



# **MONITORING YEAR 2 ANNUAL REPORT FINAL**

January 2024

## **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 v1  
USACE Action ID No. 2019-00909

Data Collection Period: January - November 2023

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**DYNAMITE CREEK MITIGATION SITE**  
Monitoring Year 2 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	EI	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.

Blue = Restoration	Yellow = Enhancement I	Green = Preservation
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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
<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.	Evidence of cow access was found in the CE. Wildlands is working with landowners on a solution.
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.

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Improve in-stream 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.	Five groundwater gauges met the performance standard, the other five 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.
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.	Vehicle access occurred near the bridge crossing. The CE boundary has been more clearly marked and it is no longer a concern. Note cow encroachment above.



### 1.3 Project Attributes

The Site consists of streams on lands which are forested along the upper 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 2 DATA ASSESSMENT

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Annual monitoring and site visits were conducted during MY2 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 MY2 vegetation survey was completed in August 2023. Vegetation monitoring resulted in an average density of 492 stems per acre of project planting list species across all vegetation plots, which is well above the interim success criteria of 320 stems per acre required at MY3. All vegetation plots individually met the interim success criteria. Planting list stem densities for each plot range from 324 to 850 stems per acre. Despite being in the old pond bed, vegetation plot 3 shows thick herbaceous vegetation and is exceeding interim success criteria with 324 stems per acre consisting of 8 individuals of 7 different species. 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.

Mature trees in the existing forest seem to be surviving well. There were multiple large mature trees that had fallen in the preservation area across the stream long before construction began. These trees continue to add varied habitat and large woody debris to the forest floor. A few more trees have fallen in the preservation area during storms. Two mature trees along Dynamite Creek Reach 6 (restoration) have fallen, one just after as-built install was completed. Both were removed from the stream. A few large trees on the floodplain around Dynamite Creek Reach 7 have died but are still standing snags. However, it is difficult to tell the cause of mortality for these trees. Cause of death could be attributed to many things including change in water table elevation, insect infestation, being blown over in a storm because of loss of neighboring mature trees for stability, or in some areas damage from heavy machinery. The vast majority of existing mature trees are healthy and surviving.

### 2.2 Vegetation Areas of Concern and Management

To help trees outcompete dense herbaceous vegetation, herbicide was applied in rings around planted trees where necessary in April 2023. Additionally, soil tests were done to learn what was lacking. Appropriate soil amendments were then applied to the base of trees across the floodplain along Dynamite Creek Reach 7 in order to improve soil fertility and boost tree growth. In an effort to give planted trees a good head start, herbicide ring sprays will again be applied to herbaceous vegetation around planted trees in areas where vegetation is thick in Spring 2024. Soil amendments will be applied again to the base of smaller trees to help them continue to compete with surrounding herbaceous vegetation.

Small, scattered populations of multiflora rose (*Rosa multiflora*) were treated on the floodplain along Dynamite Creek Reach 7 in May 2023 using 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 for resprouts of multiflora rose and other invasive species. Additional treatments will be applied as needed.

A small vehicular access encroachment was discovered near the bridge crossing in January 2023 (see Figure 1b for location). We believe one of the landowner's family members did not see the signs and followed an old dirt path down the hill from the house to the bridge crossing. Another t-post was added





in the middle of the old path, and polytape was strung between the t-post signs to make the edge of the conservation easement obvious. No other vehicular encroachments have occurred since, vegetation is growing well, and this area is no longer a concern. See Vegetation Area of Concern Photographs– Conservation Easement Encroachment in Appendix A for current photographs from November 2023.

Additionally, evidence has been found that cows from the adjacent field have been accessing the conservation easement. Wildlands has been in contact with both the landowners and the tenant farmer. Both have been responsive, and no permanent damage has been done. It was thought the problem had been resolved but it now seems that the calves are still finding a way to access the easement. Figure 1b shows a polygon connecting the approximate area where a few spread out droppings have been observed, indicating cow access. Wildlands is in the process of setting up a meeting with the landowners and tenant farmer so we can work together to find a solution. Wildlands will continue working to resolve the problem and monitor for cow access.

### **2.3 Stream Assessment**

Morphological surveys for MY2 were completed in March 2023. 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. Specific entrenchment ratio numbers are not included in this report template but are available upon request. 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 North Carolina Interagency Review Team (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 and Management**

While waiting for the live stakes to grow and shade the stream channels, in-stream vegetation was treated with glyphosate in August 2023 on the lower reaches of Dynamite Creek. Additional live stakes will be planted along the stream banks of Dynamite Creek Reach 7 in areas where those planted at as-built did not survive. Dynamite Creek Reaches 2, 3, and 6 will also be inspected for live stake survival, with additional live stakes planted as needed.

During the September 2023 IRT site walk, a stretch of the Dynamite Creek Reach 2 stream channel was observed to be damp but did not show active flow. A flow gauge was requested and was installed on November 16. Please see Section 2.5 below for more details and Figure 1a for flow gauge location. Wildlands will monitor stream flow both visually and through the gauge data.

Additionally at the confluence of UT1 and Dynamite Creek, the stream was observed flowing through a hole on the downstream right side of the channel, behind an old fallen tree that had been acting as grade control. The IRT requested an additional photo point be added to monitor the area and confirm stream stability. The photo point (PP16) was installed, and photos were taken on November 16, 2023. Please see Stream Photographs in Appendix A and Figure 1a for the location.

### **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 February and April 2023. Refer to Appendix D for hydrology summary data and the Recorded Bankfull Events Plot.

Dynamite Creek was identified as a perennial stream before project construction so only the crest gauge to record bankfull events was required. The crest gauge was installed like a flow gauge (beneath the thalweg of the stream channel) to keep the transducer from freezing. This also allows the gauge to function in both roles, and it has shown consistent flow since installation. However, this gauge is located on Dynamite Creek Reach 6, lower in the watershed and elevation. At the end of September 2023, during the IRT site walk a stretch of the Dynamite Creek Reach 2 channel was damp but did not show stream flow. The IRT requested a flow gauge to confirm consistent flow in the area. The flow data for 2024 will be included in this section of the MY3 annual report.

## 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 consecutively for 12.0% (31 days) of the growing season. A soil temperature probe was installed to help confirm growing season, data shows soil temperature did not drop below 41 degrees Fahrenheit between the end of February and mid-November. Since the growing season for this project has been set as March 1 through November 14 (258 days) and was approved by the IRT during the April 2023 Credit Release Meeting, the soil temperature probe is no longer necessary and will be removed.

Of the ten groundwater gauges, gauges 2, 5, 7, 9, and 10 met the success criteria with hydroperiods ranging from 13.1% (34 consecutive days) to 31.3% (81 consecutive days). The other five groundwater gauge hydroperiods ranged from 1.2% (3 consecutive days) to 2.7% (7 consecutive days).

According to the National Integrated Drought Information System, all of Rockingham County was abnormally dry January 2022, and a portion of the county was abnormally dry mid-June through late August 2022, and late October through November 2022 (NOAA, 2023). From mid-March through the end of May 2023 the county was abnormally dry and from mid-October until report writing, all of Rockingham County was in the first level of drought (NOAA, 2023). Originally, it was thought that groundwater levels needed more time and rain to return to within 12 inches of the soil surface across the Dynamite Creek Reach 7 floodplain. Given that rainfall seems to have been closer to normal for much of 2023 and only half of the groundwater wells are meeting success criterion, Wildlands would like to investigate further. While 2 years of data is not enough to show a consistent pattern, it does seem that groundwater wells closer to the hillslope on the south side of Dynamite Creek record groundwater levels closer to the surface. Groundwater wells further from the toe of slope, and especially on the north side of the stream, show deeper levels of groundwater. There are multiple theories on why groundwater well gauges may not show the expected wetland data, however, we do not know the cause. In order to investigate where on the floodplain the groundwater seems to drop below the 12 inches standard, Wildlands will install two more groundwater well gauges in winter 2023/2024.

Refer to Figures 1-1b for groundwater well gauge locations and Appendix D for groundwater hydrology data and plots.

## 2.7 Monitoring Year 2 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. MY2 data shows an average density of 492 stems per acre of project planting list species across plots. Scattered stems of multiflora rose were treated, and 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 and soil amendments will be applied around the base of trees in spring 2024 to help planted trees compete with herbaceous vegetation. The easement boundary has been walked, any signage issues found were resolved, and two encroachments were observed during MY2. One vehicular access easement



encroachment was observed at the beginning of the year, has been resolved, and is no longer a concern. Evidence of cow access has been observed in the easement and Wildlands is working with the landowners and tenant farmer to find a solution. All project streams are stable and functioning as intended. Two bankfull events were observed on Dynamite Creek Reach 6. A flow gauge was installed on Dynamite Creek Reach 2 in November. Stream flow data will be included in future reports. An additional photo point was added at the confluence of Dynamite Creek and UT1 to monitor for stream stability. Five of the ten groundwater well gauges surpassed the success criterion. Two additional groundwater gauges will be installed to narrow down where on the floodplain groundwater seems to be dropping below the success standard.

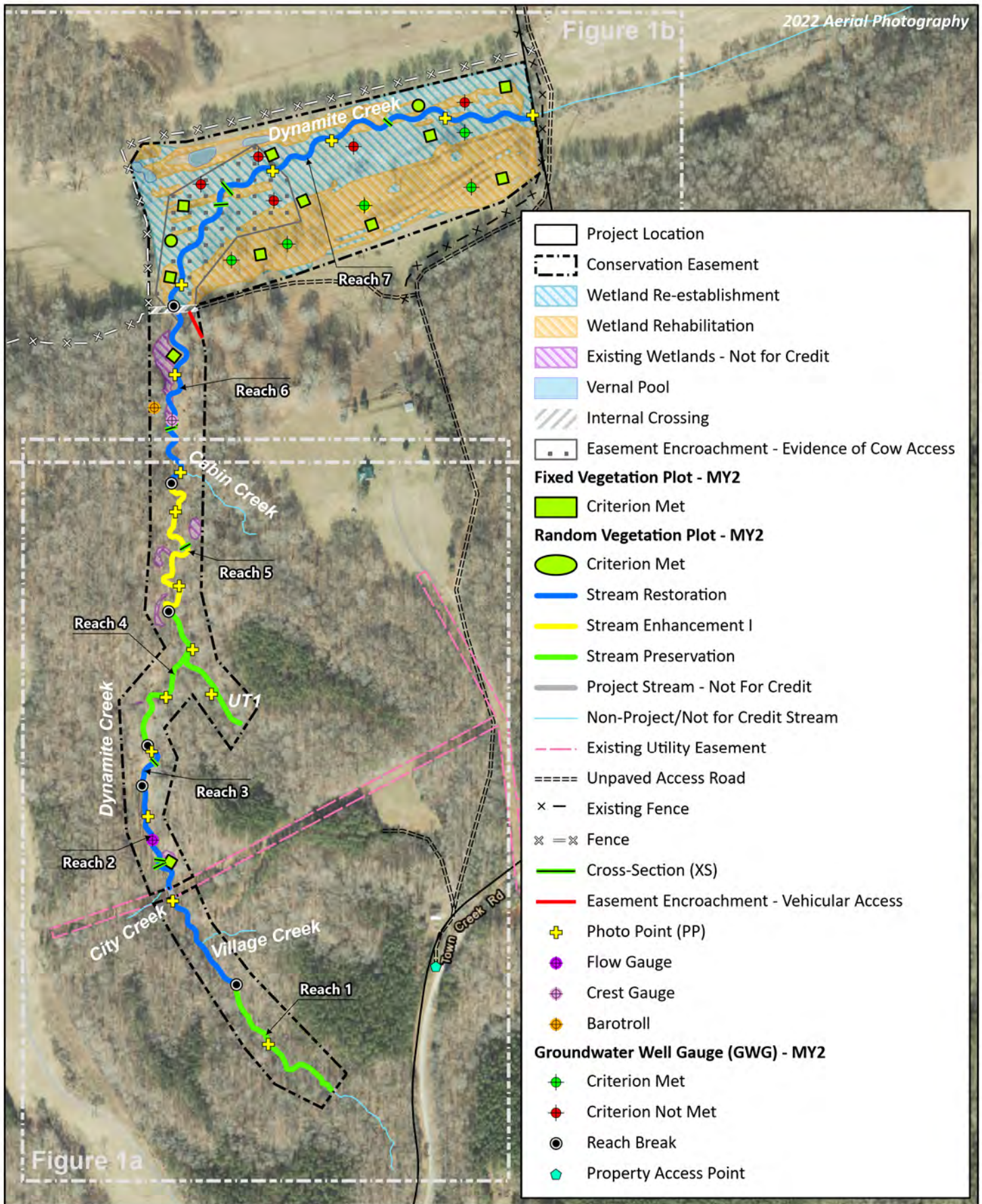
Summary information and data related to the performance of various project and monitoring elements can be found in the tables and figures in the report appendices. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

## Section 3: REFERENCES

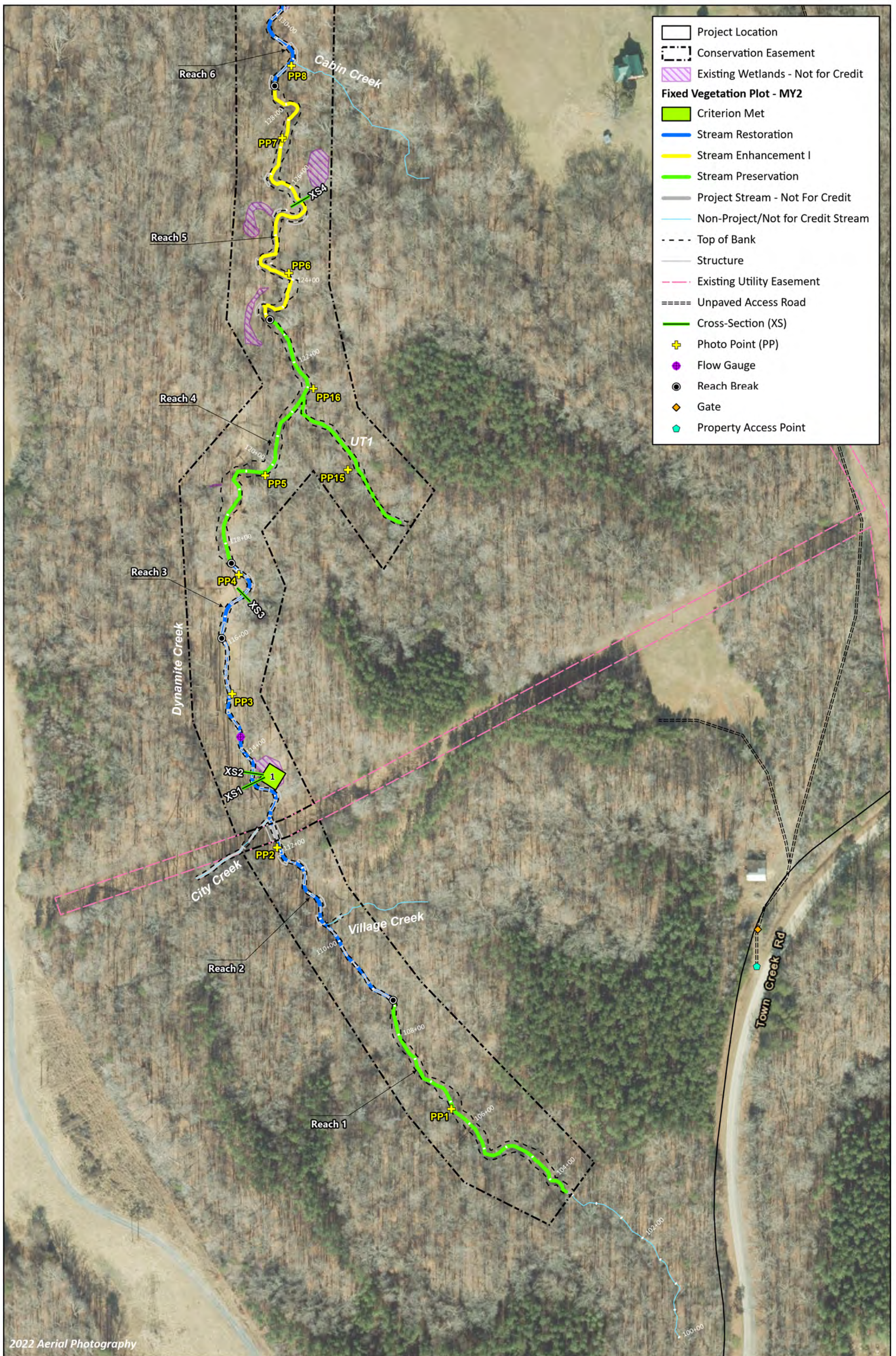
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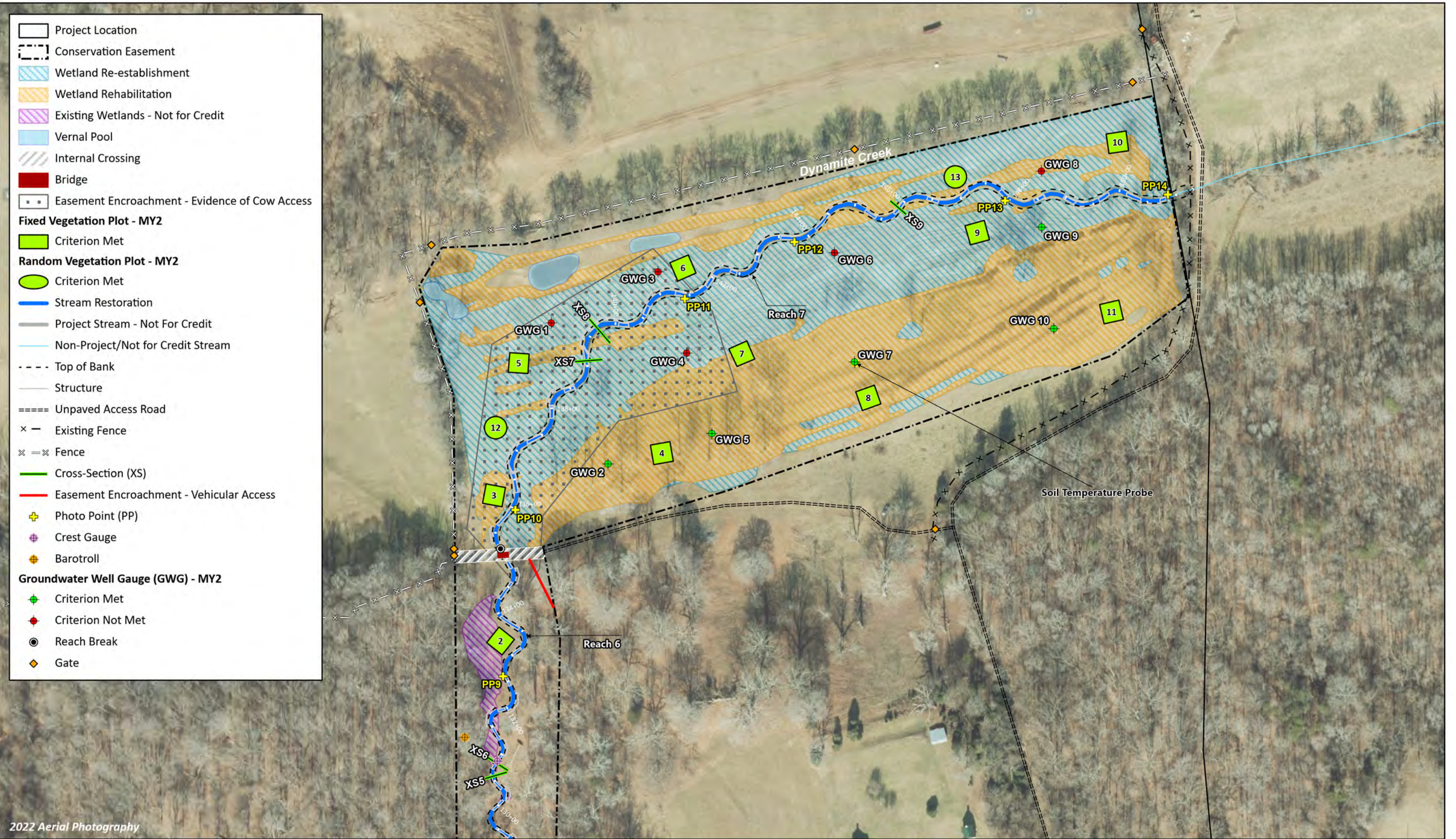












2022 Aerial Photography

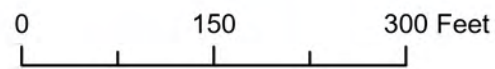


Figure 1b. Current Condition Plan View Map  
 Dynamite Creek Mitigation Site  
 DMS Project No. 100125  
 Monitoring Year 2 - 2023  
 Rockingham County, NC



## **APPENDIX A. Visual Assessment Data**

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

Dynamite Creek Mitigation Site  
 DMS Project No. 100125  
 Monitoring Year 2 - 2023

**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 16, 2023.

**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 16, 2023.

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

Dynamite Creek Mitigation Site  
 DMS Project No. 100125  
 Monitoring Year 2 - 2023

**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 16, 2023.

**Table 5. Vegetation Condition Assessment Table**

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023

**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 16, 2023.

**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	2 Encroachments Noted* / 2.7 ac	

Visual assessment was completed November 16, 2023.

\*Tire tracks from a vehicle and evidence of cow access were discovered inside the easement. The vehicular access encroachment has been resolved.

## **STREAM PHOTOGRAPHS**





**PHOTO POINT 1 Dynamite Creek R1 – upstream (03/01/2023)**



**PHOTO POINT 1 Dynamite Creek R1 – downstream (03/01/2023)**



**PHOTO POINT 2 Dynamite Creek R2 – upstream (03/01/2023)**



**PHOTO POINT 2 Dynamite Creek R2 – downstream (03/01/2023)**



**PHOTO POINT 3 Dynamite Creek R2 – upstream (03/01/2023)**



**PHOTO POINT 3 Dynamite Creek R2 – downstream (03/01/2023)**







PHOTO POINT 4 Dynamite Creek R3 – upstream (03/01/2023)



PHOTO POINT 4 Dynamite Creek R3 – downstream (03/01/2023)



PHOTO POINT 5 Dynamite Creek R4 – upstream (03/01/2023)



PHOTO POINT 5 Dynamite Creek R4 – downstream (03/01/2023)



PHOTO POINT 6 Dynamite Creek R5 – upstream (03/01/2023)



PHOTO POINT 6 Dynamite Creek R5 – downstream (03/01/2023)







**PHOTO POINT 7 Dynamite Creek R5 – upstream (03/01/2023)**



**PHOTO POINT 7 Dynamite Creek R5 – downstream (03/01/2023)**



**PHOTO POINT 8 Dynamite Creek R6 – upstream (03/01/2023)**



**PHOTO POINT 8 Dynamite Creek R6 – downstream (03/01/2023)**



**PHOTO POINT 9 Dynamite Creek R6 – upstream (03/01/2023)**



**PHOTO POINT 9 Dynamite Creek R6 – downstream (03/01/2023)**







**PHOTO POINT 10 Dynamite Creek R7 – upstream (03/01/2023)**



**PHOTO POINT 10 Dynamite Creek R7 – downstream (03/01/2023)**



**PHOTO POINT 11 Dynamite Creek R7 – upstream (03/01/2023)**



**PHOTO POINT 11 Dynamite Creek R7 – downstream (03/01/2023)**



**PHOTO POINT 12 Dynamite Creek R7 – upstream (03/01/2023)**



**PHOTO POINT 12 Dynamite Creek R7 – downstream (03/01/2023)**







**PHOTO POINT 13 Dynamite Creek R7 – upstream (03/01/2023)**



**PHOTO POINT 13 Dynamite Creek R7 – downstream (03/01/2023)**



**PHOTO POINT 14 Dynamite Creek R7 – upstream (03/01/2023)**



**PHOTO POINT 14 Dynamite Creek R7 – downstream (03/01/2023)**



**PHOTO POINT 15 UT1 – upstream (03/01/2023)**



**PHOTO POINT 15 UT1 – downstream (03/01/2023)**







**PHOTO POINT 16\* Dynamite Creek Confluence with UT1 –  
upstream (11/16/2023)**



**PHOTO POINT 16\* Dynamite Creek – downstream (11/16/2023)**

\*Photo Point 16 was added 11/16/2023 to monitor stability around the natural log sill seen in the upstream view as requested by the IRT.





## **BRIDGE PHOTOGRAPHS**



**Dynamite Creek R7 - Looking Upstream (03/01/2023)**



**Dynamite Creek R6 - Looking Downstream (03/01/2023)**



**VEGETATION PLOT PHOTOGRAPHS**





**FIXED VEG PLOT 1** (08/02/2023)



**FIXED VEG PLOT 2** (08/02/2023)



**FIXED VEG PLOT 3** (08/02/2023)



**FIXED VEG PLOT 4** (08/02/2023)



**FIXED VEG PLOT 5** (08/02/2023)



**FIXED VEG PLOT 6** (08/02/2023)







**FIXED VEG PLOT 7** (08/02/2023)



**FIXED VEG PLOT 8** (08/02/2023)



**FIXED VEG PLOT 9** (08/02/2023)



**FIXED VEG PLOT 10** (08/02/2023)



**FIXED VEG PLOT 11** (08/02/2023)







**RANDOM VEG PLOT 12** (08/02/2023)



**RANDOM VEG PLOT 13** (08/02/2023)



**VEGETATION AREA OF CONCERN PHOTOGRAPHS**  
**Conservation Easement Encroachment**



## Easement Encroachment – Vehicle Access



Photo taken November 16, 2023 along the edge of the easement showing the polytape clearly marking the edge of the conservation easement. Dirt path is to the left and comes down the hill behind the large trees, the easement is to the right.



Photo taken November 16, 2023 standing in the dirt path, facing into the easement toward Dynamite Creek and the bridge crossing. The added t-post and polytape marking the easement boundary are visible. Vegetation is growing well and no new vehicle tracks have been observed.



**GROUNDWATER WELL GAUGE PHOTOGRAPHS**





**GROUNDWATER WELL GAUGE 1 – (11/16/2023)**



**GROUNDWATER WELL GAUGE 2 – (11/16/2023)**



**GROUNDWATER WELL GAUGE 3 – (11/16/2023)**



**GROUNDWATER WELL GAUGE 4 – (11/16/2023)**



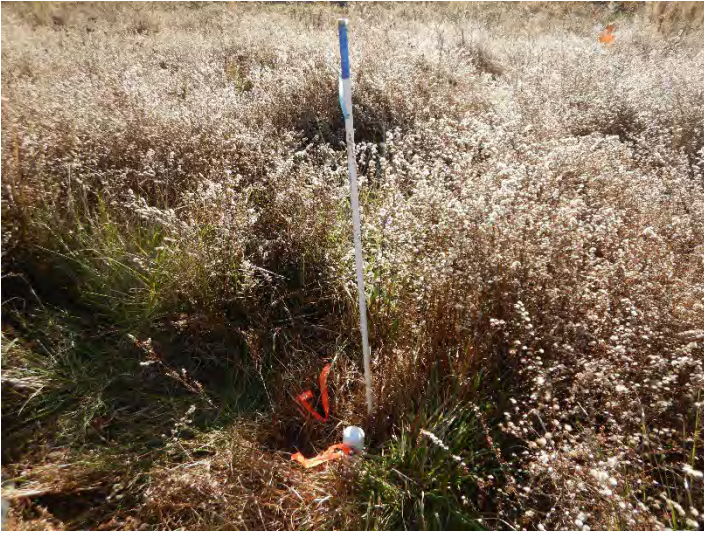
**GROUNDWATER WELL GAUGE 5 – (11/16/2023)**



**GROUNDWATER WELL GAUGE 6 – (11/16/2023)**







**GROUNDWATER WELL GAUGE 7 – (11/16/2023)**



**GROUNDWATER WELL GAUGE 8 – (11/16/2023)**



**GROUNDWATER WELL GAUGE 9 – (11/16/2023)**



**GROUNDWATER WELL GAUGE 10 – (11/16/2023)**



## **APPENDIX B. Vegetation Plot Data**



**Table 6. Vegetation Plot Data**

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023

Planted Acreage	15.4
Date of Initial Plant	2022-01-11
Date of Current Survey	2023-08-02
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		Veg Plot 6 F	
					Planted	Total	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	1	1	2	2			1	1
	<i>Alnus serrulata</i>	hazel alder	Tree	OBL					1	1						
	<i>Betula nigra</i>	river birch	Tree	FACW	3	3	1	1			1	1	2	2	2	2
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW					1	1	1	1	2	2		
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC												
	<i>Fraxinus pennsylvanica</i>	green ash	Tree	FACW												
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	3	3	4	4	2	2	2	2			3	3
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL			1	1			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	2	2
	<i>Salix sericea</i>	silky willow	Shrub	OBL	2	2	2	2			1	1	1	1	3	3
	<i>Sambucus canadensis</i>	American black elderberry	Tree								1	1	1	1		
<i>Ulmus americana</i>	American elm	Tree	FACW			1	1	1	1	2	2	1	1	1	1	
<i>Ulmus rubra</i>	slippery elm	Tree	FAC					1	1					1	1	
<b>Sum</b>	<b>Performance Standard</b>				<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>8</b>	<b>8</b>	<b>16</b>	<b>16</b>	<b>8</b>	<b>8</b>	<b>14</b>	<b>14</b>
Mitigation Plan Performance Standard	<b>Current Year Stem Count</b>					<b>12</b>		<b>12</b>		<b>8</b>		<b>16</b>		<b>8</b>		<b>14</b>
	<b>Stems/Acre</b>					<b>486</b>		<b>486</b>		<b>324</b>		<b>648</b>		<b>324</b>		<b>567</b>
	<b>Species Count</b>					<b>6</b>		<b>7</b>		<b>7</b>		<b>10</b>		<b>6</b>		<b>8</b>
	<b>Dominant Species Composition (%)</b>					<b>25</b>		<b>33</b>		<b>25</b>		<b>19</b>		<b>25</b>		<b>21</b>
	<b>Average Plot Height (ft.)</b>					<b>4</b>		<b>2</b>		<b>3</b>		<b>3</b>		<b>1</b>		<b>2</b>
	<b>% Invasives</b>					<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>
Post Mitigation Plan Performance Standard	<b>Current Year Stem Count</b>					<b>12</b>		<b>12</b>		<b>8</b>		<b>16</b>		<b>8</b>		<b>14</b>
	<b>Stems/Acre</b>					<b>486</b>		<b>486</b>		<b>324</b>		<b>648</b>		<b>324</b>		<b>567</b>
	<b>Species Count</b>					<b>6</b>		<b>7</b>		<b>7</b>		<b>10</b>		<b>6</b>		<b>8</b>
	<b>Dominant Species Composition (%)</b>					<b>25</b>		<b>33</b>		<b>25</b>		<b>19</b>		<b>25</b>		<b>21</b>
	<b>Average Plot Height (ft.)</b>					<b>4</b>		<b>2</b>		<b>3</b>		<b>3</b>		<b>1</b>		<b>2</b>
	<b>% Invasives</b>					<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>

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 2 - 2023

Planted Acreage	15.4
Date of Initial Plant	2022-01-11
Date of Current Survey	2023-08-02
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 F		Veg Plot 10 F		Veg Plot 11 F		Veg Plot 12 R	Veg Plot 13 R
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Total	Total
Species Included in Approved Mitigation Plan	<i>Acer negundo</i>	boxelder	Tree	FAC			1	1			1	1	2	2	7	3
	<i>Alnus serrulata</i>	hazel alder	Tree	OBL			1	1	1	1	1	1			1	
	<i>Betula nigra</i>	river birch	Tree	FACW	1	1	1	1	2	2			1	1		
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW									1	1	3	1
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC												2
	<i>Fraxinus pennsylvanica</i>	green ash	Tree	FACW												1
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	3	3			3	3	1	1	4	4	5	6
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL	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	1	1	1	1	2	2	1	1	1	1	2	2
	<i>Salix sericea</i>	silky willow	Shrub	OBL	1	1	1	1	2	2			1	1	2	1
	<i>Sambucus canadensis</i>	American black elderberry	Tree								1	1	1	1		
<i>Ulmus americana</i>	American elm	Tree	FACW			2	2			1	1	1	1	1		
<i>Ulmus rubra</i>	slippery elm	Tree	FAC	1	1			1	1			1	1			
<b>Sum</b>	<b>Performance Standard</b>				<b>10</b>	<b>10</b>	<b>8</b>	<b>8</b>	<b>12</b>	<b>12</b>	<b>8</b>	<b>8</b>	<b>13</b>	<b>13</b>	<b>21</b>	<b>16</b>
Mitigation Plan Performance Standard	Current Year Stem Count					10		8		12		8		13	21	16
	Stems/Acre					405		324		486		324		526	850	648
	Species Count					7		7		7		8		9	7	7
	Dominant Species Composition (%)					30		25		25		12		31	33	38
	Average Plot Height (ft.)					2		3		3		2		4	3	3
	% Invasives					0		0		0		0		0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					10		8		12		8		13	21	16
	Stems/Acre					405		324		486		324		526	850	648
	Species Count					7		7		7		8		9	7	7
	Dominant Species Composition (%)					30		25		25		12		31	33	38
	Average Plot Height (ft.)					2		3		3		2		4	3	3
	% Invasives					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.

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

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023

	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	486	4	6	0	486	2	7	0	324	3	7	0
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	648	3	10	0	324	1	6	0	567	2	8	0
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	405	2	7	0	324	3	7	0	486	3	7	0
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	324	2	8	0	526	4	9	0	850	3	7	0
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	648	3	7	0								
Monitoring Year 1	364	2	6	0								
Monitoring Year 0	567	2	9	0								

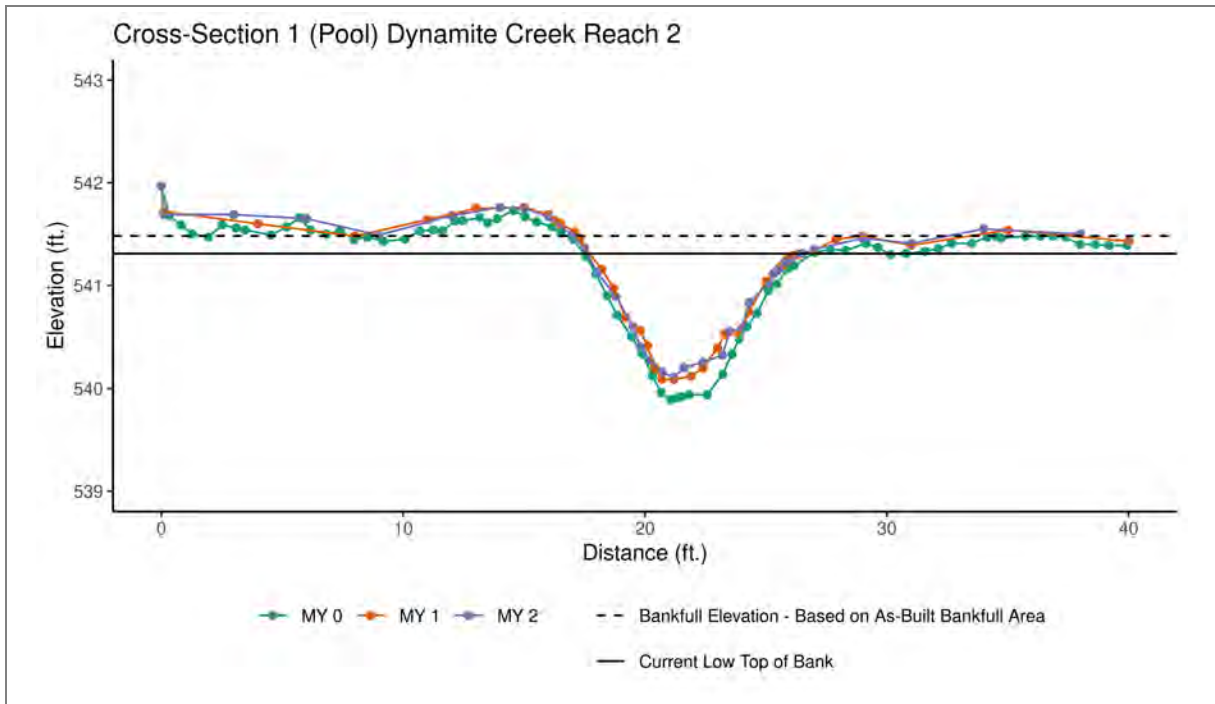
\*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.



## **APPENDIX C. Stream Geomorphology Data**

## Cross-Section Plots



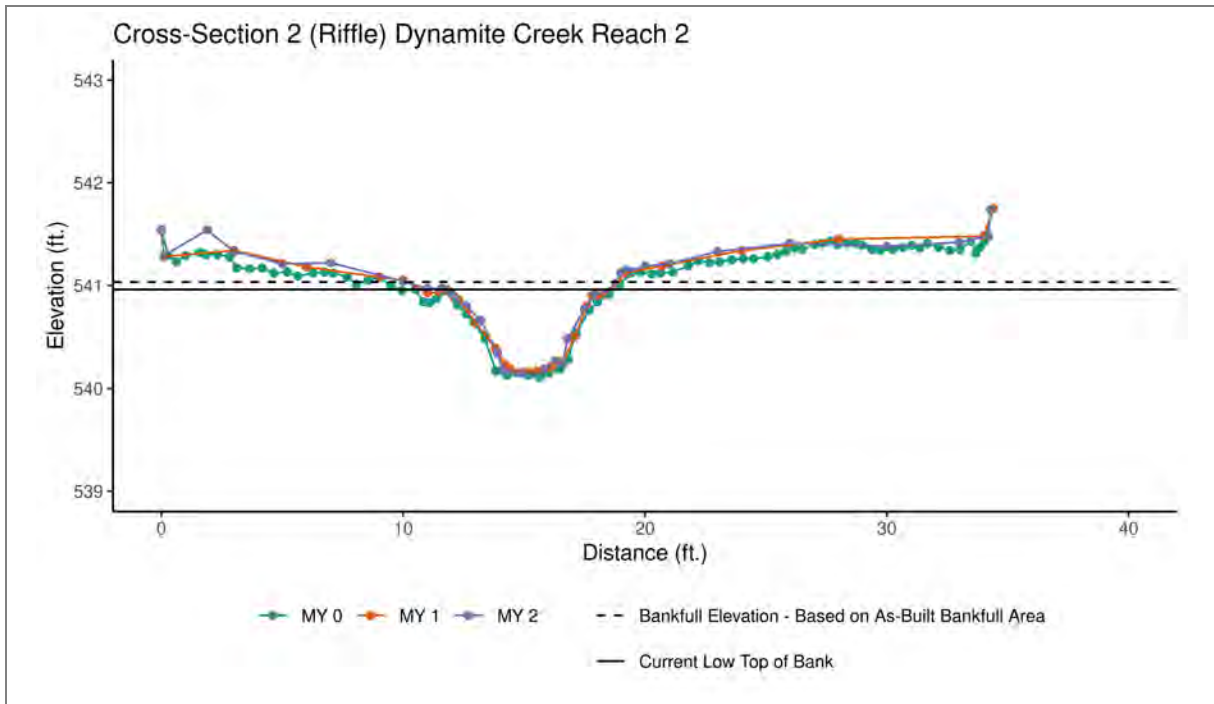


	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A	N/A	N/A			
Bank Height Ratio - Based on AB-Bankfull Area	N/A	N/A	N/A			
Thalweg Elevation	539.89	540.09	540.11			
LTOB Elevation	541.32	541.29	541.31			
LTOB Max Depth	1.43	1.20	1.20			
LTOB Cross-Sectional Area	7.39	5.62	5.86			



Downstream (03/07/2023)





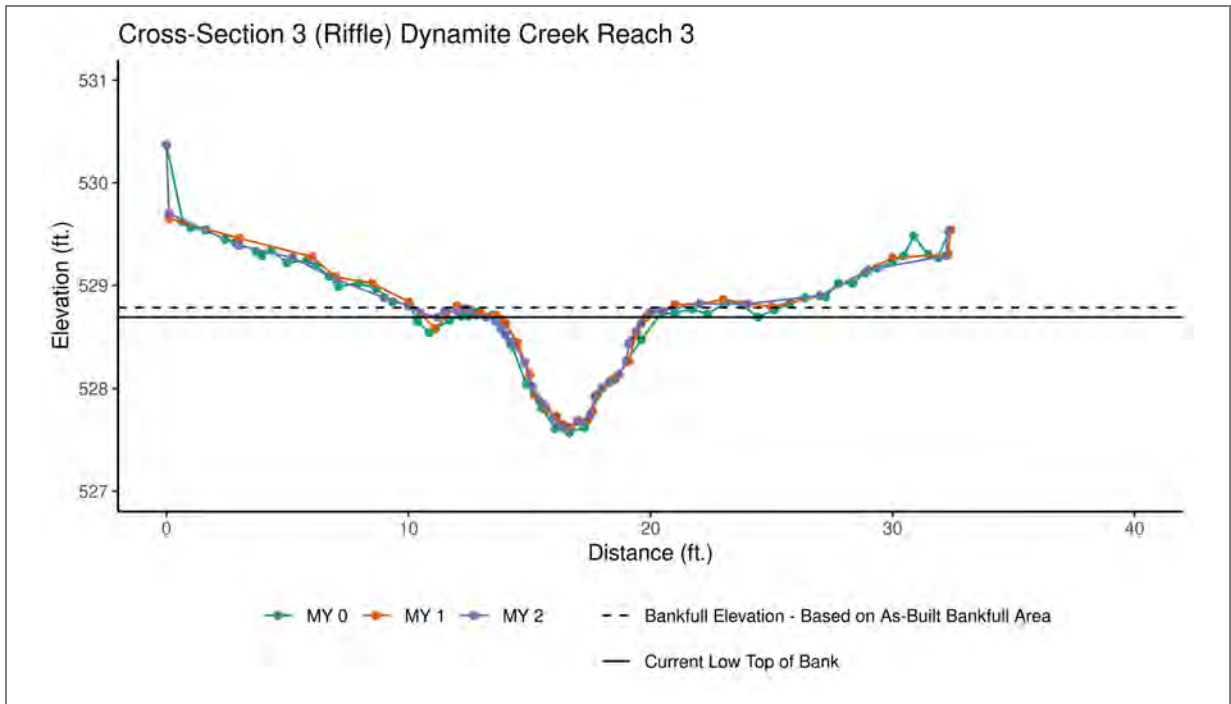
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	540.96	541.02	541.03			
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.92	0.92			
Thalweg Elevation	540.11	540.16	540.14			
LTOB Elevation	540.96	540.95	540.96			
LTOB Max Depth	0.85	0.79	0.82			
LTOB Cross-Sectional Area	3.53	3.08	3.04			



Downstream (03/07/2023)





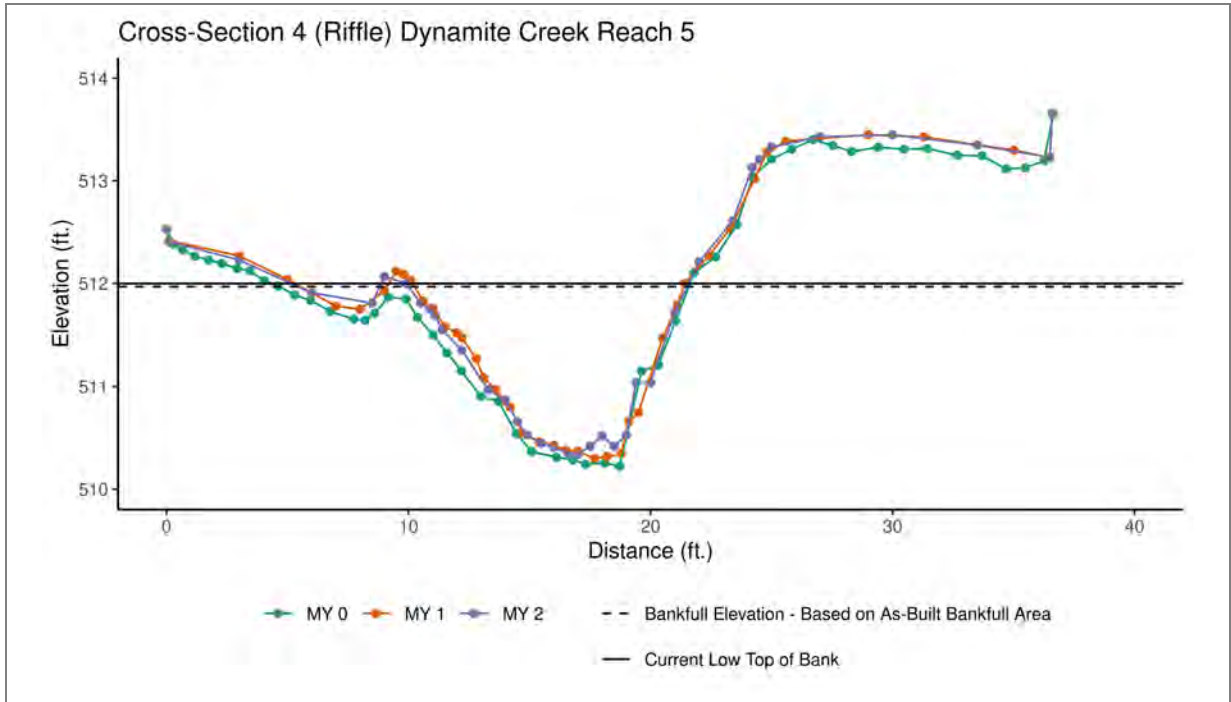


	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	528.72	528.80	528.78			
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.93	0.92			
Thalweg Elevation	527.57	527.62	527.59			
LTOB Elevation	528.72	528.71	528.69			
LTOB Max Depth	1.15	1.09	1.10			
LTOB Cross-Sectional Area	4.45	3.90	3.84			



Downstream (03/07/2023)





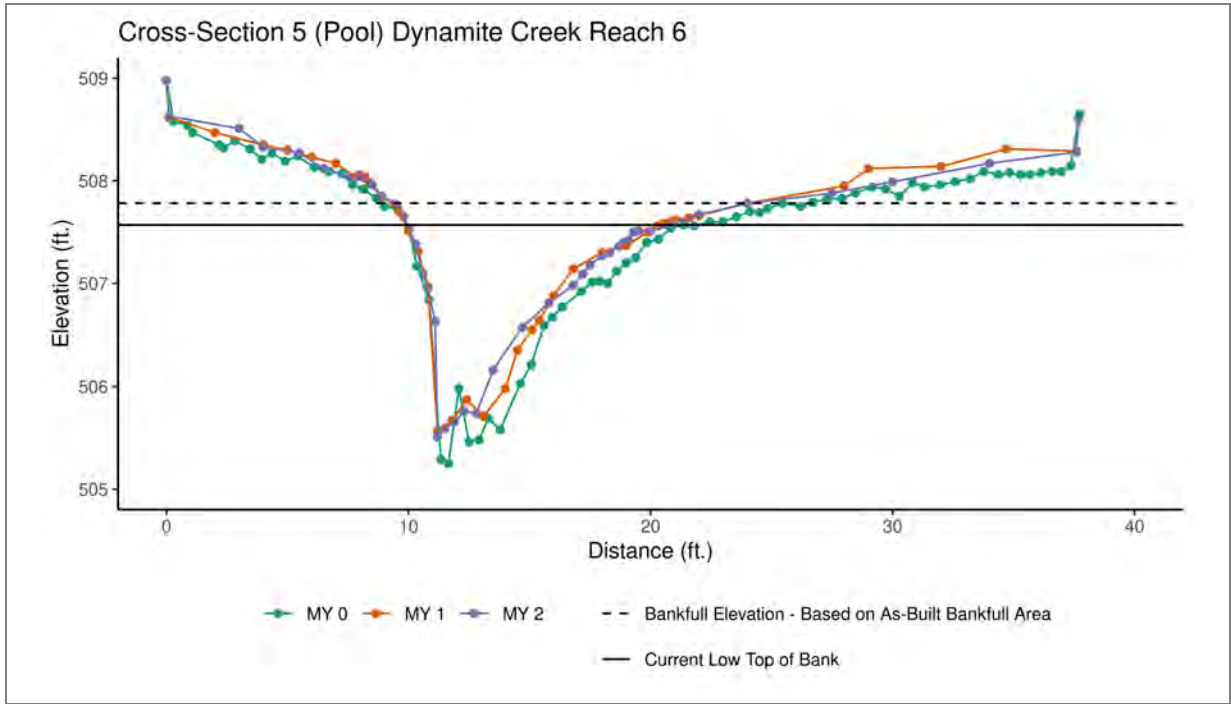
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	511.85	511.97	511.97			
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.09	1.02			
Thalweg Elevation	510.22	510.30	510.34			
LTOB Elevation	511.85	512.09	512.00			
LTOB Max Depth	1.62	1.79	1.66			
LTOB Cross-Sectional Area	11.45	12.80	11.80			



Downstream (03/07/2023)





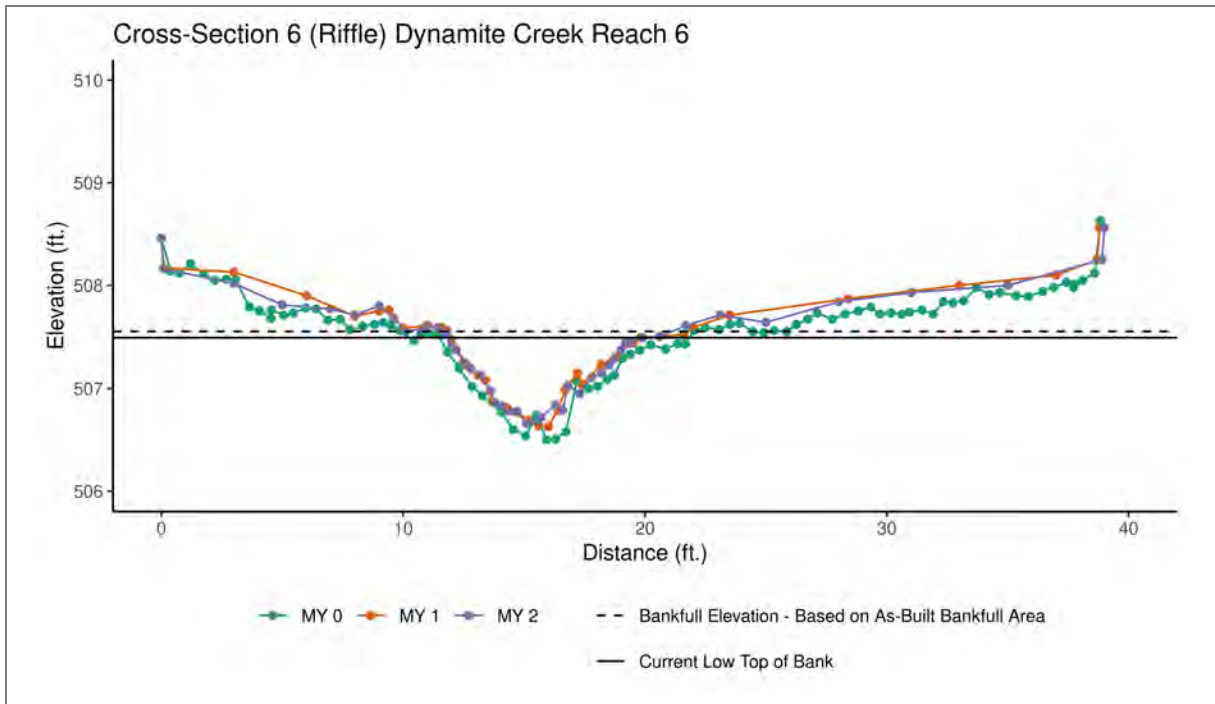


	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A	N/A	N/A			
Bank Height Ratio - Based on AB-Bankfull Area	N/A	N/A	N/A			
Thalweg Elevation	505.25	505.57	505.51			
LTOB Elevation	507.54	507.62	507.57			
LTOB Max Depth	2.29	2.05	2.06			
LTOB Cross-Sectional Area	11.01	9.74	8.74			



Downstream (03/07/2023)





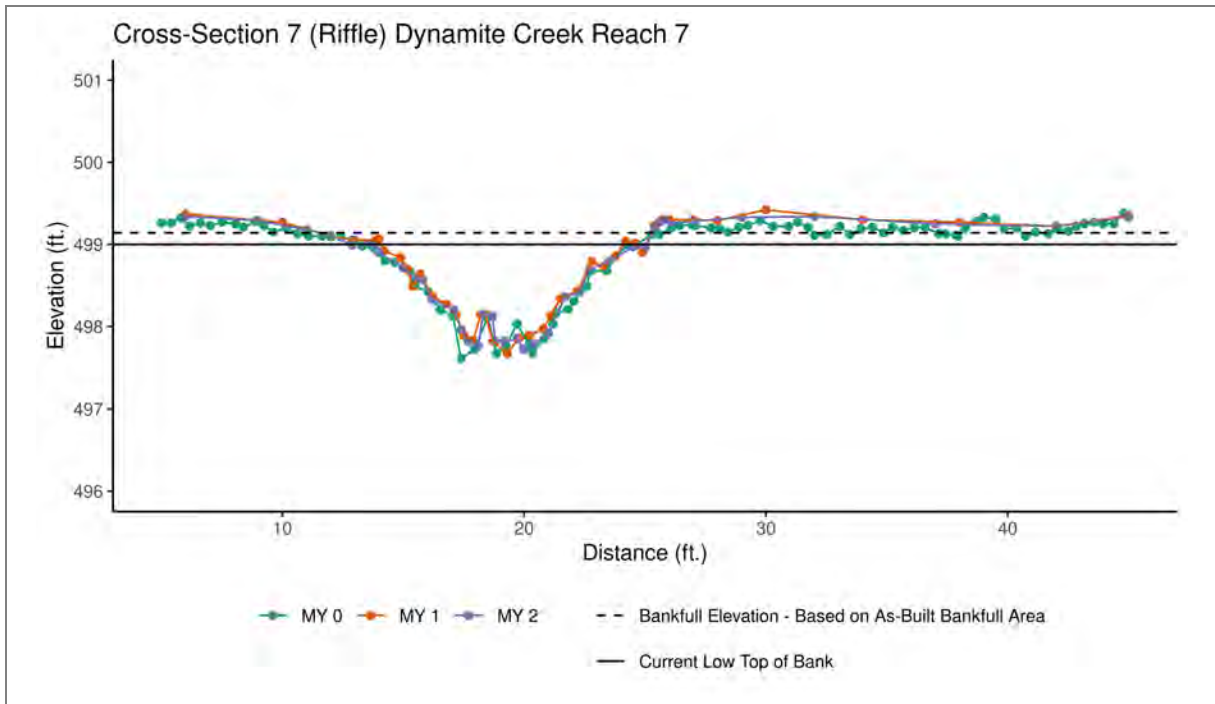
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	507.42	507.56	507.55			
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.92	0.93			
Thalweg Elevation	506.50	506.63	506.66			
LTOB Elevation	507.42	507.49	507.49			
LTOB Max Depth	0.92	0.86	0.83			
LTOB Cross-Sectional Area	4.06	3.51	3.57			



**Downstream (03/07/2023)**





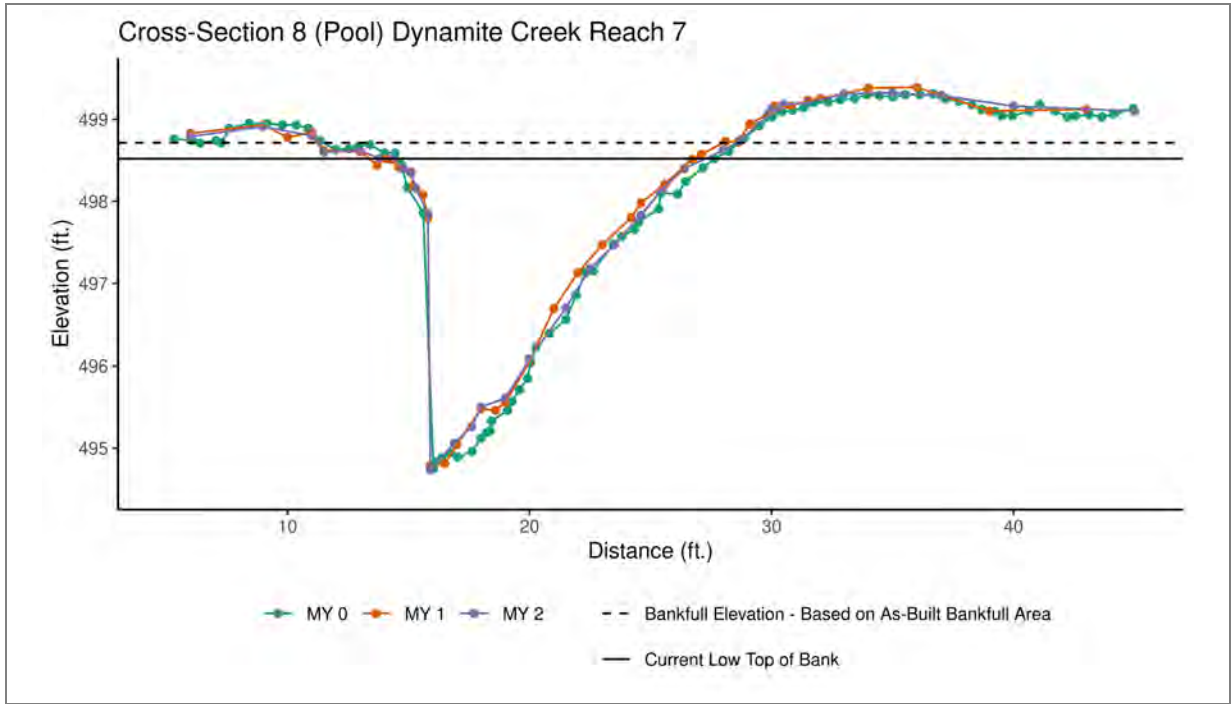


	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	499.09	499.18	499.14			
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.92	0.90			
Thalweg Elevation	497.61	497.67	497.72			
LTOB Elevation	499.09	499.06	499.00			
LTOB Max Depth	1.47	1.39	1.28			
LTOB Cross-Sectional Area	8.84	7.51	7.24			



Downstream (03/07/2023)





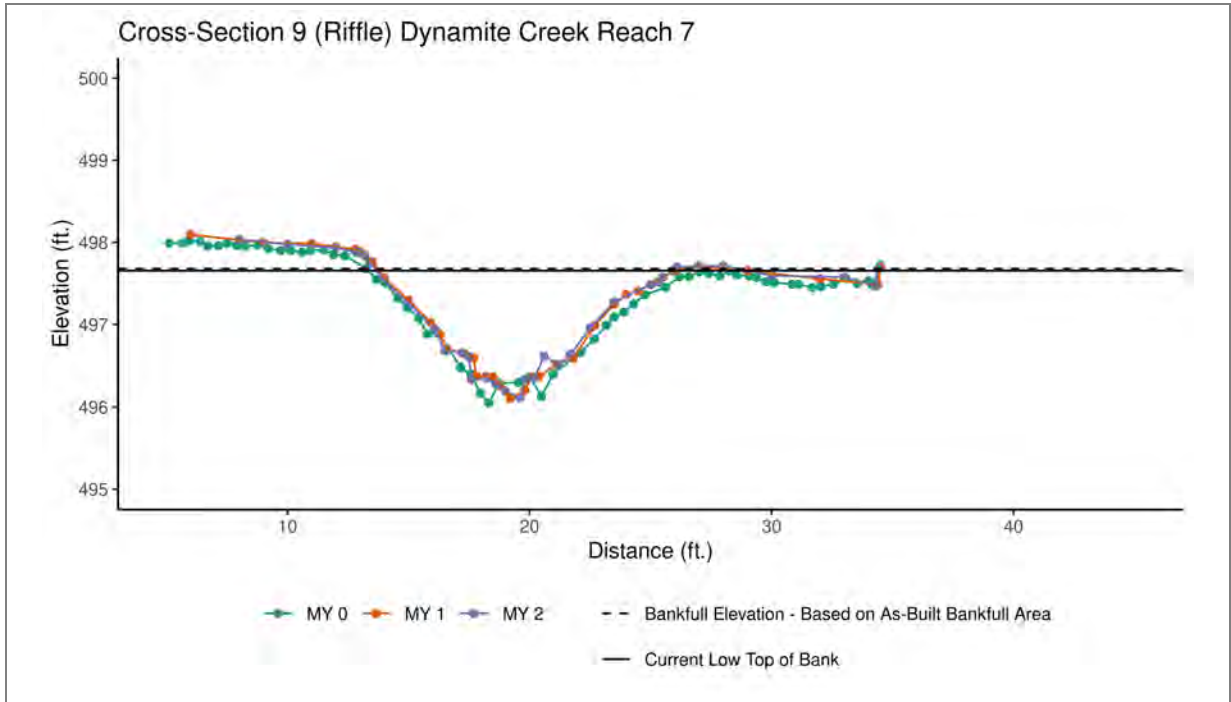
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A	N/A	N/A			
Bank Height Ratio - Based on AB-Bankfull Area	N/A	N/A	N/A			
Thalweg Elevation	494.75	494.79	494.74			
LTOB Elevation	498.59	498.51	498.52			
LTOB Max Depth	3.79	3.72	3.78			
LTOB Cross-Sectional Area	23.62	20.38	21.13			



**Downstream (03/07/2023)**







	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	497.58	497.68	497.68			
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.99	0.99			
Thalweg Elevation	496.05	496.11	496.12			
LTOB Elevation	497.58	497.66	497.66			
LTOB Max Depth	1.53	1.55	1.54			
LTOB Cross-Sectional Area	9.61	9.36	9.34			



Downstream (03/07/2023)



**Table 8. Baseline Stream Data Summary**

Dynamite Creek Mitigation Site  
 DMS Project No. 100125  
 Monitoring Year 2 - 2023

Parameter	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)			
	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 (ft)	0.7		1	0.5		0.5		1	
Bankfull Max Depth (ft)	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 particle 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			
Sinuosity	1.30			1.10		1.10			
Water Surface Slope (ft/ft)	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 (ft)	0.4		1	0.5		0.6		1	
Bankfull Max Depth (ft)	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 particle size (mm) mobilized at bankfull	70			40		40			
Rosgen Classification	C4			B4/C4		B4/C4			
Bankfull Discharge (cfs)	10.5			9.2		9.0			
Sinuosity	1.00			1.10		1.10			
Water Surface Slope (ft/ft)	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 (ft)	0.6		1	N/A		1.0		1	
Bankfull Max Depth (ft)	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 particle size (mm) mobilized at bankfull	N/A			N/A		N/A			
Rosgen Classification	E4			N/A		E4			
Bankfull Discharge (cfs)	16.0			N/A		14.4			
Sinuosity	1.70			N/A		1.70			
Water Surface Slope (ft/ft)	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 2 - 2023

	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
<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 (ft)	0.9		1	0.7		0.5		1
Bankfull Max Depth (ft)	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 particle 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)	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 (ft)	0.9		1	0.9		0.7	0.8	2
Bankfull Max Depth (ft)	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 particle 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)	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 2 - 2023**

	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	N/A				540.96	541.02	541.03				528.72	528.80	528.78			
Bank Height Ratio - Based on AB Bankfull <sup>1</sup> Area	N/A	N/A	N/A				1.00	0.92	0.92				1.00	0.93	0.92			
Thalweg Elevation (ft)	539.89	540.09	540.11				540.11	540.16	540.14				527.57	527.62	527.59			
LTOB <sup>2</sup> Elevation (ft)	541.32	541.29	541.31				540.96	540.95	540.96				528.72	528.71	528.69			
LTOB <sup>2</sup> Max Depth (ft)	1.43	1.20	1.20				0.85	0.79	0.82				1.15	1.09	1.10			
LTOB <sup>2</sup> Cross Sectional Area (ft <sup>2</sup> )	7.39	5.62	5.86				3.53	3.08	3.04				4.45	3.90	3.84			
	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	511.97				N/A	N/A	N/A				507.42	507.56	507.55			
Bank Height Ratio - Based on AB Bankfull <sup>1</sup> Area	1.00	1.09	1.02				N/A	N/A	N/A				1.00	0.92	0.93			
Thalweg Elevation (ft)	510.22	510.30	510.34				505.25	505.57	505.51				506.50	506.63	506.66			
LTOB <sup>2</sup> Elevation (ft)	511.85	512.09	512.00				507.54	507.62	507.57				507.42	507.49	507.49			
LTOB <sup>2</sup> Max Depth (ft)	1.62	1.79	1.66				2.29	2.05	2.06				0.92	0.86	0.83			
LTOB <sup>2</sup> Cross Sectional Area (ft <sup>2</sup> )	11.45	12.80	11.80				11.01	9.74	8.74				4.06	3.51	3.57			
	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	499.14				N/A	N/A	N/A				497.58	497.68	497.68			
Bank Height Ratio - Based on AB Bankfull <sup>1</sup> Area	1.00	0.92	0.90				N/A	N/A	N/A				1.00	0.99	0.99			
Thalweg Elevation (ft)	497.61	497.67	497.72				494.75	494.79	494.74				496.05	496.11	496.12			
LTOB <sup>2</sup> Elevation (ft)	499.09	499.06	499.00				498.59	498.51	498.52				497.58	497.66	497.66			
LTOB <sup>2</sup> Max Depth (ft)	1.47	1.39	1.28				3.79	3.72	3.78				1.53	1.55	1.54			
LTOB <sup>2</sup> Cross Sectional Area (ft <sup>2</sup> )	8.84	7.51	7.24				23.62	20.38	21.13				9.61	9.36	9.34			

<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 recorded 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 2 - 2023

Reach	MY1 (2022)	MY2 (2023)*	MY3 (2024)	MY4 (2025)	MY5 (2026)	MY6 (2027)	MY7 (2028)
Dynamite Creek Reach 6	3/12/2022	2/17/2023					
	8/22/2022	4/30/2023					
	12/22/2022						

\*Data was collected 1/1/2023 to 11/16/2023. Data from the remainder of MY2 will be updated in MY3.

**Table 11. Rainfall Summary**

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023

	MY1 (2022)	MY2 (2023)	MY3 (2024)	MY4 (2025)	MY5 (2026)	MY6 (2027)	MY7 (2028)
Annual Precipitation Total	46.33 in	33.55 in*					
30 Year Average Precip WETS 30th Percentile	41.44 in	41.83 in					
30 Year Average Precip WETS 70th Percentile	50.51 in	50.48 in					
Annual Precipitation Compared to Normal	Normal	*					

Annual Precipitation Source: **Eden COOP** Station, Rockingham County, NC, State Climate Office (Approximately 1.9 miles from Site)

30 Year Average Precipitation Source: **Eden** Station, Rockingham County, NC, AgACIS (Approximately 1.9 miles from Site)

\*Annual precipitation was collected 1/1/2023 to 11/16/2023. Data from the remainder of MY2 will be updated in MY3.

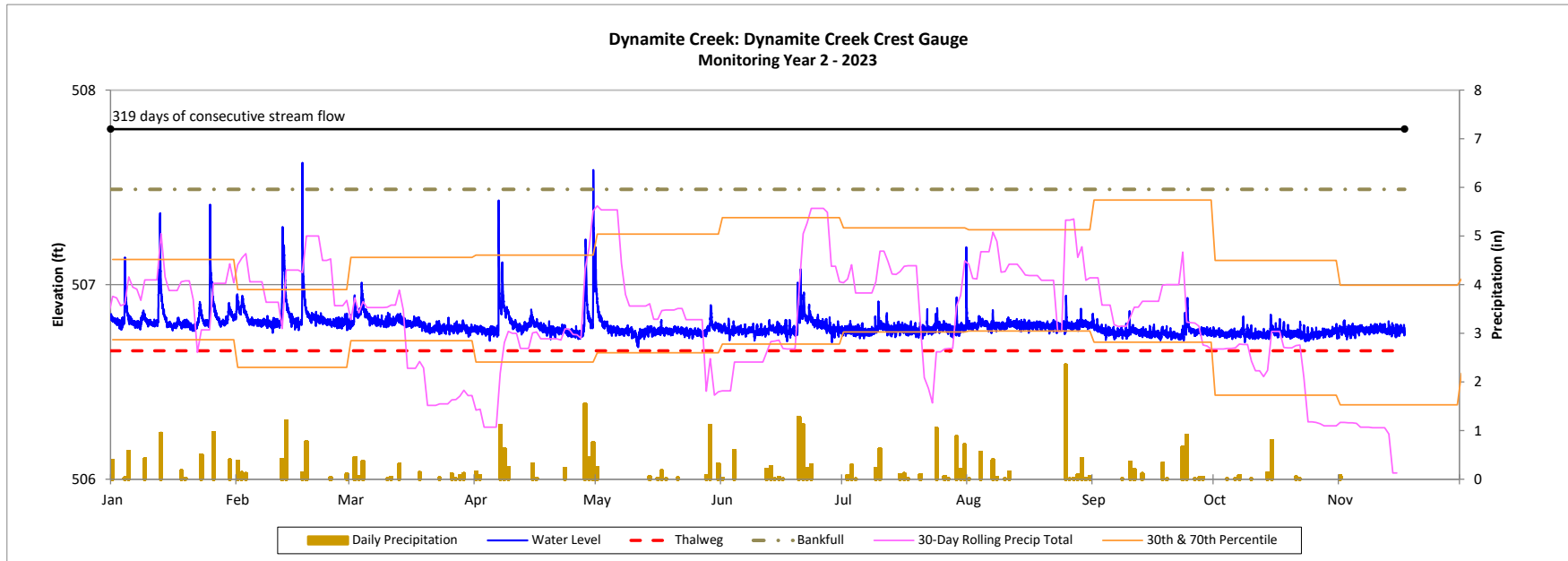


**Recorded Bankfull Events Plot**

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023



**Table 12. Groundwater Gauge Summary**

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 2 - 2023**

Gauge	Max. Consecutive Hydroperiod (Percentage)						
	MY1 (2022)	MY2 (2023)	MY3 (2024)	MY4 (2025)	MY5 (2026)	MY6 (2027)	MY7 (2028)
1	3 Days (1.2%)	5 Days (1.9%)					
2	13 Days (5.0%)	34 Days (13.1%)					
3	3 Days (1.2%)	5 Days (1.9%)					
4	4 Days (1.5%)	7 Days (2.7%)					
5	29 Days (11.2%)	36 Days (13.9%)					
6	4 Days (1.5%)	6 Days (2.3%)					
7	12 Days (4.6%)	35 Days (13.5%)					
8	3 Days (1.2%)	3 Days (1.2%)					
9	8 Days (3.1%)	52 Days (20.1%)					
10	59 Days (22.8%)	81 Days (31.3%)					

Performance Standard: Free groundwater table within 12 inches of the ground surface for 12% (31 days) of the growing season.

Growing Season: 3/1/2023 to 11/14/2023 (258 Days)



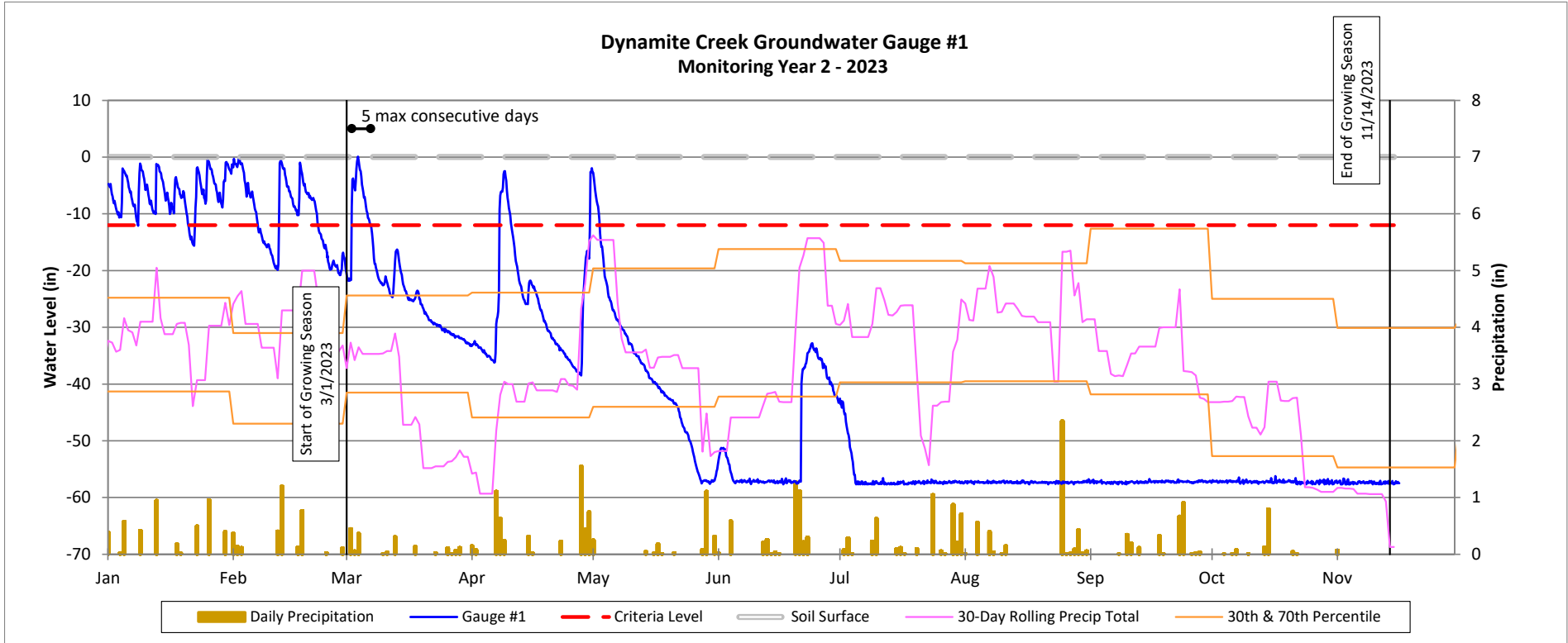
### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023

Wetland Re-establishment Area



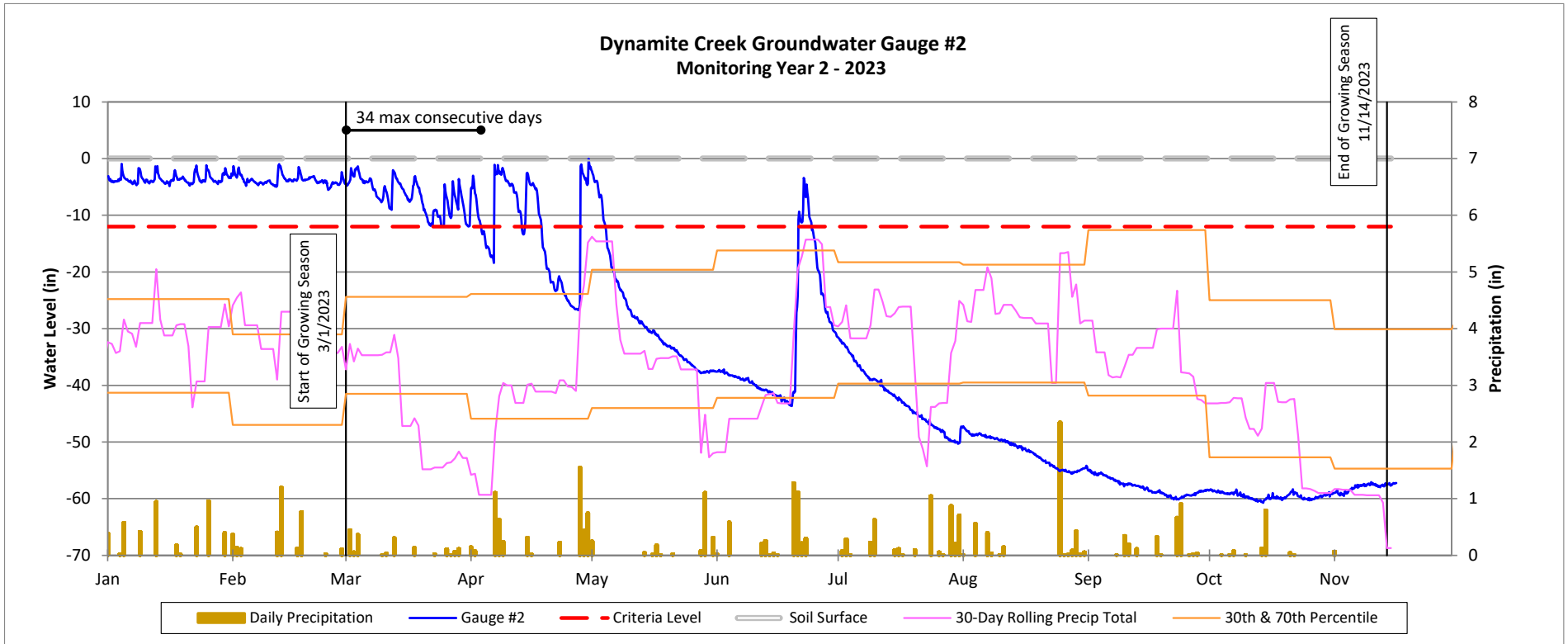
### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 2 - 2023**

Wetland Rehabilitation Area





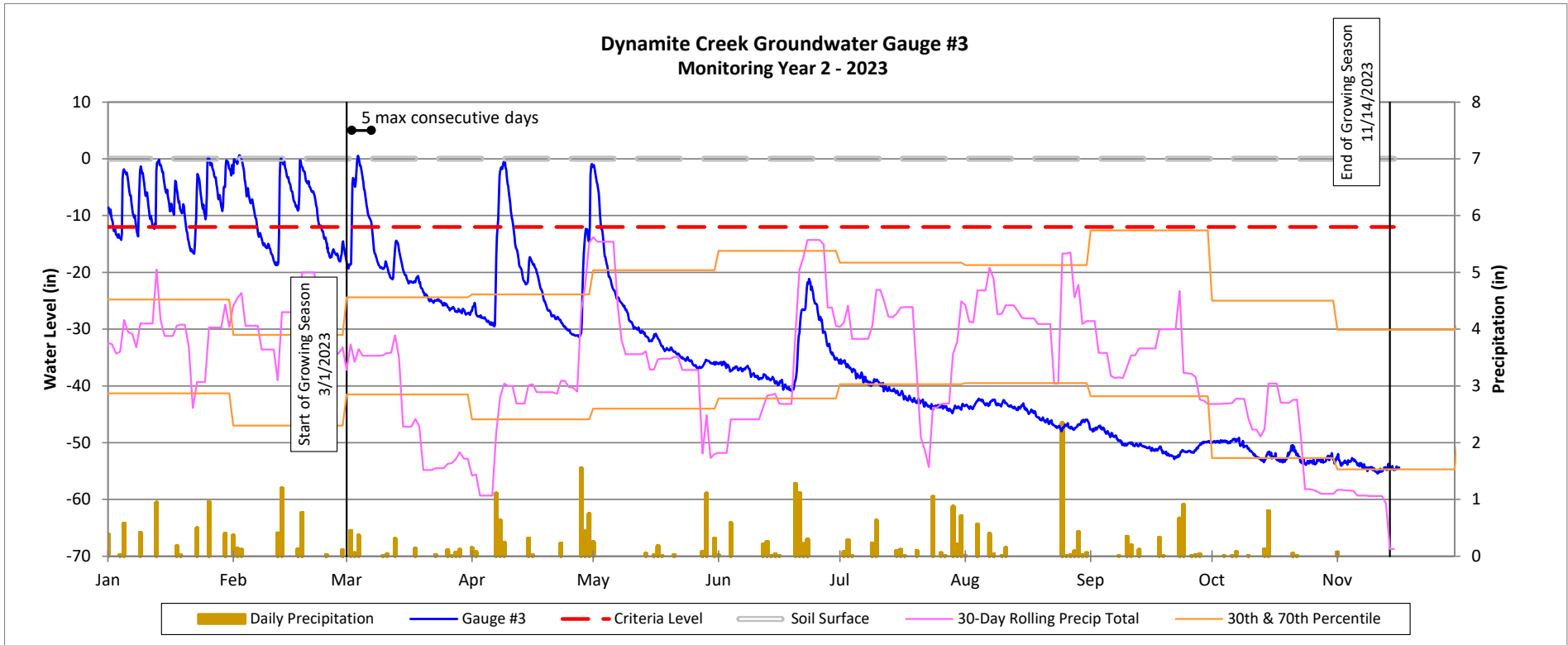
### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023

Wetland Re-establishment Area



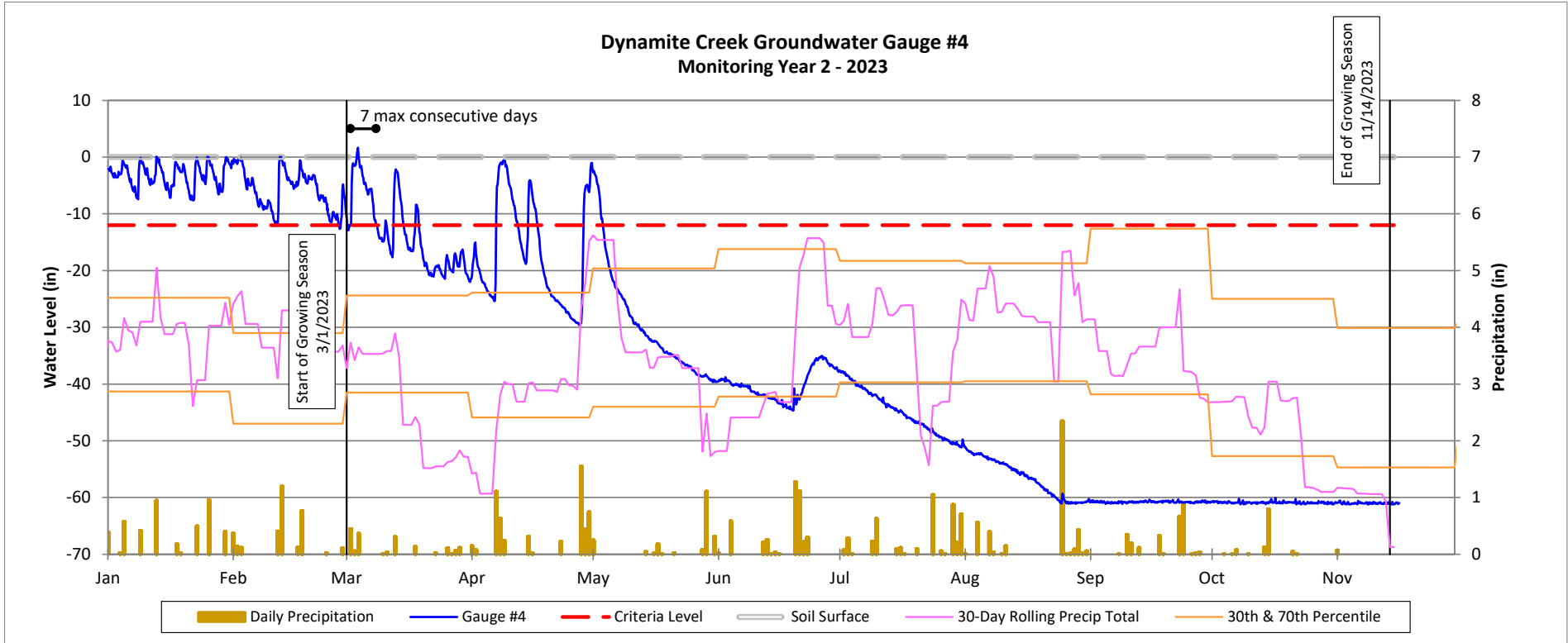
### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 2 - 2023**

Wetland Re-establishment Area





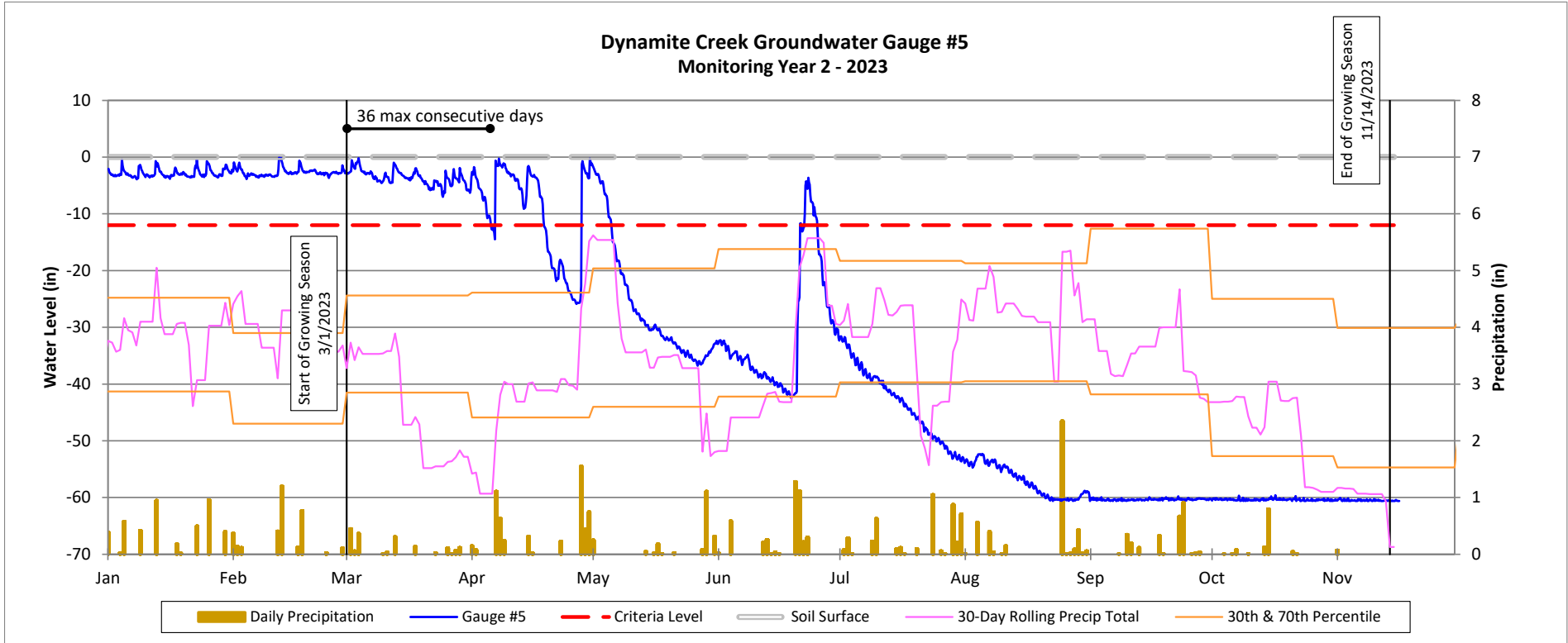
### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023

Wetland Rehabilitation Area



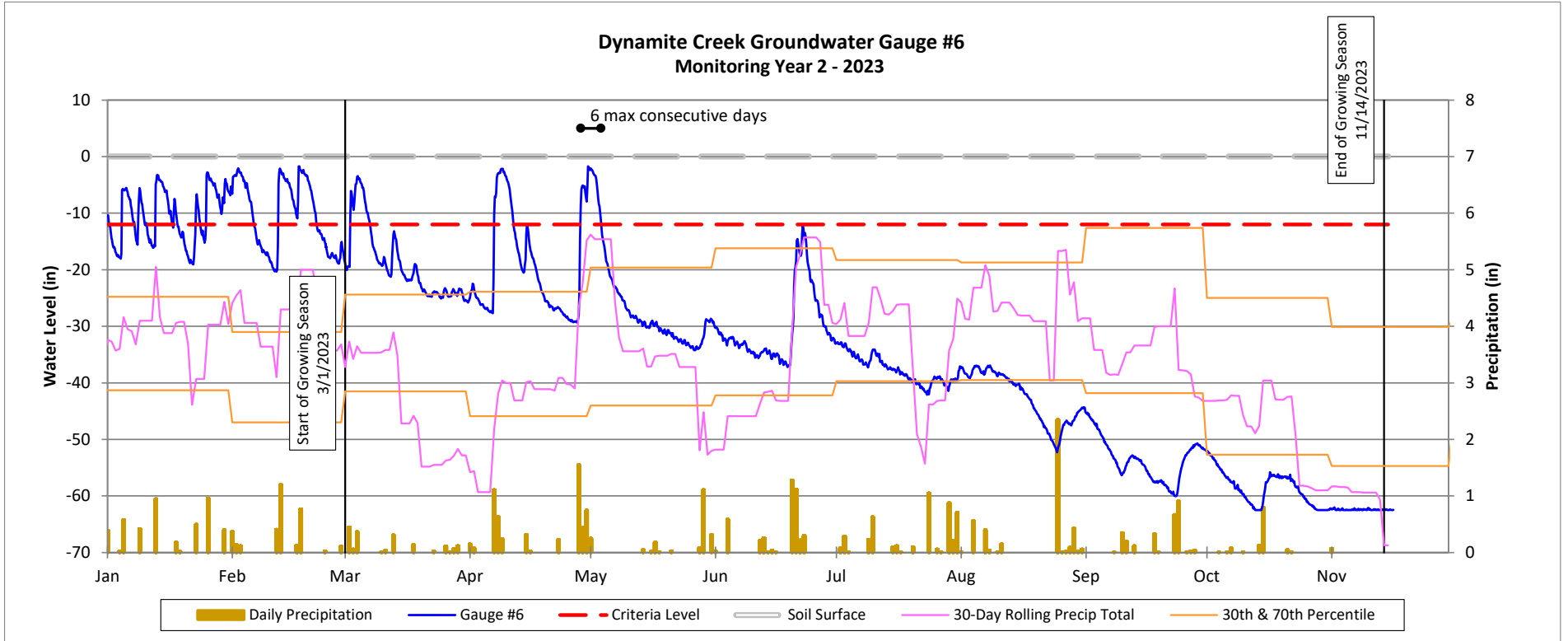
### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023

Wetland Re-establishment Area





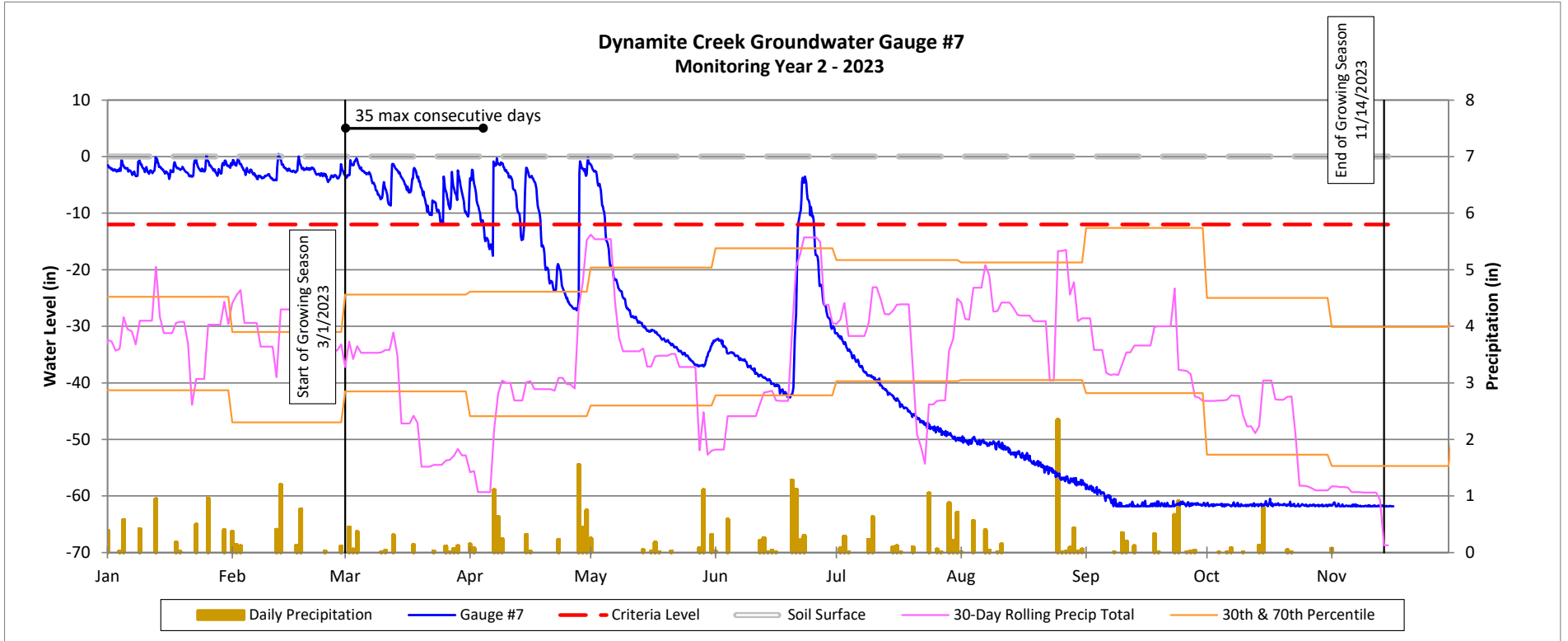
### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 2 - 2023**

Wetland Rehabilitation Area



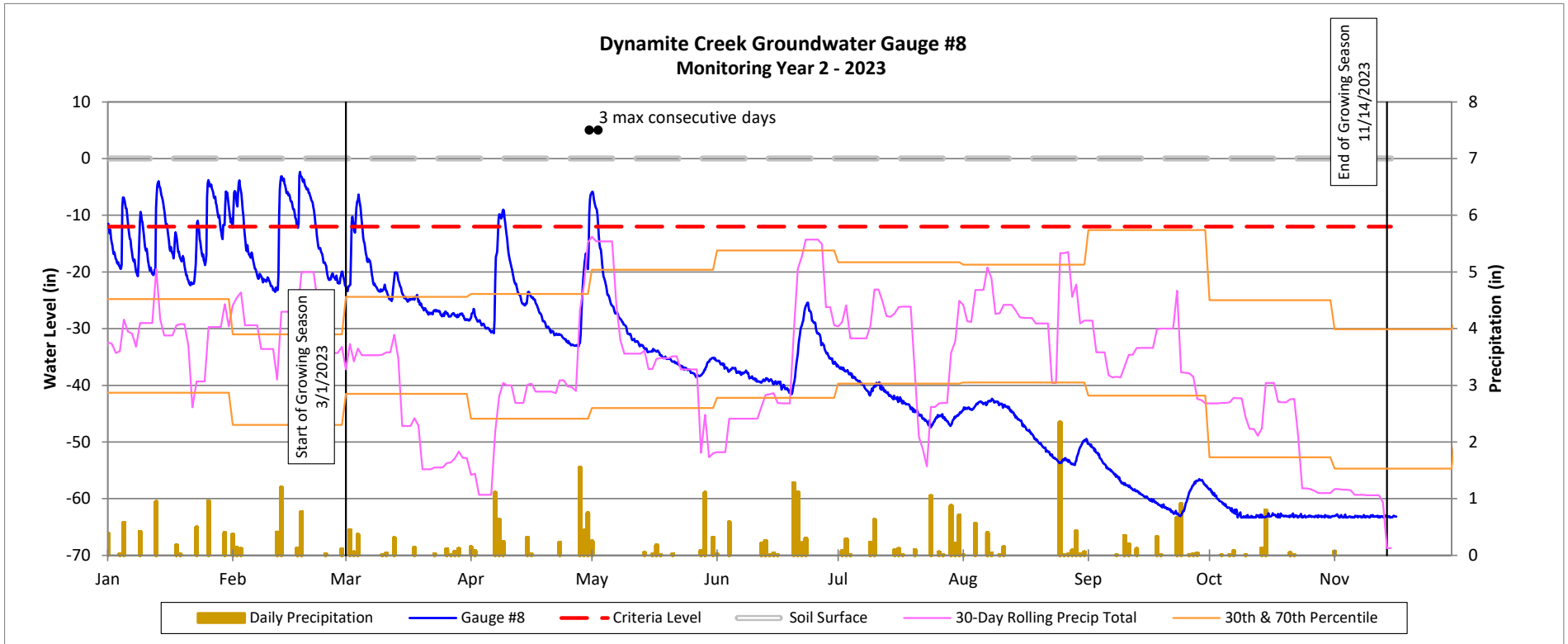
### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023

Wetland Rehabilitation Area





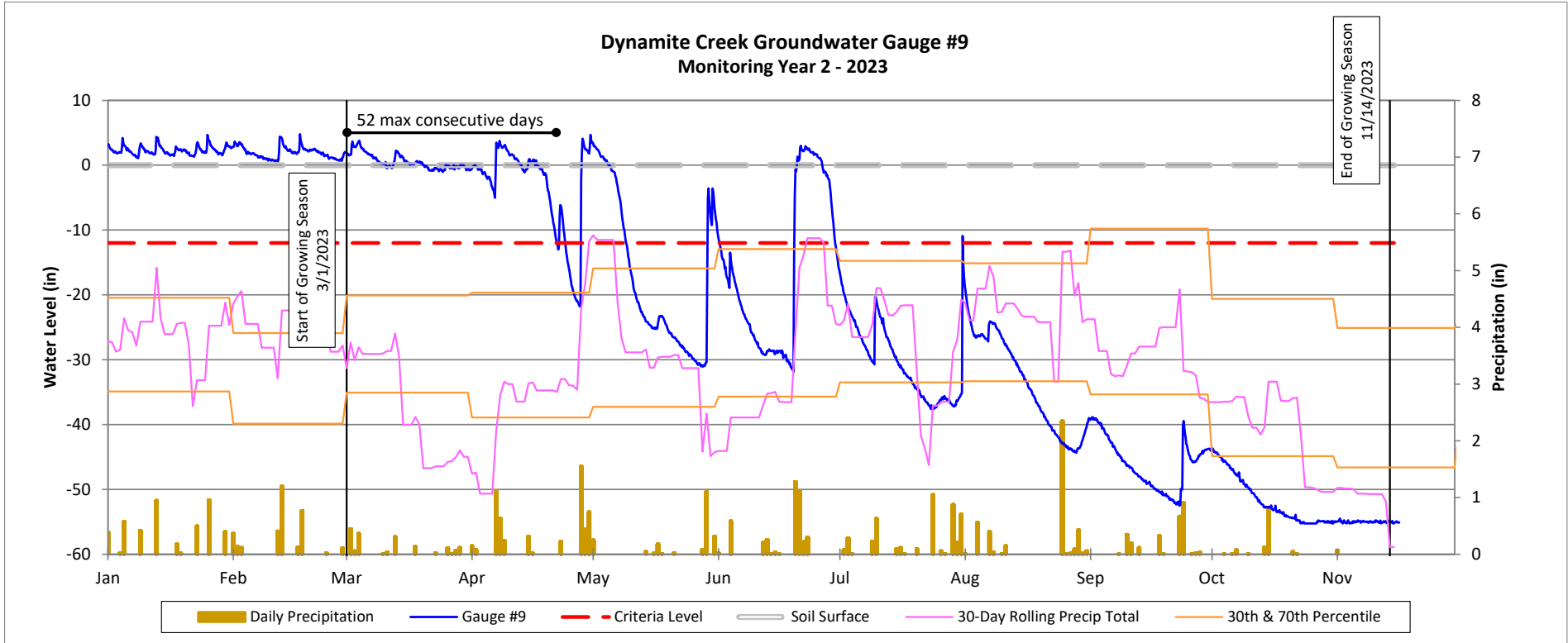
### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023

Wetland Re-establishment Area



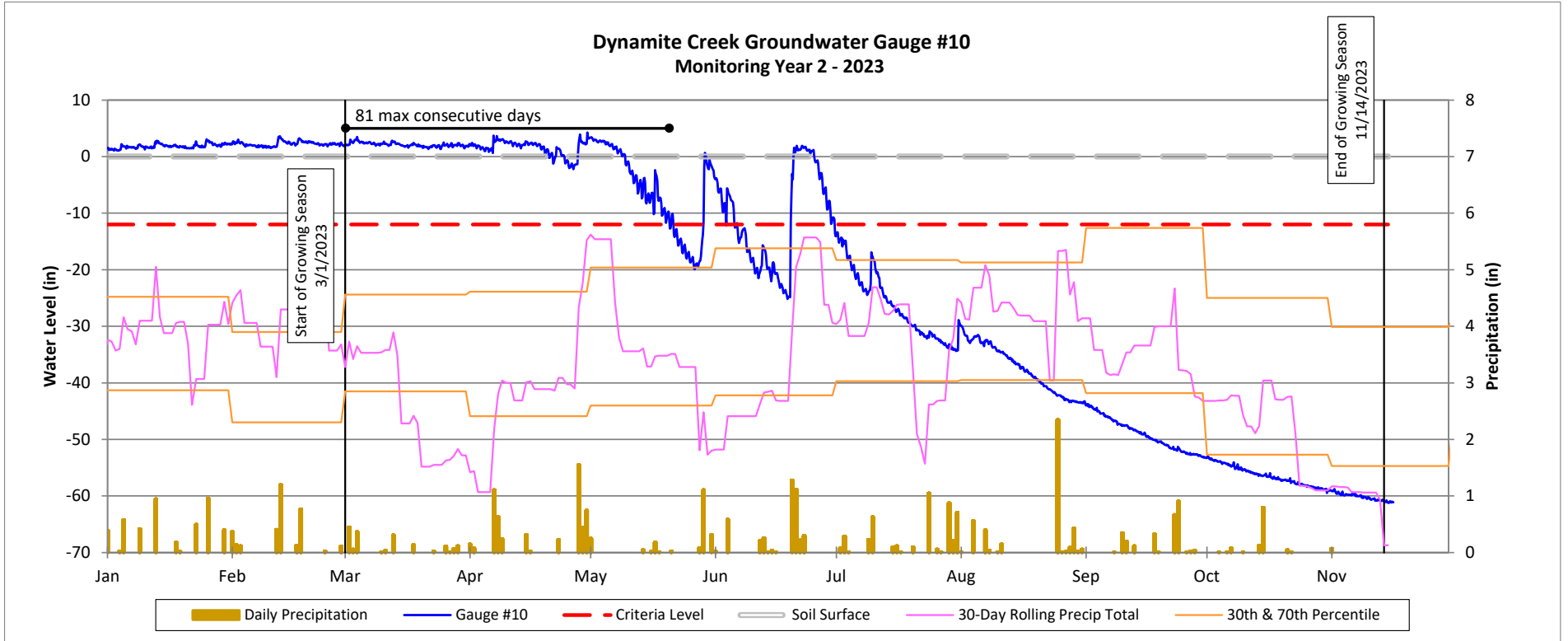
### Groundwater Gauge Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 2 - 2023**

Wetland Rehabilitation Area



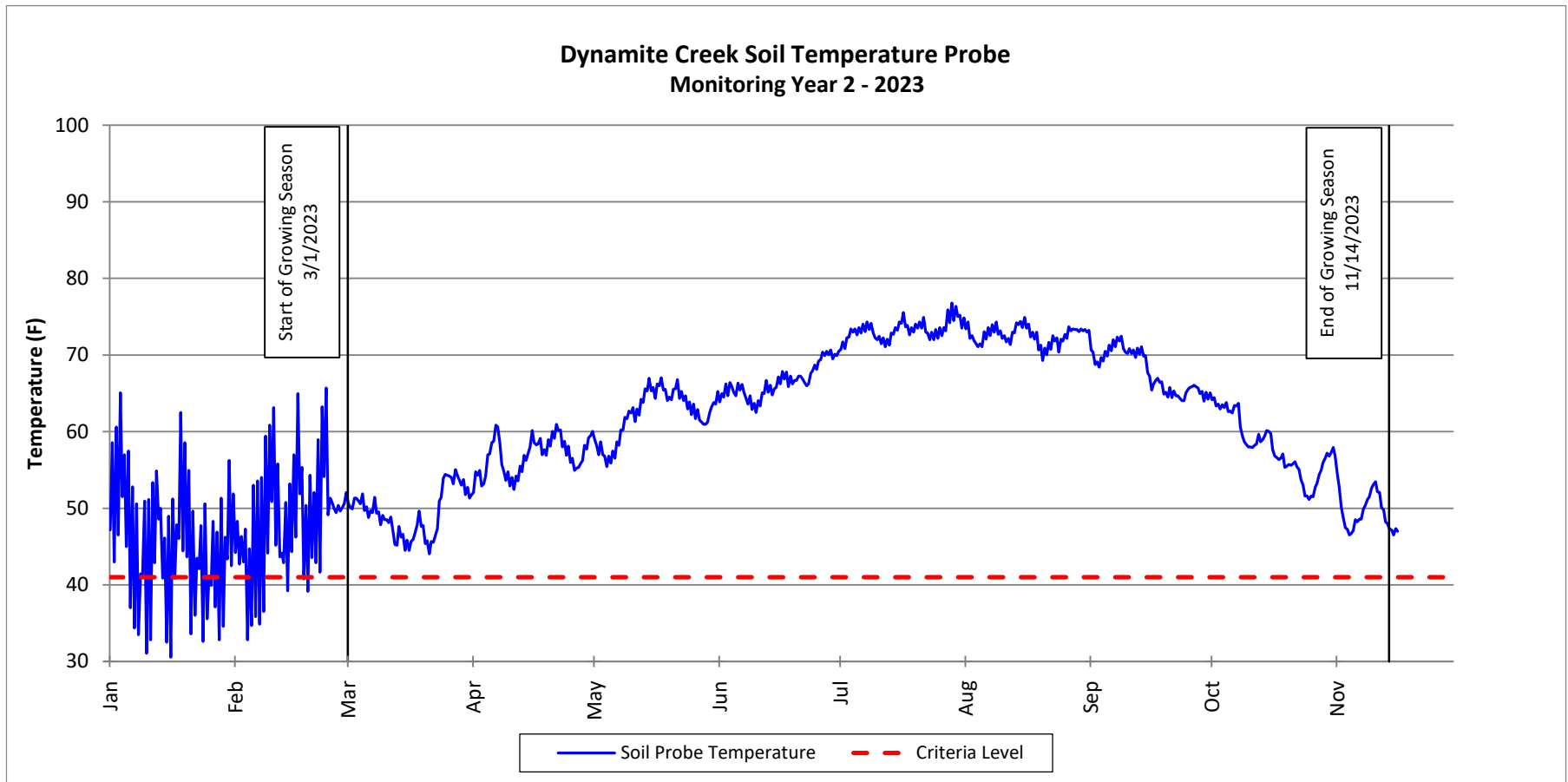


## Soil Temperature Probe Plot

Dynamite Creek Mitigation Site

DMS Project No. 100125

Monitoring Year 2 - 2023



## **APPENDIX E. Project Timeline and Contact Info**

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

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 2 - 2023**

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	Easement Encroachment - Vehicle and Cow Access		January 2023
	Competitive Vegetation Treatment <sup>1</sup>		April 2023
	Invasive Vegetation Treatment		May 2023
	In-stream Vegetation Treatment		August 2023
	Stream Survey	March 2023	December 2023
	Vegetation Survey	August 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	

<sup>1</sup>Herbicide ring sprays and soil amendments around the base of planted stems.

**Table 14. Project Contact Table**

Dynamite Creek Mitigation Site

DMS Project No. 100125

**Monitoring Year 2 - 2023**

<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**



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## MEETING SUMMARY

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MEETING: MY2 IRT Site Walk  
**Dynamite Creek Mitigation Site**  
Roanoke 03010103; Rockingham County, NC  
DEQ Contract No. 7911  
DMS Project No. 100125  
USACE ID: 2019-00909

DATE: *On-Site Meeting:* Thursday, September 28, 2023  
*Meeting Notes Distributed:* Wednesday, October 4, 2023

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### Attendees

Kim Isenhour, USACE	Maria Polizzi, DWR	Hanna Peterman, Wildlands
Casey Haywood, USACE	Jeremiah Dow, DMS	Jason Lorch, Wildlands
Travis Wilson, WRC	Danielle Mir, DMS	Tasha King, Wildlands

### Meeting Notes

- **General Site Notes**
    - USACE would like a sentence added in each yearly monitoring report to discuss mature tree mortality in the existing forest.
    - More live stakes planted along the stream banks on upper reaches in existing forest areas were requested.
  - **Dynamite Creek Reach 2**
    - There was no flow in the lower part of Reach 2 below the utility crossing. This is worrisome because there is water both above and below this stretch of channel. The IRT would like a flow gauge to be installed, possibly 2, to document flow on what is marked as a perennial stream.
  - **Dynamite Creek Reach 4**
    - While this is a preservation section, the IRT still expects that it will show stability. A tree across the Dynamite Creek channel near the confluence of UT1 has been holding channel grade. At the time of the site walk, water was flowing behind the log on the downstream right side of the channel that could potentially form a headcut. The IRT has requested a photo point be installed at the confluence to monitor channel stability.
  - **Dynamite Creek Reach 5**
    - Wildlands showed the IRT the “light touch” work completed on this enhancement I reach.
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- **Dynamite Creek Reach 6**

- The IRT confirmed that a resolved driving encroachment will be documented in the Monitoring Year 2 report.
- The treatment of pasture grass during construction and via ring sprays in MY1 was discussed. Ring sprays were done around trees along Reach 7 in MY1, but not along Reach 6 where there is existing mature forest.

- **Dynamite Creek Reach 7**

- The wetland groundwater well data and next steps were discussed. Wildlands explained plans to install two extra groundwater well gauges to find the edge between wetlands meeting the hydrology performance standard and those where credits could be put at risk. The IRT agreed with this strategy and indicated it was unnecessary to put credits at risk this early in the project life cycle. Once a couple more years of data have been collected and we are more confident of groundwater levels in the area, then wetland crediting should be revisited.
  - USACE requested a copy of a map showing possible locations for the two extra groundwater well gauges and a soils map for the area.
  - A theory was discussed that since this is in the Dan River floodplain, a layer of sandy material may have formed at the ground surface. It is possible that these sandy soils are draining groundwater and making it difficult to maintain a water table near the ground surface.
- A few small piles of cow poop were noticed in multiple places along Reach 7 and the lower end of Reach 6 near the bridge. These were likely from young cows gaining access to the conservation easement. Wildlands will work with the landowner and tenant farmer to keep the cows from accessing the conservation easement.

