Blair Creek Stream Mitigation Project
Year 2 (2023) Monitoring Report FINAL

Clay County, North Carolina
DMS Project ID No. 100047
DEQ Contract No. 7415
DWR# 2020-1094
Hiwassee River Basin: 06020002
DMS RFP #16-007278 (Issued: 6/21/17)
USACE Action ID No. SAW-2018-00449
Year 2 Collection Period: September - October 2023

Submitted to/Prepared for:
NC Department of Environmental Quality
Division of Mitigation Services (DMS)
1652 Mail Service Center
Raleigh, North Carolina 27699-1652

Michael Baker
INTERNATIONAL

Submission Date: January 2024

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January 17, 2024

Matt Reid, PM
NCDEQ, Division of Mitigation Services
Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

Subject:
Response to DMS Comments (January 2, 2024) for DRAFT Monitoring Year 2 Report.
Blair Creek Stream Mitigation Project, Clay County
Hiwassee River Basin: 06020002
DMS Project #100047
DEQ Contract #7415

Dear Mr. Reid,

Please find below our responses to the NC Division of Mitigation Services (DMS) review comments dated January 2, 2024 in reference to the Blair Creek Stream Mitigation Project's DRAFT Monitoring Year 2 Report. We have revised the Draft document in response to review comments as outlined below.

- Table of Contents: Please review formatting for appendices and correct as necessary.
  RESPONSE: The Table of Contents was reviewed and formatting for appendices was corrected as requested.

- 1.4 Monitoring Results and Project Performance: Typographical error in first paragraph last sentence: Stream Problem Areas (SAP1 and SPA2).
  RESPONSE: This typographical error has been corrected.

- Mowing encroachments were identified in MY1. Have these encroachments been resolved?
  RESPONSE: These encroachments have been resolved. The encroachments were identified in December of 2022 at the end of MY1. In February 2023 Baker staff installed additional boundary markers (T-posts with 10ft PVC with flagging) in these areas to clearly demarcate the CE line. Since the installation of these markers there has been no issues with mowing encroachments.

- Report indicates a supplemental planting will occur in the vicinity of vegetation plot 2. Please include supplemental planting information in the MY3 report regarding this effort. Include number, area, species, type (bare root, container, etc) and include a

797 Haywood Rd. Suite 201 | Asheville, NC 28753
Project Contact Information: 828-380-0118, Jason.york@mbakerintl.com

polygon on the CCPV. If species are selected that are not from the approved mitigation planting list, the IRT will need to be notified in advance.
RESPONSE: Records of the supplemental planting will be kept including the area, species and number of stems planted. All plants will be chosen from those listed in the approved mitigation plan. These activities will be reported on in the MY3 Report.

- SPA1 and SPA2 were repaired in July 2023. Please call out the location of these two repaired areas on the CCPV and update Table 2 to include the repair.
  RESPONSE: These repair areas have been called out on the CCPV and added to Table 2 as requested.

- Invasive treatment occurred in summer 2023. Were any other species targeted other than cattails? Please update Table 2 to include the invasive treatment.
  RESPONSE: No other species were targeted at this time. Other than cattails, the site has a very low density of invasive species although some scattered rose and privet will be treated in future monitoring years.

- Text indicates 5 of 11 groundwater wells met or exceeded performance criteria. Table 11 only shows 10 total wells. Please review and revise as necessary.
  RESPONSE: BCW 11 had been added to Table 11 as requested.

- Only 5 of 11 wells met success criteria. Does Baker have concerns surrounding site hydrology and meeting success criteria moving into MY3? DMS recommends installing additional wells to better define the areas meeting success criteria. Portions of wetlands not meeting success criteria or trending towards success at the end of MY3 are considered assets at risk. DMS will work with Baker to determine credits at risk to prevent overpaying and over releasing credits on the site if this occurs.
  RESPONSE: Baker does have concerns surrounding site hydrology and meeting success criteria, particularly between BCW 6 and 8 on the right floodplain of R1 and on the left floodplain of R2 between BCW 8 and 9. These data will be reported on during MY3.

- Recommend clarifying that the one flow gauge that met success criteria is the only required flow gauge installed at the project site on UT1.
  RESPONSE: This has been clarified in section 1.4 Monitoring Results and Project Performance as requested.

- Two easement encroachments on Reach 1 are discussed and shown on the CCPV. Have the encroachments been resolved? Please include additional information regarding the resolution.
  RESPONSE: The encroachments have not yet been resolved; however, no lasting impact to the project is apparent. No equipment has since been used inside the easement and

the boundary is clearly marked. Currently the corrugated black plastic drainpipe still protrudes approximately 2 feet past the easement boundary, draining into a drain swale. This pipe is underwater and feeds a pool at the head of the swale. Baker has been reluctant to cut this pipe back to the easement boundary due to the prospect of litigation involving the property owner's concern about potential hydrologic trespass. Until this issue is resolved Baker would opt not to alter any existing drainage features that might further aggravate the situation.

- Recommend revising ground water gauge labels on CCPV to be consistent with Table 11 and Figure 5. CCPV shows gauges as GW1 as opposed to BCW1 for Figure 5 and Table 11.
  RESPONSE: The ground water gauge labels have been changed on the CCPV to be consistent.

- Table 5 indicates one structure is piping and bank erosion is present on Reach 1. This is not discussed in the report or shown on the CCPV. Please review and revise as necessary.
  RESPONSE: This was an error in Table 5 leftover from the Stream Problem Areas (SPAs) reported during MY1. Table 5 has been reviewed and revised as requested.

- Table 5 shows 25' of active scour/erosion on Reach 2. This is not discussed in the report or shown on the CCPV. Please review and revise as necessary.
  RESPONSE: Please see the above comment.

- 2023 IRT Credit Release Comments:
  - The IRT requested that the drainage pipes be discussed MY2 report and include photos. Please update the text with additional information and include photos.
    RESPONSE: The pipes are discussed in Section 1.4 Monitoring Results and Project Performance. A photo has been added to Monitoring Gauges and Additional Photographs in Appendix B depicting the current condition of the field drains; however, the pipe and swale are barely visible in the photo due to thick vegetation.

  - There was discussion regarding how rain gauge data was collected for the site. Baker indicated that offsite gauge data was preferred due to onsite gauge malfunctions. Please include additional information regarding the NC Climate Office Weather Climate Database Legacy System that was used this year for observed project rainfall.
    RESPONSE: A discussion of the NC Climate Office Weather Climate Database Legacy System, Multi-Sensor Precipitation Estimates (MPE) has been included in Section 1.5 Technical and Methodological Descriptions and a citation to support the efficacy of this system has been included in Section 1.6 References (Wooten 2014).

  - IRT had concerns with changes noted in XS11, 12, 13 and 14. Recommend adding

additional discussion regarding changes since asbuilt and stream stability.
RESPONSE: A brief discussion of stream stability has been added to Section 1.4 Monitoring Results and Project Performance.

Digital Deliverable Comments

- No comments. Please include updated digital deliverables based on any changes to final submittal.
  RESPONSE: All updated digital deliverables have been submitted as requested.

As requested, Michael Baker has provided an electronic response letter addressing the DMS comments received and two (2) hardcopies of the FINAL report, and the updated e-submission digital files will be sent via secure ftp link. A full final electronic copy with electronic support files have been included on a USB drive. Please do not hesitate to contact me (Jason.york@mbakerintl.com 828-412-6101) should you have any questions regarding our response submittal.

Sincerely,

Jason York

Digitally signed by Jason York
DN: C=US, E=jason.york@mbakerintl.com, O=Michael Baker Intl., CN=Jason York
Date: 2024.01.17 12:37:50-05'00'

Jason York
Environmental Scientist

Enclosure: Final MY4 Report Russell Gap Mitigation Project

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APPENDICES

1.0 PROJECT SUMMARY

1.1 Project Description

Michael Baker Engineering, Inc. (Michael Baker) restored approximately 4,293 linear feet of existing stream along both the North and South Forks of Blair Creek and below the confluence on Blair Creek itself and enhanced 177 linear feet of an unnamed tributary (UT) to the South Fork. Additionally, the project has restored-by-reestablishment, restored-by-rehabilitation, or enhanced approximately 6.095 total acres of riparian wetlands. The project is located in the Blue Ridge Physiographic Region, within the Broad Basins Level IV ecoregion. The project watershed drains into the Hiwassee River approximately 1.4 miles downstream, ultimately emptying into the Tennessee River. Blair Creek and its tributaries are classified by NCDWR as Class "WS-IV" waters (NCDWR, 2016).

The Blair Creek Mitigation Project (project) is located on five abutting parcels of an active farm in Clay County, North Carolina, approximately 1.5 miles south of the Town of Hayesville as shown on the Project Vicinity Map (Figure 1). Historic agricultural use on the project site has predominantly been for a dairy operation and is currently utilized for row crop and hay production. These activities have negatively impacted both water quality and streambank stability along the project streams. The resulting observed stressors include streambank erosion, sedimentation, excess nutrient input, channel modification, channel incision, wetland drainage, and the loss of riparian buffers.
The project is being conducted as part of the NCDMS Full Delivery In-Lieu Fee Program and is anticipated to generate a total of 4,363.37 cold water stream mitigation credits and 5.772 wetland mitigation credits and will be protected by a 10.02-acre permanent conservation easement (Appendix B).

1.2 Goals and Objectives

The goals of this project are identified below:

- Establishment of geomorphically stable conditions along all project reaches,
- Improvement of water quality by reducing nutrient and sediment inputs,
- Restoration of natural stream and floodplain interactions,
- Restoration and enhancement of riparian wetland functions,
- Restoration and protection of riparian buffer functions and corridor habitat,
- Improvement of in-stream aquatic habitat, and
- Establishment of a permanent conservation easement on the entire project.

To accomplish these goals, the following objectives were identified:

- To restore appropriate bankfull dimensions, remove spoil berms, and/or raise channel beds, by utilizing either a Priority I Restoration approach or an Enhancement Level I approach.
- To construct streams of appropriate dimensions, pattern, and profile in restored reaches, slope stream banks and provide bankfull benches on enhanced streams and utilize bio-engineering to provide long-term stability.
- Construct the correct channel morphology along all stream channels, increasing the number and depth of pools utilizing structures including geo-lifts with brush toe, log vanes/weirs, root wads, and/or J-hooks.

- Raise ground water tables within the buffer through the implementation of Priority I restoration. Wetland vegetation will also be planted.
- Establish riparian buffers at a 30-foot minimum width along all stream reaches, planted with native tree and shrub species.
- Establish a permanent conservation easement restricting land use in perpetuity. This will prevent site disturbance and allow the project to mature and stabilize.

1.3 Project Success Criteria

The success criteria and performance standards for the project will follow the NCDMS's templates As-Built Baseline Monitoring Report Format, Data Requirements, and Content Guidance (NCDMS 2020a), and the Annual Monitoring Report Format, Data Requirements, and Content Guidance (NCDMS 2020b), and as described in Section 7 of the approved Mitigation Plan. All specific monitoring activities will follow those outlined in detail in Section 8 of the approved Mitigation Plan and will be conducted for a period of 7 years unless otherwise directed by the IRT.

1.4 Monitoring Results and Project Performance

The Year 2 monitoring survey data of the fifteen permanent cross-sections indicates that the stream transects are geomorphically stable and in-stream structures are performing as designed. Minor fluctuations to vertical and lateral constraints are expected as the channel evolves; however, all reaches are stable and performing as designed. XS-14 may have experienced some hydraulic changes due to the scour created from Stream Problem Area 1, although this scour has since been repaired and XS-14 will be monitored closely during MY3 for stability. Stream Problem Areas (SPA1 and SPA2) were repaired in July 2023 and are functioning as intended.

During Year 2 monitoring, the planted acreage performance categories were functioning well overall. Rainfall was near average during the first four months of MY2. Rainfall was well below average in May and well above average in August, with the planted stems enduring drought conditions during September and October of MY2 (2023) (Figure 7). The average density of total planted stems, based on data collected from the 6 permanent and 2 random monitoring plots for the Year 2 monitoring conducted in October 2023 was 480.75 stems per acre (Table 7). Thus, the Year 2 vegetation data demonstrate that the Site is on track to meet the interim minimum success criteria of 320 trees per acre by the end of Year 3. One vegetation problem area (VPA) was identified as exceeding the reportable mapping threshold of 0.1 acres. This area includes Vegetation Plot 2 and the area surrounding this monitoring plot. This area can be seen in the Vegetation Plot Photographs for Plot 2. Vegetation Plot 2 failed to meet success criteria due to a dense infestation of cattails in the wetland area outside of the easement which continues to compete with planted vegetation. Cattails within the easement in this area were cut back and sprayed with herbicide during the summer of MY2. This area will be replanted with species from the approved planting list before the growing season begins in MY3.

During Year 2 monitoring, two separate post-construction bankfull events were observed (Table 10). The events occurred on 6/25/23 and 8/15/2023 as high flows are documented by automated Crest Gauge 3 on R2 (Table 10). Automated Crest Gauges 1 and 2 did not record a bankfull event. The automated loggers in Crest Gauges 1 and 2 were faulty and were replaced with new loggers on September 20, 2023.

As the observed monthly rainfall data for the project (Figure 7) demonstrates, the past 12 months have varied dramatically from month to month as compared to historic average precipitation. A total of 50.33 inches of rainfall was observed in the project area, while the region averages 58.07 inches of annual rainfall,

a deficit of 7.74 inches. All observed project rainfall was collected from the North Carolina Climate Office Weather Climate Database Legacy System.

During Year 2 monitoring, five of the eleven automated groundwater monitoring wells met or exceeded the minimum hydroperiod performance criteria approved in the Mitigation Plan of 12% of the 211-day growing season (24 or more consecutive days). It should be noted that Clay County is experiencing an "Extreme Drought," with October being the driest October on record over the past 129 years and January – October 2023 being the 48th driest year over the past 129 years (NOAA 2023). The sole automated flow gauge on site, located on UT1, met or exceeded the minimum 30-day performance criteria during MY2 (Table 12).

The easement boundary has been walked and signage is posted up to specifications. Two encroachment areas were identified where the property owner used a piece of equipment to dredge a drain swale that is a designed feature of the project. In late December of 2022, two field drains were installed outside of the conservation easement (CE) that drain into the easement. A few feet of corrugated black plastic drainpipe extend past the CE boundary. This pipe drains a field adjacent to the left floodplain of Upper Reach 1 and empties underwater into a pool and the head of a drain swale. These locations are shown on the CCPV in Appendix B. A letter was sent to the property owners in April 2023 informing them of the encroachment. A copy of the Deed of Conservation Easement and Right of Access was also included with this letter. This correspondence is included in Appendix F. No long-term impacts to the site occurred as a result of these encroachments; however, this incident resulted in the landowner expressing concern over potential hydrologic trespass which Michael Baker is currently working to resolve.

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 previous Monitoring Reports and in the Mitigation Plan available on the DMS website. Any raw data supporting the tables and figures in the Appendices is available from DMS upon request.

This report documents the successful completion of the Year 2 monitoring activities for the post-construction monitoring period.

1.5 Technical and Methodological Descriptions

Stream survey data was collected to a minimum of Class C Vertical and Class A Horizontal Accuracy using a 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 survey data from the permanent project cross-sections were collected and classified using the Rosgen Stream Classification System to confirm design stream type (Rosgen 1994).

The six vegetation-monitoring quadrants (plots) were installed across the site in accordance with the CVS-DMS Protocol for Recording Vegetation, Version 4.1 (Lee 2007) and the data collected from each was input into the DMS Veg Table Production Tool (2021).

Ten automated groundwater monitoring wells were installed in the floodplain following USACE protocols (USACE 2005). The gauges themselves, both flow and groundwater gauges, are all Van Essen brand Baro-Diver data loggers.

All observed project rainfall was collected from the North Carolina Climate Office Weather Climate Database Legacy System, Multi-Sensor Precipitation Estimates (MPE). This system combines radar-based precipitation estimates with regional surface gauges to develop an accurate estimate of precipitation based on specific site coordinates. A study by the State Climate Office of North Carolina suggests that MPE compares well with an independent daily precipitation gage network over the Carolinas (Wooten 2014). We find this method more reliable than traditional on-site rain gauges as we have historically had insufficient data due to gauge malfunction. These gauges are prone to malfunction due to infestation by insects such as ants and wasps and are also subject to battery failure, resulting in a loss of data.

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

1.6 References

Carolina Vegetation Survey (CVS) and NC Division of Mitigation Services (DMS). CVS-DMS Protocol for Recording Vegetation, Version 4.1 (Lee 2007), DMS Veg Table Production Tool (2021)

Lee, M., Peet R., Roberts, S., Wentworth, T. 2007. CVS-DMS Protocol for Recording Vegetation, Version 4.1.

North Carolina Division of Mitigation Services. 2020a. *Annual Monitoring Report Format, Data Requirements, and Content Guidance October 2020.* NC Department of Environmental Quality. Raleigh, NC.

North Carolina Interagency Review Team (NCIRT). 2020b. Guidance document "*Wilmington District Stream and Wetland Compensatory Mitigation Update".* October 2020

Rosgen, D.L. 1994. A Classification of Natural Rivers. Catena 22:169-199.

Rosgen, D.L. 1996. Applied River Morphology. Wildlands Hydrology. Pagosa Springs, CO.

United States Army Corps of Engineers (USACE). 2005. "Technical Standard for Water-Table Monitoring of Potential Wetland Sites," WRAP Technical Notes Collection (ERDC TN-WRAP-05-2), U.S. Army Engineer Research and Development Center. Vicksburg, MS.

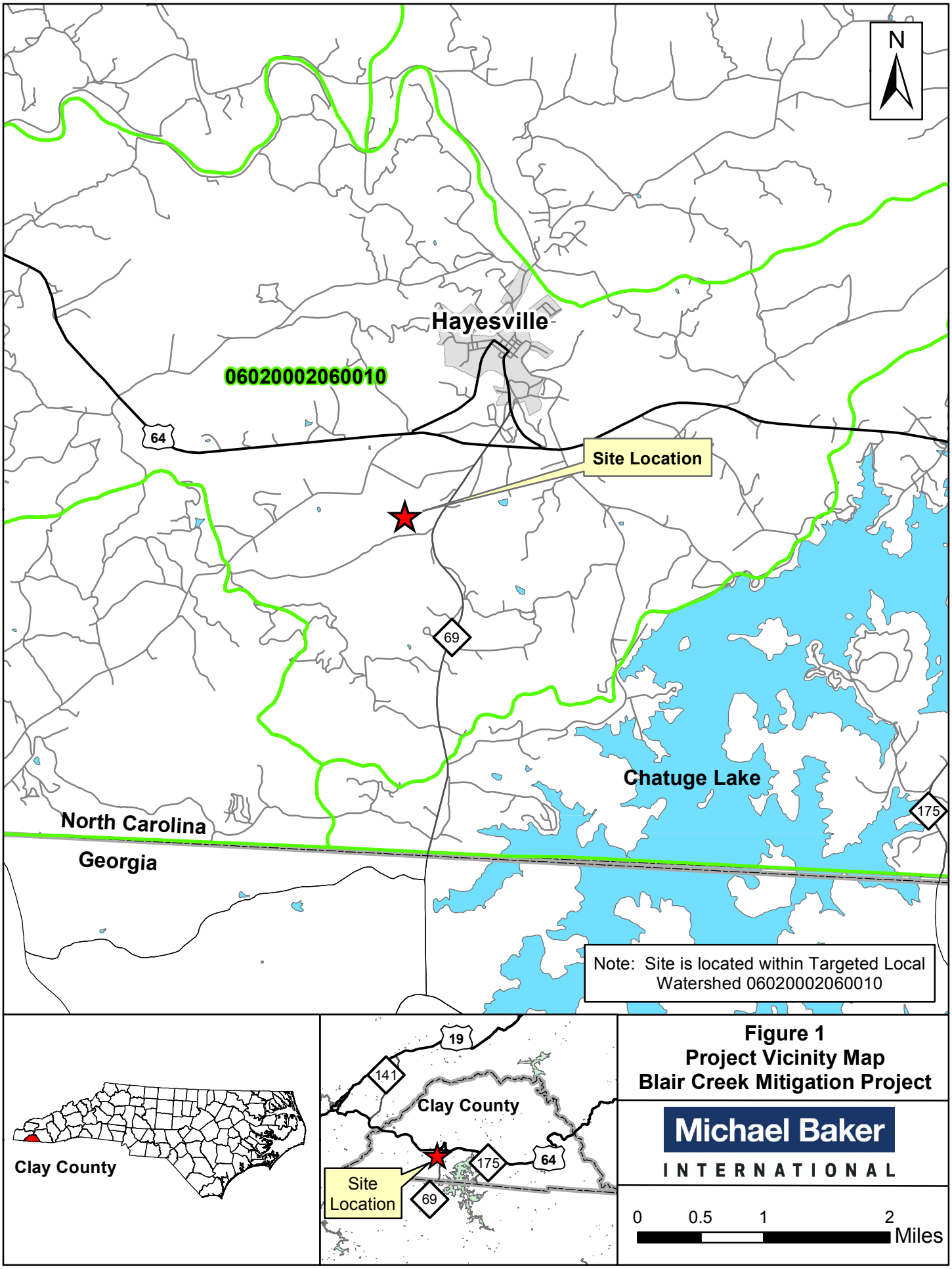
NOAA. National Integrated Drought Information System (2023, November 20). Clay County Conditions | Drought.gov

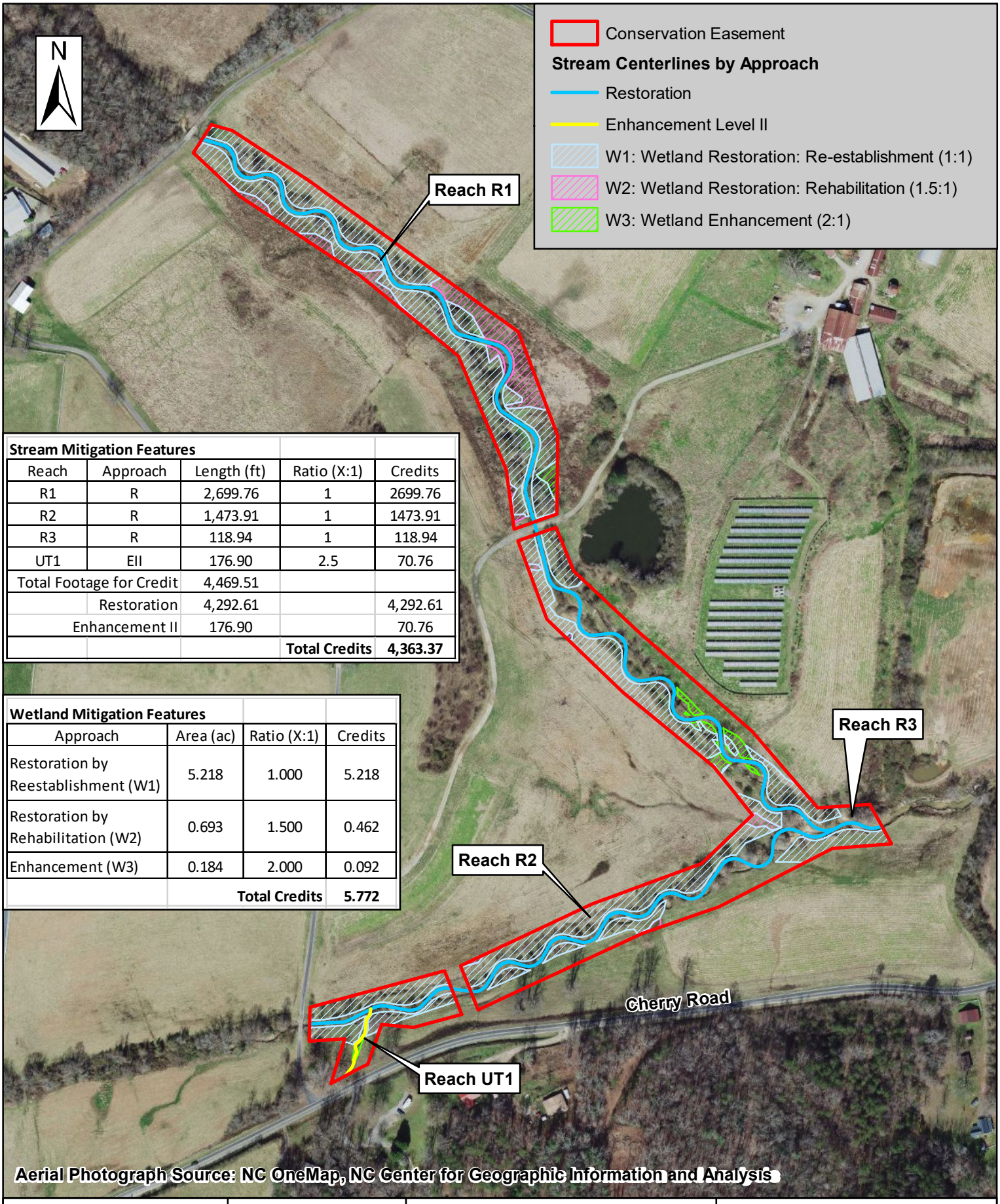
Wooten, Adrienne & Boyles, Ryan P. "The Comparison of NCEP Precipitation Estimates with Independent Gauge Data over the Eastern United States." *Journal of Applied Meteorology and Climatology,* Vol. 53, Issue 12. December 2014 pp. 2848-2862. Comparison of NCEP Multisensor Precipitation Estimates with Independent Gauge Data over the Eastern United States in: Journal of Applied Meteorology and Climatology Volume 53 Issue 12 (2014) (ametsoc.org)

APPENDIX A

Background Tables and Figures

Figure 1. Project Vicinity Map





Stream Mitigation Features

Reach	Approach	Length (ft)	Ratio (X:1)	Credits
R1	R	2,699.76	1	2699.76
R2	R	1,473.91	1	1473.91
R3	R	118.94	1	118.94
UT1	EII	176.90	2.5	70.76
Total Footage for Credit		4,469.51		
	Restoration	4,292.61		4,292.61
	Enhancement II	176.90		70.76
			Total Credits	**4,363.37**

Wetland Mitigation Features

Approach	Area (ac)	Ratio (X:1)	Credits
Restoration by Reestablishment (W1)	5.218	1.000	5.218
Restoration by Rehabilitation (W2)	0.693	1.500	0.462
Enhancement (W3)	0.184	2.000	0.092
		Total Credits	**5.772**

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DMS Proj. No. 100047

0 125 250 500 Feet

Figure 2: Project Asset and Credit Map
Blair Creek Mitigation Project
Clay County, NC

Table 1.0 Project Mitigation Quantities and Credits
Blair Creek Mitigation Project - NCDMS Project No. 100047

Project Component (reach ID, etc.)	Wetland Position and HydroType	Existing Footage or Acreage	Stationing	As-Built Restored Footage[1]	Mitigation Plan Designed Footage	Restoration Level	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Plan Credits [2]
Reach 1		2,399	10+00 - 2501.60, 2531.66 - 3771.92	2,699.76	2,741.86	R	P1	1.0	2,699.760
Reach 2		1,468	09+99.88 - 13+72.39, 14+20.16 - 2555.18	1,473.91	1,507.53	R	P1	1.0	1,473.910
Reach 3		185	25+55.18 - 26+88.82	118.94	133.64	R	P1	1.0	118.940
Reach UT1		195	10+14.97 - 11+88.00	176.9	173.03	EII	-	2.5	70.760
Wetland 1		5.218		5.218	5.217	R	Re-establishment	1.0	5.218
Wetland 2		0.693		0.693	0.691	R	Rehabilitation	1.5	0.462
Wetland 3		0.184		0.184	0.179	E	Enhancement	2.0	0.092

[1] All stream stationing and restored footage numbers reported here and shown in the as-built plan sheets use *thalweg* survey values and have had easement breaks removed.

[2] Credits reported here are derived from the design lengths as taken from the approved mitigation plan Table 11.1

Table 1.1
As-Built Centerline Length and Area Summations by Mitigation Category

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Credited Buffer (ft^2)
		Riverine	Non-Riverine		
Restoration	4,383				
Enhancement I					
Enhancement II	173				
Re-establishment		5.217			
Rehabilitation		0.691			
Wetland Enhancement		0.179			
Creation					
Preservation					
High Quality Pres					

Table 1.2
Overall Assets Summary

Asset Category	Overall Credits
Stream (cool)	4,363.370
RP Wetland	5.772
NR Wetland	
Buffer	

Table 2. Project Activity and Reporting History
Blair Creek Mitigation Project - NCDMS Project No. 100047

Grading Completed in December 2021	
Elapsed Time Since grading complete:	**2 years**
All Planting Completed in February 2022	
Elapsed Time Since planting complete:	**23 months**
Number of Reporting Years[1]:	**2**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Institution date	N/A	Jan-22
404 permit date	N/A	Jan-21
Mitigation Plan	N/A	May-21
Final Design – Construction Plans	N/A	Dec-21
Construction Grading Completed	1/1/2022	Jan-22
As-Built Survey	Jan-22	Jan-22
Livestake and Bareroot Planting Completed	Feb-22	Feb-22
As-Built Stream Survey	Feb-22	Feb-22
As-Built Vegetation Monitoring	Mar-22	Apr-22
As-Built Baseline Monitoring Report (MY0)	Mar-22	May-22
Year 1 Stream Survey	Oct-22	N/A
Year 1 Vegetation Monitoring	Oct-22	N/A
Year 1 Monitoring	Nov-22	Dec-22
Year 2 Stream Survey	Sep-23	N/A
Year 2 Vegetation Monitoring	Oct-23	N/A
Year 2 Monitoring	Oct-23	Dec-23
Repair of Stream Problem Areas (SPA)	N/A	Jul-23
Invasive Plant Treatment	N/A	Jul-23
Year 4 Monitoring (anticipated)	Oct-25	Dec-25
Year 5 Monitoring (anticipated)	Oct-26	Dec-26
Year 6 Monitoring (anticipoated)	Oct-27	Dec-27
Year 7 Monitoring (anticipated)	Oct-28	Dec-28

[1] = The number of monitoring reports excluding the as-built/baseline report

Table 3. Project Contacts
Blair Creek Mitigation Project - NCDMS Project No. 100047

Designer	8000 Regency Parkway, Suite 600
Michael Baker Engineering, Inc.	Cary, NC 27518 Contact: Katie McKeithan, Tel. 919-418-5703
Construction Contractor	5616 Coble Church Rd
KBS Earthworks, Inc.	Julian, NC 27283 Contact: Kory Strader, Tel. 336-362-0289
Survey Contractor	88 Central Avenue
Kee Mapping and Surveying	Asheville, NC 28801 Contact: Brad Kee, Tel. 828-575-9021
Planting Contractor	
Ripple EcoSolutions	215 Moonridge Road Chapel Hill, NC 27516 Contact: George Morris, Tel. 919-818-3984
Seeding Contractor	5616 Coble Church Rd
KBS Earthworks, Inc.	Julian, NC 27283 Contact: Kory Strader, Tel. 336-362-0289
Seed Mix Sources	
Green Resources	5204 Highgreen Court, Colfax, NC 27235 Telephone: 336-855-6363
Nursery Stock Suppliers	825 Maude Etter Road, McMinnville, TN 37110
Dykes and Son Nursery	Telephone: 919-742-1200
Native Forest Nursery	11306 US-441, Chatswort, GA 30705 Telephone: 336-855-6363
Monitoring Performers	
Michael Baker Engineering, Inc.	797 Haywood Rd, Suite 201 Michael Baker Engineering, Inc. Asheville, NC 28806
Stream Monitoring POC	Jason York, Tel. 828-380-0118
Vegetation Monitoring POC	Jason York, Tel. 828-380-0119

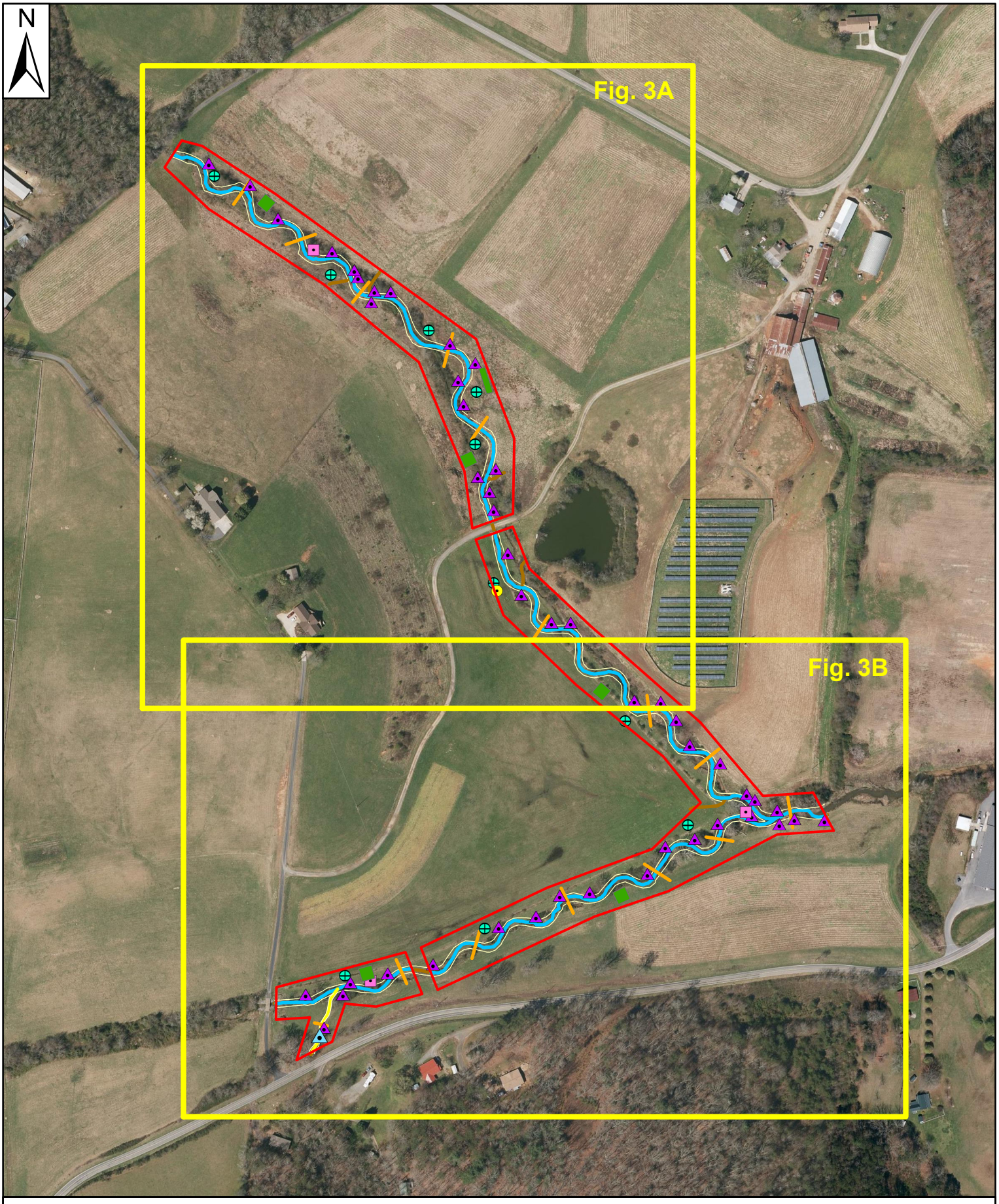
Table 4. Project Attributes for Existing Conditions

Blair Creek Mitigation Project – NCDMS Project No. 100047

Project Information				
Project Name	Blair Creek Stream Mitigation Project			
County	Clay			
Project Area (acres)	10.02			
Project Coordinates (lat. and long.)	35.026069 N, -83.831862 W			
Project Watershed Summary Information				
Physiographic Province	Level III Blue Ridge, Level IV; Broad Basins			
River Basin	Hiawassee			
USGS Hydrologic Unit 8-digit	6020002	USGS Hydrologic Unit 14-digit	06020002-060010	
DWR Sub-basin	04-05-01			
Project Drainage Area (acres)	1,862 arcres / 2.94 square miles (at confluence in Blair Creek)			
Stream Temperature Regime	cool			
Project Drainage Area Percentage of Impervious Area	1.7% impervious area			
USGS National Land Cover Database (NLCD) for 2011	12.6% developed (predominantly rural residential), 55.7% forested, 29.8% cultivated crops and pasture/hay, 1.2% shrub/scrub, and 0.7% herbaceous.			
Reach Summary Information				
Parameters	**Reach 1 (North Fork)**	**Reach 2 (South Fork)**	**Reach 3 (Blair Creek)**	**UT1**
Existing length of reach (linear feet)	2,399	1468	185	195
Valley confinement (Confined, moderately confined, unconfined)	Unconfined	Moderately Confined	Moderately Confined	Moderately Confined
Drainage area (acres)	983	880	1864	22
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial	Intermittent
NCDWR Water Quality Classification	WS-IV	WS-IV	WS-IV	N/A
Stream Classification (existing / proposed)	B-E4/C4	E4/C4	F4/C4	B/B
Evolutionary trend (Simon)	IV – Degradation and Widening	III – Degradation	IV – Aggradation and Widening	III – Degrading
FEMA classification	Zone X	Zone X	Zone AE	Zone X
Regulatory Considerations				
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**	
Water of the United States - Section 404	Yes	Yes	PCN	
Water of the United States - Section 401	Yes	Yes	PCN	
Endangered Species Act	Yes	Yes	Categorical Exclusion	
Historic Preservation Act	Yes	Yes	Categorical Exclusion	
Coastal Zone Management Act (CAMA)	No	N/A	N/A	
FEMA Floodplain Compliance	No	N/A	N/A	
Essential Fisheries Habitat	No	N/A	N/A	

APPENDIX B

Visual Assessment Data



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0 125 250 500
Feet

DMS Proj. No. 100047

Overview Map: Current Condition Plan View (CCPV)
Blair Creek Mitigation Project
Clay County, NC

N

PP-1
BCW-1
BCW-11
PP-2
VP1: 648 stems/ac
XS-1
PP-3
RVP5-MY2: 486 stems/ac
XS-2
PP-4
PP-5
CG-1
BCW-2
PP-42
PP-6
PP-7
XS-3
PP-43
MY2 VPA
BCW-3
VP2: 243 stems/ac
PP-8
PP-9
XS-4
PP-44
BCW-4
PP-10
Reach R1
XS-5
BCW-5
PP-11
PP-45
PP-13
VP3: 445 stems/ac
PP-12
PP-14
BCW-6
PP-46
PP-15
XS-6
VP4: 445 stems/ac

MY2 Encroachment Areas
PhotoPoints
MY2 VPA
MY2 Random Veg Plots
Conservation Easement
Cross-Sections

Monitoring Gauges

Crest Gauge -1
Groundwater Well FAIL
Groundwater Well PASS

Vegetation Plots

FAIL
PASS

Streams by Mitigation Type

Restoration
No Credit
Wetlands: Reestablishment (5.21 ac)
Wetlands: Rehabilitation (0.69 ac)
Wetlands: Enhancement (0.18 ac)

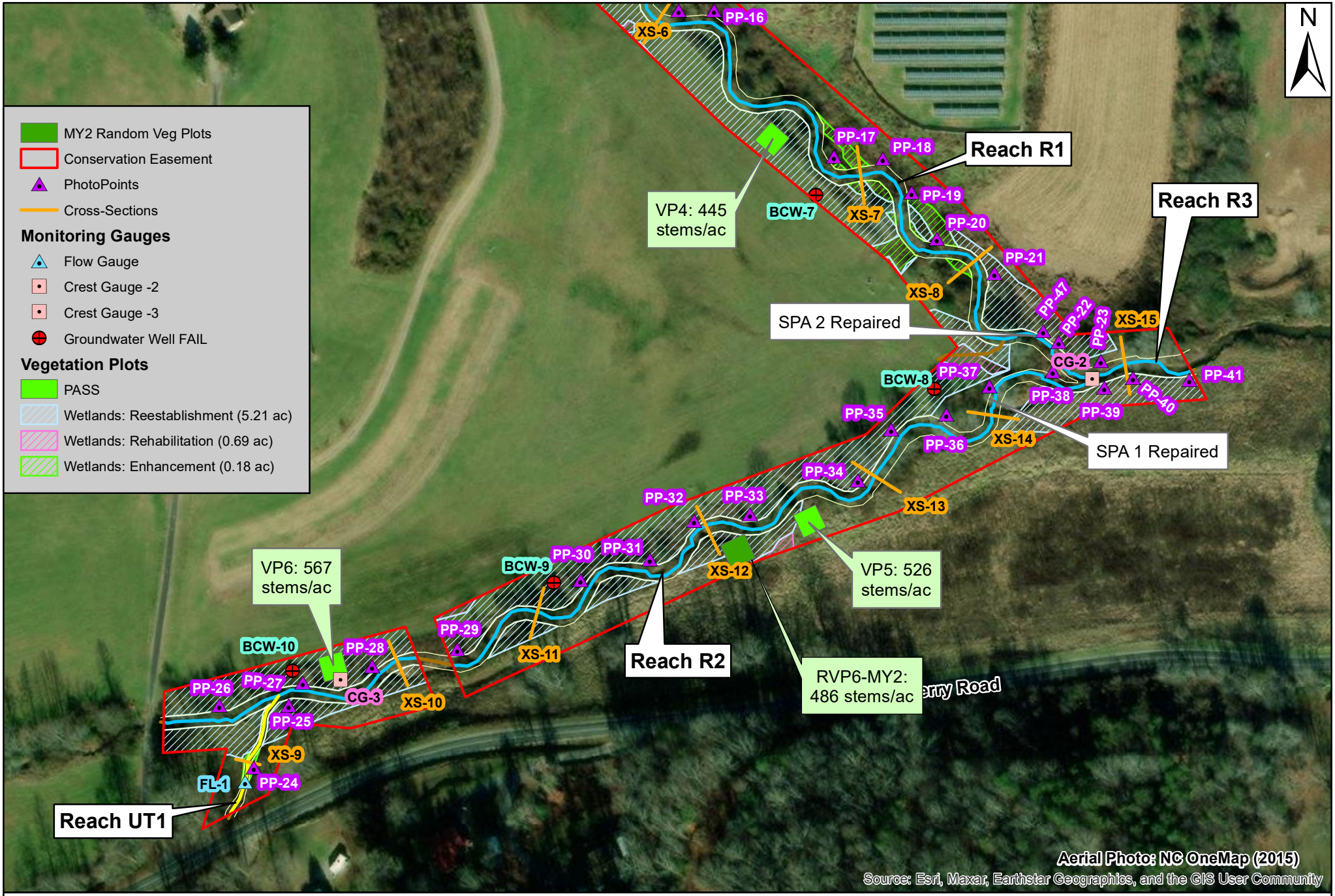
Aerial Photo: NC OneMap (2015)
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Michael Baker INTERNATIONAL

0 125 250 500 Feet

DMS Proj. No. 100047

Figure 3A. Current Condition Plan View (CCPV)
Blair Creek Mitigation Project
Clay County, NC



Michael Baker INTERNATIONAL

0 125 250 500 Feet

DMS Proj. No. 100047

Figure 3B. Current Condition Plan View (CCPV)
Blair Creek Mitigation Project
Clay County, NC

Table 5. Visual Stream Morphology Stability Assessment

Blair Creek Mitigation Project – NCDMS Project No. 100047 - All Reaches Assessed in October 2023

Reach ID: Reach 1							
Assessed Length (LF):	**2,741.86**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100.0%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	36	36	**0.00**	**0.00**	100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth ≥ 1.5)	36	36			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	27	27			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	27	27			100%
		2. Thalweg centering at downstream of meander bend (Glide)	27	27			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion		0	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected		0	0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse		0	0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	31	31			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 or around sills or arms	31	31			100%
	3. Bank Position	Bank erosion within the structures extent of influence **does not** exceed 15%	31	31			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio ≥ 1.5. Rootwads/logs providing some cover at low flow	14	14			100%

Table 5. Visual Stream Morphology Stability Assessment

Blair Creek Mitigation Project – NCDMS Project No. 100047

Reach ID: Reach 2							
Assessed Length (LF):	**1,507.53**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	24	24	**0.00**	**0.00**	100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth ≥ 1.5)	26	26			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	26	26			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	26	26			100%
		2. Thalweg centering at downstream of meander bend (Glide)	26	26			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion		0	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected		0	0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse		0	0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	21	21			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	7	7			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	21	21			100%
	3. Bank Position	Bank erosion within the structures extent of influence **does not** exceed 15%	21	21			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio ≥ 1.5. Rootwads/logs providing some cover at low flow	7	7			100%

Table 5. Visual Stream Morphology Stability Assessment

Blair Creek Mitigation Project – NCDMS Project No. 100047 - All Reaches Assessed in October 2023

Reach ID: Reach 3							
Assessed Length (LF):	**133.64**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	2	2	**0.00**	**0.00**	100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth ≥ 1.5)	3	3			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	3	3			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	3	3			100%
		2. Thalweg centering at downstream of meander bend (Glide)	3	3			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion		0	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected		0	0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse		0	0	0	100%
				Totals	0	0	100%
3. Engineering 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 or around sills or arms	1	1			100%
	3. Bank Position	Bank erosion within the structures extent of influence **does not** exceed 15%	1	1			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	1	1			100%

Table 5. Visual Stream Morphology Stability Assessment

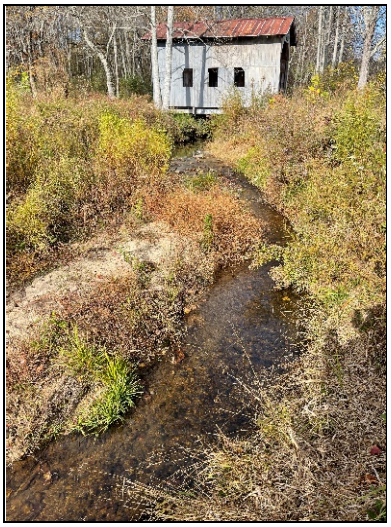
Blair Creek Mitigation Project – NCDMS Project No. 100047

Reach ID: Reach UT1							
Assessed Length (LF):	**173.03**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	7	7	**0.00**	**0.00**	100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth ≥ 1.5) **Plunge Pools**	7	7			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	7	7			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	N/A	N/A			100%
		2. Thalweg centering at downstream of meander bend (Glide)	N/A	N/A			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion		0	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected		0	0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse		0	0	0	100%
				Totals	0	0	100%
3. Engineering 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	7	7			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	7	7			100%
	3. Bank Position	Bank erosion within the structures extent of influence **does not** exceed 15%	7	7			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	7	7			100%

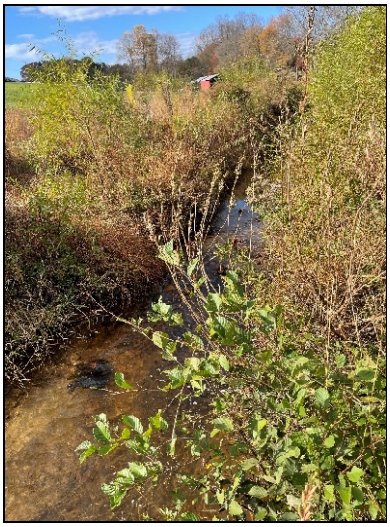
Table 6. Vegetation Conditions Assessment
Blair Creek Mitigation Project - NCDMS Project No. 100047 - Vegetation Assessed in November 2022

Planted Acreage: 8.3						
Vegetation Category	**Defintions**	**Mapping Threshold (acres)**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Planted Acreage**
1. Bare Areas *	Very limited cover 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	1	0.08	1.5%
			Total			
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25 acres	N/A	0	0.00	0.0%
			Cumulative Total			
Easement Acreage: 8.3						
Vegetation Category	**Defintions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Points**	**Combined Acreage**	**% of Planted Acreage**
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale)	1000 ft²	Green Hatching	0	0.00	0.0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale)	577 ft²	Yellow Polygon	2	0.00	0.0%

Blair Creek: Stream Station Photo-Points
NCDMS Project No. #100047 – MY 2 Photos taken October 30, 2023.



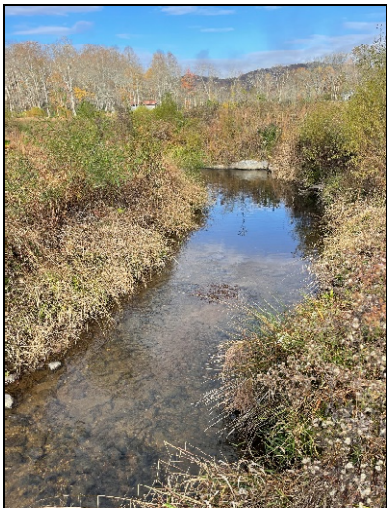
PP-1: R1 Upstream, Station 10+75- Begin R1



PP-2: R1, Upstream, Station 12+25

PP-3: R1, Upstream, Station 13+50

PP-4: R1, Upstream, Station 15+50



PP-5: R1, Upstream, Station 16+00

PP-6: R1, Upstream, Station 17+00

Blair Creek: Stream Station Photo-Points
NCDMS Project No. #100047 – MY 2 Photos taken October 30, 2023.

PP-7: R1 Upstream, Station 17+40

PP-8: R1, Upstream, Station 19+50

PP-9: R1, Upstream, Station 20+20

PP-10: R1, Upstream, Station 21+75

PP-11: R1, Upstream Station 23+75

PP-12: R1, Upstream, Station 24+60

Blair Creek: Stream Station Photo-Points
NCDMS Project No. #100047 – MY 2 Photos taken October 30, 2023.

PP-13: R1, Downstream, Station 24+25- Culvert

PP-14: R1, Upstream, Station 25+60- Culvert

PP-15: R1, Upstream, Station 28+00

PP-16: R1, Upstream, Station 28+60

PP-17: R1, Upstream, Station 31+75

PP-18: R1, Upstream, Station 32+25

Blair Creek: Stream Station Photo-Points
NCDMS Project No. #100047 – MY 2 Photos taken October 30, 2023.

PP-19: R1, Upstream, Station 32+75

PP-20: R1, Upstream, Station 33+75

PP-21: R1, Upstream, Station 34+65

PP-22: R1, Upstream, Station 36+75

PP-23: R1, Upstream, Station 37+00 – End R1

PP-24: UT1, Upstream, Station 10+60

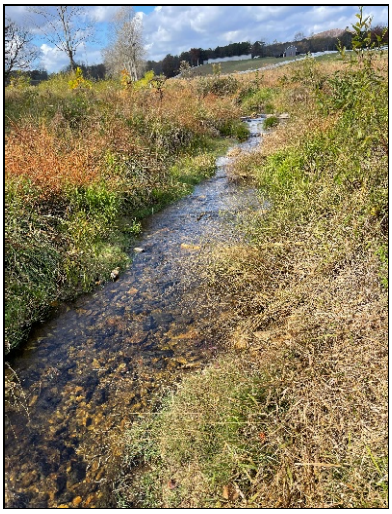
Blair Creek: Stream Station Photo-Points
NCDMS Project No. #100047 – MY 2 Photos taken October 30, 2023.

PP-25: UT1, Upstream, Station 11+85- Confluence with R2

PP-26: R2, Upstream, Station 10+50- Begin R2

PP-27: R2, Upstream, Station 11+60

PP-28: R2, Upstream, Station 13+51

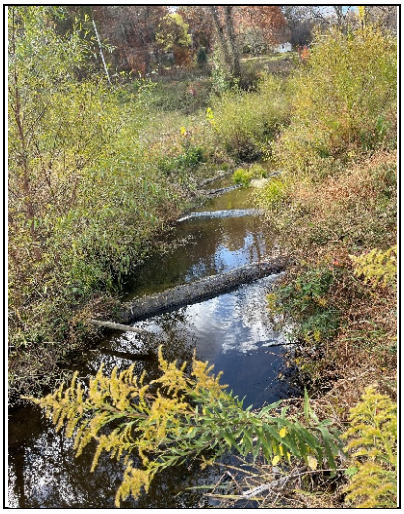


PP-29: R2, Upstream, Station 12+25

PP-30: R2, Upstream, Station 16+50

Blair Creek: Stream Station Photo-Points
NCDMS Project No. #100047 – MY 2 Photos taken October 30, 2023.

PP-31: R2, Upstream, Station 17+40



PP-32: R2, Upstream, Station 18+40

PP-33: R2, Upstream, Station 19+15

PP-34: R2, Upstream at Station 20+80

PP-35: R2, Upstream, Station 21+75

PP-36: R2, Upstream, Station 22+30

Blair Creek: Stream Station Photo-Points
NCDMS Project No. #100047 – MY 2 Photos taken October 30, 2023.

PP-37: R2, Upstream, Station 23+50

PP-38: R2, Upstream, Station 24+60

PP-39: R2, Upstream, Station 25+20- Confluence with R1

PP-40: R3, Upstream, Station 25+50- Begin R3

PP-41: R3, view upstream at Station 10+80- End R3

PP-42: R1, Swale on Right Floodplain, Station 16+25

Blair Creek: Stream Station Photo-Points
NCDMS Project No. #100047 – MY 2 Photos taken October 30, 2023.

PP-43: R1, Swale on Left Floodplain, Station 17+00

PP-44: R1, Swale on Left Floodplain, Station 20+70

PP-45: R1, Swale on Left Floodplain, Station 24+00

PP-46: R1, Overflow Channel on Left Floodplain, Station 26+75

PP-47: R1, Swale on Right Floodplain, Station 36+40

SPA1 (MY1) Before Repair. Photo Taken November 11, 2022 (MY2)

Blair Creek: Stream Station Photo-Points
NCDMS Project No. #100047 – MY 2 Photos taken October 30, 2023.

SPA1 (MY1) After Repair. Photo Taken September 19, 2023 (MY2)

SPA2(MY1) After Repair. Photo Taken September 19, 2023 (MY2)

Blair Creek: Vegetation Plot Photographs
NCDMS Project No. 100047

Vegetation Plot #1: Photo taken October 30, 2023

Vegetation Plot #2: Photo taken October 30, 2023

Vegetation Plot #3: Photo taken October 30, 2023

Vegetation Plot #4: Photo taken October 30, 2023

Vegetation Plot #5: Photo taken October 30, 2023

Vegetation Plot #6: Photo taken October 30, 2023

Blair Creek: Vegetation Plot Photographs
NCDMS Project No. 100047

MY2 Random Vegetation Plot #5:
Photo taken October 30, 2023

MY2 Random Vegetation Plot #6:
Photo taken October 30, 2023

Monitoring Gauges and Overbank Photographs. MY 2 Photos taken October 30, 2023.

Monitoring Well 1

Monitoring Well 2

Monitoring Well 3

Monitoring Well 4

Monitoring Well 5

Monitoring Well 6

Monitoring Gauges and Additional Photographs. MY 2 Photos taken October 30, 2023.

BCW 1

BCW 2

BCW 3

BCW 4

BCW 5

BCW 6

Monitoring Gauges and Additional Photographs. MY 2 Photos taken October 30, 2023.

BCW 7

BCW 8

BCW 9

BCW 10

BCW 11

Crest Gauge 1. Reach 1

Monitoring Gauges and Additional Photographs. MY 2 Photos taken October 30, 2023.

Crest Gauge 2. Confluence Reach 1&2

Crest Gauge 3

Flow Gauge 1. UT1

Encroachment Area into existing drain swale. R1 Left floodplain.

APPENDIX C

Vegetation Plot Data

Table 7. Planted Stem Counts by Plot and Species

Planted Acreage	8.3
Date of Initial Plant	2022-02-10
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	2023-10-30
Date of Current Survey	2023-10-30
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F		Veg Plot 6 F		Veg Plot 5 R	Veg Plot 6 R
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Total	Total
Species Included in Approved Mitigation Plan	Acer negundo	boxelder	Tree	FAC					1	2	1	1						
	Acer saccharinum	silver maple	Tree	FACW	1	1	1	1	4	4							1	
	Alnus serrulata	hazel alder	Tree	OBL								2		1	1	2	3	
	Betula alleghaniensis	yellow birch	Tree	FAC									1	1				
	Betula nigra	river birch	Tree	FACW	3	3	1	1			3	3	2	2	2	2	1	1
	Carpinus caroliniana	American hornbeam	Tree	FAC	2	2			2	2			3	3	1	1		1
	Cephalanthus occidentalis	common buttonbush	Shrub	OBL	1	1	1	1					1	1				
	Cornus amomum	silky dogwood	Shrub	FACW	3	3	1	1					3	4	2	4	1	7
	Diospyros virginiana	common persimmon	Tree	FAC			1	1										
	Fraxinus pennsylvanica	green ash	Tree	FACW	1	1			1	1							4	2
	Ilex verticillata	common winterberry	Tree	FACW					1	1			1	1	2	2		
	Lindera benzoin	northern spicebush	Tree	FAC											1	1		
	Liriodendron tulipifera	tuliptree	Tree	FACU														1
	Platanus occidentalis	American sycamore	Tree	FACW	3	3					3	3			2	2	2	
	Quercus imbricaria	shingle oak	Tree	FAC	1	1	1	1	1	1	1	1						
	Quercus lyrata	overcup oak	Tree	OBL							1	1						1
	Ulmus americana	American elm	Tree	FACW	1	1												
Sum	Performance Standard				16	16	6	6	10	11	9	11	11	13	11	14	12	13
Post Mitigation Plan Species	*Cercis canadensis*	*eastern redbud*	*Tree*	*FACU*													*1*	
	Quercus michauxii	swamp chestnut oak	Tree	FACW	1	1			3	3	1	1						
Sum	Proposed Standard				17	17	6	6	13	14	10	12	11	13	11	14	12	13
Mitigation Plan Performance Standard	Current Year Stem Count					16		6		11		11		13		14	12	13
	Stems/Acre					648		243		445		445		526		567	486	486
	Species Count					9		6		6		6		7		7	6	6
	Dominant Species Composition (%)					18		17		29		25		31		29	31	54
	Average Plot Height (ft.)					2		3		2		2		3		3	3	2
	% Invasives					0		0		0		0		0		0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					17		6		14		12		13		14	12	13
	Stems/Acre					688		243		567		486		526		567	486	486
	Species Count					10		6		7		7		7		7	6	6
	Dominant Species Composition (%)					18		17		29		25		31		29	31	54
	Average Plot Height (ft.)					2		3		2		2		3		3	3	2
	% Invasives					0		0		0		0		0		0	0	0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Vegetation Performance Standards Summary Table

	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	648		9	0	243		6	0	445		6	0
Monitoring Year 1					162		3	0	40		1	0
Monitoring Year 0												
	Veg Plot 4 F				Veg Plot 5 F				Veg Plot 6 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	445		6	0	526		7	0	567		7	0
Monitoring Year 1									40		1	0
Monitoring Year 0					40		1	0	40		1	0
	Veg Plot Group 1 R				Veg Plot Group 2 R							
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives				
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	486		6	0	486		6	0				
Monitoring Year 1												
Monitoring Year 0												

*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

APPENDIX D

Stream Geomorphology Data

FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

Permanent Cross-section 1

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	15.9	12.8	1.2	1.7	10.3	--	--	1848.21	1848.2

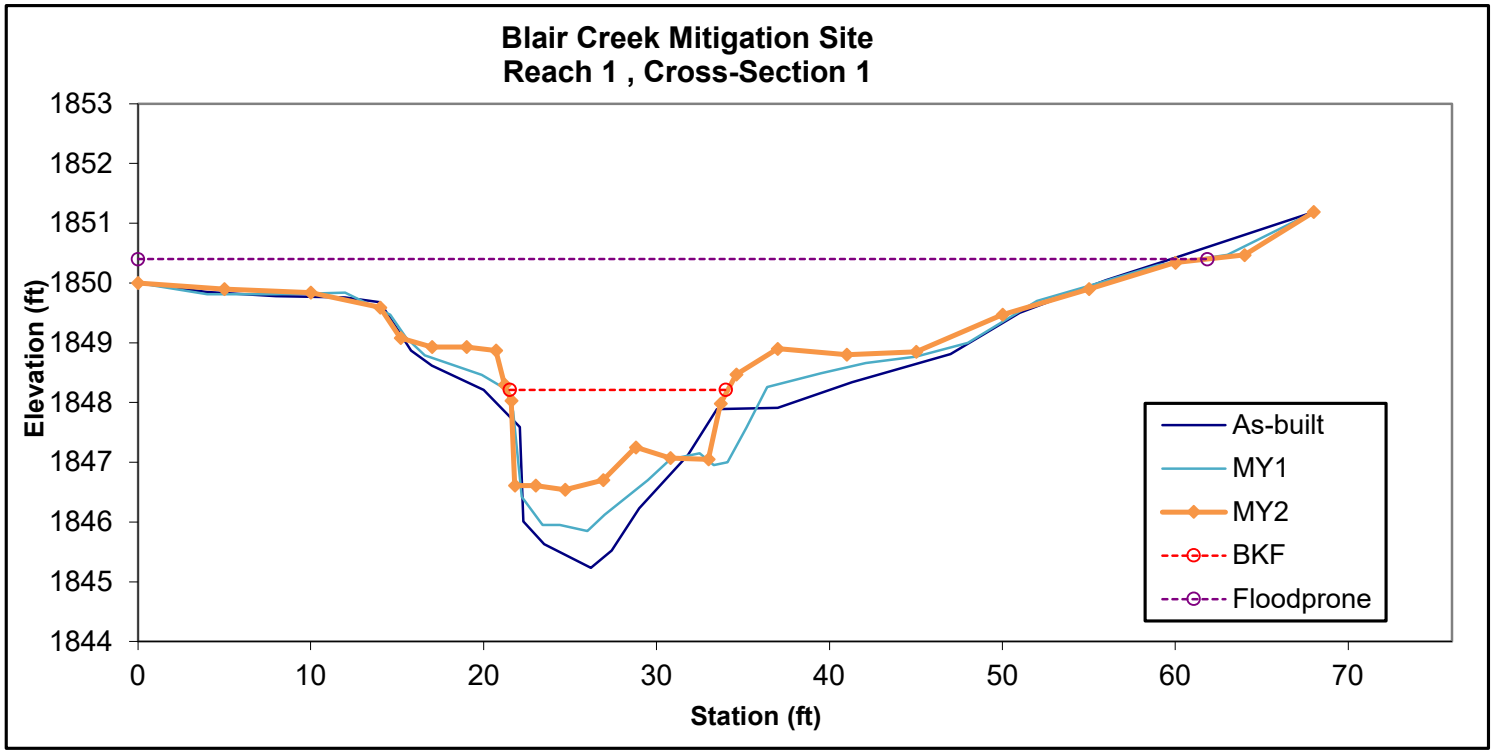


FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

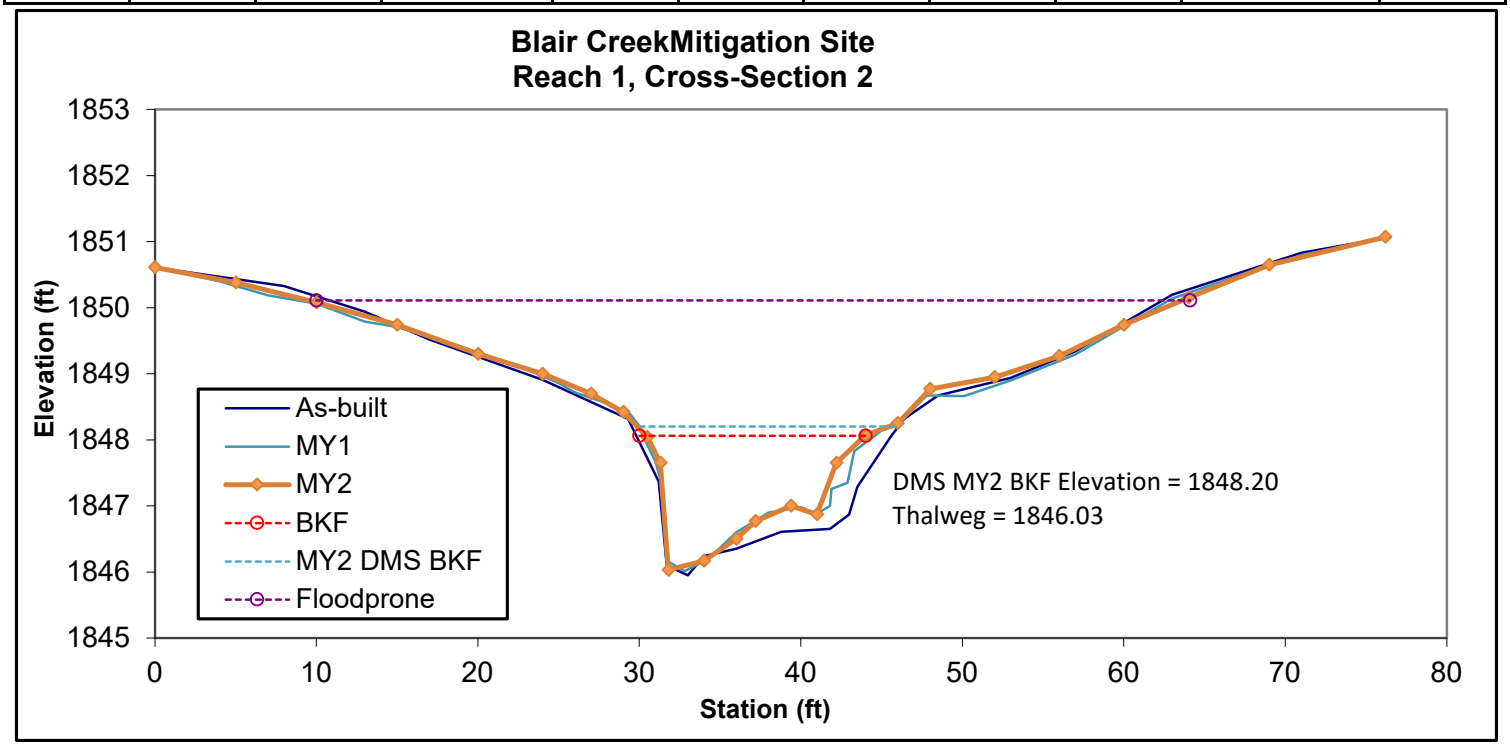
Permanent Cross-section 2

(Year 2 Data - Collected September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	18.5	16	1.2	2.2	13.9	1.0	3.7	1848.06	1848.2



Note: Per DMS/IRT request, bank height ratio for MY2 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

Permanent Cross-section 3

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	34.6	12.2	2.8	4.4	4.3	--	--	1847.87	1847.9

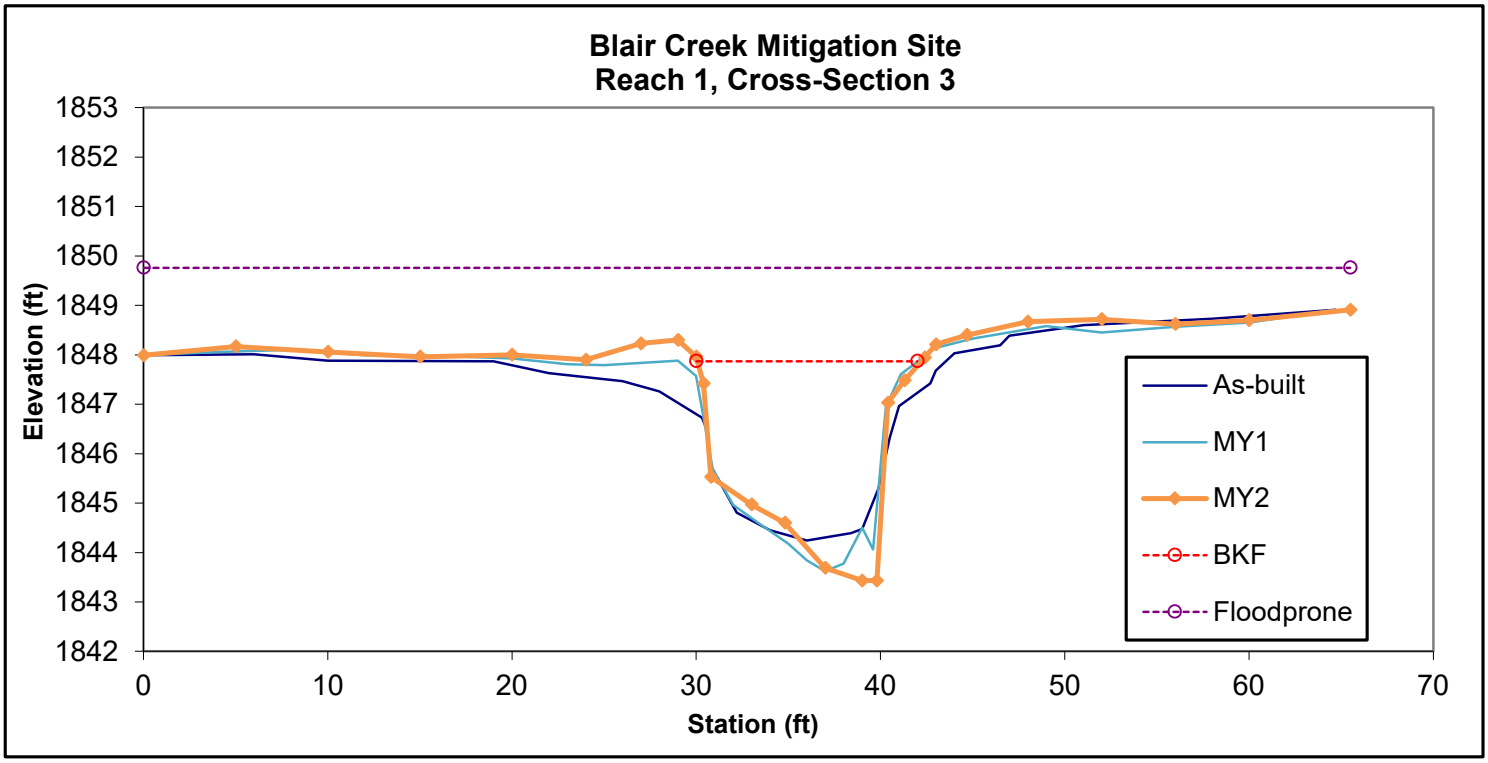


FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

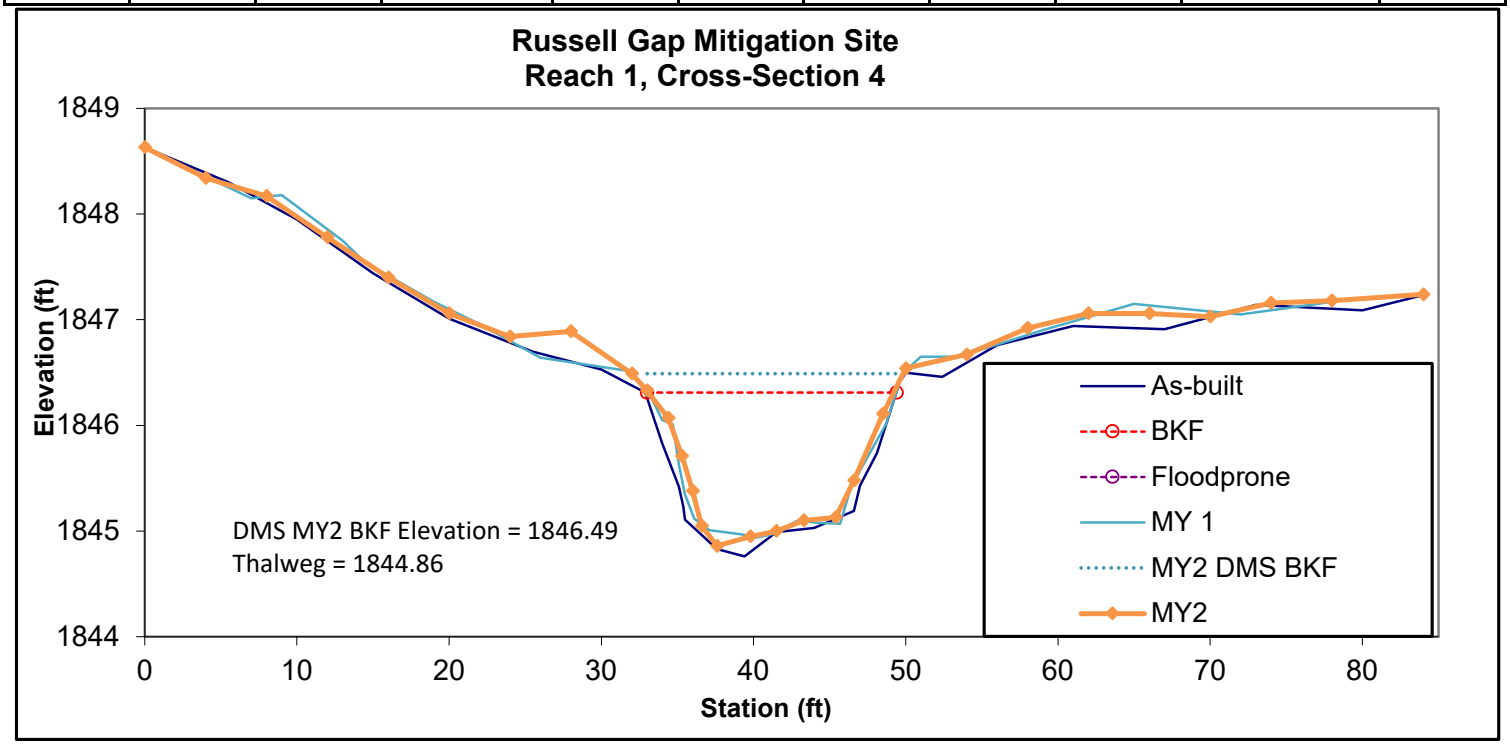
Permanent Cross-section 4

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	15	15.8	0.9	1.4	16.7	1.0	4.3	1846.31	1846.5



Note: Per DMS/IRT request, bank height ratio for MY2 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

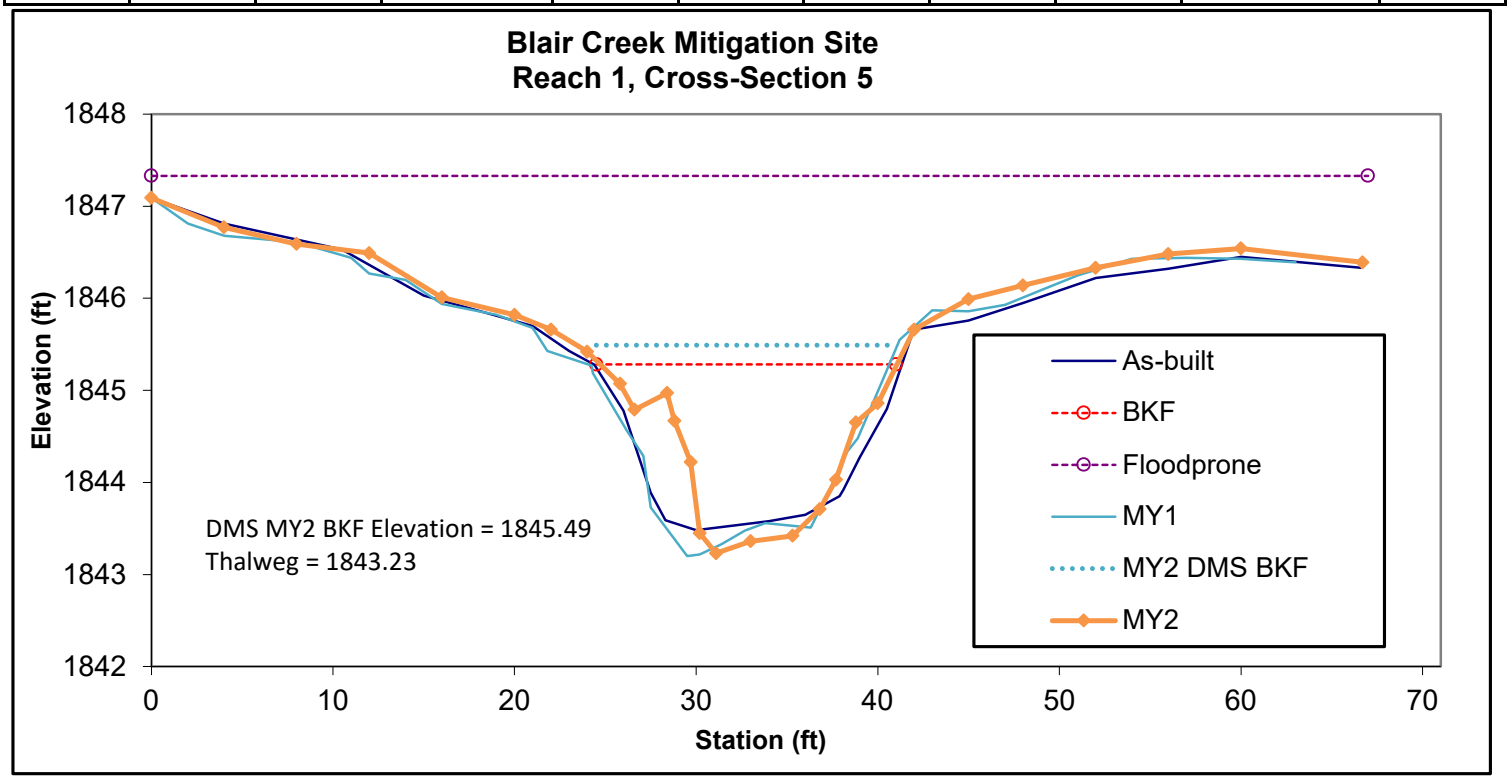
Permanent Cross-section 5

(Year 2 Data -September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	18.4	16.3	1.1	2	14.5	1.0	3.7	1845.28	1845.5



Note: Per DMS/IRT request, bank height ratio for MY2 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

Permanent Cross-section 6

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	34.6	17.4	2	3.4	8.7	--	--	1842.09	1842.1

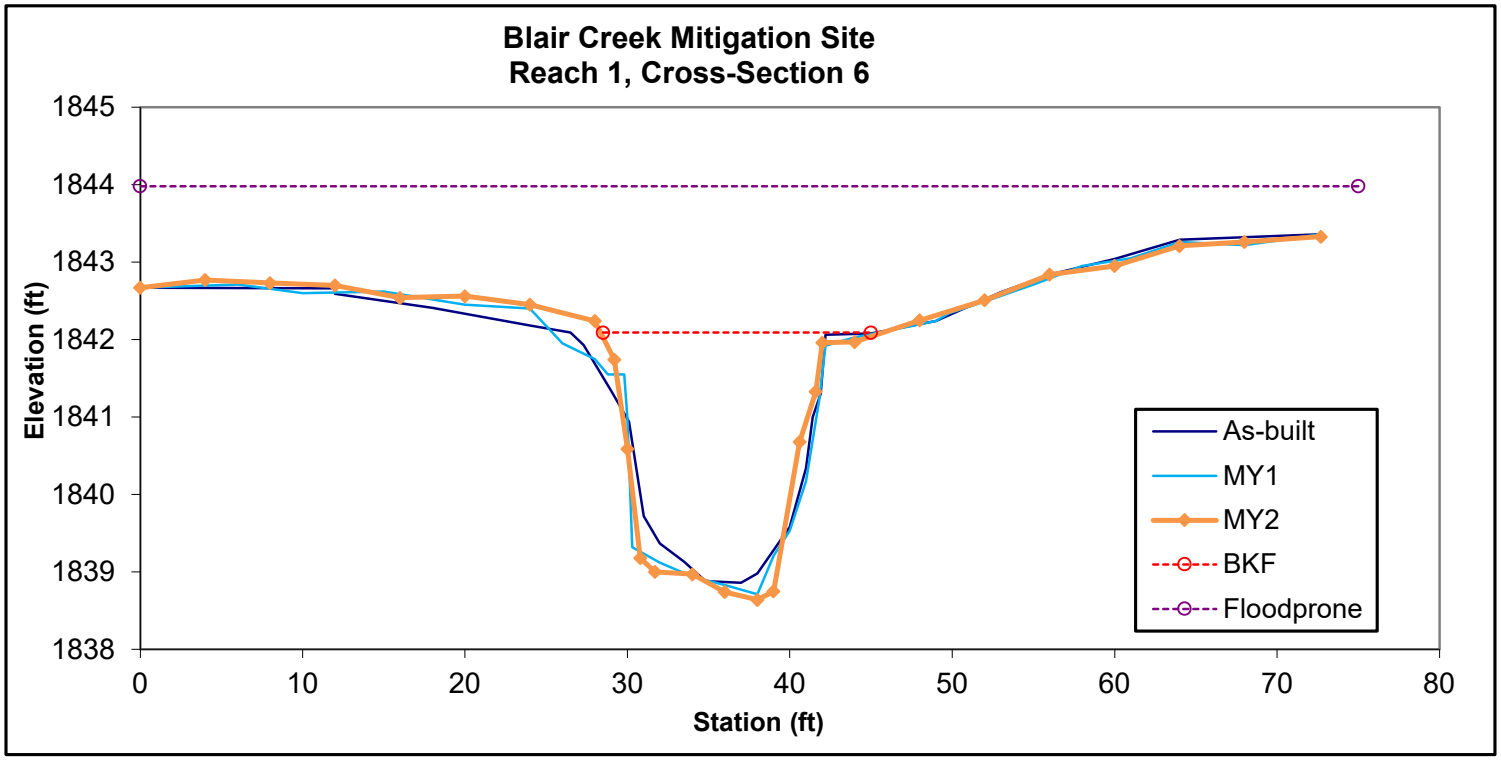


FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

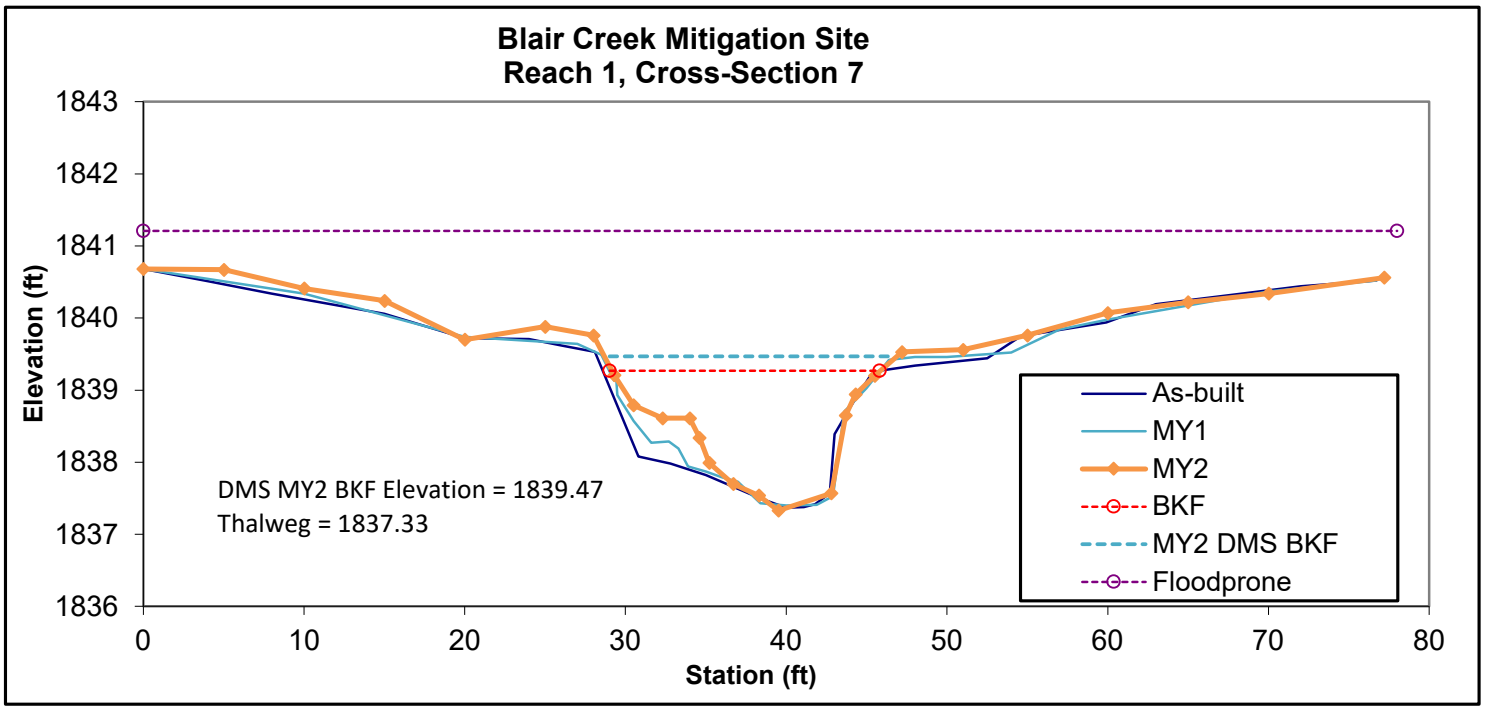
Permanent Cross-section 7

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	18.2	16.7	1.1	1.9	15.3	1.0	4.2	1839.27	1839.4



Note: Per DMS/IRT request, bank height ratio for MY2 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

Permanent Cross-section 8

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	45.9	15.7	2.9	5.3	5.4	--	--	1837.5	1837.5

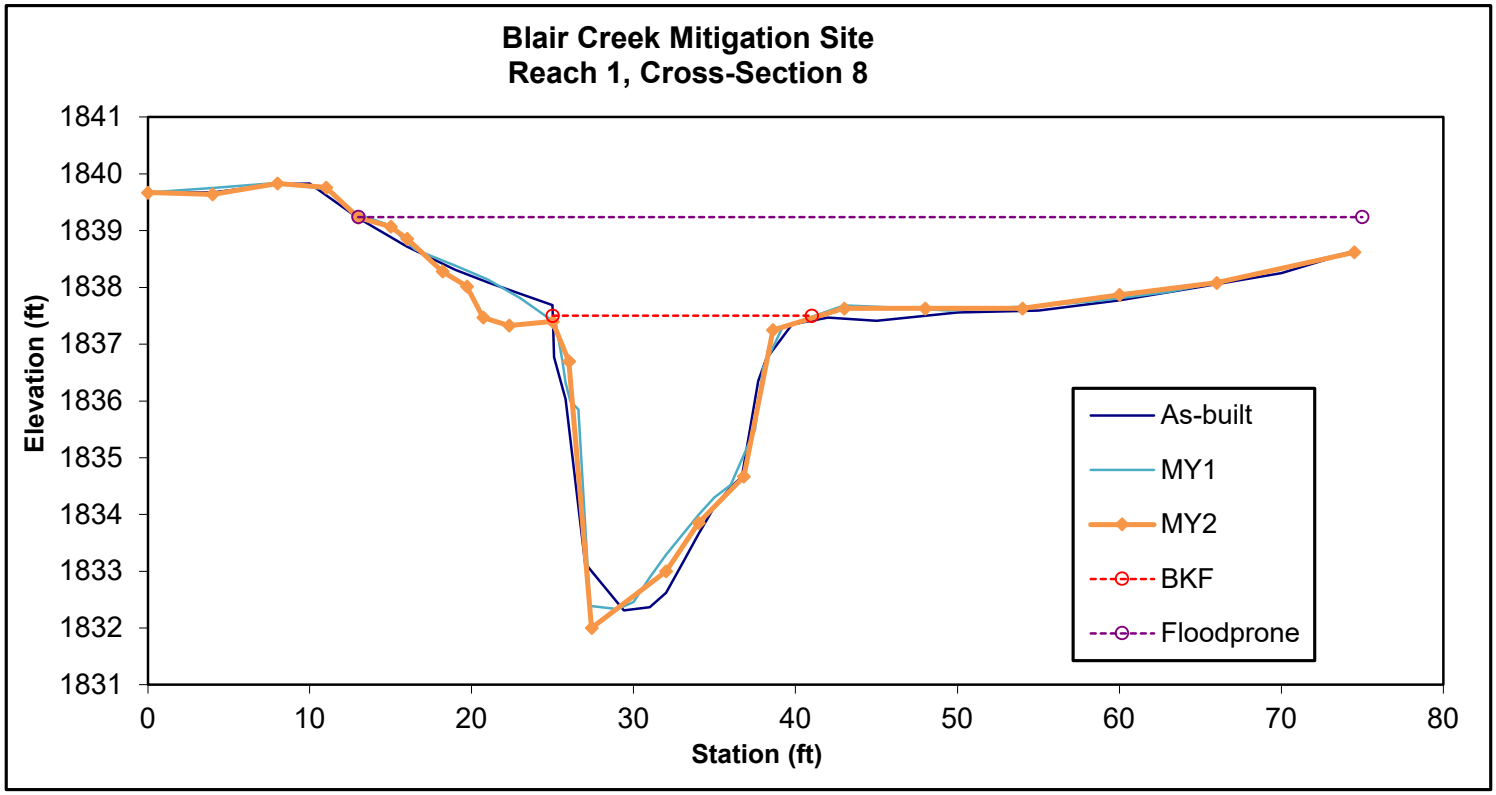


FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

Permanent Cross-section 9

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	6.1	6		2.12	6	--	--	1845.99	1846.0

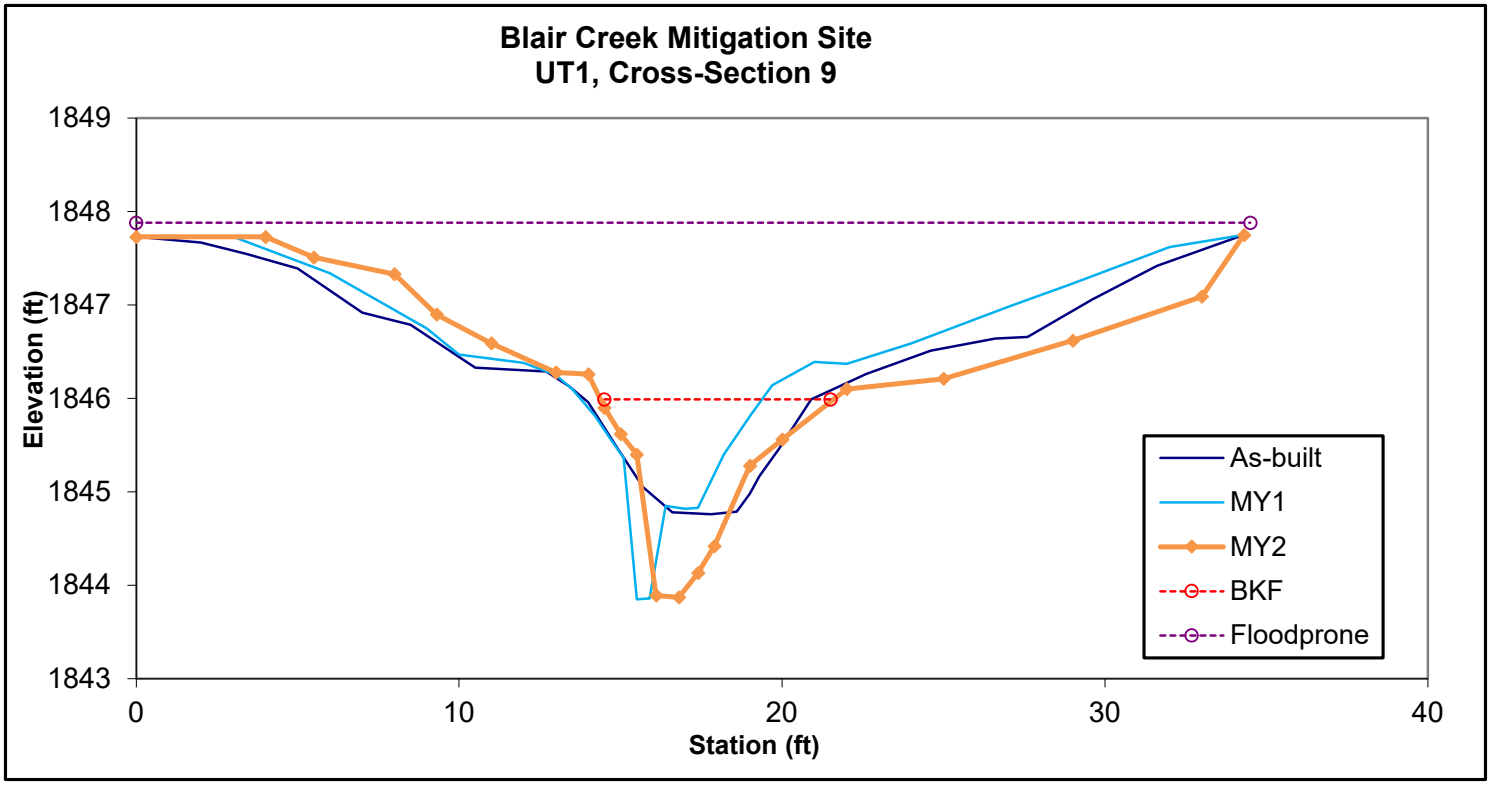


FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

Permanent Cross-section 10

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	35.2	15.7	2.2	3.6	7	--	--	1843.54	1843.5

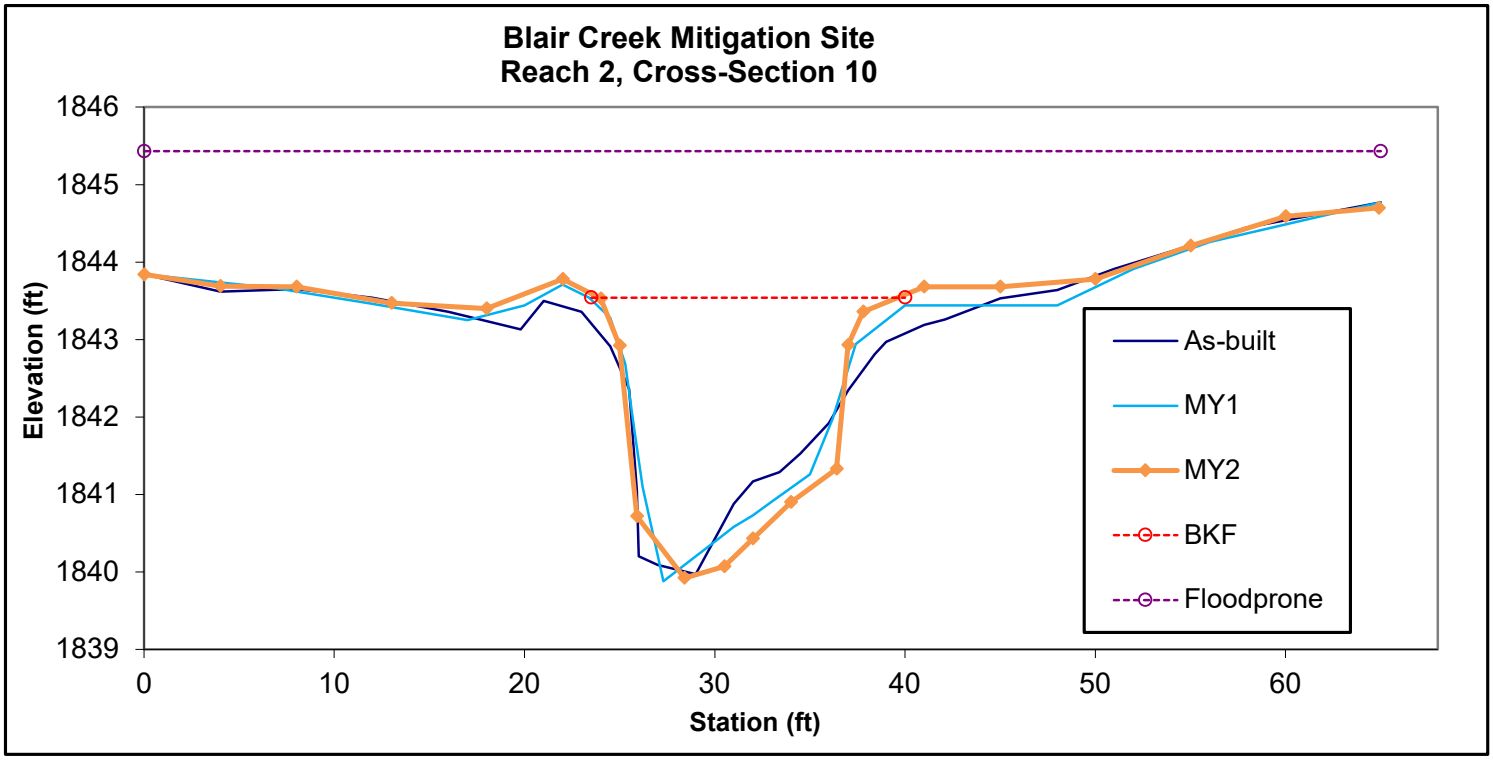


FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

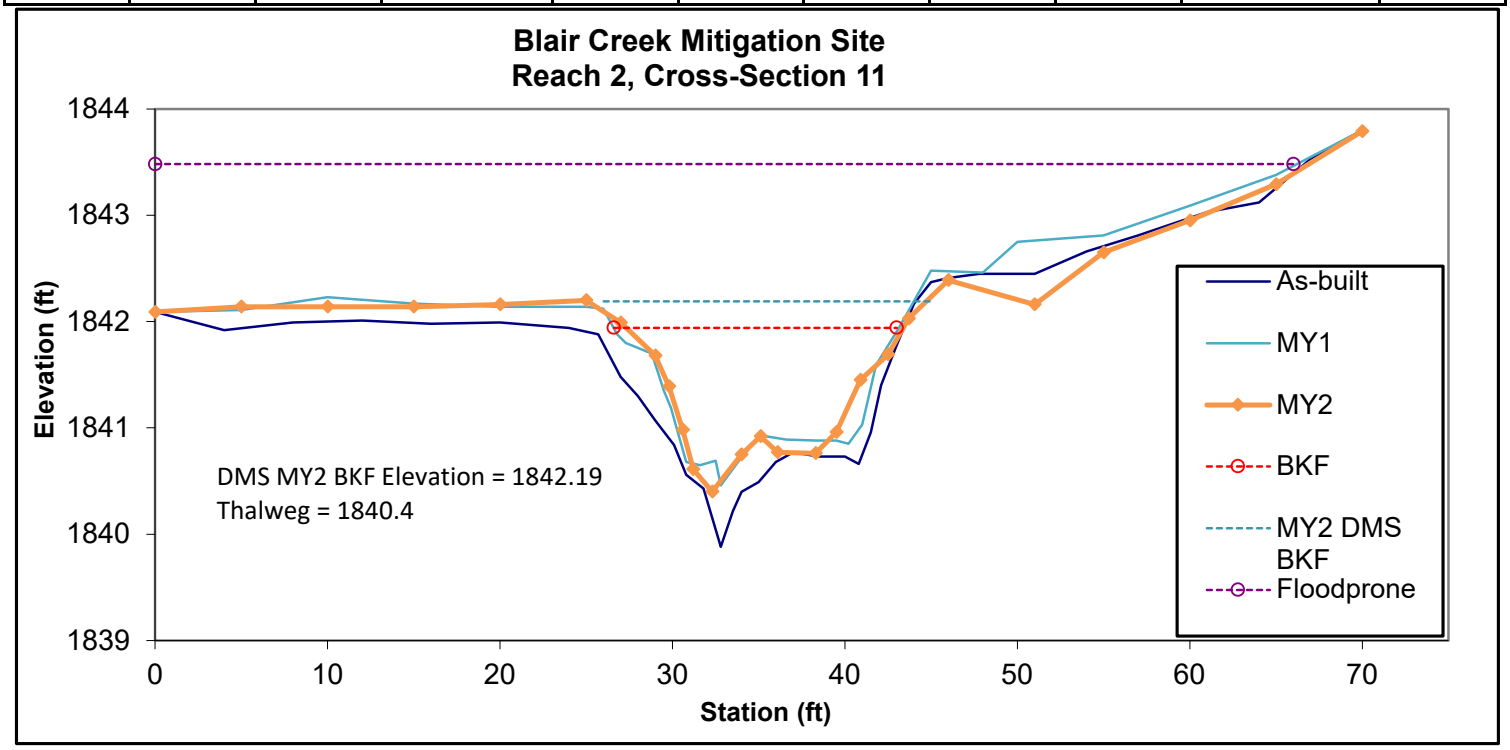
Permanent Cross-section 11

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	13.7	16.1	0.9	1.5	18.9	1.0	1.5	1841.94	1842.2



Note: Per DMS/IRT request, bank height ratio for MY2 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

Permanent Cross-section 12

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	--	25.5	18	1.4	3.04	12.7	--	--	1839.98	1840.0

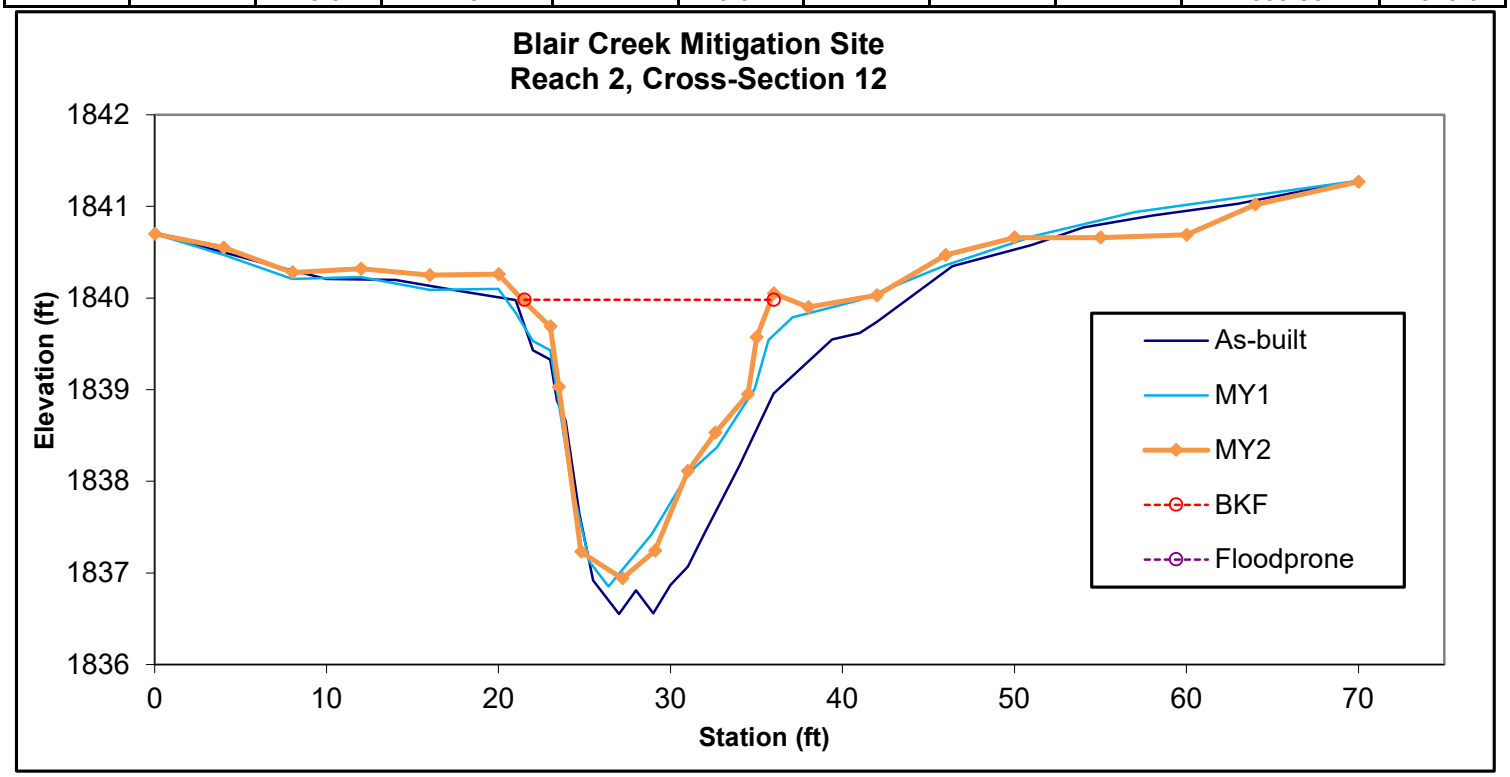


FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

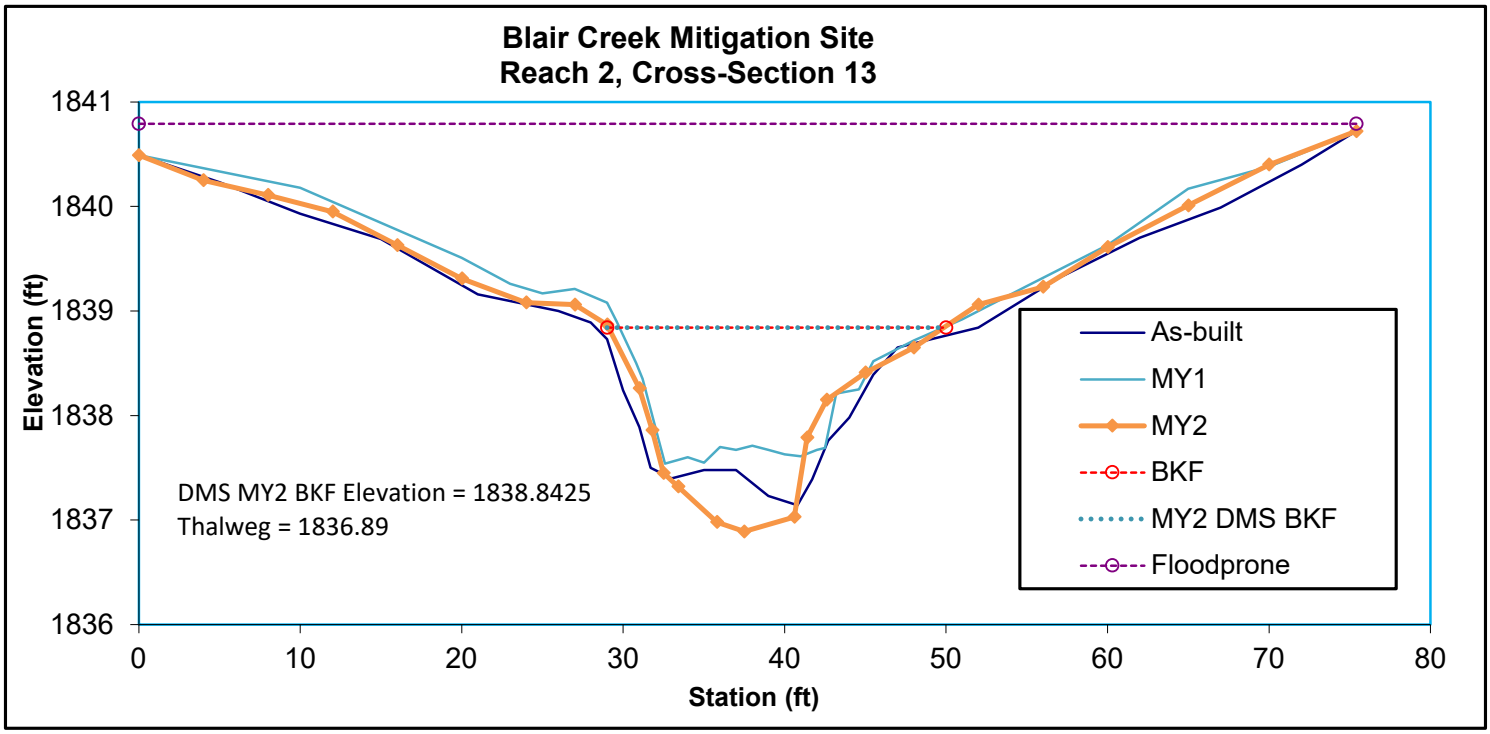
Permanent Cross-section 13

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	21.08	20.8	1	2.03	20.4	1.0	3.5	1838.84	1838.9



Note: Per DMS/IRT request, bank height ratio for MY2 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

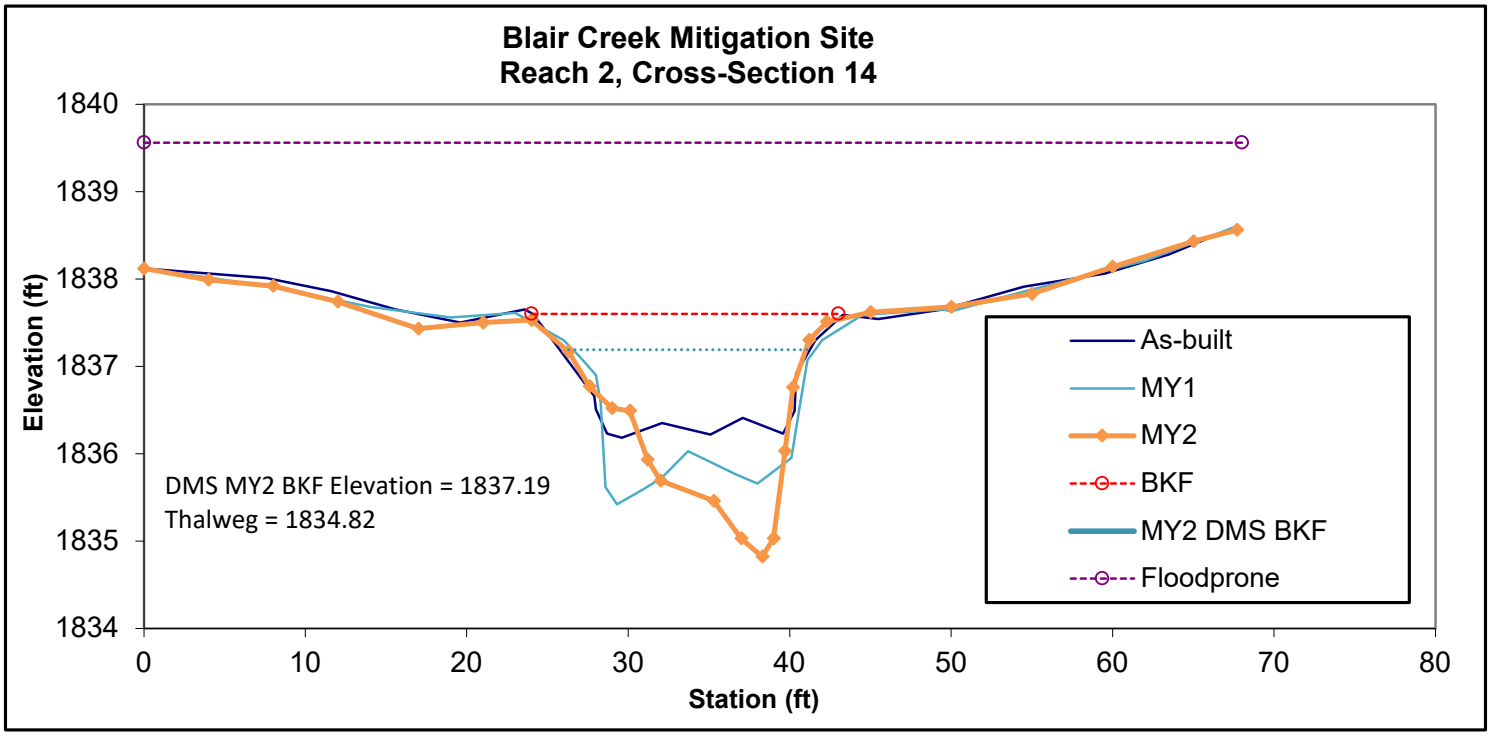
Permanent Cross-section 14

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	25.9	20.5	1.3	2.8	16.3	1.10	4.6	1837.6	1837.5



Note: Per DMS/IRT request, bank height ratio for MY2 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

FIGURE 4. MY2 CROSS SECTIONS WITH ANNUAL OVERLAY

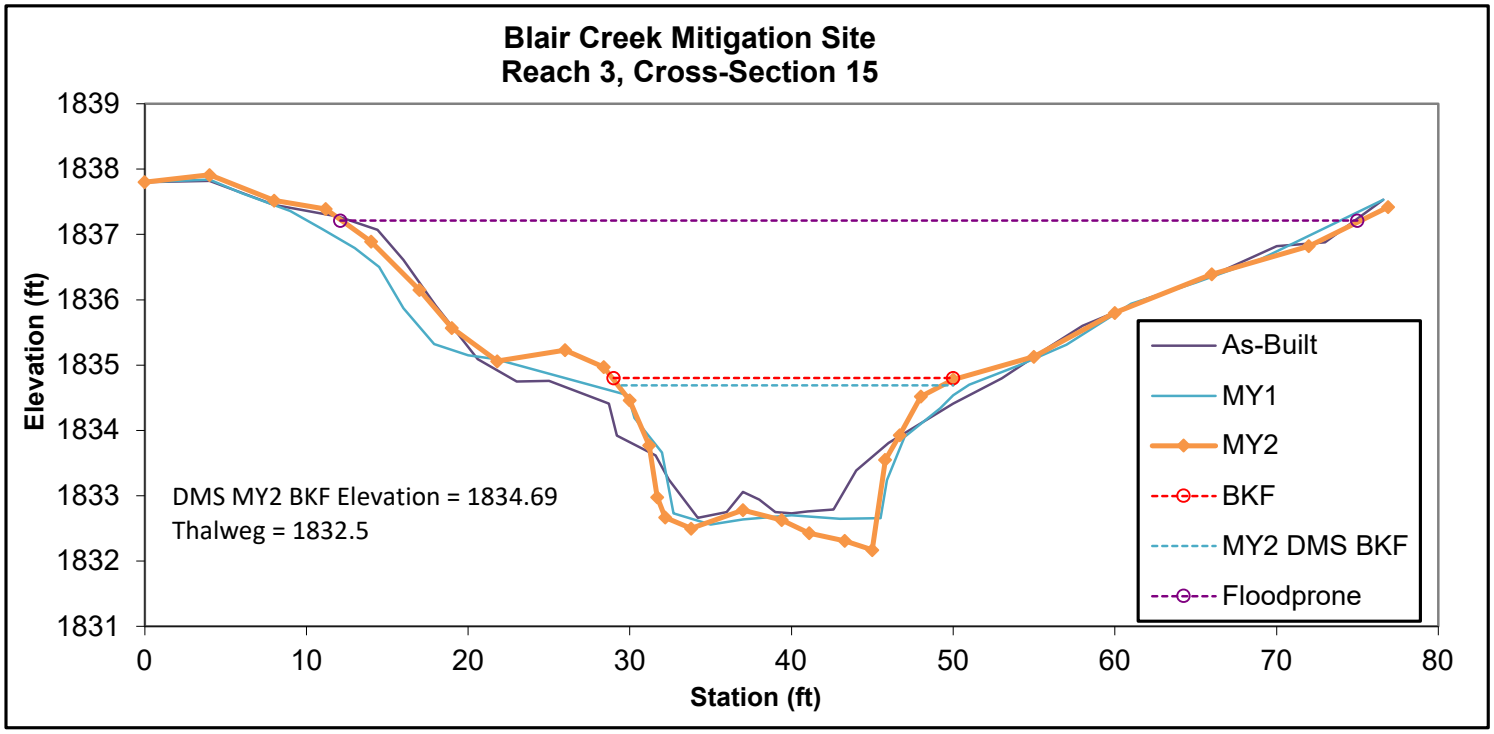
Permanent Cross-section 15

(Year 2 Data - September 2023)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B	35.3	21.4	1.7	2.6	12.9	1	3.1	1834.8	1834.8



Note: Per DMS/IRT request, bank height ratio for MY2 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

Table 8. Baseline Stream Data Summary
Blair Creek Restoration Project: DMS Project No ID. 100047

Reach 1 (North Fork)

Parameter	Pre-Existing Condition			Reference Reach(es) Data			Design			As-built		
				Composite								
Dimension and Substrate - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
BF Width (ft)	-----	8.57 - 8.59	-----	-----	-----	-----	-----	16.5 - 17.0	-----	16.48	16.60	17.22
Floodprone Width (ft)	-----	12.9 - 34.7	-----	-----	-----	-----	-----	60.00	-----	66.46	67.31	76.70
BF Mean Depth (ft)	-----	1.43 - 1.48	-----	-----	-----	-----	-----	1.1-1.2	-----	1.09	1.24	1.32
BF Max Depth (ft)	-----	2.77	-----	-----	-----	-----	-----	1.4 - 1.8	-----	1.55	1.84	2.11
BF Cross-sectional Area (ft^2)	-----	12.3 - 12.7	-----	-----	-----	-----	-----	18.2 - 20.4	-----	17.91	20.58	21.91
Width/Depth Ratio	-----	6.01 - 5.79	-----	10.00	12.50	15.00	-----	14.2 - 15	-----	11.95	12.58	15.10
Entrenchment Ratio	-----	1.5 - 4.05	-----	-----	-----	-----	-----	3.5-3.6	-----	3.93	4.04	4.46
Bank Height Ratio	-----	2.7 - 1.8	-----	1.00	1.05	1.10	-----	1.00	-----	1.00	1.00	1.00
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----
Pattern												
Channel Beltwidth (ft)	-----	N/A	-----	-----	----	-----	58-60	N/A	132-135	53.00	67.00	92.00
Radius of Curvature (ft)	-----	N/A	-----	-----	----	-----	33-34	N/A	50-51	33.00	45.00	61.00
Rc/Bankfull width (ft/ft)	-----	N/A	-----	2.00	2.5000	3.00	-----	2.0-3.0	-----	1.90	2.70	3.70
Meander Wavelength (ft)	-----	N/A	-----	-----	----	-----	115.00	N/A	235.00	134.00	163.00	229.00
Meander Width Ratio	-----	N/A	-----	3.50	5.7500	8.00	3.50	N/A	8.00	3.10	4.00	5.60
Profile												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.10	33.54	87.52
Riffle Slope (ft/ft)	0.0260	0.0345	0.0430	-----	-----	-----	0.006-0.007	0.0080	0.009-0.01	-0.018	0.011	0.09
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	11.00	42.00	70.00
Pool to Pool Spacing (ft)	35.00	57.50	80.00	-----	-----	-----	58	88.5	119	30.00	80.19	135.00
Pool Max Depth (ft)	1.14	1.9600	2.77	-----	-----	-----	1.8	3.0	4.2	0.00	0.00	5.04
Substrate and Transport Parameters												
SC% / Sa% / G% / C% / Bo%	0% / 7% / 89% / 4% / 0%			-----	-----	-----	-----	-----	-----	0% / 1% / 83% / 16% / 0%		
d16 / d35 / d50 / d84 / d95	11 / 17 / 21 / 38 / 60			----	-----	-----	-----	-----	-----	16 / 28 / 37 / 64 / 127		
Additional Reach Parameters												
Drainage Area (SM)	-----	1.38 - 1.53	-----	-----	-----	-----	-----	1.38	---	-----	1.38	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Rosgen Classification	-----	B - E	-----	-----	C4	-----	-----	C4	-----	-----	C4	-----
BF Velocity (fps)	-----	3.15 - 3.20	-----	-----	5.00	5.00	-----	3.00	-----	-----	----	-----
BF Discharge (cfs)	-----	38.7 - 40.7	-----	-----	-----	-----	-----	61.85	-----	-----	----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2,280.00	-----
Channel Length (ft)	-----	2,399	-----	-----	-----	-----	-----	2,730	-----	-----	2,771.90	-----
Sinuosity	-----	1.06	-----	-----	-----	-----	-----	1.22	-----	-----	1.22	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 8. Baseline Stream Data Summary
Blair Creek Restoration Project: DMS Project No ID. 100047

Reach 2 (South Fork)

Parameter	Pre-Existing Condition			Reference Reach(es) Data			Design			As-built		
				Composite								
Dimension and Substrate - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
BF Width (ft)	-----	9.82 - 11.26	-----	-----	-----	-----	-----	17.00	----	19.30	21.34	23.69
Floodprone Width (ft)	-----	25.66 - 26.55	-----	-----	-----	-----	-----	60.00	----	67.67	70.39	73.49
BF Mean Depth (ft)	-----	1.54 - 1.33	-----	-----	-----	-----	-----	1.20	----	0.89	0.94	1.00
BF Max Depth (ft)	-----	2.77	-----	-----	-----	-----	-----	1.40	----	1.42	1.73	2.06
BF Cross-sectional Area (ft²)	-----	15.16 - 15.01	-----	-----	-----	-----	-----	20.40	----	18.86	19.76	21.13
Width/Depth Ratio	-----	6.38 - 8.47	-----	10.00	12.50	15.00	-----	14.20	----	19.69	23.05	26.62
Entrenchment Ratio	-----	2.61 - 2.36	-----	-----	-----	-----	-----	3.50	----	3.10	3.31	3.51
Bank Height Ratio	-----	1.96 - 1.54	-----	1.00	1.05	1.10	-----	1.10	----	1.00	1.00	1.00
d50 (mm)	-----	-----	----	-----	-----	-----	-----	-----	-----	-----		-----
Pattern												
Channel Beltwidth (ft)	-----	N/A	-----	-----	----	-----	65.00	-----	135	47.00	56.00	72.00
Radius of Curvature (ft)	-----	N/A	-----	-----	----	-----	34.00	-----	50	31.00	43.00	48.00
Rc/Bankfull width (ft/ft)	-----	N/A	-----	2.00	2.50	3.0	2.00	-----	2.9	1.80	2.50	2.80
Meander Wavelength (ft)	-----	N/A	-----	-----	----	-----	125.00	-----	235	129.00	149.00	174.00
Meander Width Ratio	-----	N/A	-----	3.50	5.75	8.0	3.80	-----	7.9	2.80	3.30	4.20
Profile												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.71	34.705	64.44
Riffle Slope (ft/ft)	0.026	0.035	0.043	-----	-----	-----	0.0075	0.0084	0.0093	-0.0460	0.0010	0.1070
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	10.00	37.00	70.00
Pool to Pool Spacing (ft)	35	58	80	-----	-----	-----	60.00	89.00	118.00	30.00	72.40	105.00
Pool Max Depth (ft)	1.14	1.96	2.77	----	-----	----	1.8000	3.00	4.2000	0.00	0.00	0.00
Substrate and Transport Parameters												
SC% / Sa% / G% / C% / B%	0% / 1% / 91% / 8% / 0%			-----	-----	-----	-----	-----	-----	0% / 7% / 92% / 1% / 0%		
d16 / d35 / d50 / d84 / d95	13 / 18 / 23 / 42 / 131			-----	-----	-----	-----	-----	-----	7 / 13 / 18 / 40 / 55		
Additional Reach Parameters												
Drainage Area (SM)	-----	2.91	-----	-----	-----	-----	-----	1.53	-----	-----	----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Rosgen Classification	-----	F4	-----	-----	C4	-----	-----	C4	-----	-----	C4	-----
BF Velocity (fps)	-----	-----	-----	3.50	4.25	5.00	-----	3.00	-----	-----	----	-----
BF Discharge (cfs)	-----	-----	-----	-----	-----	-----	-----	61.85	-----	-----	----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1,310	-----
Channel Length (ft)	-----	185	-----	-----	-----	-----	-----	1,520	-----	-----	1,555	-----
Sinuosity	-----	1.07	-----	1.20	1.30	1.40	-----	1.14	-----	-----	1.14	-----
Water Surface Slope (Channel) (ft/ft)	-----		-----	-----	-----	-----	-----		-----	-----		-----

* The As-Built parameters shown here apply only to those surveyed sections of Reach UT4a where the channel was improved in its cross-section, profile, and in-stream structures.

Table 8. Baseline Stream Data Summary
Blair Creek Restoration Project: DMS Project No ID. 100047
Reach 3 Blair Creek, below confluence of North and South Fork.

Parameter	Pre-Existing Condition			Reference Reach(es) Data			Design			As-built		
				Composite								
Dimension and Substrate - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
BF Width (ft)	-----	19.20	-----	-----	-----	-----	-----	22.50	----	-----	30.40	-----
Floodprone Width (ft)	-----	-----	-----	-----	-----	-----	-----	60.00	-----	-----	58.48	-----
BF Mean Depth (ft)	-----	1.33	-----	-----	-----	-----	-----		-----	-----	1.10	-----
BF Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	1.80	-----	-----	2.14	-----
BF Cross-sectional Area (ft²)	-----	25.60	-----	-----	-----	-----	-----	33.80	-----	-----	33.01	-----
Width/Depth Ratio	-----	14.44	-----	10.00	12.50	15.00	-----	15.00	-----	-----	27.80	-----
Entrenchment Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Bank Height Ratio	-----	2.00	-----	1.00	1.05	1.10	-----	-----	----	-----	----	-----
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Pattern												
Channel Beltwidth (ft)	-----	N/A	-----	-----	----	-----	-----	N/A	-----	43.00	46.00	50.00
Radius of Curvature (ft)	-----	N/A	-----	-----	----	-----	-----	N/A	-----	33.00	40.00	46.00
Rc/Bankfull width (ft/ft)	-----	N/A	-----	2.00	2.50	3.00	-----	N/A	-----	1.40	1.60	1.90
Meander Wavelength (ft)	-----	N/A	-----	-----	----	-----	-----	N/A	-----	131.00	134.00	136.00
Meander Width Ratio	-----	N/A	-----	3.50	5.75	8.00	-----	N/A	-----	1.80	1.90	2.10
Profile												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Pool Max Depth (ft)	-----	-----	-----	----	-----	----	2.2500	3.75	5.2500	-----	----	-----
Substrate and Transport Parameters												
SC% / Sa% / G% / C% / B%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----				-----	-----	-----	-----	----	-----
Additional Reach Parameters												
Drainage Area (SM)	-----	2.91	-----	-----	-----	-----	-----	2.91	-----	-----	----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Rosgen Classification	-----	F4	-----	-----	C4	-----	-----	C4	-----	-----	C4	-----
BF Velocity (fps)	-----	-----	-----	3.50	4.25	5.00	-----	3.76	-----	-----	----	-----
BF Discharge (cfs)	-----	-----	-----	-----	-----	-----	-----	128.00	-----	-----	----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Channel Length (ft)	-----	185	-----	-----	-----	-----	-----	185	-----	-----	133.6	-----
Sinuosity	-----	1.07	-----	1.20	1.30	1.40	-----	-----	-----	-----	1.09	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.02	-----

Table 8. Baseline Stream Data Summary
Blair Creek Restoration Project: DMS Project No ID. 100047
Reach UT1- *As Built data from pool XS

Parameter	Pre-Existing Condition			Reference Reach(es) Data Composite			Design			As-built		
Dimension and Substrate - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
BF Width (ft)	-----	-----	-----	-----	-----	-----	-----	7.25	----	-----	10.14	-----
Floodprone Width (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	34.30	-----
BF Mean Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.81	-----
BF Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	1.00	-----	-----	1.53	-----
BF Cross-sectional Area (ft²)	-----	-----	-----	-----	-----	-----	-----	4.30	-----	-----	8.18	-----
Width/Depth Ratio	-----	-----	-----	-----	-----	-----	-----	12.40	-----	-----	----	-----
Entrenchment Ratio	-----	-----	-----	-----	-----	-----	-----		-----	-----	----	-----
Bank Height Ratio	-----	-----	-----	-----	-----	-----	-----		----	-----	----	-----
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Pattern												
Channel Beltwidth (ft)	-----	N/A	-----	-----	-----	-----	-----	N/A	-----	15.00	17.00	18.00
Radius of Curvature (ft)	-----	N/A	-----	-----	-----	-----	-----	N/A	-----	----	----	----
Rc/Bankfull width (ft/ft)	-----	N/A	-----	-----	-----	-----	-----	N/A	-----	3.20	3.50	3.80
Meander Wavelength (ft)	-----	N/A	-----	-----	-----	-----	-----	N/A	-----	67.00	70.00	72.00
Meander Width Ratio	-----	N/A	-----	-----	-----	-----	-----	N/A	-----	3.20	3.50	3.80
Profile												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Pool Max Depth (ft)	-----	-----	-----	----	-----	----	-----	-----	-----	-----	----	-----
Substrate and Transport Parameters												
SC% / Sa% / G% / C% / B%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----				-----	-----	-----	-----	----	-----
Additional Reach Parameters												
Drainage Area (SM)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Rosgen Classification	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
BF Discharge (cfs)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Channel Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----
Sinuosity	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	173	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.02	-----

Table 9. Cross-Section Morphology Data Summary
Blair Creek Restoration Project: DMS Project No ID. 100047

Stream Reach	Reach 1																										
	Cross-section X-1 (Pool)							Cross-section X-2 (Riffle)							Cross-section X-3 (Pool)							Cross-section X-4 (Riffle)						
	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+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1848.21	1848.21	1848.21					1848.06	1848.33	1848.20					1847.87	1847.87	1847.87					1846.31	1846.43	1846.49				
Bank Height Ratio_Based on AB Bankfull[1] Area	--	--	--					1.00	1.00	1.0					--	--	--					1.00	1.10	1.0				
Thalweg Elevation	1845.23	1845.85	1846.5					1845.95	1846.01	1846.03					1844.24	1843.62	1843.43					1844.76	1844.94	1844.86				
LTOB[2] Elevation	1848.21	1848.21	1848.2					1848.06	1848.14	1848.2					1847.87	1847.88	1847.47					1846.31	1846.51	1846.51				
LTOB[2] Max Depth (ft)	2.98	2.40	1.7					2.11	2.00	2.2					3.63	4.25	4.4					1.60	1.40	1.4				
LTOB[2] Cross Sectional Area (ft^2)	25.48	22.60	15.9					20.85	16.70	18.5					38.37	34.27	34.6					17.90	16.00	15.0				

Stream Reach	Reach 1																										
	Cross-section X-5 (Riffle)							Cross-section X-6 (Pool)							Cross-section X-7 (Riffle)							Cross-section X-8 (Pool)						
	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+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1845.28	1845.26	1845.49					1842.09	1842.09	1842.09					1839.27	1839.34	1839.47					1837.35	1837.35	1837.5				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.00	1.0					--	--	--					1.00	1.00	1.0					--	--	--				
Thalweg Elevation	1843.48	1843.20	1843.23					1838.86	1838.71	1838.64					1837.37	1837.43	1837.33					1832.31	1832.33	1832.0				
LTOB[2] Elevation	1845.28	1845.25	1845.5					1842.09	1842.09	1842.09					1839.27	1839.42	1839.42					1837.35	1837.35	1837.5				
LTOB[2] Max Depth (ft)	2.10	2.10	2.0					3.20	3.40	3.40					1.90	1.90	1.9					5.04	5.02	5.3				
LTOB[2] Cross Sectional Area (ft^2)	21.90	22.20	18.4					33.50	36.20	34.6					21.70	20.60	18.2					47.58	44.20	45.9				

Stream Reach	UT-1							Reach 2																			
	Cross-section X-9 (Pool)							Cross-section X-10 (Pool)							Cross-section X-11 (Riffle)							Cross-section X-12 (Pool)						
	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+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1845.99	1845.99	1845.99					1843.54	1843.54	1843.54					1841.94	1842.30	1842.19					1839.98	1839.98	1839.98				
Bank Height Ratio_Based on AB Bankfull[1] Area	--	--	--					--	--	--					1.00	1.00	1.00					--	--	--				
Thalweg Elevation	1844.76	1843.85	1843.87					1839.97	1839.88	1839.92					1839.88	1840.46	1840.40					1836.55	1836.85	1836.94				
LTOB[2] Elevation	1845.99	1846.25	1845.99					1843.54	1843.54	1843.54					1841.94	1842.23	1842.20					1839.88	1839.98	1839.98				
LTOB[2] Max Depth (ft)	1.20	2.10	2.12					3.57	3.66	3.60					2.06	1.50	1.50					3.43	3.13	3.04				
LTOB[2] Cross Sectional Area (ft^2)	5.60	4.80	6.1					36.81	33.46	35.20					23.70	14.10	13.70					36.69	27.28	25.50				

Stream Reach	Reach 2														Reach 3														
	Cross-section X-13 (Riffle)							Cross-section X-14 (Riffle)							Cross-section X-15 (Riffle)														
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+							
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1838.84	1839.07	1838.84					1837.60	1837.26	1837.19					1834.80	1834.73	1834.69												
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	0.90	1.00					1.00	1.00	1.10					1.00	1.00	1.00												
Thalweg Elevation	1837.14	1837.54	1836.89					1836.18	1835.42	1834.82					1832.66	1832.56	1832.50												
LTOB[2] Elevation	1838.84	1838.92	1838.92					1837.60	1837.25	1837.53					1834.80	1834.80	1834.80												
LTOB[2] Max Depth (ft)	1.70	1.30	2.03					1.40	2.20	2.80					2.14	2.20	2.60												
LTOB[2] Cross Sectional Area (ft^2)	21.13	16.00	21.08					18.90	25.20	25.90					33.01	34.90	35.30												

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 **- Bank Height Ratio (BHR)** takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.

2 - **LTOB Area and Max depth -** These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

APPENDIX E

Hydrologic Data

Table 10. Verification of Bankfull Events
Blair Creek Mitigation Project - NCDMS Project No. 100047

Date of Data Collection	Reach 1 Lower Right Floodplain	Crest Gauge 3. Reach 2, Left Floodplain	Estimated Date of Bankfull Event Occurrence	Method of Data Collection
Year 1 Monitoring (2022)				
7/1/2022	Photographic Evidence on right floodplain of Lower R1 and Left floodplain of R2 at Crest Gauge 3.		3/13/2022	Photographic Evidence
11/22/2022		Photographic Evidence on floodplain and Continuous Logger Data	3/13/2022 & 8/7/2022	Photographic Evidence & Continuous Logger
Year 2 Monitoring (2023)				
10/30/2023		Photographic Evidence on floodplain and Continuous Logger Data	6/25/2023 & 8/15/2023	Photographic Evidence & Continuous Logger

Figure 5. Wetland Monitoring Well Graphs

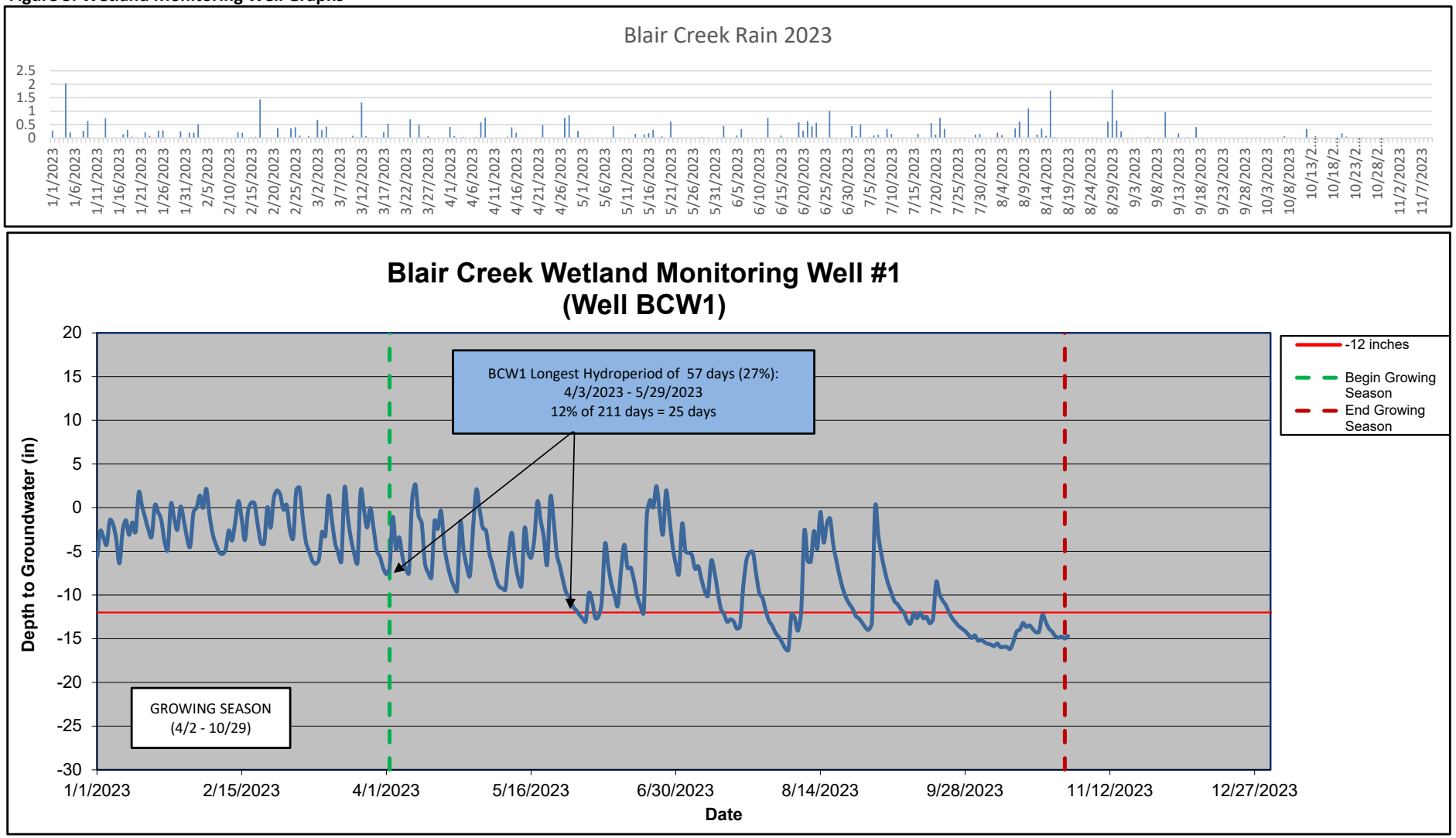


Figure 5. Wetland Monitoring Well Graphs

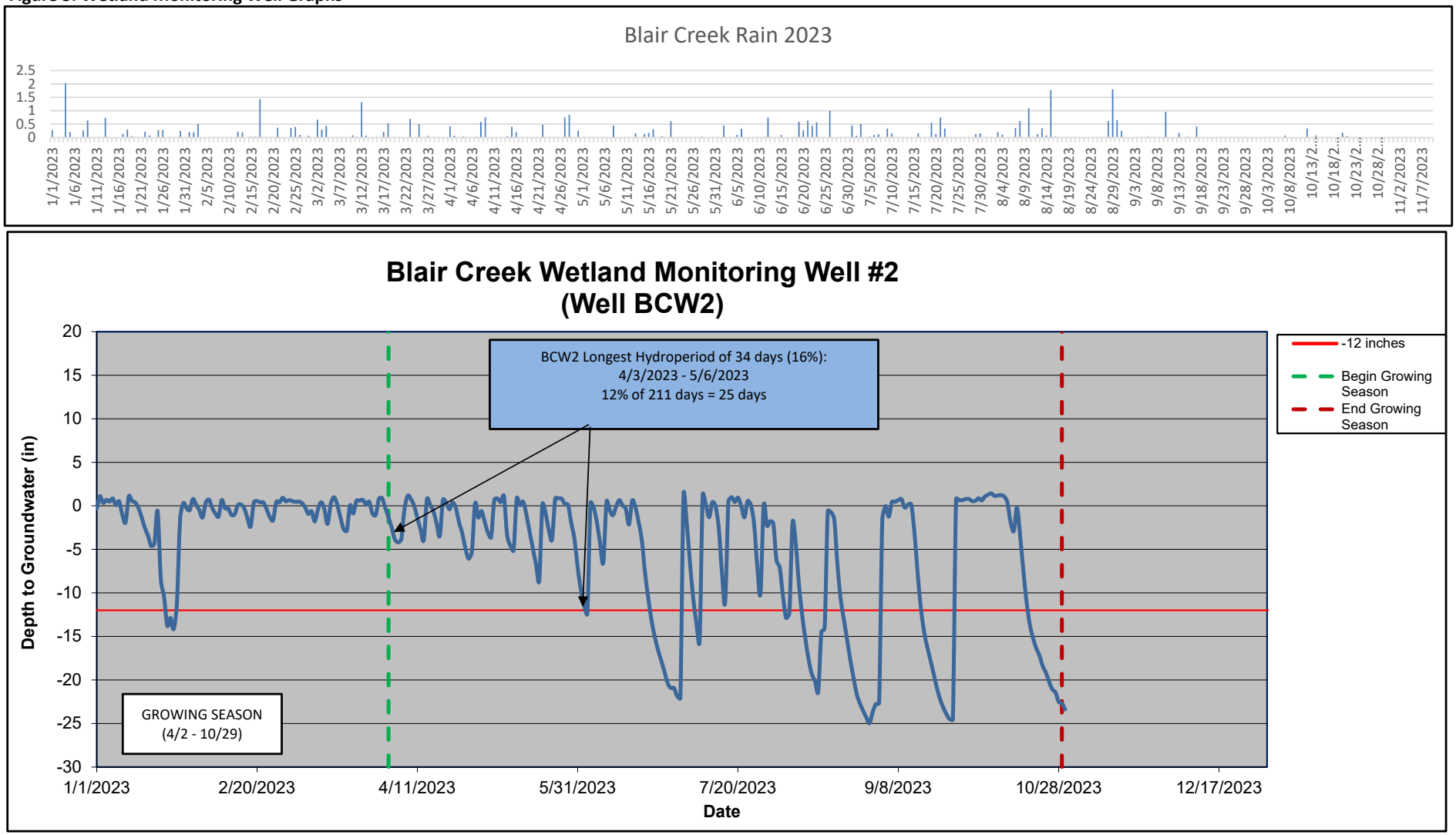


Figure 5. Wetland Monitoring Well Graphs

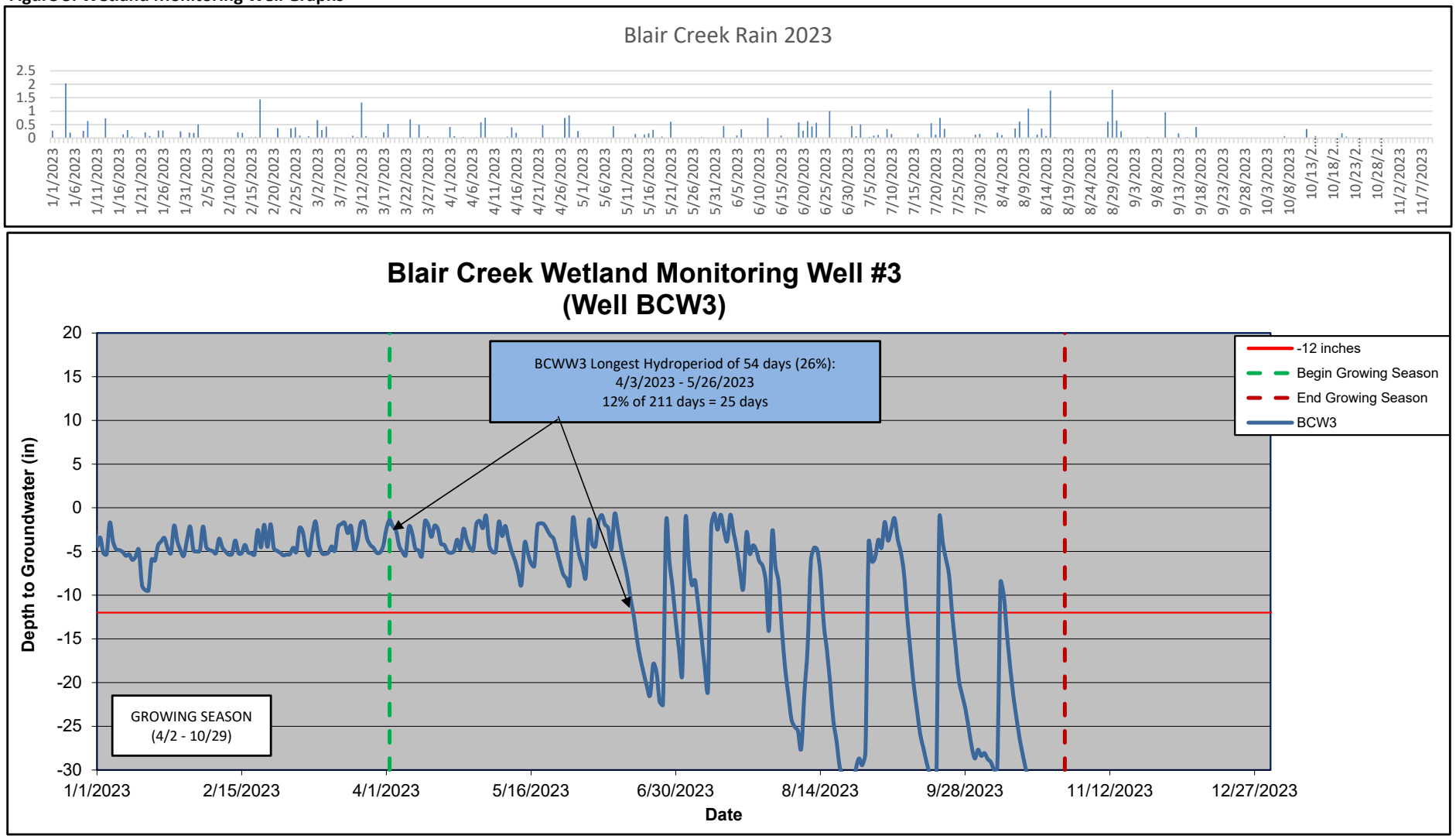
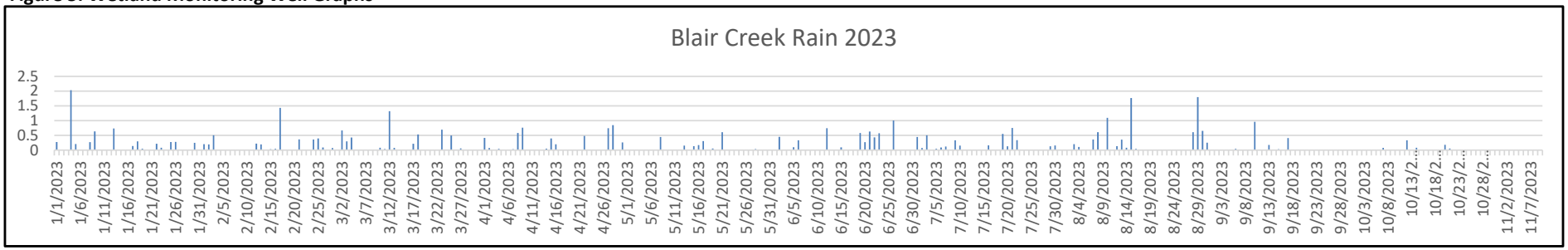


Figure 5. Wetland Monitoring Well Graphs



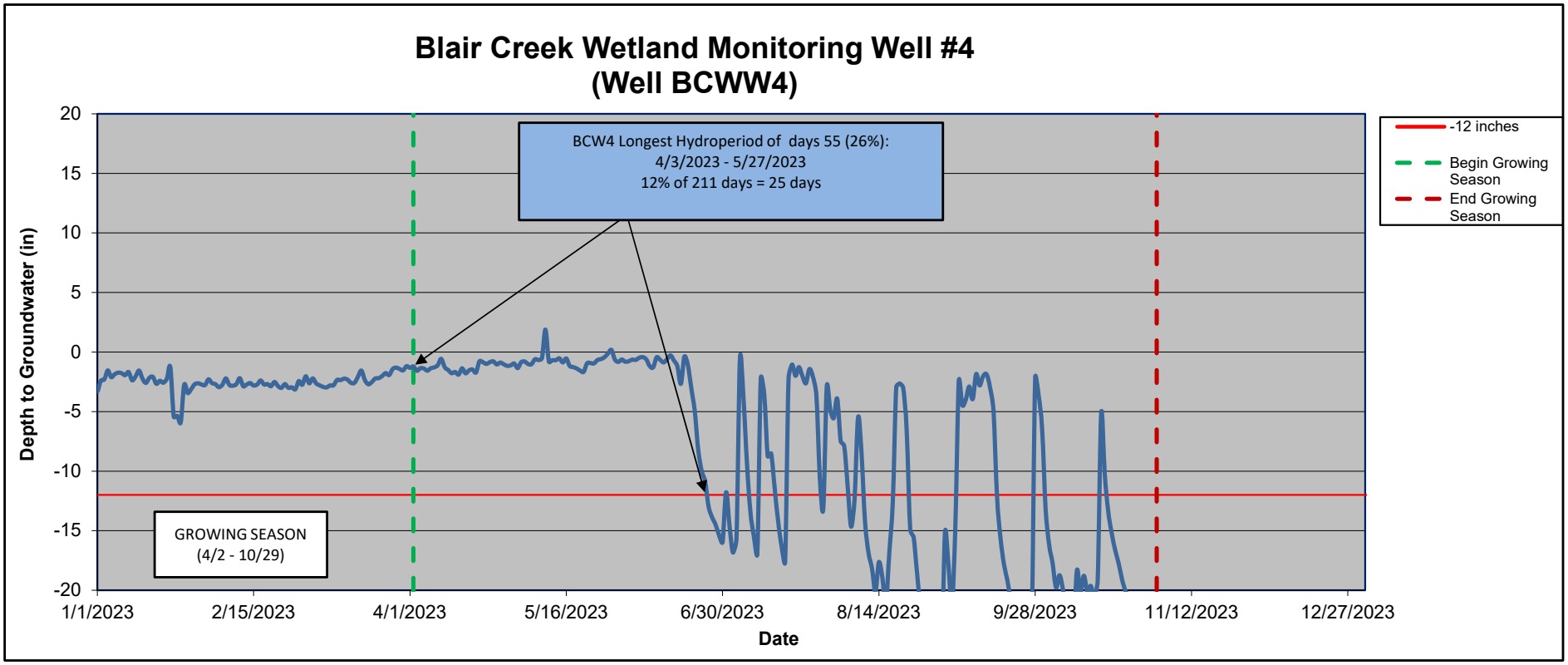


Figure 5. Wetland Monitoring Well Graphs

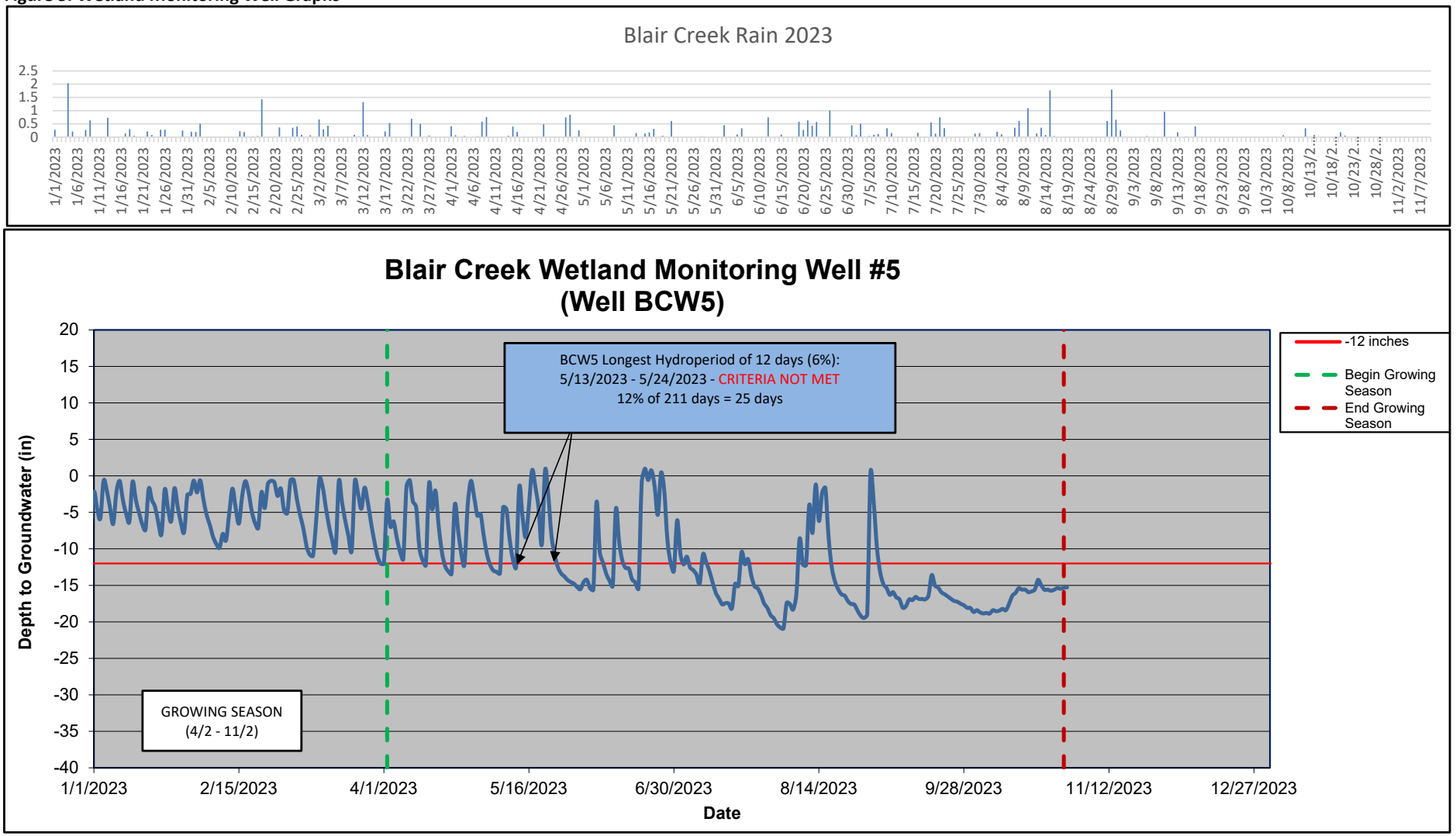


Figure 5. Wetland Monitoring Well Graphs

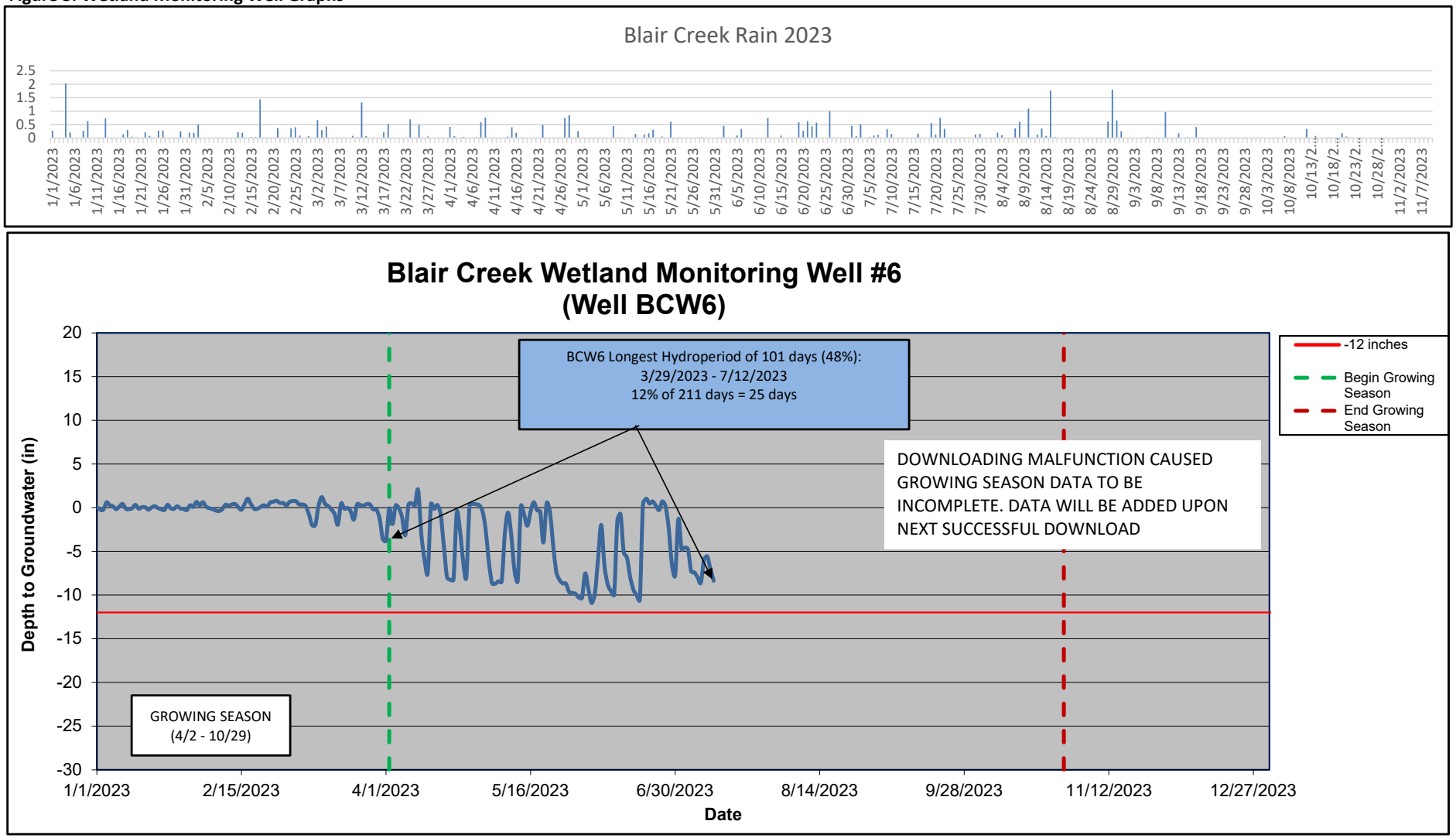


Figure 5. Wetland Monitoring Well Graphs

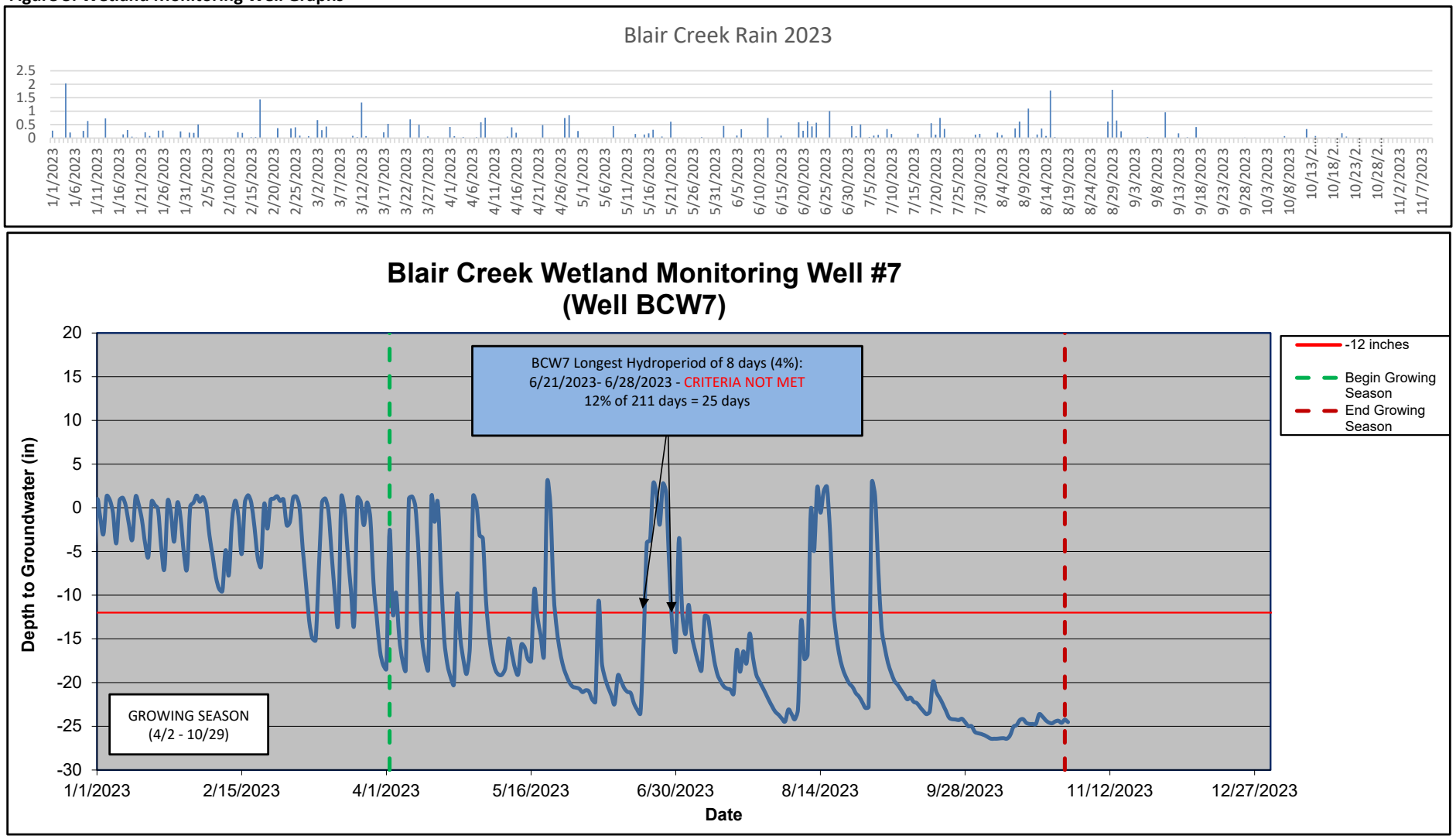


Figure 5. Wetland Monitoring Well Graphs

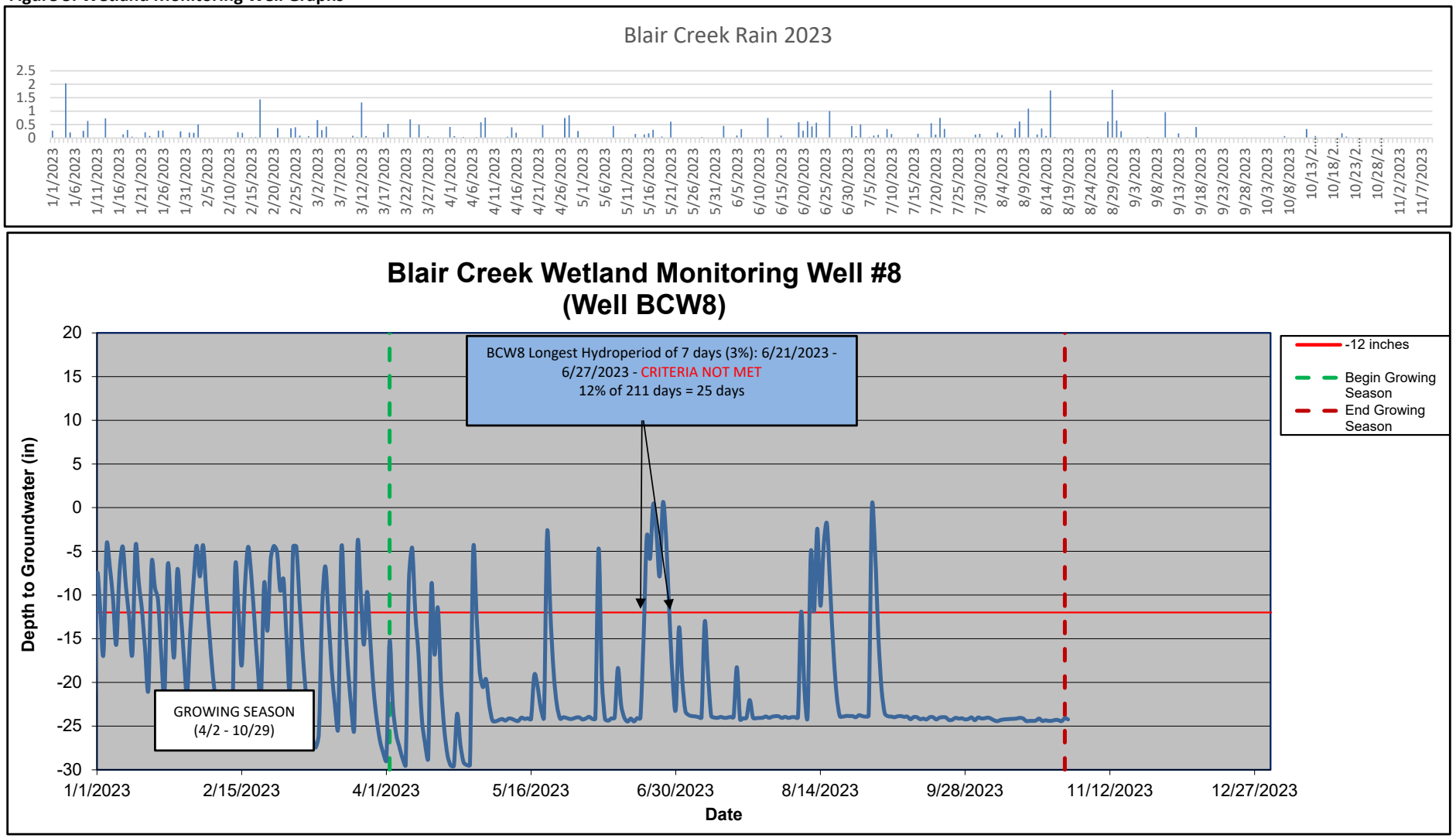


Figure 5. Wetland Monitoring Well Graphs

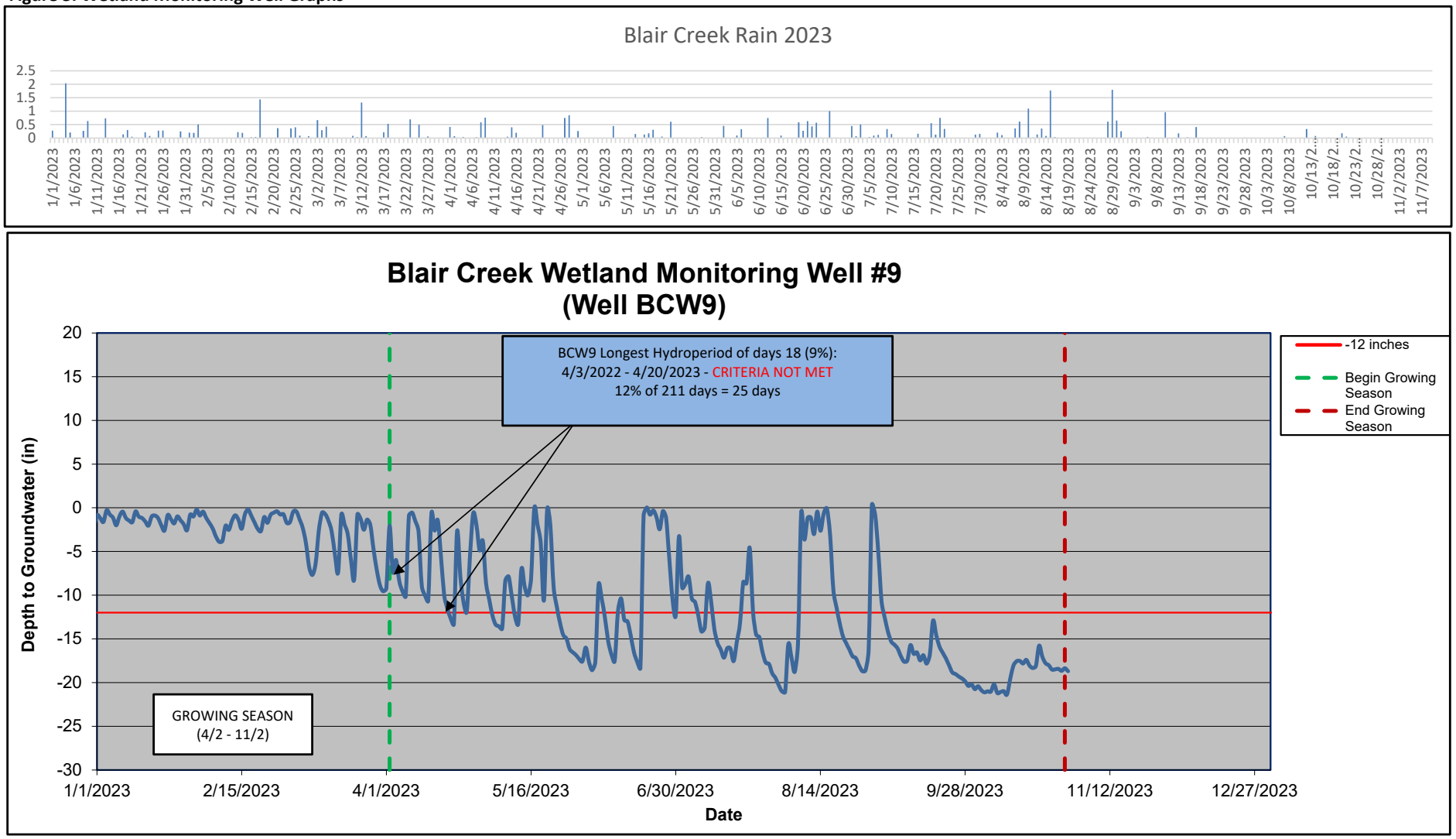


Figure 5. Wetland Monitoring Well Graphs

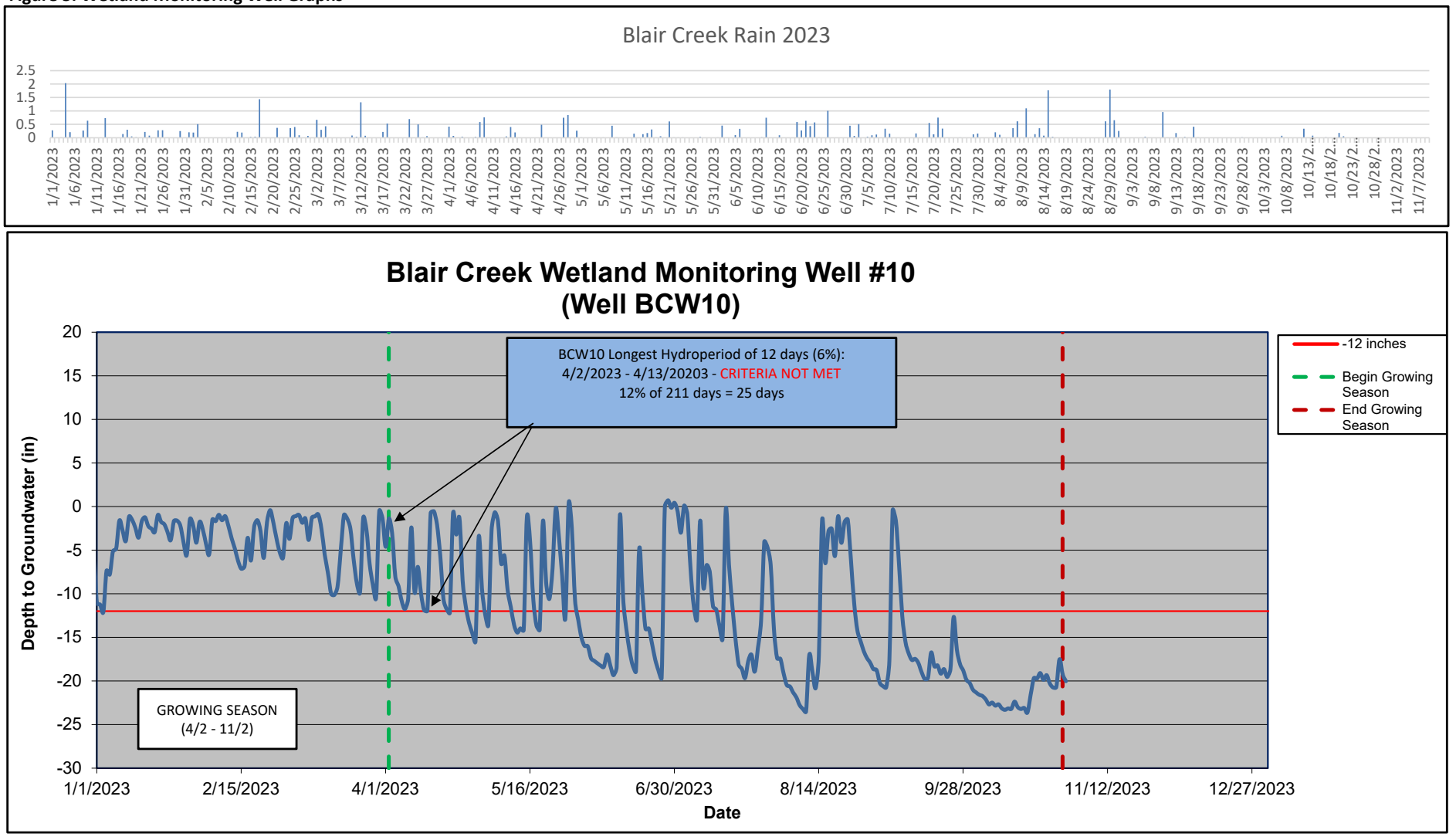


Figure 5. Wetland Monitoring Well Graphs

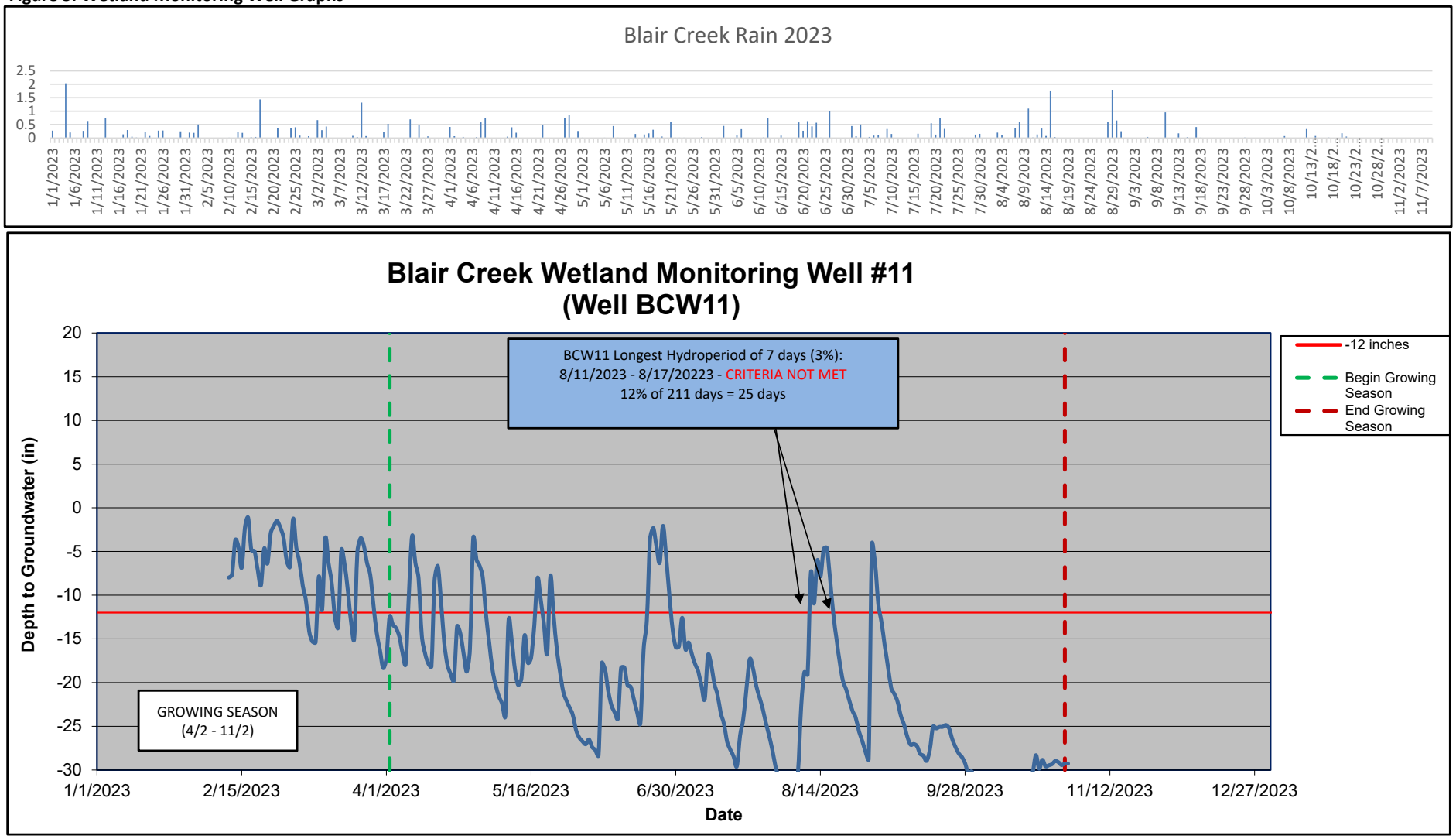
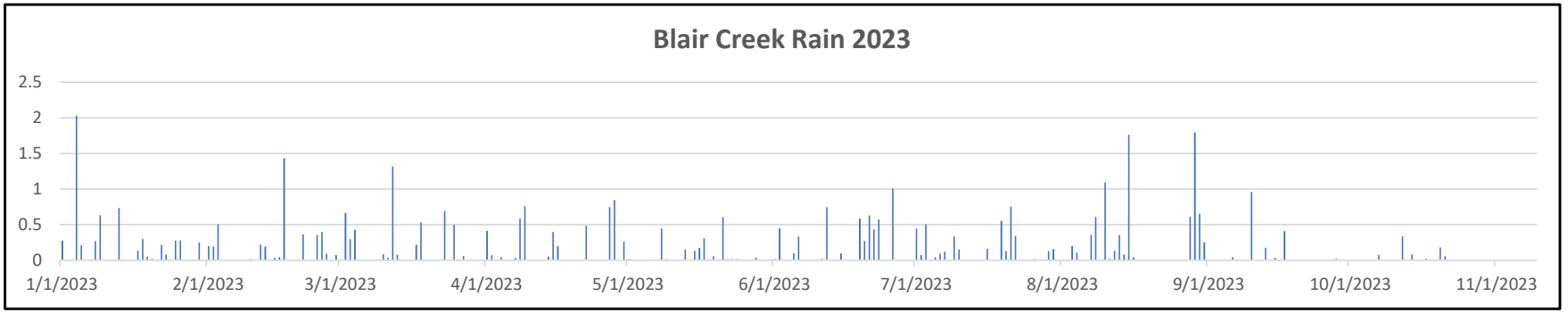
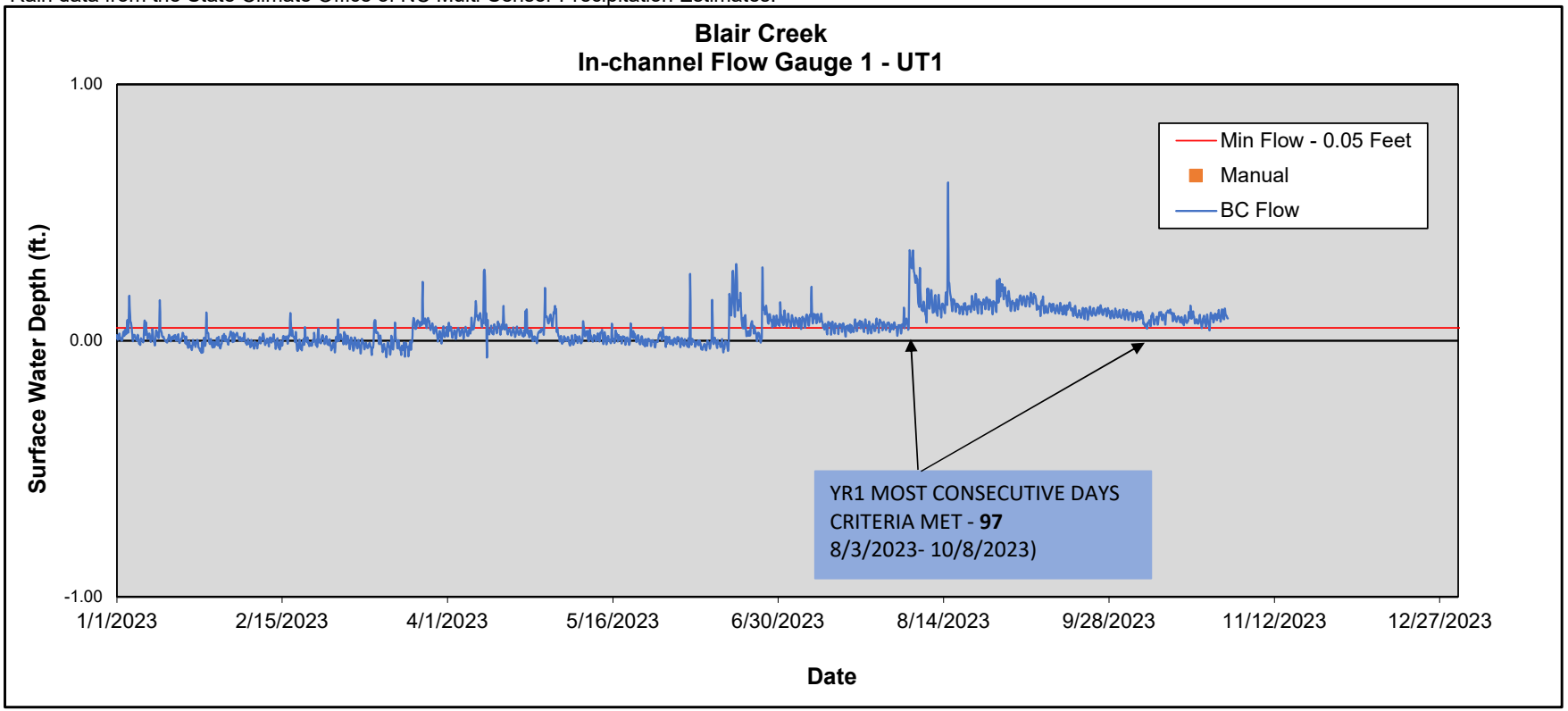


Figure 6: Crest and Flow Gauge Graphs



Rain data from the State Climate Office of NC Multi-Sensor Precipitation Estimates.



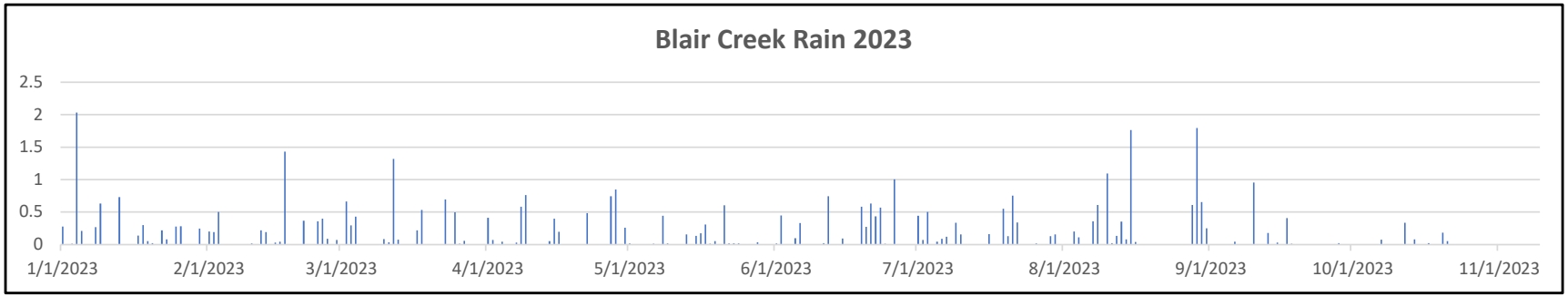
*Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

Table 11. Wetland Hydrology Summary Data
Blair Creek Stream Mitigation Project - NCDMS Project No. 100047

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							Cumulative Days Meeting Criteria[3]						
	Year 1 (2022)	Year 2 (2023)	Year 3 (2024)	Year 4 (2025)	Year 5 (2026)	Year 6 (2027)	Year 8 (2028)	Year 1 (2022)	Year 2 (2023)	Year 3 (2024)	Year 4 (2025)	Year 5 (2026)	Year 6 (2027)	Year 8 (2028)	Year 1 (2022)	Year 2 (2023)	Year 3 (2024)	Year 4 (2025)	Year 5 (2026)	Year 6 (2027)	Year 8 (2028)	Year 1 (2022)	Year 2 (2023)	Year 3 (2024)	Year 4 (2025)	Year 5 (2026)	Year 6 (2027)	Year 8 (2028)
Wetland Monitoring Wells (Installed December 2021)																												
BCW1	27.0	27.0						56	57.0						82.0	64.0						172	135.0					
BCW2	26.0	16.0						54	34.0						68.0	69.0						144	146.0					
BCW3	13.0	26.0						27	54.0						43.0	50.0						90	105.0					
BCW4	10.0	26.0						22	55.0						38.0	49.0						80	104.0					
BCW5	10.0	6.0						22	12.0						30.0	36.0						63	76.0					
BCW6	44.0	48.0						92	101.0						47.0	48.0						199	101.0					
BCW7	4.0	4.0						24	8.0						30.0	19.0						63	41.0					
BCW8	4.0	3.0						9	7.0						17.0	12.0						35	26.0					
BCW9	11.0	9.0						23	18.0						41.0	40.0						87	86.0					
BCW10	11.0	6.0						24	12.0						38.0	37.0						81	79.0					
BCW11	N/A	3.0						N/A	7.0						N/A	15.0						N/A	31.0					

[1]Indicates the percentage of the single greatest consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surface.
[2]Indicates the single greatest consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surfa
[3]Indicates the total number of days within the monitored growing season with a water table 12 inches or less from the soil surface.
Growing season for Clay County is from April 2 to October 29 and is **211** days long. 12% of the growing season is **25** days.

Figure 6: Crest and Flow Gauge Graphs



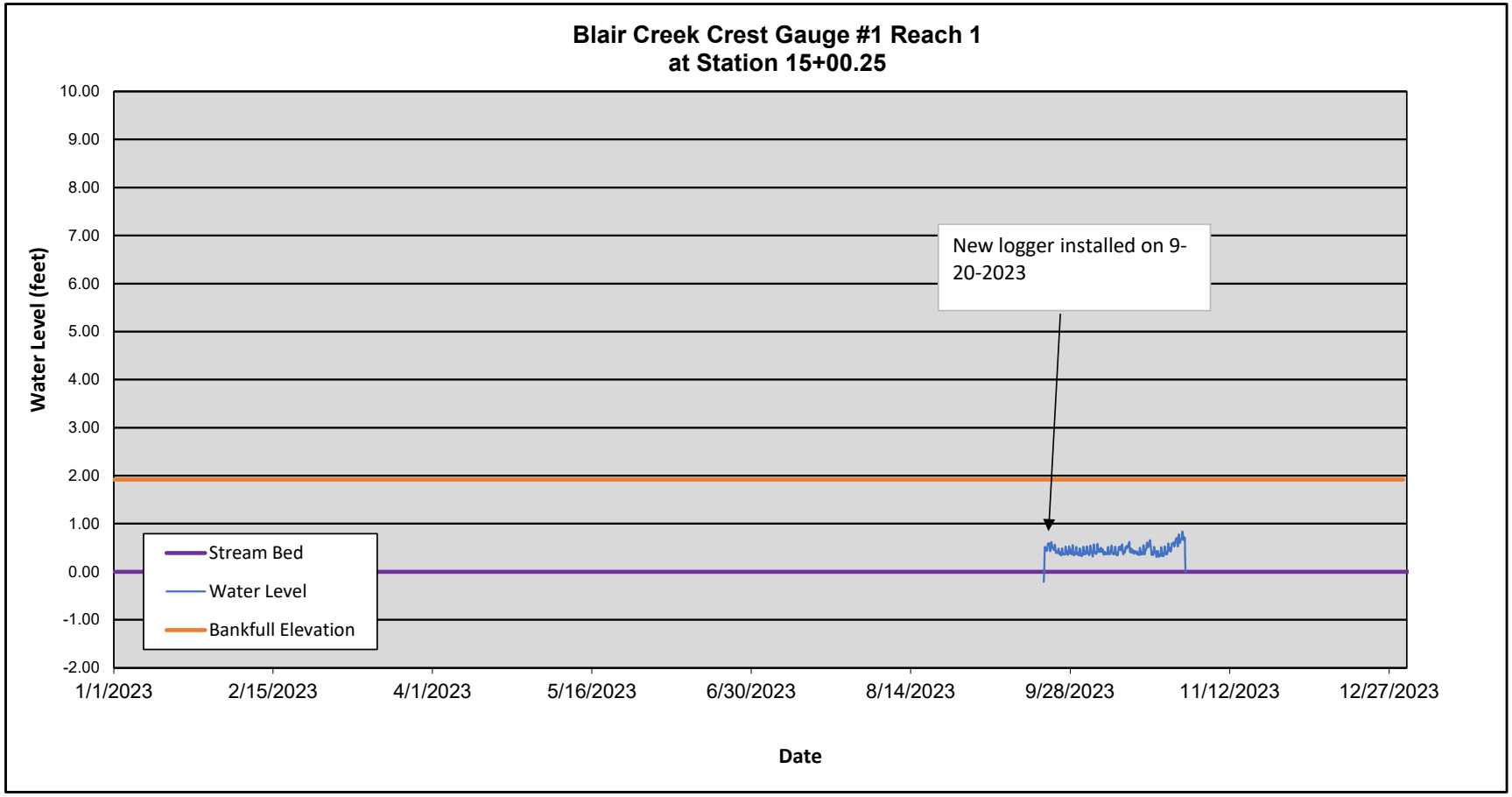


Figure 6: Crest and Flow Gauge Graphs

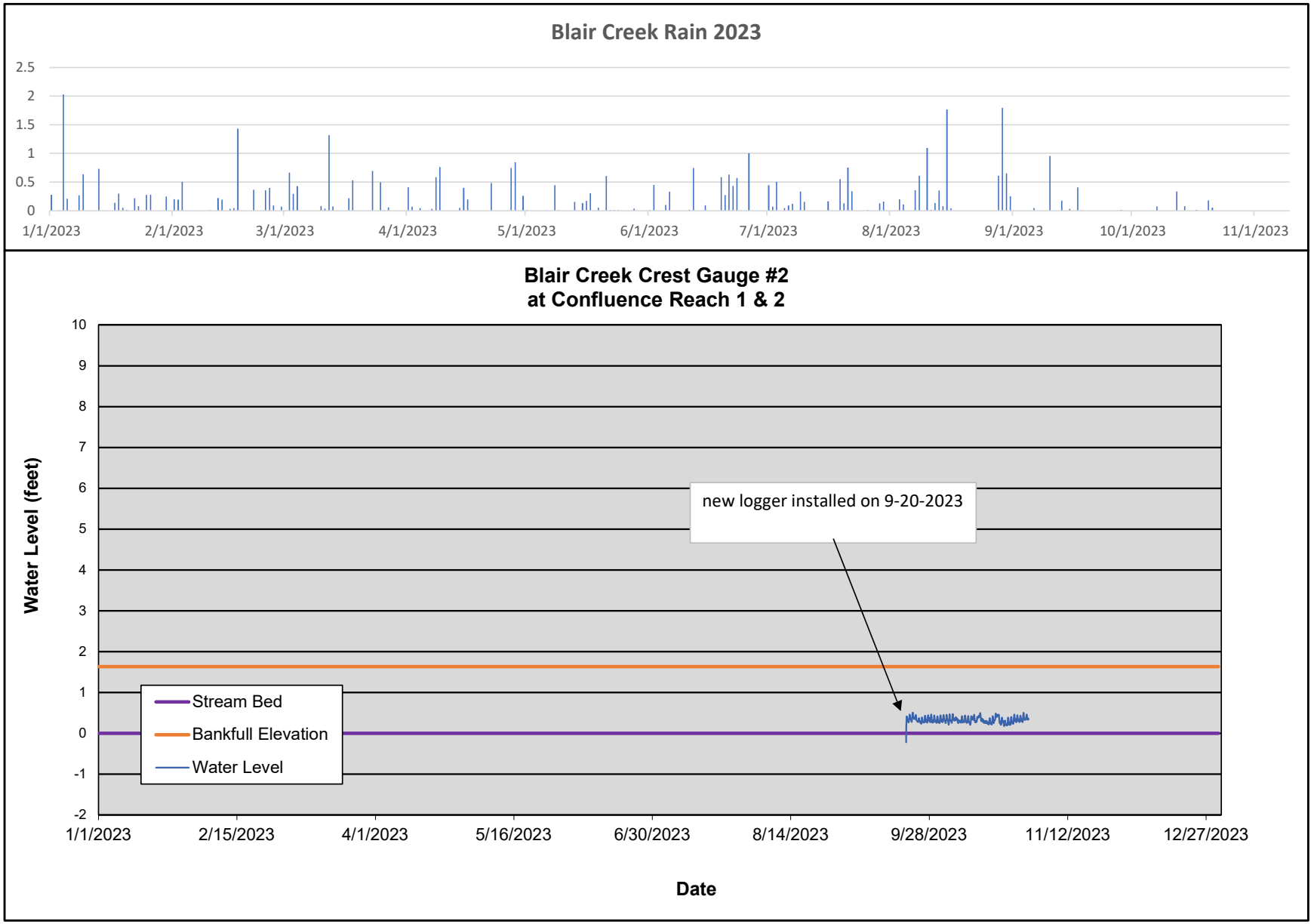


Figure 6: Crest and Flow Gauge Graphs

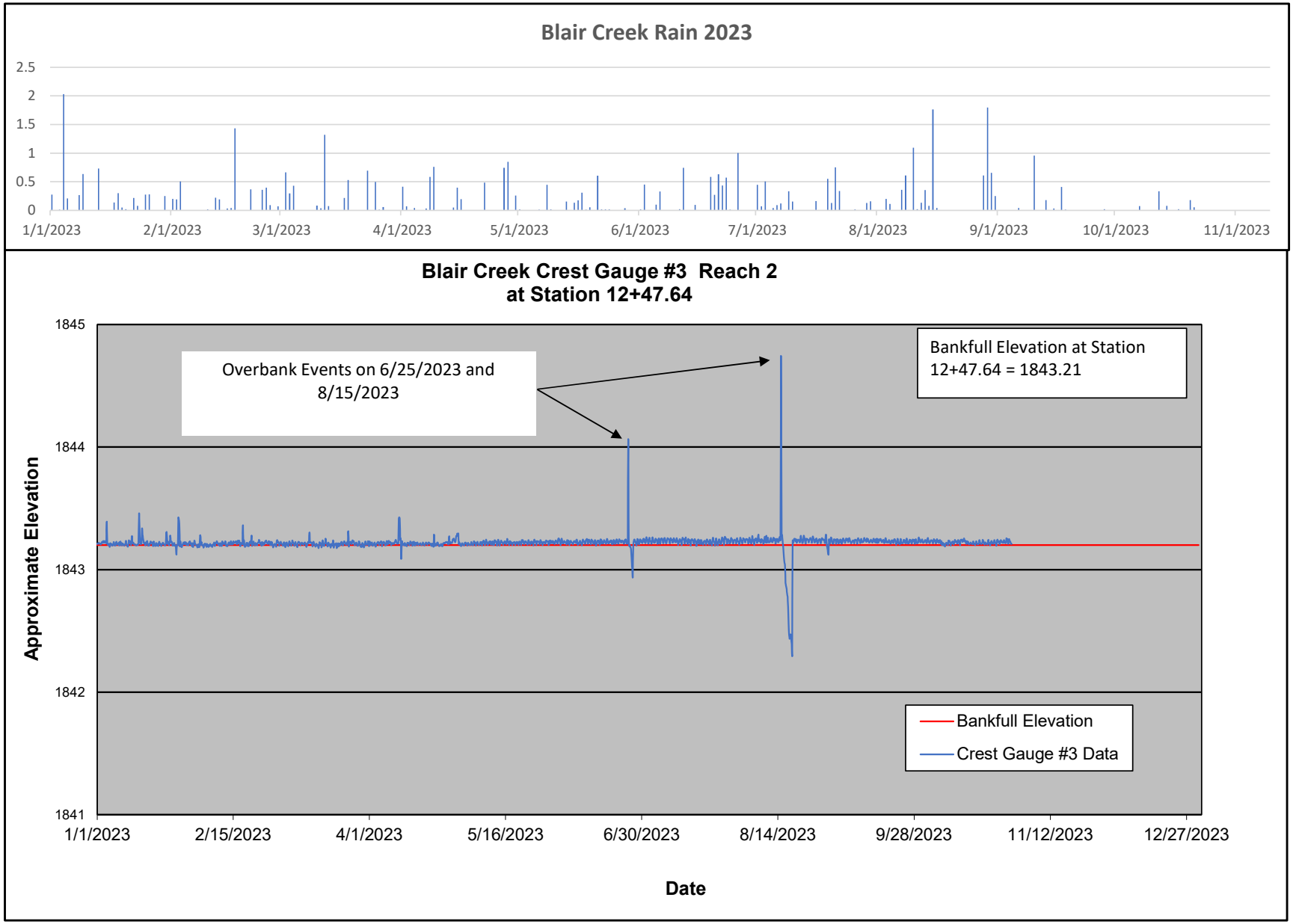


Table 12. All Years Flow Gauge Success
Blair Creek Mitigation Project - NCDMS Project No. 100047

Flow Gauge ID	Most Consecutive Days Meeting Criteria[1]							Cumulative Days Meeting Criteria[2]						
	Year 1 (2022)	Year 2 (2023)	Year 3 (2024)	Year 4 (2025)	Year 5 (2026)	Year 6 (2027)	Year 7 (2028)	Year 1 (2022)	Year 2 (2023)	Year 3 (2024)	Year 4 (2025)	Year 5 (2026)	Year 6 (2027)	Year 7 (2028)
Flow Gauges (Installed January, 2022)														
BC Flow 1	259.0	97.0						315.0	143.0					

Notes:

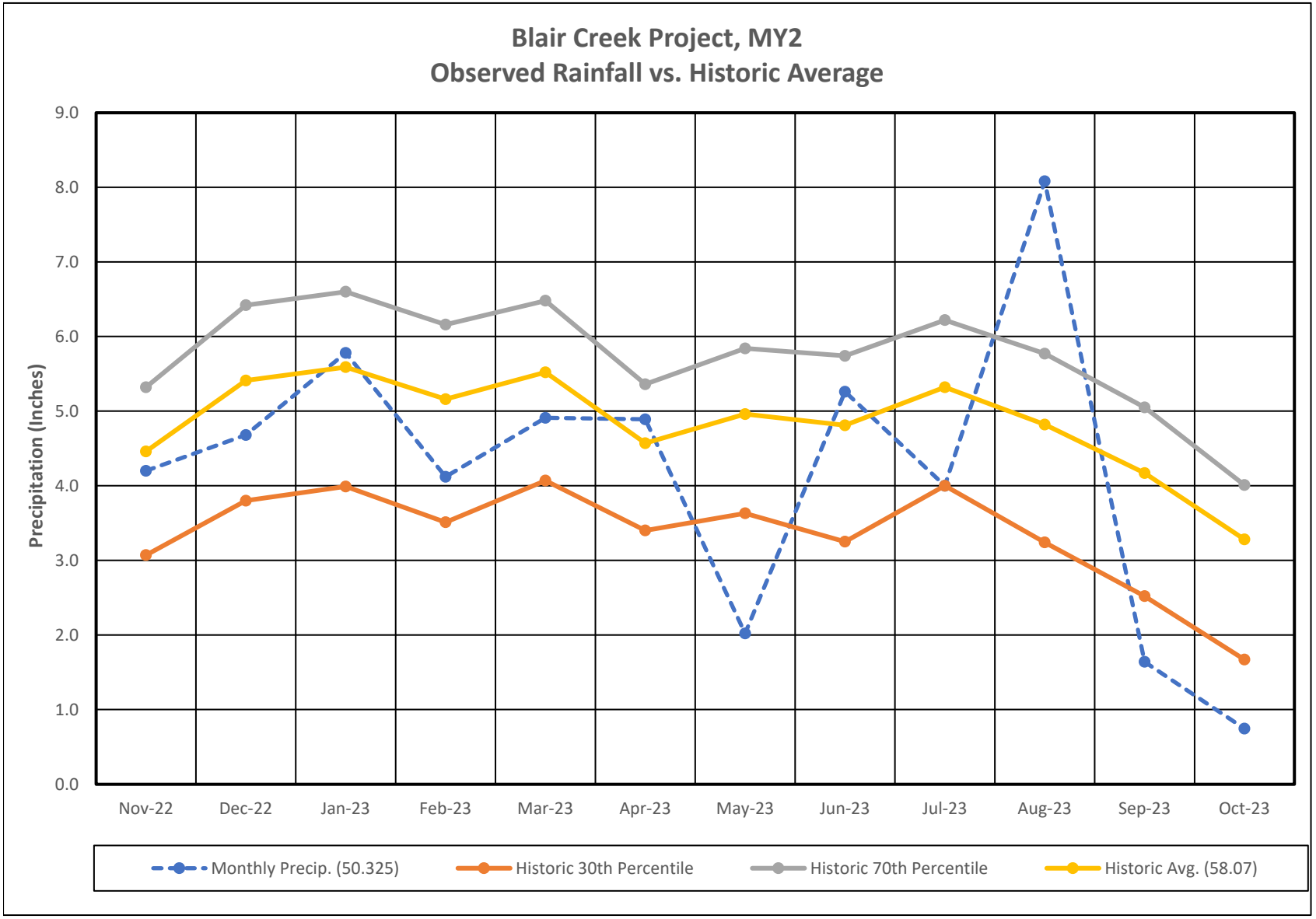
[1]Indicates the number of consecutive days within the monitoring year where flow was measured.

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

Success criteria will include 30 days of consecutive baseflow for monitoring gauges 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 7. Observed Rainfall vs. Historical Average



APPENDIX F

Correspondence

Michael Baker
INTERNATIONAL

We Make a Difference

Joseph & Ann Waldroup
767 Waldroup Rd.
Hayesville, NC 28904

Mr. Waldroup,

This is Jason York from Michael Baker International. I am responsible for performing the annual monitoring and reporting to the state and federal agencies on the Blair Creek Stream Restoration Project, which is partially on your property. During a site walk by the Division of Mitigation Services in January 2023 their staff noted that field drains installed on your property extended into the conservation easement at two locations. It was also noted that a piece of machinery was used to dredge a small drainage swale within the easement. These activities are considered an encroachment of the conservation easement area and a violation of our agreement, Deed of Conservation Easement and Right of Access, signed May 13, 2020. These prohibitions are detailed in Section K: Grading, Mineral Use, Excavation, Dredging and Section L: Water Quality and Drainage Patterns. The N.C. Division of Mitigation Services is requiring that I cut back the installed field drain lines to just outside of the conservation easement boundary and to make sure it is understood that no future encroachments should occur. Bear in mind that our agreement does include Section IV: Enforcement and Remedies that presents how encroachments of the easement may be addressed, but we would prefer to avoid those measures, by all parties keeping to the agreement. No additional action is required at this time, and I do not anticipate this being an issue in the future. I appreciate your cooperation in this matter, and I have attached the Deed of Conservation Easement and Right of Access document for your reference. Please contact me if you would like to discuss this matter in more detail (828-380-0118).
Thank you,

Jason York

Jason.york@mbakerintl.com

2020001093
CLAY CO, NC FEE $26.00
STATE OF NC REAL ESTATE EXTX
$43.00
PRESENTED & RECORDED:
05-20-2020 04:15:09 PM
ANGELA SHOOK
REGISTER OF DEEDS
BY: ANGELA SHOOK
REGISTER OF DEEDS
BK: CRP 440
PG: 47-47

STATE OF NORTH CAROLINA

DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS PROVIDED PURSUANT TO FULL DELIVERY MITIGATION CONTRACT

CLAY COUNTY

TAX OFFICE

5550004136626

SPO File Number: 22-L
DMS Project Number: 100047
Excess Tax 43.00
Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 13th day of May, 2020, by Tommie B. Waldroup, ("**Grantor**"), whose mailing address is 452 Waldroup Road; Hayesville, NC 28904, to the State of North Carolina, ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

WHEREAS, pursuant to the provisions of N.C. Gen. Stat. § 143-214.8 et seq., the State of North Carolina has established the Division of Mitigation Services (formerly known as the Ecosystem Enhancement Program and Wetlands Restoration Program) within the Department of Environment and Natural Resources for the purposes of acquiring, maintaining, restoring, enhancing, creating and preserving wetland and riparian resources that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between Michael Baker Engineering, Inc and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number 007415.

WHEREAS, The State of North Carolina is qualified to be the Grantee of a Conservation Easement pursuant to N.C. Gen. Stat. § 121-35; and

WHEREAS, the Department of Environment and Natural Resources and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Understanding, (MOU) duly executed by all parties on November 4, 1998. This MOU recognized that the Wetlands Restoration Program was to provide effective compensatory mitigation for authorized impacts to wetlands, streams and other aquatic resources by restoring, enhancing and preserving the wetland and riparian areas of the State; and

WHEREAS, the Department of Environment and Natural Resources, the North Carolina Department of Transportation and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Agreement, (MOA) duly executed by all parties in Greensboro, NC on July 22, 2003, which recognizes that the Division of Mitigation Services (formerly Ecosystem Enhancement Program) is to provide for compensatory mitigation by effective protection of the land, water and natural resources of the State by restoring, enhancing and preserving ecosystem functions; and

WHEREAS, the Department of Environment and Natural Resources, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the North Carolina Wildlife Resources Commission, the North Carolina Division of Water Quality, the North Carolina Division of Coastal Management, and the National Marine Fisheries Service entered into an agreement to continue the In-Lieu Fee operations of the North Carolina Department of Natural Resources' Division of Mitigation Services (formerly Ecosystem Enhancement Program) with an effective date of 28 July, 2010, which supersedes and replaces the previously effective MOA and MOU referenced above; and

WHEREAS, the acceptance of this instrument for and on behalf of the State of North Carolina was granted to the Department of Administration by resolution as approved by the Governor and Council of State adopted at a meeting held in the City of Raleigh, North Carolina, on the 8th day of February 2000; and

WHEREAS, the Division of Mitigation Services in the Department of Environmental Quality, which has been delegated the authority authorized by the Governor and Council of State to the Department of Administration, has approved acceptance of this instrument; and

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in Hayesville Township, Clay County, North Carolina (the "**Property**"), and being more particularly described as certain parcels of land containing approximately 69.22 acres and being conveyed to the Grantor by deed as recorded in **Deed Book 43 at Page 36** of the Clay County Registry, North Carolina; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of North Fork and South Fork Blair Creek .

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement along with a general Right of Access.

The Conservation Easement Area consists of the following:

Tracts designated Conservation Easement Area A containing a total of 1.85 **acres** as shown on the plats of survey entitled "A Conservation Easement Survey For: The State of North Carolina Division of Mitigation Services "Blair Creek Mitigation Site", Project Name: _Blair Creek Mitigation Site, SPO File No.22-L, DMS Site No. 100047, Property of _Tommie B. Waldroup, between the dates of 07/20/18 – 03/04/20 under the supervision of Kevin L. Jones, PLS Number L-5016 and recorded in the Clay County, North Carolina Register of Deeds at **Plat Book** 6 **Pages** 189 .

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the

Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the

Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

III. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees and agents, successors and assigns, receive a perpetual Right of Access to the Conservation Easement Area over the Property at reasonable times to undertake any activities on the property to restore, construct, manage, maintain, enhance, protect, and monitor the stream, wetland and any other riparian resources in the Conservation Easement Area, in accordance with restoration activities or a long-term management plan. Unless otherwise specifically set forth in this Conservation Easement, the rights granted herein do not include or establish for the public any access rights.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe

the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

E. Crossing Area(s). The Grantee is not responsible for maintenance of crossing area(s), however, the Grantee, its employees and agents, successors or assigns, reserve the right to repair crossing area(s), at its sole discretion and to recover the cost of such repairs from the Grantor if such repairs are needed as a result of activities of the Grantor, his successors or assigns.

IV. ENFORCEMENT AND REMEDIES

A. Enforcement. To accomplish the purposes of this Conservation Easement, Grantee is allowed to prevent any activity within the Conservation Easement Area that is inconsistent with the purposes of this Conservation Easement and to require the restoration of such areas or features in the Conservation Easement Area that may have been damaged by such unauthorized activity or use. Upon any breach of the terms of this Conservation Easement by Grantor, the Grantee shall, except as provided below, notify the Grantor in writing of such breach and the Grantor shall have ninety (90) days after receipt of such notice to correct the damage caused by such breach. If the breach and damage remains uncured after ninety (90) days, the Grantee may enforce this Conservation Easement by bringing appropriate legal proceedings including an action to recover damages, as well as injunctive and other relief. The Grantee shall also have the power and authority, consistent with its statutory authority: (a) to prevent any impairment of the Conservation Easement Area by acts which may be unlawful or in violation of this Conservation Easement; (b) to otherwise preserve or protect its interest in the Property; or (c) to seek damages from any appropriate person or entity. Notwithstanding the foregoing, the Grantee reserves the immediate right, without notice, to obtain a temporary restraining order, injunctive or other appropriate relief, if the breach is or would irreversibly or otherwise materially impair the benefits to be derived from this Conservation Easement, and the Grantor and Grantee acknowledge that the damage would be irreparable and remedies at law inadequate. The rights and remedies of the Grantee provided hereunder shall be in addition to, and not in lieu of, all other rights and remedies available to Grantee in connection with this Conservation Easement.

B. Inspection. The Grantee, its employees and agents, successors and assigns, have the right, with reasonable notice, to enter the Conservation Easement Area over the Property at reasonable times for the purpose of inspection to determine whether the Grantor is complying with the terms, conditions and restrictions of this Conservation Easement.

C. Acts Beyond Grantor's Control. Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury or change in the Conservation Easement Area caused by third parties, resulting from causes beyond the Grantor's control, including, without limitation, fire, flood, storm, and earth movement, or from any prudent action taken in good faith by the Grantor under emergency conditions to prevent, abate, or mitigate significant injury to life or damage to the Property resulting from such causes.

D. Costs of Enforcement. Beyond regular and typical monitoring expenses, any costs incurred by Grantee in enforcing the terms of this Conservation Easement against Grantor, including, without limitation, any costs of restoration necessitated by Grantor's acts or omissions in violation of the terms of this Conservation Easement, shall be borne by Grantor.

E. No Waiver. Enforcement of this Easement shall be at the discretion of the Grantee and any forbearance, delay or omission by Grantee to exercise its rights hereunder in the event of any breach of any term set forth herein shall not be construed to be a waiver by Grantee.

V. MISCELLANEOUS

A. This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be invalid, the remainder of the provisions of the Conservation Easement, and the application of such provision to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

B. Grantor is responsible for any real estate taxes, assessments, fees, or charges levied upon the Property. Grantee shall not be responsible for any costs or liability of any kind related to the ownership, operation, insurance, upkeep, or maintenance of the Property, except as expressly provided herein. Upkeep of any constructed bridges, fences, or other amenities on the Property are the sole responsibility of the Grantor. Nothing herein shall relieve the Grantor of the obligation to comply with federal, state or local laws, regulations and permits that may apply to the exercise of the Reserved Rights.

C. Any notices shall be sent by registered or certified mail, return receipt requested to the parties at their addresses shown herein or to other addresses as either party establishes in writing upon notification to the other.

D. Grantor shall notify Grantee in writing of the name and address and any party to whom the Property or any part thereof is to be transferred at or prior to the time said transfer is made. Grantor further agrees that any subsequent lease, deed, or other legal instrument by which any interest in the Property is conveyed is subject to the Conservation Easement herein created.

E. The Grantor and Grantee agree that the terms of this Conservation Easement shall survive any merger of the fee and easement interests in the Property or any portion thereof.

F. This Conservation Easement and Right of Access may be amended, but only in writing signed by all parties hereto, or their successors or assigns, if such amendment does not affect the qualification of this Conservation Easement or the status of the Grantee under any applicable laws, and is consistent with the purposes of the Conservation Easement. The owner of the Property shall notify the State Property Office and the U.S. Army Corps of Engineers in writing sixty (60) days prior to the initiation of any transfer of all or any part of the Property or of any request to void or modify this Conservation Easement. Such notifications and modification requests shall be addressed to:

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

General Counsel
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403

G. The parties recognize and agree that the benefits of this Conservation Easement are in gross and assignable provided, however, that the Grantee hereby covenants and agrees, that in the event it transfers or assigns this Conservation Easement, the organization receiving the interest will be a qualified holder under N.C. Gen. Stat. § 121-34 et seq. and § 170(h) of the Internal Revenue Code, and the Grantee further covenants and agrees that the terms of the transfer or assignment will be such that the transferee or assignee will be required to continue in perpetuity the conservation purposes described in this document.

VI. QUIET ENJOYMENT

Grantor reserves all remaining rights accruing from ownership of the Property, including the right to engage in or permit or invite others to engage in only those uses of the Conservation Easement Area that are expressly reserved herein, not prohibited or restricted herein, and are not inconsistent with the purposes of this Conservation Easement. Without limiting the generality of the foregoing, the Grantor expressly reserves to the Grantor, and the Grantor's invitees and licensees, the right of access to the Conservation Easement Area, and the right of quiet enjoyment of the Conservation Easement Area,

TO HAVE AND TO HOLD, the said rights and easements perpetually unto the State of North Carolina for the aforesaid purposes,

AND Grantor covenants that Grantor is seized of said premises in fee and has the right to convey the permanent Conservation Easement herein granted; that the same is free from encumbrances and that Grantor will warrant and defend title to the same against the claims of all persons whomsoever.

Signature and notary attestation appear on the following page

IN TESTIMONY WHEREOF, the Grantor has hereunto set her hand and seal, the day and year first above written.

Joseph E. Waldroup POA Tommie B. Waldroup

Joseph E. Waldroup, Attorney-in-Fact for Grantor Tommie B. Waldroup

NORTH CAROLINA
COUNTY OF Chatham

I, Kathleen McKeithan, a Notary Public in and for said County and State, do hereby certify that Joseph E. Waldroup, Attorney-in-Fact for Tommie B. Waldroup, appeared before me this day, and being duly sworn, acknowledges that he executes the foregoing instrument for and on behalf of Tommie B. Waldroup, and that he has authority to execute and acknowledge said instrument pursuant to that Durable Power of Attorney recorded in the office of the Register of Deeds of Clay County in Book 414 at Page 88, and that this instrument is executed under and by authority given by said Durable Power of Attorney, and that he acknowledged his voluntary execution of the foregoing instrument for the purposes expressed herein and on behalf of Tommie B. Waldroup. I further certify that Joseph E. Waldroup has presented satisfactory evidence of his identity.

1. I signed this notarial certificate on May 13, 2020, according to the emergency video notarization requirements contained in G.S. 10B-25.
2. The North Carolina county in which the Notary Public was located during the emergency video notarization was Chatham County.
3. The North Carolina county in which the principal signer(s) stated they were physically located during the emergency video notarization was Clay County.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the 13 day of May, 2020.

Kathleen M McKeithan, Notary Public
Kathleen M. McKeithan

My commission expires:
2·26·2024

Exhibit A:

A Conservation Easement for
The State of North Carolina,
Division of Mitigation Services
"Blair Creek"
Property of:
Tommie B. Waldroup
SPO FILE NO. 22-L DMS SITE ID NO. 100047

The following conservation easement area is located off of Waldroup Road, SR 1120, within the Hayesville Township, Clay County, North Carolina and being on a portion of that property conveyed to Eugene Waldroup through Deed Book 43, Page 36 of the Clay County Register of Deeds, and being more particularly described as follows (all bearings are grid bearings and all distances are horizontal ground distances):

Conservation Easement Area A:

BEGINNING AT A 5/8" REBAR SET WITH A CE CAP (CORNER 1), said rebar being in the common line of Deed Book 43, Page 36 and Deed Book 158, Page 101 of the Clay County Registry, and also being located S 51°08'23" E a distance of 670.81 feet from a 5/8" rebar with a "Kee" Control Point cap set in concrete (Control Point #501) having North Carolina State Plane Coordinates (2011) of Northing: 500939.92 feet and Easting: 553093.08 feet;

Thence with the aforementioned common line and with the conservation easement area S 38°00'09" W a distance of 70.12 feet to an unmarked point in the center of the North Fork of Blair Creek, said point being at the common corner of Deed Book 43, Page 36, Deed Book 158, Page 101 and Deed Book 159, Page 218 (Tract Two) of the Clay County Registry;

Thence leaving the aforementioned common line, with the common line of Deed Book 43, Page 36 and Deed Book 159, Page 218 (Tract Two) of the Clay County Registry, and continuing with the conservation easement area the following (2) courses and distances:

(1) S 38°42'01" W a distance of 6.03 feet to an existing 1/2" iron pipe;
(2) S 38°42'01" W a distance of 48.10 feet to a 5/8" rebar set with a CE cap (Corner 37);

Thence leaving the aforementioned common line and continuing with the conservation easement area the following (7) courses and distances:

(1) N 50°38'54" W a distance of 200.18 feet to a 5/8" rebar set with a CE cap (Corner 38);
(2) N 56°41'21" W a distance of 341.97 feet to a 5/8" rebar set with a CE cap (Corner 39);
(3) N 46°57'25" W a distance of 152.12 feet to a 5/8" rebar set with a CE cap (Corner 40);
(4) N 32°55'29" E a distance of 79.92 feet to a 5/8" rebar set with a CE cap (Corner 41);
(5) S 74°33'56" E a distance of 52.39 feet to a 5/8" rebar set with a CE cap (Corner 42);
(6) S 56°46'39" E a distance of 217.33 feet to a 5/8" rebar set with a CE cap (Corner 43);
(7) S 54°08'37" E a distance of 435.56 feet to the TRUE POINT OF BEGINNING;

Being all of that area of land in Conservation Easement Area A containing a total of 1.85 Acres, being the same more or less.

Being all of a conservation easement area containing a total of **1.85 Acres**, being the same more or less, according to a plat of survey entitled "A Conservation Easement Survey for The State of North Carolina, Division of Mitigation Services, Blair Creek, SPO File No. 22-L , DMS Site ID NO. 100047", on the property of Tommie B. Waldroup, dated 05/06/20, Job# 180553-CE. This description of land was prepared from an actual survey and shown on the aforesaid plat by Kee Mapping and Surveying, PA (License # C-3039) between the dates of 07/23/18 – 03/04/20 and under the supervision of Kevin L. Jones, NC PLS (License # L-5016) and shown on a plat of

survey as recorded in Plat Book 6, Pages 189 through ____ of the Clay County Register of Deeds, to which reference should be made for a more complete description.