

Browns Summit Creek Restoration Project Year 4 Monitoring Report

Guilford County, North Carolina

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

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

Cape Fear River Basin: 03030002-010020



Project Info: Monitoring Year: 4 of 7
 Year of Data Collection: 2020
 Year of Completed Construction (including planting): 2017
 Submission Date: December 2020

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

Mitigation Project Name	Browns Summit Creek Restoration Project	USACE Action ID	2014-01642
DMS ID	96313	DWR Permit	2014-0332
River Basin	Cape Fear	Date Project Instituted	3/6/2014
Cataloging Unit	03030002	Date Prepared	4/20/2020
County	Guilford	Stream/Wet. Service Area	Cape Fear 03030002

Todd J. Smith 9/21/2020
Signature & Date of Official Approving Credit Release

1 - For NCDMS, no credits are released during the first milestone
2 - For NCDMS projects, the initial credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the IRT by posting it to the DMS portal, provided the following have been met:

- 1) Approved of Final Mitigation Plan
 - 2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.
 - 3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan.
 - 4) Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.
- 3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met.

Credit Release Milestone	Warm Stream Credits						
	Scheduled Releases %	Proposed Releases %	Proposed Released #	Not Approved # Releases	Approved Credits	Anticipated Release Year	Actual Release Date
1 - Site Establishment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2 - Year 0 / As-Built	30.00%	30.00%	1,590.260	0.000	1,590.260	2017	12/11/2017
3 - Year 1 Monitoring	10.00%	10.00%	530.087	0.000	530.087	2018	4/25/2018
4 - Year 2 Monitoring	10.00%	10.00%	530.087	0.000	530.087	2019	4/26/2019
5 - Year 3 Monitoring	10.00%	10.00%	530.087	0.000	530.087	2020	4/20/2020
6 - Year 4 Monitoring	5.00%					2021	
7 - Year 5 Monitoring	10.00%					2022	
8 - Year 6 Monitoring	5.00%					2023	
9 - Year 7 Monitoring	10.00%					2024	
Stream Bankfull Standard	10.00%	10.00%	530.087	0.000	530.087	2019	4/26/2019
			Totals	0.000	3,710.608		

Total Gross Credits	5,300.867
Total Unrealized Credits to Date	0.000
Total Released Credits to Date	3,710.608
Total Percentage Released	70.00%
Remaining Unreleased Credits	1,590.259

Credit Release Milestone	Riparian Credits						
	Scheduled Releases %	Proposed Releases %	Proposed Released #	Not Approved # Releases	Approved Credits	Anticipated Release Year	Actual Release Date
1 - Site Establishment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2 - Year 0 / As-Built	30.00%	30.00%	0.750	0.000	0.750	2017	12/11/2017
3 - Year 1 Monitoring	10.00%	10.00%	0.250	0.000	0.250	2018	4/25/2018
4 - Year 2 Monitoring	10.00%	10.00%	0.250	0.000	0.250	2019	4/26/2019
5 - Year 3 Monitoring	15.00%	15.00%	0.375	0.000	0.375	2020	4/20/2020
6 - Year 4 Monitoring	5.00%					2021	
7 - Year 5 Monitoring	15.00%					2022	
8 - Year 6 Monitoring	5.00%					2023	
9 - Year 7 Monitoring	10.00%					2024	
Stream Bankfull Standard	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Totals	0.000	1.625		

Total Gross Credits	2.501
Total Unrealized Credits to Date	0.000
Total Released Credits to Date	1.625
Total Percentage Released	65.00%
Remaining Unreleased Credits	0.876

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County	Guilford	Stream/Wet. Service Area	Cape Fear 03030002

Notes**Contingencies (if any)****Project Quantities**

Mitigation Type	Restoration Type	Physical Quantity
Warm Stream	Restoration	3,903.000
Warm Stream	Enhancement I	1,525.000
Warm Stream	Enhancement II	953.000
Riparian	Restoration	4.440

Debits

							Stream Restoration Credits	Riparian Restoration
Beginning Balance (mitigation credits)							5,300.867	2.501
Released Credits							0.000	0.000
Unrealized Credits							0.000	0.000
Owning Program	Req. Id	TIP #	Project Name	USACE Permit #	DWR Permit #	DCM Permit #		
NCDOT Stream & Wetland ILF Program	REQ-005224	R-2635	Western Wake Expressway	2007-02903	2007-1470		62.189	
NCDOT Stream & Wetland ILF Program	REQ-005541	U-2803	SR 1919 Improvements	2012-00941	2012-0539		222.000	
NCDOT Stream & Wetland ILF Program	REQ-005544	P-3414	Graham-Haw Passing Siding & Mail Line Relocation	2005-21270			9.943	
NCDOT Stream & Wetland ILF Program	REQ-006028	U-2525B, U-2525C	Greensboro Eastern Loop	2005-21386	2013-0918		766.041	
NCDOT Stream & Wetland ILF Program	REQ-006028	U-2525B, U-2525C	Greensboro Eastern Loop	2005-21386	2013-0918		1,170.900	
NCDOT Stream & Wetland ILF Program	REQ-006028	U-2525B, U-2525C	Greensboro Eastern Loop	2005-21386	2013-0918		305.000	
NCDOT Stream & Wetland ILF Program	REQ-006028	U-2525B, U-2525C	Greensboro Eastern Loop	2005-21386	2013-0918		114.360	
NCDOT Stream & Wetland ILF Program	REQ-006028	U-2525B, U-2525C	Greensboro Eastern Loop	2005-21386	2013-0918		390.300	
NCDOT Stream & Wetland ILF Program	REQ-006028	U-2525B, U-2525C	Greensboro Eastern Loop	2005-21386	2013-0918		101.667	
NCDOT Stream & Wetland ILF Program	REQ-006028	U-2525B, U-2525C	Greensboro Eastern Loop	2005-21386	2013-0918		38.120	
NCDOT Stream & Wetland ILF Program	REQ-006029	U-2525B, U-2525C	Greensboro Eastern Loop	2005-21386	2013+0918			0.249
NCDOT Stream & Wetland ILF Program	REQ-006516	EB-4707A, EB-4707B	SR 1838 / SR 2220 Improvements - Division 5	2015-02591				0.060
NCDOT Stream & Wetland ILF Program	REQ-006728		SR 2022 - Bridge 108 - Division 7	2016-00402				0.037
NCDOT Stream & Wetland ILF Program	REQ-006883		SR 1308 - Bridge 310117 - Division 5	2017-00185	2017-1102			0.180

Mitigation Project Name Browns Summit Creek Restoration Project
 DMS ID 96313
 River Basin Cape Fear
 Cataloging Unit 03030002
 County Guilford

USACE Action ID 2014-01642
 DWR Permit 2014-0332
 Date Project Instituted 3/6/2014
 Date Prepared 4/20/2020
 Stream/Wet. Service Area Cape Fear 03030002

NCDOT Stream & Wetland ILF Program	REQ-006910	B-5731	SR 2109 - Bridge 112 - Division 7	2017-00079				0.060
NCDOT Stream & Wetland ILF Program	REQ-007143		SR 2351 - Bridge 17 (B-5715) - Division 7	2017-00077	2017-0899			0.050
NCDOT Stream & Wetland ILF Program	REQ-007431	U-4734	Kernersville - Macy Grove Rd Extension	2009-02019	2017-1466			0.612
NCDOT Stream & Wetland ILF Program	REQ-008124	U-2524C, U-2524D	Greensboro Western Loop	2001-21125	2013-0223			0.001
NCDOT Stream & Wetland ILF Program	REQ-008353	R-2635	Western Wake Expressway	2007-02903	2007-1470			0.001
Total Credits Debited							3,180.520	1.250
Remaining Available balance (mitigation credits)							530.088	0.375
Remaining Credits (unreleased credits)							1,590.259	0.876

February 22, 2021

Kelly Phillips
NCDEQ - Division of Mitigation Services
232 State Park Road
Troutman, NC 28166

Subject: Response to Task 10 Draft Year 4 Monitoring Report Comments for Browns Summit
(DMS #96313) Cape Fear River Basin; CU 03030002; Guilford County, North
Carolina Contract No. 005792

Dear Mr. Phillips:

Please find enclosed our responses to the Year 4 Monitoring Report Comments dated January 27, 2021 regarding the Browns Summit Creek Mitigation Project. We have revised the Year 4 Monitoring Report document in response to this review.

Comment: *Cover Sheet: Please add the RFP # to the cover sheet.*

Response: RFP: 16-005568 has been added to the cover sheet as requested.

Comment: *Section 1.0 Executive Summary: Please identify the thermal regime (warm) in the project summary information.*

Response: Warm-temperature thermal regime has been added to the executive summary.

Comment: *Section 1.0 Executive Summary: The report indicates well BSAW8 was installed during MY4 in an adjacent wetland. Please include the location of this well on a figure and provide an interpretation of the data relative to the site.*

Response: BSAW8 (MW8) has been added to the CCPV along with a written description located in the executive summary.

Comment: *Section 2.1.4 Visual Assessment: Add discussion for the Reach 2 grade control structure identified in Table 5 as not functioning. Evaluate any concern associated with the reduced function of the structure and potential impact on the system.*

Response: Reach 2 grade control failed during MY3 but repaired in MY4. Table 5 has been updated to show no structures failing.

Comment: *Appendix A - CCPV: Indicate the location of the Reach 2 structure of concern on the CCPV.*

Response: See above response to comment.

Comment: *Appendix A - Table 1: Please take credit calculations out to 3 digits (5,301.867 SMU).*

Response: Table 1 credit calculations have been revised to show 3 digits.

Digital files:

Comment: *DMS commented last year about mismatches between spatial feature lengths and values reported in the asset table. The submitted features resolved the discrepancies for R1-R5. DMS understands that credits for R6 and T4 were calculated using valley length, and as such, these features will not match the asset table. However, T3's feature length is 87 ft compared to the reported length of 70 ft. DMS wants to verify that there are no available features that accurately characterize the reported length for T3.*

Response: The as-built survey length for reach T3 is 87.96 ft which matches the spatial feature length value for T3. However, in Table 1 we are requesting 70 SMU at 1:1 credit to reflect the credits reported in the Mitigation plan.

Comment: *Please spatially identify the area experiencing the grade control issue (Table 5) in the CCPV, and include this feature in the digital submission.*

Response: See response to comment 4.

Comment: *Please submit photos as JPEGs.*

Response: JPEGs have been added in the e-submission support files.

Comment: *Please provide the data used to create the streamflow and groundwater well figures.*

Response: Streamflow and groundwater well raw spreadsheets have been included in the support files.

Two hard copies and one pdf copy along with updated digital files uploaded to a thumb drive are being provided. If you have any questions concerning the Year 4 Monitoring Report, please contact me at 919-481-5703 or via email at Katie.McKeithan@mbakerintl.com.

Sincerely,



Kathleen McKeithan, PE, CPESC, CPSWQ, CFM

Michael Baker Engineering, Inc.

Browns Summit Creek Restoration Project Year 4 Monitoring Report

Guilford County, North Carolina

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

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Cape Fear River Basin: 03030002-010020

Report Prepared and Submitted by Michael Baker Engineering, Inc.

NC Professional Engineering License # F-1084



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*Note: The figures and tables marked above with an asterisk are not included as part of this Year 4 Monitoring Report, but were left listed in the Table of Contents to explain the otherwise out-of-sequence figure/table numbering and appendix designations. For clarity, Michael Baker wishes to preserve the continuity of the labeling for these features between monitoring years to avoid confusion (e.g. to allow Appendix C to always contain vegetation data, and Table 12 to always be the bankfull event table, etc. in each monitoring report). These figures and tables have been included in past reports and will be included again as part of the Year 5 monitoring report for 2021.

1. EXECUTIVE SUMMARY

Michael Baker Engineering, Inc. (Michael Baker) restored approximately 3,903 linear feet (LF) of jurisdictional stream and enhanced 2,478 LF of stream (of which 559 is for BMPs) along unnamed tributaries (UT) to the Haw River and restored over 4.44 acres of wetland (existing channel lengths). The unnamed tributary (mainstem) has been referred to as Browns Summit Creek for this project. All of these stream features are in the warm-temperature thermal regime. In addition, 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.

In accordance with the Mitigation Plan and the project-applicable DMS guidance document “Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation. Version 1.5, Dated June 8, 2012, no formal vegetation plot monitoring was performed, nor were any stream cross-sectional surveys conducted as part of the Year 4 monitoring effort. A visual assessment of the site is emphasized this year, with the full vegetation and cross-section survey work to resume for the Year 5 monitoring in 2021. No Stream Problem Area (SPA) or Vegetation Problem Area (VPA) were discovered during Year 4 monitoring. SPA 3-1 reported during Monitoring Year 3 (MY3) was repaired and remained stable throughout the MY4. VPA 3-1 reported in MY3 was treated in April 2020 and July 2020 along with any other invasive species found on the site. Baker plans on retreating these areas for future monitoring years. VPA 3-2 and 3-3 reported in MY3 were supplemental planted with species appropriate for the area planted and approved by the mitigation planting list. These areas were also seeded to help establish vegetation and help prevent scouring.

Year 4 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 137 days of consecutive flow in R4, while flow gauge BSFL2 documented 202 days of consecutive flow in T3, and BSFL3 documented 310 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 4 monitoring, the R1 crest gauge documented two post-construction bankfull event from February 2020 at 0.91 feet and second event in November of 2020 at 1.49 feet. 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).

Eight wells were installed in the wetland restoration areas. One additional well, BSAW8 was installed during MY4 to gather additional data in adjacent wetlands. BSAW8 is located adjacent to wetland type 5 (Hydrologic reestablishment) where BSAW1 is located. BSAW8 data shows the wetland performing well above success criteria. Seven of the eight are performing successfully. One well did not meet success (BSAW2). However, BSAW2 shows hydrology coming to within twelve inches of the ground surface relatively consistently and having more cumulative days meeting criteria than previous 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 4 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 4 visual site assessment was collected in November 2020. Visual Assessment is contained in Appendix B.

2.1 Stream Assessment

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

2.1.1 Morphological Parameters and Channel Stability

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

A longitudinal profile was surveyed for the entire length of channel immediately after construction to document as-built baseline conditions for the Monitoring Year 0 only. Annual longitudinal profiles were not planned to be conducted during subsequent monitoring years unless channel instability has been documented or remedial actions/repairs are required by the U.S. Army Corps of Engineers (USACE) or DMS. However, during preparation of the MY1 monitoring report, it was discovered that the data provided by the construction contractor's survey subcontractor for as-built was of low quality and insufficient. The quality of the sealed as-built survey provided by the contractor 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 subsequent monitoring years by Michael Baker and DMS staff. Due to the MY0 survey quality discovered during MY1, Michael Baker proposed to utilize the detailed survey data and associated parameters collected during MY1 by a different surveyor as the basis of comparison through the monitoring phase of the project. This will ensure an accurate assessment of success and trends throughout the life of the project. The contractor had the site's longitudinal profile re-surveyed in case future comparisons are required. The longitudinal profile overlay was provided in previous reports.

Additionally, per DMS request, 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 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 met the bankfull flow requirements of two bankfull events within two separate years.

Year 4 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

Visual inspection of the site are conducted at a minimum of twice a year. Representative photographs for Monitoring Year 4 were taken along each Reach in March 2020 and are provided in Appendix B.

2.1.4 Visual Stream Morphological Stability Assessment

The visual stream morphological stability assessment involves the qualitative evaluation of lateral and vertical channel stability, and 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 4 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.

4.1 Wetland Assessment

Eight (8) 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.

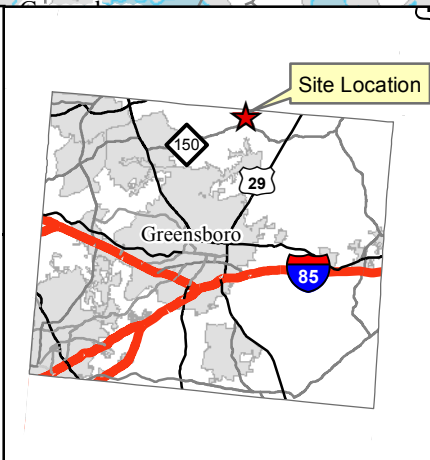
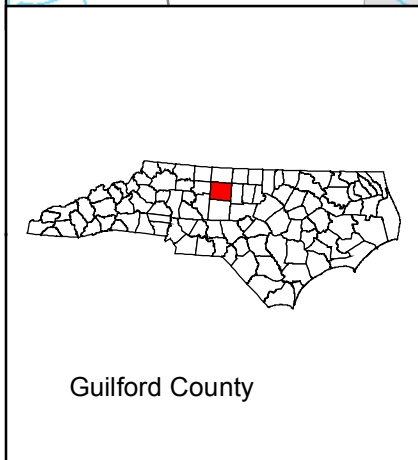
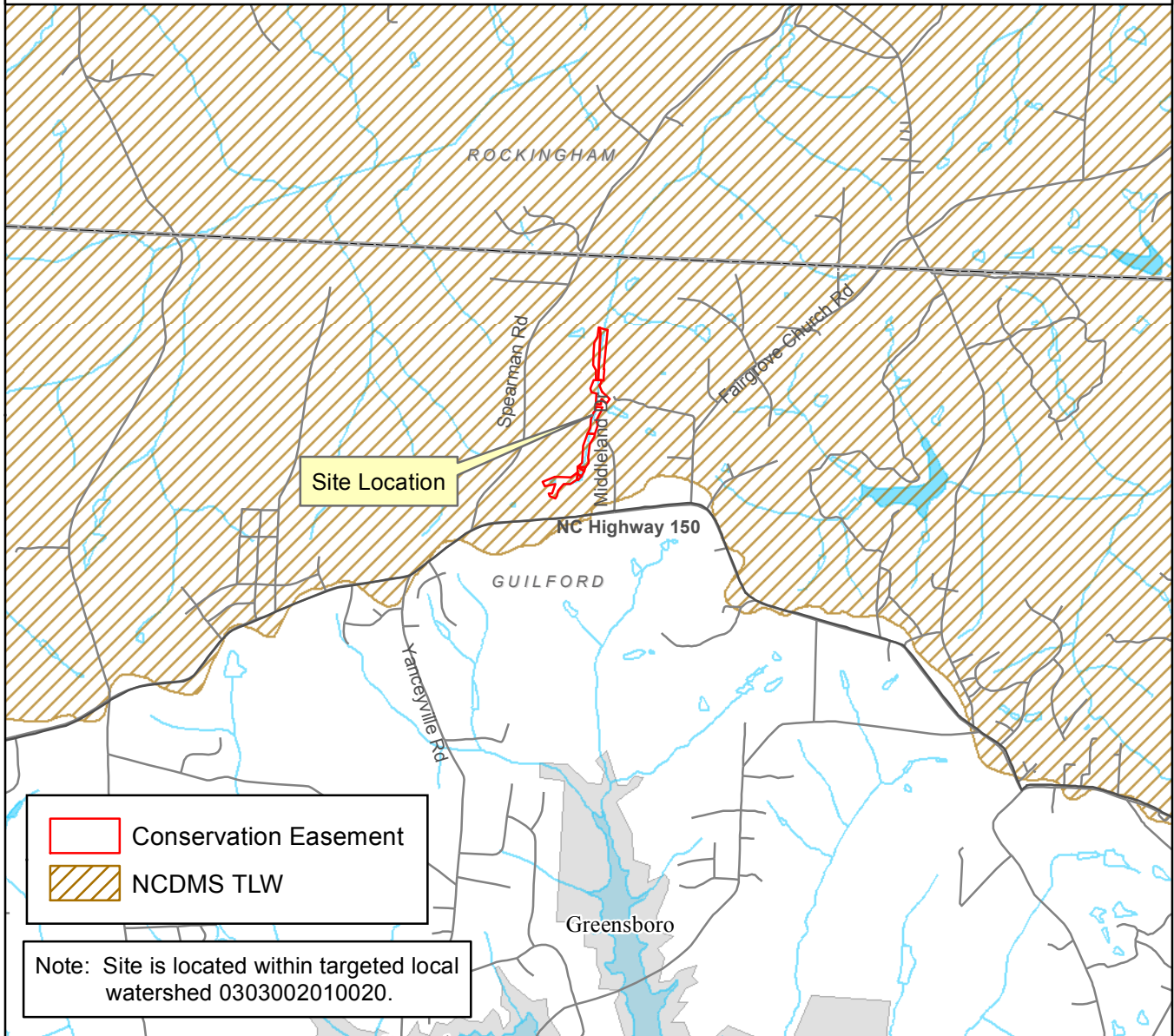


Figure 1
Project Vicinity Map
Browns Summit (DMS# 96313)

NCDEQ - Division
of Mitigation Services

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Miles

Conservation Easement

Restoration Feature Approach

Restoration

Enhancement I

Enhancement II

No Credit

Wetland Mitigation Types

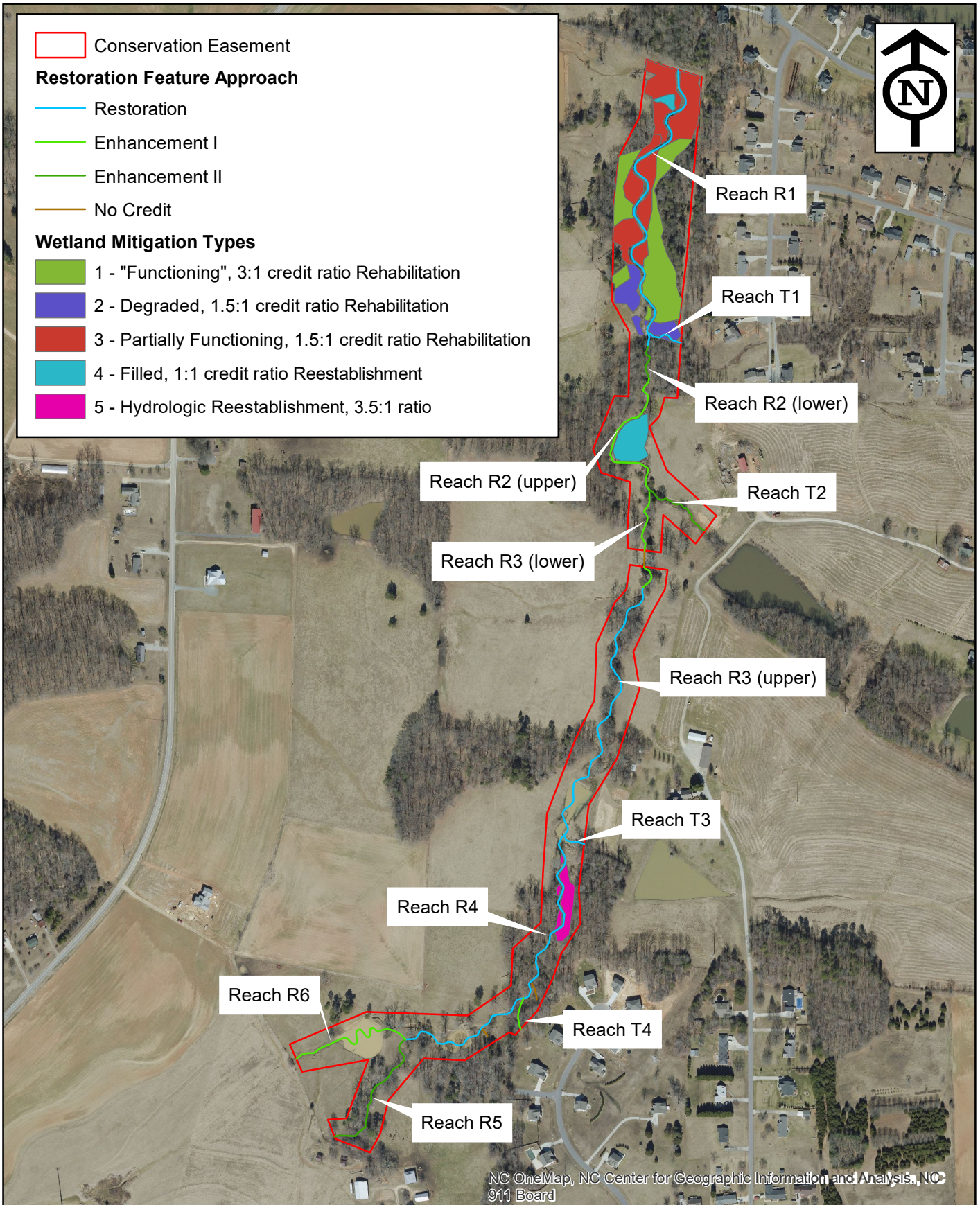
1 - "Functioning", 3:1 credit ratio Rehabilitation

2 - Degraded, 1.5:1 credit ratio Rehabilitation

3 - Partially Functioning, 1.5:1 credit ratio Rehabilitation

4 - Filled, 1:1 credit ratio Reestablishment

5 - Hydrologic Reestablishment, 3.5:1 ratio



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

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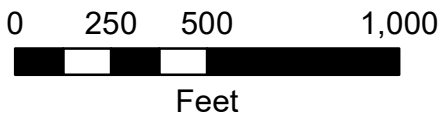
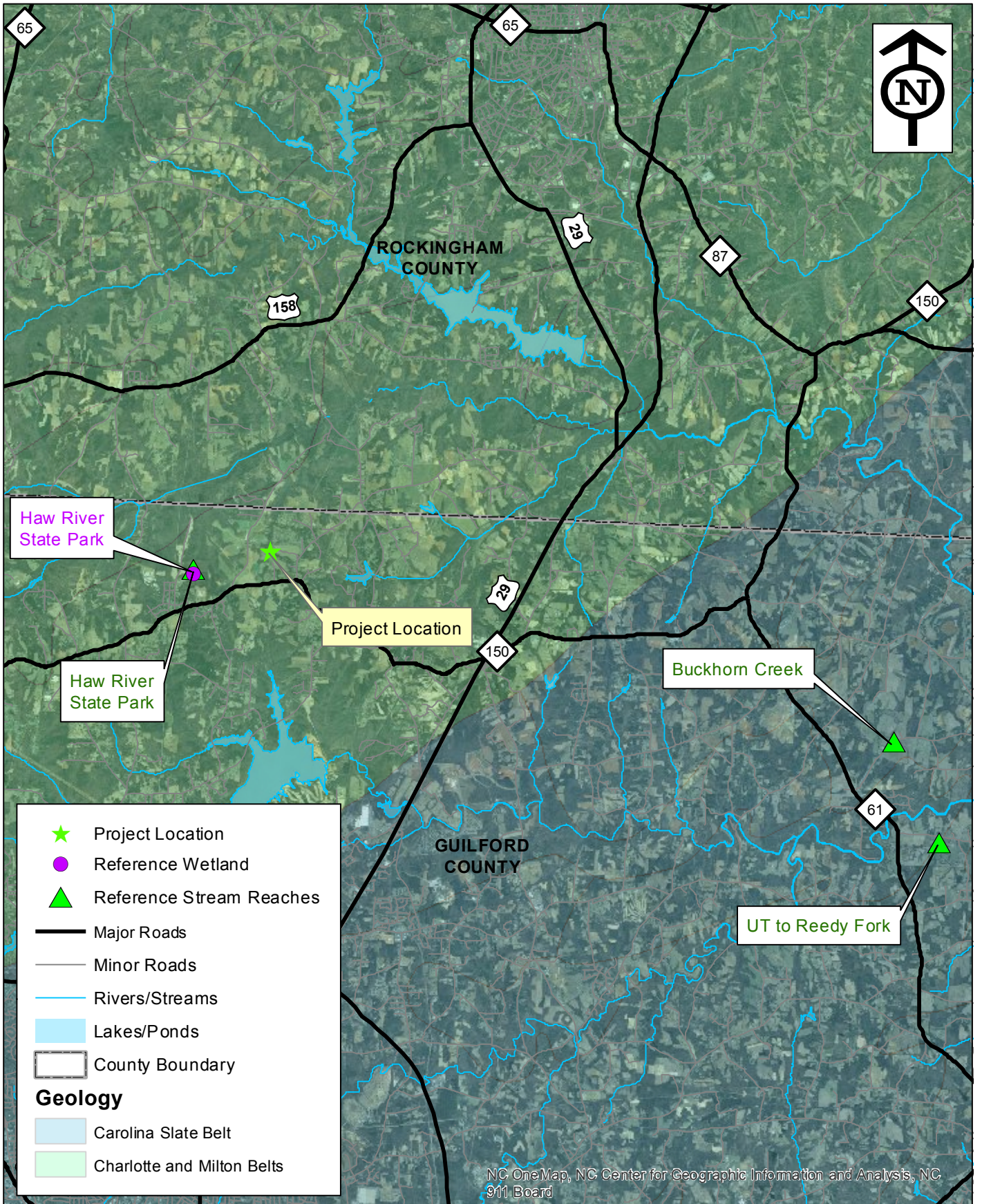


Figure 2
Restoration Summary Map
Browns Summit Site
(DMS #96313)



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Figure 3
Reference Stream
Locations Map
Browns Summit Site

Table 1. Project Components and Mitigation Credits							
Browns Summit Creek Restoration Project: DMS Project No ID. 96313							
Mitigation Credits							
	Stream	Riparian Wetland		Non-riparian Wetland	Buffer	Nitrogen Nutrient Offset	Phosphorus Nutrient Offset
Type	R, E1, EII	R	E				
Totals	5,300.867 SMU	2.50	0.0				
Project Components							
Project Component or Reach ID	Stationing/ Location (As-Built)*	Existing Footage/ Acreage (LF/AC)*	Approach	Restoration/ Restoration Equivalent (SMU/WMU)	Restoration Footage or Acreage (LF/AC)**	Mitigation Ratio	
R1	51+00.00 - 63+89.87	1,217	Restoration	1,290	1,290	1:1	
R2 (downstream section)	49+65.28 - 51+00.00	167	Enhancement II	54	134	2.5:1	
R2 (upstream section)	43+48.17 - 49+65.28	701	Enhancement I	409	614	1.5:1	
R3 (downstream section) 60' easement break subtracted from stream lengths	39+35.73 - 43+48.17 (CE 40+45.09 - 41+05.52)	362	Enhancement I	235	352	1.5:1	
R3 (upstream section)	28+31.92 - 39+35.73	1,224	Restoration	1,102	1,102	1:1	
R4	15+35.86 - 28+31.92	1,350	Restoration	1,296	1,296	1:1	
R5	10+00 - 15+35.86	536	Enhancement II	214	536	2.5:1	
R6	10+00 - 15+19.39	536	Enhancement I/BMP	295	442 LF (valley length)	1.5:1	
T1	10+00 - 11+44.99	121	Restoration	145	145	1:1	
T2	10+00 - 12+85.21	283	Enhancement II	113	283	2.5:1	
T3	10+04.88 - 10+92.84	83	Restoration	70	70	1:1	
T4	10+30.18 - 11+49.36	47	Enhancement I/BMP	78	117 LF (valley length)	1.5:1	
Wetland Area - Type 1	See Figures	1.57	Rehabilitation	0.51	1.53	3:1	
Wetland Area - Type 2	See Figures	0.49	Rehabilitation	0.29	0.43	1.5:1	
Wetland Area - Type 3	See Figures	2.06	Rehabilitation	1.17	1.75	1.5:1	
Wetland Area - Type 4	See Figures	0.49	Re-establishment	0.46	0.46	1:1	
Wetland Area - Type 5	See Figures	0.27	Re-establishment	0.08	0.27	3.5:1	
*Wetland existing acreage and restoration acreages were swapped in Table 5.1 of the Mitigation Plan.							
**All reach lengths shown here are taken from the Mitigation plan except for R1 and R2 downstream which use the As-Built lengths per IRT agreement at As-Built.							
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	November 2, 2015
Final Mitigation Plan with PCN (minor revisions requested in approval letter)	not specified in proposal	Winter 2015	January 29, 2016
Final Design – (at least 90% complete)	not specified in proposal		September 20, 2016
Construction Begins	not specified in proposal		October 10, 2016
Temporary S&E mix applied to entire project area	June 1, 2015		March 10, 2017
Permanent seed mix applied to entire project area	June 2, 2015		March 10, 2017
Planting of live stakes	June 3, 2015		March 10, 2017
Planting of bare root trees	June 3, 2015		March 10, 2017
End of Construction	May 4, 2015		March 8, 2017
Survey of As-built conditions (Year 0 Monitoring-baseline)	June 3, 2015	Spring 2017	July 1, 2017
Baseline Monitoring Report*	May 7, 2017	Spring 2017	September 15, 2017
Year 1 Monitoring	December 1, 2017	November 2017	December 1, 2017
Year 2 Monitoring	December 1, 2018	November 2018	December 1, 2018
Year 3 Monitoring	December 1, 2019	November 2019	December 3, 2019
Year 4 Monitoring	December 1, 2020	November 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 <u>Contact:</u> Katie McKeithan, Tel. 919-481-5703
Construction Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Stephen Carroll, Tel. 919-428-8368
Planting Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Stephen Carroll, Tel. 919-428-8368
Seeding Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 <u>Contact:</u> Stephen Carroll, Tel. 919-428-8368
Seed Mix Sources	Green Resources, Rodney Montgomery 336-215-3458
Nursery Stock Suppliers	Dykes and Son, 931-668-8833 Mellow Marsh Farm, 919-742-1200 ArborGen, 843-528-3204
Live Stakes Suppliers	Foggy Mountain Nursery, 336-384-5323
Monitoring Performers	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 <u>Contact:</u> Katie McKeithan, Tel. 919-481-5703
Stream Monitoring Point of Contact	Katie McKeithan, Tel. 919-481-5703
Vegetation Monitoring Point of Contact	Katie McKeithan, Tel. 919-481-5703
Surveyors	Kee Mapping and Surveying, 828-575-9021

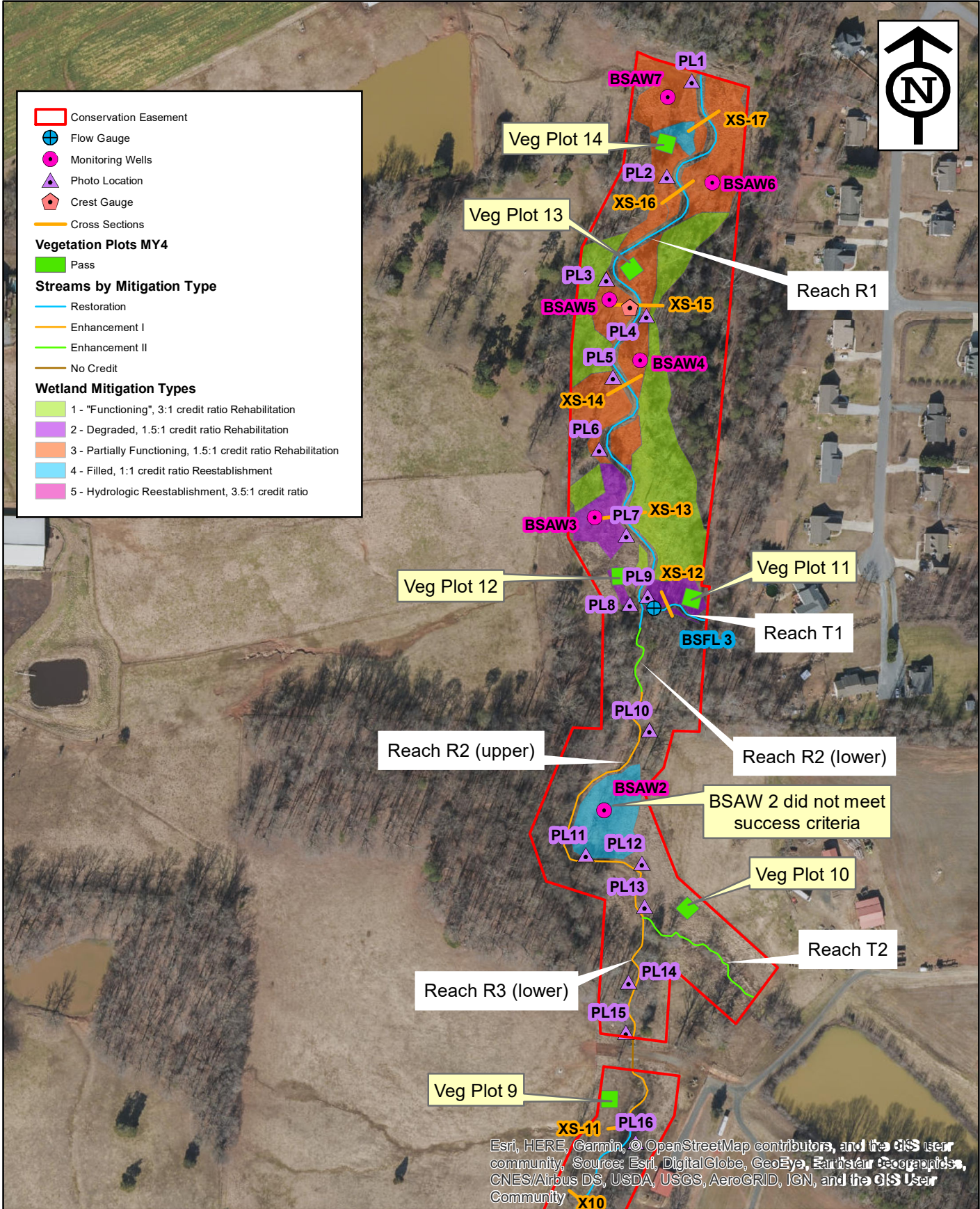
Table 4. Project Attributes					
Browns Summit Creek Restoration Project: DMS Project No ID. 96313					
Project Information					
Project Name	Browns Summit Creek Restoration Project				
County	Guilford				
Project Area (acres)	20.2				
Project Coordinates (latitude and longitude)	36.237 N, -79.749 W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

Appendix B

Visual Assessment Data



- Conservation Easement
- Flow Gauge
- Monitoring Wells
- Photo Location
- Crest Gauge
- Cross Sections
- Vegetation Plots MY4**
- Pass
- Streams by Mitigation Type**
- Restoration
- Enhancement I
- Enhancement II
- No Credit
- Wetland Mitigation Types**
- 1 - "Functioning", 3:1 credit ratio Rehabilitation
- 2 - Degraded, 1.5:1 credit ratio Rehabilitation
- 3 - Partially Functioning, 1.5:1 credit ratio Rehabilitation
- 4 - Filled, 1:1 credit ratio Reestablishment
- 5 - Hydrologic Reestablishment, 3.5:1 credit ratio



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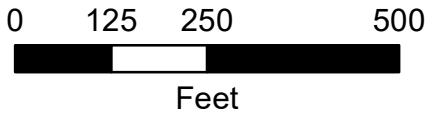


Figure 4.1
Current Conditions
Plan View
Browns Summit Site
(DMS #96313)

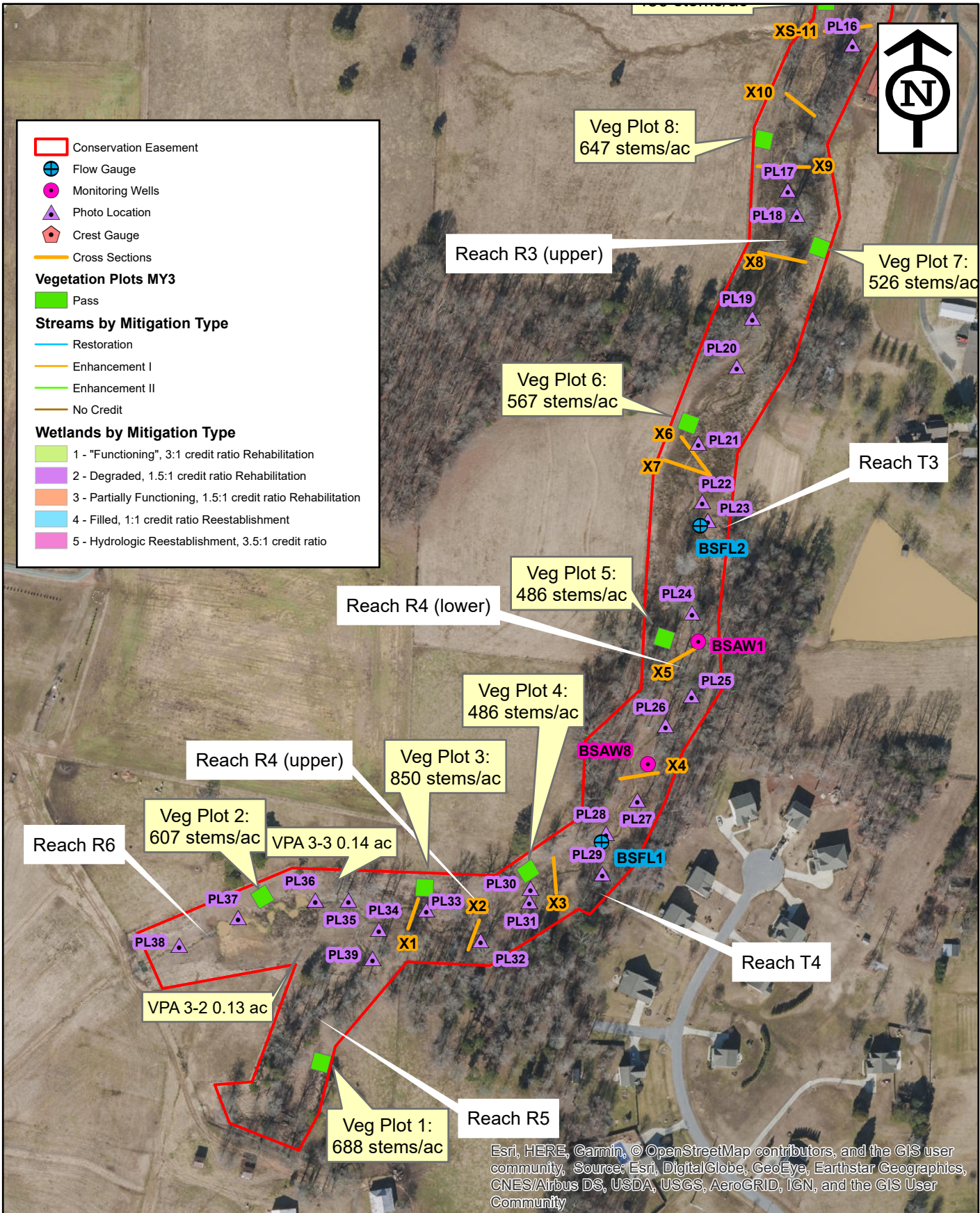


Table 5. Visual Stream Morphology Stability Assessment										
#REF!										
Reach ID		R1								
Assessed Length		1,290								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
Totals					0	0	100%			
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	20	20			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	11	11			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	20	20			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	20	20			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	20	20			100%			

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

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		R2 (upstream section)									
Assessed Length		614									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%				
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%				
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	5	5			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	5			100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	5	5			100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	5	5			100%				

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		R3 (downstream section)									
Assessed Length		352									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody	Footage with Stabilizing Woody	Adjusted % for Stabilizing Woody	
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%				
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%				
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	7	7			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	7	7			100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	7	7			100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	7	7			100%				

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID			R3 (upstream section)								
Assessed Length			1,102								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody	Footage with Stabilizing Woody	Adjusted % for Stabilizing Woody	
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%				
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%				
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	15	15			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	10	10			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	15	15			100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	15	15			100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	15	15			100%				

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		R4									
Assessed Length		1,296									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody	Footage with Stabilizing Woody	Adjusted % for Stabilizing Woody	
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%				
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%				
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	14	14			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	4	4			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	14	14			100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	14	14			100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	14	14			100%				

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

Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID		R6								
Assessed Length		442								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
Totals					0	0	100%			
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	9	9			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	9	9			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	9	9			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	9	9			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	9	9			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		T1									
Assessed Length		145									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%				
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%				
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	6	6			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	6			100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	6	6			100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	6	6			100%				

Table 5 continued. Visual Stream Morphology Stability Assessment										
Reach ID		T2								
Assessed Length		283								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
Totals					0	0	100%			
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	2	2			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment										
Browns Summit Creek Restoration Project: DMS Project No ID. 96313										
Reach ID		T3								
Assessed Length		70								
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			
Totals					0	0	100%			
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	1	1			100%			

Table 5 continued. Visual Stream Morphology Stability Assessment											
Browns Summit Creek Restoration Project: DMS Project No ID. 96313											
Reach ID		T4									
Assessed Length		117									
Major Channel Category	Channel Category	Sub-Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%				
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%				
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%				
Totals					0	0	100%				
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	8	8			100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	8	8			100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	8	8			100%				

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

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take March 3, 2020 (All photos are viewing upstream)



Photo Point 1 – Station 63+75, Reach 1



Photo Point 2 – Station 61+50, Reach 1



Photo Point 3 – Station 58+75, Reach 1



Photo Point 4 – Station 57+85, Reach 1



Photo Point 5 – Station 56+75, Reach 1



Photo Point 6 – Station 55+00, Reach 1

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take March 3, 2020 (All photos are viewing upstream)



Photo Point 7 – Station 53+50, Reach 1



Photo Point 8 – Station 51+75, Reach 1



Photo Point 9 – Station 11+25, Reach T1



Photo Point 10 – Station 49+00, Reach 2



Photo Point 11 – Station 46+00, Reach 2



Photo Point 12 – Station 44+75, Reach 2

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take March 3, 2020 (All photos are viewing upstream)



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



Photo Point 14 – Station 42+25, Reach 3



Photo Point 15 – Station 41+50, Reach 3



Photo Point 16 – Station 36+25, Reach 3



Photo Point 17 – Station 36+00, Reach 3



Photo Point 18 – Station 35+00, Reach 3

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take March 3, 2020 (All photos are viewing upstream)



Photo Point 19 – Station 33+00, Reach 3



Photo Point 20 – Station 32+00, Reach 3



Photo Point 21 – 31+50, Reach 3



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

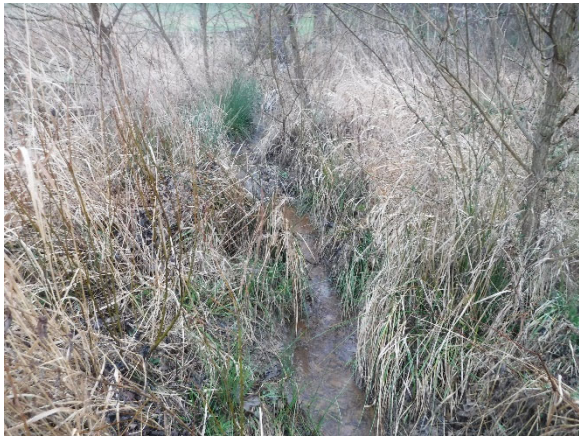


Photo Point 23 – Station 10+25, Reach T3



Photo Point 24 – Station 26+50, Reach 4

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take March 3, 2020 (All photos are viewing upstream)



Photo Point 25 – Station 24+50, Reach 4



Photo Point 26 – Station 24+00, Reach 4



Photo Point 27 – Station 22+50, Reach 4



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



Photo Point 29 – Station 11+00, Reach T4



Photo Point 30 – Station 19+50, Reach 4

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take March 3, 2020 (All photos are viewing upstream)



Photo Point 31 – Station 19+10, Step Pools



Photo Point 32 – Station 18+00, Reach 4



Photo Point 33 – Station 16+75, Reach 4



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



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



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

Browns Summit Creek Restoration Project – Stream Stations Photos

Photos take March 3, 2020 (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

Appendix C

Vegetation Plot Data*

***No Vegetation plot monitoring was required for Year 4.**

Appendix D

Stream Survey Data

***No cross-section stream survey monitoring was required for Year 4**

Appendix E

Hydrologic Data

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

Table 13. Flow Gauge Success (MY4-2020)

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

Flow Gauge ID	Consecutive Days of Flow¹	Cumulative Days of Flow²
R4 Gauge		
BSFL1	137	286
T3 Gauge		
BSFL2	202	305
T1 Gauge		
BSFL3	310	310

Notes:

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

²Indicates 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	137.0				171.0	248.0	199.0	286.0			
BSFL2	166.0	158.0	198.0	202.0				173.0	303.0	284.0	305.0			
BSFL3	263.0	319.0	289.0	310.0				263.0	319.0	289.0	310.0			
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

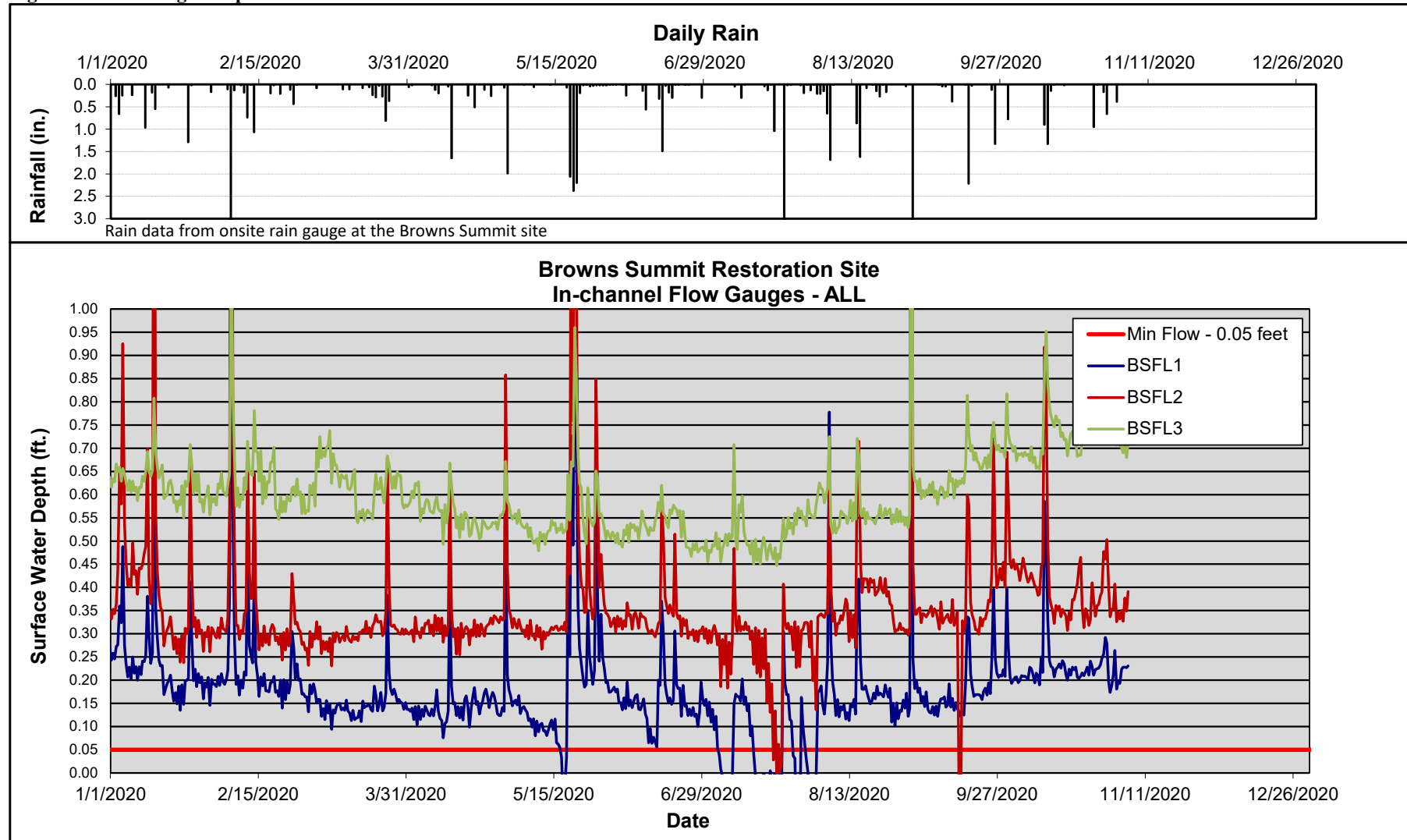
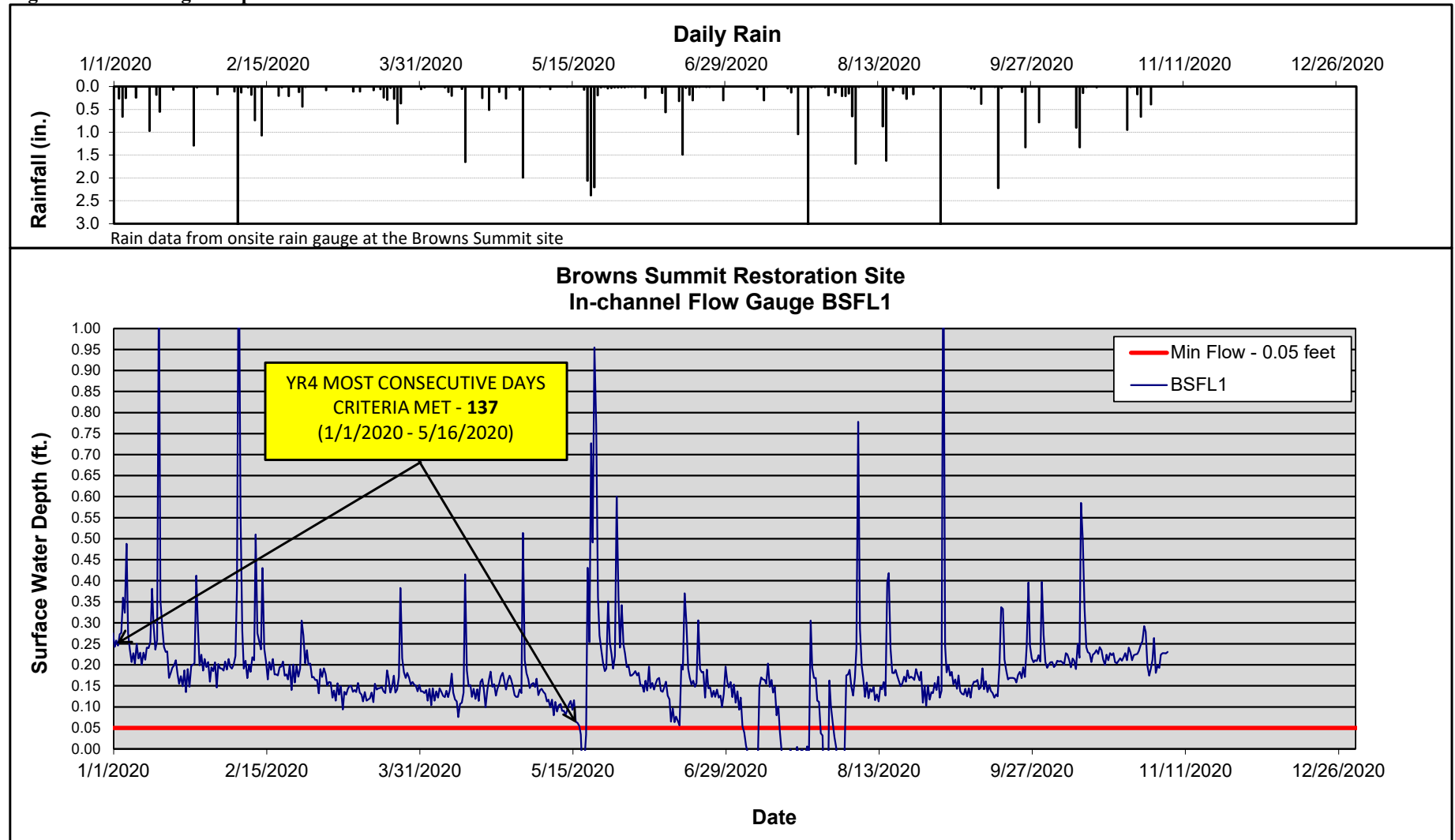
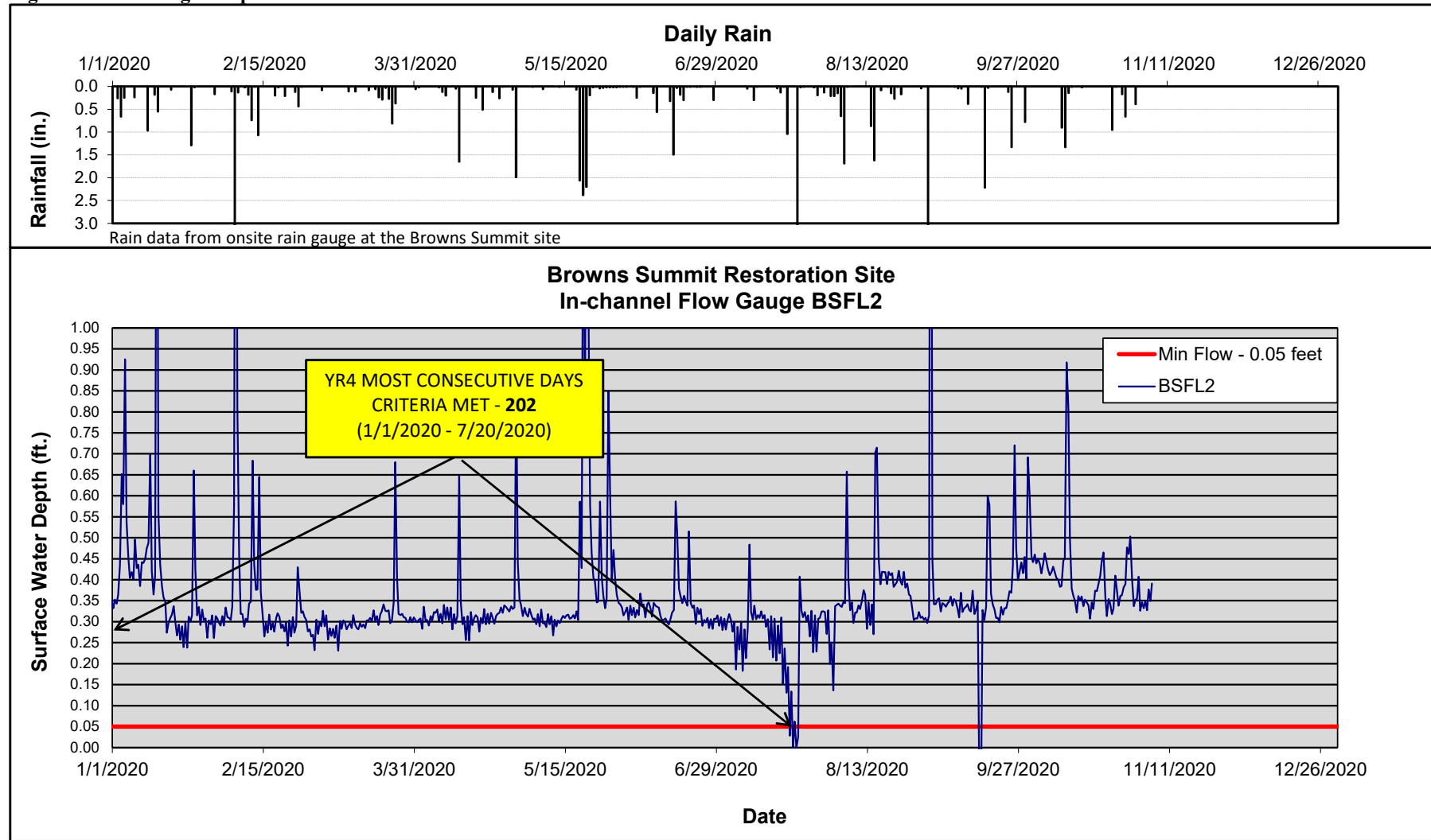


Figure 6. Flow Gauge Graphs Continued



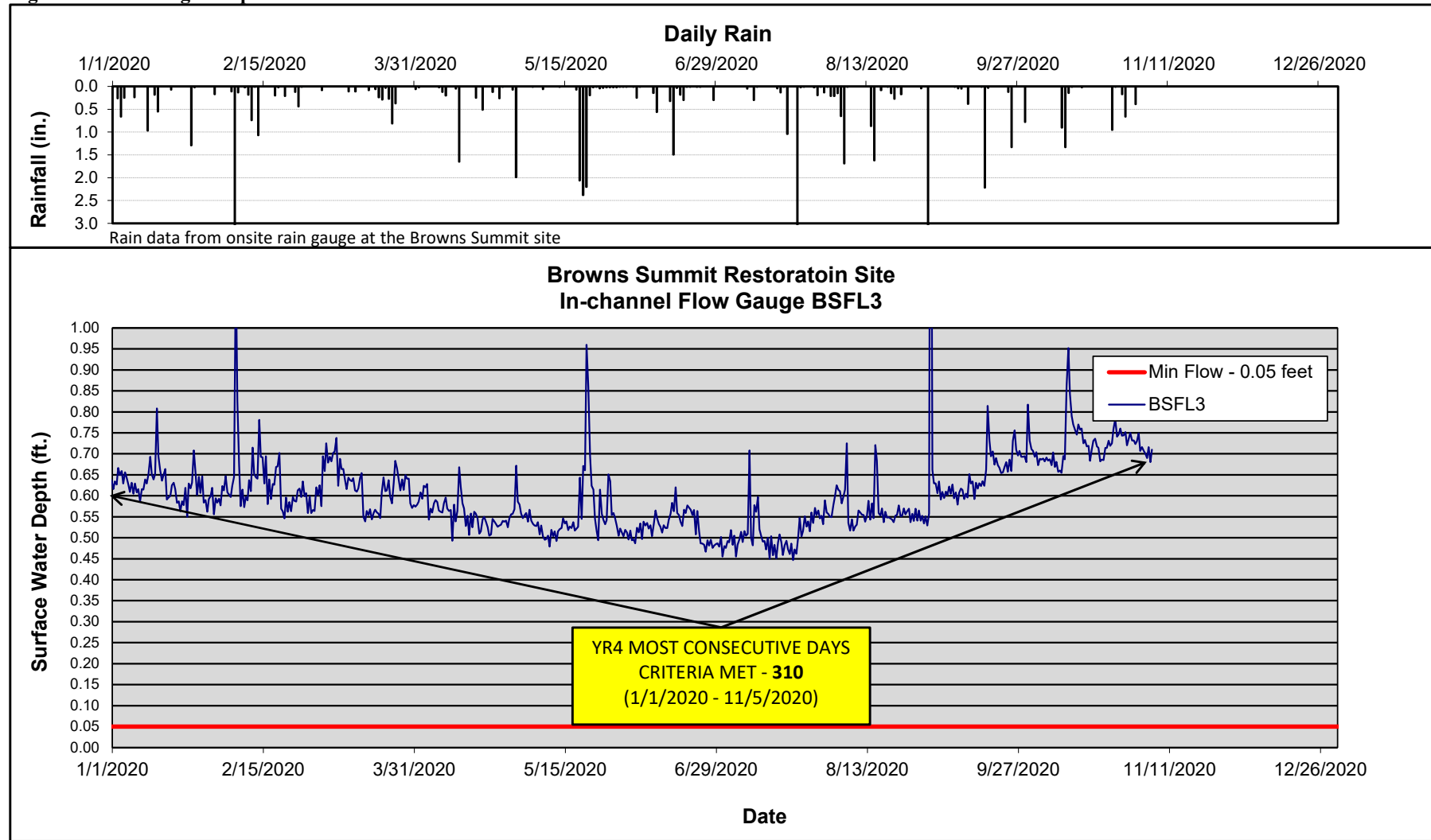
* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

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

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

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

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

Figure 7. Wetland Restoration Graphs (2020)

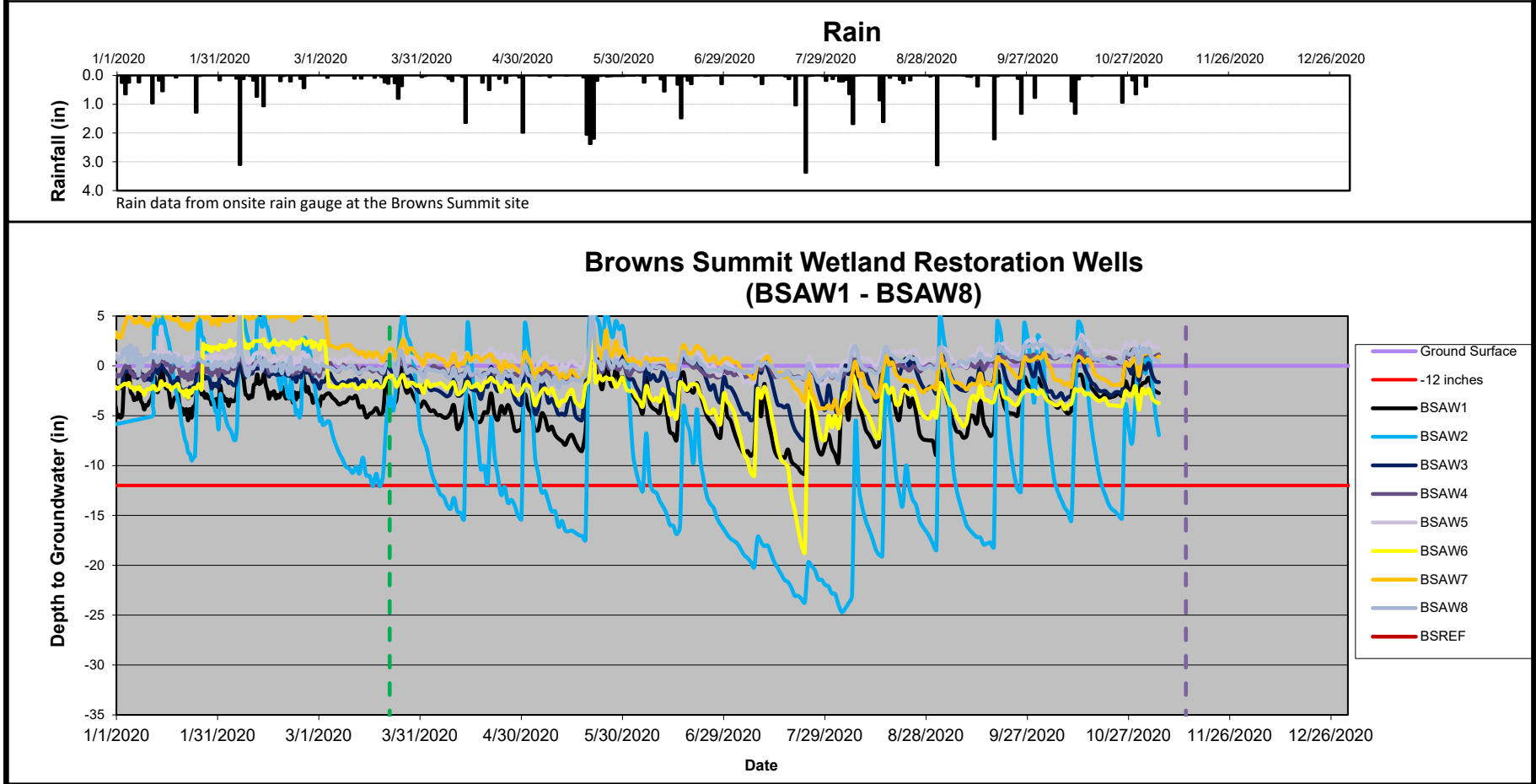


Figure 7. Wetland Restoration Graphs (2020) Continued

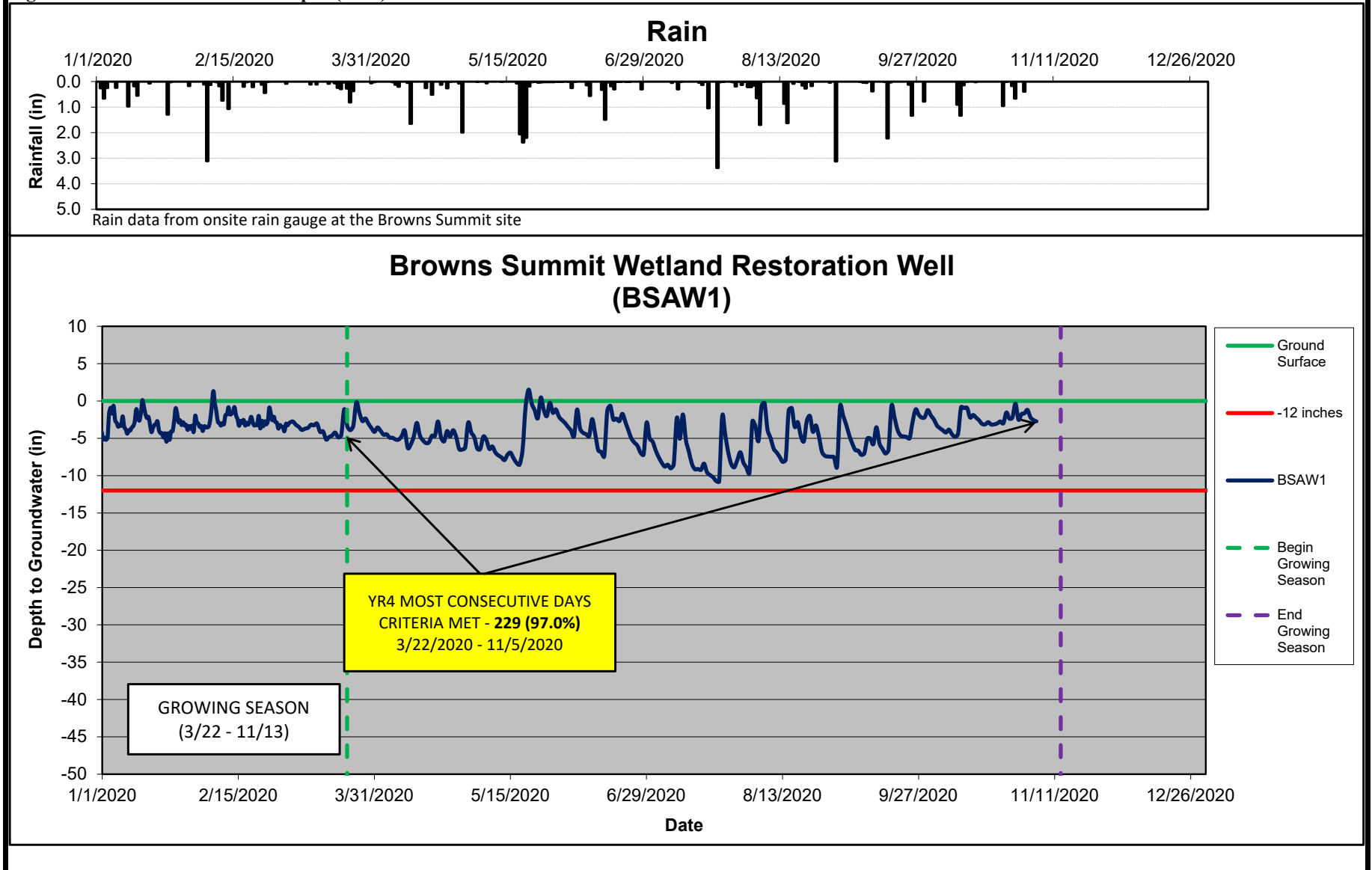


Figure 7. Wetland Restoration Graphs (2020) Continued

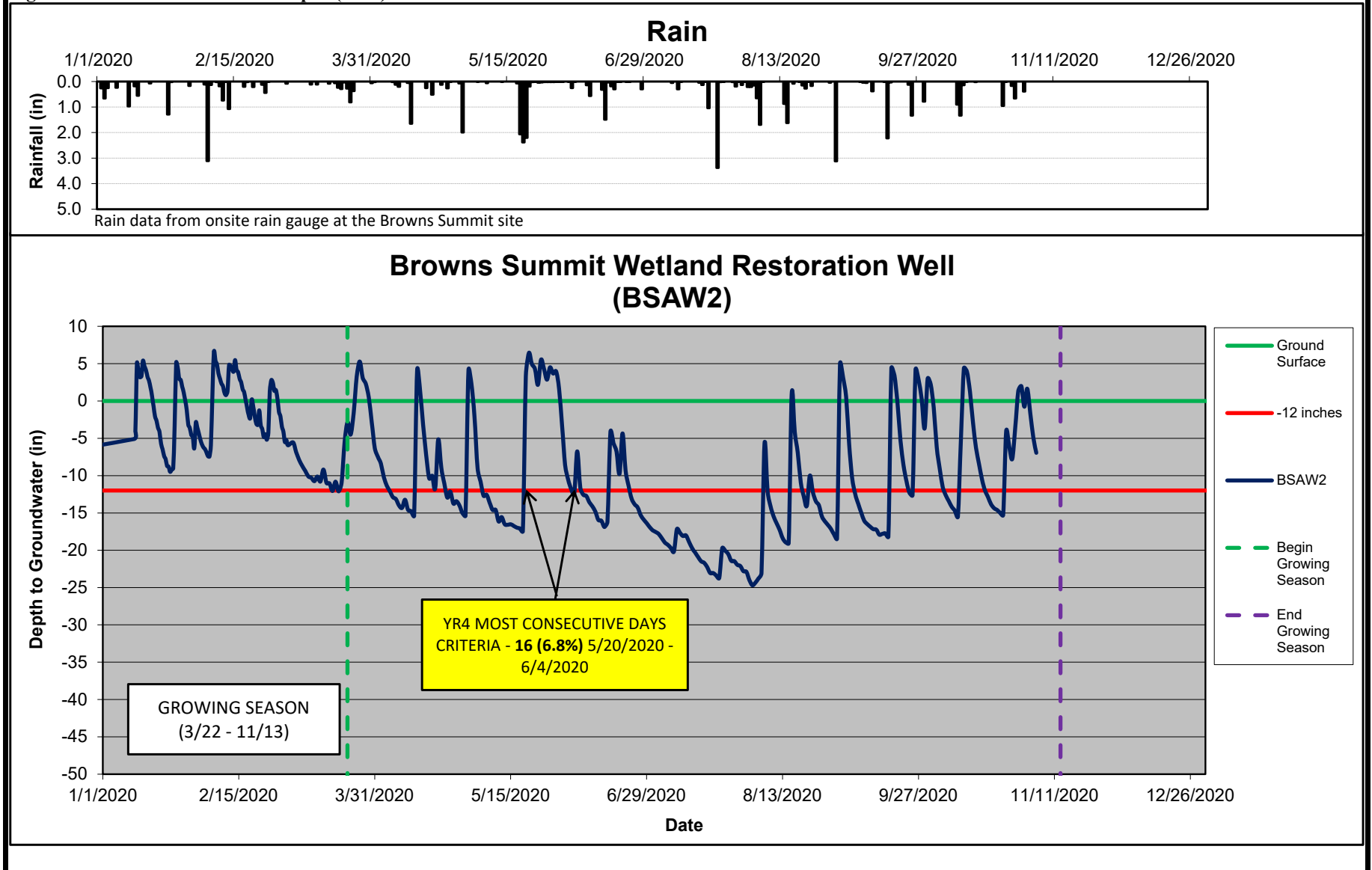


Figure 7. Wetland Restoration Graphs (2020) Continued

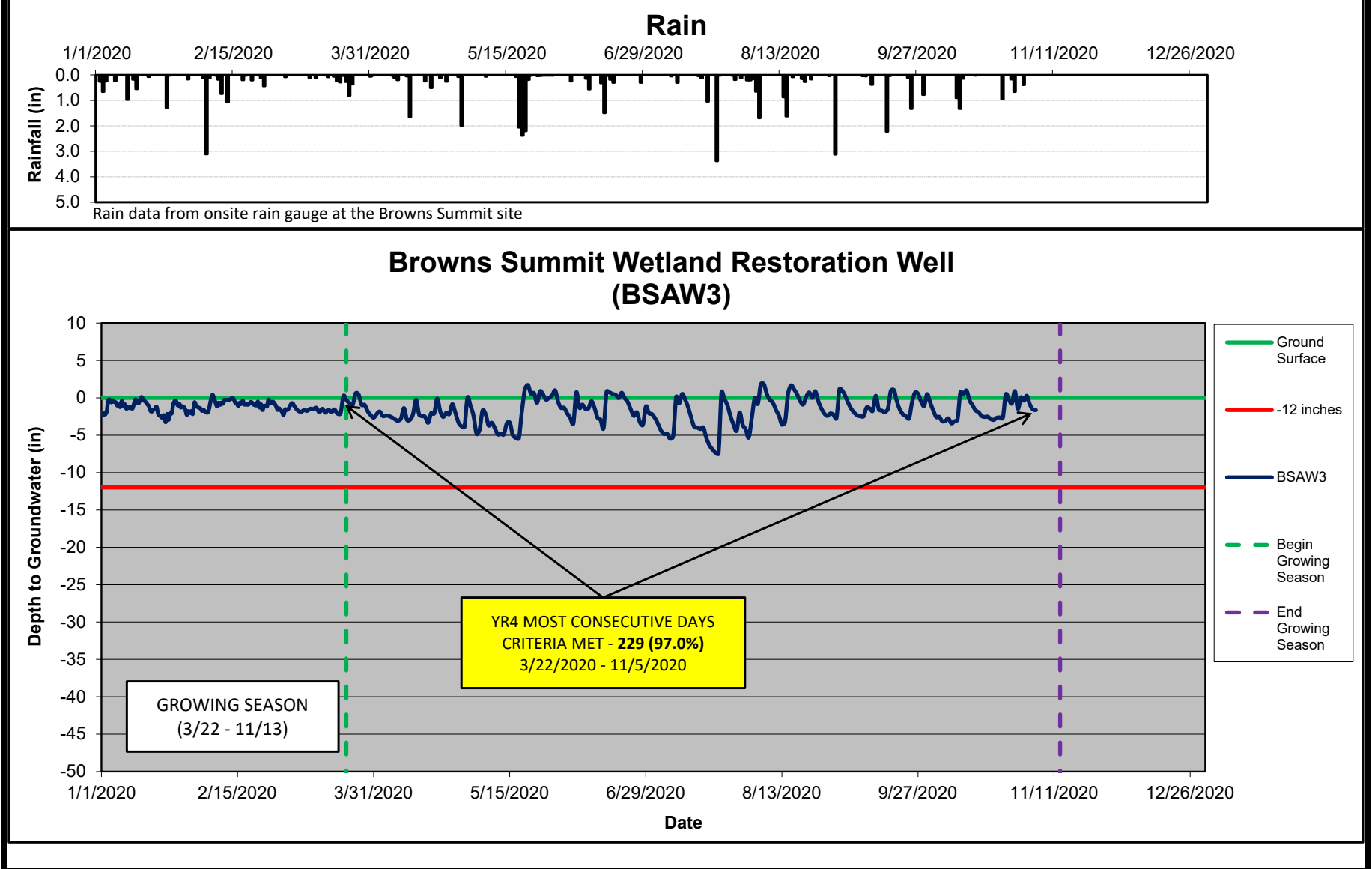


Figure 7. Wetland Restoration Graphs (2020) Continued

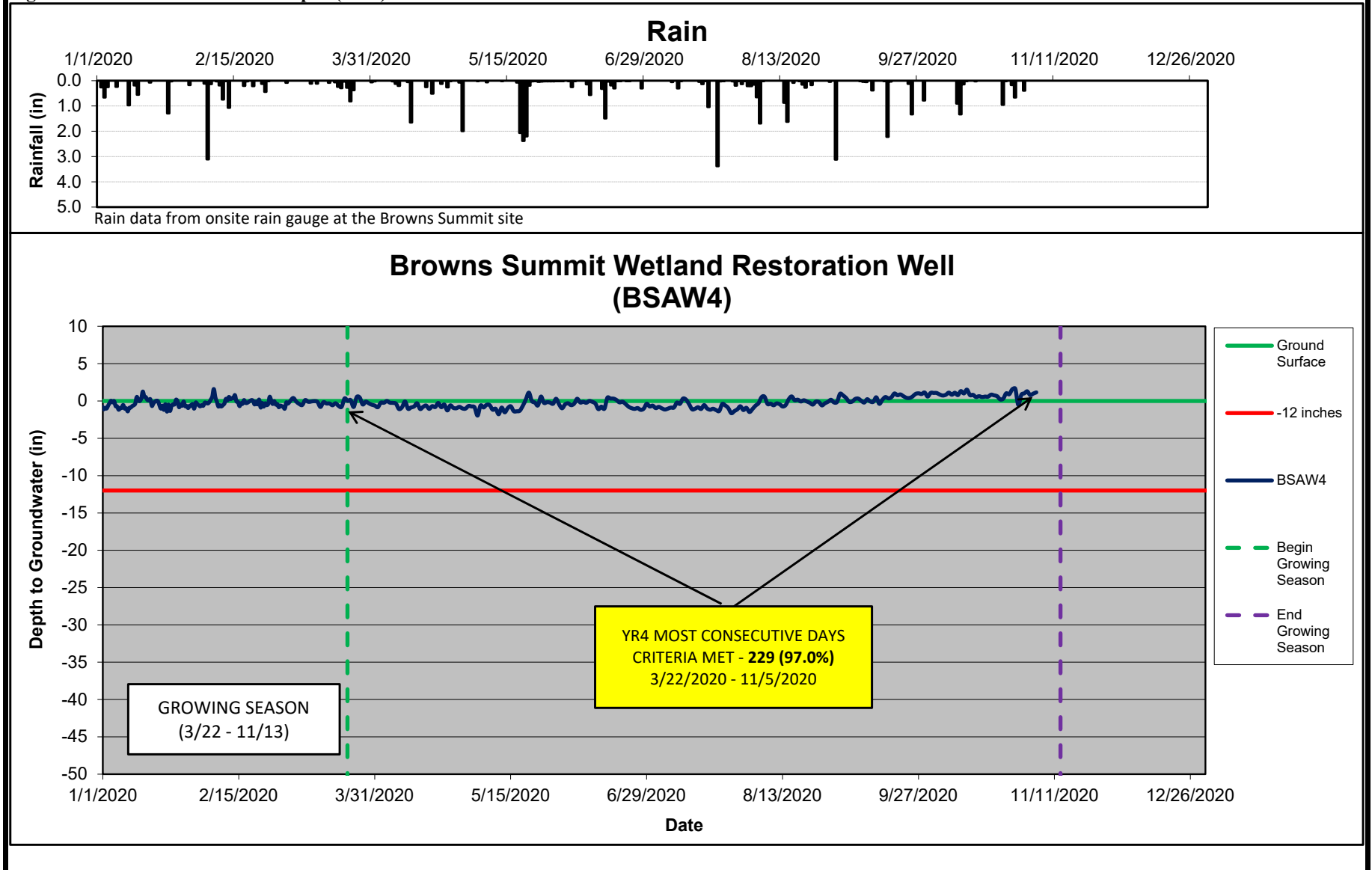


Figure 7. Wetland Restoration Graphs (2020) Continued

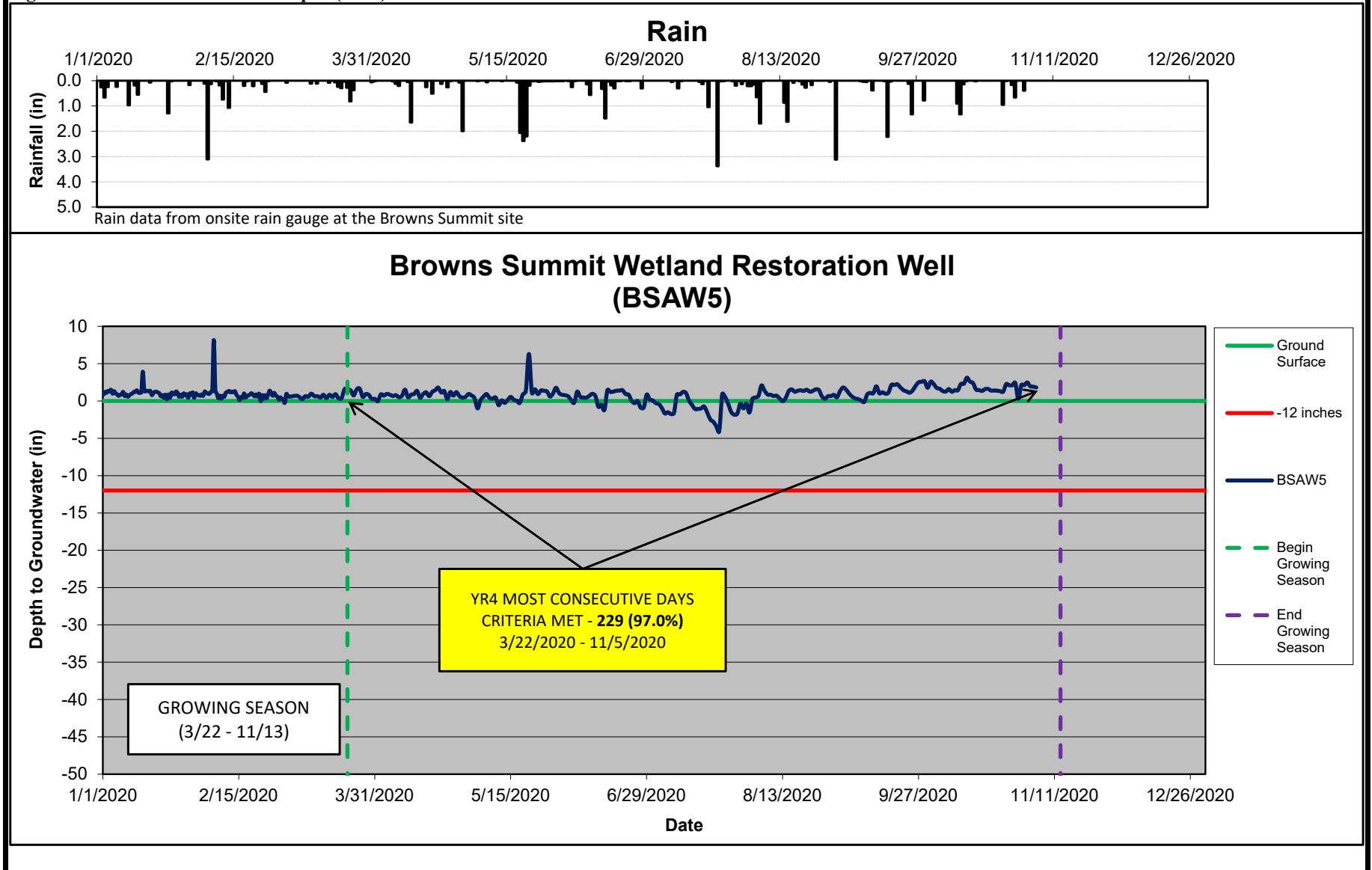


Figure 7. Wetland Restoration Graphs (2020) Continued

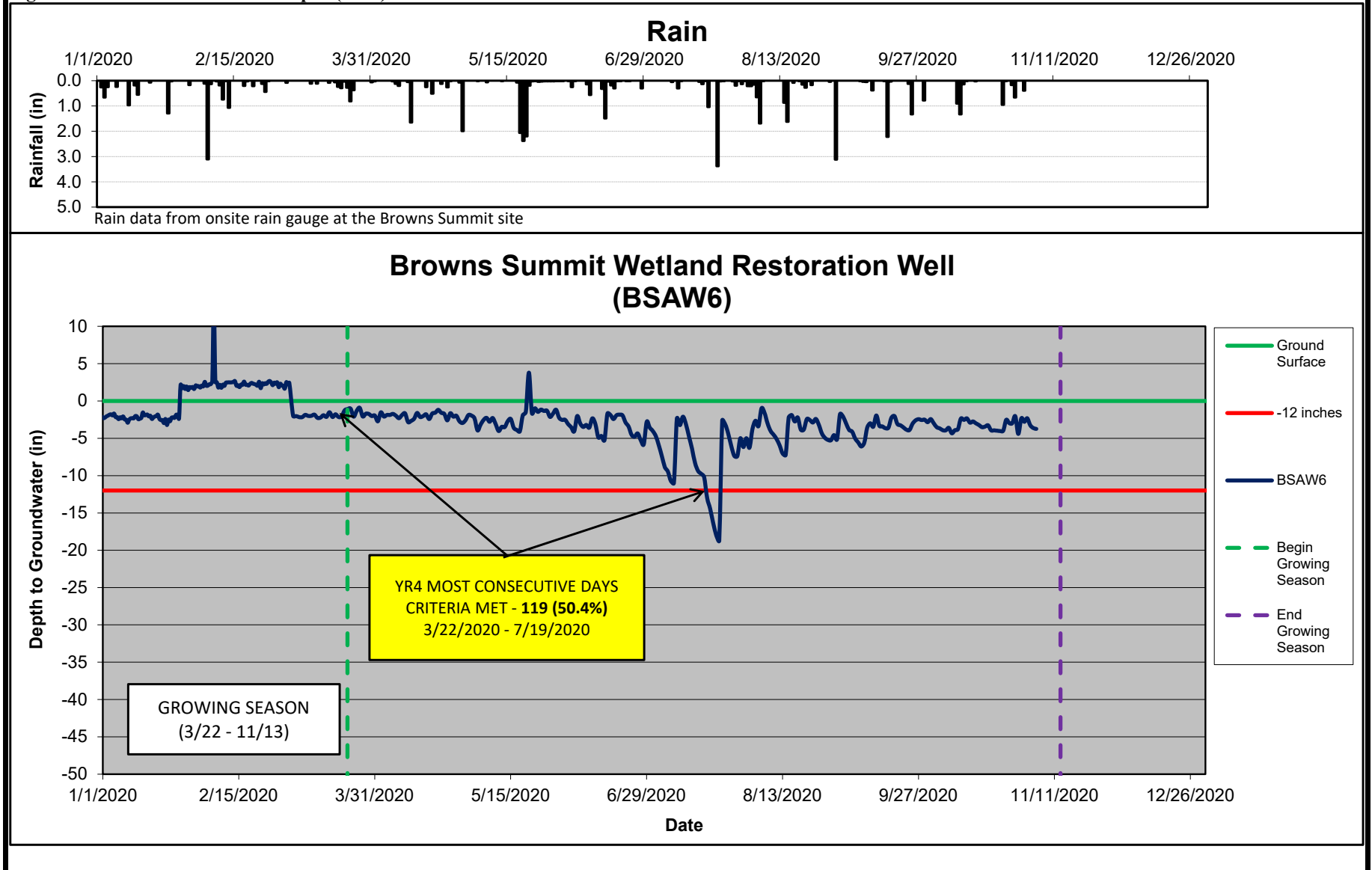


Figure 7. Wetland Restoration Graphs (2020) Continued

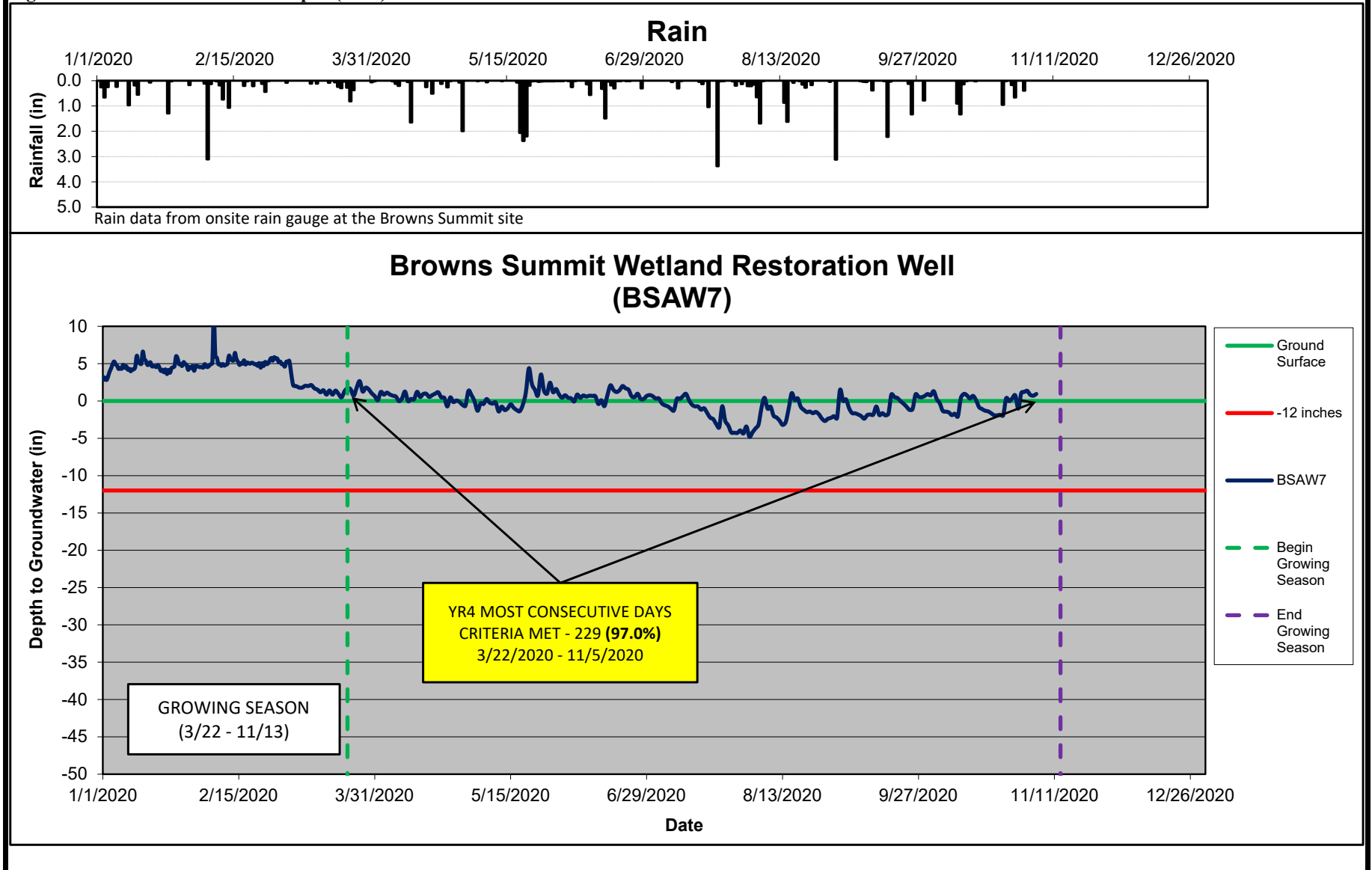


Figure 7. Wetland Restoration Graphs (2020) Continued

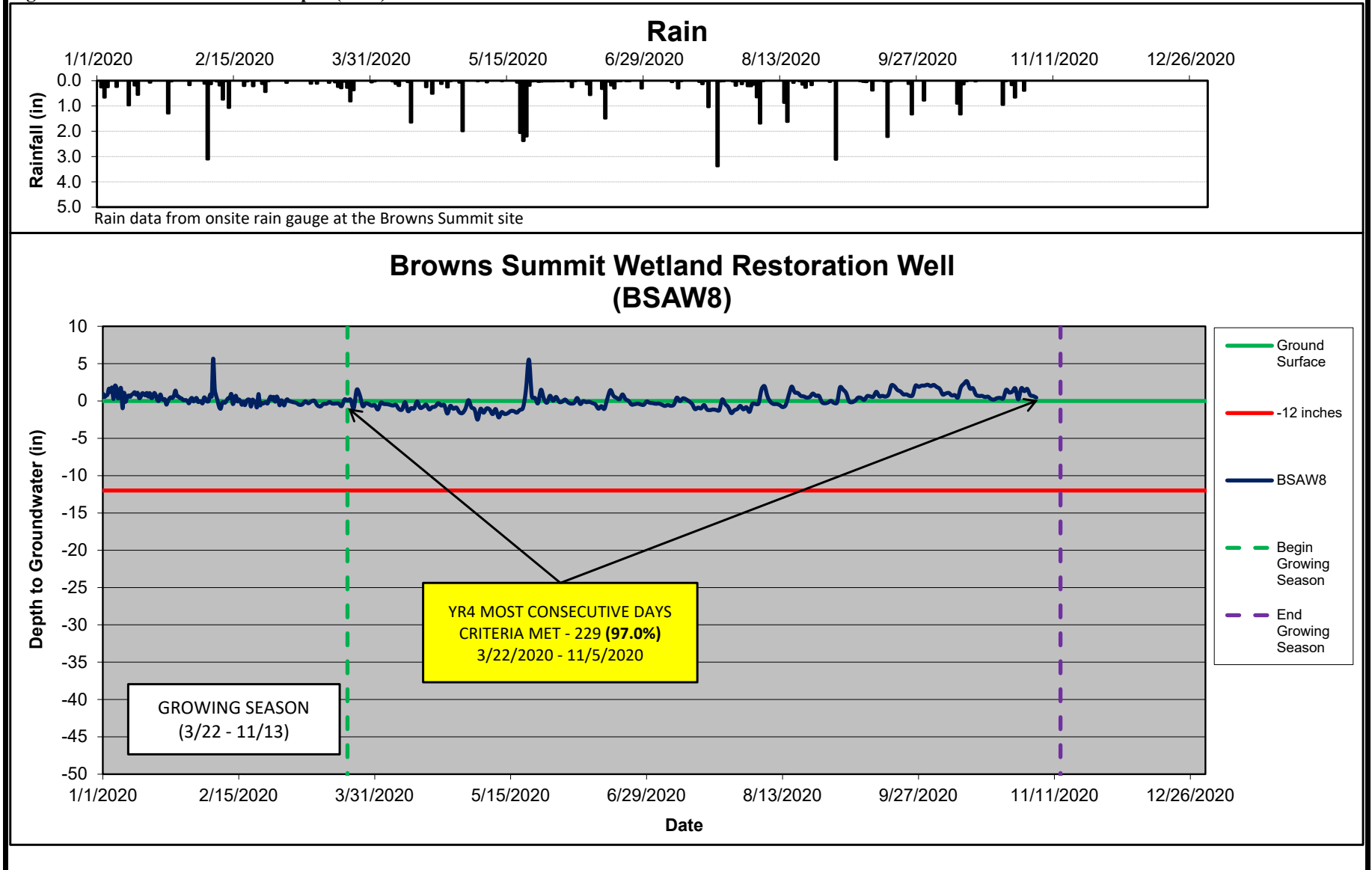
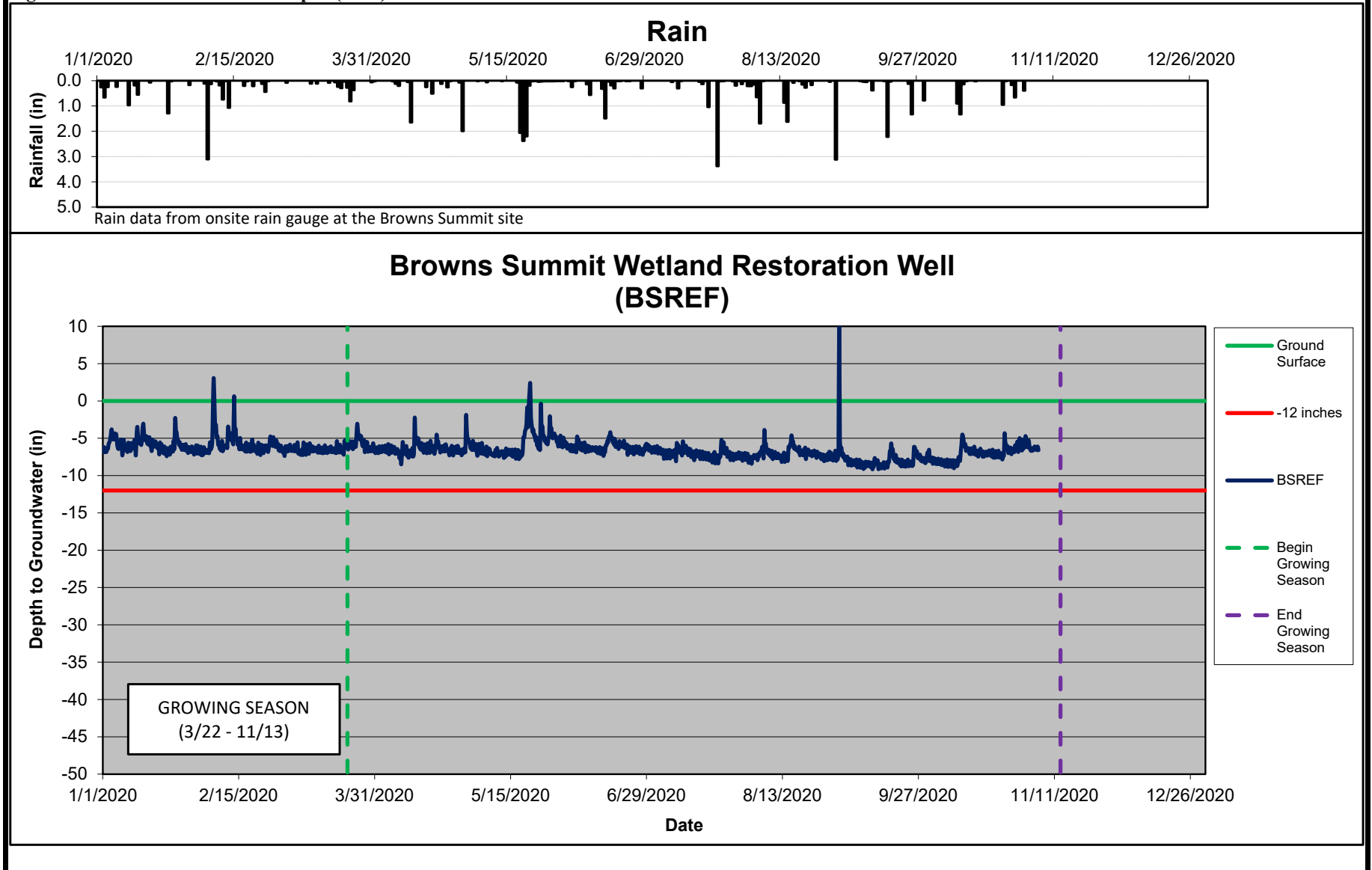


Figure 7. Wetland Restoration Graphs (2020) Continued



Browns Summit Creek Restoration Project – Hydrology Monitoring Stations Photos
Photos taken on (11/6/2020) unless noted different



Manual Crest Gauge – Reading 1/24/2020 (.91')



Manual Crest Gauge – Reading 11/6/2020 (1.49')



Wrack Line Showing High Flow (3/3/2020)



Wrack Line Showing High Flow (4/21/2020)



Wrack Line Showing High Flow (11/6/2020)



Manual Crest Gauge – Reach 1

Browns Summit Creek Restoration Project – Hydrology Monitoring Stations Photos
Photos taken on (11/6/2020) unless noted different



Flow Gauge 1 – Reach 4



Flow Gauge 2 – Reach T3



Flow Gauge 3 – Reach T1



Wetland Well 1 – Reach 4, Station 25+00



Wetland Well 2 – Reach 2, Station 47+00



Wetland Well 3 – Reach 1, Station 52+00

Browns Summit Creek Restoration Project – Hydrology Monitoring Stations Photos
Photos taken on (11/6/2020) unless noted different



Wetland Well 4 – Reach 1, Station 55+00



Wetland Well 5 – Reach 1, Station 58+00



Wetland Well 6 – Reach 1, Station 61+00



Wetland Well 7 – Reach 1, Station 63+50



Wetland Well 8 – Reach 4, Station 23+00



Wetland Well 9 – Reach 2, Station 45+00

