



# **MONITORING YEAR 1 ANNUAL REPORT FINAL**

January 2023

## **DYNAMITE CREEK MITIGATION SITE**

Rockingham County, NC  
Roanoke River Basin  
HUC 03010103

DMS Project No. 100125  
NCDEQ Contract No. 7911  
DMS RFP No. 16-007727  
NCDWR Project No. 2019-0868  
USACE Action ID No. 2019-00909  
Data Collection Period: January - November 2022

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### **PREPARED FOR:**



### **NC Department of Environmental Quality Division of Mitigation Services**

1652 Mail Service Center  
Raleigh, NC 27699-1652



January 27, 2023

**Jeremiah Dow**

NC DEQ Division of Mitigation Services  
217 West Jones Street  
Raleigh, NC 27603

Subject: DMS Comments on Dynamite Creek Mitigation Site Monitoring Year 1 Report  
DMS Project Number 100125, DMS Contract 7911

Dear Mr. Dow,

We have reviewed the comments on the MY1 Report for the above referenced project dated January 23, 2023. Below are responses to each of the comments. For your convenience, the comments are reprinted with responses in italics.

1. Section 2.6 defines the start of the growing season to be determined by soil temperature and bud burst, and the end by the Applied Climate Information Website (which is simply the most historically recent WETS). Recent correspondence with the IRT has indicated that if temperature and vegetation indicators are used to start the growing season, the same indicators must be used to determine the end. Additionally, the IRT has expressed a preference that growing season dates should be "set" at mit plan or MY1 and should not change for the remainder of project monitoring.

The hydroperiod determination is not well fleshed out in the mitigation plan stating only that "Per IRT guidance, growing dates may be modified during the monitoring period using soil temperature data and observation of bud burst. Modification of growing season dates would result in a different number of consecutive days required to achieve success..."

Since veg/temp data cannot be used to determine the end date to the MY1 growing season at this juncture, DMS recommends requesting that the IRT allow March 1 – Nov. 14 be the set growing season for the remainder of the project.

*For monitoring year 1 soil temperature data and bud burst were used to determine the start of the growing season. Based on conversations with the IRT leaf senescence data was collected to determine the end of the growing season. The onset of leaf senescence is typically agreed to be signaled by the loss of canopy greenness, which includes both leaf color change and leaf drop (Vitasse et al., 2009), which are two of the most widely used methods for determining leaf senescence dates for tree communities globally (Gill et al., 2015). Visual observations of these physical changes provide simplicity that other methods (e.g. leaf nutrient content analysis, chlorophyll degradation), which require intensive sample collection and processing, lack (Mariën et al., 2019). Wildlands chose to*



*use the 50% color change method for its simple field application and its shorter lag period between the time when leaf senescence actually starts and the physical change becomes apparent as compared to leaf drop (Mariën et al., 2019). Based on this data the end of the growing season at Dynamite Creek would be mid-October. This is further supported by the meta-analysis conducted by Gill et al. (2015) that found that in lower latitude regions, including North Carolina, temperatures in October largely control when leaf senescence starts. However, Wildlands believes that the IRT will not accept this early of a date as the end of the growing season and proposes using November 14th based off WETS Tables. To reinforce this date, soil temperature data did not drop below the forty one degree threshold before the final groundwater gauge download on November 17th.*

If you have any questions, please contact me by phone (919) 851-9986, or by email (jlorch@wildlandseng.com).

Sincerely,

A handwritten signature in black ink, appearing to read "Jason Lorch".

**Jason Lorch**, Monitoring Coordinator

## References

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**DYNAMITE CREEK MITIGATION SITE**  
Monitoring Year 1 Annual Report

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## Section 1: PROJECT OVERVIEW

The Dynamite Creek Mitigation Site (Site) is located in Rockingham County, approximately three miles east of the City of Eden. The site includes two unnamed tributaries (Dynamite Creek and UT1) draining to Town Creek, which drains to the Dan River, and subsequently the Roanoke River. The project streams are surrounded by forested land on the upper reaches and a cattle farm on the lower reaches. It is included in the Eden Area Watershed Restoration Plan (EAWRP) which identifies sediment, fecal coliform bacteria, and nutrients as the main water quality and habitat stressors. The Restoration Watershed S-09 in the EAWRP includes the Site and identifies the area as a significant source of bacteria loading from livestock. Table 3 presents information related to the project attributes.

### 1.1 Project Quantities and Credits

Mitigation work within the Site included restoration, enhancement I, and preservation of perennial and intermittent stream channels along with wetland rehabilitation and re-establishment. Table 1 below shows stream credits by reach, wetland credits by type, and credit totals expected by project closeout.

**Table 1: Project Quantities and Credits**

PROJECT MITIGATION QUANTITIES							
Project Segment	Mitigation Plan Footage	As-Built Footage	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Credits <sup>1</sup>	Comments
<b>Stream</b>							
Dynamite Creek R1	498	498	Warm	P	10.0	49.800	Conservation Easement
Dynamite Creek R2	361	356	Warm	R	1.0	361.000	Full Channel Restoration
	30	30	N/A	N/A	0.0	N/A	Easement Break
	359	362	Warm	R	1.0	359.000	Full Channel Restoration
Dynamite Creek R3	155	158	Warm	R	1.0	155.000	Full Channel Restoration
Dynamite Creek R4	522	522	Warm	P	10.0	52.200	Conservation Easement
Dynamite Creek R5	555	610	Warm	E1	1.5	370.000	Pattern and Bank Stabilization, Conservation Easement
Dynamite Creek R6	656	651	Warm	R	1.0	656.000	Full Channel Restoration
	22	22	N/A	N/A	0.0	N/A	Internal Crossing
Dynamite Creek R7	1,570	1,563	Warm	R	1.0	1,570.000	Full Channel Restoration
UT1	287	287	Warm	P	10.0	28.700	Conservation Easement
<b>Total:</b>						<b>3,601.700</b>	

<sup>1</sup>A light touch approach was used on Dynamite Creek Reach 5, only short sections of work were done without full design parameters. As-Built footage is more than projected because it was not necessary to move Reach 5 as much as anticipated to stabilize it. Credits are calculated using Mitigation Plan Footage.

PROJECT MITIGATION QUANTITIES							
Project Segment	Mitigation Plan Acreage	As-Built Acreage	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Credits	Comments
<b>Wetland</b>							
Wetland Rehabilitation	5.475	5.475	Riverine	Rehabilitation	1.5	3.650	
Wetland Re-establishment	5.541	5.541	Riverine	Re-establishment	1.0	5.541	
<b>Total:</b>						<b>9.191</b>	

Restoration Level	Stream	Riparian Wetland
	Warm	Riverine
Restoration	3,101.000	
Enhancement I	370.000	
Enhancement II		
Preservation	130.700	
Re-Establishment		5.541
Rehabilitation		3.650
Enhancement		
Creation		
<b>Total Credits</b>	<b>3,601.700</b>	<b>9.191</b>

## 1.2 Project Goals and Objectives

The project is intended to provide numerous ecological benefits. Table 2 below describes expected outcomes to water quality and ecological processes and provides project goals and objectives.

**Table 2: Goals, Performance Criteria, and Functional Improvements**

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Exclude livestock from streams.	Install fencing around the conservation easement adjacent to livestock pastures.	Reduction in sediment, nutrient, and fecal coliform bacteria inputs through livestock exclusion.	Prevent encroachment by livestock.	Visually inspect the perimeter of the site to ensure no livestock access is occurring.	No livestock access to the conservation easement has occurred.



Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Improve the stability of stream channels.	Construct stream channels that will maintain stable cross-sections, patterns, and profiles over time. Repair eroding stream banks with bioengineering methods. Restore profile to remove dam breach headcut.	Reduce shear stress on channel boundary. Reduce sediment inputs from bank erosion.	Entrenchment ratio over 2.2 for C/E or 1.4 for B restoration reaches and bank height ratio below 1.2 with visual assessments showing progression towards stability.	Cross-section data will be collected during MY1, MY2, MY3, MY5, and MY7 and visual inspections will be performed annually.	Cross-sections show streams are stable and functioning as designed. ERs are over 2.2 and BHRs are below 1.2.
Improve instream habitat.	Install habitat features such as constructed riffles, cover logs, and brush toes into restored/enhanced streams. Add woody materials to channel beds. Construct pools of varying depth.	Increase and diversify available habitats for macroinvertebrates, fish, and amphibians leading to colonization and increase in biodiversity over time. Add complexity including LWD to the streams.	There is no required performance standard for this metric.	N/A	N/A
Reconnect channels with floodplains.	Reconstruct stream channels with appropriate bankfull dimensions and depth relative to the existing floodplain.	Allow more frequent flood flows to disperse on the floodplain. Improve wetland hydrology on Dynamite Creek Reach 7.	Four bankfull events in separate years within monitoring period.	Crest gauge and/or pressure transducer recording flow elevations.	Two bankfull events were recorded on Dynamite Creek.
Improve wetland hydrology.	Remove livestock to allow soil profiles to stabilize. Remove drain effect of channelized stream and floodplain berms and swales.	Increased surface water residency time will provide contact treatment and groundwater recharge potential.	Free groundwater table within 12 inches of the ground surface for 12% of the growing season.	Groundwater gauges recording water table elevation.	One groundwater gauge met the performance standard, the other 9 did not.
Restore and enhance native floodplain and streambank vegetation.	Plant native tree and understory species in riparian zones and plant native shrub and herbaceous species on streambanks. Treat invasive species within project area.	Reduce sediment inputs from bank erosion and runoff. Increase nutrient cycling and storage in floodplain. Provide riparian habitat. Add a source of LWD and organic material to stream.	210 planted stems per acre at MY7. Interim survival rate of 320 planted stems per acre at MY3 and 260 at MY5. Trees in each plot must average 7 ft at MY5 and 10 ft at MY7.	One hundred square meter vegetation plots are placed on 2% of the planted area of the Site. Data will be collected during MY1, MY2, MY3, MY5, and MY7 and visual inspections will be performed annually.	All 13 vegetation plots have a planted stem density greater than 320 stems per acre.

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Permanently protect the project Site from harmful uses.	Establish a conservation easement on the site. Preserve high quality stream reaches through the placement of a conservation easement on site.	Protect Site from encroachment on the riparian corridor and direct impact to streams and wetlands.	Prevent easement encroachment.	Visually inspect the perimeter of the Site to ensure no easement encroachment is occurring.	No easement encroachments.

### 1.3 Project Attributes

The Site consists of streams on lands which are forested along the upland reaches and which have been historically farmed along the lower reaches on the greater Dan River floodplain. Trees on the hilltops east of project streams were logged in 2007 but the area is nearly entirely reforested. The project includes two perennial streams, Dynamite Creek and UT1, as well as three not for credit intermittent streams. Dynamite Creek begins at a headcut and is buffered by mature hardwood forest, it flows through a powerline easement, a relic dam, and was situated against valley walls causing erosion. As Dynamite Creek flows out of the forest and onto the Dan River floodplain, it previously flowed through an online pond and open cattle pasture. Cattle had full access to the pond and stream, which was dredged by the farmer approximately every ten years. UT1 flows through mature hardwood forest to its confluence with Dynamite Creek in Reach 4. Aerial photography shows land use and riparian buffer extents have remained essentially unchanged since at least 1951. Table 3 below and Table 8 in Appendix C present additional information on pre-restoration conditions.

**Table 3: Project Attributes**

PROJECT INFORMATION				
Project Name	Dynamite Creek Mitigation Site	County	Rockingham County	
Project Area (acres)	22.9	Project Coordinates	36°29'3.32"N, 79°42'39.31"W	
PROJECT WATERSHED SUMMARY INFORMATION				
Physiographic Province	Piedmont	River Basin	Roanoke River	
USGS HUC 8-digit	03010103	USGS HUC 14-digit	03010103230040	
DWR Sub-basin	03-02-2003	Land Use Classification	75% forested; 21.5% managed herbaceous cover/pasture; 2.5% shrubland; 1% developed	
Project Drainage Area (acres)	119	Percentage of Impervious Area	0.5%	
RESTORATION TRIBUTARY SUMMARY INFORMATION				
Parameters	Dynamite Creek			
	Reach 2	Reach 3	Reach 6	Reach 7
Pre-project length (feet)	947	206	703	1,376
Post-project (feet)	748	158	673	1,563
Valley confinement	Confined		Unconfined	
Drainage area (acres)	35	36	75	119

RESTORATION TRIBUTARY SUMMARY INFORMATION				
Parameters	Dynamite Creek			
	Reach 2	Reach 3	Reach 6	Reach 7
Perennial, Intermittent, Ephemeral	Perennial			
DWR Water Quality Classification	C			
Dominant Stream Classification (existing)	E4	C4	E4	C5
Dominant Stream Classification (proposed)	B4/C4	B4/C4	C4	C4/E4
Dominant Evolutionary class (Simon) if applicable	Stage III/IV		Stage IV	
REGULATORY CONSIDERATIONS				
Parameters	Applicable?	Resolved?	Supporting Documentation	
Water of the United States - Section 404	Yes	Yes	USACE Nationwide Permit No. 27 and DWQ 401 Water Quality Certification No. 4134.	
Water of the United States - Section 401	Yes	Yes		
Endangered Species Act	Yes	Yes	Categorical Exclusion in Mitigation Plan (Wildlands, 2021)	
Historic Preservation Act	Yes	Yes		
Coastal Zone Management Act (CZMA or CAMA)	No	No	N/A	
Essential Fisheries Habitat	No	N/A	N/A	

## Section 2: Monitoring Year 1 Data Assessment

Annual monitoring and site visits were conducted during MY1 to assess the condition of the project. The vegetation and stream success criteria for the Site follow the approved success criteria presented in the Mitigation Plan (Wildlands, 2021). Performance criteria for vegetation, stream, and hydrologic assessment are located in Section 1.2 Table 2: Goals, Performance Criteria, and Functional Improvements. Methodology for annual monitoring is described in the Monitoring Year 0 Annual Report (Wildlands, 2022).

### 2.1 Vegetative Assessment

The MY1 vegetation survey was completed in August 2022. Vegetation monitoring resulted in a stem density range of 364 to 688 planted stems per acre across vegetation plots which is well above the interim requirement of 320 stems per acre required at MY3. Average stem density across vegetation plots is 507 planted stems per acre. All 13 vegetation plots exceeded the interim success criteria individually and are on track to meet the final success criteria required for MY7. Additionally, dense herbaceous vegetation is covering the floodplain. Refer to Appendix A for Vegetation Plot Photographs and the Vegetation Condition Assessment Table and Appendix B for Vegetation Plot Data.

### 2.2 Vegetation Areas of Concern

Small, scattered populations of multiflora rose (*Rosa multiflora*) were treated on the floodplain along Dynamite Creek Reach 7 in August 2022 with glyphosate in a foliar spray application. Wildlands recognizes that multiple treatments are typically needed for effective invasive plant control. The Site will continue to be monitored and invasives treated as necessary.

While waiting for the live stakes to grow and shade the stream channels, in-stream vegetation was also treated with glyphosate in August 2022 on the lower reaches of Dynamite Creek.

### 2.3 Stream Assessment

Morphological surveys for MY1 were completed in June 2022. All streams within the Site are stable and functioning as designed. Cross-sections show minimal change in max depth and bankfull cross-sectional area. Bank height ratios are less than 1.2 and entrenchment ratios are over 2.2. Cross-sections show slight deviations from as-built due to sediment deposition and establishment of vegetation. Some sediment deposition in pools is natural and expected. Pebble count data is no longer required per the September 29, 2021 Technical Work Group Meeting and is not included in this report. The IRT reserves the right to request pebble count data/particle distributions if deemed necessary during the monitoring period. Refer to Appendix A for the Visual Stream Morphology Stability Assessment Table, Current Condition Plan View maps, Stream Photographs, and Bridge Photographs. Refer to Appendix C for the morphological data and cross-section plots.

### 2.4 Stream Areas of Concern

No stream areas of concern were identified at this time.

### 2.5 Hydrology Assessment

By the end of MY7, four bankfull events must have occurred in separate years on Dynamite Creek. Bankfull events were recorded on Reach 6 in both March and August 2022. Refer to Appendix D for hydrology summary data and the Recorded Bankfull Events Plot.

## 2.6 Wetland Assessment

Ten groundwater gauges were installed across wetland areas. The performance criterion for wetland hydrology is groundwater within 12 inches of the ground surface for 12.0% (31 days) of the growing season consecutively. To help determine the start of the growing season in the area, one soil temperature probe was installed.

The growing season in this area began on or before March 1 according to bud burst observations and the soil temperature probe data and ended on November 14 according to the Applied Climate Information System (ACIS) website information included in the Mitigation Plan (Wildlands, 2021). The soil temperature probe malfunctioned in January but was replaced January 19, 2022, before the growing season began. Soil temperature stayed above 41 degrees Fahrenheit within 12 inches of the soil surface for most of 2022, only dipping below 41 degrees in January and at the beginning of February. The last reading below 41 degrees was recorded on February 2. Bud burst of multiple species including American elm (*Ulmus americana*), ironwood (*Carpinus caroliniana*), river birch (*Betula nigra*), and red maple (*Acer rubrum*), some of which had obviously emerged days before, were observed on March 8. This confirms the earliest accepted growing season start date of March 1.

Of the ten groundwater gauges, gauge 10 met the success criteria with a hydroperiod of 22.8% (59 consecutive days) and gauge 5 missed the performance criteria by 2 days with a hydroperiod of 11.2% (29 consecutive days). The other eight groundwater gauge hydroperiods ranged from 1.2% (3 consecutive days) to 5.0% (13 consecutive days). According to the National Integrated Drought Information System, Rockingham County was abnormally dry mid-October through November 2021 and was in a moderate drought from the end of November 2021 through the beginning of January 2022. A significant portion of the county was abnormally dry again mid-June through much of August 2022 (NOAA, 2022). Monthly precipitation totals at the end of 2021 were lower than average – 1.8, 0.2, and 0.74 inches in October, November, December 2021 respectively. This would have left groundwater depleted during the winter months and the beginning of the 2022 growing season when groundwater levels most often meet success criterion. This likely had some effect on the low groundwater level. Given that it is MY1, more time is needed to allow for groundwater recharge and to understand how wetlands are functioning. Refer to Figures 1-1b for the groundwater well gauge locations and Appendix D for groundwater hydrology data and plots.

## 2.7 Adaptive Management Plan

To help trees outcompete dense herbaceous vegetation, Wildlands plans to apply herbicide in rings around planted trees where necessary in spring of 2023. The site will continue to be monitored for invasive species and additional treatments will be applied as needed.

## 2.8 Monitoring Year 1 Summary

Vegetation across the Site is exceeding performance standards and all vegetation plots individually are on track to achieve the MY3 interim requirement of 320 planted stems per acre. MY1 data shows an average density of 507 planted stems per acre across plots. Invasive vegetation will be monitored and follow up treatments will be scheduled as necessary. Dense herbaceous vegetation has filled in across the floodplain. Ring sprays will be applied around the base of trees in spring 2023 to help planted trees compete with herbaceous vegetation. All project streams are stable and functioning as intended. Two bankfull events were observed on Dynamite Creek Reach 6. One of the ten groundwater well gauges surpassed success criterion, and another missed by a few days. The low groundwater levels recorded by

eight of the groundwater gauges is most likely due to abnormally dry conditions at the end of 2021 and into the beginning of 2022 depleting the groundwater.

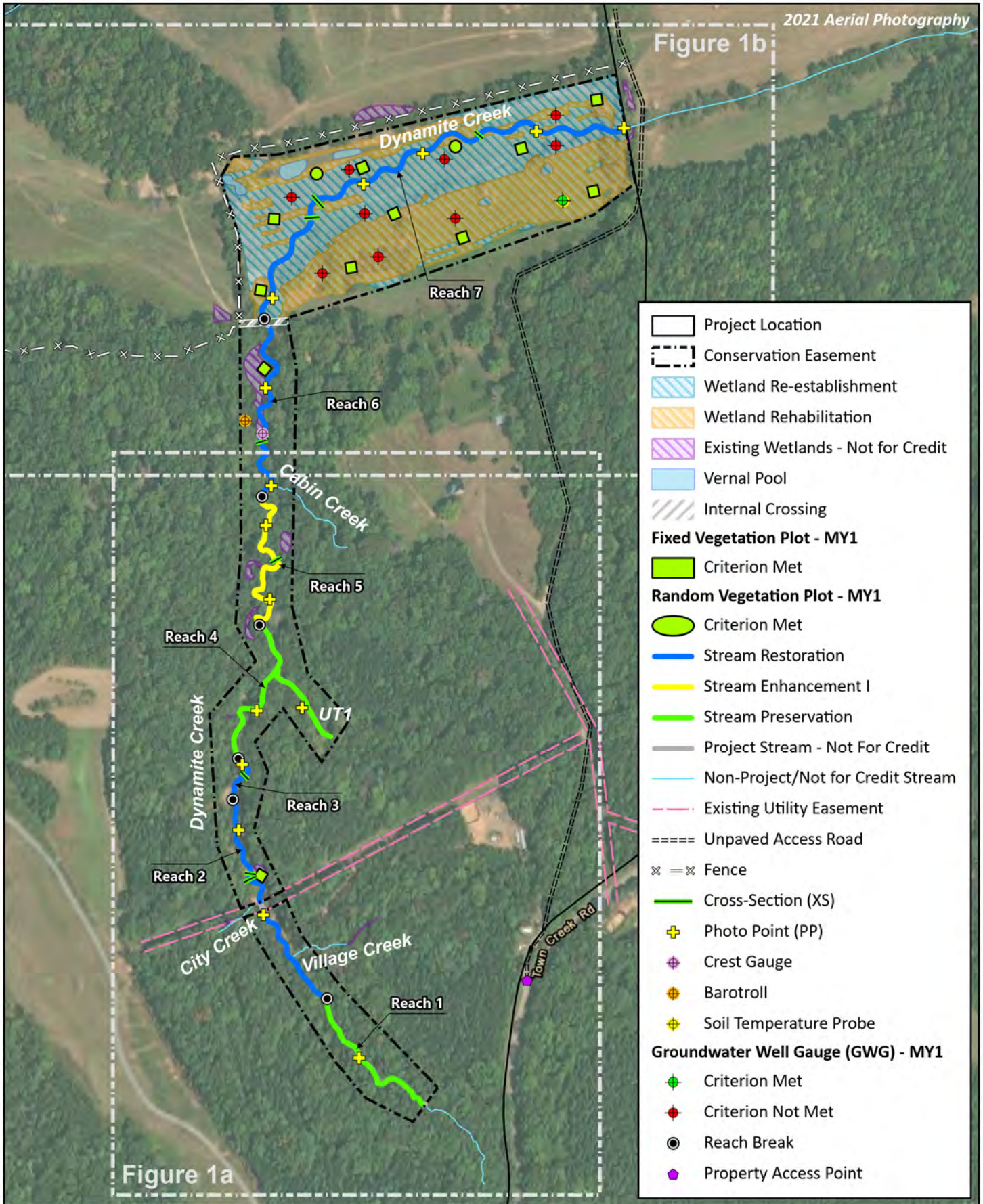
Summary information and data related to the performance of various project and monitoring elements can be found in the tables and figures in the report appendices. All raw data supporting the tables and figures in the appendices are available from DMS upon request.



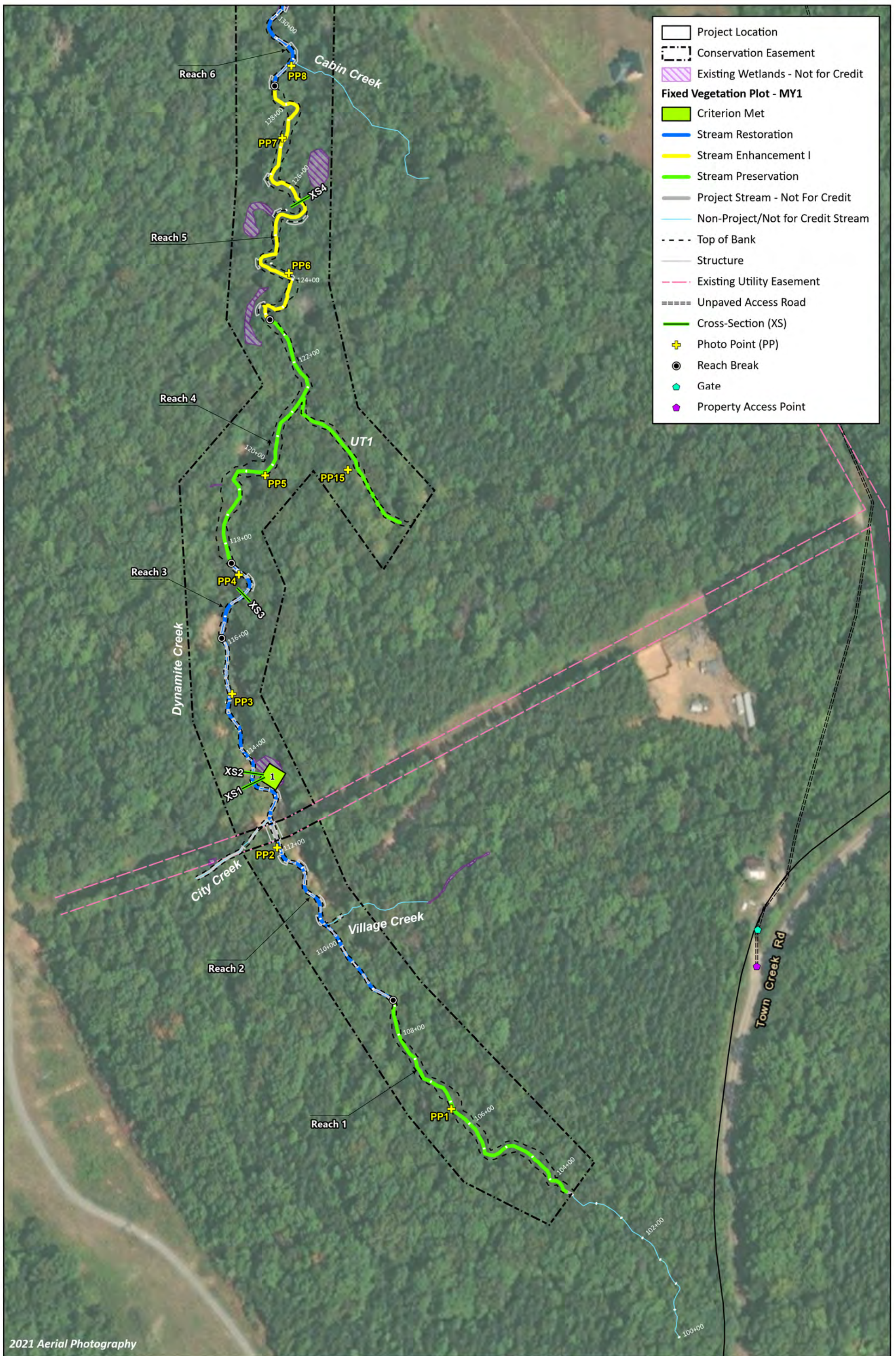
## Section 3: REFERENCES

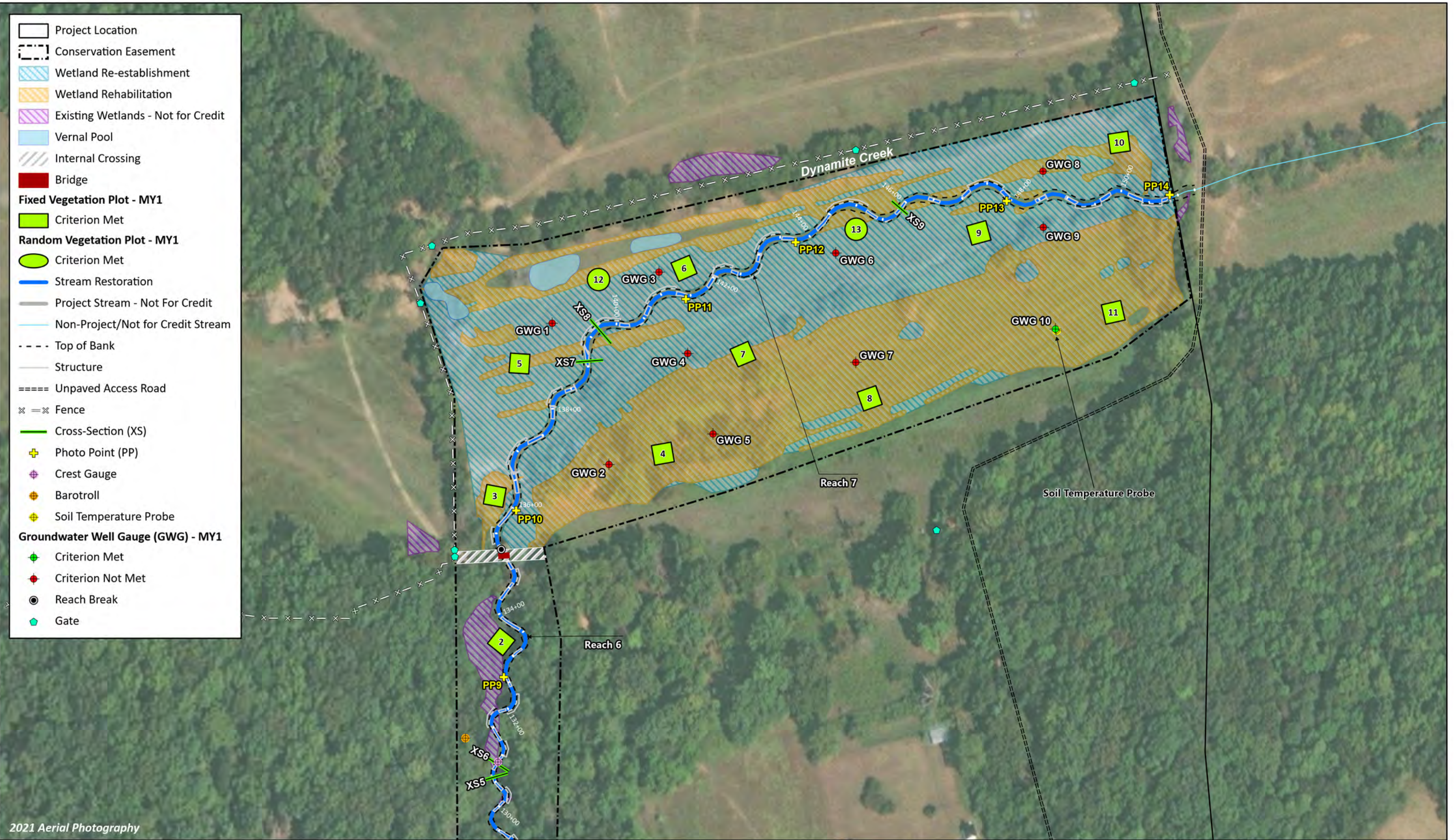
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2021 Aerial Photography

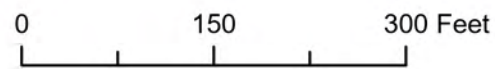


Figure 1b. Current Condition Plan View Map  
 Dynamite Creek Mitigation Site  
 DMS Project No. 100125  
 Monitoring Year 1 - 2022  
 Rockingham County, NC

## **APPENDIX A. VISUAL ASSESSMENT DATA**

**Table 4. Visual Stream Morphology Stability Assessment Table**

Dynamite Creek Mitigation Site  
 DMS Project No. 100125  
 Monitoring Year 1 - 2022

**Dynamite Creek Reach 2 and 3**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					<b>Assessed Stream Length</b>	876
					<b>Assessed Bank Length</b>	1,752
Bank	Surface Scour/ Bare Bank	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does <b>NOT</b> include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
					<b>Totals:</b>	<b>0</b>
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	24	24		100%
	Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%.	5	5		100%

Visual assessment was completed November 3, 2022.

**Dynamite Creek Reach 5**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					<b>Assessed Stream Length</b>	610
					<b>Assessed Bank Length</b>	1,220
Bank	Surface Scour/ Bare Bank	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does <b>NOT</b> include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
					<b>Totals:</b>	<b>0</b>
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	0	0		100%
	Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%.	6	6		100%

Visual assessment was completed November 3, 2022.

**Table 4. Visual Stream Morphology Stability Assessment Table**

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

**Dynamite Creek Reach 6 and 7**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					<b>Assessed Stream Length</b>	2,214
					<b>Assessed Bank Length</b>	4,428
Bank	Surface Scour/ Bare Bank	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does <b>NOT</b> include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
					<b>Totals:</b>	<b>0</b>
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	9	9		100%
	Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%.	20	20		100%

Visual assessment was completed November 3, 2022.

**Table 5. Vegetation Condition Assessment Table**

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

**Planted Acreage 15.4**

Vegetation Category	Definitions	Mapping Threshold (ac)	Combined Acreage	% of Planted Acreage
<b>Bare Areas</b>	Very limited cover of both woody and herbaceous material.	0.10	0	0%
<b>Low Stem Density Areas</b>	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10	0	0%
<b>Total</b>			<b>0</b>	<b>0%</b>
<b>Areas of Poor Growth Rates</b>	Planted areas where average height is not meeting current MY Performance Standard.	0.10	0	0%
<b>Cumulative Total</b>			<b>0.0</b>	<b>0%</b>

Visual assessment was completed November 3, 2022.

**Easement Acreage 22.9**

Vegetation Category	Definitions	Mapping Threshold (ac)	Combined Acreage	% of Easement Acreage
<b>Invasive Areas of Concern</b>	Invasives may occur outside of planted areas and within the easement and will therefore be calculated against the total easement acreage. Include species with the potential to directly outcompete native, young, woody stems in the short-term or community structure for existing communities. Invasive species included in summation above should be identified in report summary.	0.10	0	0%
<b>Easement Encroachment Areas</b>	Encroachment may be point, line, or polygon. Encroachment to be mapped consists of any violation of restrictions specified in the conservation easement. Common encroachments are mowing, cattle access, vehicular access. Encroachment has no threshold value as will need to be addressed regardless of impact area.	none	0 Encroachments Noted / 0 ac	

Visual assessment was completed November 3, 2022.

## **STREAM PHOTOGRAPHS**



PHOTO POINT 1 Dynamite Creek R1 – upstream (04/20/2022)



PHOTO POINT 1 Dynamite Creek R1 – downstream (04/20/2022)



PHOTO POINT 2 Dynamite Creek R2 – upstream (04/20/2022)



PHOTO POINT 2 Dynamite Creek R2 – downstream (04/20/2022)



PHOTO POINT 3 Dynamite Creek R2 – upstream (04/20/2022)



PHOTO POINT 3 Dynamite Creek R2 – downstream (04/20/2022)



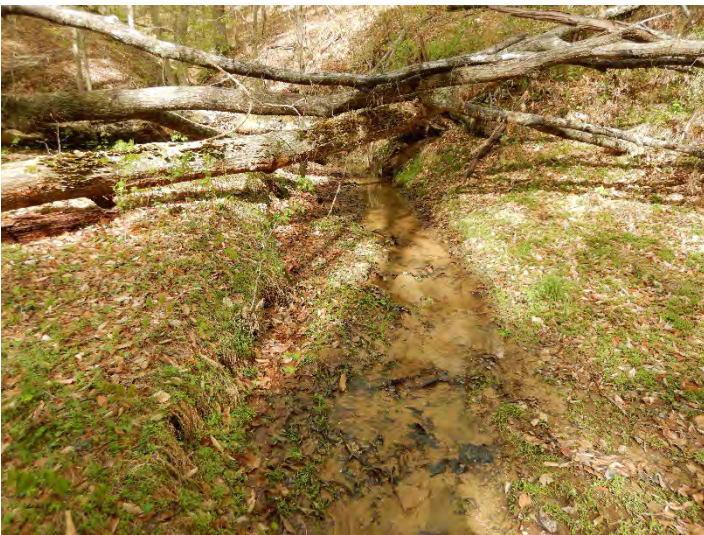




**PHOTO POINT 4 Dynamite Creek R3 – upstream (04/20/2022)**



**PHOTO POINT 4 Dynamite Creek R3 – downstream (04/20/2022)**



**PHOTO POINT 5 Dynamite Creek R4 – upstream (04/20/2022)**



**PHOTO POINT 5 Dynamite Creek R4 – downstream (04/20/2022)**



**PHOTO POINT 6 Dynamite Creek R5 – upstream (04/20/2022)**



**PHOTO POINT 6 Dynamite Creek R5 – downstream (04/20/2022)**





**PHOTO POINT 7 Dynamite Creek R5 – upstream (04/20/2022)**



**PHOTO POINT 7 Dynamite Creek R5 – downstream (04/20/2022)**



**PHOTO POINT 8 Dynamite Creek R6 – upstream (04/20/2022)**



**PHOTO POINT 8 Dynamite Creek R6 – downstream (04/20/2022)**



**PHOTO POINT 9 Dynamite Creek R6 – upstream (04/20/2022)**



**PHOTO POINT 9 Dynamite Creek R6 – downstream (04/20/2022)**





**PHOTO POINT 10 Dynamite Creek R7 – upstream (04/20/2022)**

**PHOTO POINT 10 Dynamite Creek R7 – downstream (04/20/2022)**



**PHOTO POINT 11 Dynamite Creek R7 – upstream (04/20/2022)**

**PHOTO POINT 11 Dynamite Creek R7 – downstream (04/20/2022)**



**PHOTO POINT 12 Dynamite Creek R7 – upstream (04/20/2022)**

**PHOTO POINT 12 Dynamite Creek R7 – downstream (04/20/2022)**





**PHOTO POINT 13 Dynamite Creek R7 – upstream (04/20/2022)**



**PHOTO POINT 13 Dynamite Creek R7 – downstream (04/20/2022)**



**PHOTO POINT 14 Dynamite Creek R7 – upstream (04/20/2022)**



**PHOTO POINT 14 Dynamite Creek R7 – downstream (04/20/2022)**



**PHOTO POINT 15 UT1 – upstream (04/20/2022)**



**PHOTO POINT 15 UT1 – downstream (04/20/2022)**



**BRIDGE PHOTOGRAPHS**



**Dynamite Creek R7 - Looking Upstream (04/20/2022)**



**Dynamite Creek R6 - Looking Downstream (04/20/2022)**



**VEGETATION PLOT PHOTOGRAPHS**



**FIXED VEG PLOT 1** (08/02/2022)



**FIXED VEG PLOT 2** (08/02/2022)



**FIXED VEG PLOT 3** (08/02/2022)



**FIXED VEG PLOT 4** (08/02/2022)



**FIXED VEG PLOT 5** (08/02/2022)



**FIXED VEG PLOT 6** (08/02/2022)







**FIXED VEG PLOT 7** (08/02/2022)



**FIXED VEG PLOT 8** (08/02/2022)



**FIXED VEG PLOT 9** (08/02/2022)



**FIXED VEG PLOT 10** (08/02/2022)



**FIXED VEG PLOT 11** (08/02/2022)





**RANDOM VEG PLOT 12** (08/02/2022)



**RANDOM VEG PLOT 13** (08/02/2022)



**GROUNDWATER WELL GAUGE PHOTOGRAPHS**



**GROUNDWATER WELL GAUGE 1 – (11/17/2022)**



**GROUNDWATER WELL GAUGE 2 – (11/17/2022)**



**GROUNDWATER WELL GAUGE 3 – (11/17/2022)**



**GROUNDWATER WELL GAUGE 4 – (11/17/2022)**



**GROUNDWATER WELL GAUGE 5 – (11/17/2022)**



**GROUNDWATER WELL GAUGE 6 – (11/17/2022)**





**GROUNDWATER WELL GAUGE 7 – (11/17/2022)**



**GROUNDWATER WELL GAUGE 8 – (11/17/2022)**



**GROUNDWATER WELL GAUGE 9 – (11/17/2022)**



**GROUNDWATER WELL GAUGE 10 – (11/17/2022)**



## **APPENDIX B. VEGETATION PLOT DATA**

**Table 6. Vegetation Plot Data**

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

Planted Acreage	15.4
Date of Initial Plant	2022-01-11
Date of Current Survey	2022-08-02
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	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Acer negundo</i>	boxelder	Tree	FAC	1	1	2	2			2	2		
	<i>Alnus serrulata</i>	hazel alder	Tree	OBL					2	2			2	2
	<i>Betula nigra</i>	river birch	Tree	FACW	3	3	1	1	2	2	1	1	2	2
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW			1	1	1	1	1	1	2	2
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	3	3	4	4	2	2	2	2		
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL			1	1			1	1		
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW	1	1					3	3		
	<i>Quercus rubra</i>	northern red oak	Tree	FACU										
	<i>Salix nigra</i>	black willow	Tree	OBL	2	2	1	1	1	1	2	2	1	1
	<i>Salix sericea</i>	silky willow	Shrub	OBL	2	2	2	2			1	1	1	1
	<i>Sambucus canadensis</i>	American black elderberry	Tree					1	1	1	1	2	2	
	<i>Ulmus americana</i>	American elm	Tree	FACW			1	1	2	2	2	2	1	1
	<i>Ulmus rubra</i>	slippery elm	Tree	FAC					1	1				
Sum	Performance Standard				12	12	13	13	12	12	16	16	11	11
Mitigation Plan Performance Standard	Current Year Stem Count					12		13		12		16		11
	Stems/Acre					486		526		486		648		445
	Species Count					6		8		8		10		7
	Dominant Species Composition (%)					25		31		17		19		18
	Average Plot Height (ft.)					2		2		2		2		2
	% Invasives					0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					12		13		12		16		11
	Stems/Acre					486		526		486		648		445
	Species Count					6		8		8		10		7
	Dominant Species Composition (%)					25		31		17		19		18
	Average Plot Height (ft.)					2		2		2		2		2
	% Invasives					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.

**Table 6. Vegetation Plot Data**

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

Planted Acreage	15.4
Date of Initial Plant	2022-01-11
Date of Current Survey	2022-08-02
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 6 F		Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 F		Veg Plot 10 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Acer negundo</i>	boxelder	Tree	FAC	1	1			1	1	1	1	1	1
	<i>Alnus serrulata</i>	hazel alder	Tree	OBL					1	1	1	1	1	1
	<i>Betula nigra</i>	river birch	Tree	FACW	2	2	1	1	4	4	2	2	2	2
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW									1	1
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	3	3	3	3			3	3	1	1
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL	1	1	2	2	1	1			1	1
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW							1	1	1	1
	<i>Quercus rubra</i>	northern red oak	Tree	FACU									1	1
	<i>Salix nigra</i>	black willow	Tree	OBL	2	2	2	2	1	1	2	2	1	1
	<i>Salix sericea</i>	silky willow	Shrub	OBL	4	4	1	1	1	1	2	2	1	1
	<i>Sambucus canadensis</i>	American black elderberry	Tree		2	2	1	1					1	1
<i>Ulmus americana</i>	American elm	Tree	FACW	1	1			3	3			1	1	
<i>Ulmus rubra</i>	slippery elm	Tree	FAC	1	1	1	1			1	1			
Sum	Performance Standard				17	17	11	11	12	12	13	13	13	13
Mitigation Plan Performance Standard	Current Year Stem Count					17		11		12		13		13
	Stems/Acre					688		445		486		526		526
	Species Count					9		7		7		8		12
	Dominant Species Composition (%)					24		27		33		23		15
	Average Plot Height (ft.)					2		1		2		2		2
% Invasives					0		0		0		0		0	
Post Mitigation Plan Performance Standard	Current Year Stem Count					17		11		12		13		13
	Stems/Acre					688		445		486		526		526
	Species Count					9		7		7		8		12
	Dominant Species Composition (%)					24		27		33		23		15
	Average Plot Height (ft.)					2		1		2		2		2
% Invasives					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.



**Table 6. Vegetation Plot Data**

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 1 - 2022**

Planted Acreage	15.4
Date of Initial Plant	2022-01-11
Date of Current Survey	2022-08-02
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 11 F		Veg Plot 12 R	Veg Plot 13 R
					Planted	Total	Total	Total
Species Included in Approved Mitigation Plan	<i>Acer negundo</i>	boxelder	Tree	FAC	2	2	2	
	<i>Alnus serrulata</i>	hazel alder	Tree	OBL				
	<i>Betula nigra</i>	river birch	Tree	FACW	2	2		3
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW	2	2		
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	4	4	3	2
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL				1
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW				1
	<i>Quercus rubra</i>	northern red oak	Tree	FACU				
	<i>Salix nigra</i>	black willow	Tree	OBL	1	1	3	1
	<i>Salix sericea</i>	silky willow	Shrub	OBL	1	1		
	<i>Sambucus canadensis</i>	American black elderberry	Tree		1	1		
<i>Ulmus americana</i>	American elm	Tree	FACW	1	1	1	1	
<i>Ulmus rubra</i>	slippery elm	Tree	FAC	1	1			
<b>Sum</b>	<b>Performance Standard</b>				<b>15</b>	<b>15</b>	<b>9</b>	<b>9</b>
Mitigation Plan Performance Standard	Current Year Stem Count					15	9	9
	Stems/Acre					607	364	364
	Species Count					9	4	6
	Dominant Species Composition (%)					27	33	33
	Average Plot Height (ft.)					2	2	2
	% Invasives					0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					15	9	9
	Stems/Acre					607	364	364
	Species Count					9	4	6
	Dominant Species Composition (%)					27	33	33
	Average Plot Height (ft.)					2	2	2
	% Invasives					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.

**Table 7. Vegetation Performance Standards Summary Table**

Dynamite Creek Mitigation Site

DMS Project No. 100125

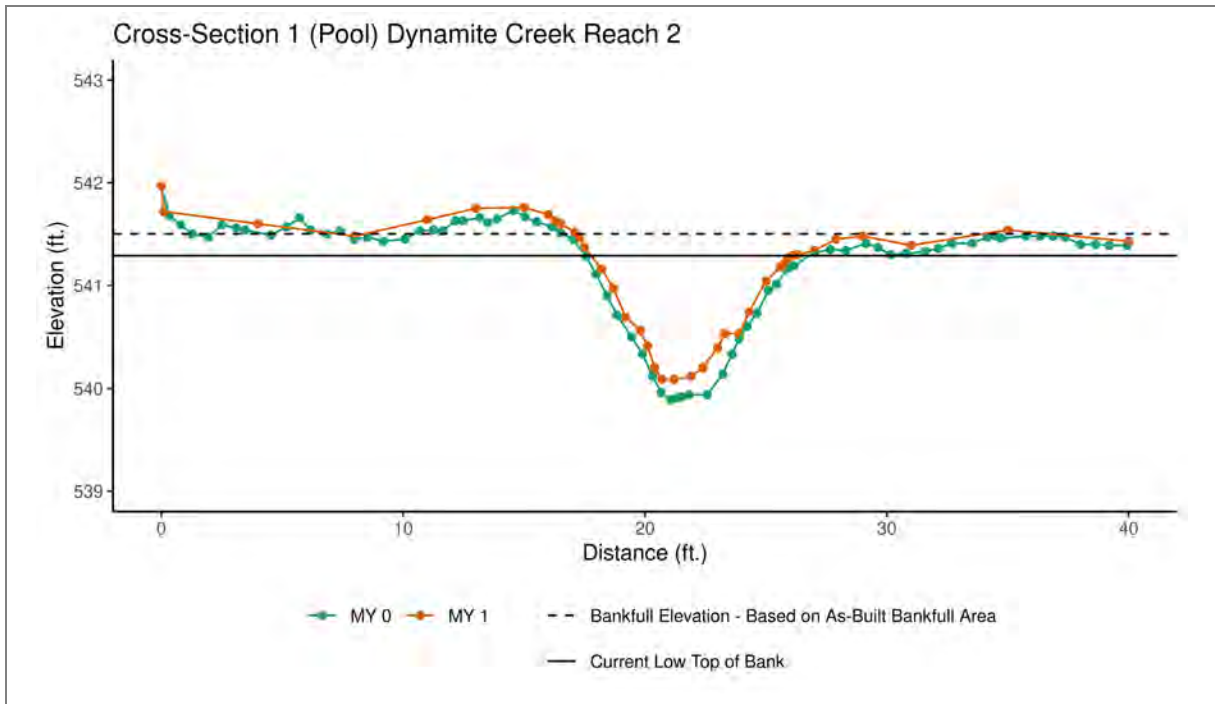
Monitoring Year 1 - 2022

	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												
Monitoring Year 1	486	2	6	0	526	2	8	0	486	2	8	0
Monitoring Year 0	526	2	6	0	526	2	8	0	607	2	9	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												
Monitoring Year 1	648	2	10	0	445	2	7	0	688	2	9	0
Monitoring Year 0	648	2	10	0	567	2	8	0	729	2	9	0
	Veg Plot 7 F				Veg Plot 8 F				Veg Plot 9 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												
Monitoring Year 1	445	1	7	0	486	2	7	0	526	2	8	0
Monitoring Year 0	607	2	9	0	607	2	9	0	648	2	11	0
	Veg Plot 10 F				Veg Plot 11 F				Veg Plot Group 12 R			
	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												
Monitoring Year 1	526	2	12	0	607	2	9	0	364	2	4	0
Monitoring Year 0	526	2	12	0	607	2	9	0	567	2	10	0
	Veg Plot Group 13 R											
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives								
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	364	2	6	0								
Monitoring Year 0	567	2	9	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 C. STREAM GEOMORPHOLOGY DATA**

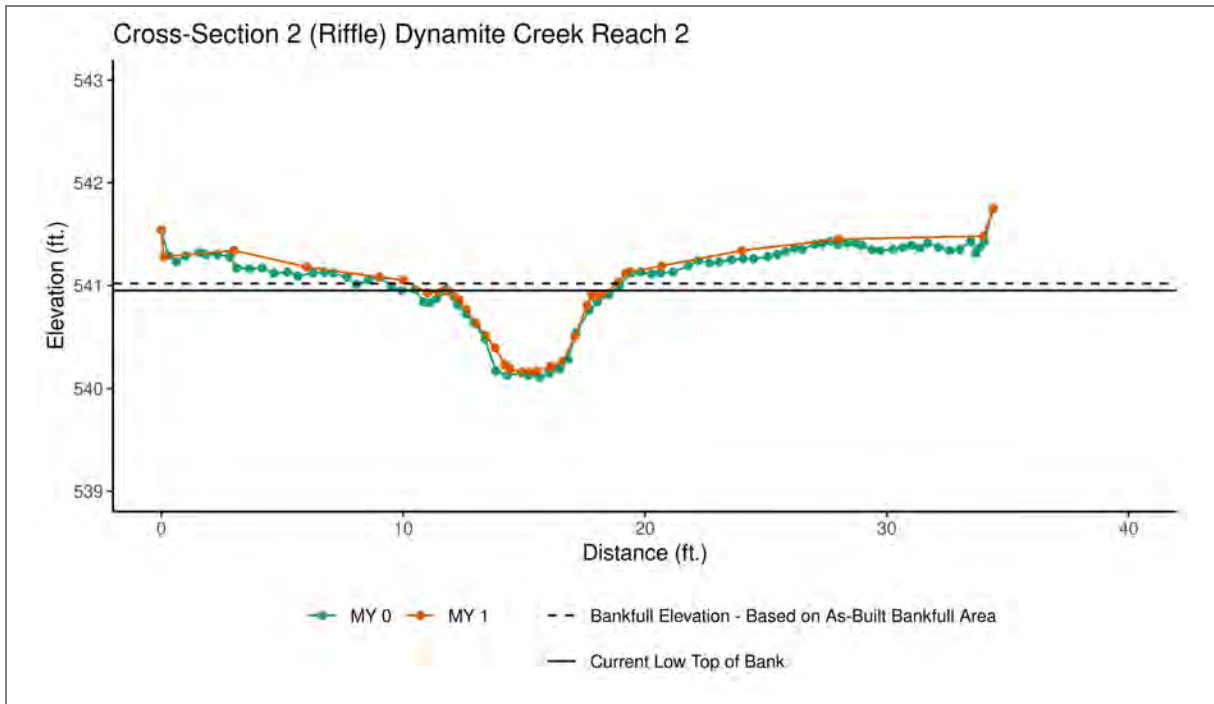
## Cross-Section Plots



	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A	N/A				
Bank Height Ratio - Based on AB-Bankfull Area	N/A	N/A				
Thalweg Elevation	539.89	540.09				
LTOB Elevation	541.32	541.29				
LTOB Max Depth	1.43	1.20				
LTOB Cross-Sectional Area	7.39	5.62				



Downstream (06/23/2022)

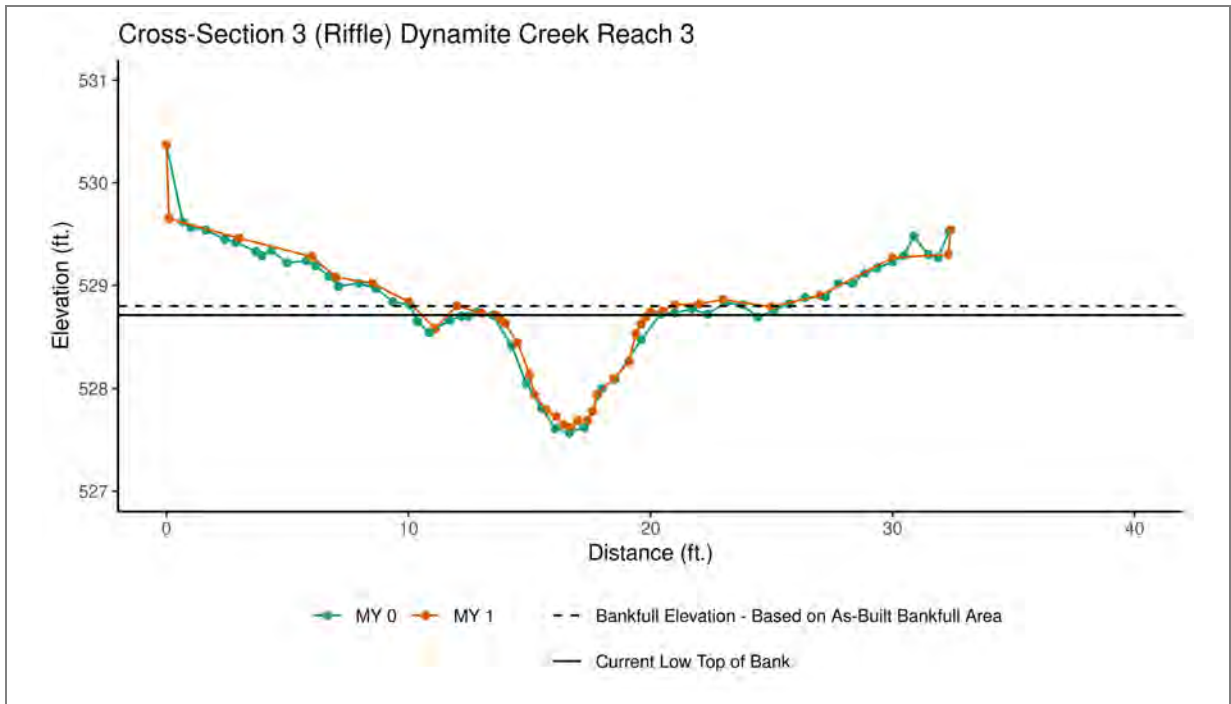


	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	540.96	541.02				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.92				
Thalweg Elevation	540.11	540.16				
LTOB Elevation	540.96	540.95				
LTOB Max Depth	0.85	0.79				
LTOB Cross-Sectional Area	3.53	3.08				



Downstream (06/23/2022)



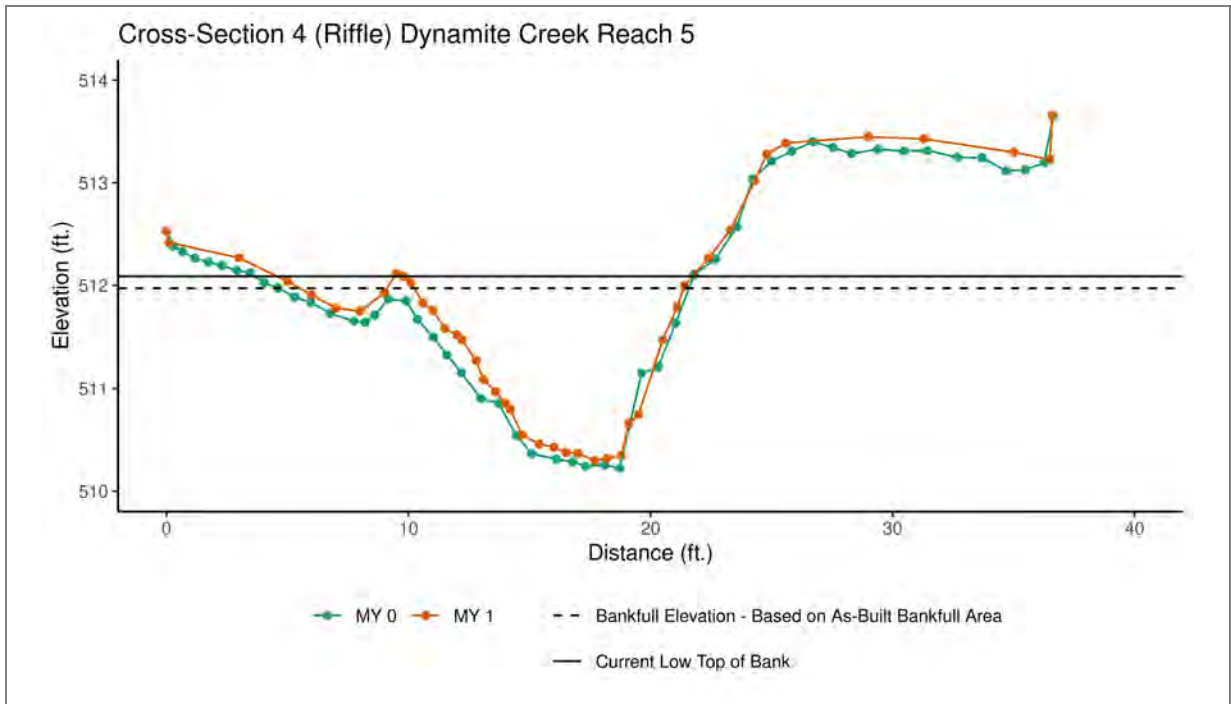


	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	528.72	528.80				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.93				
Thalweg Elevation	527.57	527.62				
LTOB Elevation	528.72	528.71				
LTOB Max Depth	1.15	1.09				
LTOB Cross-Sectional Area	4.45	3.90				



Downstream (06/23/2022)





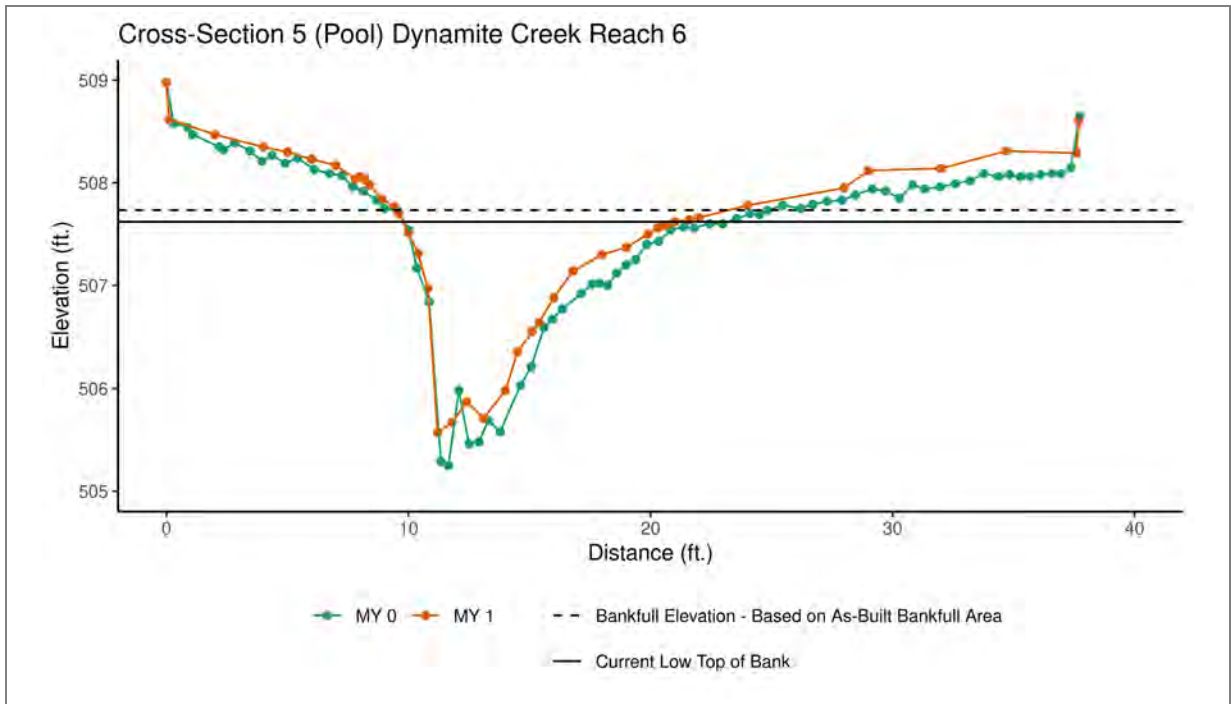
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	511.85	511.97				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.09				
Thalweg Elevation	510.22	510.30				
LTOB Elevation	511.85	512.09				
LTOB Max Depth	1.62	1.79				
LTOB Cross-Sectional Area	11.45	12.80				



Downstream (06/23/2022)





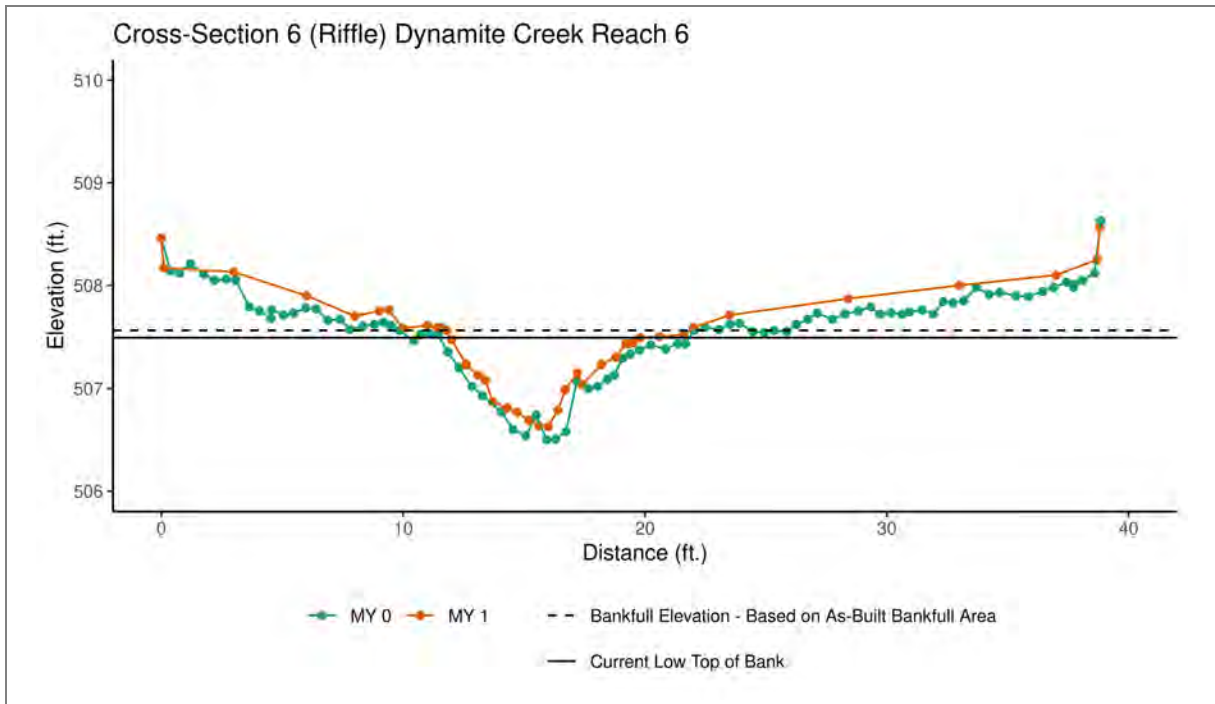


	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A	N/A				
Bank Height Ratio - Based on AB-Bankfull Area	N/A	N/A				
Thalweg Elevation	505.25	505.57				
LTOB Elevation	507.54	507.62				
LTOB Max Depth	2.29	2.05				
LTOB Cross-Sectional Area	11.01	9.74				



Downstream (06/23/2022)



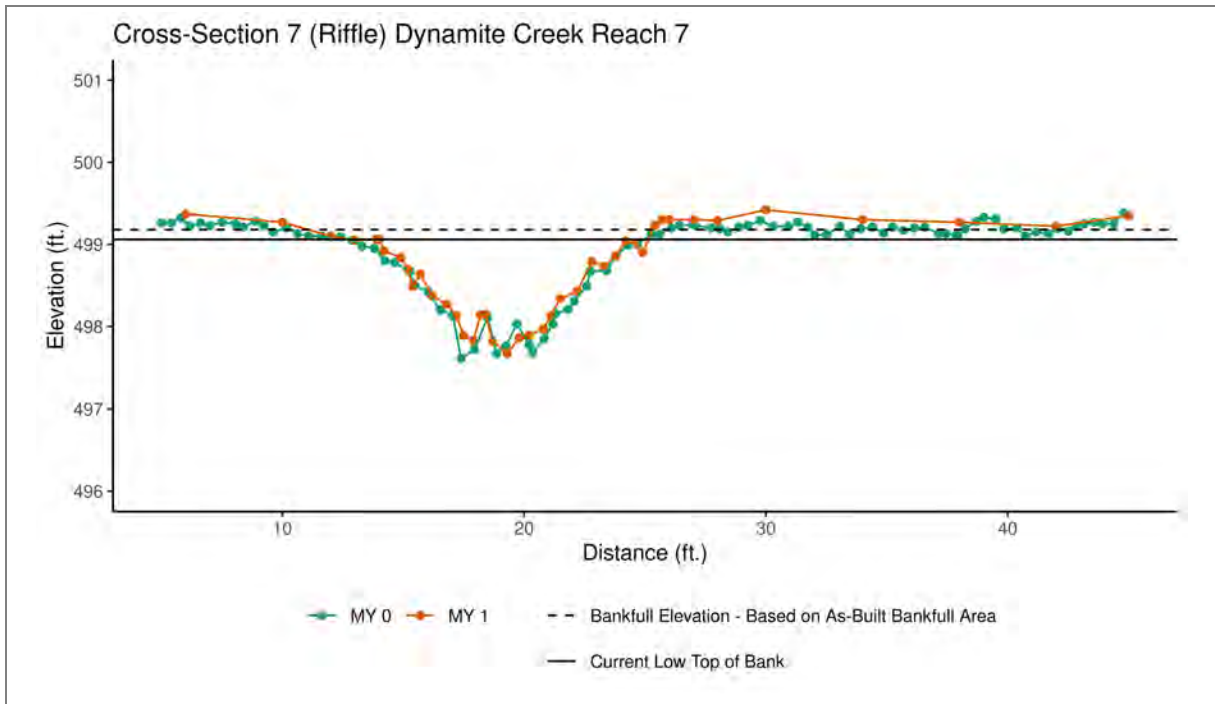


	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	507.42	507.56				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.92				
Thalweg Elevation	506.50	506.63				
LTOB Elevation	507.42	507.49				
LTOB Max Depth	0.92	0.86				
LTOB Cross-Sectional Area	4.06	3.51				



**Downstream (06/23/2022)**



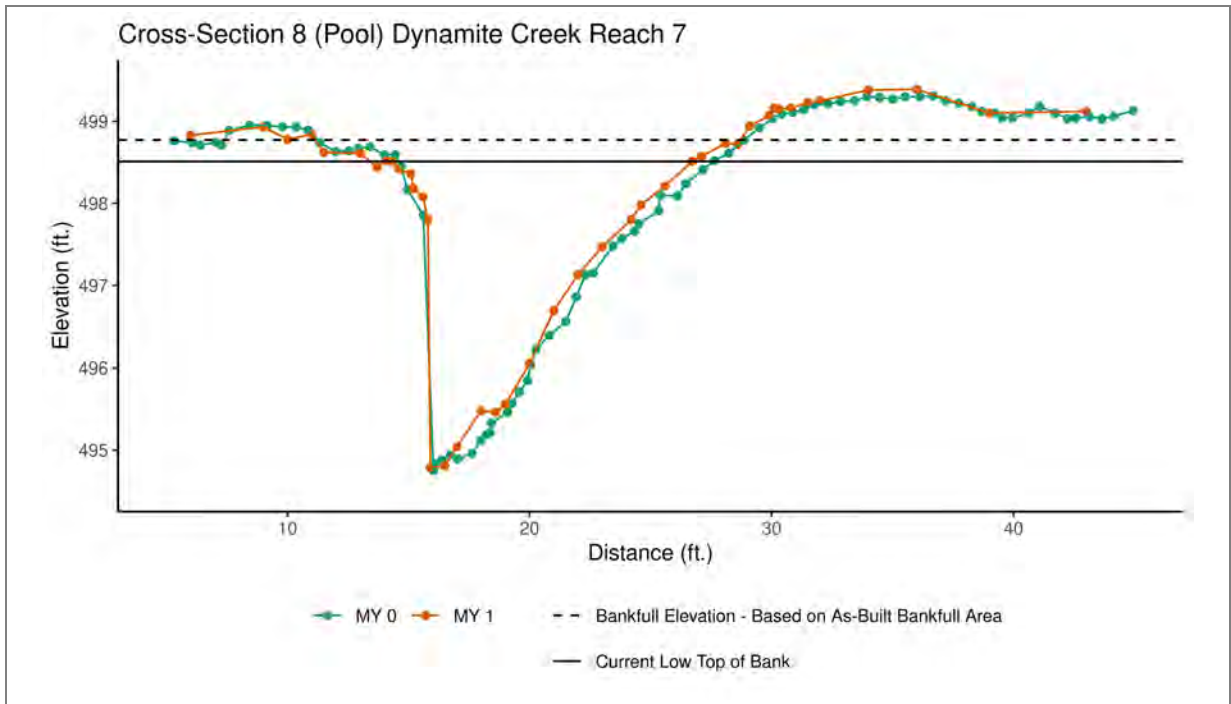


	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	499.09	499.18				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.92				
Thalweg Elevation	497.61	497.67				
LTOB Elevation	499.09	499.06				
LTOB Max Depth	1.47	1.39				
LTOB Cross-Sectional Area	8.84	7.51				



Downstream (06/23/2022)



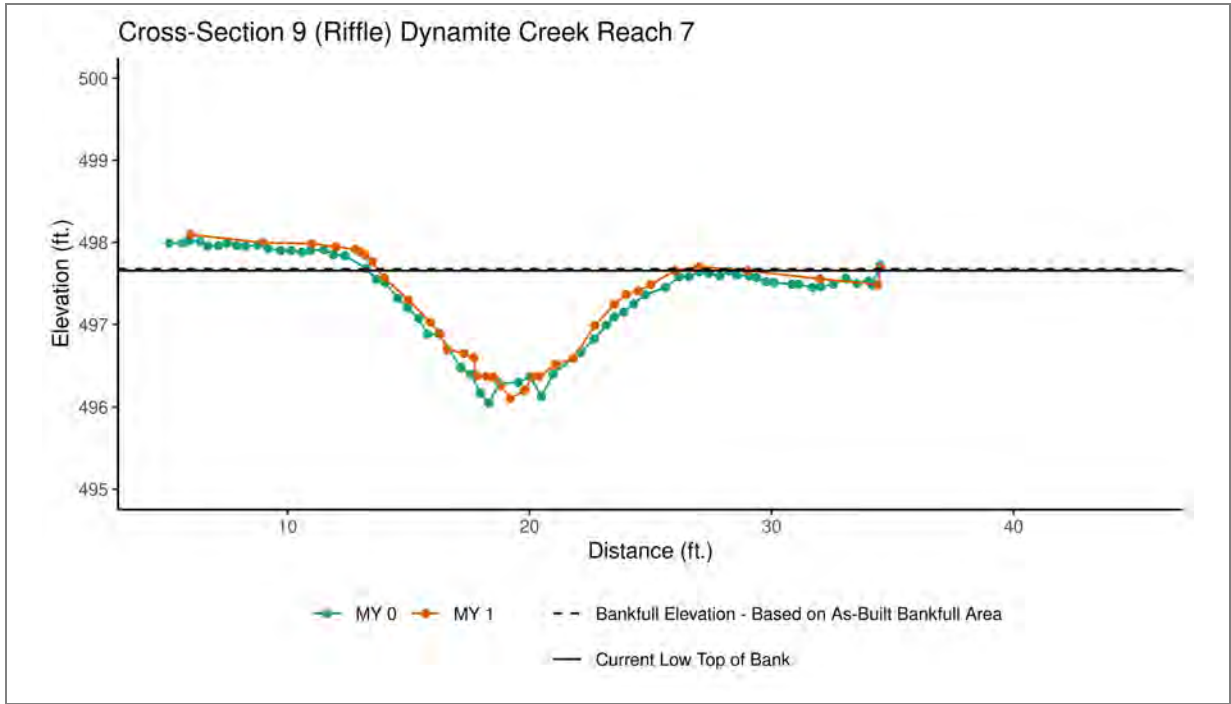


	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A	N/A				
Bank Height Ratio - Based on AB-Bankfull Area	N/A	N/A				
Thalweg Elevation	494.75	494.79				
LTOB Elevation	498.59	498.51				
LTOB Max Depth	3.79	3.72				
LTOB Cross-Sectional Area	23.62	20.38				



Downstream (06/23/2022)





	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	497.58	497.68				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.99				
Thalweg Elevation	496.05	496.11				
LTOB Elevation	497.58	497.66				
LTOB Max Depth	1.53	1.55				
LTOB Cross-Sectional Area	9.61	9.36				



Downstream (06/23/2022)



**Table 8. Baseline Stream Data Summary**

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

Parameter	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MYO)			
	Dynamite Creek Reach 2								
Riffle Only	Min	Max	n	Min	Max	Min	Max	n	
Bankfull Width (ft)	4.2		1	6.1		6.7		1	
Floodprone Width (ft)	6.6		1	90		90		1	
Bankfull Mean Depth	0.7		1	0.5		0.5		1	
Bankfull Max Depth	1.0		1	0.8		0.9		1	
Bankfull Cross Sectional Area (ft <sup>2</sup> )	3.1		1	3.0		3.5		1	
Width/Depth Ratio	6.0		1	12.6		12.7		1	
Entrenchment Ratio	1.6		1	>2.2		13.4		1	
Bank Height Ratio	5.3		1	1.0		1.0		1	
Max part size (mm) mobilized at bankfull	67			40		40			
Rosgen Classification	E4			B4/C4		B4/C4			
Bankfull Discharge (cfs)	10.3		1	8.8		8.8		1	
Sinuosity	1.30			1.10		1.10			
Water Surface Slope (ft/ft) <sup>2</sup>	0.0155		1	0.0177		0.0270			
Other	---			---		---			
Parameter	Dynamite Creek Reach 3								
Riffle Only	Min	Max	n	Min	Max	Min	Max	n	
Bankfull Width (ft)	7.8		1	6.4		7.0		1	
Floodprone Width (ft)	9		1	40		40		1	
Bankfull Mean Depth	0.4		1	0.5		0.6		1	
Bankfull Max Depth	0.5		1	0.7		1.2		1	
Bankfull Cross Sectional Area (ft <sup>2</sup> )	3.1		1	3.0		4.5		1	
Width/Depth Ratio	19.5		1	13.6		10.9		1	
Entrenchment Ratio	1.2		1	>2.2		5.8		1	
Bank Height Ratio	5.6		1	1.0		1.0		1	
Max part size (mm) mobilized at bankfull	70			40		40			
Rosgen Classification	C4			B4/C4		B4/C4			
Bankfull Discharge (cfs)	10.5		1	9.2		9.0		1	
Sinuosity	1.00			1.10		1.10			
Water Surface Slope (ft/ft) <sup>2</sup>	0.0120	0.0300	1	0.0192		0.0253			
Other	---			---		---			
Parameter	Dynamite Creek Reach 5 <sup>1</sup>								
Riffle Only	Min	Max	n	Min	Max	Min	Max	n	
Bankfull Width (ft)	8.7		1	N/A		11.1		1	
Floodprone Width (ft)	11		1	N/A		77		1	
Bankfull Mean Depth	0.6		1	N/A		1.0		1	
Bankfull Max Depth	0.8		1	N/A		1.6		1	
Bankfull Cross Sectional Area (ft <sup>2</sup> )	5.3		1	N/A		11.4		1	
Width/Depth Ratio	14.5		1	N/A		10.9		1	
Entrenchment Ratio	1.3		1	N/A		6.9		1	
Bank Height Ratio	2.6		1	N/A		1.0		1	
Max part size (mm) mobilized at bankfull	N/A			N/A		N/A			
Rosgen Classification	E4			N/A		E4			
Bankfull Discharge (cfs)	16.0		1	N/A		14.4		1	
Sinuosity	1.70			N/A		1.70			
Water Surface Slope (ft/ft) <sup>2</sup>	0.0090	0.0140	1	N/A		0.0116			
Other	---			---		---			

<sup>1</sup>A light touch approach was used on Reach 5, only short sections of work were done without full design parameters.

**Table 8. Baseline Stream Data Summary**

Dynamite Creek Mitigation Site  
 DMS Project No. 100125  
 Monitoring Year 1 - 2022

	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MYO)		
<b>Parameter</b>	<b>Dynamite Creek Reach 6</b>							
<b>Riffle Only</b>	<b>Min</b>	<b>Max</b>	<b>n</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	<b>n</b>
Bankfull Width (ft)	8.3		1	8.5		8.6		1
Floodprone Width (ft)	11.4		1	>19		39		1
Bankfull Mean Depth	0.9		1	0.7		0.5		1
Bankfull Max Depth	1.1		1	1.1		0.9		1
Bankfull Cross Sectional Area (ft <sup>2</sup> )	7.2		1	5.7		4.1		1
Width/Depth Ratio	9.2		1	12.6		18.0		1
Entrenchment Ratio	1.4		1	>2.2		4.6		1
Bank Height Ratio	2.9		1	1.0		1.0		1
Max part size (mm) mobilized at bankfull	51			28		28		
Rosgen Classification	E4			C4		C4		
Bankfull Discharge (cfs)	22.2		1	15.4		15.5		
Sinuosity	1.30			1.30		1.30		
Water Surface Slope (ft/ft) <sup>2</sup>	0.0093		1	0.0094		0.0074		
Other	---			---		---		
<b>Parameter</b>	<b>Dynamite Creek Reach 7</b>							
<b>Riffle Only</b>	<b>Min</b>	<b>Max</b>	<b>n</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	<b>n</b>
Bankfull Width (ft)	9.9		1	10.9		12.3	12.5	2
Floodprone Width (ft)	>500		1	>24		300	473	2
Bankfull Mean Depth	0.9		1	0.9		0.7	0.8	2
Bankfull Max Depth	2.0		1	1.4		1.5	1.5	2
Bankfull Cross Sectional Area (ft <sup>2</sup> )	12.8		1	9.4		8.8	9.6	2
Width/Depth Ratio	7.6		1	12.7		16.3	17.1	2
Entrenchment Ratio	>2.2		1	>2.2		23.2	37.8	2
Bank Height Ratio	1.0		1	1.0		1.0		2
Max part size (mm) mobilized at bankfull	18			17.8		17.8		
Rosgen Classification	C5			E4		E4		
Bankfull Discharge (cfs)	33.3		1	24.1		24.0		
Sinuosity	1.00			1.10		1.10		
Water Surface Slope (ft/ft) <sup>2</sup>	0.00303		1	0.0470		0.0043		
Other	---			---		---		

**Table 9. Cross-Section Morphology Monitoring Summary**

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

	Dynamite Creek Reach 2												Dynamite Creek Reach 3					
	Cross-Section 1 (Pool)						Cross-Section 2 (Riffle)						Cross-Section 3 (Riffle)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull <sup>1</sup> Area	N/A	N/A					540.96	541.02					528.72	528.80				
Bank Height Ratio - Based on AB Bankfull <sup>1</sup> Area	N/A	N/A					1.00	0.92					1.00	0.93				
Thalweg Elevation	539.89	540.09					540.11	540.16					527.57	527.62				
LTOB <sup>2</sup> Elevation	541.32	541.29					540.96	540.95					528.72	528.71				
LTOB <sup>2</sup> Max Depth (ft)	1.43	1.20					0.85	0.79					1.15	1.09				
LTOB <sup>2</sup> Cross Sectional Area (ft <sup>2</sup> )	7.39	5.62					3.53	3.08					4.45	3.90				
	Dynamite Creek Reach 5						Dynamite Creek Reach 6											
	Cross-Section 4 (Riffle)						Cross-Section 5 (Pool)						Cross-Section 6 (Riffle)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull <sup>1</sup> Area	511.85	511.97					N/A	N/A					507.42	507.56				
Bank Height Ratio - Based on AB Bankfull <sup>1</sup> Area	1.00	1.09					N/A	N/A					1.00	0.92				
Thalweg Elevation	510.22	510.30					505.25	505.57					506.50	506.63				
LTOB <sup>2</sup> Elevation	511.85	512.09					507.54	507.62					507.42	507.49				
LTOB <sup>2</sup> Max Depth (ft)	1.62	1.79					2.29	2.05					0.92	0.86				
LTOB <sup>2</sup> Cross Sectional Area (ft <sup>2</sup> )	11.45	12.80					11.01	9.74					4.06	3.51				
	Dynamite Creek Reach 7																	
	Cross-Section 7 (Riffle)						Cross-Section 8 (Pool)						Cross-Section 9 (Riffle)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull <sup>1</sup> Area	499.09	499.18					N/A	N/A					497.58	497.68				
Bank Height Ratio - Based on AB Bankfull <sup>1</sup> Area	1.00	0.92					N/A	N/A					1.00	0.99				
Thalweg Elevation	497.61	497.67					494.75	494.79					496.05	496.11				
LTOB <sup>2</sup> Elevation	499.09	499.06					498.59	498.51					497.58	497.66				
LTOB <sup>2</sup> Max Depth (ft)	1.47	1.39					3.79	3.72					1.53	1.55				
LTOB <sup>2</sup> Cross Sectional Area (ft <sup>2</sup> )	8.84	7.51					23.62	20.38					9.61	9.36				

<sup>1</sup>Bank Height Ratio (BHR) takes the As-built bankfull area as the basis for adjusting each subsequent years bankfull elevation.

<sup>2</sup>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 recoded and tracked above as LTOB max depth.



## **APPENDIX D. HYDROLOGY DATA**

**Table 10. Bankfull Events**

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 1 - 2022**

Reach	MY1 (2022)*	MY2 (2023)	MY3 (2024)	MY4 (2025)	MY5 (2026)	MY6 (2027)	MY7 (2028)
Dynamite Creek	3/12/2022						
Reach 6	8/22/2022						

\*Data was collected 1/1/2022 to 11/17/2022. Data from the remainder of MY1 will be updated in MY2.

**Table 11. Rainfall Summary**

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 1 - 2022**

	MY1 (2022)	MY2 (2023)	MY3 (2024)	MY4 (2025)	MY5 (2026)	MY6 (2027)	MY7 (2028)
<b>Annual Precipitation Total</b>	41.34*						
<b>30 Year Average Precip WETS 30th Percentile</b>	41.44						
<b>30 Year Average Precip WETS 70th Percentile</b>	50.51						
<b>Annual Precipitation Compared to Normal</b>	*						

Annual Precipitation Source: **Eden COOP** Station, Rockingham County, NC, State Climate Office

30 Year Average Precipitation Source: **Eden** Station, Rockingham County, NC, AgACIS

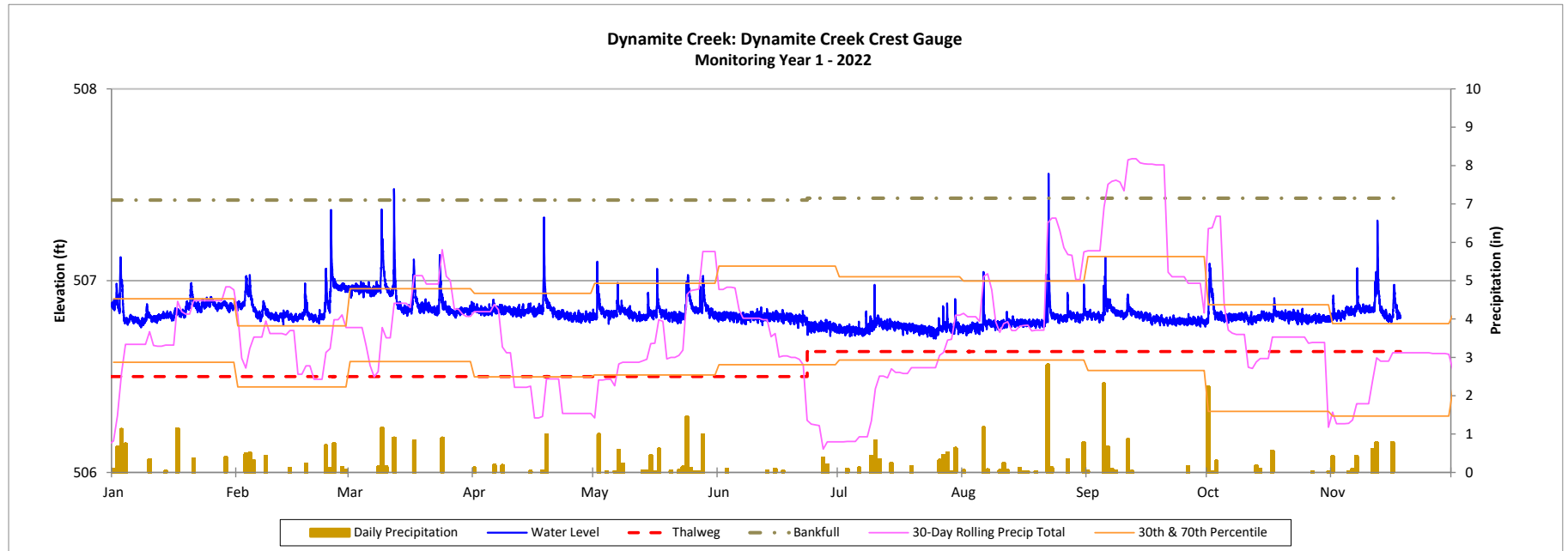
\*Annual precipitation was collected 1/1/2022 to 11/17/2022. Data from the remainder of MY1 will be updated in MY2.

### Recorded Bankfull Events Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022



**Table 12. Groundwater Gauge Summary**

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 1 - 2022**

Gauge	Max. Consecutive Hydroperiod (Percentage)						
	MY1 (2022)	MY2 (2023)	MY3 (2024)	MY4 (2025)	MY5 (2026)	MY6 (2027)	MY7 (2028)
1	3 Days (1.2%)						
2	13 Days (5.0%)						
3	3 Days (1.2%)						
4	4 Days (1.5%)						
5	29 Days (11.2%)						
6	4 Days (1.5%)						
7	12 Days (4.6%)						
8	3 Days (1.2%)						
9	8 Days (3.1%)						
10	59 Days (22.8%)						

Performance Standard: Free groundwater table within 12 inches of the ground surface for 12% of the growing season.

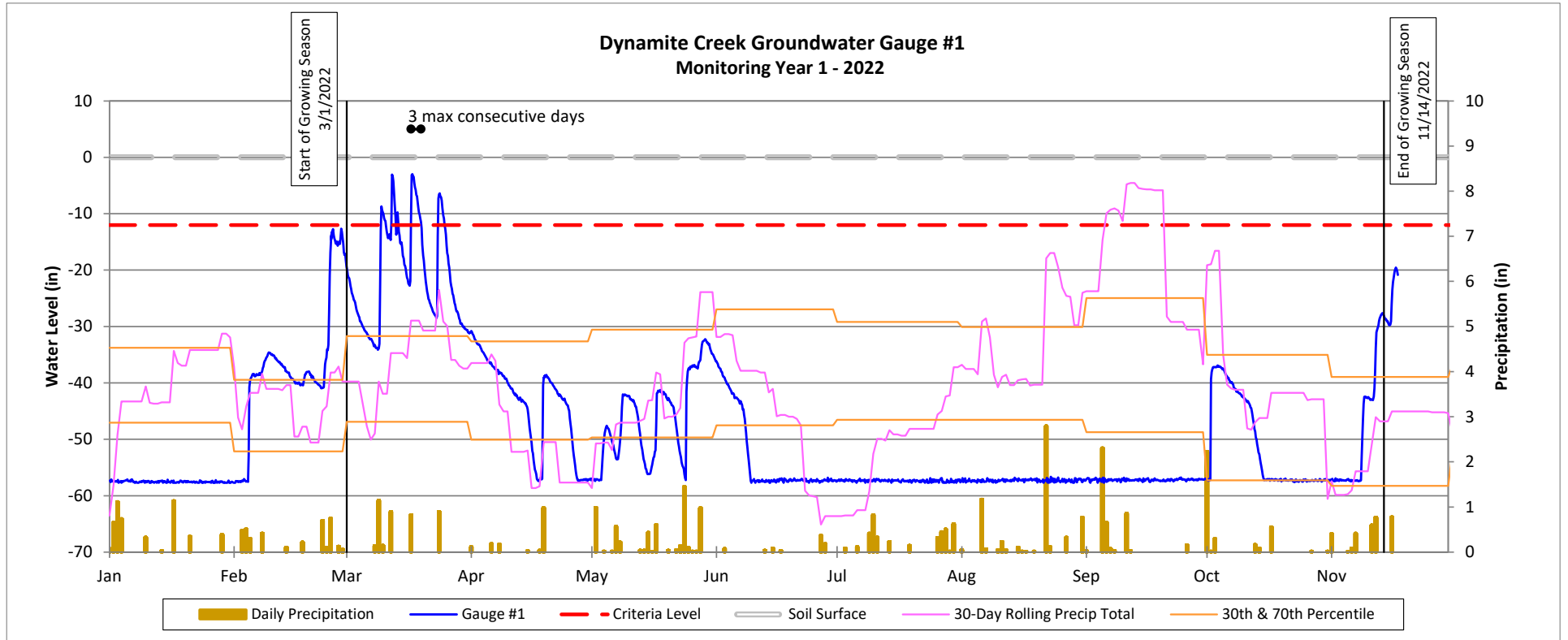
Growing Season: 3/1/2022 to 11/14/2022 (258 Days)

# Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

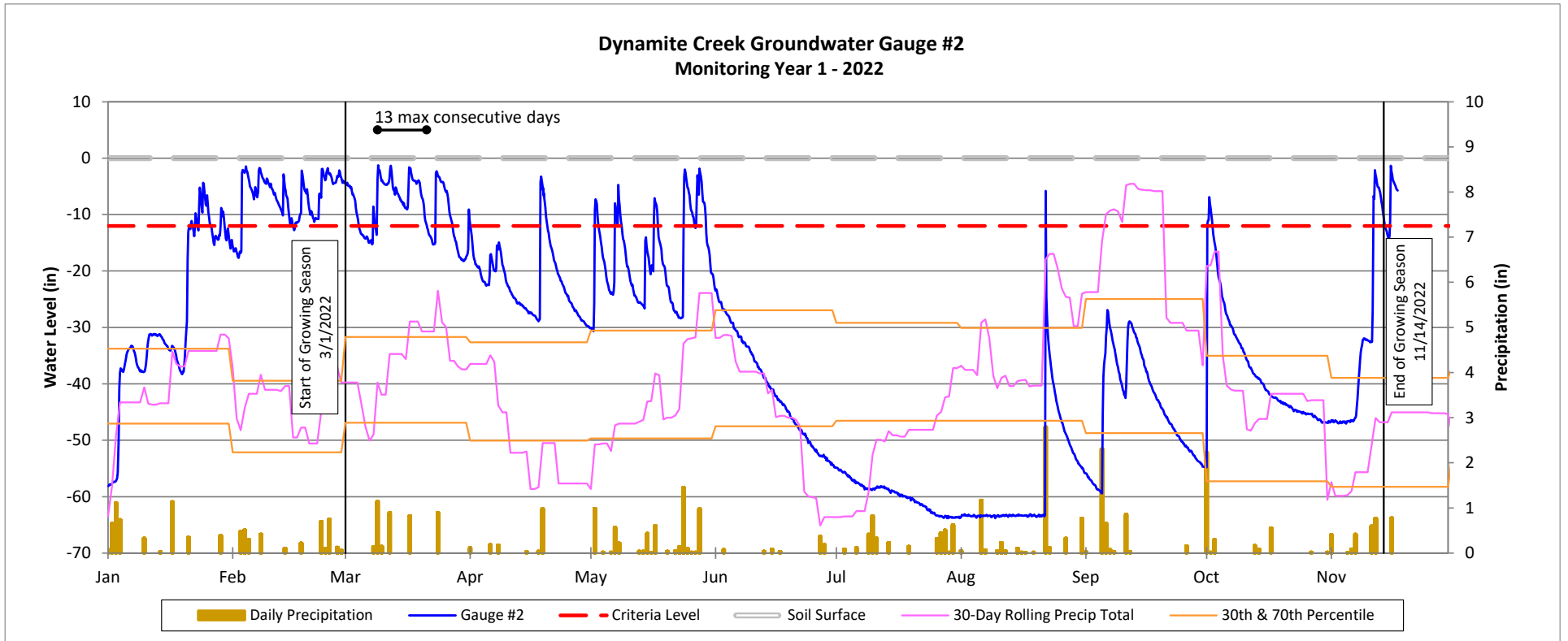


### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

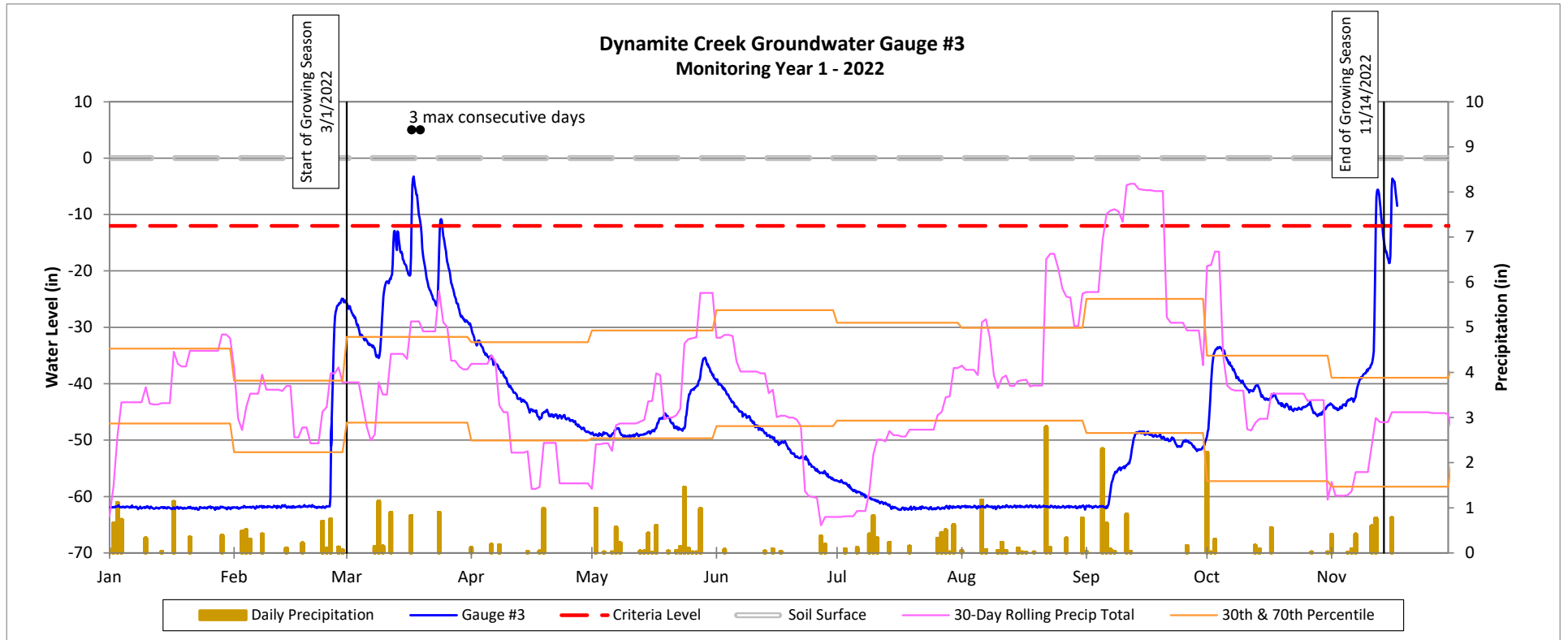


### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

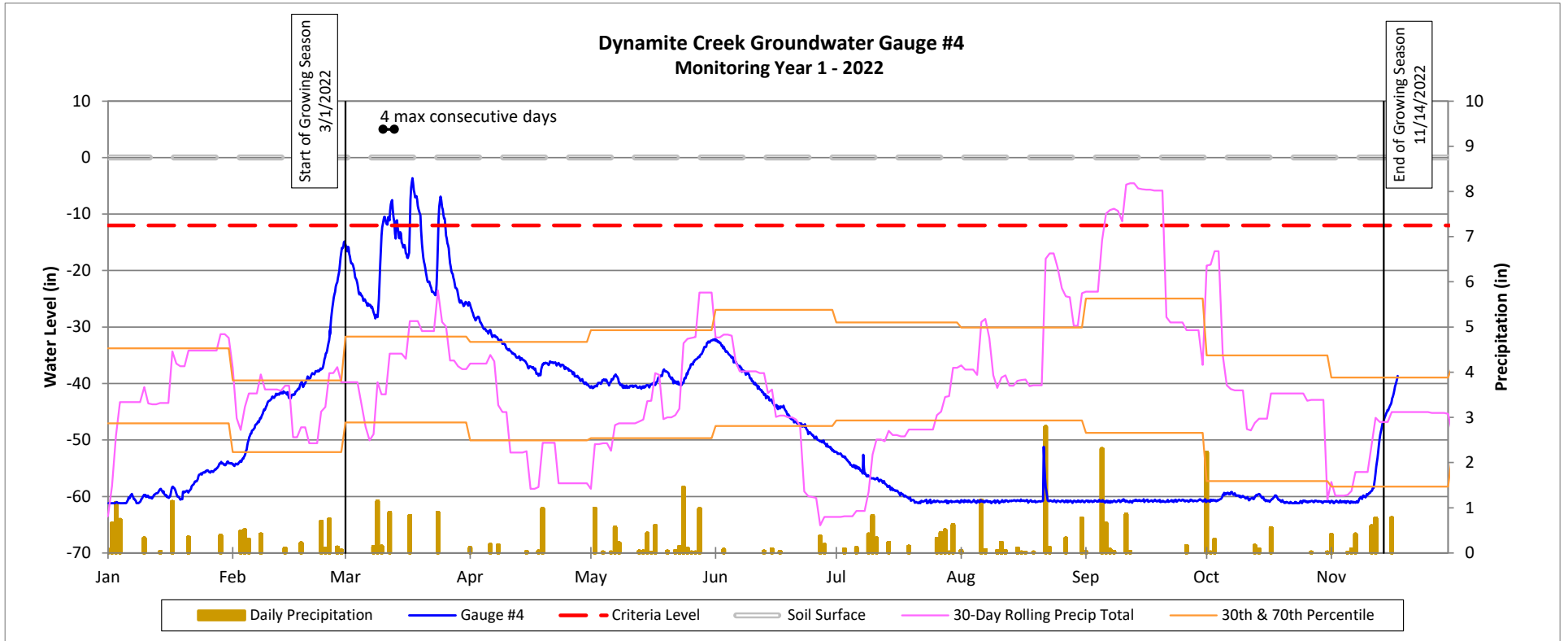


# Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022



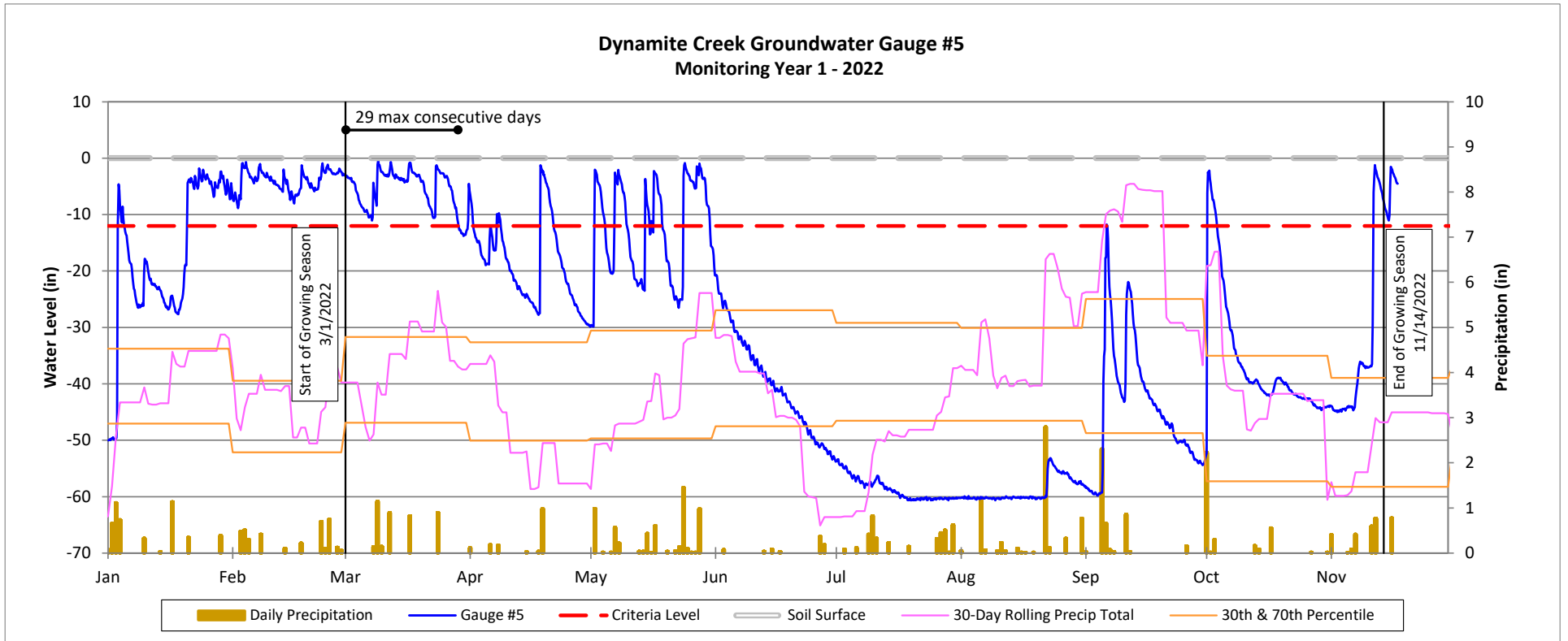


### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

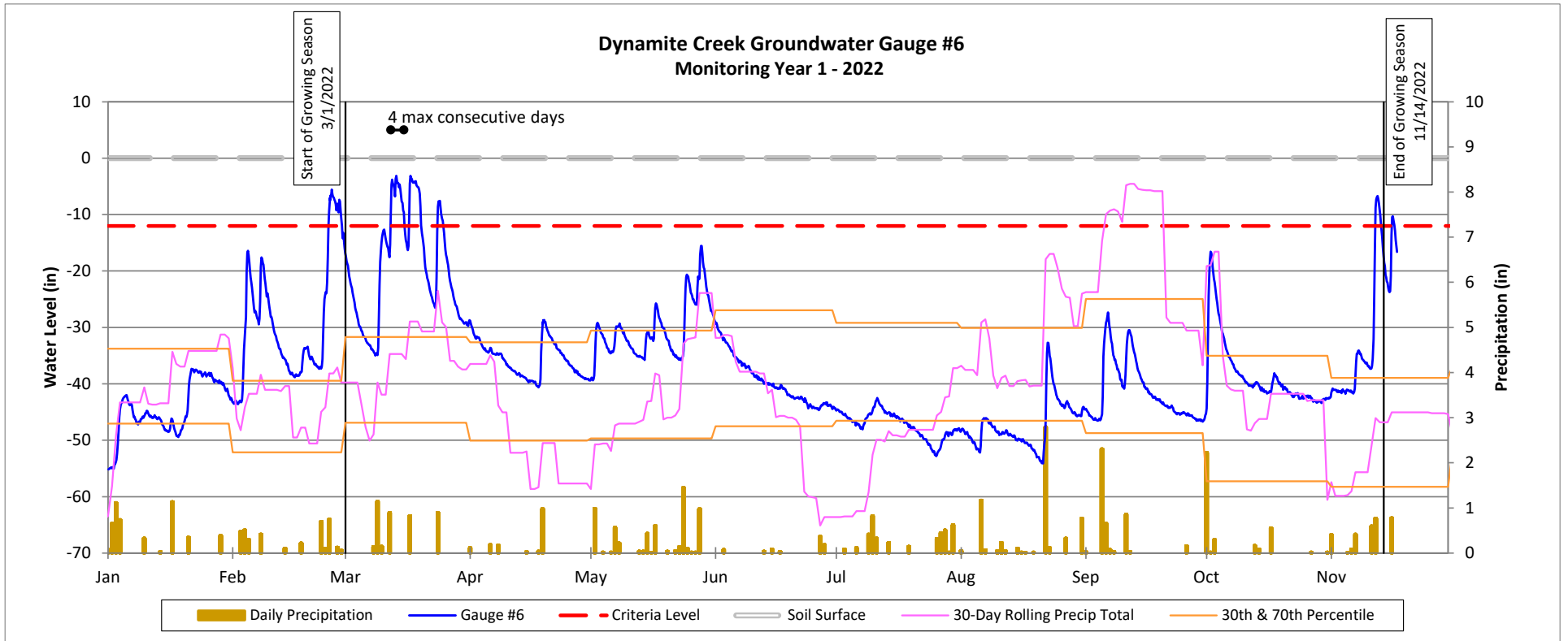


# Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

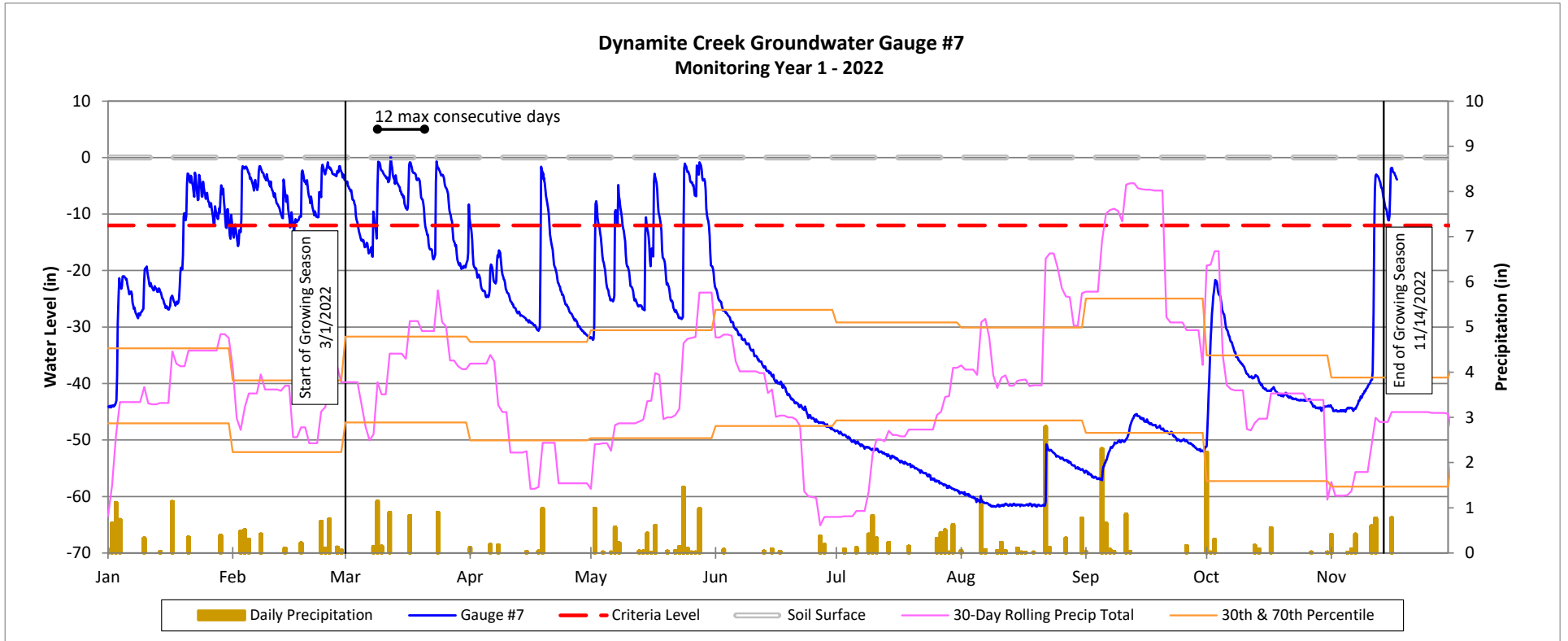


### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

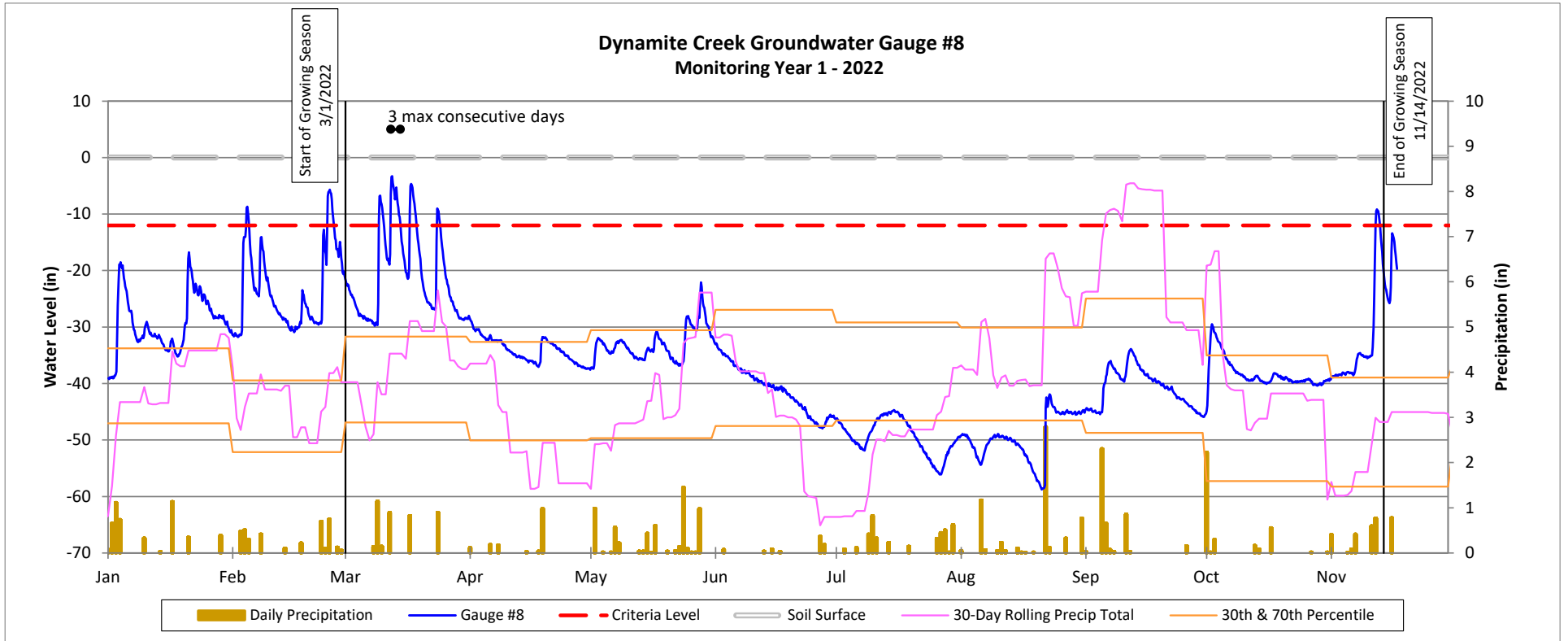


# Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

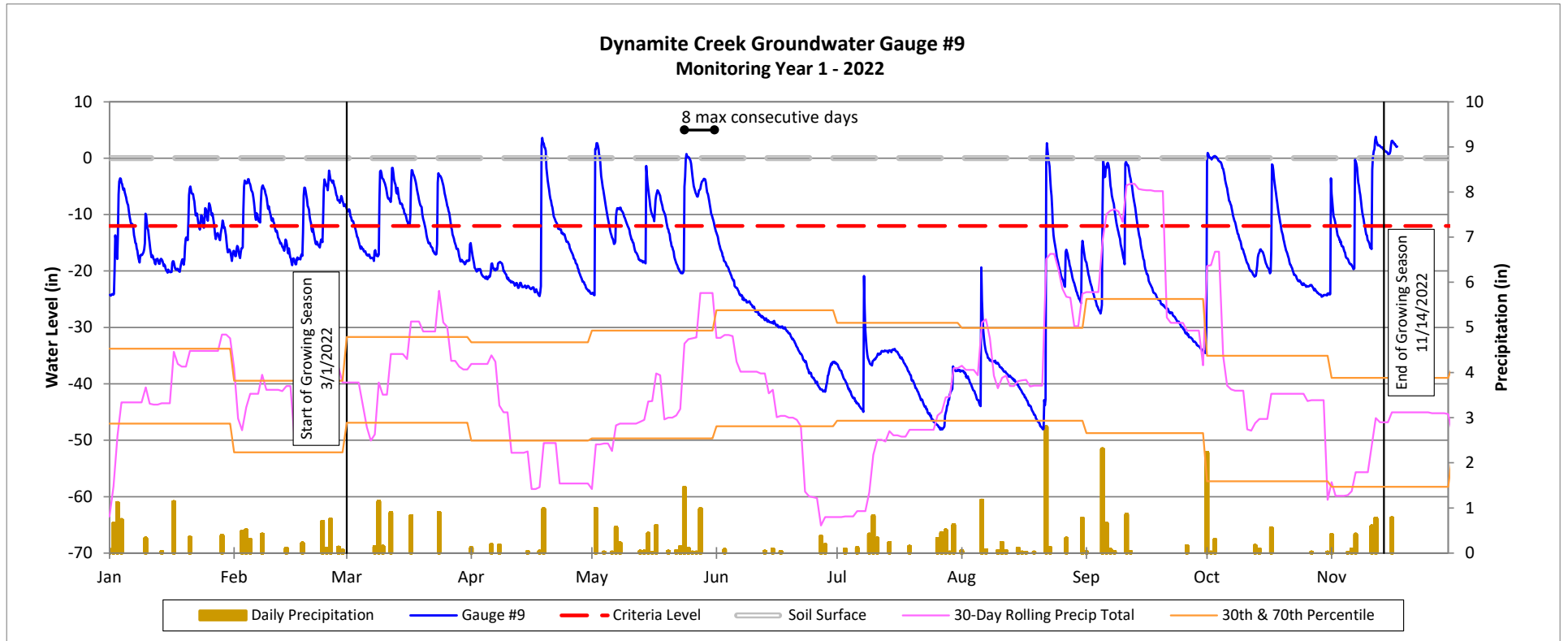


### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

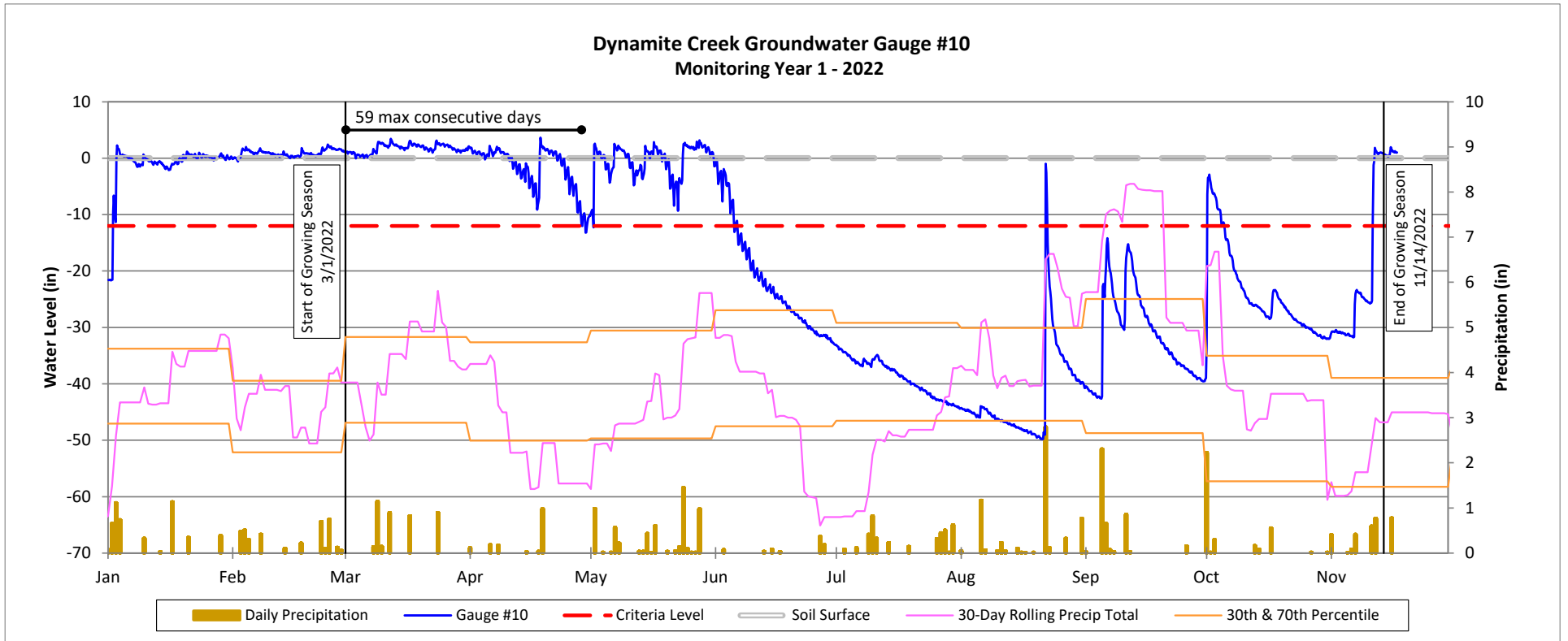


### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022

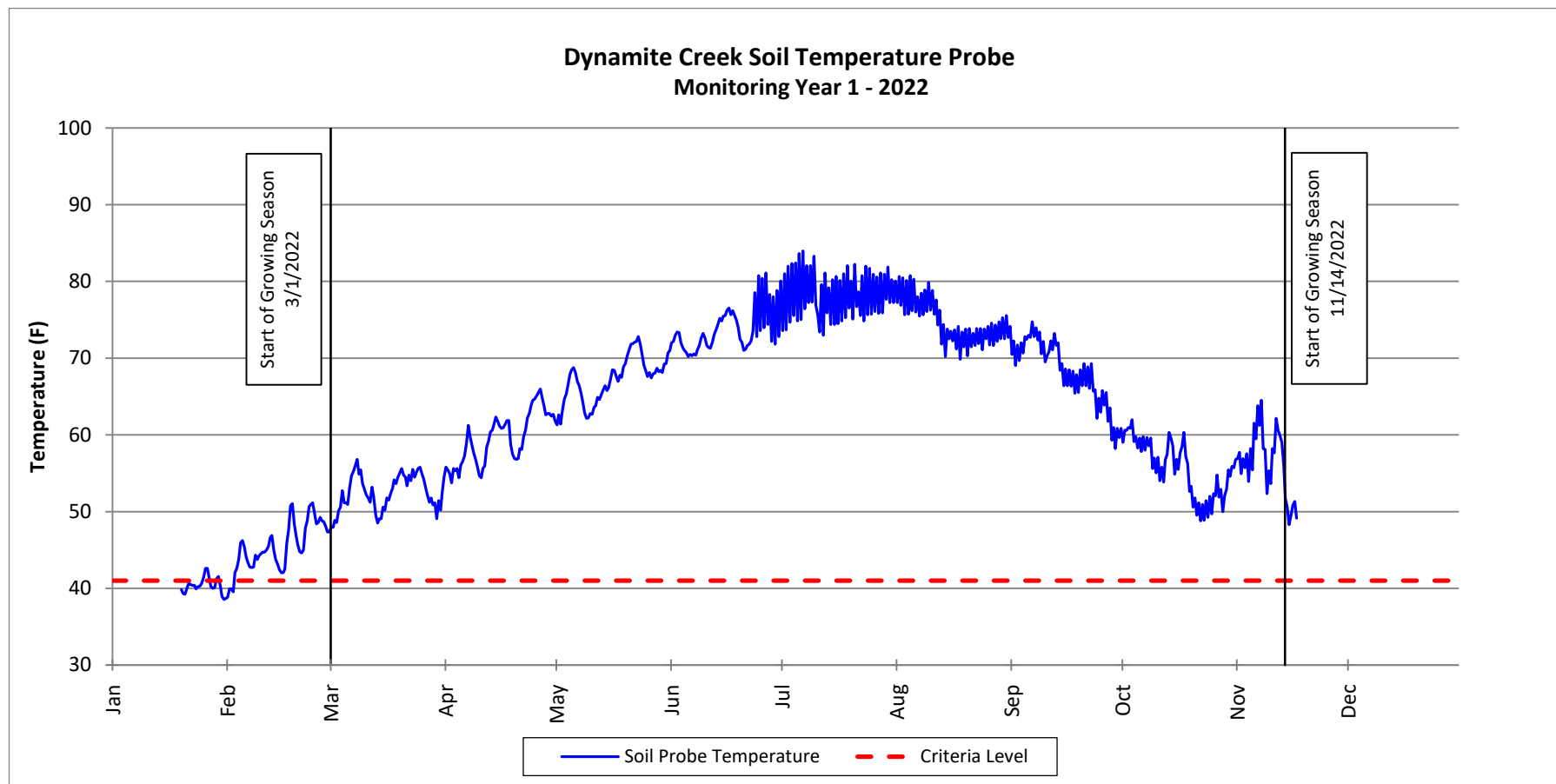


## Soil Temperature Probe Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 1 - 2022



## **APPENDIX E. PROJECT TIMELINE AND CONTACT INFO**



**Table 13. Project Activity and Reporting History**

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 1 - 2022**

Activity or Report		Data Collection Complete	Completion or Scheduled Delivery
Project Instituted		NA	May 2019
Mitigation Plan Approved		NA	February 2021
Construction (Grading) Completed		NA	November 2021
As-Built Survey Completed		December 2021	December 2021
Planting Completed		NA	January 2022
Baseline Monitoring Document (Year 0)	Stream Survey	November 2021	March 2022
	Vegetation Survey	January 2022	
Year 1 Monitoring	Invasive Vegetation Treatment		August 2022
	In-stream Vegetation Treatment		August 2022
	Stream Survey	June 2022	December 2022
	Vegetation Survey	August 2022	
Year 2 Monitoring	Stream Survey	2023	December 2023
	Vegetation Survey	2023	
Year 3 Monitoring	Stream Survey	2024	December 2024
	Vegetation Survey	2024	
Year 4 Monitoring		2025	December 2025
Year 5 Monitoring	Stream Survey	2026	December 2026
	Vegetation Survey	2026	
Year 6 Monitoring		2027	December 2027
Year 7 Monitoring	Stream Survey	2028	December 2028
	Vegetation Survey	2028	

**Table 14. Project Contact Table**

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 1 - 2022**

<b>Designer</b> Angela Allen, PE	<b>Wildlands Engineering, Inc.</b> 312 West Millbrook Road, Suite 225 Raleigh, NC 27609 919.851.9986
<b>Construction Contractor</b>	<b>Wildlands Construction</b> 312 West Millbrook Road, Suite 225 Raleigh, NC 27609
<b>Monitoring Performers</b> Monitoring, POC	<b>Wildlands Engineering, Inc.</b> Jason Lorch 919.851.9986

## **APPENDIX F. ADDITIONAL DOCUMENTATION**



November 22, 2022

**Kimberly Isenhour**

Wilmington District, Regulatory Division  
U.S. Army Corps of Engineers  
11405 Falls of Neuse Road  
Wake Forest, NC 27587

Subject: IRT Comments on Dynamite Creek Mitigation Site As-Built/MY0 Report  
NCDMS Dynamite Creek, SAW-2019-00909, DMS Project Number 100125  
Rockingham County, North Carolina

Dear Ms. Isenhour,

We have reviewed the comments on the MY0 Report for the above referenced project dated June 27, 2022. Below are responses to each of the comments. For your convenience, the comments are reprinted with responses in italics.

USEPA Comments, Todd Bowers:

1. Minimal adjustments were made during construction, where needed, based on field evaluations. All deviations noted in the report are minor (structure locations, minor GPS errors and suitable replacements/adjustments due to lack of brush).
2. No stream areas of concern were identified at this time. Cross-sections show streams are stable and functioning as designed. ERs are over 2.2 and BHRs are below 1.2.
3. There are no vegetation areas of concern. Average stem density across the site is 595 planted stems per acre and all 13 vegetation plots are meeting interim success criteria.
4. Crest gauge installed on Dynamite Creek Reach 6 for MY1 hydrology data collection.
5. Ten groundwater gauges and one soil temperature probe were installed across wetland areas for MY1 groundwater monitoring and data collection.
6. No adaptive management plan needed at this time.
7. No issues of conservation easement encroachment.

Overall, I am very satisfied with the report and the work that has been completed at the site. Having not been on-site, I really appreciated the detailed ground-level stream and veg plot photos. I recommend the appropriate credit release (Milestone 2) for warm stream and riparian wetland mitigation units for this monitoring milestone. I have no other substantial comments at this time

*Wildlands appreciates this comment and has noted the information.*



USACE Comments, Casey Haywood:

1. Dynamite Creek Reach 5- It was noted that the proposed riffles and log sills were not installed due to the channel not being realigned and to save existing trees. What is the condition of the bed material in this reach? The mitigation plan indicated the reach was proposed for E1 based on the level of intervention and potential for ecological uplift. What was the overall percentage of the reach that was worked on to provide functional uplift to justify the ratio?

*During the initial IRT site walk, a map was provided to the IRT showing suggested intervention along Reach 5, which at the time did not include channel realignment and closely matched the level of work done on the reach. The IRT agreed that a light touch in this area was the approach that should be taken, with intervention enough to uplift the level of erosion on several of the meander bends and that this justified an E1 approach. During the design phase, a slight realignment to protect these bends was proposed. The alignment would require bed stabilization in the form of riffles and log sills. However, during construction, the Contractor evaluated the bends and was able to construct brush toes without harming the large trees on the bank. The point bars were then shaved back. This gentled the proposed thalweg pattern, as was desired, without having to do an entire realignment. The riffle material is natural embedded colluvium ranging from sands and gravels to Class B size. Macroinvertebrates and salamanders were found in similar such riffles on this reach, so it was determined that reducing impact to bed material would be a greater benefit to this reach. In the end the construction met the goals of this reach by providing only the impact necessary to uplift the stream and prevent continued lateral destabilization.*

2. Why were some of the structures not able to be located (valley sills, log sills, brush toe and cover log)?

*These structures were not located or picked up by the IPW surveyors. Wildlands staff confirmed that the structures were installed and do exist on site after survey was finished. In order for IPW to seal the record drawings, these structures are called out as "installed but not located".*

3. The drone footage was appreciated and helpful for the review. Overall, the Site looks good and appears to be functioning as designed

*Wildlands appreciates this comment and has noted the information.*



NCDWR Comments, Erin Davis:

1. DWR supports/reiterates USACE's questions and comments.
2. How were the added cover logs anchored with the brush toe? Were footer logs used?

*Footer logs were installed below the cover logs, then brush and woody debris was densely packed on either side of the logs to protect the remainder of the bend. Backfill was placed on top to anchor the structures together, with soil lifts and/or sod mats to stabilize the backfill.*

3. Please confirm that vernal pools excavated greater than 1 foot do not overlap wetland credit area.

*Wildlands confirms that vernal pool boundaries do not overlap with wetland credit areas.*

4. Invasives were noted to be "much removed" during construction. Please target remaining invasives during MY1.

*Remaining small, scattered populations of invasive species have been treated. However, multiple treatments are usually necessary. Wildlands will continue to monitor for resprouts and treat as needed.*

If you have any questions, please contact me by phone (919) 851-9986, or by email (jlorch@wildlandseng.com).

Sincerely,

A handwritten signature in black ink, appearing to read "J Lorch", is placed over a white rectangular background.

**Jason Lorch**, Monitoring Coordinator