3.0	2.5				10.5	10.5	10.5	11.1				8.2	7.25	6.9	6.3											
BF Max Depth (ft)	0.8	0.9	0.7	0.6				2	2.5	2.7	2.6				1.6	1.21	1.1	1.2											
Width of Floodprone Area (ft)	31.3	58.8	46.3	45.7				-	-	-	-				66.2	66.1	65.6	65.6											
Entrenchment Ratio (MY1 will provide standard)*	4.4	5.9	6.6	6.6				-	-	-	-				7.0	5.3	6.2	5.9											
Bank Height Ratio (MY1 will provide standard)*	1	1.0	1.0	0.9				-	-	-	-				1.0	1.0	1.0	0.9											
Wetted Perimeter (ft)	7.4	8.5	7.2	7.1				12.6	15.3	15.0	16.8				10.1	13.0	11.0	11.5											
Hydraulic Radius (ft)	0.5	0.4	0.4	0.3				0.8	0.7	0.7	0.7				0.8	0.6	0.6	0.5											
Cross Sectional Area between end pins (ft^2)	-	-	-					-	-	-	-				-	-	-	-											
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	8.8				11.8	10.93	11.6	14.5				12.5	12.9	12.4	12.7				11.2	11.5	9.7	9.3			
BF Mean Depth (ft)	0.8	0.73	0.6	0.6				1.1	0.75	0.7	0.5				0.9	1.1	1.1	1.1				0.6	0.5	0.5	0.5			
Width/Depth Ratio	11.6	12.55	13.6	15.3				11	14.57	17.7	26.9				14	11.6	11.2	11.1				18.6	21.3	21.0	18.3			
BF Cross-sectional Area (ft^2)	6.6	6.72	5.6	5.0				12.7	8.18	7.5	7.8				11.2	14.4	13.7	14.5				6.8	6.2	4.5	4.8			
BF Max Depth (ft)	1.4	1.0	1.0	0.9				1.7	1.08	1.1	1.0				1.3	2.4	2.2	2.2				1.1	1.0	0.9	0.8			
Width of Floodprone Area (ft)	65.8	72.0	67.5	66.1				68.1	69.3	68.3	68.3				-	-	-	-				89.9	89.9	89.9	89.9			
Entrenchment Ratio (MY1 will provide standard)*	7.6	7.4	7.7	7.5				5.8	6.3	5.9	4.7				-	-	-	-				8	7.8	9.3	9.7			
Bank Height Ratio (MY1 will provide standard)*	1.0	1.0	1.0	0.9				1.0	1.0	1.0	0.9				-	-	-	-				1.0	1.0	1.0	1.0			
Wetted Perimeter (ft)	9.4	6.94	9.2	9.1				12.8	11.47	12	14.9				13.0	13.92	13.4	13.7				11.6	11.8	10.1	9.6			
Hydraulic Radius (ft)	0.7	0.7	0.6	0.6				1.0	0.71	0.6	0.5				0.9	1.03	1.0	1.1				0.6	0.5	0.4	0.5			
Cross Sectional Area between end pins (ft^2)	-	-	-	-				-	-	-	-				-	-	-	-				-	-	-	-			
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	9.5				17.60	15.3	14.5	15.1				11.60	11.5	10	10.3				9.30	11.7	10.5	9.7			
BF Mean Depth (ft)	0.90	0.71	0.7	0.7				1.00	1.1	1.2	1.1				0.60	0.6	0.5	0.6				0.90	0.7	0.6	0.7			
Width/Depth Ratio	11.5	14.15	15.1	13.5				17.7	13.5	12.1	13.7				19.2	19.2	20.8	17.9				10.8	17.2	18.5	14.5			
BF Cross-sectional Area (ft^2)	9.8	7.16	6.4	6.7				17.5	17.2	17.3	16.7				7.0	6.9	4.8	5.9				8.1	8.0	6.0	6.6			
BF Max Depth (ft)	1.30	1.05	1.1	1.2				2.20	2.4	2.5	2.5				1.30	1.1	1	1.1				1.30	1.2	1.2	1.2			
Width of Floodprone Area (ft)	86.6	89.5	88.3	87.1				-	-	-	-				51.6	67.5	50.9	52.3				65.6	87.3	65.2	65.7			
Entrenchment Ratio (MY1 will provide standard)*	8.2	8.5	9.0	9.2				-	-	-	-				4.4	4.5	5.1	5.1				7.0	5.5	6.2	6.7			
Bank Height Ratio (MY1 will provide standard)*	1.0	1.0	0.9	1.0				-	-	-	-				1.0	1.0	1.0	1.1				1.0	1.0	1.0	1.0			
Wetted Perimeter (ft)	11.2	11.3	10.6	9.9				18.2	11.3	15.9	16.1				12.0	11.9	10.2	10.6				9.9	12.3	11.0	10.3			
Hydraulic Radius (ft)	0.9	0.6	0.6	0.7				1.0	0.6	1.1	1.0				0.6	0.6	0.5	0.6				0.8	0.7	0.5	0.6			
Cross Sectional Area between end pins (ft^2)	-	-	-	-				-	-	-	-				-	-	-	-				-	-	-	-			
d50 (mm)	-	-	-	-				-	-	-	-				-	-	-	-				-	-	-	-			

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

Table 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	6.9				19.6	18.7	17.3	17.6				13.80	14.7	13.1	12.2				29.4	24.3	22.8	22.4			
BF Mean Depth (ft)	0.7	0.6	0.5	0.5				1.2	0.9	0.6	1.0				0.90	0.9	0.9	1.0				1.1	0.9	0.7	0.7			
Width/Depth Ratio	11.7	11	12.1	14.1				16.4	20.6	29	16.9				15.2	17.3	14	12.5				26.1	28.3	31.8	30.8			
BF Cross-sectional Area (ft^2)	5.1	4.1	3.4	3.4				23.5	17.1	10.3	18.3				12.5	12.5	12.3	11.8				33.2	20.8	16.3	16.3			
BF Max Depth (ft)	1.2	1.1	0.8	0.8				2.8	1.7	2.0	3				1.70	1.6	0.9	1.8				2.80	2.5	1.8	1.5			
Width of Floodprone Area (ft)	39.9	49.4	34.7	33.4				-	-	-	-				100.0	73.1	73.2	73.1				100.0	93.8	92.5	87.5			
Entrenchment Ratio (MY1 will provide standard)*	5.2	5.4	5.4	4.9				-	-	-	-				5.3	5.0	5.6	6.0				-	-	-	-			
Bank Height Ratio (MY1 will provide standard)*	1.0	1.0	1.0	1.1				-	-	-	-				1.0	1.0	1.0	1.0				-	-	-	-			
Wetted Perimeter (ft)	8.5	7.18	6.7	7.2				21.0	19.4	18.1	20.2				14.4	15.4	13.9	13.0				30.5	25.7	23.7	23.0			
Hydraulic Radius (ft)	0.6	0.57	0.5	0.5				1.1	0.9	0.6	0.9				0.9	0.8	0.9	0.9				1.1	0.8	0.7	0.7			
Cross Sectional Area between end pins (ft^2)	-	-	-	-				-	-	-	-				-	-	-	-				-	-	-	-			
d50 (mm)	-	-	-	-				-	-	-	-				-	-	-	-				-	-	-	-			

Stream Reach	Reach 1																												
	Cross-section X-16 (Riffle)							Cross-section X-17 (Riffle)																					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+															
Based on fixed baseline bankfull elevation																													
BF Width (ft)	12.6	11.9	19.7	11.6				12.60	12.2	12.1	12.6																		
BF Mean Depth (ft)	1.1	1.09	0.7	1.0				1.20	1.2	1.1	1.0																		
Width/Depth Ratio	12.0	10.9	26.6	11.3				10.9	10.3	10.6	13.0																		
BF Cross-sectional Area (ft^2)	13.2	13	14.6	12.0				14.5	14.6	13.9	12.2																		
BF Max Depth (ft)	1.70	1.8	1.8	1.7				1.70	2	2.1	1.7																		
Width of Floodprone Area (ft)	100.0	71.4	71.3	71.3				100.0	68.6	68.5	68.5																		
Entrenchment Ratio (MY1 will provide standard)*	5.7	6	3.6	6.1				5.4	5.6	5.7	5.5																		
Bank Height Ratio (MY1 will provide standard)*	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0																		
Wetted Perimeter (ft)	13.5	13.0	20.4	12.4				13.3	13.1	13.2	13.7																		
Hydraulic Radius (ft)	1.0	1.0	0.9	1				1.1	1.1	1.1	0.9																		
Cross Sectional Area between end pins (ft^2)	-	-	-	-				-	-	-	-																		
d50 (mm)	-	-	-	-				-	-	-	-																		

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

Table 11b. Stream Reach Morphology Summary
Browns Summit Creek Restoration Project: DMS Project No ID. 96313
Reach 4

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	7.2	9.3	9.1	11.8	1.7	4	8.1	10.2	10.0	12.5	1.7	4	7	9.5	9.7	11.6	1.8	4	7	10.33	9.9	14.5	2.8	4												
Floodprone Width (ft)	31.3	57.9	66.0	68.1	15.4	4	58.8	66.6	67.7	72.0	4.9	4	46.3	61.93	66.55	68.3	9.1	4	45.7	61.43	65.85	68.3	9.1	4												
Bankfull Mean Depth (ft)	0.5	0.8	0.9	1.1	0.2	4	0.4	0.6	0.7	0.8	0.1	4	0.4	0.6	0.65	0.7	0.1	4	0.4	0.525	0.55	0.6	0.1	4												
[1]Bankfull Max Depth (ft)	0.8	1.4	1.5	1.7	0.3	4	0.9	1.1	1.1	1.2	0.1	4	0.7	0.975	1.05	1.1	0.2	4	0.6	0.925	0.95	1.2	0.2	4												
Bankfull Cross Sectional Area (ft^2)	3.3	7.7	7.4	12.7	3.4	4	3.4	6.4	7.0	8.2	1.8	4	3	5.75	6.25	7.5	1.7	4	0.6	0.925	0.95	1.2	0.2	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	0.6	0.925	0.95	1.2	0.2	4												
Entrenchment Ratio (MY1 will provide standard)*	4.4	6.2	6.4	7.6	1.2	4	5.3	6.2	6.1	7.4	0.8	4	5.9	6.6	6.4	7.7	0.7	4	4.7	6.175	6.25	7.5	1.0	4												
Bank Height Ratio (MY1 will provide standard)*	1	1	1	1	0	4	1	1	1	1	0	4	1	1	1	1	0	4	0.9	0.9	0.9	0.9	0	4												
Profile																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
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Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
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[2]% 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					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	9.3	10.7	10.9	11.6	0.9	4	10.1	11.2	11.5	11.7	0.7	4	9.7	10.0	9.9	10.5	0.3	4.0	9.3	9.7	9.6	10.3	0.4	4.0												
Floodprone Width (ft)	51.6	73.4	76.1	89.9	15.7	4	67.5	83.5	88.4	89.9	9.3	4	50.9	73.6	76.8	89.9	16.3	4.0	52.3	73.8	76.4	89.9	15.5	4.0												
Bankfull Mean Depth (ft)	0.6	0.8	0.8	0.9	0.2	4	0.5	0.6	0.7	0.7	0.1	4	0.5	0.6	0.6	0.7	0.1	4.0	0.5	0.6	0.7	0.7	0.1	4.0												
[1]Bankfull Max Depth (ft)	1.1	1.3	1.3	1.3	0.1	4	1.0	1.1	1.1	1.2	0.1	4	0.9	1.1	1.1	1.2	0.1	4.0	0.8	1.1	1.2	1.2	0.2	4.0												
Bankfull Cross Sectional Area (ft^2)	6.8	7.9	7.6	9.8	1.2	4	6.2	7.1	7.0	8.0	0.6	4	4.5	5.4	5.4	6.4	0.8	4.0	4.8	6.0	6.3	6.7	0.8	4.0												
Width/Depth Ratio	10.8	15.0	15.1	19.2	3.9	4	14.2	18.0	18.2	21.3	2.6	4	15.1	18.9	19.7	21.0	2.4	4.0	13.5	16.1	16.2	18.3	2.1	4.0												
Entrenchment Ratio (MY1 will provide standard)*	4.4	6.9	7.5	8.2	1.5	4	4.5	6.6	6.7	8.5	1.6	4	5.1	7.4	7.6	9.3	1.8	4.0	5.1	7.7	8.0	9.7	1.9	4.0												
Bank Height Ratio (MY1 will provide standard)*	1	1	1	1	0	4	1	1	1	1	0	4	0.9	1.0	1.0	1.0	0.0	4.0	1.0	1.0	1.0	1.1	0.0	4.0												
Profile																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
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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					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	12.6	13.0	12.6	13.8	0.6	3	11.9	12.9	12.2	14.7	1.3	3	12.1	15.0	13.1	19.7	3.4	3.0	11.6	12.1	12.2	12.6	0.4	3.0												
Floodprone Width (ft)	100.0	100.0	100.0	100.0	0.0	3	68.6	71.0	71.4	73.1	1.9	3	68.5	71.0	71.3	73.2	1.9	3.0	68.5	71.0	71.3	73.1	1.9	3.0												
Bankfull Mean Depth (ft)	0.9	1.1	1.1	1.2	0.1	3	0.9	1.1	1.1	1.2	0.1	3	0.7	0.9	0.9	1.1	0.2	3.0	1.0	1.0	1.0	1.0	0.0	3.0												
[1]Bankfull Max Depth (ft)	1.7	1.7	1.7	1.7	0.0	3	1.6	1.8	1.8	2.0	0.2	3	0.9	1.6	1.8	2.1	0.5	3.0	1.7	1.7	1.7	1.8	0.0	3.0												
Bankfull Cross Sectional Area (ft^2)	12.5	13.4	13.2	14.5	0.8	3	12.5	13.4	13.0	14.6	0.9	3	12.3	13.6	13.9	14.6	1.0	3.0	11.8	12.0	12.0	12.2	0.2	3.0												
Width/Depth Ratio	10.9	12.7	12.0	15.2	1.8	3	10.3	12.8	10.9	17.3	3.2	3	10.6	17.1	14.0	26.6	6.9	3.0	11.3	12.3	12.5	13.0	0.7	3.0												
Entrenchment Ratio (MY1 will provide standard)*	5.3	5.5	5.4	5.7	0.2	3	5.0	5.5	5.6	6.0	0.4	3	3.6	5.0	5.6	5.7	1.0	3.0	5.5	5.9	6.0	6.1	0.3	3.0												
Bank Height Ratio (MY1 will provide standard)*	1	1	1	1	0	3	1	1	1	1	0	3	1.0	1.0	1.0	1.0	0.0	3.0	1.0	1.0	1.0	1.0	0.0	3.0												
Profile																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
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Rc:Bankfull width (ft/ft)																																				
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Per DMS/IRT request, bank height ratio is calculated by setting the current bankfull area to match the asbuilt bankfull area and dividing t
the current max depth.

Appendix E

Hydrologic Data

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

Table 13. Flow Gauge Success (MY3-2019)		
Browns Summit Creek Restoration Project: DMS Project ID No. 96313		
Flow Gauge ID	**Consecutive Days of Flow[1]**	**Cumulative Days of Flow[2]**
R4 Gauge		
BSFL1	140	199
T3 Gauge		
BSFL2	198	284
T1 Gauge		
BSFL3	289	289

Notes:

[1]Indicates the number of consecutive days within the monitoring year where flow was measured.

[2]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[1]							Cumulative Days Meeting Criteria[2]						
	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)
Flow Gauges (Installed March 4, 2017)														
BSFL1	127.0	122.0	140.0					171.0	248.0	199.0				
BSFL2	166.0	158.0	198.0					173.0	303.0	284.0				
BSFL3	263.0	319.0	289.0					263.0	319.0	289.0				

Notes:

[1]Indicates the number of consecutive days within the monitoring year where flow was measured.

[2]Indicates the number of cumulative days within the monitoring year where flow was measured.

Success Criteria per Browns Summit Mitigation Plan (1/13/2016): "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

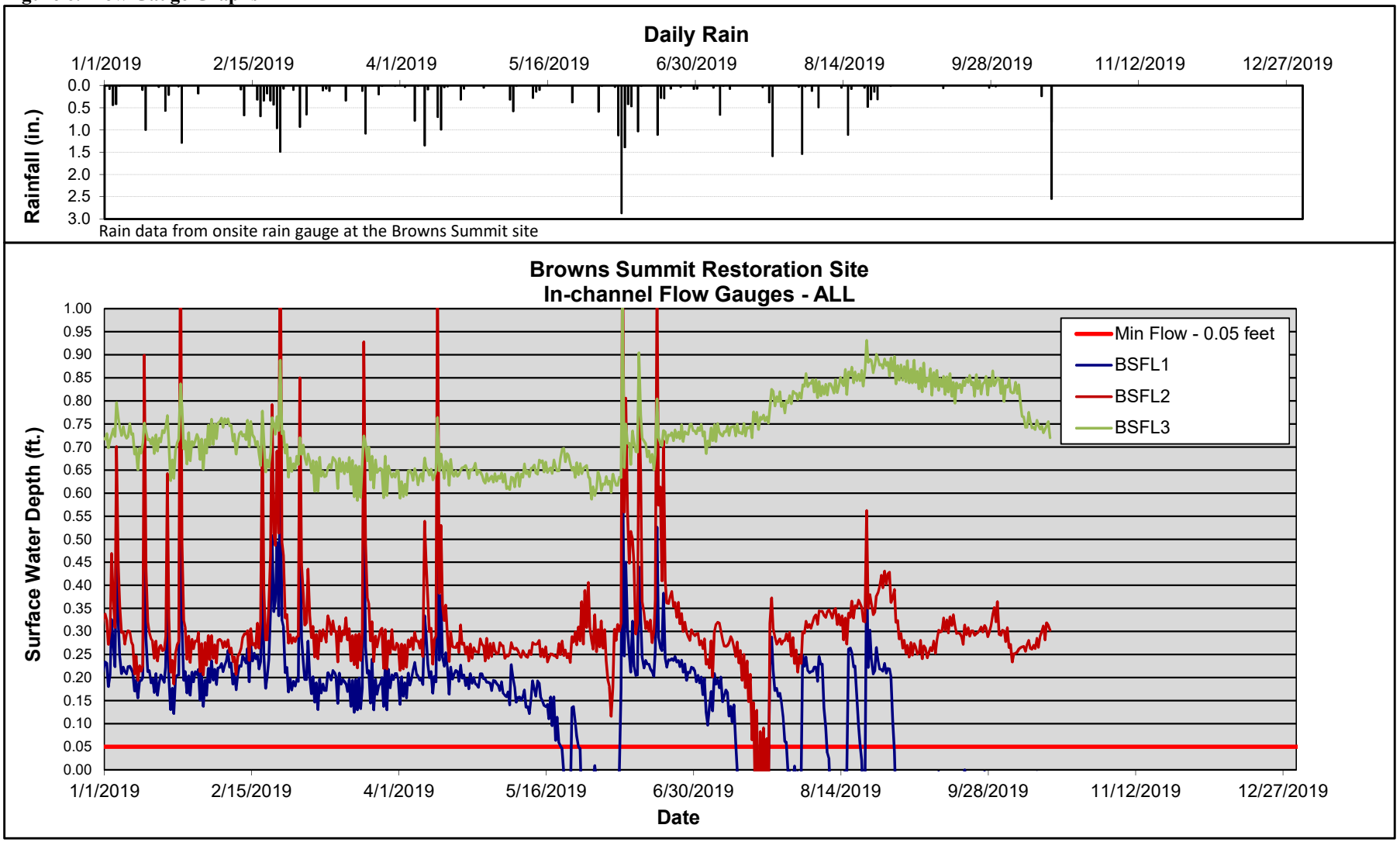
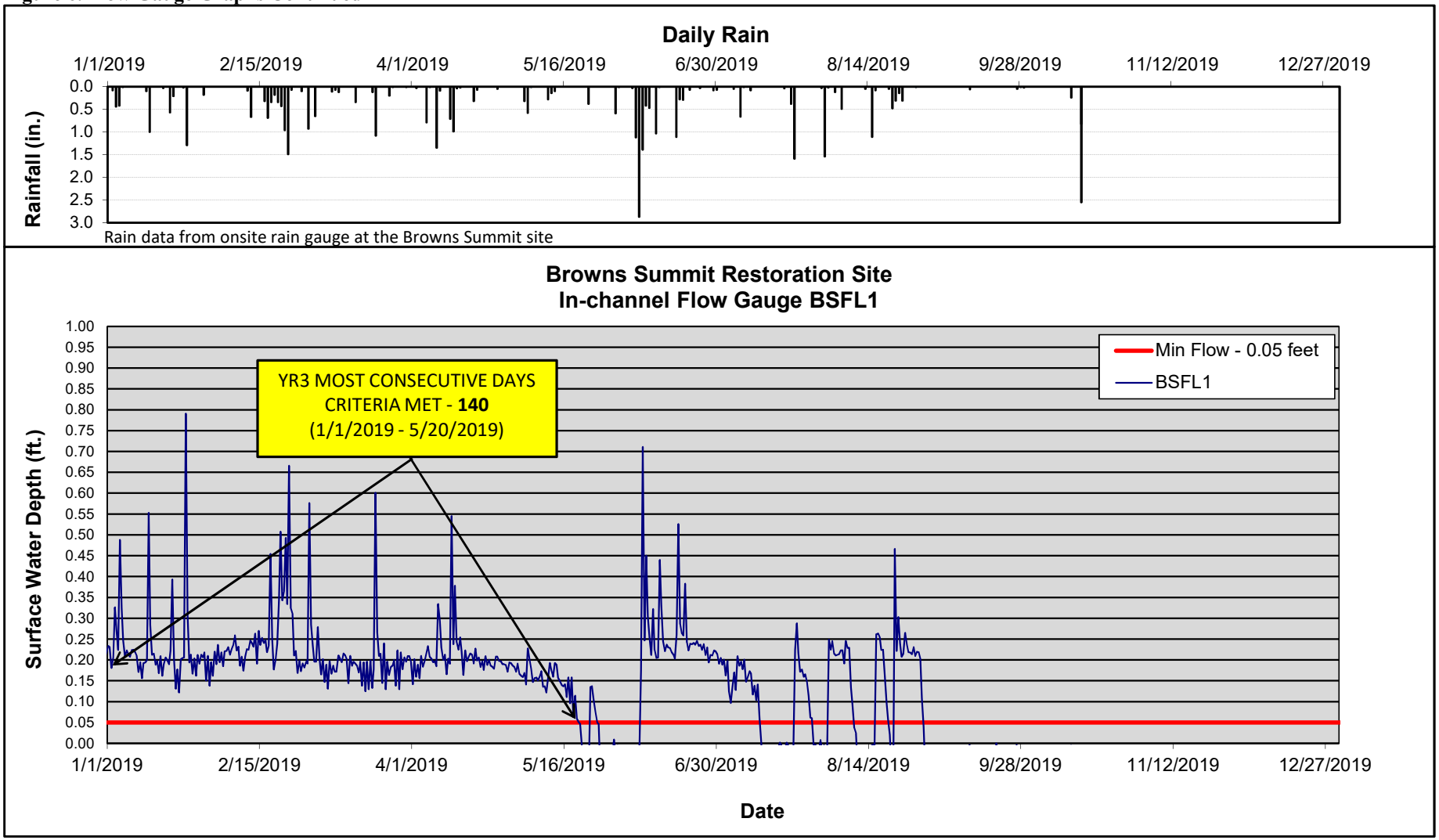
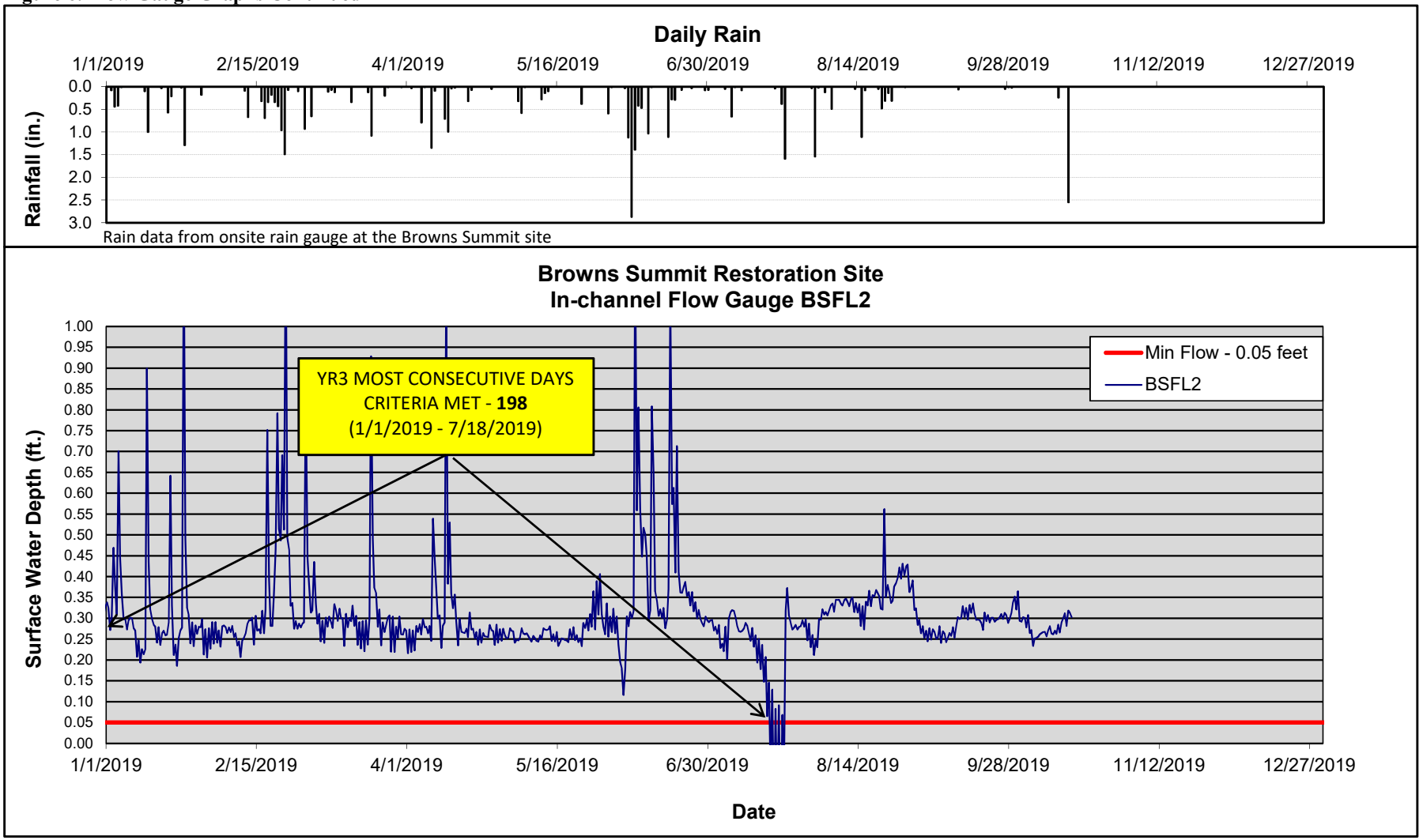


Figure 6. Flow Gauge Graphs Continued



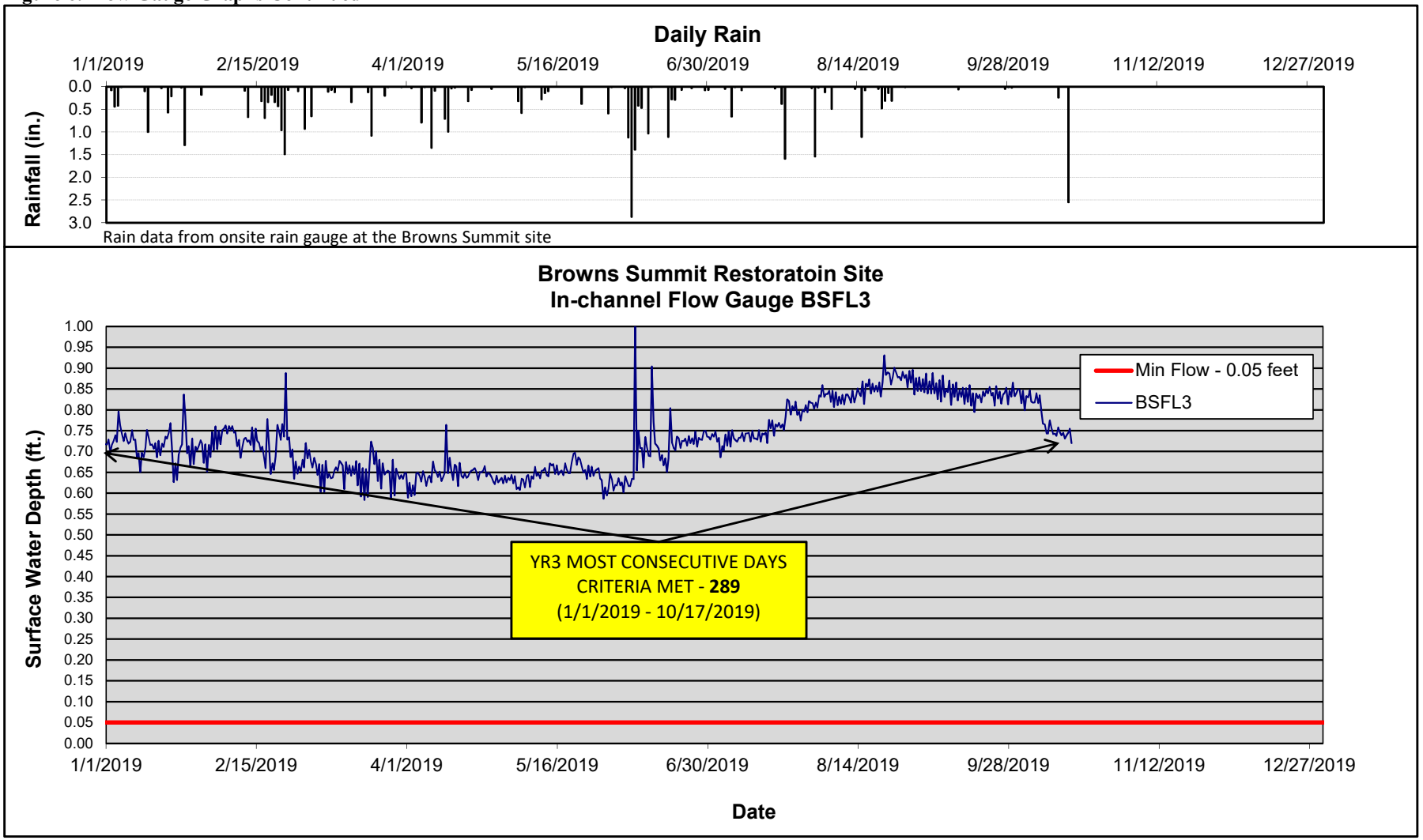
* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

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.

Table 15. Wetland Restoration Area Success (2019)

Wetland Restoration Area Success

Browns Summit Restoration Project: DMS Project ID No. 95019

Well ID	Percentage of Consecutive Days <12 inches from Ground Surface[1]	Most Consecutive Days Meeting Criteria[2]	Minimum Consecutive Days for Success	Percentage of Cumulative Days <12 inches from Ground Surface[4]	Cumulative Days Meeting Criteria[3]
Groundwater Monitoring Wells (Installed March 2017)					
BSAW1 (9% Criteria)	50.8	120	21	86.4	204
BSAW2 (12% Criteria)*	7.2	17	28	18.2	43
BSAW3 (12% Criteria)	83.1	196	28	87.7	207
BSAW4 (12% Criteria)	88.6	209	28	88.6	209
BSAW5 (12% Criteria)	88.6	209	28	88.6	209
BSAW6 (12% Criteria)	48.5	115	28	71.6	169
BSAW7 (12% Criteria)	88.6	209	28	88.6	209

Notes:

[1]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.

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

[3]Indicates the cumulative number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

[4]Indicates the number of instances within the monitored growing season when the water table rose to 12 inches or less from the soil surface.

*BSAW 2 malfunctioned (7/3/2019) but has been replaced on (10/30/2019) to capture well data during monitoring year 4.

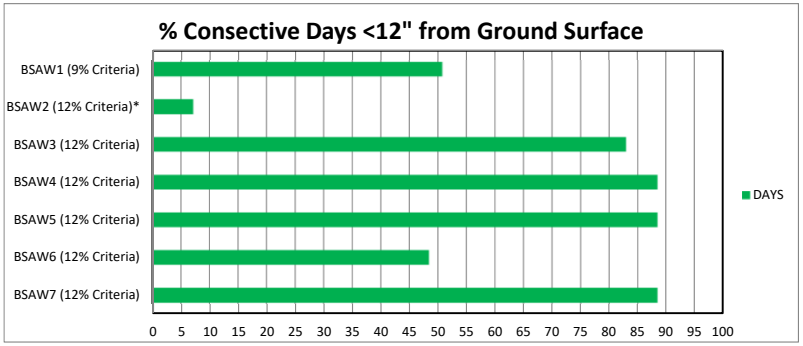
According to the Site Mitigation Plan, the growing season for Guilford County is from March 22 to November 13 and is 236 days long. 12% of the growing season is 28 days and 9% of the growing season is 21 days.

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



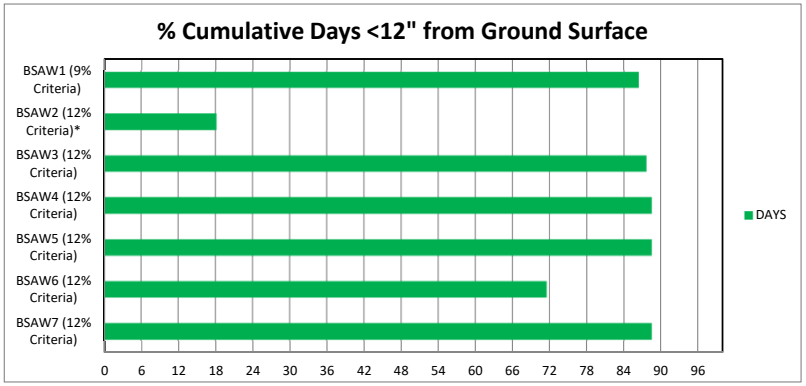


Table 16. Wetland Restoration Area Success
Browns Summit Restoration Project: DMS Project ID No. 96313

Well ID	Percentage of Consecutive Days <12 inches from Ground Surface[1]							Most Consecutive Days Meeting Criteria[2]							Percentage of Cumulative Days <12 inches from Ground Surface[1]							Cumulative Days Meeting Criteria[3]						
	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)	Year 6 (2022)	Year 7 (2023)	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)	Year 6 (2022)	Year 7 (2023)	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)	Year 6 (2022)	Year 7 (2023)	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)	Year 6 (2022)	Year 7 (2023)
Type 5 (3.5:1 Ratio - Success Criteria 9% of Growing Season)																												
BSAW1	44.7	45.1	88.6					105.5	106.5	209.0					74.8	80.5	88.6					176.5	190.0	209.0				
Type 4 (1:1 Ratio - Success Criteria 12% of Growing Season)																												
BSAW2*	3.2	6.8	7.2					7.5	16.0	17.0					13.8	38.8	18.4					32.5	91.5	43.5				
Type 2 (1.5:1 Ratio - Success Criteria 12% of Growing Season)																												
BSAW3	47.7	48.7	83.1					112.5	115.0	196.0					91.7	97.9	87.7					216.5	231.0	207.0				
Type 3 (1.5:1 Ratio - Success Criteria 12% of Growing Season)																												
BSAW4	88.6	100.0	88.6					209.0	236.0	209.0					88.6	100.0	88.6					209.0	236.0	209.0				
BSAW5	34.1	48.7	88.6					80.5	115.0	209.0					73.7	86.0	88.6					174.0	203.0	209.0				
BSAW6	46.0	48.7	48.7					108.5	115.0	115.0					89.4	91.9	71.6					211.0	217.0	169.0				
BSAW7	51.1	48.7	88.6					120.5	115.0	209.0					91.1	91.7	88.6					215.0	216.5	209.0				

Notes:
*BSAW 2 malfunctioned (7/3/2019) but has been replaced on (10/30/2019) to capture well data during monitoring year 4.
[1]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.
[2]Indicates the most consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surface.
[3]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 (2019) Continued

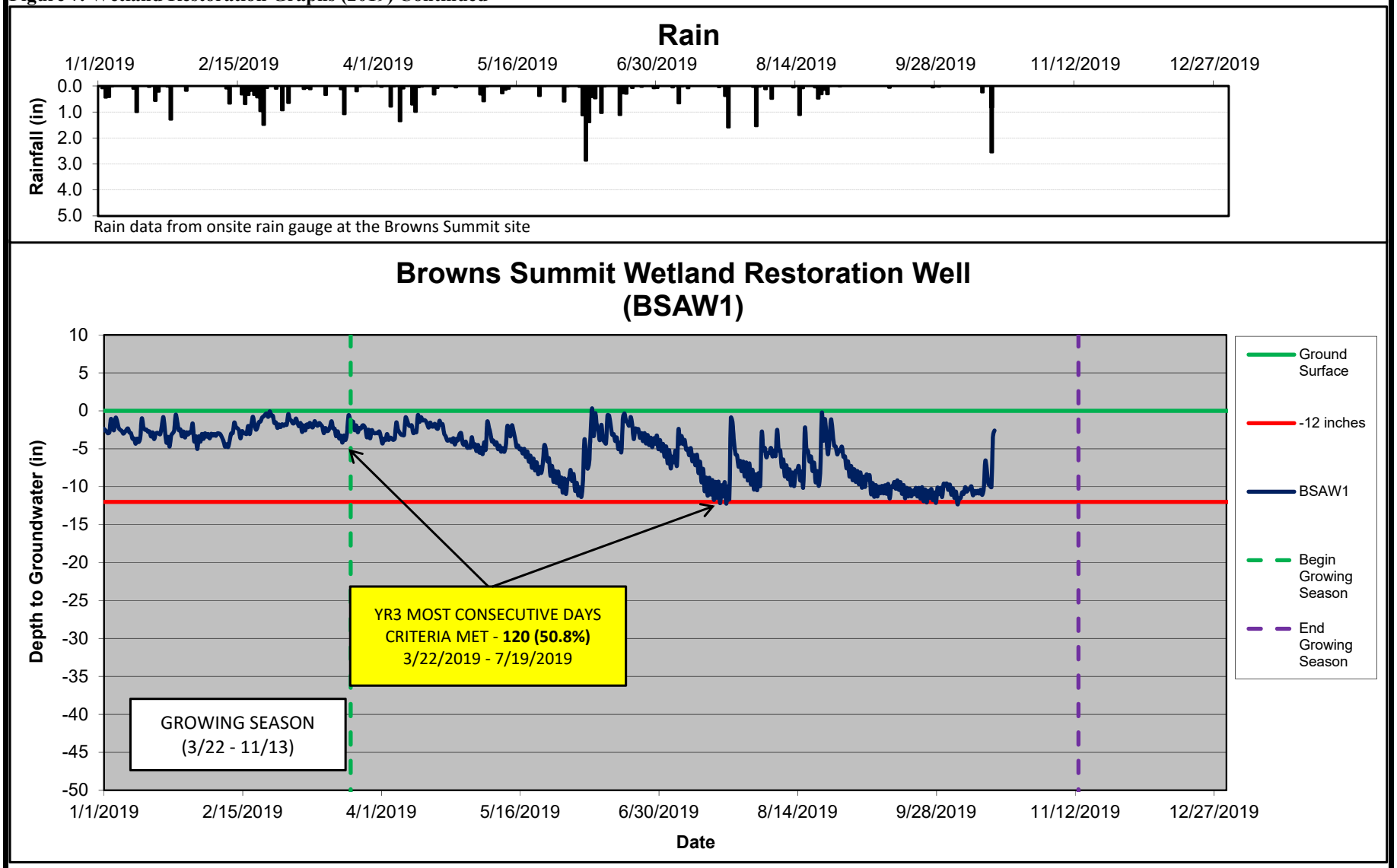
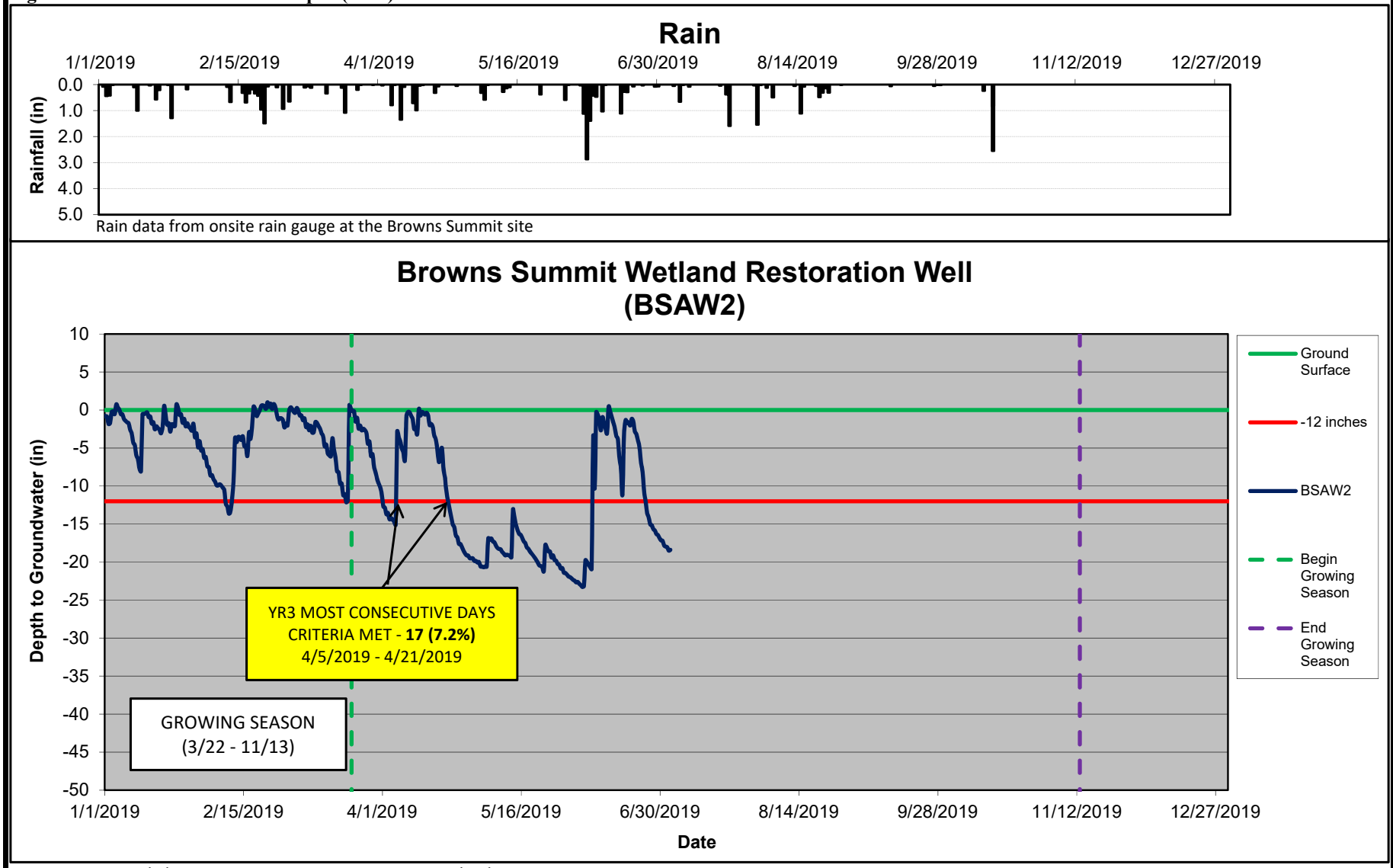
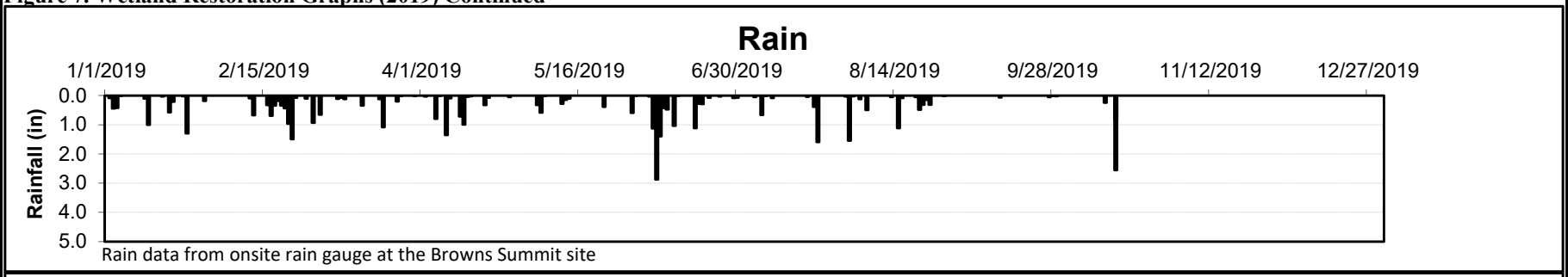


Figure 7. Wetland Restoration Graphs (2019) Continued



*BSAW 2 died (7/3/2019) but has been replaced on (10/30/2019) to capture well data during monitoring year 4.

Figure 7. Wetland Restoration Graphs (2019) Continued



Rain data from onsite rain gauge at the Browns Summit site

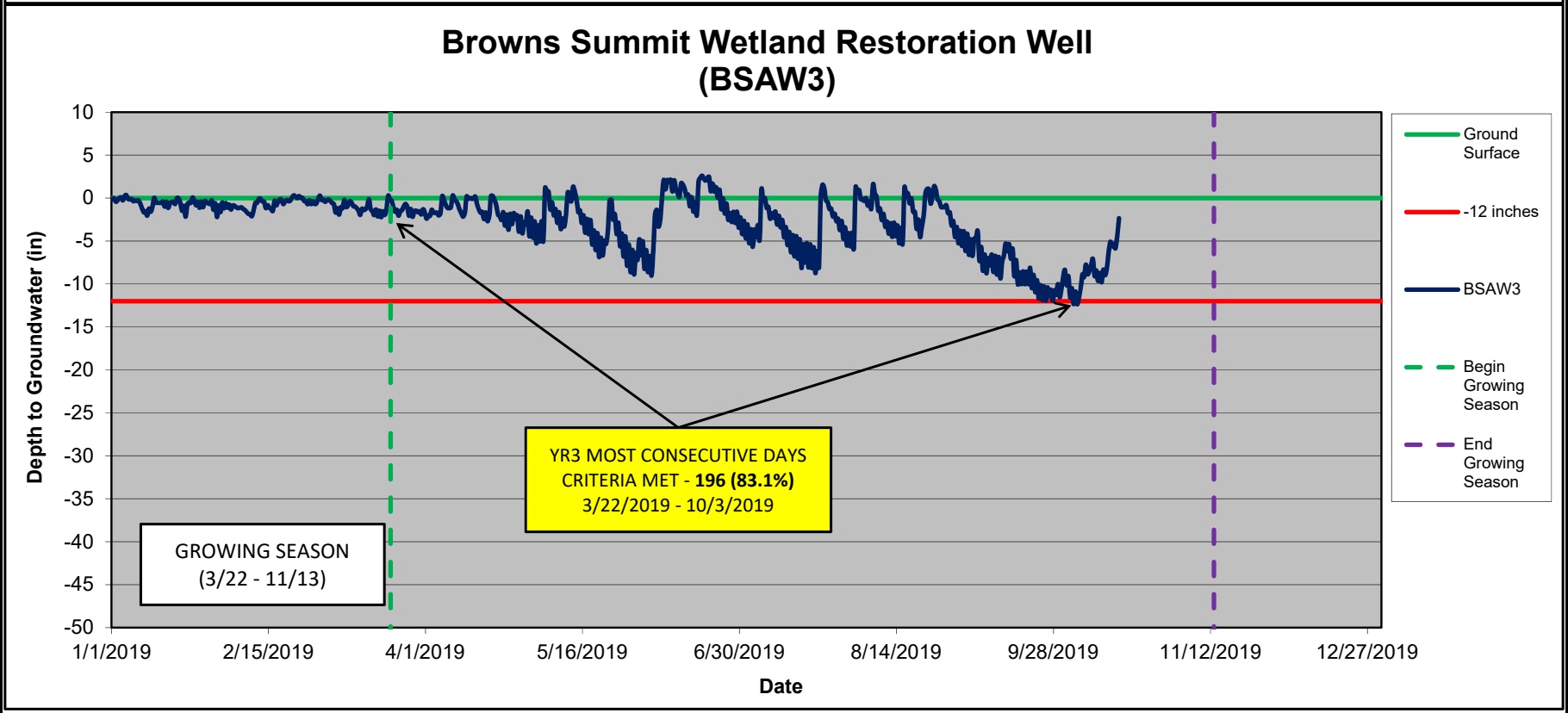
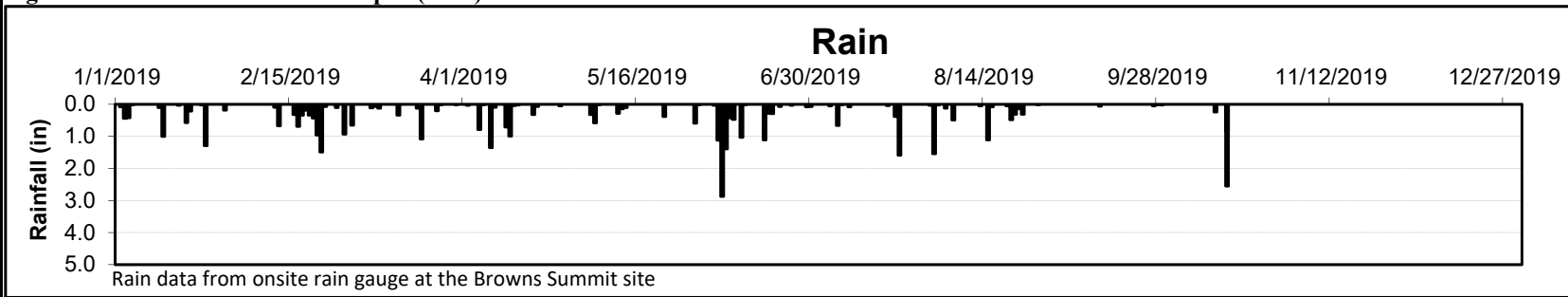


Figure 7. Wetland Restoration Graphs (2019) Continued



Rain data from onsite rain gauge at the Browns Summit site

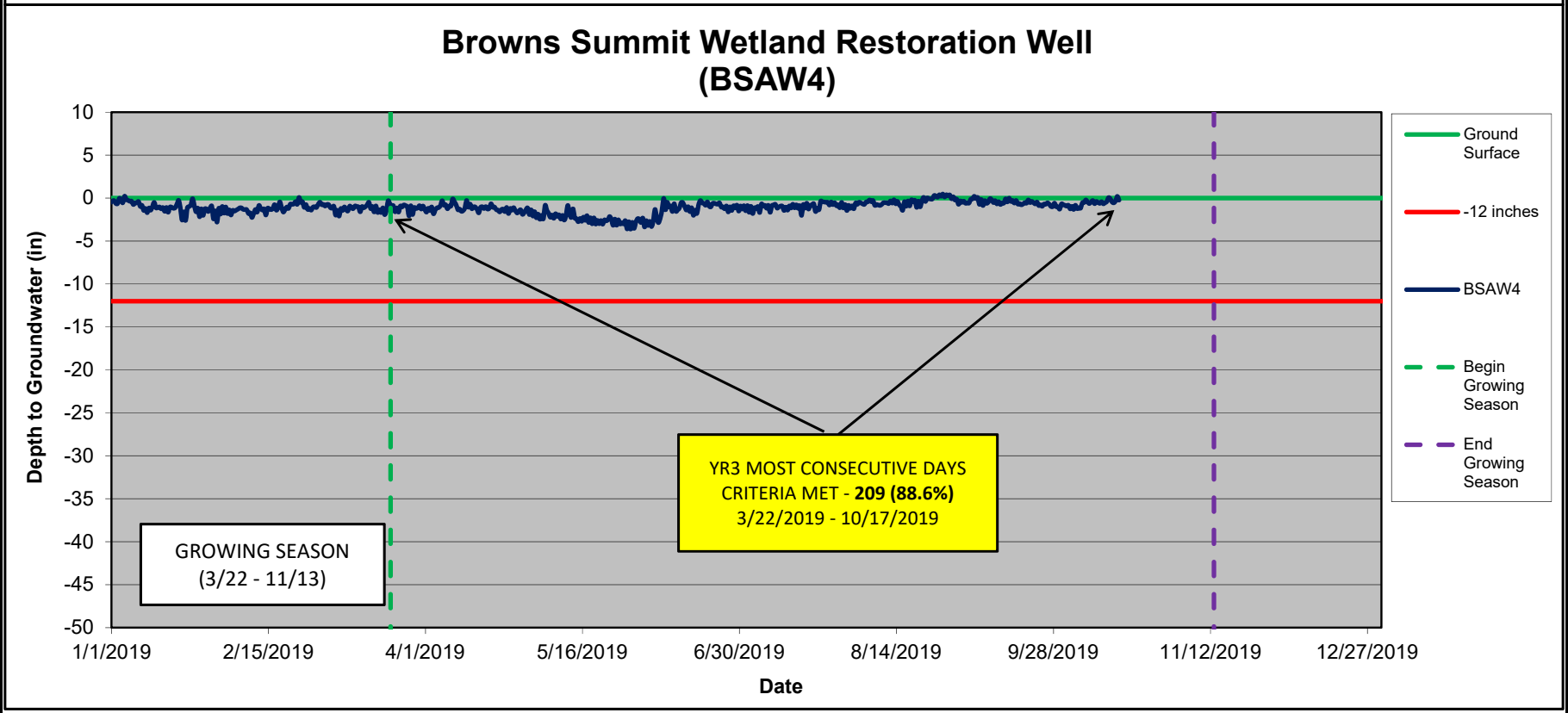
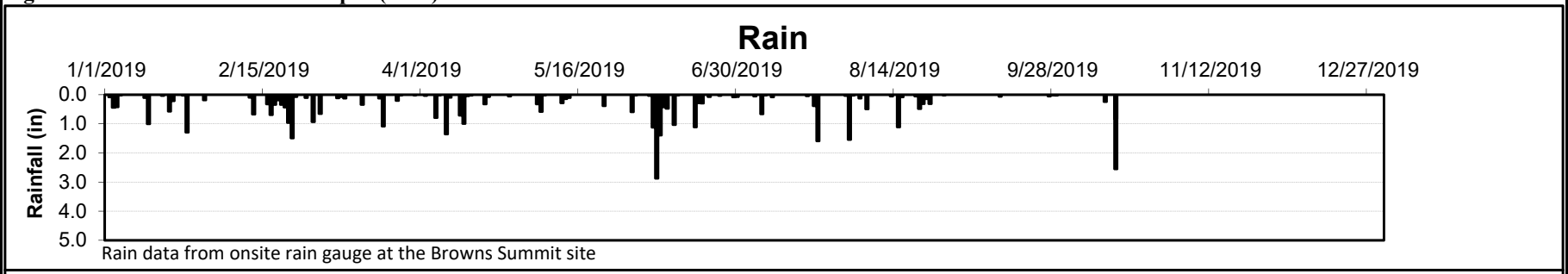


Figure 7. Wetland Restoration Graphs (2019) Continued



Rain data from onsite rain gauge at the Browns Summit site

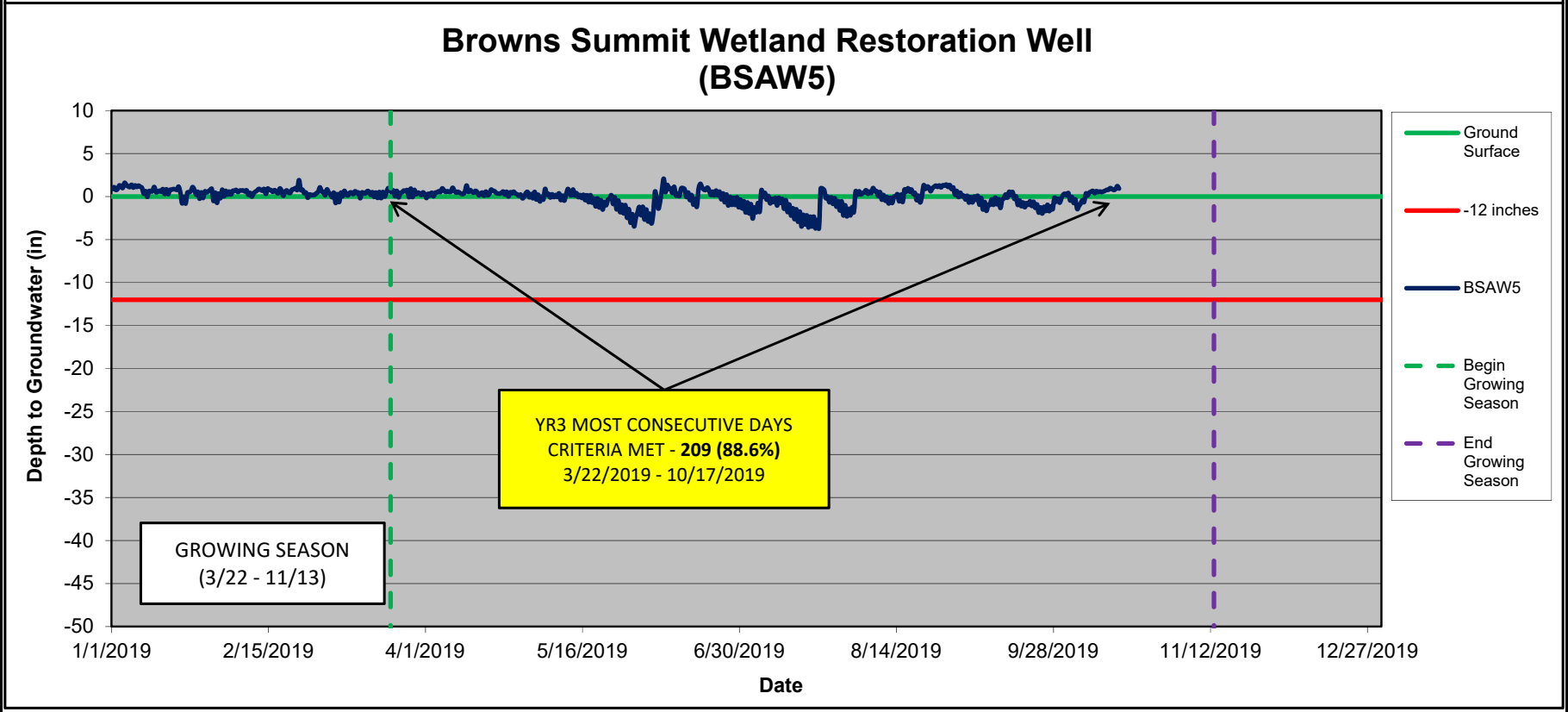


Figure 7. Wetland Restoration Graphs (2019) Continued

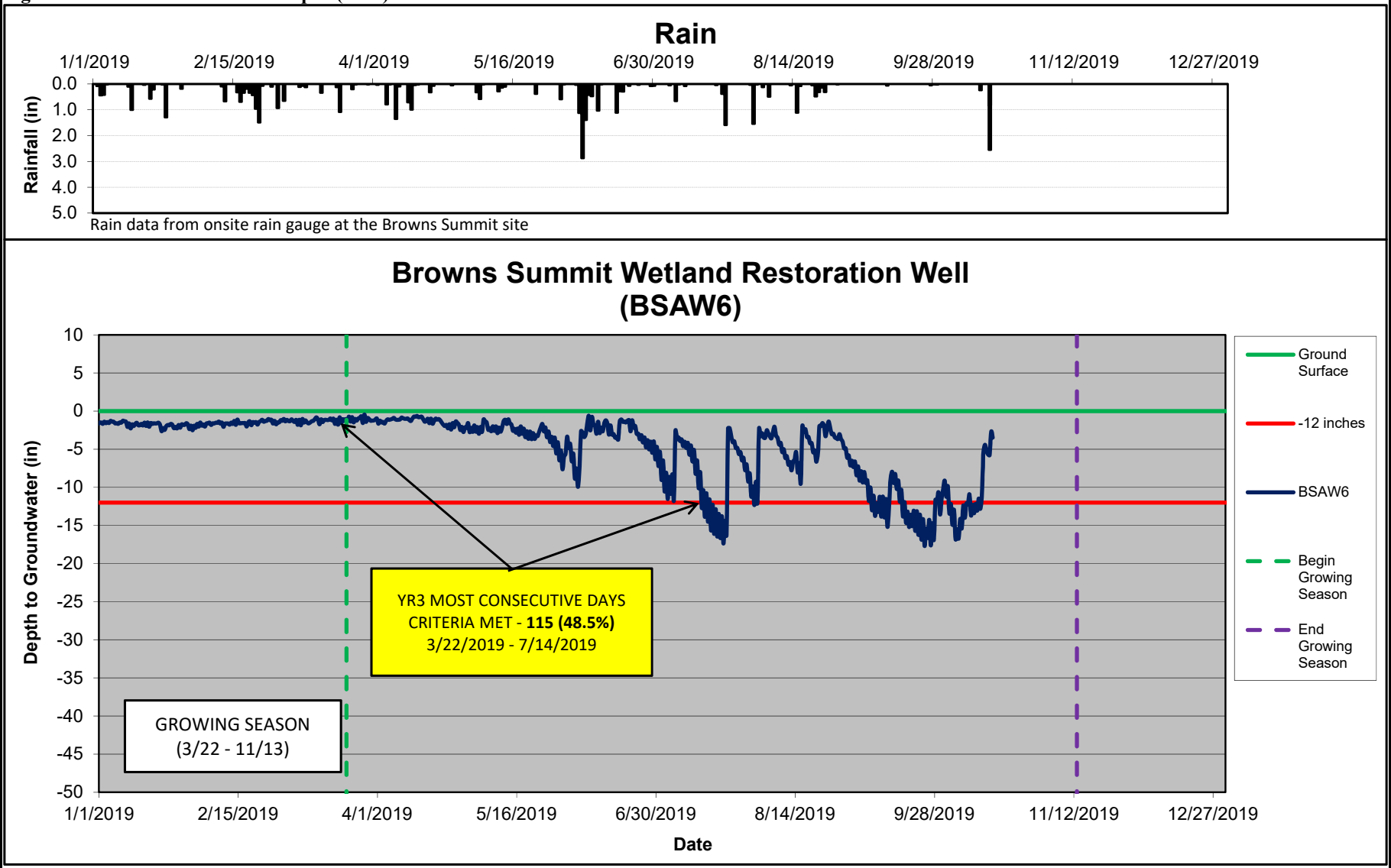
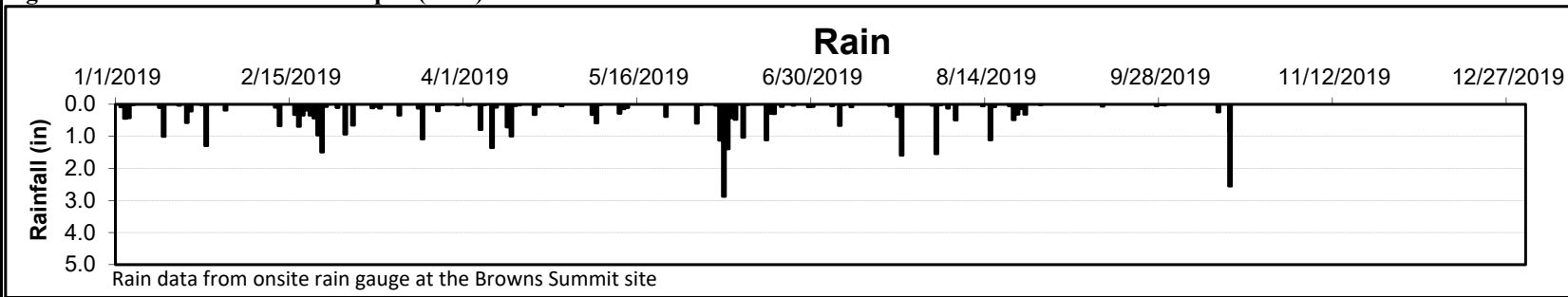


Figure 7. Wetland Restoration Graphs (2019) Continued



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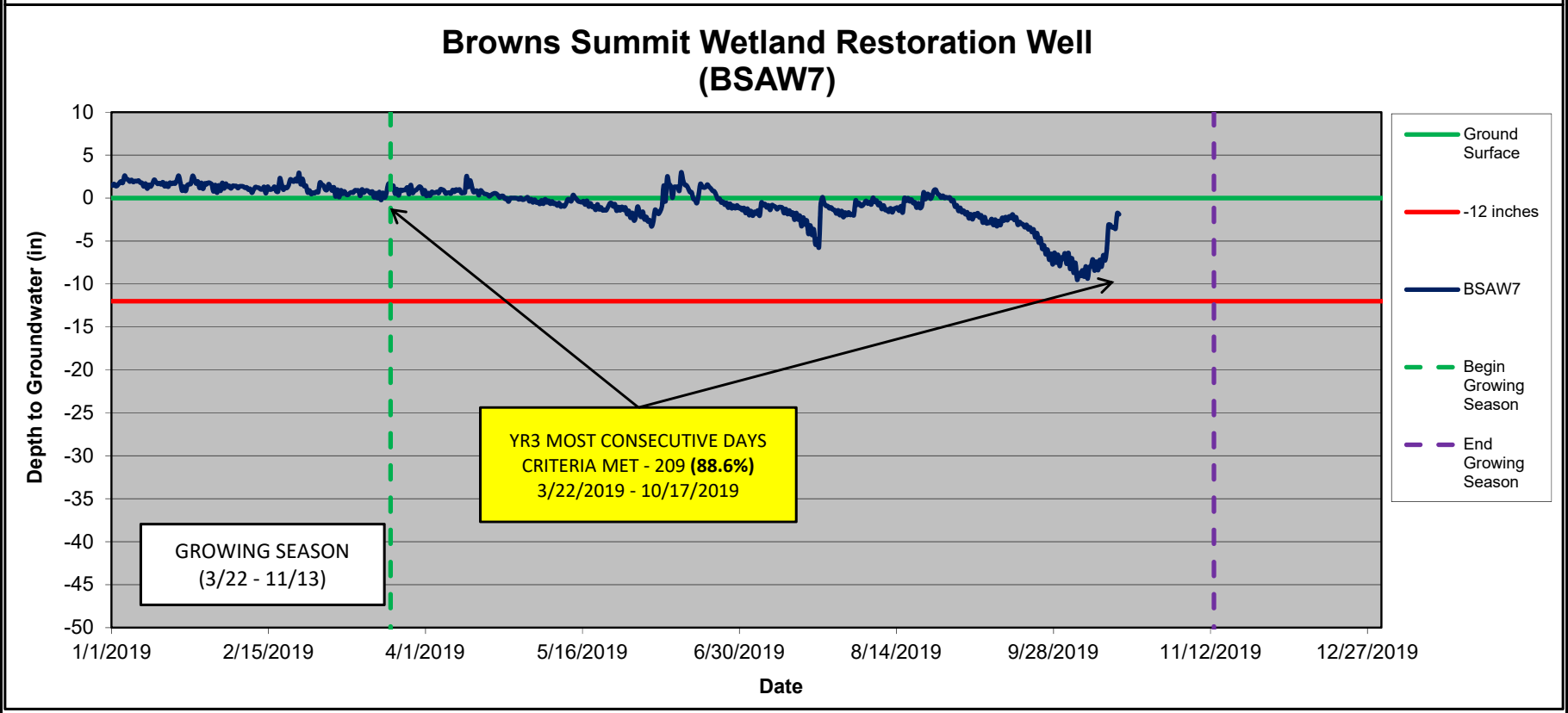
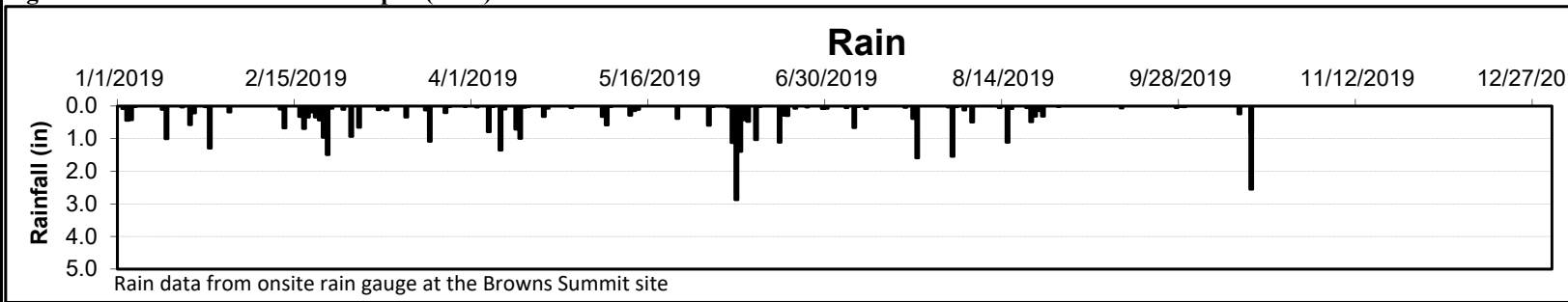


Figure 7. Wetland Restoration Graphs (2019) Continued



Rain data from onsite rain gauge at the Browns Summit site

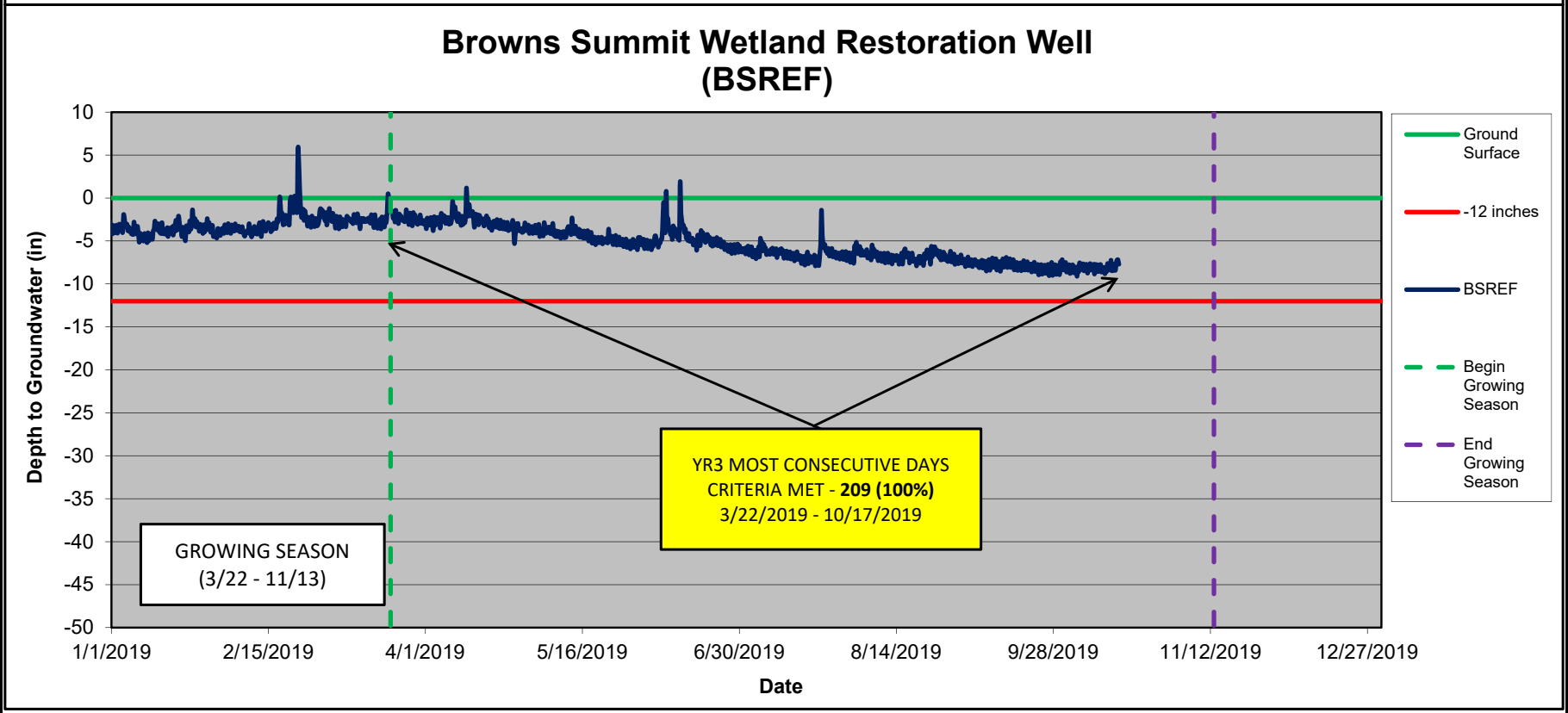
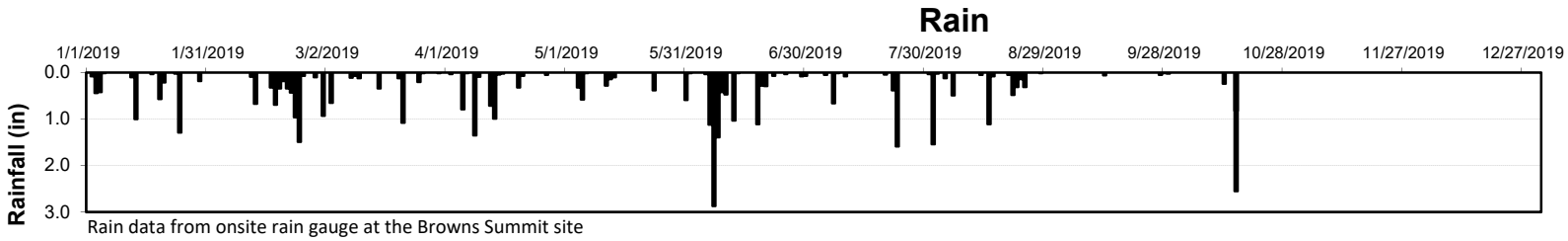
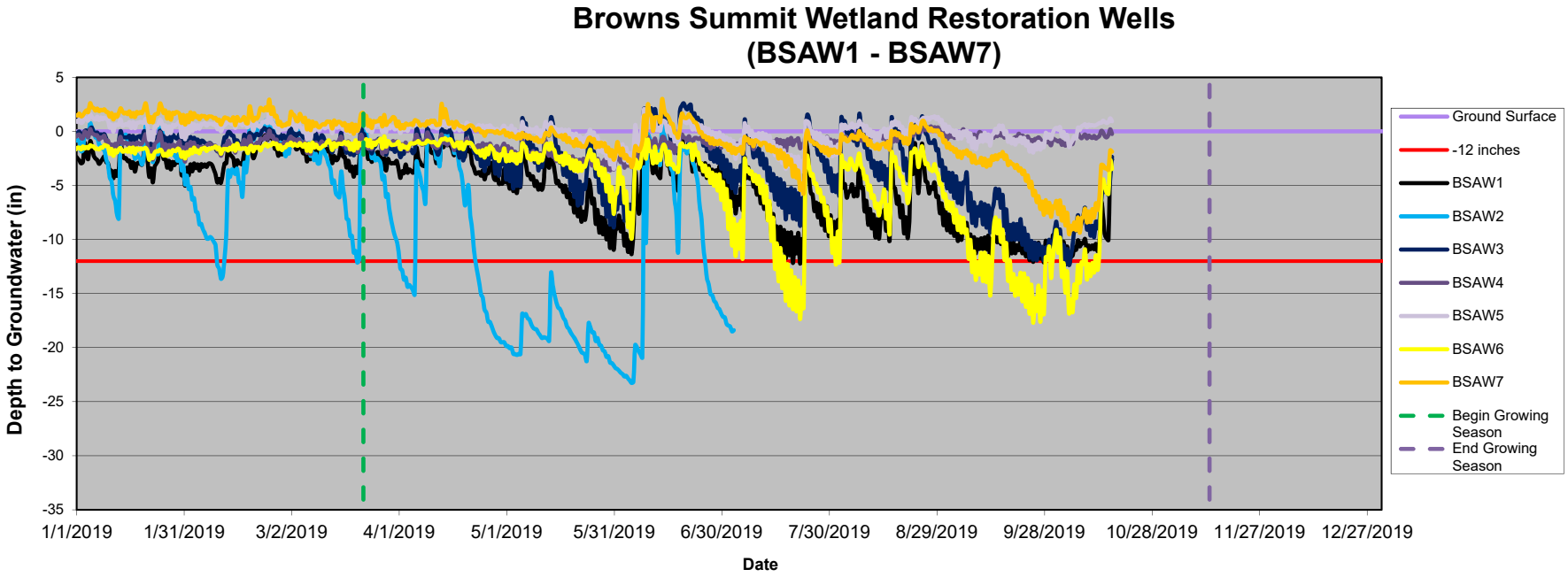


Figure 7. Wetland Restoration Graphs (2019)



Rain data from onsite rain gauge at the Browns Summit site



Browns Summit Creek Restoration Project – Hydrology Monitoring Stations

Manual Crest Gauge – Reading 3/28/19

Manual Crest Gauge – Reach 1, Reading 10/17/19

Wrack Line Showing High Flow (7/3/2019)

Wrack Line Showing High Flow (7/3/2019)