



# **MONITORING YEAR 7 ANNUAL REPORT FINAL**

## **HOLMAN MILL MITIGATION SITE**

Alamance County, NC

NCDEQ Contract 005795

DMS Project Number 96316

USACE Action ID Number 2015-00019

NCDWR Project Number 2014-0333

Data Collection Period: January - October 2022

Draft Submission Date: October 28, 2022

Final Submission Date: December 9, 2022

---

### **PREPARED FOR:**



**NC Department of Environmental Quality**

**Division of Mitigation Services**

1652 Mail Service Center

Raleigh, NC 27699-1652

**PREPARED BY:**

---



312 West Millbrook Road, Suite 225  
Raleigh, NC 27609

**Jason Lorch**  
jlorch@wildlandseng.com  
Phone: 919.851.9986

**HOLMAN MILL MITIGATION SITE**  
Monitoring Year 7 Annual Report

**TABLE OF CONTENTS**

**Section 1: PROJECT OVERVIEW** .....1-1

    1.1 Project Goals and Objectives ..... 1-1

    1.2 Monitoring Year 7 Data Assessment..... 1-2

        1.2.1 Vegetative Assessment ..... 1-2

        1.2.2 Vegetation Areas of Concern ..... 1-2

        1.2.3 Stream Assessment..... 1-3

        1.2.4 Stream Areas of Concern ..... 1-3

        1.2.5 Hydrology Assessment..... 1-3

        1.2.6 Maintenance Plan ..... 1-3

    1.3 Monitoring Year 7 Summary ..... 1-3

**Section 2: REFERENCES**.....2-1

**APPENDICES**

<b>Appendix 1</b>	<b>General Figures and Tables</b>
Figure 1	Project Vicinity Map
Figure 2	Project Component / Asset Map
Table 1	Project Components and Mitigation Credits
Table 2	Project Activity and Reporting History
Table 3	Project Contact Table
Table 4	Project Information and Attributes
<b>Appendix 2</b>	<b>Visual Assessment Data</b>
Figure 3.0-3.2	Integrated Current Condition Plan View
Table 5a-f	Visual Stream Morphology Stability Assessment Table
Table 6	Vegetation Condition Assessment Table
	Stream Photographs
	Vegetation Photographs
<b>Appendix 3</b>	<b>Vegetation Plot Data</b>
Table 7a	Vegetation Plot Criteria Attainment Table
Table 7b	Average Height by Plot
Graph 1	Vegetation Plot Trends
Table 8	CVS Vegetation Tables - Metadata
Table 9	Planted and Total Stem Counts
<b>Appendix 4</b>	<b>Morphological Summary Data and Plots</b>
Table 10a-c	Baseline Stream Data Summary
Table 11	Morphology and Hydraulic Summary (Dimensional Parameters – Cross-Section)
Table 12a-d	Monitoring Data – Stream Reach Data Summary
	Cross-Section Plots
<b>Appendix 5</b>	<b>Hydrology Summary Data</b>
Table 13	Verification of Bankfull Events
	Monthly Rainfall Data



## Section 1: PROJECT OVERVIEW

---

The Holman Mill Mitigation Site (Site) is located in southern Alamance County, southeast of Snow Camp off of Holman Mill Road (Figure 1). The Site is located within the Jordan Lake Water Supply Watershed (HUC 03030002050050) which has been designated as a Nutrient Sensitive Water. The Site is in the Carolina Slate Belt of the Piedmont Physiographic Province (USGS, 1998) and the project watershed consists primarily of agricultural and wooded land. The drainage area for the project site is 1,077 acres (1.68 square miles).

The project streams consist of six unnamed tributaries to Pine Hill Branch. Stream restoration reaches include UT1 (Reach 1 and 3), UT2 (Reach 3 and 4) and UT2A. Stream enhancement I (EI) and enhancement II (EII) reaches included UT1 (Reach 2 and 4), EII; UT2 (Reach 1), EII; UT2 (Reach 2), EI; UT2B, EII; UT1A, EII; and UT to Pine Hill Branch, EII. Mitigation work within the Site included restoration and enhancement of 8,717 linear feet (LF) of perennial and intermittent stream channels. The riparian areas were planted with native vegetation to improve habitat and protect water quality. The final mitigation plan was submitted and accepted by the DMS in May 2015. Construction activities were completed by Land Mechanic Designs, Inc. in March 2016. Planting and seeding activities were completed by Bruton Natural Systems, Inc. in March 2016. Baseline monitoring (MY0) was conducted between January 2016 and April 2016. Annual monitoring will occur for seven years with the close-out anticipated to commence in 2023 given the success criteria are met. Appendix 1 provides more detailed project activity, history, contact information, and watershed/site background information for the Site.

A conservation easement (32.4 ac; Deed Book 3472, Page 968; Deed Book 3472, Page 951) has been recorded and is in place along the stream riparian corridors to protect them in perpetuity within two tracts; a tract owned by the Russell B. Hadley Revocable Trust and a tract owned by the M. Darryl Lindley Revocable Trust, respectively. The project is expected to provide 3,883.333 SMU's by closeout.

A project vicinity map and directions are provided in Figure 1 and project components are illustrated in Figure 2.

### 1.1 Project Goals and Objectives

Prior to construction activities, the streams and vegetative communities on the Site had been severely impacted due to direct livestock access to the streams and riparian zones. Table 4 in Appendix 1 and Tables 10a through 10c in Appendix 4 present the pre-restoration conditions in detail.

This Site is intended to provide numerous ecological benefits within the Cape Fear River Basin. While many of these benefits are limited to the Site, others such as pollutant removal and reduced sediment loading have more far-reaching effects. Expected improvements to water quality and ecological processes are outlined below as project goals and objectives. These project goals were established with careful consideration of goals and objectives that were described in the RBRP and to meet the DMS mitigation needs while maximizing the ecological and water quality uplift within the watershed.

The following project goals and related objectives established in the mitigation plan (Wildlands, 2015) included:

The primary project goals will be:

- Reduce fecal coliform, nitrogen, and phosphorous inputs by removing cattle from streams and establishing and augmenting a forested riparian corridor to intercept and process sediment and nutrients before they reach the channel during storm events;
- Reduce sediment loads by stabilizing eroding stream banks;
- Return a network of streams to a stable form that is capable of supporting biological functions;



- Install instream structures to improve bed and bank stability, create fish and macroinvertebrate habitat, and help oxygenate streamflows; and
- Protect existing high-quality streams and forested buffers.

Secondary project objectives are expected to include:

- Improving instream nutrient cycling by incorporating woody debris into constructed riffles and bank stabilization measures;
- Reducing thermal loadings through establishment of riparian shading;
- Reconnecting channels with floodplains to raise the local water table; and
- Create and implement a stream and riparian area restoration design that is both natural and aesthetically pleasing.

## 1.2 Monitoring Year 7 Data Assessment

Annual monitoring and quarterly site visits were conducted during MY7 to assess the condition of the project. The vegetation and stream success criteria for the Site follows the approved success criteria presented in the Holman Mill Mitigation Project Mitigation Plan (Wildlands, 2015). Methodology for annual monitoring is presented in the MY0 Annual Report (Wildlands, 2016).

### 1.2.1 Vegetative Assessment

A total of 12 standard 10-meter by 10-meter vegetation plots were established during the baseline monitoring within the project easement area. The final vegetative success criteria will be the survival of 210 planted stems per acre averaging 10 feet in height within the conservation easement at the end of MY7.

The MY7 vegetative survey was completed in August 2022. The 2022 vegetation monitoring resulted in an average planted stem density of 418 stems per acre; exceeding the requirement of 210 planted stems per acre required at closeout. When including volunteer stems, the average stems per acre is 685 for MY7. There is an average of 10 stems per plot as compared to 15 stems per plot in MY0. Eleven of the twelve individual vegetation plots exceeded the success criteria required for MY7 (Table 7, Appendix 3). Vegetation plot 12 had 202 stems per acre and did not meet the MY7 requirement. However, when counting volunteer trees, vegetation plot 12 had an average stem density of 567 stems per acre, which exceeds the MY7 requirement of 210 stems per acre. Vegetation plot 7 average tree height was an outlier from the surrounding area. Overall, average vegetation height surpassed the final success criteria of ten feet with the standard plots averaging 16.2 feet across the Site. Along with a successful early successional canopy starting to develop, the herbaceous vegetation is dense and providing appropriate streambank stabilization and wildlife habitat. Refer to Appendix 2 for vegetation plot photographs and the vegetation condition assessment table and Appendix 3 for vegetation data tables.

### 1.2.2 Vegetation Areas of Concern

Sporadic populations of Japanese honeysuckle (*Lonicera japonica*), multiflora rose (*Rosa multiflora*), and Chinese Privet (*Ligustrum sinense*) were treated throughout the Site in July 2022. A follow up invasive vegetation treatment will occur during in the winter of 2022 to check for resprouts.

During MY7, vegetation was trimmed off of the fence to ensure fence integrity, cattle exclusion, and signage visibility. Additional signage was added along the east and north wooded boundaries in August 2022.



### **1.2.3 Stream Assessment**

Morphological surveys for MY7 were conducted in March 2022. All streams within the Site are stable and met success criteria for MY7. Seven out of the eight cross-sections at the Site show little to no change in the bankfull area, maximum depth ratio, or width-to-depth ratio. Bank height ratios fall within the appropriate Rosgen stream type parameters. Cross-section 8 and sections of UT2A have experienced large amounts of sediment from off-site material in previous monitoring years. The majority of the sediment plume seems to have washed into the stream during one monitoring year and is making its way through the system. Over the course of several site walks the sediment continues to move downstream, and only small amounts of sediment look to be washing into the stream from off-site. This large sediment plume seems to be a one-time event. After reviewing aerial photographs, there have been no major land use changes upstream of the project that would have caused this large amount of sediment to enter the stream. This sediment is expected to continue to move through the system and has not caused any stability issues to the stream. 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. Longitudinal profile surveys are not required on the project unless visual inspection indicates reach wide vertical instability. Refer to Appendix 2 for the visual stability assessment table, Current Condition Plan View (CCPV) map, and stream photographs. Refer to Appendix 4 for the morphological data and plots.

### **1.2.4 Stream Areas of Concern**

No stream areas of concern were identified during MY7.

### **1.2.5 Hydrology Assessment**

At the end of the seven-year monitoring period, two or more bankfull events must have occurred in separate years within the restoration reaches. Two bankfull events were recorded on all restoration reaches during MY7 and multiple bankfull events were recorded on each reach throughout the monitoring years, resulting in attainment of the stream hydrology assessment criteria. Refer to Appendix 5 for hydrologic data.

### **1.2.6 Maintenance Plan**

Additional invasive species treatment is scheduled for the winter of 2022 to continue treating sporadic new growth of invasive vegetation.

The polytape along the conservation easement boundary of UT1 is scheduled to be fully clear of vegetation in January 2023 to help maintain a visible boundary.

## **1.3 Monitoring Year 7 Summary**

Eleven of the twelve vegetation plots met the final success criteria of 210 planted stems per acre as noted in the CCPV. Stream bank stabilization and wildlife habitat have improved with the increase of dense herbaceous vegetation. In July 2022, an invasive vegetation treatment occurred across the Site to treat small sporadic populations of invasive species. The Site will continue to receive follow up invasive treatment until closeout. Additional signage was added along the boundary and vegetation was cleared along the fence. Vegetation along the polytape will be cleared to maintain a visible boundary along UT1. Hydrology criteria has been successfully completed for the duration of the project and two bankfull events were recorded on each stream during MY7. The project successfully restored and enhanced 8,717 linear feet of stream to provide drastic ecological, water quality, and habitat benefits relative to the pre-restoration condition of the site.



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. Narrative background and supporting information formerly found in these reports can be found in the Mitigation Plan documents available on DMS's website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.



## Section 2: REFERENCES

---

- Doll, B.A., Grabow, G.L., Hall, K.A., Halley, J., Harman, W.A., Jennings, G.D., and Wise, D.E. 2003. Stream Restoration A Natural Channel Design Handbook.
- Harrelson, C.C., Rawlins, C.L., Potyondy, J.P. 1994. *Stream Channel Reference Sites: An Illustrated Guide to Field Technique*. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p.
- Lee, M.T., Peet, R.K., S.D., Wentworth, T.R. 2008. CVS-EEP Protocol for Recording Vegetation Version 4.2. Retrieved from <http://cvs.bio.unc.edu/protocol/cvs-eep-protocol-v4.2-lev1-5.pdf>.
- Rosgen, D. L. 1994. A classification of natural rivers. *Catena* 22:169-199.
- Rosgen, D.L. 1996. Applied River Morphology. Pagosa Springs, CO: Wildland Hydrology Books.
- Rosgen, D.L. 1997. A Geomorphological Approach to Restoration of Incised Rivers. Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision. Center For Computational Hydroscience and Bioengineering, Oxford Campus, University of Mississippi, Pages 12-22.
- United States Army Corps of Engineers. 2003. Stream Mitigation Guidelines. USACE, NCDENR-DWQ, USEPA, NCWRC.
- United States Geological Survey. 1998. North Carolina Geology. <http://www.geology.enr.state.nc.us/usgs/carolina.htm>
- Wildlands Engineering, Inc. 2016. Holman Mill Mitigation Site Baseline Monitoring Document and As-Built Baseline Report. DMS, Raleigh, NC.
- Wildlands Engineering, Inc. 2015. Holman Mill Mitigation Project Mitigation Plan. DMS, Raleigh, NC.



## **APPENDIX 1. General Figures and Tables**

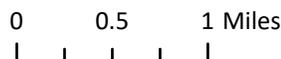
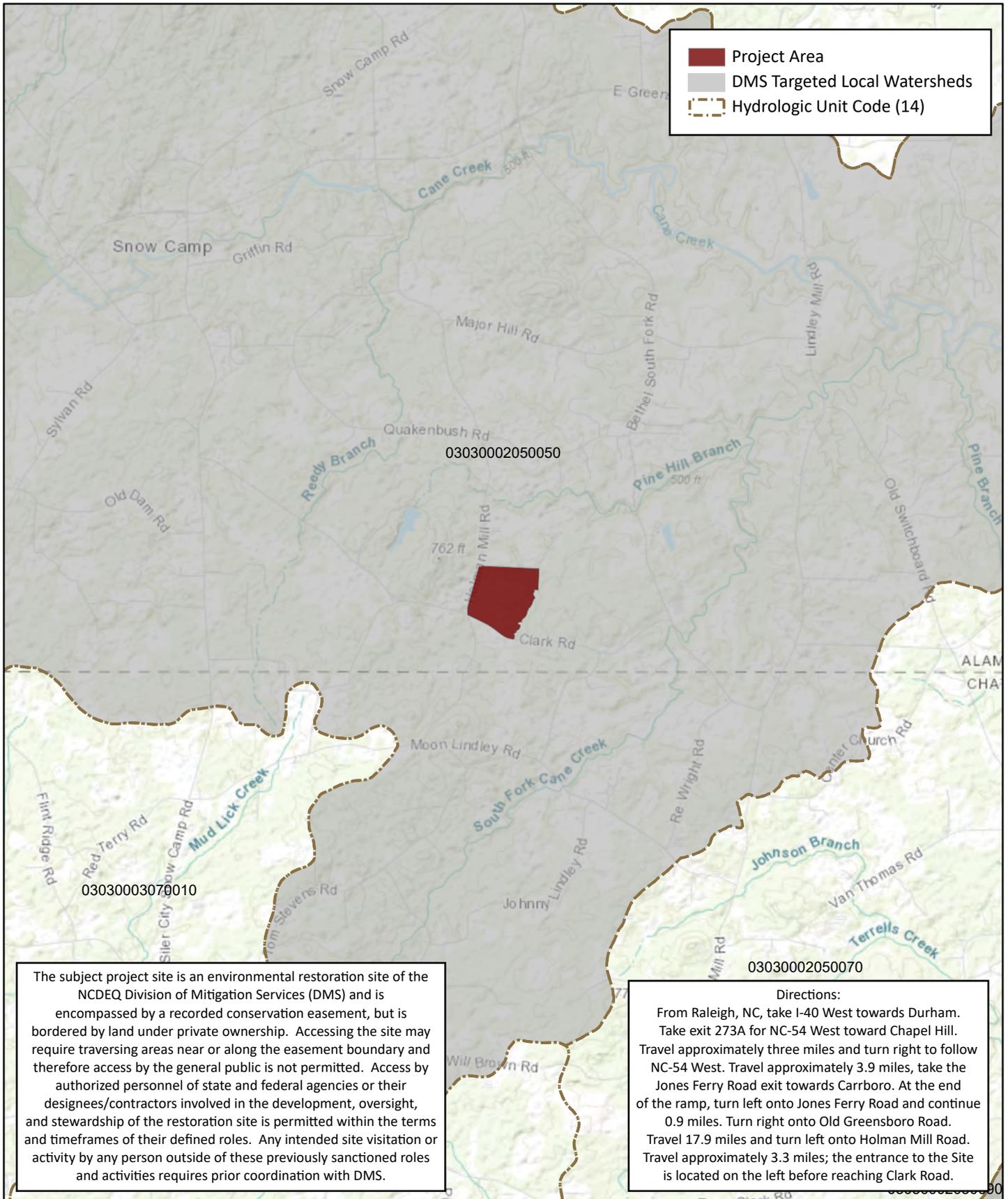


Figure 1 Project Vicinity Map  
 Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022  
 Alamance County, NC

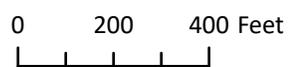
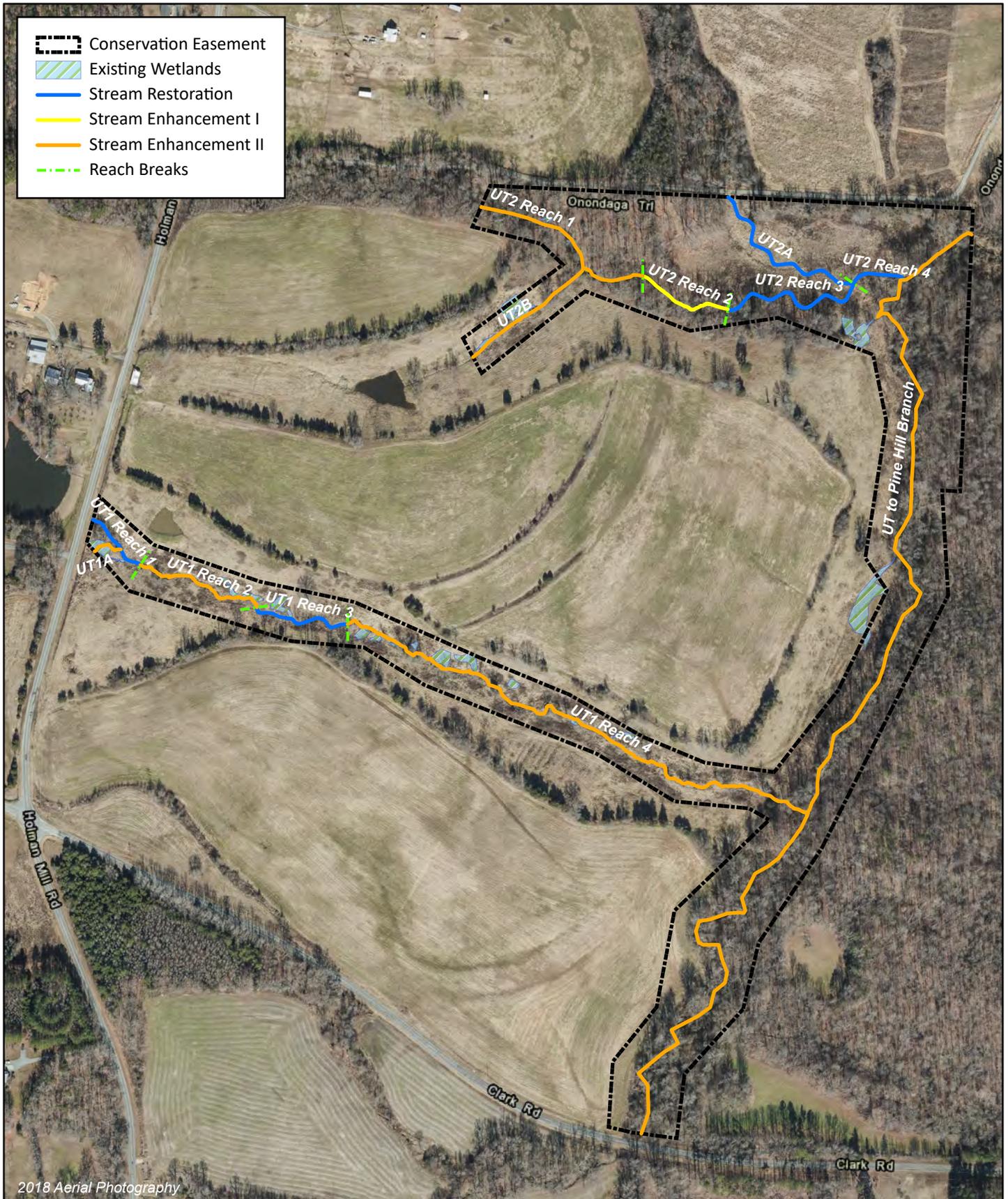


Figure 2 Project Component / Asset Map  
 Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022  
 Alamance County, NC

**Table 1. Project Components and Mitigation Credits**  
 Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

MITIGATION CREDITS									
	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	3,883.333	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PROJECT COMPONENTS									
Reach ID	As-Built Stationing / Location	Existing Footage / Acreage	Approach	Restoration or Restoration Equivalent	Restoration Footage / Acreage	Mitigation Ratio	Credits (SMU / WMU)		
STREAMS									
UT to Pine Hill Branch	600+00 - 635+26	3,526	EII	Restoration	3,526	5	705.200		
UT1 Reach 1	100+00 - 102+08	215	P1	Restoration	208	1	208.000		
UT1 Reach 2	102+08 - 106+31	433	EII	Restoration	423	2.5	169.200		
UT1 Reach 3	106+31 - 109+40	331	P1	Restoration	309	1	309.000		
UT1 Reach 4	109+40 - 125+98	1,687	EII	Restoration	1,658	2.5	663.200		
UT1A	400+00 - 400+94	84	EII	Restoration	94	2.5	37.600		
UT2A	300+00 - 305+40	468	P1	Restoration	540	1	540.000		
UT2 Reach 1	200+00 - 205+88	588	EII	Restoration	588	2.5	235.200		
UT2 Reach 2	205+88 - 208+81	298	E1	Restoration	293	1.5	195.333		
UT2 Reach 3	208+81 - 213+63	396	P1	Restoration	482	1	482.000		
UT2 Reach 4	213+63 - 215+30	242	P1	Restoration	167	1	167.000		
UT2B	500+00 - 504+29	429	EII	Restoration	429	2.5	171.600		
COMPONENT SUMMATION									
Restoration Level	Stream (LF)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Buffer (acres)	Upland (acres)			
		Riverine	Non-Riverine						
Restoration	1,706	-	-	-	-	-			
Enhancement		-	-	-	-	-			
Enhancement I	293								
Enhancement II	6,718								
Creation		-	-	-					
Preservation		-	-	-					
High Quality Preservation		-	-	-					

**Table 2. Project Activity and Reporting History**

Holman Mill Mitigation Site  
 DMS Project No. 96316  
**Monitoring Year 7 - 2022**

Activity or Report	Date Collection Complete	Completion or Scheduled Delivery
Mitigation Plan	April 2014 - April 2015	May 2015
Final Design - Construction Plans	May 2015 - October 2015	October 2015
Construction	January 2016 - March 2016	March 2016
Temporary S&E mix applied to entire project area <sup>1</sup>	March 2016	March 2016
Permanent seed mix applied to reach/segments <sup>1</sup>	March 2016	March 2016
Bare root and live stake plantings for reach/segments	March 2016	March 2016
Baseline Monitoring Document (Year 0)	Stream Survey	March 2016
	Vegetation Survey	March 2016
Year 1 Monitoring	Stream Survey	September 2016
	Vegetation Survey	September 2016
Year 2 Monitoring	Stream Survey	March 2017
	Vegetation Survey	August 2017
Year 3 Monitoring	Stream Survey	March 2018
	Vegetation Survey	August 2018
Replanting		December 2018
Sweetgum Removal		April 2019
Tree Release		April 2019
Fence Repaired		August 2019
Easement Encroachment		December 2019
Year 4 Monitoring		December 2019
Replanting		February 2020
Stream Repair		May 2020
Year 5 Monitoring	Stream Survey	March 2020
	Vegetation Survey	August 2020
Soil Amendments		March 2021
Invasive Vegetation Treatment		April 2021
Year 6 Monitoring		December 2021
Invasive Vegetation Treatment		July 2022
Year 7 Monitoring	Stream Survey	March 2022
	Vegetation Survey	August 2022

<sup>1</sup>Seed and mulch is added as each section of construction is completed.

**Table 3. Project Contact Table**

Holman Mill Mitigation Site  
 DMS Project No. 96316  
**Monitoring Year 7 - 2022**

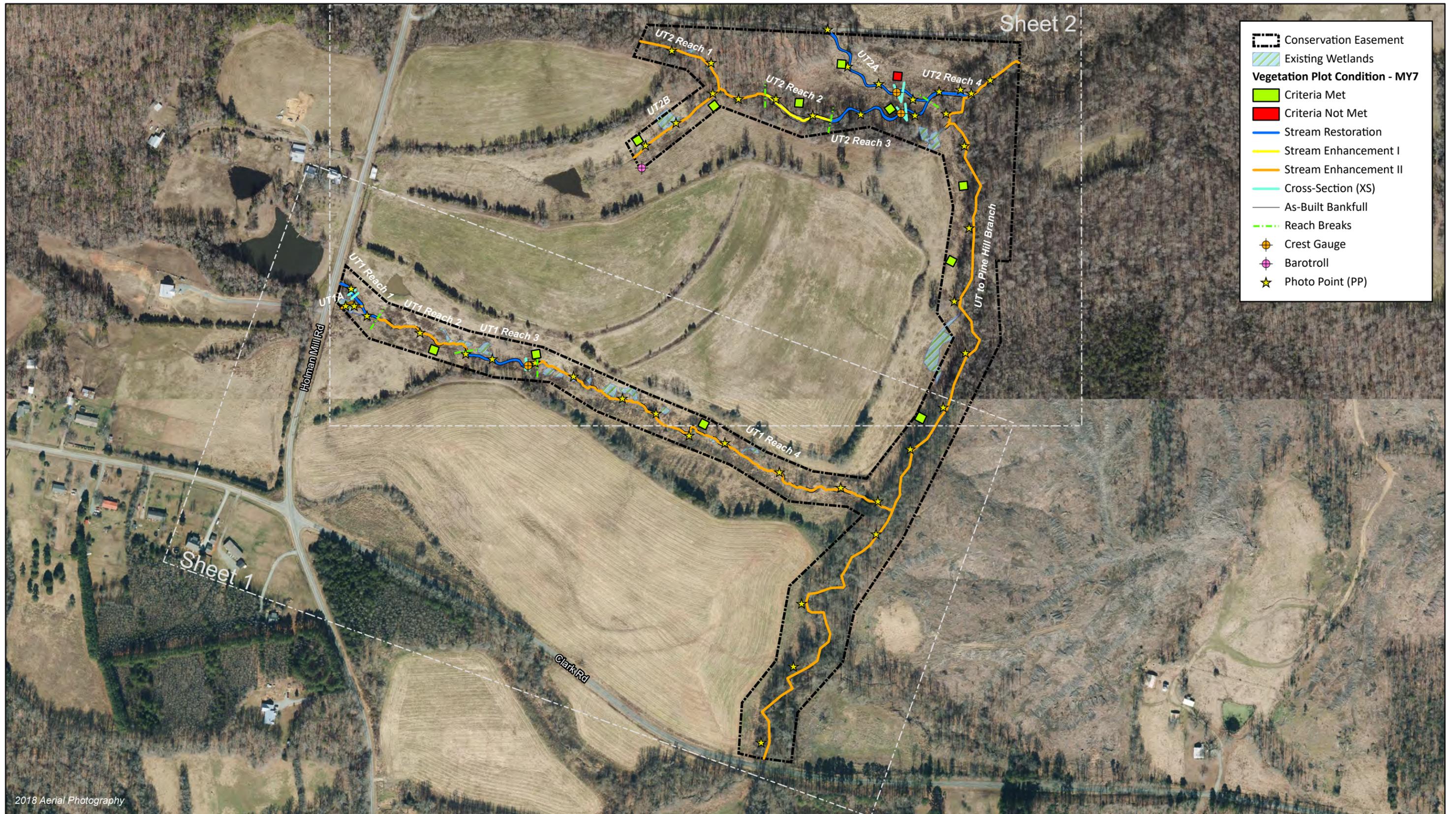
<b>Designer</b> Angela Allen, PE	<b>Wildlands Engineering, Inc.</b> 312 West Millbrook Road, Suite 225 Raleigh, NC 27609 919.851.9986, ext. 106
<b>Construction Contractor</b>	<b>Land Mechanic Designs, Inc.</b> 126 Circle G Lane Willow Spring, NC 27592
<b>Planting Contractor</b>	<b>Bruton Natural Systems, Inc</b> P.O. Box 1197 Fremont, NC 27830
<b>Seeding Contractor</b>	<b>Land Mechanic Designs, Inc.</b> 126 Circle G Lane Willow Spring, NC 27592
<b>Seed Mix Sources</b>	<b>Green Resource, LLC</b>
<b>Nursery Stock Suppliers</b> Bare Roots	<b>Dykes and Son Nursery</b>
<b>Live Stakes</b>	<b>Bruton Natural Systems, Inc</b>
<b>Monitoring Performers</b> Monitoring, POC	<b>Wildlands Engineering, Inc.</b> Jason Lorch 919.851.9986, ext. 107

**Table 4. Project Information and Attributes**

Holman Mill Mitigation Site  
 DMS Project No. 96316  
**Monitoring Year 7 - 2022**

PROJECT INFORMATION						
Project Name	Holman Mill Mitigation Site					
County	Alamance County					
Project Area (acres)	32.4 Acres					
Planted Area (acres)	14.0 Acres					
Project Coordinates (latitude and longitude)	35°51'310.12"N, 79°23'16.00"W					
PROJECT WATERSHED SUMMARY INFORMATION						
Physiographic Province	Carolina Slate Belt of the Piedmont Physiographic Province					
River Basin	Cape Fear River					
USGS Hydrologic Unit 8-digit	03030002					
USGS Hydrologic Unit 14-digit	03030002050050					
DWR Sub-basin	03-06-04					
Project Drainage Area (acres)	1,077					
Project Drainage Area Percentage of Impervious Area	3%					
CGIA Land Use Classification	49% Forested/Scrubland, 42% Agriculture/Managed Herbaceous, 4% Pasture, 3% Watershed Impervious Cover, 2% Residential, <1% Open Water					
REACH SUMMARY INFORMATION						
Parameters	UT to Pine Hill Branch	UT1	UT1A	UT2	UT2A	UT2B
Length of reach (linear feet) - Post-Restoration	3,526	2,598	94	1,530	540	429
Drainage area (acres)	1,077	102	20	130	47	18
NCDWR stream identification score	44.5	33.5/30.5	25.5	35	36.75	26.5
NCDWR Water Quality Classification	N/A					
Morphological Description (stream type)	P	P	I	P	P	I
Evolutionary trend (Simon's Model) - Pre- Restoration	I	II	NA	III/IV	III/IV	NA
Underlying mapped soils	Georgeville silty clay loam, Local alluvial land, Herndon silt loam, Goldston Channery silt loam					
Drainage class	---	---	---	---	---	---
Soil Hydric status	---	---	---	---	---	---
Slope	---	---	---	---	---	---
FEMA classification	AE	AE	---	AE	AE	---
Native vegetation community	Piedmont bottomland forest, Bottomland hardwood forest					
Percent composition exotic invasive vegetation - Post-Restoration	0%					
REGULATORY CONSIDERATIONS						
Regulation	Applicable?	Resolved?	Supporting Documentation			
Waters of the United States - Section 404	Yes	Yes	USACE Nationwide Permit No.27 and DWQ			
Waters of the United States - Section 401	Yes	Yes	401 Water Quality Certification No. 3885.			
Division of Land Quality (Dam Safety)	No	N/A	N/A			
Endangered Species Act	Yes	Yes	Holman Mill Mitigation Plan (2015); Wildlands determined "no effect" on Alamance County listed endangered species.			
Historic Preservation Act	Yes	Yes	No historic resources were found to be impacted (letter from SHPO dated 3/24/14).			
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A			
FEMA Floodplain Compliance	Yes	Yes	UT to Pine Hill Branch and portions of UT2 and UT2A are located within the floodway and flood fringe (FEMA Zone AE, FIRM panel 8786).			
Essential Fisheries Habitat	No	N/A	N/A			

## **APPENDIX 2. Visual Assessment Data**





2018 Aerial Photography

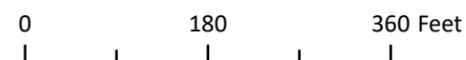


Figure 3.1 Integrated Current Condition Plan View  
 Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022



Figure 3.2 Integrated Current Condition Plan View  
 Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

**Table 5a. Visual Stream Morphology Stability Assessment Table**

Holman Mill Mitigation Project  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

UT1 - 2,598 lf

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	14	14			100%			
	3. Meander Pool Condition	Depth Sufficient	13	13			100%			
		Length Appropriate	13	13			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	12	12			100%			
		Thalweg centering at downstream of meander bend (Glide)	13	13			100%			
<b>Totals</b>					0	0	100%	n/a	n/a	n/a
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
3. Engineered Structures <sup>1</sup>	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	10	10			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	10	10			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	10	10			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	10	10			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	10	10			100%			

<sup>1</sup>Excludes constructed riffles since they are evaluated in section 1.

**Table 5b. Visual Stream Morphology Stability Assessment Table**

Holman Mill Mitigation Project  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

**UT1A - 94 lf**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
<b>1. Bed</b>	<b>1. Vertical Stability (Riffle and Run Units)</b>	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	<b>2. Riffle Condition</b>	Texture/Substrate	3	3			100%			
	<b>3. Meander Pool Condition</b>	Depth Sufficient	n/a	n/a			n/a			
		Length Appropriate	n/a	n/a			n/a			
	<b>4. Thalweg Position</b>	Thalweg centering at upstream of meander bend (Run)	n/a	n/a			n/a			
		Thalweg centering at downstream of meander bend (Glide)	n/a	n/a			n/a			
<b>Totals</b>					0	0	100%	n/a	n/a	n/a
<b>2. Bank</b>	<b>1. Scoured/Eroded</b>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	n/a	n/a	n/a
	<b>2. Undercut</b>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	<b>3. Mass Wasting</b>	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
<b>3. Engineered Structures<sup>1</sup></b>	<b>1. Overall Integrity</b>	Structures physically intact with no dislodged boulders or logs.	n/a	n/a			n/a			
	<b>2. Grade Control</b>	Grade control structures exhibiting maintenance of grade across the sill.	n/a	n/a			n/a			
	<b>2a. Piping</b>	Structures lacking any substantial flow underneath sills or arms.	n/a	n/a			n/a			
	<b>3. Bank Protection</b>	Bank erosion within the structures extent of influence does not exceed 15%.	n/a	n/a			n/a			
	<b>4. Habitat</b>	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	n/a	n/a			n/a			

<sup>1</sup>Excludes constructed riffles since they are evaluated in section 1.

**Table 5c. Visual Stream Morphology Stability Assessment Table**

Holman Mill Mitigation Project  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

**UT2 - 1,530 lf**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
<b>1. Bed</b>	<b>1. Vertical Stability (Riffle and Run Units)</b>	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	<b>2. Riffle Condition</b>	Texture/Substrate	14	14			100%			
	<b>3. Meander Pool Condition</b>	Depth Sufficient	10	10			100%			
		Length Appropriate	10	10			100%			
	<b>4. Thalweg Position</b>	Thalweg centering at upstream of meander bend (Run)	13	13			100%			
		Thalweg centering at downstream of meander bend (Glide)	13	13			100%			
<b>Totals</b>					0	0	100%	n/a	n/a	n/a
<b>2. Bank</b>	<b>1. Scoured/Eroded</b>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	n/a	n/a	n/a
	<b>2. Undercut</b>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	<b>3. Mass Wasting</b>	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
<b>Totals</b>					0	0	100%	n/a	n/a	n/a
<b>3. Engineered Structures<sup>1</sup></b>	<b>1. Overall Integrity</b>	Structures physically intact with no dislodged boulders or logs.	3	3			100%			
	<b>2. Grade Control</b>	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	<b>2a. Piping</b>	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	<b>3. Bank Protection</b>	Bank erosion within the structures extent of influence does not exceed 15%.	3	3			100%			
	<b>4. Habitat</b>	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	3	3			100%			

<sup>1</sup>Excludes constructed riffles since they are evaluated in section 1.

**Table 5d. Visual Stream Morphology Stability Assessment Table**

Holman Mill Mitigation Project  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

**UT2A - 540 If**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
<b>1. Bed</b>	<b>1. Vertical Stability (Riffle and Run Units)</b>	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	<b>2. Riffle Condition</b>	Texture/Substrate	11	11			100%			
	<b>3. Meander Pool Condition</b>	Depth Sufficient	10	10			100%			
		Length Appropriate	10	10			100%			
	<b>4. Thalweg Position</b>	Thalweg centering at upstream of meander bend (Run)	11	11			100%			
		Thalweg centering at downstream of meander bend (Glide)	10	10			100%			
<b>Totals</b>					0	0	100%	n/a	n/a	n/a
<b>2. Bank</b>	<b>1. Scoured/Eroded</b>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	n/a	n/a	n/a
	<b>2. Undercut</b>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	<b>3. Mass Wasting</b>	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
<b>Totals</b>					0	0	100%	n/a	n/a	n/a
<b>3. Engineered Structures<sup>1</sup></b>	<b>1. Overall Integrity</b>	Structures physically intact with no dislodged boulders or logs.	2	2			100%			
	<b>2. Grade Control</b>	Grade control structures exhibiting maintenance of grade across the sill.	2	2			100%			
	<b>2a. Piping</b>	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	<b>3. Bank Protection</b>	Bank erosion within the structures extent of influence does not exceed 15%.	2	2			100%			
	<b>4. Habitat</b>	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	2	2			100%			

<sup>1</sup>Excludes constructed riffles since they are evaluated in section 1.

**Table 5e. Visual Stream Morphology Stability Assessment Table**

Holman Mill Mitigation Project  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

UT2B - 429 If

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	n/a	n/a			n/a			
	3. Meander Pool Condition	Depth Sufficient	n/a	n/a			n/a			
		Length Appropriate	n/a	n/a			n/a			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	n/a	n/a			n/a			
		Thalweg centering at downstream of meander bend (Glide)	n/a	n/a			n/a			
<b>Totals</b>					0	0	100%	n/a	n/a	n/a
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
3. Engineered Structures <sup>1</sup>	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	n/a	n/a			n/a			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	n/a	n/a			n/a			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	n/a	n/a			n/a			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	n/a	n/a			n/a			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	n/a	n/a			n/a			

<sup>1</sup>Excludes constructed riffles since they are evaluated in section 1.

**Table 5f. Visual Stream Morphology Stability Assessment Table**

Holman Mill Mitigation Project  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

**UT to Pine Hill Branch - 3,526 lf**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
<b>1. Bed</b>	<b>1. Vertical Stability (Riffle and Run Units)</b>	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	<b>2. Riffle Condition</b>	Texture/Substrate	n/a	n/a			n/a			
	<b>3. Meander Pool Condition</b>	Depth Sufficient	n/a	n/a			n/a			
		Length Appropriate	n/a	n/a			n/a			
	<b>4. Thalweg Position</b>	Thalweg centering at upstream of meander bend (Run)	n/a	n/a			n/a			
		Thalweg centering at downstream of meander bend (Glide)	n/a	n/a			n/a			
<b>Totals</b>					0	0	100%	n/a	n/a	n/a
<b>2. Bank</b>	<b>1. Scoured/Eroded</b>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	n/a	n/a	n/a
	<b>2. Undercut</b>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	<b>3. Mass Wasting</b>	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
<b>3. Engineered Structures<sup>1</sup></b>	<b>1. Overall Integrity</b>	Structures physically intact with no dislodged boulders or logs.	n/a	n/a			n/a			
	<b>2. Grade Control</b>	Grade control structures exhibiting maintenance of grade across the sill.	n/a	n/a			n/a			
	<b>2a. Piping</b>	Structures lacking any substantial flow underneath sills or arms.	n/a	n/a			n/a			
	<b>3. Bank Protection</b>	Bank erosion within the structures extent of influence does not exceed 15%.	n/a	n/a			n/a			
	<b>4. Habitat</b>	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	n/a	n/a			n/a			

<sup>1</sup>Excludes constructed riffles since they are evaluated in section 1.

**Table 6. Vegetation Condition Assessment Table**

Holman Mill Mitigation Project

DMS Project No. 96316

Monitoring Year 7 - 2022

**Planted Acreage 14.0**

Vegetation Category	Definitions	Mapping Threshold (Ac)	Number of Polygons	Combined Acreage	% of Planted Acreage
<b>Bare Areas</b>	Very limited cover of both woody and herbaceous material	0.1	0	0	0%
<b>Low Stem Density Areas</b>	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0.0	0%
<b>Total</b>			<b>0</b>	<b>0.0</b>	<b>0%</b>
<b>Areas of Poor Growth Rates or Vigor</b>	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 Ac	0	0	0%
<b>Cumulative Total</b>			<b>0</b>	<b>0.0</b>	<b>0%</b>

**Easement Acreage 32.4**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Easement Acreage
<b>Invasive Areas of Concern</b>	Areas of points (if too small to render as polygons at map scale).	1,000	0	0	0%
<b>Easement Encroachment Areas</b>	Areas of points (if too small to render as polygons at map scale).	none	0	0.0	0%

## **Stream Photographs**



**PHOTO POINT 1 UT1A – looking upstream (04/06/2022)**



**PHOTO POINT 1 UT1A – looking downstream (04/06/2022)**



**PHOTO POINT 2 UT1A – looking upstream (04/06/2022)**



**PHOTO POINT 2 UT1A – looking downstream (04/06/2022)**



**PHOTO POINT 3 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 3 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 4 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 4 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 5 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 5 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 6 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 6 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 7 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 7 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 8 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 8 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 9 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 9 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 10 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 10 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 11 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 11 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 12 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 12 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 13 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 13 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 14 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 14 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 15 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 15 UT1 – looking downstream (04/06/2022)**



**PHOTO POINT 16 UT1 – looking upstream (04/06/2022)**



**PHOTO POINT 16 UT1 – looking downstream (04/06/2022)**



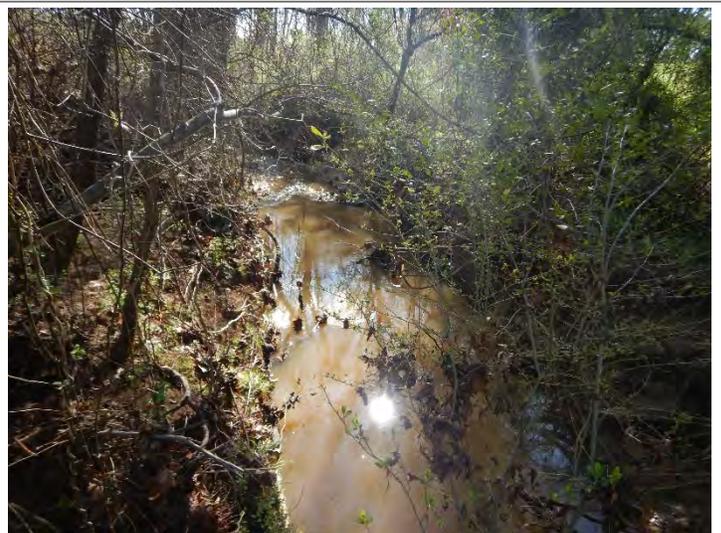
**PHOTO POINT 17 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 17 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 18 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 18 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 19 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 19 UT - PHB – looking downstream (04/06/2022)**



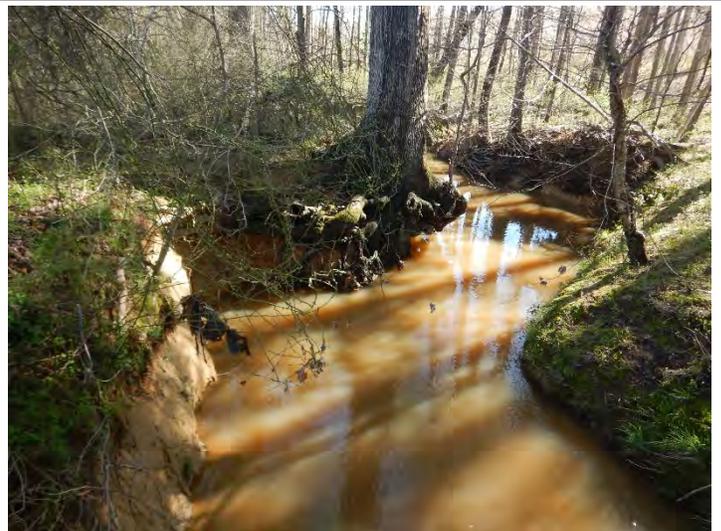
**PHOTO POINT 20 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 20 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 21 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 21 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 22 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 22 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 23 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 23 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 24 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 24 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 25 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 25 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 26 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 26 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 27 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 27 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 28 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 28 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 29 UT - PHB – looking upstream (04/06/2022)**



**PHOTO POINT 29 UT - PHB – looking downstream (04/06/2022)**



**PHOTO POINT 30 UT2B – looking upstream (04/06/2022)**



**PHOTO POINT 30 UT2B – looking downstream (04/06/2022)**



**PHOTO POINT 31 UT2B – looking upstream (04/06/2022)**



**PHOTO POINT 31 UT2B – looking downstream (04/06/2022)**



**PHOTO POINT 32 UT2B – looking upstream (04/06/2022)**



**PHOTO POINT 32 UT2B – looking downstream (04/06/2022)**



**PHOTO POINT 33 UT2 – looking upstream (04/06/2022)**



**PHOTO POINT 33 UT2 – looking downstream (04/06/2022)**



**PHOTO POINT 34 UT2 – looking upstream (04/06/2022)**



**PHOTO POINT 34 UT2 – looking downstream (04/06/2022)**



**PHOTO POINT 35 UT2 – looking upstream (04/06/2022)**



**PHOTO POINT 35 UT2 – looking downstream (04/06/2022)**



**PHOTO POINT 36 UT2 – looking upstream (04/06/2022)**



**PHOTO POINT 36 UT2 – looking downstream (04/06/2022)**



**PHOTO POINT 37 UT2 – looking upstream (04/06/2022)**



**PHOTO POINT 37 UT2 – looking downstream (04/06/2022)**



**PHOTO POINT 38 UT2 – looking upstream (04/06/2022)**



**PHOTO POINT 38 UT2 – looking downstream (04/06/2022)**



**PHOTO POINT 39 UT2 – looking upstream (04/06/2022)**



**PHOTO POINT 39 UT2 – looking downstream (04/06/2022)**



**PHOTO POINT 40 UT2 – looking upstream (04/06/2022)**



**PHOTO POINT 40 UT2 – looking downstream (04/06/2022)**



**PHOTO POINT 41 UT2 – looking upstream (04/06/2022)**



**PHOTO POINT 41 UT2 – looking downstream (04/06/2022)**



**PHOTO POINT 42 UT2A – looking upstream (04/06/2022)**



**PHOTO POINT 42 UT2A – looking downstream (04/06/2022)**



**PHOTO POINT 43 UT2A – looking upstream (04/06/2022)**



**PHOTO POINT 43 UT2A – looking downstream (04/06/2022)**



**PHOTO POINT 44 UT2A – looking upstream (04/06/2022)**



**PHOTO POINT 44 UT2A – looking downstream (04/06/2022)**



**PHOTO POINT 45 UT2A – looking upstream (04/06/2022)**



**PHOTO POINT 45 UT2A – looking downstream (04/06/2022)**

## **Vegetation Photographs**



**Vegetation Plot 1 (08/11/2022)**



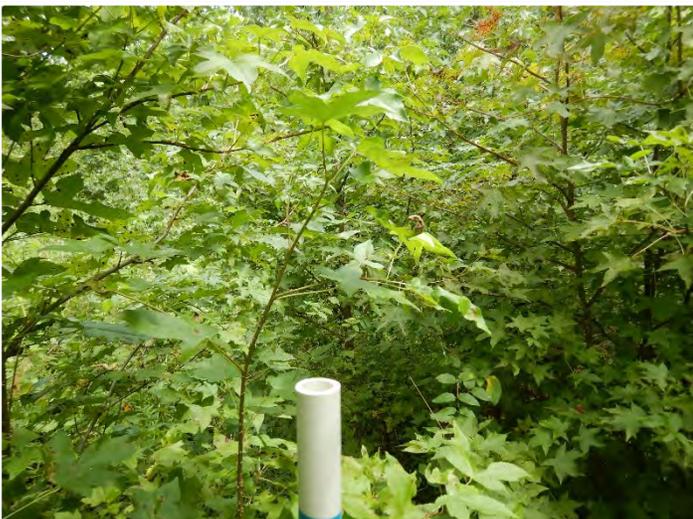
**Vegetation Plot 2 (08/11/2022)**



**Vegetation Plot 3 (08/11/2022)**



**Vegetation Plot 4 (08/11/2022)**



**Vegetation Plot 5 (08/11/2022)**



**Vegetation Plot 6 (08/11/2022)**



**Vegetation Plot 7 (08/11/2022)**



**Vegetation Plot 8 (08/11/2022)**



**Vegetation Plot 9 (08/11/2022)**



**Vegetation Plot 10 (08/11/2022)**



**Vegetation Plot 11 (08/11/2022)**



**Vegetation Plot 12 (08/11/2022)**

### **APPENDIX 3. Vegetation Plot Data**

**Table 7a. Vegetation Plot Criteria Attainment Table**

Holman Mill Mitigation Project

DMS Project No. 96316

**Monitoring Year 7 - 2022**

Plot	Success Criteria Met	Tract Mean
1	Yes	92%
2	Yes	
3	Yes	
4	Yes	
5	Yes	
6	Yes	
7	Yes	
8	Yes	
9	Yes	
10	Yes	
11	Yes	
12	No*	

\*Vegetation Plot 12 does not meet the final success criteria for MY7 of 210 planted stems per acre. However, when including desirable volunteers Vegetation Plot 12 does meet the final success criteria for MY7 of 210 planted stems per acre.

**Table 7b. Average Height by Plot**

Holman Mill Mitigation Project

DMS Project No. 96316

**Monitoring Year 7 - 2022**

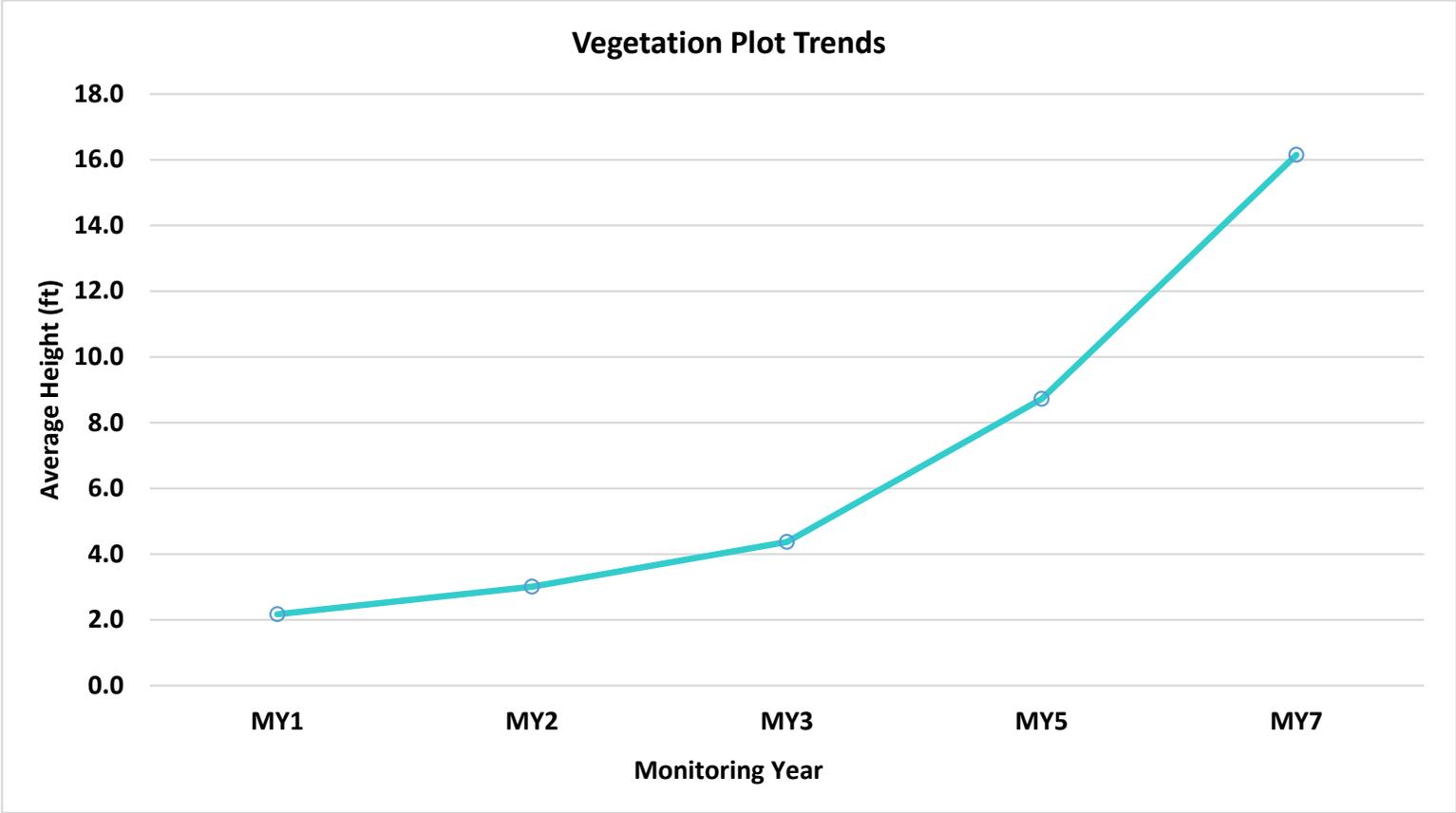
<b>Plot</b>	<b>MY1</b>	<b>MY2</b>	<b>MY3</b>	<b>MY5</b>	<b>MY7</b>
<b>1</b>	2.3	4.2	5.6	10.5	20.9
<b>2</b>	2.2	3.0	4.1	8.5	17.3
<b>3</b>	2.5	3.8	5.3	9.1	17.5
<b>4</b>	2.3	2.6	3.6	5.4	9.3
<b>5</b>	2.5	3.1	3.8	5.8	10.0
<b>6</b>	2.0	2.5	3.3	5.6	8.9
<b>7</b>	1.6	1.7	2.1	3.7	6.8
<b>8</b>	1.9	3.1	4.4	8.5	13.9
<b>9</b>	2.2	2.6	4.1	10.4	23.2
<b>10</b>	2.2	4.1	7.6	15.2	26.4
<b>11</b>	2.4	3.1	5.2	14.5	25.3
<b>12</b>	2.0	2.4	3.3	7.3	14.3
<b>Average</b>	<b>2.2</b>	<b>3.0</b>	<b>4.4</b>	<b>8.7</b>	<b>16.2</b>

**Graph 1. Vegetation Plot Trends**

Holman Mill Mitigation Project

DMS Project No. 96316

**Monitoring Year 7 - 2022**



**Table 8. CVS Vegetation Tables - Metadata**

Holman Mill Mitigation Project  
DMS Project No. 96316  
**Monitoring Year 7 - 2022**

<b>Report Prepared By</b>	Carolyn Lanza
<b>Date Prepared</b>	8/15/2022 7:28
<b>Database Name</b>	Holman Mill MY7- cvs-eep-entrytool-v2.5.0.mdb
<b>Database Location</b>	C:\Users\clanza\Documents
<b>Computer Name</b>	CAROLYN-PC
<b>File Size</b>	50237440
<b>DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----</b>	
<b>Metadata</b>	Description of database file, the report worksheets, and a summary of project(s) and project data.
<b>Project Planted</b>	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
<b>Project Total Stems</b>	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
<b>Plots</b>	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
<b>Vigor</b>	Frequency distribution of vigor classes for stems for all plots.
<b>Vigor by Spp</b>	Frequency distribution of vigor classes listed by species.
<b>Damage</b>	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
<b>Damage by Spp</b>	Damage values tallied by type for each species.
<b>Damage by Plot</b>	Damage values tallied by type for each plot.
<b>Planted Stems by Plot and Spp</b>	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
<b>ALL Stems by Plot and Spp</b>	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
<b>PROJECT SUMMARY-----</b>	
<b>Project Code</b>	96316
<b>Project Name</b>	Holman Mill Mitigation Project
<b>Description</b>	Stream Restoration Project
<b>Sampled Plots</b>	12

**Table 9. Planted and Total Stem Counts**

Holman Mill Mitigation Project

DMS Project No. 96316

Monitoring Year 7 - 2022

Scientific Name	Common Name	Species Type	Current Plot Data (MY7 2022)																	
			VP 1			VP 2			VP 3			VP 4			VP 5			VP 6		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
<i>Alnus serrulata</i>	Tag Alder	Shrub Tree																		
<i>Betula nigra</i>	River Birch	Tree	5	5	5	4	4	4	3	3	3				1	1	2			
<i>Calycanthus floridus</i>	Sweet-shrub	Shrub																		
<i>Cephalanthus occidentalis</i>	Buttonbush	Shrub Tree												1						
<i>Diospyros virginiana</i>	American Persimmon	Tree															1			
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree	6	6	6	4	4	4	3	3	3	5	5	5	5	5	5	7	7	9
<i>Juglans nigra</i>	Black Walnut	Tree																		
<i>Juniperus virginiana</i>	Eastern Red Cedar	Tree																		
<i>Ligustrum sinense</i>	Chinese Privet	Exotic																		
<i>Liquidambar styraciflua</i>	Sweet Gum	Tree															11		4	
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree							4	4	4	2	2	2	3	3	3			
<i>Nyssa biflora</i>	Swamp Tupelo	Tree																		
<i>Platanus occidentalis</i>	Sycamore	Tree												1	1	1				
<i>Quercus palustris</i>	Pin Oak	Tree				2	2	2	2	2	2	1	1	1	1	1	1	3	3	3
<i>Quercus phellos</i>	Willow Oak	Tree	1	1	1	1	1	1												
<i>Rhus copallinum</i>	Winged Sumac	Shrub Tree																		
<i>Salix nigra</i>	Black Willow	Tree																		
<i>Symphoricarpos orbiculatus</i>	Coralberry	Shrub																		
<i>Ulmus alata</i>	Winged Elm	Tree			1			1									2		8	
<i>Ulmus americana</i>	American Elm	Tree												2						
<i>Viburnum prunifolium</i>	Black Haw	Shrub Tree																		
<b>Stem count</b>			12	12	13	11	11	12	12	12	12	8	8	11	11	11	15	10	10	20
<b>size (ares)</b>			1			1			1			1			1			1		
<b>size (ACRES)</b>			0.02			0.02			0.02			0.02			0.02			0.02		
<b>Species count</b>			3	3	4	4	4	5	4	4	4	3	3	5	5	5	8	2	2	4
<b>Stems per ACRE</b>			486	486	526	445	445	486	486	486	486	324	324	445	445	445	607	405	405	809

**Color for Density**

- Exceeds requirements by 10%
- Exceeds requirements, but by less than 10%
- Fails to meet requirements, by less than 10%
- Fails to meet requirements by more than 10%
- Volunteers

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes

T: Total Stems

**Table 9. Planted and Total Stem Counts**

Holman Mill Mitigation Project

DMS Project No. 96316

Monitoring Year 7 - 2022

Scientific Name	Common Name	Species Type	Current Plot Data (MY7 2022)																	
			VP 7			VP 8			VP 9			VP 10			VP 11			VP 12		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
<i>Alnus serrulata</i>	Tag Alder	Shrub Tree																		
<i>Betula nigra</i>	River Birch	Tree							1	1	1	5	5	5	4	4	4	1	1	1
<i>Calycanthus floridus</i>	Sweet-shrub	Shrub																		
<i>Cephalanthus occidentalis</i>	Buttonbush	Shrub Tree																		
<i>Diospyros virginiana</i>	American Persimmon	Tree																		
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree	3	3	9	3	3	3			6									
<i>Juglans nigra</i>	Black Walnut	Tree														5				
<i>Juniperus virginiana</i>	Eastern Red Cedar	Tree			1						1									
<i>Ligustrum sinense</i>	Chinese Privet	Exotic																		
<i>Liquidambar styraciflua</i>	Sweet Gum	Tree			16			20			2			1						9
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree									2				1	1	1			
<i>Nyssa biflora</i>	Swamp Tupelo	Tree																		
<i>Platanus occidentalis</i>	Sycamore	Tree	2	2	2	3	3	3	8	8	8	2	2	2	2	2	2	2	2	2
<i>Quercus palustris</i>	Pin Oak	Tree	2	2	2				1	1	1	1	1	1	1	1	1	1	1	1
<i>Quercus phellos</i>	Willow Oak	Tree	5	5	5	4	4	14	2	2	2	2	2	8	3	3	3	1	1	1
<i>Rhus copallinum</i>	Winged Sumac	Shrub Tree																		
<i>Salix nigra</i>	Black Willow	Tree																		
<i>Symphoricarpos orbiculatus</i>	Coralberry	Shrub																		
<i>Ulmus alata</i>	Winged Elm	Tree			5			6						3						8
<i>Ulmus americana</i>	American Elm	Tree																		
<i>Viburnum prunifolium</i>	Black Haw	Shrub Tree																		1
<b>Stem count</b>			12	12	24	10	10	26	12	12	21	10	10	19	11	11	16	5	5	14
<b>size (ares)</b>			1			1			1			1			1			1		
<b>size (ACRES)</b>			0.02			0.02			0.02			0.02			0.02			0.02		
<b>Species count</b>			4	4	7	3	3	5	4	4	8	4	4	6	5	5	6	4	4	7
<b>Stems per ACRE</b>			486	486	971	405	405	1,052	486	486	850	405	405	769	445	445	647	202	202	567

**Color for Density**

- Exceeds requirements by 10%
- Exceeds requirements, but by less than 10%
- Fails to meet requirements, by less than 10%
- Fails to meet requirements by more than 10%
- Volunteers

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes

T: Total Stems

**Table 9. Planted and Total Stem Counts**

Holman Mill Mitigation Project

DMS Project No. 96316

Monitoring Year 7 - 2022

Scientific Name	Common Name	Species Type	Annual Means																	
			MY7 (2022)			MY5 (2020)			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
<i>Alnus serrulata</i>	Tag Alder	Shrub Tree						1												
<i>Betula nigra</i>	River Birch	Tree	24	24	25	26	26	26	27	27	27	27	27	27	28	28	28	31	31	31
<i>Calycanthus floridus</i>	Sweet-shrub	Shrub									1									
<i>Cephalanthus occidentalis</i>	Buttonbush	Shrub Tree			1			1												
<i>Diospyros virginiana</i>	American Persimmon	Tree			1															
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree	36	36	50	38	38	52	40	40	52	42	42	44	39	39	39	39	39	39
<i>Juglans nigra</i>	Black Walnut	Tree			5			7												
<i>Juniperus virginiana</i>	Eastern Red Cedar	Tree			2						1			1						
<i>Ligustrum sinense</i>	Chinese Privet	Exotic						3												
<i>Liquidambar styraciflua</i>	Sweet Gum	Tree			63			66			85			26						
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree	10	10	12	12	12	15	13	13	13	14	14	16	33	33	33	35	35	35
<i>Nyssa biflora</i>	Swamp Tupelo	Tree						1												
<i>Platanus occidentalis</i>	Sycamore	Tree	20	20	20	21	21	21	23	23	23	22	22	22	41	41	41	45	45	45
<i>Quercus palustris</i>	Pin Oak	Tree	15	15	15	15	15	15	15	15	15	15	15	15	18	18	18	18	18	18
<i>Quercus phellos</i>	Willow Oak	Tree	19	19	35	19	19	25	20	20	21	20	20	20	20	20	20	20	20	20
<i>Rhus copallinum</i>	Winged Sumac	Shrub Tree									4									
<i>Salix nigra</i>	Black Willow	Tree						4			7			3						
<i>Symphoricarpos orbiculatus</i>	Coralberry	Shrub									1									
<i>Ulmus alata</i>	Winged Elm	Tree			34			34			27			10						
<i>Ulmus americana</i>	American Elm	Tree			2			8			9									
<i>Viburnum prunifolium</i>	Black Haw	Shrub Tree			1															
<b>Stem count</b>			124	124	203	131	131	210	138	138	201	140	140	156	179	179	179	188	188	188
<b>size (ares)</b>			12			12			12			12			12			12		
<b>size (ACRES)</b>			0.30			0.30			0.30			0.30			0.30			0.30		
<b>Species count</b>			6	6	14	6	6	15	6	6	14	6	6	10	6	6	6	6	6	6
<b>Stems per ACRE</b>			418	418	685	442	442	708	465	465	678	472	472	526	604	604	604	634	634	634

**Color for Density**

- Exceeds requirements by 10%
- Exceeds requirements, but by less than 10%
- Fails to meet requirements, by less than 10%
- Fails to meet requirements by more than 10%
- Volunteers

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes

T: Total Stems

## **APPENDIX 4. Morphological Summary Data and Plots**

**Table 10a. Baseline Stream Data Summary**  
 Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

**UT1**

Parameter	Gage	PRE-RESTORATION	REFERENCE REACH DATA						DESIGN		AS-BUILT/BASELINE		
		UT1 - Reach 1/3	Agony Acres UT1A- Reach 1		UT to Polecat Creek		UT to Varnals Creek		UT1 - Reach 1/3		UT1 - Reach 1/3		
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
<b>Dimension and Substrate - Riffle</b>													
Bankfull Width (ft)	N/A	5.7	9.1	10.4	5.3	10.9	9.3	10.5	7.8		7.5	7.9	
Floodprone Width (ft)		12	>36		25	65	20	64	15	65	23	24	
Bankfull Mean Depth		0.7	1.0	1.2	1.0	1.1	1.1	1.2	0.6		0.6		
Bankfull Max Depth		1.0	1.8		1.4	1.7	1.5	1.7	0.8	1.0	0.9		
Bankfull Cross-Sectional Area (ft <sup>2</sup> )		4.3	10.7	11.3	5.4	12.4	10.3	12.3	4.3		4.3	4.6	
Width/Depth Ratio		8.1	7.3	10.1	5.2	9.6	8.1	9.3	14.1		13.1	13.6	
Entrenchment Ratio		2.0	>3.9		3.2	8.3	1.9	6.1	1.9	8.3	3.0	3.1	
Bank Height Ratio		2.2	1.0		1.0	1.1	0.9	1.0	0.9	1.1	1.0		
D50 (mm)		33.1	---		---		---		---		28.8	32.0	
<b>Profile</b>													
Riffle Length (ft)	N/A	---		---		---		---		12.5		31.4	
Riffle Slope (ft/ft)		N/A		0.0040	0.0470	0.0240	0.0570	0.0158	0.0661	0.0200	0.0690		
Pool Length (ft)		---		---		---		---		6.0		23.6	
Pool Max Depth (ft)		---		1.8		2.5	2.6	0.9	1.7	1.5	3.4		
Pool Spacing (ft)		---		N/A		34	52	8	82	2	44	20	53
Pool Volume (ft <sup>3</sup> )	---	---		---		---		---		---			
<b>Pattern</b>													
Channel Beltwidth (ft)	N/A	62	82	21	93	28	50	15	45	12	69	11	45
Radius of Curvature (ft)		56	90	14	60	19	50	8	47	10	45	9	37
Rc:Bankfull Width (ft/ft)		6.2	9.9	1.5	5.8	2.0	5.3	0.6	3.2	1.3	5.8	1.2	4.7
Meander Length (ft)		209	300	N/A		--	--	--	--	25	128	31	75
Meander Width Ratio		6.8	9.0	2.3	8.9	3.0	5.3	1.0	3.0	1.6	8.9	1.5	5.7
<b>Substrate, Bed and Transport Parameters</b>													
Ri%/Ru%/P%/G%/S%	N/A	---		---		---		---		---		---	
SC%/Sa%/G%/C%/B%/Be%		---		---		---		---		---		---	
d16/d35/d50/d84/d95/d100		0.18/8.66/33.11/128/2655/>2048		---		---		---		---		0.22/2.97/6.6/38.7/69.7/128	
Reach Shear Stress (Competency) lb/ft <sup>2</sup>		1.6		---		---		---		0.9		0.7	
Max part size (mm) mobilized at bankfull		---		---		---		---		---		---	
Stream Power (Capacity) W/m <sup>2</sup>	---	---		---		---		---		---			
<b>Additional Reach Parameters</b>													
Drainage Area (SM)	N/A	0.16		0.30		0.41		0.41		0.16		0.16	
Watershed Impervious Cover Estimate (%)		2%		---		---		---		2%		2%	
Rosgen Classification		B4		E4		E4		E4		C4		C4	
Bankfull Velocity (fps)		3.0	2.2	2.4	2.2	3.5	4.4	5.2	3.2	3.5	3.5	3.6	
Bankfull Discharge (cfs)		14.0		25.3		20.3		54.0		14.0		15.0	16.7
Q-NFF regression		---		---		---		---		---		---	
Q-USGS extrapolation		---		---		---		---		---		---	
Q-Mannings		---		---		---		---		---		---	
Valley Length (ft)		---		---		---		---		468		468	
Channel Thalweg Length (ft)		2,648		---		---		---		519		517	
Sinuosity		1.12		1.35		1.40		1.20		1.15	1.20	1.10	
Water Surface Slope (ft/ft) <sup>2</sup>		---		---		---		---		---		0.0246	
Bankfull Slope (ft/ft)		0.025		0.004	0.028	0.012		0.017		0.015	0.03	0.0203	

(---): Data was not provided  
 N/A: Not Applicable

Table 10b. Baseline Stream Data Summary  
 Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

UT2

Parameter	Gage	PRE-RESTORATION CONDITION		REFERENCE REACH DATA						DESIGN				AS-BUILT/BASELINE					
		UT2 - Reach 3		UT2 - Reach 4		Agony Acres UT1A-Reach 1		UT to Polecat Creek		UT to Varnals Creek		UT2 - Reach 3		UT2 - Reach 4		UT2 - Reach 3		UT2 - Reach 4	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
<b>Dimension and Substrate - Riffle</b>																			
Bankfull Width (ft)	N/A	5.7	5.4	9.1	10.4	5.3	10.9	9.3	10.5	7.9		11.2		9.7		9.7			
Floodprone Width (ft)		12	26	>36		25	65	20	64	17	79	25	90	100		100			
Bankfull Mean Depth		0.7	0.8	1.0	1.2	1.0	1.1	1.1	1.2	0.6		0.8		0.5		0.5			
Bankfull Max Depth		1.0	1.5	1.8		1.4	1.7	1.5	1.7	0.8	1.0	1.1	1.5	0.8		0.8			
Bankfull Cross-Sectional Area (ft <sup>2</sup> )		4.3	4.1	10.7	11.3	5.4	12.4	10.3	12.3	4.4		9.1		4.5		4.5			
Width/Depth Ratio		8.1	6.8	7.3	10.1	5.2	9.6	8.1	9.3	14.0		14.0		20.5		20.5			
Entrenchment Ratio		2.0	4.7	>3.9		3.2	8.3	1.9	6.1	2.2	10.0	2.2	8.0	10.4		10.4			
Bank Height Ratio		2.2	2.1	1.0		1.0	1.1	0.9	1.0	1.0	1.1	1.0	1.1	1.0		1.0			
D50 (mm)		33.1	0.7	---		---		---		---		---		11.4		11.4			
<b>Profile</b>																			
Riffle Length (ft)	N/A	---	---	---		---		---		---		---		14.7	45.8	23.7	31.4		
Riffle Slope (ft/ft)		---	---	---		0.0040	0.0470	0.024	0.057	0.0138	0.0598	0.0062	0.0264	0.0135	0.0288	0.0395*	0.0592*		
Pool Length (ft)		---	---	---		---		---		---		---		20.4		59.8			
Pool Max Depth (ft)		---	2.3	2.5		1.8		2.5	2.6	0.9	1.7	1.3	2.5	1.5	2.7	1.9	3.1		
Pool Spacing (ft)		---	---	N/A		34	52	8	82	4	44	3	63	56	87	33	61		
Pool Volume (ft <sup>3</sup> )		---	---	---		---		---		---		---		---		---			
<b>Pattern</b>																			
Channel Beltwidth (ft)	N/A	62	82	16	50	21	93	28	50	15	45	13	70	18	100	31	52	20	
Radius of Curvature (ft)		56	90	10	47	14	60	19	50	8	47	10	46	15	65	18	42	45	
Rc:Bankfull Width (ft/ft)		6.2	9.9	1.2	5.6	1.5	5.8	2.0	5.3	0.6	3.2	1.3	5.8	1.3	5.8	1.9	4.3	4.6	
Meander Length (ft)		209	300	42	192	N/A		---		---		25	130	36	184	56	92	130	
Meander Width Ratio		6.8	9.0	1.9	6.0	2.3	8.9	3.0	5.3	1.0	3.0	1.6	8.9	1.6	8.9	3.2	5.4	2.1	
<b>Substrate, Bed and Transport Parameters</b>																			
R <sub>p</sub> /R <sub>u</sub> /P%/G%/S%	N/A	---	---	---		---		---		---		---		---		---			
SC%/Sa%/G%/C%/B%/Be%		---	---	---		---		---		---		---		---		---			
d16/d35/d50/d84/d95/d100		0.18/8.66/33.11/128/2655/>2048		SC/0.43/0.69/17.84/32.14/64		---		---		---		---		SC/2.18/5.6/34.0/56.9/362.0		SC/2.18/5.6/34.0/56.9/362.0			
Reach Shear Stress (Competency) lb/ft <sup>2</sup>		1.77	1.10	---		---		---		0.38	0.59	0.38		0.44					
Max part size (mm) mobilized at bankfull		---	---	---		---		---		---		---		---					
Stream Power (Capacity) W/m <sup>2</sup>		---	---	---		---		---		---		---		---					
<b>Additional Reach Parameters</b>																			
Drainage Area (SM)	N/A	0.13	0.21	0.30		0.41		0.41		0.13	0.21	0.13		0.21					
Watershed Impervious Cover Estimate (%)		2%	2%	---		---		---		2%	2%	2%		2%					
Rosgen Classification		B4	E5	E4		E4		E4		C4	C4	C4		C4					
Bankfull Velocity (fps)		3.0	2.9	2.2	2.4	2.2	3.5	4.4	5.2	2.9	2.5	2.6		N/A					
Bankfull Discharge (cfs)		13.0	22.0	25.3		20.3		54.0		13.0	22.0	11.7		N/A					
Q-NFF regression		---	---	---		---		---		---		---		---					
Q-USGS extrapolation		---	---	---		---		---		---		---		---					
Q-Mannings		---	---	---		---		---		---		---		---					
Valley Length (ft)		---	---	---		---		---		386	152	---		---					
Channel Thalweg Length (ft)		396	242	---		---		---		479	210	482		167					
Sinuosity		1.12	1.17	1.35		1.40		1.20		1.15	1.25	1.13	1.20	---					
Water Surface Slope (ft/ft) <sup>2</sup>		---	---	---		---		---		---		---		0.0119					
Bankfull Slope (ft/ft)		0.0300	0.013	0.0040	0.028	0.012		0.0170		0.014		0.02		0.0120					

\*: Alignment change during construction created steeper riffles  
 (---): Data was not provided  
 N/A: Not Applicable

Table 10c. Baseline Stream Data Summary

Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

UT2A

Parameter	Gage	PRE-RESTORATION	REFERENCE REACH DATA						DESIGN		AS-BUILT/BASELINE		
		UT2A	Agony Acres UT1A-Reach 1		UT to Polecat Creek		UT to Varnals Creek		UT2A		UT2A		
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
<b>Dimension and Substrate - Riffle</b>													
Bankfull Width (ft)	N/A	5.1	9.1	10.4	5.3	10.9	9.3	10.5	6.4		6.6		
Floodprone Width (ft)		11.5	>36		25	65	20	64	14	80	100		
Bankfull Mean Depth		0.4	1.0	1.2	1.0	1.1	1.1	1.2	0.5		0.5		
Bankfull Max Depth		0.9	1.8		1.4	1.7	1.5	1.7	0.7	0.9	0.7		
Bankfull Cross-Sectional Area (ft <sup>2</sup> )		2.1	10.7	11.3	5.4	12.4	10.3	12.3	3.3		3.2		
Width/Depth Ratio		12	7.3	10.1	5.2	9.6	8.1	9.3	13.0		13.5		
Entrenchment Ratio		2.3	>3.9		3.2	8.3	1.9	6.1	2.2	12.5	15.1		
Bank Height Ratio		3.4	1.0		1.0	1.1	0.9	1.0	0.9	1.1	1.0		
D50 (mm)		3.2	---		---		---		---		18.3		
<b>Profile</b>													
Riffle Length (ft)	N/A	---	---		---		---		---		17.9	38.2	
Riffle Slope (ft/ft)		---	N/A		0.0040	0.0470	0.0240	0.0570	0.018	0.08	0.0007	0.0520	
Pool Length (ft)		---	---		---		---		---		16.3	33.0	
Pool Max Depth (ft)		2.4	2.5		1.8		2.5	2.6	0.8	1.6	1.5	3.3	
Pool Spacing (ft)		---	N/A		34	52	8	82	2	36	29	62	
Pool Volume (ft <sup>3</sup> )		---	---		---		---		---		---		
<b>Pattern</b>													
Channel Beltwidth (ft)	N/A	15	30	21	93	28	50	15	45	10	57	25	40
Radius of Curvature (ft)		5.8	33	14	60	19	50	8	47	8	37	11	31
Rc:Bankfull Width (ft/ft)		1.1	6.5	1.5	5.8	2.0	5.3	0.6	3.2	1.3	5.8	1.7	4.7
Meander Length (ft)		27	69	N/A		--	--	--	--	20	105	41	61
Meander Width Ratio		2.9	9.0	2.3	8.9	3.0	5.3	1.0	3.0	1.6	8.6	3.8	6.1
<b>Substrate, Bed and Transport Parameters</b>													
Ri%/Ru%/P%/G%/S%	N/A	---	---		---		---		---		---		
SC%/Sa%/G%/C%/B%/Be%		---	---		---		---		---		---		
d16/d35/d50/d84/d95/d100		0.18/8.66/33.11/128/2655/>2048	---		---		---		---		3.15/11.86/18.3/43.5/101.2/362		
Reach Shear Stress (Competency) lb/ft <sup>2</sup>		1.85	---		---		---		0.52		0.45		
Max part size (mm) mobilized at bankfull		---	---		---		---		---		---		
Stream Power (Capacity) W/m <sup>2</sup>		---	---		---		---		---		---		
<b>Additional Reach Parameters</b>													
Drainage Area (SM)	N/A	0.08	0.30		0.41		0.41		0.08		0.08		
Watershed Impervious Cover Estimate (%)		2%	---		---		---		2%		2%		
Rosgen Classification		C4b	E4		E4		E4		C4		C4		
Bankfull Velocity (fps)		2.5	2.2	2.4	2.2	3.5	4.4	5.2	3.1		2.9		
Bankfull Discharge (cfs)		9.0	25.3		20.3		54.0		9.0		8.6		
Q-NFF regression		---	---		---		---		---		---		
Q-USGS extrapolation		---	---		---		---		---		---		
Q-Mannings		---	---		---		---		---		---		
Valley Length (ft)		---	---		---		---		480		480		
Channel Thalweg Length (ft)		468	---		---		---		540		540		
Sinuosity		1.15	1.35		1.40		1.20		1.15	1.25	1.13		
Water Surface Slope (ft/ft) <sup>2</sup>		---	---		---		---		---		0.0129		
Bankfull Slope (ft/ft)		0.023	0.0040	0.028	0.012		0.0170		0.007	0.018	0.0143		

(---): Data was not provided  
 N/A: Not Applicable

**Table 11. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)**

Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

Dimension and Substrate	UT1 Reach 1												UT1 Reach 3											
	Cross-Section 1 (Riffle)						Cross-Section 2 (Pool)						Cross-Section 3 (Pool)						Cross-Section 4 (Riffle) <sup>3</sup>					
	Base	MY1	MY2	MY3	MY5	MY7	Base	MY1	MY2	MY3	MY5	MY7	Base	MY1	MY2	MY3	MY5	MY7	Base	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft)	570.5	570.5	570.5	570.7	570.7	570.7	569.8	569.8	569.8	569.9	569.7	569.6	554.1	554.1	554.1	554.2	554.2	554.2	554.3	554.3	554.3	554.4	554.5	554.5
Low Bank Elevation (ft)	570.5	570.5	570.5	570.7	570.7	570.7	569.8	569.8	569.8	569.8	569.7	569.6	554.1	554.1	554.1	554.1	554.2	554.2	554.3	554.3	554.3	554.4	554.5	554.5
Bankfull Width (ft)	7.9	7.7	7.2	8.3	8.8	8.7	8.4	7.3	7.1	8.2	6.8	6.3	9.6	8.9	8.5	9.2	6.4	6.5	10.7	9.9	9.4	9.8	11.3	10.5
Floodprone Width (ft)	23.6	21.6	21.6	22.0	22.0	22.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	23.4	17.0	17.0	17.0	17.0	17.0
Bankfull Mean Depth (ft)	0.6	0.5	0.5	0.6	0.6	0.5	0.9	0.9	0.8	0.9	0.7	0.9	0.9	0.9	0.9	0.9	1.1	1.1	0.7	0.7	0.6	0.8	0.6	0.7
Bankfull Max Depth (ft)	0.9	0.8	0.8	1.1	1.3	1.2	1.6	1.5	1.4	1.5	1.1	1.5	1.8	1.9	1.7	1.7	1.9	1.7	1.3	1.2	1.1	1.4	1.3	1.5
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	4.6	3.8	3.6	4.6	5.2	4.8	7.4	6.5	5.8	7.4	4.5	5.7	8.2	8.1	7.9	8.2	7.3	7.3	8.0	6.4	6.1	8.0	7.2	7.1
Bankfull Width/Depth Ratio	13.6	15.8	14.4	15.1	15.0	15.8	9.5	8.3	8.7	9.1	10.2	7.0	11.3	9.8	9.2	10.3	5.6	5.9	14.3	15.2	14.6	12.0	17.8	15.5
Entrenchment Ratio <sup>1</sup>	3.0	2.8	3.0	3.0	2.5	2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.2	1.7	1.8	1.7	1.5	1.6
Bankfull Bank Height Ratio <sup>2</sup>	1.0	1.0	1.0	1.0	1.1	1.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.0	1.0	1.0	<1.0	<1.0	1.0
Dimension and Substrate	UT2 Reach 3												UT2A											
	Cross-Section 5 (Riffle)						Cross-Section 6 (Pool)						Cross-Section 7 (Riffle)						Cross-Section 8 (Pool)					
	Base	MY1	MY2	MY3	MY5	MY7	Base	MY1	MY2	MY3	MY5	MY7	Base	MY1	MY2	MY3	MY5	MY7	Base	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft)	520.1	520.1	520.1	520.1	520.1	520.0	519.5	519.5	519.5	519.5	519.5	519.6	520.5	520.5	520.5	520.6	520.5	520.8	520.2	520.2	520.2	520.3	520.2	520.3
Low Bank Elevation (ft)	520.1	520.1	520.1	520.1	520.1	520.0	519.5	519.5	519.5	519.5	519.5	519.6	520.5	520.5	520.5	520.6	520.5	520.8	520.2	520.2	520.2	520.1	520.2	520.3
Bankfull Width (ft)	9.7	9.8	9.2	9.8	7.1	6.9	9.9	10.7	10.6	10.0	9.0	8.4	6.6	7.5	7.4	8.3	6.9	6.1	9.7	8.6	9.8	9.5	9.1	11.0
Floodprone Width (ft)	100.0	100.0	100.0	100.0	100.0	100.0	N/A	N/A	N/A	N/A	N/A	N/A	100.0	100.0	100.0	100.0	100.0	100.0	N/A	N/A	N/A	N/A	N/A	N/A
Bankfull Mean Depth (ft)	0.5	0.4	0.4	0.5	0.5	0.5	0.9	0.8	0.8	0.9	1.1	1.2	0.5	0.4	0.4	0.4	0.4	0.6	0.9	0.8	0.9	1.0	0.6	0.4
Bankfull Max Depth (ft)	0.8	0.9	0.9	0.9	1.0	0.8	1.6	1.7	1.6	1.7	1.9	1.9	0.7	0.7	0.7	0.9	0.8	1.1	1.5	1.6	1.6	1.7	0.9	0.9
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	4.5	4.4	3.9	4.5	3.6	3.3	8.9	9.0	8.4	8.9	9.6	10.1	3.2	2.7	2.7	3.2	2.5	3.7	9.1	8.6	9.1	9.1	5.5	4.8
Bankfull Width/Depth Ratio	20.5	21.9	21.7	21.2	14.2	14.5	11.0	12.7	13.4	11.2	8.5	6.9	13.5	20.7	20.6	21.6	18.8	9.9	10.4	12.3	10.5	9.9	14.8	25.5
Entrenchment Ratio <sup>1</sup>	10.4	10.2	10.8	10.2	14.1	14.5	N/A	N/A	N/A	N/A	N/A	N/A	15.1	13.3	13.4	12.0	14.6	16.5	N/A	N/A	N/A	N/A	N/A	N/A
Bankfull Bank Height Ratio <sup>2</sup>	1.0	1.0	1.0	1.0	<1.0	<1.0	N/A	N/A	N/A	N/A	N/A	N/A	1.0	1.0	1.0	<1.0	<1.0	1.1	N/A	N/A	N/A	N/A	N/A	N/A

<sup>1</sup>Entrenchment Ratio is calculated using the method specified in the Industry Technical Workgroup Memorandum  
<sup>2</sup>Bank Height Ratio is calculated using the method specified in the Industry Technical Workgroup Memorandum  
<sup>3</sup>Cross-Section 4 Bankfull Elevation was changed at MY3. Base and MY1-2 was updated based off of new Bankfull Elevation

**Table 12a. Monitoring Data - Stream Reach Data Summary**

Holman Mill Mitigation Project

DMS Project No. 96316

Monitoring Year 7 - 2022

**UT1 Reach 1**

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY5		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
<b>Dimension and Substrate - Riffle</b>												
Bankfull Width (ft)	7.9		7.7		7.2		8.3		8.8		8.7	
Floodprone Width (ft)	24		22		22		22		22		22	
Bankfull Mean Depth	0.6		0.5		0.5		0.6		0.6		0.5	
Bankfull Max Depth	0.9		0.8		0.8		1.1		1.3		1.2	
Bankfull Cross Sectional Area (ft <sup>2</sup> )	4.6		3.8		3.6		4.6		5.2		4.8	
Width/Depth Ratio	13.6		15.8		14.4		15.1		15.0		15.8	
Entrenchment Ratio	3.0		2.8		3		3.0		2.5		2.5	
Bank Height Ratio	1.0		1.0		1.0		1.0		1.1		1.0	
D50 (mm)	32.0		43.7		7.1		6.2		28.0		*	
<b>Profile</b>												
Riffle Length (ft)	12.5	31.4										
Riffle Slope (ft/ft)	0.0200	0.0690										
Pool Length (ft)	6.0	23.6										
Pool Max Depth (ft)	1.5	3.4										
Pool Spacing (ft)	20	53										
Pool Volume (ft <sup>3</sup> )												
<b>Pattern</b>												
Channel Beltwidth (ft)	11	45										
Radius of Curvature (ft)	9	37										
Rc:Bankfull Width (ft/ft)	1.1	4.7										
Meander Wave Length (ft)	31	75										
Meander Width Ratio	1.4	5.7										
<b>Additional Reach Parameters</b>												
Rosgen Classification	C4											
Channel Thalweg Length (ft)	208											
Sinuosity (ft)	1.1											
Water Surface Slope (ft/ft)	0.0246											
Bankfull Slope (ft/ft)	0.0203											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	0.22/2.97/6.6/38.7/ 69.7/128		SC/1.19/9.1/57.4/ 107.3/256		SC/SC/4.9/61.0/ 163.2/362		SC/SC/2.1/42.9/137.0/ 256		SC/0.67/1.6/39.3/113.8 /256		*	
% of Reach with Eroding Banks	0%		0%		0%		0%		0%		0%	

(--): Data was not provided

\*Pebble count data is no longer required per the September 29, 2021 Technical Work Group Meeting and is not included in this report.

**Table 12b. Monitoring Data - Stream Reach Data Summary**

Holman Mill Mitigation Project

DMS Project No. 96316

Monitoring Year 7 - 2022

**UT1 Reach 3**

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY5		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
<b>Dimension and Substrate - Riffle</b>												
Bankfull Width (ft)	10.7		9.9		9.4		9.8		11.3		10.5	
Floodprone Width (ft)	23		17		17		17		17		17	
Bankfull Mean Depth	0.7		0.7		0.6		0.8		0.6		0.7	
Bankfull Max Depth	1.3		1.2		1.1		1.4		1.3		1.5	
Bankfull Cross Sectional Area (ft <sup>2</sup> )	8.0		6.4		6.1		8.0		7.2		7.1	
Width/Depth Ratio	14.3		15.2		14.6		12.0		17.8		15.5	
Entrenchment Ratio	2.2		1.7		1.8		1.7		1.5		1.6	
Bank Height Ratio	1.0		1.0		1.0		<1.0		<1.0		1.0	
D50 (mm)	28.8		22.6		23.6		10.0		23.5		*	
<b>Profile</b>												
Riffle Length (ft)	12.5	31.4										
Riffle Slope (ft/ft)	0.0200	0.0690										
Pool Length (ft)	6.0	23.6										
Pool Max Depth (ft)	1.5	3.4										
Pool Spacing (ft)	20	53										
Pool Volume (ft <sup>3</sup> )												
<b>Pattern</b>												
Channel Beltwidth (ft)	11	45										
Radius of Curvature (ft)	9	37										
Rc:Bankfull Width (ft/ft)	0.8	3.5										
Meander Wave Length (ft)	31	75										
Meander Width Ratio	1.0	4.2										
<b>Additional Reach Parameters</b>												
Rosgen Classification	C4											
Channel Thalweg Length (ft)	309											
Sinuosity (ft)	1.1											
Water Surface Slope (ft/ft)	0.0246											
Bankfull Slope (ft/ft)	0.0203											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	0.22/2.97/6.6/38.7/ 69.7/128		SC/1.19/9.1/57.4/ 107.3/256		0.75/13.14/23.6/63.4/ 138.2/256		SC/SC/2.1/42.9/137.0/ 256		SC/0.67/1.6/39.3/113.8 /256		*	
% of Reach with Eroding Banks	0%		0%		0%		0%		0%		0%	

(---): Data was not provided

<sup>1</sup> Cross-Section 4 Bankfull Elevation was changed at MY3. As-Built/Baseline and MY1-2 was updated based off of new Bankfull Elevation.

\*Pebble count data is no longer required per the September 29, 2021 Technical Work Group Meeting and is not included in this report.

**Table 12c. Monitoring Data - Stream Reach Data Summary**

Holman Mill Mitigation Project

DMS Project No. 96316

Monitoring Year 7 - 2022

**UT2 Reaches 3, 4**

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY5		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
<b>Dimension and Substrate - Riffle</b>												
Bankfull Width (ft)	9.7		9.8		9.2		9.8		7.1		6.9	
Floodprone Width (ft)	100		100		100		100		100		100	
Bankfull Mean Depth	0.5		0.4		0.4		0.5		0.5		0.5	
Bankfull Max Depth	0.8		0.9		0.9		0.9		1.0		0.8	
Bankfull Cross Sectional Area (ft <sup>2</sup> )	4.5		4.4		3.9		4.5		3.6		3.3	
Width/Depth Ratio	20.5		21.9		21.7		21.2		14.2		14.5	
Entrenchment Ratio	10.4		10.2		10.8		10.2		14.1		14.5	
Bank Height Ratio	1.0		1.0		1.0		1.0		<1.0		<1.0	
D50 (mm)	11.4		35.0		41.3		16.0		38.5		*	
<b>Profile</b>												
Riffle Length (ft)	15	46										
Riffle Slope (ft/ft)	0.0135	0.0592										
Pool Length (ft)	11	60										
Pool Max Depth (ft)	1.5	3.1										
Pool Spacing (ft)	33	61										
Pool Volume (ft <sup>3</sup> )												
<b>Pattern</b>												
Channel Beltwidth (ft)	20	52										
Radius of Curvature (ft)	18	45										
Rc:Bankfull Width (ft/ft)	1.9	4.6										
Meander Wave Length (ft)	56	130										
Meander Width Ratio	2.1	3.2										
<b>Additional Reach Parameters</b>												
Rosgen Classification	C4											
Channel Thalweg Length (ft)	649											
Sinuosity (ft)	1.15											
Water Surface Slope (ft/ft)	0.0119	0.0237										
Bankfull Slope (ft/ft)	0.0120	0.0176										
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	SC/2.18/5.6/ 34.0/56.9/362.0	1.0/9.17/24.5/53.7/ 77.8/128	19.15/31.72/41.3/84.3/ 123.1/256	SC/2.50/11.0/53.7/98.3/1	SC/0.66/3.7/50 /128 /256							*
% of Reach with Eroding Banks	0%		0%		0%		0%		0%		0%	

(--): Data was not provided

\*Pebble count data is no longer required per the September 29, 2021 Technical Work Group Meeting and is not included in this report.

**Table 12d. Monitoring Data - Stream Reach Data Summary**

Holman Mill Mitigation Project

DMS Project No. 96316

Monitoring Year 7 - 2022

**UT2A**

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY5		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
<b>Dimension and Substrate - Riffle</b>												
Bankfull Width (ft)	6.6		7.5		7.4		8.3		6.9		6.1	
Floodprone Width (ft)	100		100		100		100		100		100	
Bankfull Mean Depth	0.5		0.4		0.4		0.4		0.4		0.6	
Bankfull Max Depth	0.7		0.7		0.7		0.9		0.8		1.1	
Bankfull Cross Sectional Area (ft <sup>2</sup> )	3.2		2.7		2.7		3.2		2.5		3.7	
Width/Depth Ratio	13.5		20.7		20.6		21.6		18.8		9.9	
Entrenchment Ratio	15.1		13.3		13.4		12.0		14.6		16.5	
Bank Height Ratio	1.0		1.0		1.0		<1.0		<1.0		1.1	
D50 (mm)	18.3		29.7		7.1		11.2		12.3		*	
<b>Profile</b>												
Riffle Length (ft)	17.9	38.2										
Riffle Slope (ft/ft)	0.0007	0.0520										
Pool Length (ft)	16.3	33.0										
Pool Max Depth (ft)	1.5	3.3										
Pool Spacing (ft)	29	62										
Pool Volume (ft <sup>3</sup> )												
<b>Pattern</b>												
Channel Beltwidth (ft)	25	40										
Radius of Curvature (ft)	11	31										
Rc:Bankfull Width (ft/ft)	1.7	4.7										
Meander Wave Length (ft)	41	61										
Meander Width Ratio	3.8	6.1										
<b>Additional Reach Parameters</b>												
Rosgen Classification	C4											
Channel Thalweg Length (ft)	540											
Sinuosity (ft)	1.10											
Water Surface Slope (ft/ft)	0.0129											
Bankfull Slope (ft/ft)	0.0143											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	3.15/11.86/18.3/43.5/101.2/362		.21/6.69/20.1/53.1/75.9/128		SC/0.87/1.9/32.0/75.9/128		SC/SC/11/45.0/86.6/2048.0		0.21/1.78/6.9/47/119.3/180		*	
% of Reach with Eroding Banks	0%		0%		0%		0%		0%		0%	

(--): Data was not provided

\*Pebble count data is no longer required per the September 29, 2021 Technical Work Group Meeting and is not included in this report.

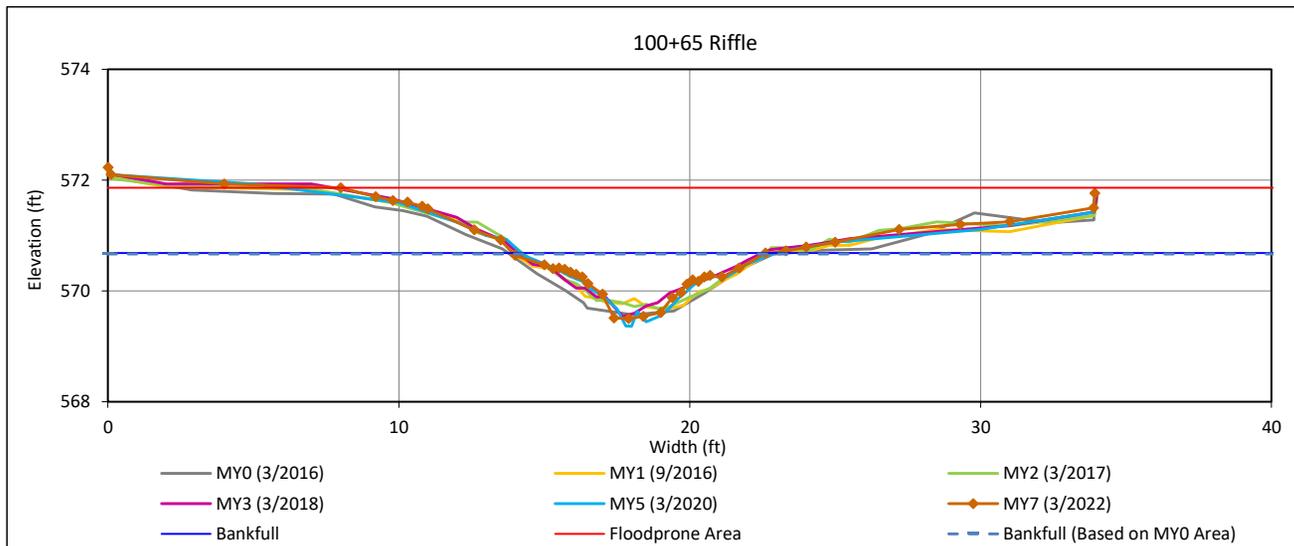
### Cross-Section Plots

Holman Mill Mitigation Site

DMS Project No. 96316

Monitoring Year 7 - 2022

#### Cross-Section 1-UT1 Reach 1



#### Bankfull Dimensions

4.8	x-section area (ft.sq.)
8.7	width (ft)
0.5	mean depth (ft)
1.2	max depth (ft)
9.2	wetted perimeter (ft)
0.5	hydraulic radius (ft)
15.8	width-depth ratio
22.0	W flood prone area (ft)
2.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Wildlands Engineering



View Downstream

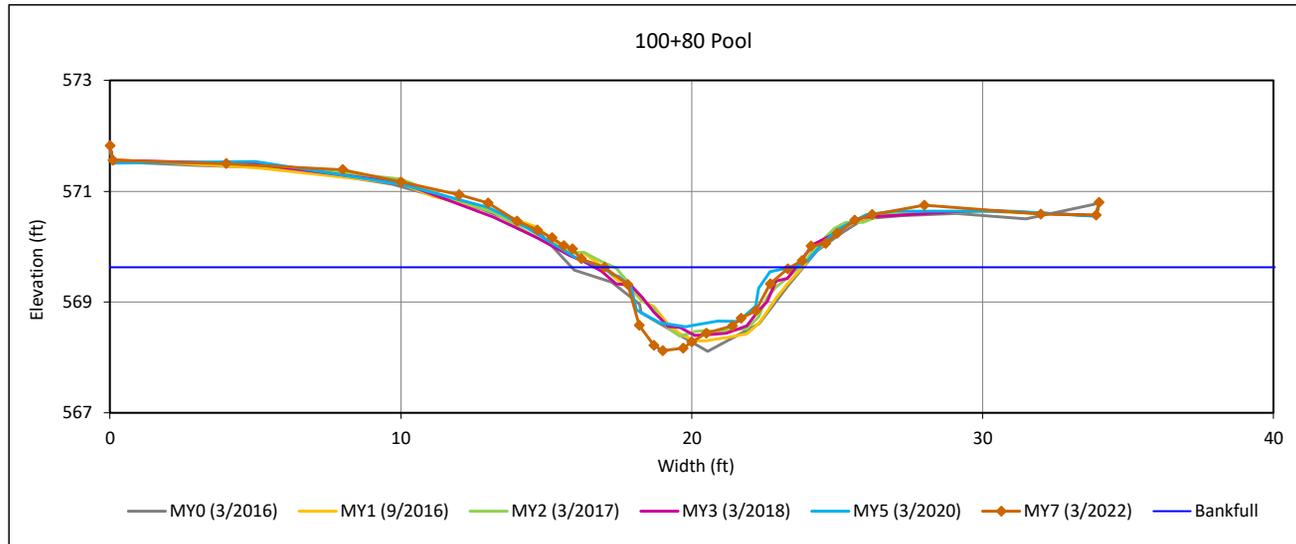
### Cross-Section Plots

Holman Mill Mitigation Site

DMS Project No. 96316

Monitoring Year 7 - 2022

#### Cross-Section 2-UT1 Reach 1



#### Bankfull Dimensions

5.7	x-section area (ft.sq.)
6.3	width (ft)
0.9	mean depth (ft)
1.5	max depth (ft)
7.3	wetted perimeter (ft)
0.8	hydraulic radius (ft)
7.0	width-depth ratio

Survey Date: 3/2022  
Field Crew: Wildlands Engineering



View Downstream

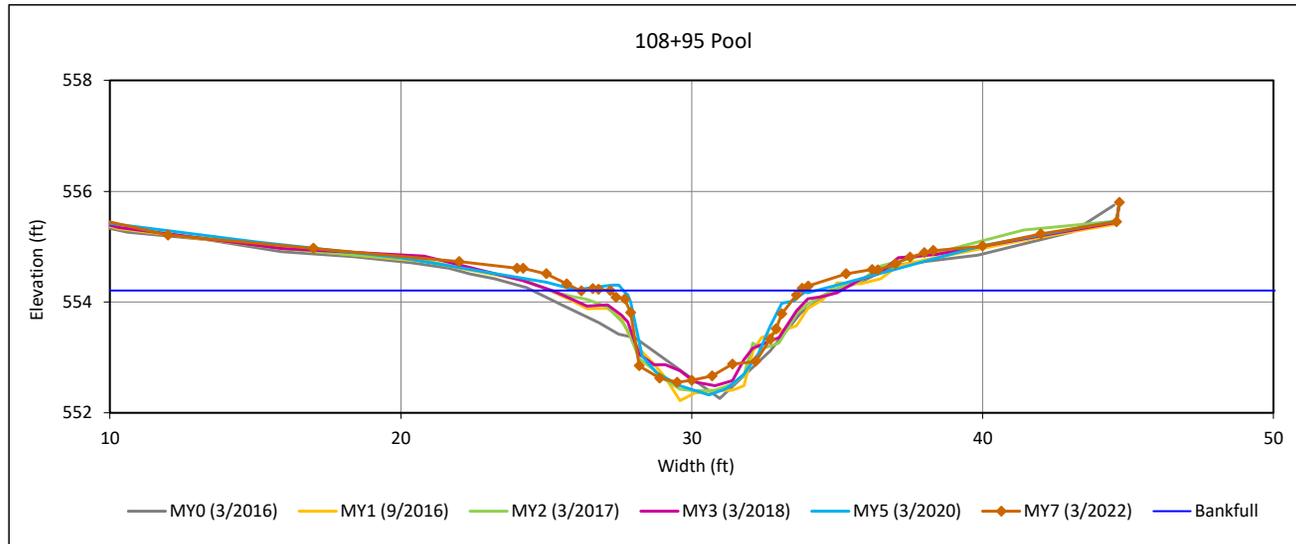
### Cross-Section Plots

Holman Mill Mitigation Site

DMS Project No. 96316

Monitoring Year 7 - 2022

### Cross-Section 3-UT1 Reach 3



#### Bankfull Dimensions

7.3	x-section area (ft.sq.)
6.5	width (ft)
1.1	mean depth (ft)
1.7	max depth (ft)
8.0	wetted perimeter (ft)
0.9	hydraulic radius (ft)
5.9	width-depth ratio

Survey Date: 3/2022

Field Crew: Wildlands Engineering



View Downstream

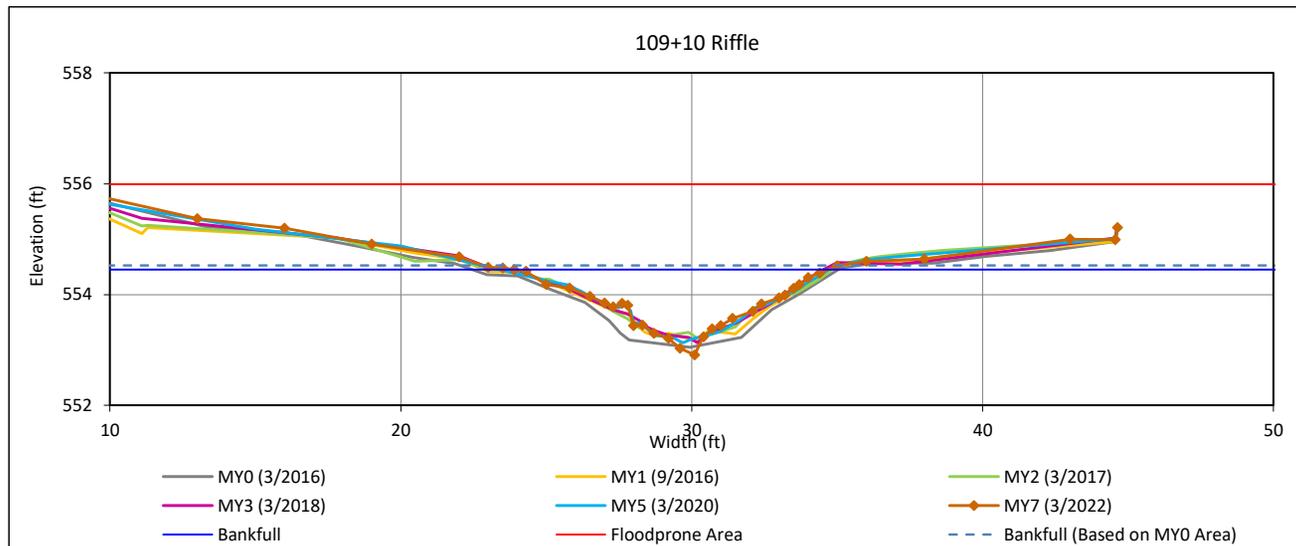
### Cross-Section Plots

Holman Mill Mitigation Site

DMS Project No. 96316

Monitoring Year 7 - 2022

### Cross-Section 4-UT1 Reach 3



#### Bankfull Dimensions

7.1	x-section area (ft.sq.)
10.5	width (ft)
0.7	mean depth (ft)
1.5	max depth (ft)
11.2	wetted perimeter (ft)
0.6	hydraulic radius (ft)
15.5	width-depth ratio
17.0	W flood prone area (ft)
1.6	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Wildlands Engineering



View Downstream

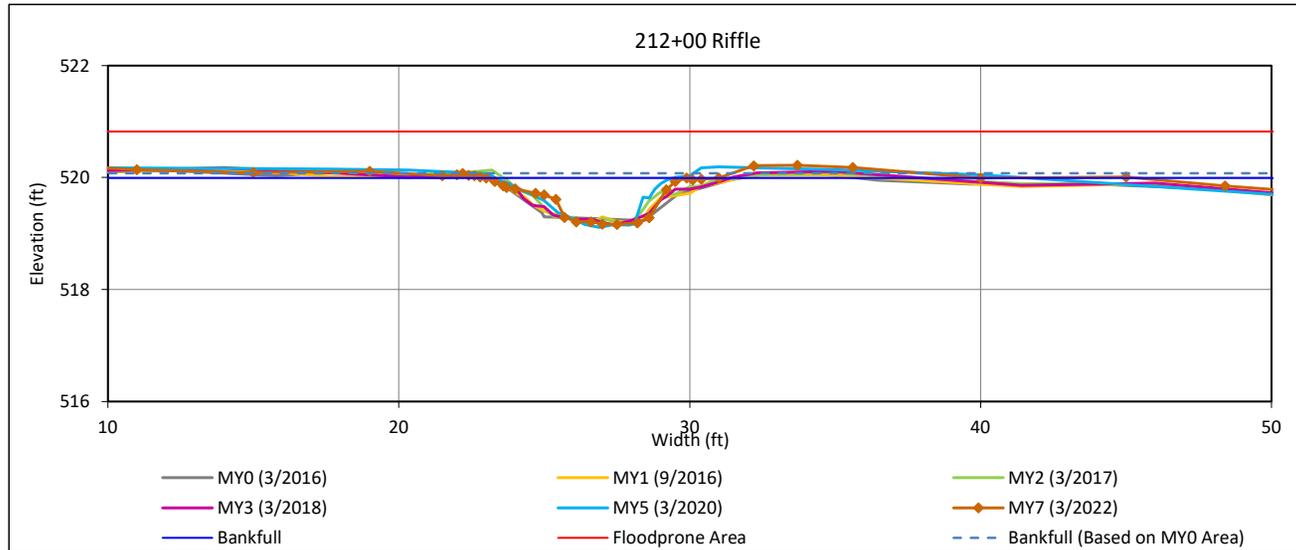
### Cross-Section Plots

Holman Mill Mitigation Site

DMS Project No. 96316

Monitoring Year 7 - 2022

#### Cross-Section 5-UT2 Reach 3



#### Bankfull Dimensions

3.3	x-section area (ft.sq.)
6.9	width (ft)
0.5	mean depth (ft)
0.8	max depth (ft)
7.3	wetted perimeter (ft)
0.4	hydraulic radius (ft)
14.5	width-depth ratio
100.0	W flood prone area (ft)
14.5	entrenchment ratio
< 1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Wildlands Engineering



View Downstream

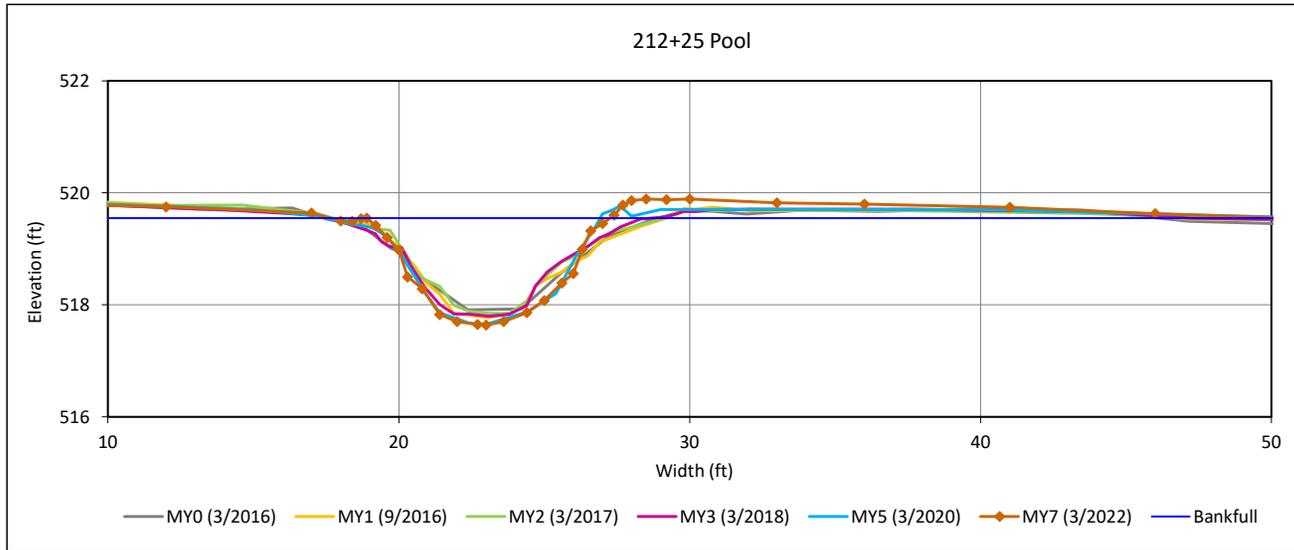
### Cross-Section Plots

Holman Mill Mitigation Site

DMS Project No. 96316

Monitoring Year 7 - 2022

#### Cross-Section 6-UT2 Reach 3



#### Bankfull Dimensions

10.1	x-section area (ft.sq.)
8.4	width (ft)
1.2	mean depth (ft)
1.9	max depth (ft)
9.6	wetted perimeter (ft)
1.1	hydraulic radius (ft)
6.9	width-depth ratio

Survey Date: 3/2022  
Field Crew: Wildlands Engineering



View Downstream

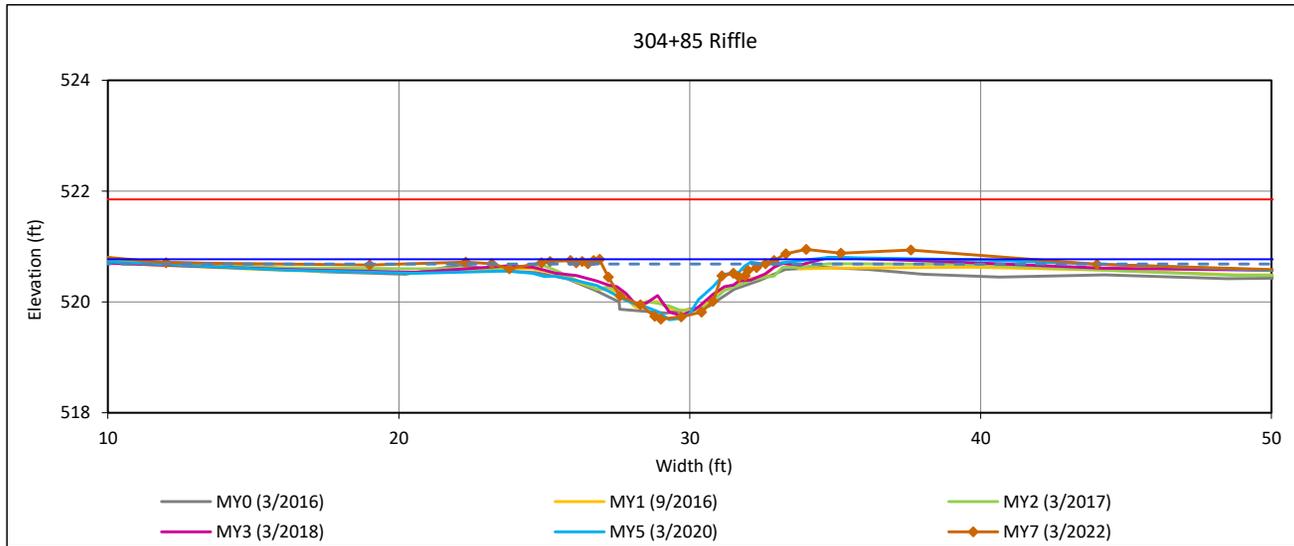
### Cross-Section Plots

Holman Mill Mitigation Site

DMS Project No. 96316

Monitoring Year 7 - 2022

#### Cross-Section 7-UT2A



#### Bankfull Dimensions

3.7	x-section area (ft.sq.)
6.1	width (ft)
0.6	mean depth (ft)
1.1	max depth (ft)
6.8	wetted perimeter (ft)
0.6	hydraulic radius (ft)
9.9	width-depth ratio
100.0	W flood prone area (ft)
16.5	entrenchment ratio
1.1	low bank height ratio

Survey Date: 3/2022

Field Crew: Wildlands Engineering



View Downstream

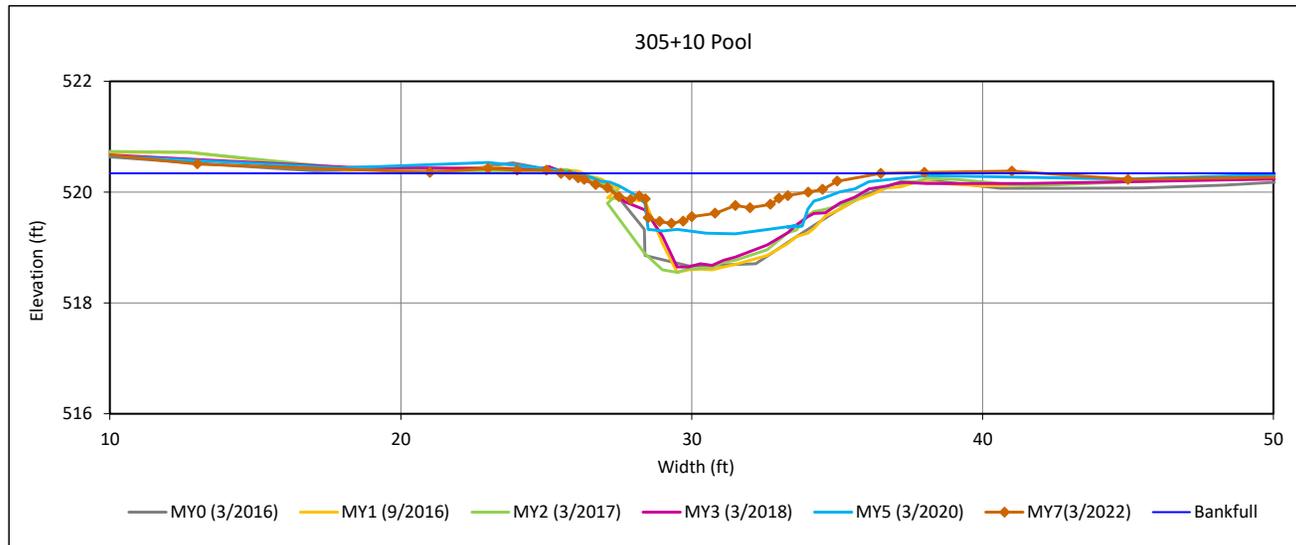
### Cross-Section Plots

Holman Mill Mitigation Site

DMS Project No. 96316

Monitoring Year 7 - 2022

### Cross-Section 8-UT2A



#### Bankfull Dimensions

4.8	x-section area (ft.sq.)
11.0	width (ft)
0.4	mean depth (ft)
0.9	max depth (ft)
11.4	wetted perimeter (ft)
0.4	hydraulic radius (ft)
25.5	width-depth ratio

Survey Date: 3/2022

Field Crew: Wildlands Engineering



View Downstream

## **APPENDIX 5. Hydrology Summary Data**

**Table 13. Verification of Bankfull Events**

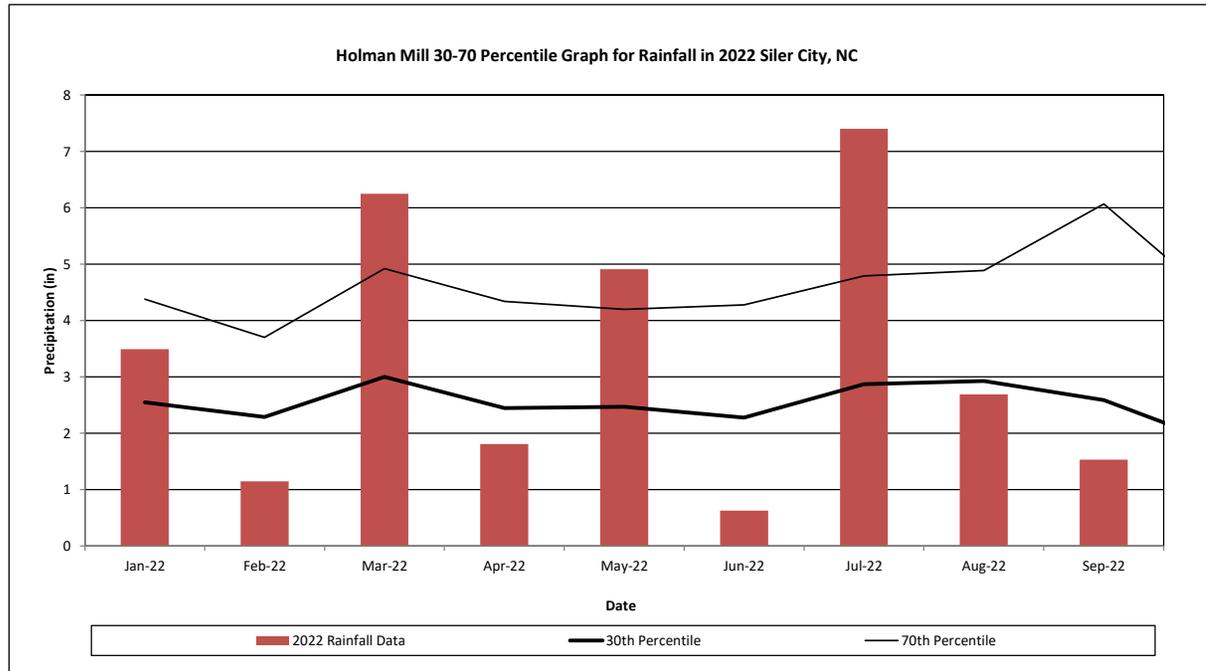
Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022

Reach	MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Date of Data Collection	Date of Occurrence	Date of Data Collection	Date of Occurrence	Date of Data Collection	Date of Occurrence	Date of Data Collection	Date of Occurrence	Date of Data Collection	Date of Occurrence	Date of Data Collection	Date of Occurrence	Date of Data Collection	Date of Occurrence
UT1	9/6/2016	7/31/2016	10/17/2017	4/24/2017	10/19/2018	8/8/2018	9/26/2019	3/21/2019	2/11/2020	2/6/2020	2/24/2021	1/3/2021	2/2/2022	1/3/2022
	10/11/2016	10/8/2016		6/20/2017		9/17/2018*		4/13/2019	8/6/2020	6/11/2020		2/15/2021	5/18/2022	3/17/2022
UT2	9/6/2016	7/31/2016	10/17/2017	4/24/2017	10/19/2018	8/8/2018	9/26/2019	3/21/2019	2/11/2020	2/6/2020	2/24/2021	1/10/2021	5/18/2022	3/12/2022
	10/11/2016	10/8/2016		6/20/2017		9/17/2018*		4/13/2019	8/6/2020	6/11/2020		2/15/2021	5/18/2022	3/17/2022
UT2A	9/6/2016	7/31/2016	10/17/2017	4/24/2017	10/19/2018	8/8/2018	9/26/2019	3/21/2019	2/11/2020	2/6/2020	2/24/2021	1/30/2021	5/18/2022	3/17/2022
	10/11/2016	10/8/2016		6/20/2017		9/17/2018*		4/13/2019	8/6/2020	6/11/2020		2/4/2021	10/13/2022	8/23/2022

\*Hurricane Florence

**Monthly Rainfall Data**

Holman Mill Mitigation Site  
 DMS Project No. 96316  
 Monitoring Year 7 - 2022



<sup>1</sup> 2022 monthly rainfall from USDA Station SILER CITY (317924)

<sup>2</sup> 30th and 70th percentile rainfall data collected from weather station Siler City 2 N, NC7924 (USDA, 2022).