



MONITORING YEAR 7 ANNUAL/CLOSEOUT REPORT

Final

LITTLE PINE III STREAM AND WETLAND RESTORATION PROJECT

Alleghany County, NC
NCDEQ Contract 6844
DMS Project Number 94903
DWR # 14-0041
USACE Action ID 2012-01299

Data Collection Period: August - December 2022
Draft Submission Date: January 26, 2023
Final Submission Date: February 23, 2023

PREPARED FOR:



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February 23, 2023

Mr. Harry Tsomides
NC Department of Environmental Quality
Division of Mitigation Services
Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

RE: Draft Monitoring Year 7 / Closeout Report
Little Pine III Stream and Wetland Restoration Project
DMS Project Number 94903
Contract Number 6844
New River Basin - CU# 05050001 - Alleghany County, North Carolina

Dear Mr. Tsomides:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Mitigation Services (DMS) comments from the Draft Monitoring Year 7 / Closeout report for the Little Pine III Stream and Wetland Restoration Project. DMS' comments are noted below in **bold**. Wildlands' responses to those comments are noted in *italics*.

DMS comment: Please indicate that per the approved mitigation plan, the project is a 5-year stream / 7-year wetland project that has been monitored for both stream and wetlands in MY6/7 due to stream repair work.

Wildlands response: Text has been added to Section 1.

DMS comment: Please indicate that the Phase III repair plan and maps implemented in 2022 can be found in the MY6/2021 report appendix.

Wildlands response: Text has been added to Section 1.2.4.

DMS comment: Please indicate that the beaver dam on UT-1 has been removed and beaver trapped by Aphis in January 2023.

Wildlands response: Text has been added to Section 1.2.4.

DMS comment: Please include GWG results for all years.

Wildlands response: The GWG plots have been added to Appendix 5.



Enclosed please find two (2) hard copies (one spiral bound, one binder clipped) and one (1) electronic copy on USB of the Final Monitoring Report and all digital support files. Please contact me at 704-941-9093 if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Kirsten Y. Gimbert".

Kirsten Y. Gimbert

Project Manager

kgimbert@wildlandseng.com

EXECUTIVE SUMMARY

Wildlands Engineering, Inc. (Wildlands) completed design and construction management for the North Carolina Division of Mitigation Services (DMS) as part of a design-bid-build contract at the Little Pine III Stream and Wetland Restoration Project (Site). The Site is in Alleghany County approximately eight miles east of the Town of Sparta, NC and approximately four miles south of the Virginia border. The Site lies within the New River Basin; eight-digit Cataloging Unit (CU) 05050001 and the 14-digit Hydrologic Unit Code (HUC) 05050001030030 (Figure 1). Site streams consist of Little Pine Creek, a third order stream, as well as an unnamed second order tributary to Little Pine Creek (UT2), an unnamed first order tributary to Little Pine Creek (UT2a), four unnamed zero order tributaries to Little Pine Creek (UT1, UT2b, UT3, and UT4), and 2.9 acres of wetlands (Figure 2). The project design and construction restored, enhanced, and preserved a total of 13,112 linear feet (LF) of perennial and intermittent stream, and enhanced and preserved 2.9 acres of wetlands. The Site is expected to generate 6,973.4 stream mitigation units (SMUs), and 1.393 wetland mitigation units (WMUs) for the New River Basin (Table 1).

The Site is within a Targeted Local Watershed (TLW) identified in the New River Basin Restoration Priority (RBRP) plan (NCDENR, 2009). The Site is also located within the Little River & Brush Creek Local Watershed Plan (LWP). The project goals from the mitigation plan (Wildlands, 2014) were established with careful consideration of RBRP goals and objectives to address stressors identified in the LWP. The established project goals include:

- Restore unforested buffers;
- Remove livestock from buffers;
- Remove livestock from streams;
- Repair heavily eroded stream banks and improve stream bank stability;
- Reforest steep landscape around streams; and
- Enhance wetland vegetation.

Site construction and as-built survey were completed in 2016 with planting and baseline monitoring activities occurring between December 2015 and May 2016. Annual monitoring has been completed for seven years since as-built/construction. This following report summarizes the Monitoring Year (MY) 7 status of the Site.

Assessments completed over the past seven years illustrate that the Site has met the success criteria as defined in the mitigation plan (Wildlands, 2014) for vegetation, stream morphology, and stream and wetland hydrology, with the exception of a segment of UT1 as it enters Wetland FF where sediment deposition has resulted in a loss of stream function. The MY7 visual assessment revealed that invasive treatments have been successful in reducing areas of invasive species and no easement encroachments currently exist on the Site. DMS implemented three phases of stream repairs in 2019, 2020, and 2022 along Little Pine Creek, UT1, UT2, UT2a, and UT2b. The repairs appear stable and have benefited the long-term ecological function of the Site.

The as-built planted stem density averaged 549 stems per acre with the MY6 vegetation assessment resulting in an average of 383 stems per acre. This exceeds the final success criteria of 260 stems per acre and demonstrates that the Site has established a healthy riparian buffer. Stream morphology surveys throughout MY0 – MY6 along Little Pine Creek, UT2, and UT2b demonstrate that the channels are functioning as designed, with minor to moderate deviations in bankfull dimensions compared to as-built. MY7 stream morphology surveys and visual assessments reveal that repair areas are functioning as designed. The performance standard of two recorded bankfull events in separate monitoring years was met for all project reaches in MY3. No target performance standard was established for wetland hydrology success; however, for the past five monitoring years (MY2 – MY6), the groundwater gage in Wetland FF recorded 169 consecutive days of the groundwater levels at or within 12 inches of the ground surface, consisting of 100% of the growing season.



LITTLE PINE III STREAM AND WETLAND RESTORATION PROJECT

Monitoring Year 7/Closeout 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 Vegetation Assessment.....	1-2
1.2.2 Vegetation Areas of Concern and Management Activity	1-3
1.2.3 Stream Assessment.....	1-3
1.2.4 Stream Areas of Concern and Management Activity.....	1-3
1.2.5 Hydrology Assessment.....	1-4
1.2.6 Wetland Assessment.....	1-4
1.2.7 Conservation Easement Boundary Assessment.....	1-4
1.3 Monitoring Year 7 Summary.....	1-5
Section 2: METHODOLOGY	2-1
Section 3: REFERENCES	3-1

APPENDICES

Appendix 1	General Tables and Figures
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
Table 5	Monitoring Component Summary
Appendix 2	Visual Assessment Data
Figure 3.0 – 3.2	Current Condition Plan View Maps
Table 6a – g	Visual Stream Morphology Stability Assessment Table
Table 7	Vegetation Condition Assessment Table
	Stream Repair Photographs
	Conservation Easement Photographs
	Areas of Concern Photographs
	Vegetation Transect Photograph
Appendix 3	Vegetation Plot Data
Table 8	Vegetation Plot Criteria Attainment
Table 9	CVS Vegetation Plot Metadata
Table 10a-b	Planted and Total Stem Counts (Species by Plot with Annual Means)
Table 10c	Vegetation Transect Data
Table 10d	Stems Per Plot Across All Years
Appendix 4	Morphological Summary Data and Plots
Table 11a-b	Baseline Stream Data Summary
Table 12a-b	Morphology and Hydraulic Summary (Dimensional Parameters – Cross-Section)
Table 13a-f	Monitoring Data – Stream Reach Data Summary
	Longitudinal Profile Plots (MY0 – MY6)
	Cross-Section Plots (MY0 – MY6)
Table 14	Dimensional Parameters – Cross-Sections (Repair Areas)



Appendix 5

Table 15

Table 16

Cross-Section Plots (Repair Areas)
Longitudinal Profile Plots (Repair Areas)

Hydrology Summary Data and Plots

Verification of Bankfull Events

Wetland Gage Attainment Summary

Groundwater Gage Plots (MY1 – MY6)

Monthly Rainfall Data



Section 1: PROJECT OVERVIEW

The Site is a DMS design-bid-build project in Alleghany County, NC, located in the New River Basin; eight-digit CU 05050001 and the 14-digit HUC 05050001030030 (Figure 1). Located in the Blue Ridge belt of the Blue Ridge province (USGS, 1998), the project watershed includes primarily managed herbaceous, mixed upland hardwoods, and other forested land. The drainage area for the Site is 2,784 acres. Little Pine Creek flows into Brush Creek several hundred feet downstream of the Site boundary. The land adjacent to the streams and wetlands is primarily maintained cattle pasture and forest.

The project streams consist of Little Pine Creek, a third order stream, as well as an unnamed second order tributary to Little Pine Creek (UT2), an unnamed first order tributary to Little Pine Creek (UT2a) and four unnamed zero order tributaries to Little Pine Creek (UT1, UT2b, UT3, and UT4) (Figure 2). Mitigation work within the Site included restoring and enhancing 9,888 linear feet (LF) and preserving 3,224 LF of perennial stream, enhancing 2.71 acres of wetlands and preserving a 0.19 acres existing wetland. The Site is expected to provide 6,973.4 SMUs, and 1.393 WMUs.

A conservation easement protecting 57.3 acres in perpetuity was purchased by the State of North Carolina and recorded with Alleghany County Register of Deeds in 2012. The final mitigation plan was submitted and accepted by DMS in March 2014. Construction activities were completed in September 2015 by North State Environmental, Inc. Planting was completed in December 2015 by Bruton Environmental, Inc. Kee Surveying, Inc. completed the as-built survey in April 2016. Repairs were completed in March and December 2016. Wildlands completed the baseline monitoring activities in May 2016 and subsequent monitoring has been conducted annually with closeout expected in 2023. Per the approved final mitigation plan, the site was to be monitored for a minimum of five years post-construction. An additional two years of monitoring (MY6 and MY7) occurred in 2021 and 2022 to further assess stream repairs. Appendix 1 includes detailed project activity, history, contact information, and background information. Directions and a map of the Site are provided in Figure 1. Site components are discussed in Table 1 and illustrated in Figure 2.

1.1 Project Goals and Objectives

Prior to construction activities, livestock had full access to most of the Site streams and used them as a water source. The riparian buffers in areas proposed for restoration were primarily herbaceous with a few sparse trees. Deposition of fine sediment, severe bank erosion, and trampling of banks impacted the in-stream habitat. Channel widening and incision indicated instability. Table 4 in Appendix 1 and Table 11 in Appendix 4 provide pre-restoration condition details.

The Site is intended to provide numerous ecological benefits within the New River Basin. While many of these benefits are limited to the Site area, others, such as pollutant removal, reduced sediment loading, and improved aquatic and terrestrial habitat, have farther-reaching effects. Expected improvements to water quality and ecological processes are outlined below as secondary goals and objectives. These project goals were established with careful consideration of goals and objectives that were described in the RBRP and to address stressors identified in the LWP.

The project specific goals of the Site address stressors identified in the Mitigation Plan (Wildlands, 2014) include the following:

- Restore unforested buffers;
- Remove livestock from buffers;
- Remove livestock from streams;
- Repair heavily eroded stream banks and improve stream bank stability;
- Reforest steep landscape around streams; and



- Enhance wetland vegetation.

Secondary goals include the following:

- Remove harmful nutrients from creek flow;
- Reduce pollution of creek by excess sediment;
- Improve in-stream habitat; and
- Improve aesthetics.

The project objectives have been defined as follows:

- Restore 27.8 acres of forested riparian buffer;
- Fence off livestock from 57.3 acres of buffer and 14,736 LF of existing streams;
- Stream bank erosion which contributes sediment load to the creek will be greatly reduced, if not eliminated, in the project area. Eroding stream banks will be stabilized by increased woody root mass in banks, reducing channel incision, and by using natural channel design techniques, grading, and planting to reduce bank angles and bank height;
- Steep, unforested landscape within the conservation easement will be reforested;
- Eight of the nine onsite wetlands will be enhanced with supplemental plantings;
- Flood flows will be filtered through restored floodplain areas, where flood flow will spread through native vegetation. Vegetation takes up excess nutrients;
- Storm flow containing grit and fine sediment will be filtered through restored floodplain areas, where flow will spread through native vegetation. The spreading of flood flows will reduce velocity allowing sediment to settle out;
- In-stream structures will promote aeration of water;
- In-stream structures will be constructed to improve habitat diversity and trap detritus. Wood structures will be incorporated into the stream as part of the restoration design. Such structures may include log drops and rock structures that incorporate woody debris; and
- Site aesthetics will be enhanced by planting native plant species, treating invasive species, and stabilizing eroding and unstable areas throughout the project.

1.2 Monitoring Year 7 Data Assessment

Annual monitoring was conducted during MY7 (August to December 2022) to assess the condition of the project. The stream restoration success criteria for the Site follows the approved performance standards presented in the Little Pine III Stream & Wetland Restoration Project Final Mitigation Plan (Wildlands, 2014).

1.2.1 Vegetation Assessment

MY7 is a reduced monitoring year that does not require detailed vegetation inventory and analysis. One vegetation transect was performed along the right floodplain of Little Pine Creek Reach 1 in the haul road for the Phase II repair area that was replanted with woody stems as shown in Figure 3.2. This transect resulted in a planted stem density of 486 stems per acre. Please refer to Appendix 2 for the vegetation transect photograph and Table 10c in Appendix 3 for vegetation transect data.

In MY6, a full detailed vegetation assessment took place in September 2021 and resulted in an average planted stem density of 383 stems per acre. The Site met the final MY5 requirement of 260 planted stems per acre, with 18 of the 21 plots (86%) individually meeting this requirement. Visual assessments in MY7 indicate that planted stems continue to appear healthy in areas where vegetation plots previously met criteria. Please refer Appendix 3 for vegetation data tables summarizing data for all monitoring years.



1.2.2 Vegetation Areas of Concern and Management Activity

Invasive treatments have been successful in reducing previously noted areas of invasive species; MY7 visual assessments reveal that over 99% of the conservation easement is unaffected by invasive plant populations. When present, invasive species found on the Site include Japanese barberry (*Berberis thunbergii*) and multiflora rose (*Rosa multiflora*), which are found in small, isolated pockets within the floodplain and the fence line. Invasive treatments occurred in fall 2022 and will continue as necessary through closeout. Please refer to the current condition plan view (CCPV) Figures 3.0-3.2 in Appendix 2 for locations vegetation areas of concern.

1.2.3 Stream Assessment

MY7 is a reduced monitoring year that only requires cross-sections to be surveyed in stream repair areas. The locations of the eight repair area cross-sections (XS-R) are shown on Figures 3.0-3.2 in Appendix 2. Results indicate that repairs are stable and bankfull dimensions are appropriate with stream reach design parameters. Cross-section 5/R5 is located where bank repair work was completed in 2020 and although the cross-sectional area is larger than at baseline, the stream conditions appear stable and show little change compared to MY5 (2020). A longitudinal profile survey was also conducted upstream and downstream of repaired two internal crossings along UT2 Reach 1. The deposition that was previously observed upstream of the crossings has been repaired and the channel thalweg has returned to a similar elevation compared to the as-built. Repair areas are discussed further in section 1.2.4. Please refer to Appendix 4 for the repair areas Morphological Summary Table 14 and plots.

In MY6, a full detailed morphological survey was conducted between June and November 2021. The results of that survey revealed that overall, channels were stable and functioning as designed, with the exception of some cross-sections experiencing minor to moderate deviations in bankfull dimensions compared to baseline survey. Refer to Appendix 4 for the MY0-MY6 morphological summary data tables 11 – 13 and plots.

1.2.4 Stream Areas of Concern and Management Activity

Three phases of stream repairs that were completed in the fall 2019, fall 2020, and summer 2022 have significantly reduced major areas of concern and improved the overall stability of project streams. In the fall 2019, DMS completed a plan to complete repairs along UT2 Reach 2 (STA 332+25 to 339+15) and UT2a (STA 427+00 to 432+00) which included spot bank grading, geolift, grade control installation, and structure repairs. Along Little Pine Creek, DMS completed a repair plan in fall 2020 for Reach 1 (STA 100+43 to 101+75) and Reach 2a (STA 121+25 to 122+50) to address areas of stream instability. Repair activities included installing constructed riffles, geolifts, and repairing rock vane structures. The 2020 repair plan also addressed the formation of headcuts and bank erosion along UT1 (STA 10+00 to 12+28) by regrading banks and installing structures to improve grade control in the stream. The third phase of repairs completed in summer 2022 addressed previously identified areas of instability along Little Pine Creek, UT1, UT2, UT2a, and UT2b which included multiple instances of bank scour, structure piping, headcutting, and sediment clogged culverts. Repairs consisted of installing geolifts with toe wood, regrading banks, repairing existing structures, and adding log or rock cross-vanes structures and constructed riffles. To repair the internal crossings along UT2 Reach 1, a larger culvert was installed within the upper crossing (STA 308+50) and a ford crossing was installed to replace the lower culvert crossing (STA 326+75). Stream and visual assessments reveal that all three phases of repairs appear to be stable and functioning as designed with herbaceous cover and live stakes becoming well established along banks and engineered structures maintaining vertical stability. Please refer to Appendix 2 for the stream repair photographs. Please refer to Appendix 6 in the MY6 (2021) annual monitoring report for Phase III repair plans and maps.



Outside of the repaired areas, there remain a few isolated instances of bank scour, sediment deposition, and structure piping. In MY7, sediment aggradation continues to be observed on approximately 192 linear feet of UT1 downstream of the culvert crossing (STA 200+36) and beyond the two installed boulder sills (STA 202+28). Currently, a defined baseflow channel is still present downstream of the two installed boulder sills and woody vegetation established along the banks is helping shade out the herbaceous cover, thus transporting more accumulated fine sediment in the reach. A small beaver dam was identified on UT1 (STA 204+40) in December 2022. DMS has contracted with APHIS to address the beaver. The dam was removed, and the beaver was trapped by APHIS in January 2023. A few areas of bank scour and sediment deposition persist along UT2 Reach 2 but are isolated and 97% of the reach remains stable and performing as intended. Please refer to Appendix 2 for stream stability tables and CCPV Figures 3.0-3.2.

1.2.5 Hydrology Assessment

At least one bankfull event occurred on Little Pine Creek, UT2, and UT2b reaches during the MY7 data collection, which was recorded using crest gages and visual indicators. Two bankfull flow events occurring in separate years must be documented on the restoration reaches within the five year monitoring period. The performance standard was met in MY3 for Little Pine, UT2, and UT2b.

The Site does not contain a rainfall gage; therefore, the daily precipitation data was collected from the closest NC CRONOS Station, Sparta 3.5 SSW. Monthly rainfall data in 2022 indicated higher than normal rainfall amounts occurred during the months of February, May, July, August, and November. Lower than normal rainfall amounts occurred during June, and normal rainfall was recorded during the remainder of the year.

At the end of MY3, a stream gage using a pressure transducer was installed to monitor flow on UT1, approximately 50 LF downstream of the two installed boulder sills. Since MY7 is a reduced monitoring year, the hydrologic data was not assessed. Previously, a total of 270 consecutive days of flow were documented in MY6. Please refer to Appendix 5 for hydrologic data and monthly rainfall graph.

1.2.6 Wetland Assessment

One groundwater monitoring gage (GWG 1) was established during the baseline monitoring within the Wetland FF area using logging hydrology pressure transducers. The gage was installed at an appropriate location so that the data collected will provide an indication of groundwater levels throughout the wetland enhancement area. No target performance standard for wetland hydrology success was established within the mitigation plan (Wildlands, 2014). Wetland hydrology attainment typically consists of recorded groundwater levels within 12 inches of the ground surface for a consecutive period consisting of a pre-defined percentage of the growing season. Under typical precipitation conditions, Alleghany County's growing season extends 169 days from April 26th to October 11th.

MY7 is a reduced monitoring year that does not require hydrologic monitoring; therefore, the gage data was not collected. For the previous five monitoring years (MY2 – MY6), GWG 1 recorded 169 consecutive days of the groundwater level at or within 12 inches of the ground surface, consisting of 100% of the growing season. Please refer to Appendix 2 for the groundwater gage location and Appendix 5 for MY0 – MY6 groundwater hydrology data.

1.2.7 Conservation Easement Boundary Assessment

In December 2022, the entire conservation easement boundary was walked as part of the MY7 (2022) monitoring effort and no conservation easement encroachments currently exist on the Site. However, minor fence issues were noted where trees have fallen on the fence line along the easement. DMS is taking action with the landowner to resolve the damage to the fence. Please refer to Appendix 2 for representative photos of the conservation boundary and the minor fence issues.



1.3 Monitoring Year 7 Summary

Assessments completed over the past seven years illustrate that the Site has met the success criteria as defined in the mitigation plan (Wildlands, 2014) for vegetation, stream morphology, and stream and wetland hydrology, with the exception of a segment of UT1 as it enters Wetland FF where sediment deposition has resulted in a loss of stream function. The MY7 visual assessment revealed that invasive treatments have been successful in reducing areas of invasive species and no easement encroachments currently exist on the Site. DMS implemented three phases of stream repairs in 2019, 2020, and 2022 along Little Pine Creek, UT1, UT2, UT2a, and UT2b and repairs appear stable and have benefited the long-term ecological function of the Site.

The as-built planted stem density averaged 549 stems per acre with the MY6 vegetation assessment resulting in an average of 383 stems per acre. This exceeds the final success criteria of 260 stems per acre and demonstrates that the Site has established a healthy riparian buffer. Stream morphology surveys throughout MY0 – MY6 along Little Pine Creek, UT2, and UT2b demonstrate that the channels are functioning as designed, with minor to moderate deviations in bankfull dimensions compared to as-built. MY7 stream morphology surveys and visual assessments reveal that previously described repair areas are functioning as designed. The performance standard of two recorded bankfull events in separate monitoring years was met for all project reaches in MY3. No target performance standard was established for wetland hydrology success; however, for the past five monitoring years (MY2 – MY6), the groundwater gage in Wetland FF recorded 169 consecutive days of the groundwater levels at or within 12 inches of the ground surface, consisting of 100% of the growing season.

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 annual monitoring reports can be found in the mitigation plan documents available on the DMS website. All raw data supporting the tables and figures in the Appendices are available from DMS upon request.



Section 2: METHODOLOGY

Geomorphic data was collected following the standards outlined in *The Stream Channel Reference Site: An Illustrated Guide to Field Techniques* (Harrelson et al., 1994) and in the *Stream Restoration: A Natural Channel Design Handbook* (Doll et al., 2003). Longitudinal and cross-sectional data were collected using a total station and were georeferenced. All Current Condition Plan View mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcView. Crest gages were installed in surveyed riffle cross-sections and monitored annually. Hydrology attainment installation and monitoring methods are in accordance with the standards published in the United States Army Corps of Engineers *Stream Mitigation Guidelines* (2003). Vegetation monitoring protocols followed the *Carolina Vegetation Survey-NCEEP Level 2 Protocol* (Lee et al., 2008).



Section 3: REFERENCES

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APPENDIX 1. General Tables and Figures

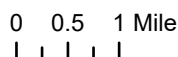
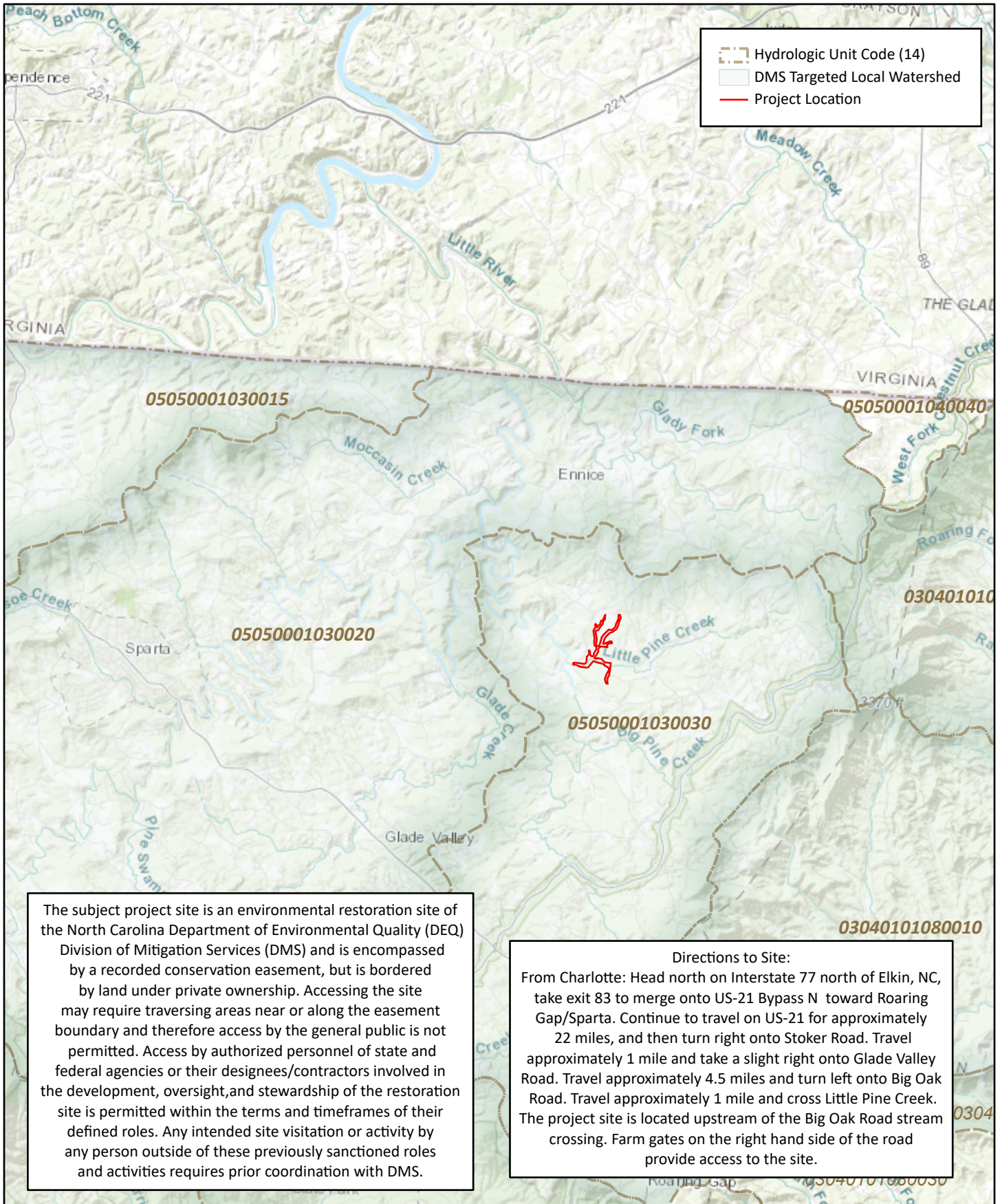


Figure 1 Project Vicinity Map
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

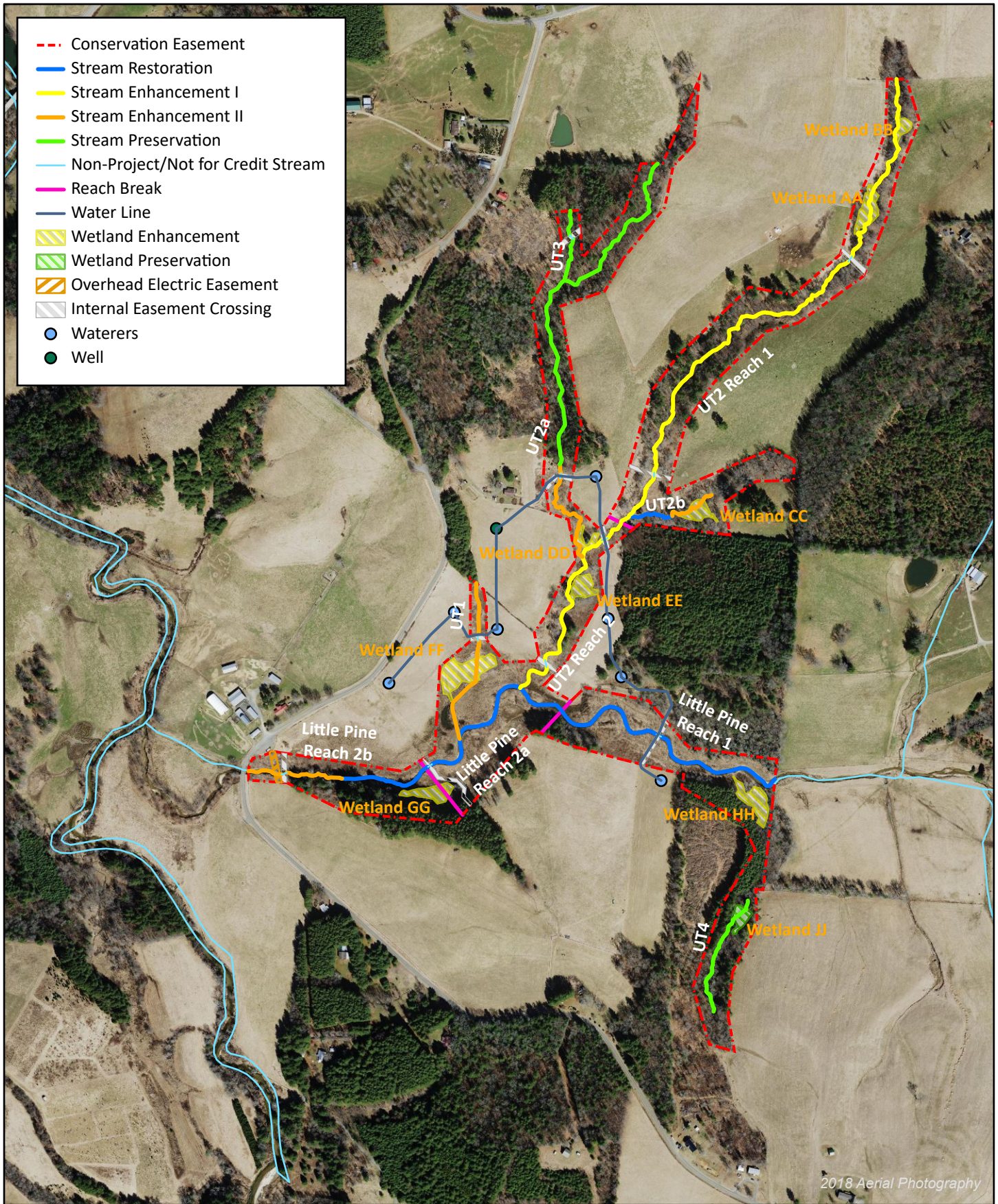


Figure 2 Project Component/Asset Map
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

Table 1. Project Components and Mitigation Credits

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

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	6,328.6	644.8	N/A	1.393	N/A	N/A	N/A	N/A	N/A
Project Components									
Reach ID	Existing Footage/Acreage	Approach	Restoration (R) or Restoration Equivalent (RE)	As-Built Stationing/Location	As-Built Footage/Acreage	Restoration Footage/Acreage ¹	Mitigation Ratio ²	Credits ¹ (SMU/WMU)	Notes ¹
STREAMS									
Little Pine Reach 1	4,016	P1/P2	Restoration (R)	100+00 to 114+44	1,444	1,417	1:1	1,417.0	Excludes one 27 foot wide ford crossing.
Little Pine Reach 2a		P1	Restoration (R)	114+44 to 125+27	1,083	1,058	1:1	1,058.0	Excludes one 25 foot wide ford crossing.
Little Pine Reach 2b		P1/P2	Restoration (R)	125+27 to 130+20	493	493	1:1	493.0	
		Planting, fencing	Enhancement II (R)	130+20 to 135+60	540	509	2.5:1	197.0	Excludes one 31 foot wide ford crossing, Includes 50% reduction for 33 ft overhead electric easement crossing.
UT1	540	Planting, fencing	Enhancement II (R)	197+26 to 202+24	498	463	2.5:1	185.2	Excludes one 35 foot wide culvert crossing, 192 LF of excessive aggradation.
		Planting, fencing, channel creation	Enhancement II (R)	202+24 to 206+26	402	402	2.5:1	160.8	
UT2 Reach 1	5,270	P1/P2/P4, preservation	Enhancement I (R)	297+18-343+18	4,600	4,474	2:1	2,237.0	Excludes four constructed culvert crossings; 32, 24, 32, and 38 feet wide respectively.
UT2 Reach 2									
UT2a	2,921	Planting, fencing	Enhancement II (R) ³	401+78 to 403+34 & 403+75 to 404+34	215 ³	215 ³	n/a	n/a	Easement Break 403+34 - 403+75
		Preservation	Preservation (RE)	405+15 to 426+58	2,143	2,143	5:1	428.6	
		Planting, fencing	Enhancement II (R)	426+58 to 432+09	551	519	2.5:1	207.6	Excludes one 32 foot wide constructed culvert crossing.
UT2b	553	Planting, fencing	Enhancement II (R)	500+00 to 503+00	300	300	2.5:1	120.0	
		P2	Restoration (R)	503+00 to 505+53	253	253	1:1	253.0	
UT3	400	Preservation	Preservation (RE)	602+44 to 606+44	400	384	5:1	76.8	Excludes one 16 foot wide constructed ford crossing.
UT4	1,036	Preservation	Preservation (RE)	701+26 to 708+23	697	697	5:1	139.4	
WETLANDS									
Wetland AA	0.38	Planting, fencing	Enhancement (RE)	UT2 floodplain		0.38	2:1	0.190	
Wetland BB	0.16	Planting, fencing	Enhancement (RE)	UT2 floodplain		0.16	2:1	0.080	
Wetland CC	0.26	Grade control, planting, fencing	Enhancement (RE)	UT2b headwaters		0.26	2:1	0.130	
Wetland DD	0.12	Planting, fencing	Enhancement (RE)	North of UT2/UT2a		0.12	2:1	0.060	
Wetland EE	0.28	Planting, fencing	Enhancement (RE)	UT2 floodplain		0.28	2:1	0.140	
Wetland FF	0.76	Outlet stabilization, planting, fencing	Enhancement (RE)	North of UT1/Little Pine		0.76	2:1	0.380	
Wetland GG	0.33	Planting, fencing	Enhancement (RE)	Little Pine		0.33	2:1	0.165	
Wetland HH	0.42	Planting, grade control	Enhancement (RE)	South of UT4/ Little Pine		0.42	2:1	0.210	
Wetland JJ	0.19	Preservation	Preservation (RE)	UT4 floodplain		0.19	5:1	0.038	

Component Summation					
Restoration Level	Stream (LF)	Riparian Wetland (acres)	Non-Riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
Restoration	3221				
Enhancement I	4474				
Enhancement II	2193				
Enhancement		2.71			
Preservation	3224	0.19			

¹Restoration footage based off of the surveyed as-built thalweg alignment is greater than design centerline alignment, resulting in credited length greater than that reported in the Mitigation Plan.

²Unique ratio for UT2 was discussed in field with IRT members and recorded 8/15/2012 in meeting notes.

³Length not included in component summation since no credit is sought

Table 2. Project Activity and Reporting History

Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

Activity or Report	Data Collection Complete	Completion or Scheduled Delivery
Mitigation Plan	March 2013	March 2014
Final Design - Construction Plans	N/A	September 2014
Construction	N/A	September 2015
Temporary S&E mix applied to entire project area ¹	N/A	July - September 2015
Permanent seed mix applied to reach/segments ¹	N/A	July - September 2015
Bare root and live stake plantings for reach/segments	N/A	December 2015
Repair Work	N/A	March 2016 / December 2016
Baseline Monitoring Document (Year 0)	Vegetation Survey	July 2016
	Stream Survey	
Year 1 Monitoring	Vegetation Survey	December 2016
	Stream Survey	
Year 2 Monitoring	Vegetation Survey	November 2017
	Stream Survey	
Year 3 Monitoring	Invasive Treatment	July 2018
	Vegetation Survey	November 2018
	Stream Survey	
Year 4 Monitoring	Invasive Treatment	July, Aug, Sept, & Oct 2019
	Stream Repair	September 2019
	Vegetation Survey	December 2019
	Stream Survey	
Year 5 Monitoring	Stream Repair	November 2020
	Vegetation Survey	January 2021
	Stream Survey	
Year 6 Monitoring	Vegetation Survey	November 2021
	Stream Survey	
Year 7 Monitoring	Invasive Treatment	Fall 2022
	Stream Repair	July 2022
	Vegetation Survey	January 2023
	Stream Survey	

¹Seed and mulch was added as each section of construction was completed.

Table 3. Project Contact Table

Little Pine III Stream & Wetland Restoration Project
 DMS Project No.94903
 Monitoring Year 7 - 2022

Designer Aaron Early, PE, CFM	Wildlands Engineering, Inc. 1430 South Mint Street, Ste 104 Charlotte, NC 28205 704.332.7754
Construction Contractor	North State Environmental, Inc. 2889 Lowery Street Winston-Salem, NC 27101
Planting Contractor	Bruton Natural Systems, Inc P.O. Box 1197 Fremont, NC 27830
Seeding Contractor	North State Environmental, Inc. 2889 Lowery Street Winston-Salem, NC 27101
Seed Mix Sources	Green Resource, LLC
Nursery Stock Suppliers Bare Roots Live Stakes Plugs	Bruton Natural Systems, Inc Foggy Mountain Nursery Mellow Marsh Farms
Monitoring Performers	Wildlands Engineering, Inc.
Monitoring, POC	Kirsten Gimbart 704.941.9093

Table 4. Project Information and Attributes

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

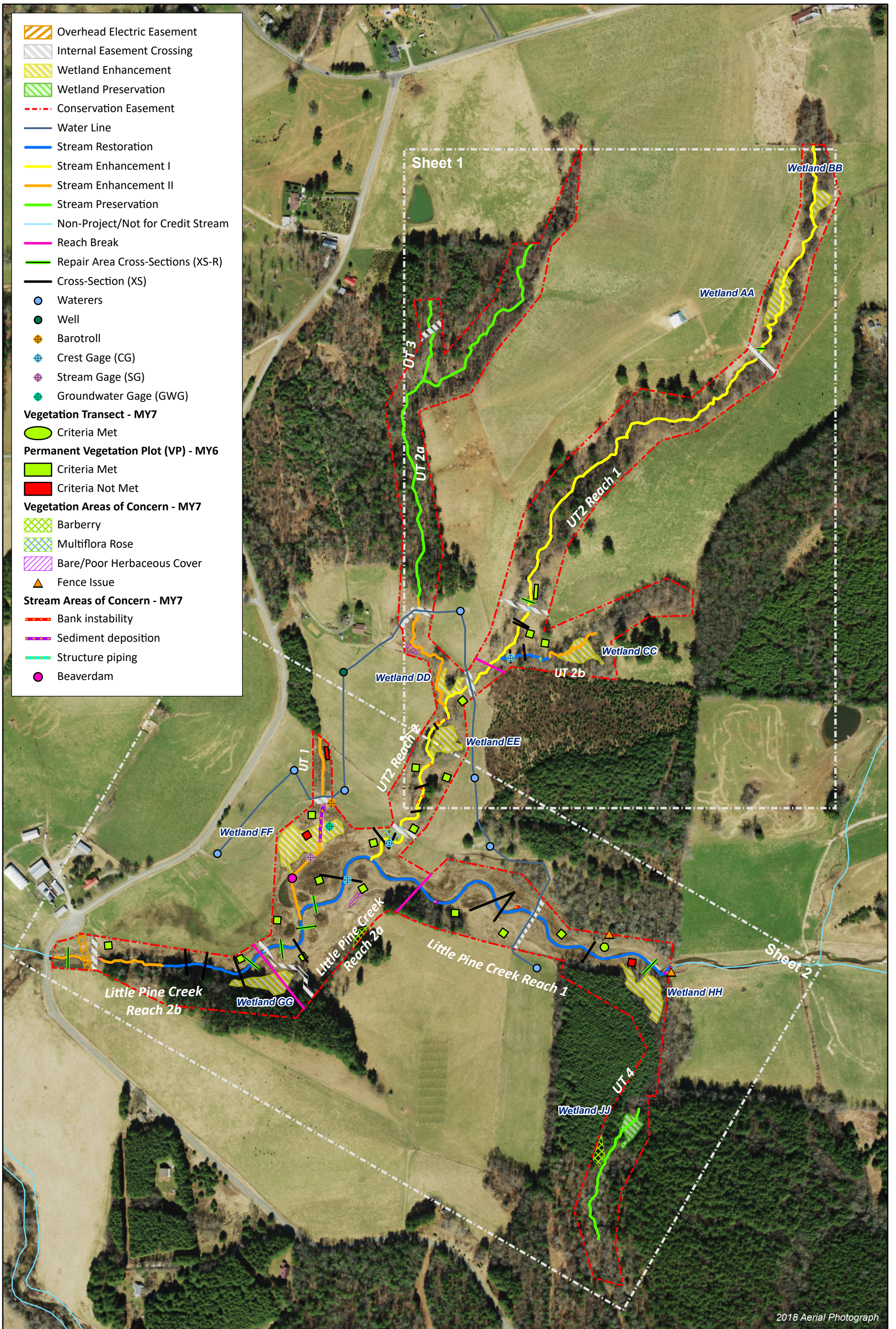
Project Information											
Project Name	Little Pine Creek III Stream & Wetland Restoration										
County	Alleghany County										
Project Area (acres)	57.32										
Project Coordinates (latitude and longitude)	36° 30' 29.16" N, 81° 0' 6.12" W										
Project Watershed Summary Information											
Physiographic Province	Blue Ridge Belt of the Blue Ridge Province										
River Basin	New										
USGS Hydrologic Unit 8-digit	05050001										
USGS Hydrologic Unit 14-digit	05050001030030										
DWR Sub-basin	05-07-03										
Project Drainage Area (acres)	2,784										
Project Drainage Area Percentage of Impervious Area	<1%										
CGIA Land Use Classification	Managed Herbaceous (74%), Mixed Upland Hardwoods (20%), Mixed Hardwoods/Conifers (5%), Southern Yellow Pine (<1%), Mountain Conifers (<1%)										
Reach Summary Information											
Parameters	LP Reach 1	LP Reach 2a	LP Reach 2b	UT1	UT2 Reach 1	UT2 Reach 2	UT2 Reach 3	UT2a	UT2b	UT3	UT4
Length of Reach (linear feet) - Post-Restoration ¹	1,444	1,083	1,033	900	4,600			2,909	553	400	697
Drainage Area (acres)	2,496	2,752	2,784	28	75	185	196	89	19	23	33
NCDWR Stream Identification Score - Pre-Restoration	45.5	45.5	45.5	22.25	36	36	41.5	42	28/37.5	38.5	31.5
NCDWR Water Quality Classification	C, Tr										
Morphological Description (stream type) - Pre-Restoration	C4	C/E4	C4	N/A	A4	E4b	E4	C4b	F4b	N/A	N/A
Evolutionary Trend (Simon's Model) - Pre-Restoration	IV/V	III/IV	IV/V	N/A ²	N/A ⁴	N/A ⁴	N/A ⁴	V	N/A ⁴	N/A ²	N/A ²
Underlying Mapped Soils	Alluvial land, wet (Nikwasi); Ashe stony fine sandy loam (25-45% slopes); Chester loam (10-25% slopes); Chester clay loam (25-45% slopes), eroded (Evard); Codorus complex (Arkaqua); Tate loam (6-10% slopes); Watauga loam (6-45% slopes).										
Drainage Class	Well-drained										
Soil Hydric Status	A/D (Nikwasi); B (Ashe stony fine sandy loam, Chester loam, Tate loam, Watauga loam); B/D (Codorus										
Slope - Pre-Restoration	0.0043	0.0059	0.0087	N/A ²	0.047	0.036	0.028	0.044	0.064	N/A ²	N/A ²
FEMA Classification	AE ³										
Native Vegetation Community	Piedmont/Mountain Bottomland Forest, Rich Cove										
Percent Composition Exotic Invasive Vegetation -Post-	0%										
Regulatory Considerations											
Regulation	Applicable?	Resolved?	Supporting Documentation								
Waters of the United States - Section 404	Yes	Yes	USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885. Action ID# 14-0041								
Waters of the United States - Section 401	Yes	Yes									
Division of Land Quality (Dam Safety)	N/A	N/A	N/A								
Endangered Species Act	Yes	Yes	LPIII Categorical Exclusion (CE) Approved 7/6/2012								
Historic Preservation Act	Yes	Yes	No historic resources were found to be impacted (letter from SHPO dated 5/3/2012)								
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A								
FEMA Floodplain Compliance	Yes ³	No impact application was prepared for local review. No post-project activities required.	LPIII Final Mitigation Plan (3/4/2014) and LPIII CE Approved 7/6/2012								
Essential Fisheries Habitat	Yes	Yes	LPIII Final Mitigation Plan (3/4/2014) and LPIII CE Approved 7/6/2012								
<p>1: Length includes internal easment crossings.</p> <p>2: UT1 is enhancement II only, and UT3 and UT4 are preservation only. Geomorphic surveys were not performed for these streams in existing conditions.</p> <p>3: The downstream 400 LF of Little Pine Creek near Big Oak Road is within a FEMA Zone AE floodplain on Firm panel 4010. The Zone AE floodplain is due to the backwater of Brush Creek; Little Pine Creek is not a FEMA studied stream.</p> <p>4: Streams do not fit into Simon Evolutionary Sequence.</p>											

Table 5. Monitoring Component Summary
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

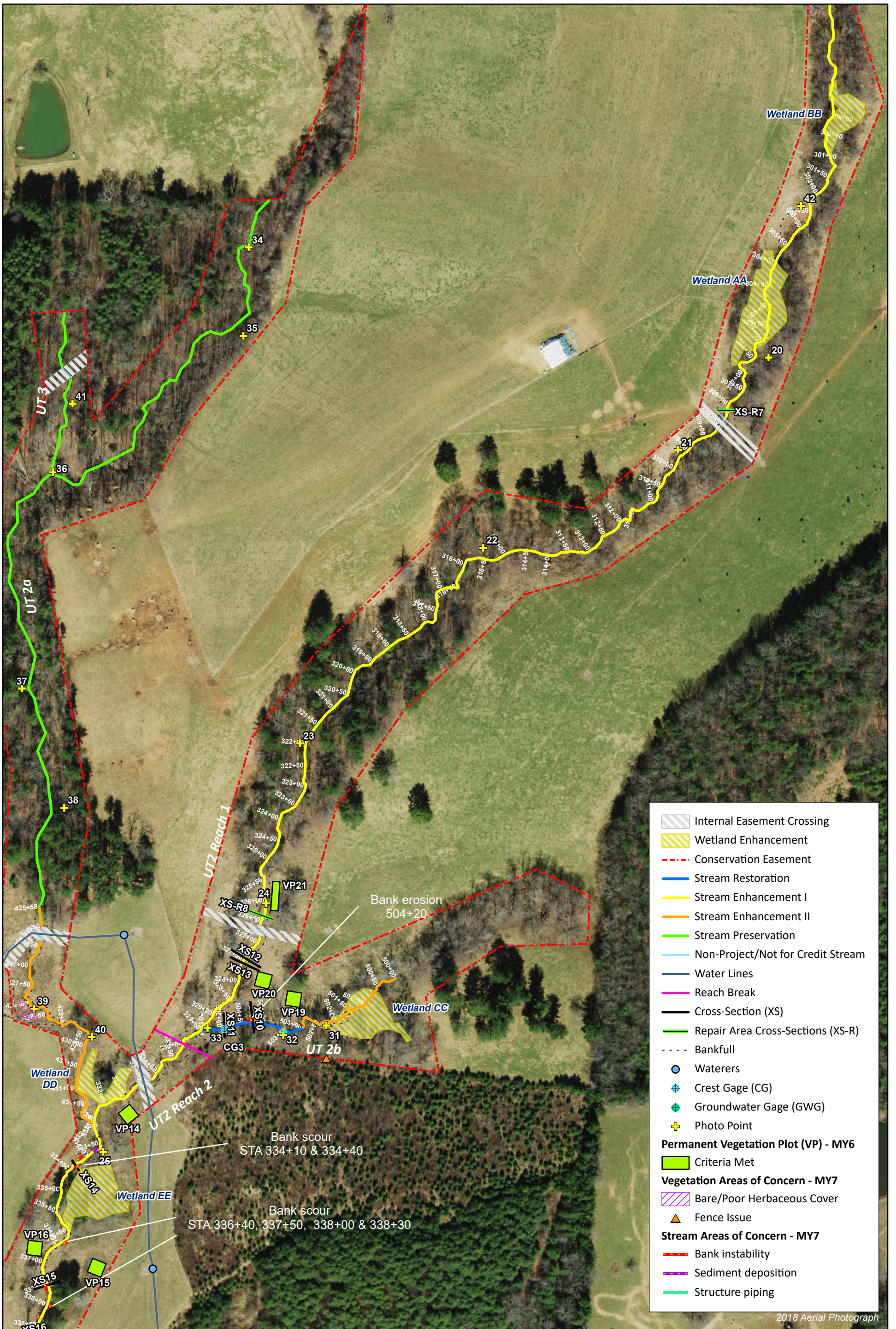
Parameter	Monitoring Feature	Quantity/ Length by Reach										Frequency
		Little Pine Reach 1	Little Pine Reach 2a	Little Pine Reach 2b	UT1	UT2	UT2a	UT2b	UT3	UT4	Wetlands	
Dimension	Riffle Cross Section	2	2	2	N/A	4	N/A	1	N/A	N/A	N/A	Annual
	Pool Cross Section	1	1	1	N/A	3	N/A	1	N/A	N/A	N/A	
Pattern	Pattern	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Profile	Longitudinal Profile	Y			N/A	Y	N/A	Y	N/A	N/A	N/A	Annual
Substrate	Reach Wide (RW) / Riffle (RF) 100 Pebble Count	RW-1, RF-1	RW-1, RF-1	RW-1, RF-1	N/A	RW-1, RF-3	N/A	RW-1, RF-1	N/A	N/A	N/A	Annual
Stream Hydrology	Crest Gage	1			N/A	1	N/A	1	N/A	N/A	N/A	Annual
Wetland Hydrology	Groundwater Gages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	Annual
Vegetation ¹	CVS Level 2	21										Annual
Visual Assessment	All Streams	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Annual
Exotic and nuisance vegetation												
Project Boundary												
Reference Photos	Photographs	42										Annual

¹A deviation from the vegetation plot quantity indicated in the Mitigation Plan is due to a smaller than expected planted area.

APPENDIX 2. Visual Assessment Data



2018 Aerial Photograph



- Internal Easement Crossing
- Wetland Enhancement
- Conservation Easement
- Stream Restoration
- Stream Enhancement I
- Stream Enhancement II
- Stream Preservation
- Non-Project/Not for Credit Stream
- Water Lines
- Reach Break
- Cross-Section (XS)
- Repair Area Cross-Sections (XS-R)
- Bankfull
- Waterers
- Crest Gage (CG)
- Groundwater Gage (GWG)
- Photo Point
- Permanent Vegetation Plot (VP) - MY6**
- Criteria Met
- Vegetation Areas of Concern - MY7**
- Bare/Poor Herbaceous Cover
- Fence Issue
- Stream Areas of Concern - MY7**
- Bank instability
- Sediment deposition
- Structure piping

2018 Aerial Photograph

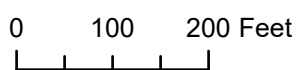
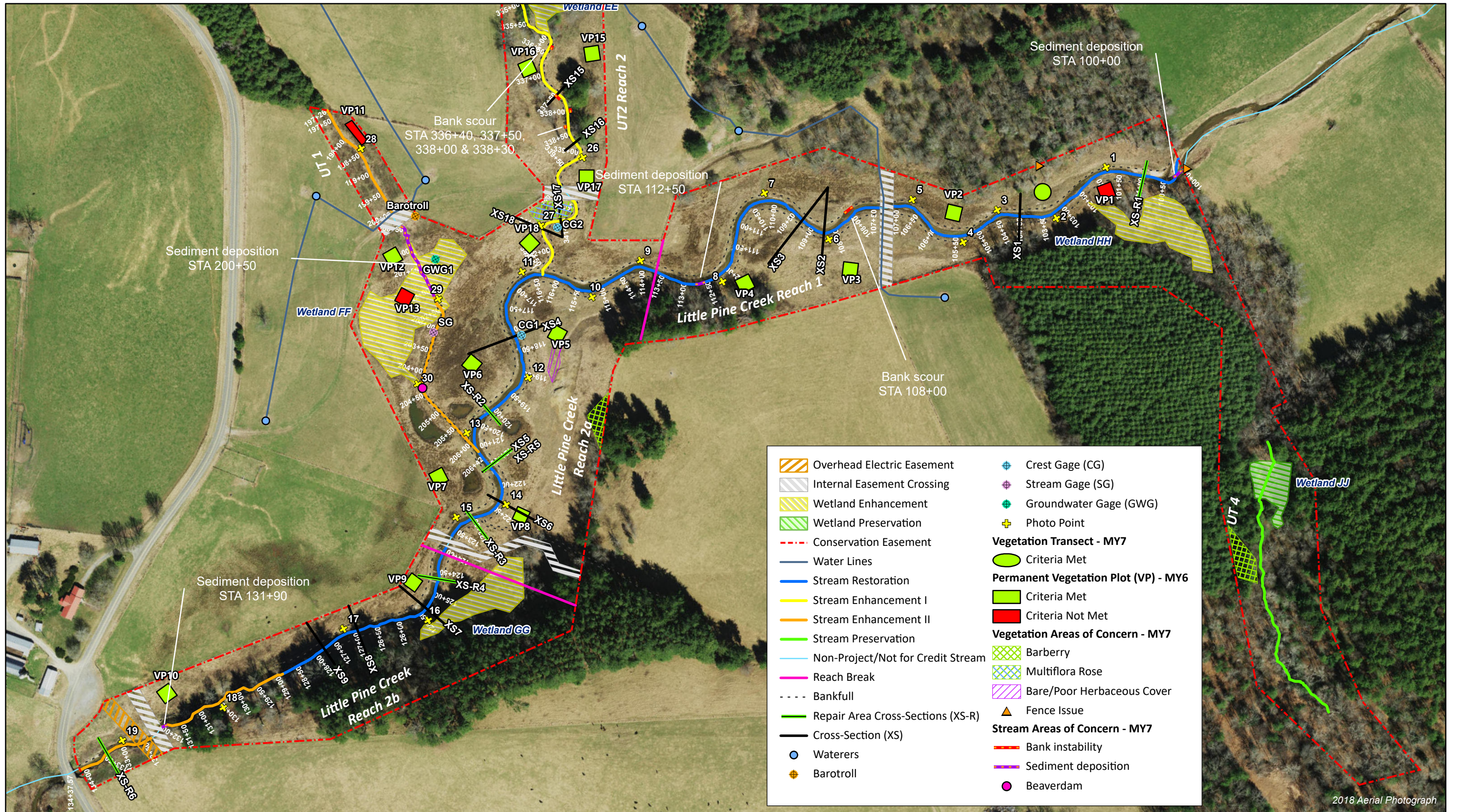


Figure 3.1 Current Condition Plan View Map (Sheet 1)
 Little Pine Creek III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022
 Alleghany County, NC



2018 Aerial Photograph

Table 6a. Visual Stream Morphology Stability Assessment Table

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Date of Visual Assessment: December 7, 2022

Little Pine Reach 1 (STA 100+00 - 114+44) 1,444 LF assessed

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			2	47	97%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	10	10			100%			
	3. Meander Pool Condition	Depth Sufficient	7	7			100%			
		Length Appropriate	7	7			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	9	9			100%			
		Thalweg centering at downstream of meander bend (Glide)	9	9			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	23	99%	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, calving, or collapse			0	0	100%	n/a	n/a	n/a
Totals					1	23	99%	n/a	n/a	n/a
3. Engineered Structures ¹	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	3	3			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	3	3			100%			

¹Excludes constructed riffles since they are evaluated in section 1.

Table 6b. Visual Stream Morphology Stability Assessment Table

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Date of Visual Assessment: December 7, 2022

Little Pine Reach 2a (114+44-125+27) 1,083 LF assessed

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	7	7	0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	7	7			100%			
	3. Meander Pool Condition	Depth Sufficient	6	6			100%			
		Length Appropriate	6	6			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	7	7			100%			
Thalweg centering at downstream of meander bend (Glide)		7	7			100%				
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion	7	7	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, calving, or collapse			0	0	100%	n/a	n/a	n/a
Totals					0	0	100%	n/a	n/a	n/a
3. Engineered Structures ¹	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	5	5			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	5			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	5	5			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	5	5			100%			

¹Excludes constructed riffles since they are evaluated in section 1.

Table 6c. Visual Stream Morphology Stability Assessment Table

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Date of Visual Assessment: December 7, 2022

Little Pine Reach 2b (125+27-130+20) 493 LF assessed

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	4	4	0	0	100%	n/a	n/a	n/a	
		Degradation									0
	2. Riffle Condition	Texture/Substrate	4	4	0	0	100%				
	3. Meander Pool Condition	Depth Sufficient	4	4							100%
		Length Appropriate	4	4							100%
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	4	4							100%
Thalweg centering at downstream of meander bend (Glide)		4	4	100%							
Totals					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	4	4	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, calving, or collapse			0	0	100%	n/a	n/a	n/a	
Totals					0	0	100%	n/a	n/a	n/a	
3. Engineered Structures ¹	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	5	5	0	0	100%	n/a	n/a	n/a	
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	5	5			100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	5			100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	5	5			100%				
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	5	5			100%				

¹Excludes constructed riffles since they are evaluated in section 1.

Table 6d. Visual Stream Morphology Stability Assessment Table

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Date of Visual Assessment: December 7, 2022

UT2 Reach 1 Upper (STA 297+18 - 310+50) 1,332 LF assessed

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	10	10		100%				
	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						
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, calving, or collapse			0	0	100%	n/a	n/a	n/a
Totals					0	0	100%	n/a	n/a	n/a
3. Engineered Structures ¹	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	21	21			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	21	21			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	21	21			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	21	21			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	21	21			100%			

¹Excludes constructed riffles since they are evaluated in section 1.

Table 6e. Visual Stream Morphology Stability Assessment Table

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Date of Visual Assessment: December 7, 2022

UT2 Reach 1 Lower (STA 325+67 - 330+00) 433 LF assessed

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	12	12		100%				
	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						
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, calving, or collapse			0	0	100%	n/a	n/a	n/a
Totals					0	0	100%	n/a	n/a	n/a
3. Engineered Structures ¹	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	20	20			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	20	20			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	20	20			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	20	20			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	16	20			80%			

¹Excludes constructed riffles since they are evaluated in section 1.

Table 6f. Visual Stream Morphology Stability Assessment Table

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Date of Visual Assessment: December 7, 2022

UT2 Reach 2 (STA 330+00 - 343+18) 1,318 LF assessed

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	14	15	1	15	99%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate					93%			
	3. Meander Pool Condition	Depth Sufficient	4	5			80%			
		Length Appropriate	4	5			80%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	4	5			80%			
Thalweg centering at downstream of meander bend (Glide)		4	5			80%				
					6	67	97%	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, calving, or collapse			0	0	100%	n/a	n/a	n/a
Totals					6	67	97%	n/a	n/a	n/a
3. Engineered Structures ¹	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	19	19			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	19	19			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	19	19			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	19	19			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	18	19			95%			

¹Excludes constructed riffles since they are evaluated in section 1.

Table 6g. Visual Stream Morphology Stability Assessment Table

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Date of Visual Assessment: December 7, 2022

UT2b (STA 503+00 - 505+53) 253 LF assessed

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	9	9		100%				
	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						
Totals					1	10	98%	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			1	10	98%	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, calving, or collapse			0	0	100%	n/a	n/a	n/a
Totals					1	10	98%	n/a	n/a	n/a
3. Engineered Structures ¹	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	22	23			96%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	22	23			96%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	22	23			96%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	23	23			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	23	23			100%			

¹Excludes constructed riffles since they are evaluated in section 1.

Table 7. Vegetation Condition Assessment Table

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Date of Visual Assessment: December 7, 2022

Planted Acreage **27.8**

Vegetation Category	Definitions	Mapping Threshold (acres)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	2	0.06	0.22%
Low Stem Density Areas ¹	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	3	0.07	0.27%
Total			5	0.13	0.48%
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.1	0	0.0	0.0%
Cumulative Total			5	0.13	0.48%

Easement Acreage **57.3**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Acreage
Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000	3	0.22	0.38%
Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	0	0	0.0%

¹Acreage calculated from permanent vegetation monitoring plots.

Stream Repair Photographs

MY7



LPC Reach 1 STA 100+50 – Phase II left bank repaired with geolift and toe wood added, looking downstream (12/7/2022)



LPC Reach 2a STA 118+00 – Phase III right bank repaired with geolift and toe wood, looking downstream (12/7/2022)



LPC Reach 2a STA 120+25 – Phase III J-hook repaired, looking upstream (12/7/2022)



LPC Reach 2a STA 121+50 – Phase II constructed riffle and right bank repaired, looking upstream (12/7/2022)



LPC Reach 2a STA 123+00 – Phase III lunker log removed, and left bank repaired, looking downstream (12/7/2022)



LPC Reach 2b STA 124+50 – Phase III roller log repaired and right bank geolift with toe wood, looking upstream (12/7/2022)



LPC Reach 2b STA 125+50 – Phase III wetland GG outlet repaired with step pool outlets, looking downstream (12/7/2022)



LPC Reach 2b STA 125+75 – Phase III wetland GG outlet repaired with step pool outlets, looking at left bank (12/7/2022)



LPC Reach 2b STA 132+00 – Phase III ford crossing bar removal (still present), looking upstream (12/7/2022)



LPC Reach 2b STA 133+00 – Phase III left bank repaired, looking downstream (12/7/2022)



LPC Reach 2b STA 133+50 – Phase III right bank repaired, looking downstream (12/7/2022)



UT1 STA 198+00 – 198+30 – Phase III headcut repaired by installing rock step pools, looking upstream (12/7/2022)



UT1 STA 198+30 – 199+00 – Phase III filter fabric added to repair piping, looking upstream (12/7/2022)



UT1 STA 199+50 – Phase III channel thalweg recentered, looking upstream (12/7/2022)



UT2 Reach 1 (Upper) STA 303+16 – Phase III filter fabric installed to repair piping log roller, looking upstream (12/7/2022)



UT2 Reach 1 (Upper) STA 303+80 – 304+20 – Phase III rock cross vanes installed and right bank repaired, looking upstream (12/7/2022)



UT2 Reach 1 (Upper) STA 308+50 – Phase III repaired crossing inlet by replacing with 48" culvert, looking downstream (12/7/2022)



UT2 Reach 1 (Upper) STA 308+75 – Phase III repaired culvert outlet, stone added to plunge pool, looking upstream (12/7/2022)



UT2 Reach 1 (Upper) STA 309+50 – 310+50 – Phase III rock cross vanes added, structures and left bank repaired, looking upstream (12/7/2022)

UT2 Reach 1 (Lower) STA 325+50 – 326+00 – Phase III buried channel rebuilt, rock cross vanes and riffles added, looking upstream (12/7/2022)



UT2 Reach 1 (Lower) STA 326+00 – 326+50 – Phase III buried channel rebuilt, rock cross vanes and riffles added, looking upstream (12/7/2022)

UT2 Reach 1 (Lower) STA 326+75 – Phase III culvert crossing replaced with ford crossing, fencing repaired, looking upstream (12/7/2022)



UT2 Reach 1 (Lower) STA 327+00 – Phase III rock cross vane added, looking upstream (12/7/2022)

UT2 Reach 1 (Lower) STA 328+25 – Phase III left bank repaired, looking upstream (12/7/2022)



UT2 Reach 2 STA 330+00 – Phase III rock cross vane added, looking upstream (12/7/2022)



UT2 Reach 2 STA 331+60 – Phase III right bank repaired, looking upstream (12/7/2022)



UT2A STA 426+50 – Phase III right and left banks repaired, looking downstream (12/7/2022)



UT2A STA 430+50 – Phase I repair area stone and log step pool added, looking downstream (12/7/2022)



UT2A STA 431+25 – Phase I right bank repair area, looking downstream (12/7/2022)



UT2A STA 431+60 – Phase I right bank repair area, looking downstream (12/7/2022)



UT2B STA 505+20 – Phase III constructed riffle material added and headcut repaired, looking upstream (12/7/2022)

Conservation Easement Photographs

MY7



Conservation Easement Corner – Located south of Wetland HH, logging well outside of easement, looking northwest (12/7/2022)



Conservation Easement Corner– Located south of UT4, representative of no encroachment, looking southeast (12/7/2022)



Conservation Easement Boundary – Located at the start of Little Pine Creek, fencing down across the stream, looking east (12/7/2022)



Conservation Easement Boundary – Located north of XS1 on Little Pine Creek, tree down on fence line, looking north (12/7/2022)



Conservation Easement Boundary – Located south of PP31 on UT2B, tree down on fence line, looking southwest (12/7/2022)



Conservation Easement Boundary – Located at corner east of UT2B, representative of intact fence line, looking south (12/7/2022)



Conservation Easement Boundary– Located at corner east of UT2B, representative of intact fence line, looking northwest (12/7/2022)



Conservation Easement Boundary – Located at corner north of UT2, representative of intact fence line, looking southeast (12/7/2022)



Conservation Easement Corner – Located north of UT2A, representative of intact fence line, looking south (12/7/2022)



Conservation Easement Corner – Located south of UT2A/UT3 confluence, fenced to avoid tree down at corner, looking west (12/7/2022)



Conservation Easement Corner – Located west of UT2A, previously logged area outside of CE no encroachment, looking south (12/7/2022)



Conservation Easement Corner – Located west of UT2A, previously logged area outside of CE no encroachment, looking north (12/7/2022)



Conservation Easement Corner – Located west of UT3 at ford crossing, gates intact, looking north (12/7/2022)



Conservation Easement Corner – Located west of UT3 project start, representative of no encroachment, looking south (12/7/2022)

Areas of Concern Photographs

MY7



LPC Reach 1 STA 100+00 – Mid channel sediment bar at the start of project, looking downstream (12/7/2022)



LPC Reach 1 STA 108+00 – Right bank scour, looking downstream (12/7/2022)



LPC Reach 1 STA 112+50 – Mid channel sediment bar, looking downstream (12/7/2022)



UT1 STA 204+40 – Small beaver dam on UT1, looking upstream (12/7/2022)



UT2 Reach 2 STA 333+50 – Mid channel sediment bar, looking downstream (12/7/2022)



UT2 Reach 2 STA 334+10 – Right bank scour, looking upstream (12/7/2022)



UT2 Reach 2 STA 334+40 – Left bank scour, looking upstream (12/7/2022)



UT2 Reach 2 STA 336+40 – Left bank scour, looking upstream (12/7/2022)



UT2 Reach 2 STA 337+50 – Right bank scour around rock vane structure, looking upstream (12/7/2022)



UT2 Reach 2 STA 338+00 – Left bank scour, looking at left bank (12/7/2022)



UT2 Reach 2 STA 338+30 – Right bank scour, looking at right bank (12/7/2022)



UT2B STA 504+20 – Right bank scour, looking at right bank (12/7/2022)

Vegetation Transect Photograph

MY7



Vegetation Transect – Located in the right floodplain of Little Pine Creek Reach 1, looking west (8/9/2022)

APPENDIX 3. Vegetation Plot Data

Table 8. Vegetation Plot Criteria Attainment

Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

MY6 Plot Data	MY5 Success Criteria Met (Y/N)	Tract Mean
1	N	86%
2	Y	
3	Y	
4	Y	
5	Y	
6	Y	
7	Y	
8	Y	
9	Y	
10	Y	
11	N	
12	Y	
13	N	
14	Y	
15	Y	
16	Y	
17	Y	
18	Y	
19	Y	
20	Y	
21	Y	

Table 9. CVS Vegetation Plot Metadata

Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

Database Name	cvs-eep-entrytool-v2.5.0 LP III MY6.mdb
Database Location	L:\ActiveProjects\005-02160 Little Pine III Monitoring\Monitoring\Monitoring Year 6\Vegetation Assessment
Computer Name	MIMI-PC
File Size	53932032
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	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.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	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.
PROJECT SUMMARY-----	
Project Code	94903
Project Name	Little Pine Creek III Stream & Wetland Restoration Project
Description	Little Pine Creek III Stream & Wetland Restoration Project
Sampled Plots	21
Required Plots (calculated)	21
Sampled Plots	21

Table 10a. Planted and Total Stem Counts
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

MY6 Plot Data (2021)																							
Scientific Name	Common Name	Species Type	94903-WEI-0001			94903-WEI-0002			94903-WEI-0003			94903-WEI-0004			94903-WEI-0005			94903-WEI-0006			94903-WEI-0007		
			PnoLS	P-all	T	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>Acer rubrum</i>	Red Maple	Tree			40	1	1	1	1	1	1	4	4	4	4	4	9				1	1	1
<i>Alnus serrulata</i>	Tag Alder	Shrub Tree																					
<i>Betula nigra</i>	River Birch	Tree	1	1	1	3	3	3	2	2	2	2	2	2				5	5	5	1	1	1
<i>Cercis canadensis</i>	Redbud	Shrub Tree	2	2	2							1	1	1	4	4	4				1	1	1
<i>Cornus</i>	Dogwood	Shrub Tree																					
<i>Cornus amomum</i>	Silky Dogwood	Shrub Tree																					
<i>Cornus florida</i>	Flowering Dogwood	Shrub Tree																					
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree	1	1	1	2	2	2	2	2	2	5	5	5	2	2	2				8	8	8
<i>Juglans nigra</i>	Black Walnut	Tree																					
<i>Lindera benzoin</i>	Northern Spicebush	Shrub Tree																					
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree																					
<i>Pinus taeda</i>	Loblolly Pine	Tree																					
<i>Platanus occidentalis</i>	Sycamore	Tree	1	1	1	1	1	1				1	1	1	1	1	1	2	2	2	3	3	4
<i>Salix nigra</i>	Black Willow	Tree						25											2				
<i>Salix sericea</i>	Silky Willow	Shrub Tree																					
<i>Sambucus canadensis</i>	Common Elderberry	Shrub Tree																					
<i>Ulmus americana</i>	American Elm	Tree	1	1	1	2	2	2	8	8	8				2	2	2						
Stem count			6	6	46	9	9	34	13	13	13	13	13	13	13	13	18	7	7	9	14	14	15
size (ares)			1			1			1			1			1			1			1		
size (ACRES)			0.02471			0.02471			0.02471			0.02471			0.02471			0.02471			0.02471		
Species count			5	5	6	5	5	6	4	4	4	5	5	5	5	5	5	2	2	3	5	5	5
Stems per ACRE			242.8	243	1862	364	364	1376	526	526	526	526	526	526	526	728	283	283	364	567	567	607	

MY6 Plot Data (2021)																							
Scientific Name	Common Name	Species Type	94903-WEI-0008			94903-WEI-0009			94903-WEI-0010			94903-WEI-0011			94903-WEI-0012			94903-WEI-0013			94903-WEI-0014		
			PnoLS	P-all	T	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>Acer rubrum</i>	Red Maple	Tree	3	3	3	1	1	1	2	2	2				1	1	1					5	
<i>Alnus serrulata</i>	Tag Alder	Shrub Tree																					
<i>Betula nigra</i>	River Birch	Tree				1	1	1	1	1	1			3	3	3				2	2	2	
<i>Cercis canadensis</i>	Redbud	Shrub Tree	2	2	2	1	1	1	1	1	1									2	2	2	
<i>Cornus</i>	Dogwood	Shrub Tree																					
<i>Cornus amomum</i>	Silky Dogwood	Shrub Tree																					
<i>Cornus florida</i>	Flowering Dogwood	Shrub Tree																					
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree	4	4	4	3	3	3	4	4	7	3	3	3	3	3	3				2	2	2
<i>Juglans nigra</i>	Black Walnut	Tree																					
<i>Lindera benzoin</i>	Northern Spicebush	Shrub Tree																				1	
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree																					
<i>Pinus taeda</i>	Loblolly Pine	Tree																					
<i>Platanus occidentalis</i>	Sycamore	Tree	1	1	1				2	2	2			1	1	2				2	2	2	
<i>Salix nigra</i>	Black Willow	Tree																					
<i>Salix sericea</i>	Silky Willow	Shrub Tree																					
<i>Sambucus canadensis</i>	Common Elderberry	Shrub Tree																					
<i>Ulmus americana</i>	American Elm	Tree				4	4	4	10	10	13	3	3	3	8	8	9	0	0	0	3	3	3
Stem count			10	10	10	10	10	10	10	10	13	3	3	3	8	8	9	0	0	0	11	11	17
size (ares)			1			1			1			1			1			1			1		
size (ACRES)			0.02471			0.02471			0.02471			0.02471			0.02471			0.02471			0.02471		
Species count			4	4	4	5	5	5	5	5	5	1	1	1	4	4	4	0	0	0	5	5	7
Stems per ACRE			405	405	405	405	405	405	405	405	526	121	121	121	324	324	364	0	0	0	445	445	688

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%
 Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes
 P-all: Number of planted stems including live stakes
 T: Total stems

Table 10b. Planted and Total Stem Counts
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

			MY6 Plot Data (2021)																							
Scientific Name	Common Name	Species Type	94903-WEI-0015			94903-WEI-0016			94903-WEI-0017			94903-WEI-0018			94903-WEI-0019			94903-WEI-0020			94903-WEI-0021					
			PnoLS	P-all	T	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>Acer rubrum</i>	Red Maple	Tree			150	3	3	3							1	1	26			200	1	1	201			
<i>Alnus serrulata</i>	Tag Alder	Shrub Tree																								
<i>Betula nigra</i>	River Birch	Tree	2	2	2				3	3	3	3	3	3	1	1	1				3	3	3			
<i>Cercis canadensis</i>	Redbud	Shrub Tree										5	5	5	2	2	2	3	3	3						
<i>Cornus</i>	Dogwood	Shrub Tree																								
<i>Cornus amomum</i>	Silky Dogwood	Shrub Tree																								
<i>Cornus florida</i>	Flowering Dogwood	Shrub Tree																								
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree	2	2	2	4	4	4	4	4	4	2	2	2	4	4	4	2	2	2	3	3	3			
<i>Juglans nigra</i>	Black Walnut	Tree																								
<i>Lindera benzoin</i>	Northern Spicebush	Shrub Tree																					2			
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree																					4			
<i>Pinus taeda</i>	Loblolly Pine	Tree																								
<i>Platanus occidentalis</i>	Sycamore	Tree	8	8	8	1	1	1				5	5	5							2	2	2			
<i>Salix nigra</i>	Black Willow	Tree																								
<i>Salix sericea</i>	Silky Willow	Shrub Tree																								
<i>Sambucus canadensis</i>	Common Elderberry	Shrub Tree																								
<i>Ulmus americana</i>	American Elm	Tree							4	4	4	1	1	1	1	1	1	2	2	2						
Stem count			12	12	162	8	8	8	11	11	11	16	16	16	9	9	34	7	7	211	9	9	211			
size (ares)			1			1			1			1			1			1			1					
size (ACRES)			0.02471			0.02471			0.02471			0.02471			0.02471			0.02471			0.02471					
Species count			3	3	4	3	3	3	3	3	3	5	5	5	5	5	5	3	3	5	4	4	5			
Stems per ACRE			486	486	6556	324	324	324	445	445	445	647	647	647	364	364	1376	283.3	283	8539	364	364	8539			

			Annual Means																							
Scientific Name	Common Name	Species Type	MY6 (9/2021)			MY5 (8/2020)			MY4 (9/2019)			MY3 (9/2018)			MY2 (9/2017)			MY1 (10/2016)			MY0 (05/2016)					
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T			
<i>Acer rubrum</i>	Red Maple	Tree	23	23	648	26	26	168	35	35	144	34	34	99	41	41	45	45	45	45	45	45	50	50		
<i>Alnus serrulata</i>	Tag Alder	Shrub Tree						2						3			1					1				
<i>Betula nigra</i>	River Birch	Tree	33	33	33	34	34	37	37	37	38	39	39	39	39	39	41	41	41	41	41	49	49	49		
<i>Cercis canadensis</i>	Redbud	Shrub Tree	24	24	24	25	25	25	26	26	27	35	35	35	35	35	37	44	44	44	44	46	46	46		
<i>Cornus</i>	Dogwood	Shrub Tree																								
<i>Cornus amomum</i>	Silky Dogwood	Shrub Tree																								
<i>Cornus florida</i>	Flowering Dogwood	Shrub Tree						1						5												
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree	60	60	63	60	60	63	63	63	68	67	67	68	61	61	67	58	58	58	58	58	58	58		
<i>Juglans nigra</i>	Black Walnut	Tree						2																		
<i>Lindera benzoin</i>	Northern Spicebush	Shrub Tree			3			3																		
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree			4			3						4												
<i>Pinus taeda</i>	Loblolly Pine	Tree						1																		
<i>Platanus occidentalis</i>	Sycamore	Tree	31	31	33	32	32	33	33	33	35	33	33	35	33	33	33	33	33	33	33	30	30	30		
<i>Salix nigra</i>	Black Willow	Tree			27																					
<i>Salix sericea</i>	Silky Willow	Shrub Tree						5																		
<i>Sambucus canadensis</i>	Common Elderberry	Shrub Tree																								
<i>Ulmus americana</i>	American Elm	Tree	28	28	28	35	35	37	38	38	38	44	44	44	47	47	47	50	50	50	52	52	52			
Stem count			199	199	863	212	212	380	232	232	360	252	252	337	256	256	272	271	271	272	285	285	285			
size (ares)			21			21			21			21			21			21			21					
size (ACRES)			0.5189			0.5189			0.5189			0.5189			0.5189			0.5189			0.5189					
Species count			6	6	9	6	6	13	6	6	11	6	6	10	6	6	8	6	6	7	6	6	6			
Stems per ACRE			383	383	1663	409	409	732	447	447	694	486	486	649	493	493	524	522	522	524	549	549	549			

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%
 Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes
 P-all: Number of planted stems including live stakes
 T: Total stems

Table 10c. Vegetation Transect Data

Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

Current Plot Data (MY7 2022)			
Scientific Name	Common Name	Species Type	Transect 1
			T
<i>Acer rubrum</i>	Red Maple	Tree	4
<i>Betula nigra</i>	River Birch	Tree	2
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree	1
<i>Platanus occidentalis</i>	Sycamore	Tree	5
Stem count			12
size (ares)			1
size (ACRES)			0.02471
Species count			4
Stems per ACRE			486

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%
- Volunteer species included in total

T: Total stems

Table 10d. Stems Per Plot Across All Years
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

Plot	MY6 (2021)			MY5 (2020)			MY4 (2019)			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)		
	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac
Permanent Plot 1	6	46	1,862	7	17	688	7	22	890	13	10	405	13	13	526	15	15	607	15	15	607
Permanent Plot 2	9	34	1,376	9	12	486	9	11	445	10	21	850	10	10	405	12	12	486	14	14	567
Permanent Plot 3	13	13	526	14	14	567	15	15	607	15	15	607	15	15	607	16	16	648	17	17	688
Permanent Plot 4	13	13	526	13	14	567	16	18	728	16	16	648	14	17	688	14	14	567	15	15	607
Permanent Plot 5	13	18	728	13	16	648	14	14	567	14	14	567	15	15	607	15	15	607	14	14	567
Permanent Plot 6	7	9	364	7	12	486	8	9	364	8	10	405	11	12	486	12	13	526	14	14	567
Permanent Plot 7	14	15	607	15	18	728	15	20	809	16	19	769	13	16	648	16	16	648	15	15	607
Permanent Plot 8	10	10	405	11	12	486	15	15	607	15	15	607	14	14	567	15	15	607	15	15	607
Permanent Plot 9	10	10	405	12	13	526	13	16	648	11	11	445	12	13	526	13	13	526	13	13	526
Permanent Plot 10	10	13	526	10	12	486	10	14	567	11	12	486	11	15	607	11	11	445	12	12	486
Permanent Plot 11	3	3	121	2	2	81	3	3	121	9	9	364	12	12	486	14	14	567	14	14	567
Permanent Plot 12	8	9	364	11	15	607	14	17	688	15	17	688	15	15	607	12	12	486	13	13	526
Permanent Plot 13	0	0	0	1	1	40	2	2	81	5	5	202	6	6	243	5	5	202	10	10	405
Permanent Plot 14	11	17	688	9	11	445	12	13	526	12	16	648	12	12	486	13	13	526	14	14	567
Permanent Plot 15	12	162	6,556	13	43	1,740	13	28	1,133	13	23	931	13	13	526	13	13	526	14	14	567
Permanent Plot 16	8	8	324	8	11	445	10	10	405	10	15	607	10	10	405	11	11	445	12	12	486
Permanent Plot 17	11	11	445	11	11	445	10	10	405	10	10	405	10	10	405	10	10	405	13	13	526
Permanent Plot 18	16	16	648	16	16	648	16	16	648	16	16	648	16	16	648	16	16	648	13	13	526
Permanent Plot 19	9	34	1,376	9	37	1,497	9	44	1,781	11	16	648	10	10	405	10	10	405	9	9	364
Permanent Plot 20	7	211	8,539	11	62	2,509	11	32	1,295	11	23	931	11	13	526	14	14	567	15	15	607
Permanent Plot 21	9	211	8,539	10	31	1,255	10	31	1,255	11	26	1,052	13	15	607	14	14	567	14	14	567

APPENDIX 4. Morphological Summary Data and Plots

Table 11a. Baseline Stream Data Summary
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

Little Pine Reach 1, Reach 2a, Reach 2b

Parameter	Gage	Pre-Restoration Condition						Reference Reach Data		Design						As-Built/Baseline					
		Little Pine Reach 1		Little Pine Reach 2a		Little Pine Reach 2b		Meadow Fork		Little Pine Reach 1		Little Pine Reach 2a		Little Pine Reach 2b		Little Pine Reach 1		Little Pine Reach 2a		Little Pine Reach 2b ¹	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Rifle																					
Bankfull Width (ft)	N/A	25.8	33.4	24.9		29.0		21.4		30.0		30.0		31.0		30.3	33.5	29.1	30.7	28.7	31.9
Floodprone Width (ft)		>200		>200		>200		>200		>200		>200		>200		>200		>200		>200	
Bankfull Mean Depth		1.7	1.8	2.1		1.8		2.1		1.8		1.8		1.8		1.6	1.8	1.6	1.9	2.0	2.1
Bankfull Max Depth		3.3	3.3	3.7		2.2		3.1		2.5		2.5		2.5		2.7	3.2	2.6	3.9	3.1	3.4
Bankfull Cross-sectional Area (ft ²)	N/A	45.5	47.5	53.3		53.3		44.0		54.5		53.0		54.9		52.2	53.5	46.6	56.9	58.8	64.2
Width/Depth Ratio		1.4	23.9	11.6		16.1		10.2		16.5		17.0		17.5		17.1	21.4	16.6	18.1	14.0	15.9
Entrenchment Ratio		>2.2		>2.2		>2.2		>2.2		>2.2		>2.2		>2.2		>6.0		>6.5		>6.3	
Bank Height Ratio		1.2	1.4	1.6		1.0		1.1		1.0		1.0		1.0		0.8	1.0	1.0	1.0	1.0	1.0
D50 (mm)		10.2		1.3		18.4		---		---		---		---		50.7		1.0		87.6	
Rifle Length (ft)		---		---		---		---		---		---		---		28.4		80.5		37.8	
Rifle Slope (ft/ft)		0.012	0.019	0.0095	0.031	0.028	0.045	0.0239	0.007	0.0125	0.0098	0.0175	0.0155	0.0278	0.0040	0.0275	0.0101	0.0274	0.0055	0.0236	
Pool Length (ft)	N/A	---		---		---		---		---		---		---		44.5		96.5		38.7	
Pool Max Depth (ft)		---		---		---		---		---		---		---		3.5		5.8		4.7	
Pool Spacing (ft)		38	85	55	227	65	229	---	75	270	75	270	78	279	71	191	132	206	88	190	
Pool Volume (ft ³)		---		---		---		---		---		---		---		---		---		---	
Pattern																					
Channel Beltwidth (ft)	N/A	63	82	77	94	57		---	45	210	45	210	47	217	45	154	48	108		89	
Radius of Curvature (ft)		25	59	39	58	34	70	---	60	210	60	120	62	124	60	96	63	77	82	124	
Rc-Bankfull Width (ft/ft)		1.0	1.8	1.6	2.3	1.3	2.4	---	2.0	4.0	2.0	4.0	2.0	4.0	2.0	2.9	2.2	2.5	2.9	3.9	
Meander Length (ft)		86	140	110	186	100	134	---	210	360	210	360	217	372	207	313	288	337	334	329	
Meander Width Ratio		2.4	2.5	3.1	3.8	2.0		---	1.5	7.0	1.5	7.0	1.5	7.0	1.5	4.6	1.6	3.5		3.1	
Substrate, Bed and Transport Parameters																					
R%/Ru%/P%/G%/S%	N/A	---		---		---		---		---		---		---		---		---		---	
SC%/Sa%/G%/C%/B%/Be%		SC/4.5/10.2/61.2/143.4/>2048		SC/0.4/1.3/77.8/180.0/362		SC/0.5/18.4/79.2/143.4/256		---		---		---		---		0.22/0.48/2.0/88.2/146.7/362		0.22/1.0/37.9/111.8/160.7/256		0.38/21.6/47.4/122.3/208.8/362	
d16/d35/d50/d84/d95/d100		0.85		0.66		2.43		---		0.56		0.75		1.20		0.46		0.51		0.69	
Reach Shear Stress (Competency) lb/ft ²		134		122		289		---		99		123		174		---		---		---	
Max part size (mm) mobilized at bankfull		---		---		---		---		---		---		---		---		---		---	
Stream Power (Capacity) W/m ²		---		---		---		---		---		---		---		---		---		---	
Additional Reach Parameters																					
Drainage Area (SM)	N/A	3.9		4.3		4.4		4.4		3.9		4.3		4.4		3.9		4.3		4.4	
Watershed Impervious Cover Estimate (%)		<1%		<1%		<1%		<1%		<1%		<1%		<1%		<1%		<1%		<1%	
Rosgen Classification		C4		E/C5		C4		E4		C4		C5		C4		C4		C4		C4	
Bankfull Velocity (fps)		4.2	4.6	4.0		4.4		5.1		3.8		4.0		4.1		3.6	3.8	4.1	4.3	3.6	3.7
Bankfull Discharge (cfs)		205		215		225		224		205		215		225		205		215		225	
Q-NFF regression (2-yr)		---		---		---		---		---		---		---		---		---		---	
Q- NC Mountain Regional Curve (cfs)		284		306		308		---		---		---		---		---		---		---	
Q-USGS extrapolation (1.2-yr)		177		191		193		---		---		---		---		---		---		---	
Q-Mannings		199	211	213		235		---		---		---		---	188	204	199	231	219	232	
Valley Length (ft)		---		---		---		---		---		---		---		1,184		876		476	
Channel Thalweg Length (ft)		---		4,016		---		---		1,350 ¹		1,025 ¹		481 ¹		1,444		1,083		493	
Simuosity		1.2		1.7		1.1		---		1.14		1.17		1.01		1.22		1.24		1.04	
Water Surface Slope (ft/ft)		0.0048	0.0058	0.0033	0.0057	0.0049	0.0058	0.0100	0.0050	0.0070	0.0111	0.0049	0.0049	0.0072	0.0072	0.0072	0.0072	0.0072	0.0118		
Bankfull Slope (ft/ft)		0.0057		0.0087		0.0089		---		0.0057		0.0082		0.0089		0.0051		0.0074		0.0101	

SC: Silt/Clay <0.062 mm diameter particles
 (---): Data was not provided
 N/A: Not Applicable
¹ Little Pine Reach 2b: Calculations only include reaches with a P1 or P2 approach

Table 11b. Baseline Stream Data Summary
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

UT2, UT2b

Parameter	Gage	Pre-Restoration Condition						Reference Reach Data		Design						As-Built/Baseline																									
		UT2 Reach 1		UT2 Reach 2/3		UT2b		UT2a Reference		UT2 Reach 1 Lower		UT2 Reach 2		UT2b ²		UT2 Reach 1 Lower		UT2 Reach 2		UT2b ²																					
		Min	Max	Reach 2	Reach 3	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max																				
Dimension and Substrate - Riffle																																									
Bankfull Width (ft)	N/A	4.9	9.7	6.1	7.0	8.3		12.6		9.0		11.6		5.9		8.1		8.9		12.8		6.7																			
Floodprone Width (ft)		5.4	29.9	49.3	41.0	10.6		31.0		98		17	195	15	30	28.4		21.5		>200		15.9																			
Bankfull Mean Depth		0.9	1.2	1.4	1.2	0.4		1.4		0.49		0.65		0.35		0.6		0.5		0.9		0.5																			
Bankfull Max Depth		1.4		2.3	1.9	0.6		2.0		0.7		0.95		0.55		1.0		1.10		2.10		0.9																			
Bankfull Cross-sectional Area (ft ²)		5.9	8.6	8.7	8.5	3.1		18.1		4.4		7.6		2.1		5.1		4.2		12.0		3.7																			
Width/Depth Ratio		4.1	11.0	4.2	5.7	22.6		8.7		18.5		17.7		16.8		13.0		13.6		20.1		12.2																			
Entrenchment Ratio		1.1	3.1	8.1	5.9	1.3		2.4		10.9		1.5	16.8	2.5	5.1	3.5		2.0		>22.4		2.4																			
Bank Height Ratio		2.6	3.2	1.0	1.2	5.8		1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0																			
D50 (mm)		10.7		15		16.0		---		---		---		---		56.9		44		53		43																			
Profile																																									
Riffle Length (ft)	N/A	0.012		0.083		0.0327-0.063		0.0092-0.068		0.0178		0.081		0.0404		0.0517		0.0512		0.0681		0.026		0.046		0.0436		0.0750		10.7		25.0		16.8		29.3		4.4		23.0	
Riffle Slope (ft/ft)		---		---		---		---		2.2		2.5		---		---		---		---		---		---		5.0		22.3		13.3		46.3		3.1		14.3					
Pool Length (ft)		---		---		---		---		---		---		---		---		---		---		---		---		1.9		5.0		1.6		3.2		0.6		2.1					
Pool Max Depth (ft)		11.6		40.5		14-68		22-63		8		34		78		6.5		41.5		19		95		5		21		7		34		24		98		3		33			
Pool Spacing (ft)		---		---		---		---		---		---		---		---		---		---		---		---		---		---		---		---		---		---		---			
Pool Volume (ft ³)	---		---		---		---		---		---		---		---		---		---		---		---		---		---		---		---		---		---		---				
Pattern																																									
Channel Beltwidth (ft)	N/A	---		49-52		120		N/A		---		---		45		68		---		---		---		---		61		66		---		---		---							
Radius of Curvature (ft)		---		10-48		8-27		N/A		---		---		29		39		---		---		---		---		19		63		---		---		---							
Rc:Bankfull Width (ft/ft)		---		1.6-7.9		1.1-3.9		N/A		---		---		2.5		3.4		---		---		---		---		2.1		4.9		---		---		---							
Meander Length (ft)		---		64-188		43-141		N/A		---		---		88		135		---		---		---		---		105		135		---		---		---							
Meander Width Ratio		---		8.0-8.5		17.1		N/A		---		---		3.9		5.9		---		---		---		---		7		5		---		---		---							
Substrate, Bed and Transport Parameters																																									
Ri%/Ru%/P%/G%/S%	N/A	SC/5.9/10.7/21.5/36.7/90.0		SC/8.0/15/55.6/84.6/180.0		SC/11/16/52.6/128/180		---		---		---		---		---		0.25/11.0/27.6/96.0/143.4/256.0		---		0.78/28.5/41.6/85.0/123.3/180.0		---																	
SC%/Sa%/G%/C%/B%/Be%		1.53		0.73		0.75		---		1.49		0.96		1.38		1.95		0.83		1.69		---		1.98																	
d16/d35/d50/d84/d95/d100		208		121		123		---		208		148		193		---		---		---		---		---																	
Reach Shear Stress (Competency) lb/ft ²		---		---		---		---		---		---		---		---		---		---		---		---																	
Max part size (mm) mobilized at bankfull		---		---		---		---		---		---		---		---		---		---		---		---																	
Stream Power (Capacity) W/m ²	---		---		---		---		---		---		---		---		---		---		---		---																		
Additional Reach Parameters																																									
Drainage Area (SM)	N/A	0.12		0.29		0.31		0.030		0.12		0.12		0.31		0.03		0.12		0.31		0.03																			
Watershed Impervious Cover Estimate (%)		<1%		<1%		<1%		<1%		<1%		<1%		<1%		<1%		<1%		<1%		<1%																			
Rosgen Classification		A4		E4b		E4		F4b		A/B4/1		B4a		C4b		B4a		B4a		C4b		B4a																			
Bankfull Velocity (fps)		2.3	3.4	4.0	4.1	3.2		---		4.5		4.6		4.7		4.1		2.7		4.3		5.1																			
Bankfull Discharge (cfs)		20		35		10		20		20		35		10		20		35		10		10																			
Q-NFF regression (2-yr)		---		---		---		---		---		---		---		---		---		---		---																			
Q- NC Mountain Regional Curve (cfs)		21		44		7		---		---		---		---		---		---		---		---																			
Q-USGS extrapolation (1.2-yr)		10		21		3		---		---		---		---		---		---		---		---																			
Q-Mannings		35		43		8		---		---		---		---		21		11.2		51.0		18.7																			
Valley Length (ft)		---		---		---		---		---		---		---		---		3,988		---		231																			
Channel Thalweg Length (ft)		---		5270 ¹		553		---		433		1264		241		433		1318		---		253																			
Sinuosity		1.1		1.3		2.1		1.1		---		1.05		1.20		1.04		1.05		1.2		1.1																			
Water Surface Slope (ft/ft) ²		0.0436		0.0290		0.0136		0.0406		0.0433		0.0501		0.0239		0.0639		0.0560		0.0231		0.0616																			
Bankfull Slope (ft/ft)		0.0476		0.0363		0.028		0.0667		---		0.0525		0.0280		0.0667		0.0563		0.0237		0.0536																			

SC: Silt/Clay <0.062 mm diameter particles
 FS: Fine Sand 0.125-0.250mm diameter particles
 (---) Data was not provided
 N/A: Not Applicable
¹entire length of UT2
² UT2b: Calculations only include reach with a P2 approach

Table 12a. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Dimension ^{1,2}	Cross-Section 1, Little Pine Reach 1 (Riffle)							Cross-Section 2, Little Pine Reach 1 (Pool)							Cross-Section 3, Little Pine Reach 1 (Riffle)						
	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6
Bankfull Elevation (ft)	2,535.4	2,535.4	2,535.4	2,535.7	2535.8	2536.1	2536.2	2,533.2	2,533.2	2,533.2	2,533.5	2,534.0	2,534.4	2534.6	2,532.9	2,532.9	2,532.9	2,533.2	2,533.4	2,533.5	2533.0
Low Bank Elevation (ft)	2,535.4	2,535.4	2,535.5	2,535.7	2535.9	2536.1	2535.8	2,533.2	2,533.2	2,533.1	2,533.5	2,534.0	2,534.4	2534.6	2,532.4	2,532.2	2,532.5	2,533.2	2,533.5	2,533.9	2533.7
Bankfull Width (ft)	30.3	29.9	30.8	29.5	29.1	25.3	25.0	30.6	30.9	30.9	29.8	29.5	29.8	24.6	33.5	32.9	32.3	29.5	23.7	25.5	22.5
Floodprone Width (ft)	132.9	135.1	135.1	>106	>106	>106	>106	---	---	---	---	---	---	---	>200	>200	>200	>215	>215	>214	>214
Bankfull Mean Depth (ft)	1.8	1.7	1.7	1.9	1.9	2.1	1.8	2.2	2.1	2.2	2.3	2.6	3.3	4.2	1.6	1.6	1.6	1.8	2.3	2.4	3.0
Bankfull Max Depth (ft)	2.7	2.8	3.2	3.1	3.1	3.7	3.5	4.3	3.9	4.4	4.8	5.2	5.6	6.3	3.2	3.1	3.0	3.5	3.5	4.4	4.5
Bankfull Cross Sectional Area (ft ²)	53.5	49.8	52.8	55.9	55.6	54.2	44.3	68.0	65.9	66.9	69.4	76.0	97.0	103.2	52.2	51.8	52.2	53.6	54.7	61.8	67.0
Bankfull Width/Depth Ratio	17.1	18.0	18.0	15.6	15.3	11.8	14.1	---	---	---	---	---	---	---	21.4	20.9	20.0	16.3	10.3	10.5	7.6
Bankfull Entrenchment Ratio	4.4	4.5	4.4	>3.6	>3.6	>4.2	>4.2	---	---	---	---	---	---	---	>6.0	>6.1	>6.2	>7.3	>9.1	>8.4	>9.5
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0	<1.0	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	1.0	1.0	1.1	1.2
Dimension ^{1,2}	Cross-Section 4, Little Pine Reach 2a (Riffle)							Cross-Section 5, Little Pine Reach 2a (Riffle)							Cross-Section 6, Little Pine Reach 2a (Pool)						
	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6
Bankfull Elevation (ft)	2,527.4	2,527.4	2,527.4	2,527.3	2,527.1	2526.6	2,526.7	2,525.4	2,525.4	2,525.4	2,525.2	2,524.9	2,524.4	2524.5	2,524.8	2,524.8	2,524.8	2,524.4	2,525.2	2,524.8	2524.7
Low Bank Elevation (ft)	2,527.4	2,527.5	2,527.5	2,527.7	2,527.8	2527.6	2,527.5	2,525.4	2,525.3	2,525.4	2,525.4	2,525.8	2,524.9	2525.1	2,524.8	2,524.5	2,524.7	2,524.4	2,525.2	2,524.8	2524.7
Bankfull Width (ft)	29.1	29.3	28.5	31.0	27.9	25.4	24.4	30.7	31.3	31.0	31.4	31.5	29.2	31.2	35.4	35.5	35.4	27.7	32.7	26.9	26.2
Floodprone Width (ft)	>200	>200	>200	>189	>189	>189	>189	>200	>200	>200	>90	>79.5	>93	>93	---	---	---	---	---	---	---
Bankfull Mean Depth (ft)	1.6	1.6	1.8	1.9	2.2	2.8	2.7	1.9	1.8	1.9	2.0	2.6	2.5	2.3	2.6	2.4	2.4	2.4	3.0	3.6	3.3
Bankfull Max Depth (ft)	2.6	2.6	2.9	3.9	4.1	4.4	4.3	3.9	3.6	3.5	3.6	5.4	3.6	3.6	5.7	5.1	5.3	4.6	5.5	6.2	6.6
Bankfull Cross Sectional Area (ft ²)	46.6	46.4	49.8	57.8	62.6	71.1	66.8	56.9	56.7	58.2	63.1	82.3	72.2	73.1	93.4	83.6	86.5	67.4	98.7	97.4	86.8
Bankfull Width/Depth Ratio	18.1	18.5	16.2	16.6	12.5	9.1	8.9	16.6	17.2	16.5	15.6	12.0	11.8	13.3	---	---	---	---	---	---	---
Bankfull Entrenchment Ratio	>6.9	>6.8	>7.0	>6.1	>6.8	>7.4	>7.7	>6.5	>6.4	>6.5	>2.9	>2.5	>3.2	>3.0	---	---	---	---	---	---	---
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.1	1.2	1.3	1.2	1.0	1.0	1.0	1.1	1.2	1.2	1.2	---	---	---	---	---	---	---
Dimension ^{1,2}	Cross-Section 7, Little Pine Reach 2b (Pool)							Cross-Section 8, Little Pine Reach 2b (Riffle)							Cross-Section 9, Little Pine Reach 2b (Riffle)						
	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6
Bankfull Elevation (ft)	2,522.0	2,522.0	2,522.0	2,522.2	2,522.5	2,522.4	2522.3	2,520.1	2,520.1	2,520.1	2,519.9	2,519.7	2,519.5	2519.6	2,519.5	2,519.5	2,519.5	2,519.3	2,519.3	2,519.0	2519.0
Low Bank Elevation (ft)	2,522.0	2,522.0	2,522.2	2,522.2	2,522.5	2,522.4	2522.3	2,520.1	2,520.1	2,520.2	2,520.3	2,520.4	2,520.3	2520.4	2,519.5	2,519.5	2,519.4	2,519.5	2,519.6	2,519.4	2519.4
Bankfull Width (ft)	35.3	35.5	35.2	39.4	40.3	38.1	29.5	28.7	29.8	29.4	30.3	31.8	29.8	26.8	31.9	30.7	29.3	31.2	32.7	28.8	29.2
Floodprone Width (ft)	---	---	---	---	---	---	---	>200	>200	>200	>121	>121	>121	>121	>200	>200	>200	>110	>110	>110	>110
Bankfull Mean Depth (ft)	2.9	2.8	2.8	2.5	2.6	2.6	3.2	2.1	2.1	2.0	2.3	2.4	2.6	2.9	2.0	2.0	2.1	2.2	2.3	2.7	2.5
Bankfull Max Depth (ft)	5.4	5.6	5.4	5.4	5.5	5.5	5.5	3.4	3.6	3.4	4.2	4.5	4.7	4.6	3.1	3.2	3.0	3.7	3.9	4.2	4.0
Bankfull Cross Sectional Area (ft ²)	103.7	100.0	97.2	96.9	104.8	98.1	94.0	58.8	61.2	59.8	68.3	77.5	77.4	77.7	64.2	62.3	60.2	67.4	74.3	76.6	73.9
Bankfull Width/Depth Ratio	---	---	---	---	---	---	---	14.0	14.5	14.4	13.5	13.1	11.5	9.3	15.9	15.2	14.2	14.4	14.3	10.9	11.5
Bankfull Entrenchment Ratio	---	---	---	---	---	---	---	>7.0	>6.7	>6.8	>4.0	>3.8	>4.1	>4.5	>6.3	>6.5	>6.9	>3.5	>3.4	>3.8	>3.8
Bankfull Bank Height Ratio	---	---	---	---	---	---	---	1.0	1.0	1.0	1.1	1.2	1.2	1.2	1.0	1.0	1.0	1.0	1.1	1.1	1.1

---: not applicable

¹Prior to MY3, bankfull dimensions were calculated using a fixed bankfull elevation.

²MY3-MY5 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by NCIRT and NCDMS (9/2018). The remainder of the bankfull dimensions are calculated based on the current year's low bank height. MY3 dimensions were updated in MY4.

Table 12b. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Dimension ^{1,2}	Cross-Section 10, UT2b (Pool)							Cross-Section 11, UT2b (Riffle)							Cross-Section 12, UT2 Reach 1 Lower (Riffle)						
	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6
Bankfull Elevation (ft)	2,570.0	2,570.0	2,570.0	2,570.1	2,570.2	2,570.0	2,570.0	2,566.4	2,566.4	2,566.4	2,566.4	2,566.5	2,566.7	2,567.0	2,573.8	2,573.8	2,573.8	2,573.8	2,573.9	2,574.0	2,573.9
Low Bank Elevation (ft)	2,570.0	2,569.7	2,570.0	2,570.1	2,570.2	2,570.0	2,570.0	2,566.4	2,566.4	2,566.2	2,566.3	2,566.3	2,566.4	2,566.3	2,573.8	2,573.7	2,573.7	2,573.9	2,573.8	2,573.9	2,574.0
Bankfull Width (ft)	5.9	6.0	6.1	7.3	7.6	6.4	7.4	6.7	6.3	6.6	6.3	6.4	3.2	3.4	8.1	8.4	8.6	8.9	7.1	4.9	5.8
Floodprone Width (ft)	---	---	---	---	---	---	---	15.9	17.7	17.9	14.3	14.1	14.9	14.2	28.4	30.0	30.0	31.4	29.5	32.7	34.1
Bankfull Mean Depth (ft)	1.0	2.3	2.4	2.3	2.3	2.3	2.1	0.5	0.7	0.7	0.5	0.4	0.5	0.4	0.6	0.7	0.6	0.7	0.6	1.0	0.9
Bankfull Max Depth (ft)	1.7	3.4	3.3	3.4	3.3	2.9	3.0	0.9	1.1	1.1	0.8	0.8	0.8	0.8	1.0	1.3	1.2	1.4	1.2	1.5	1.8
Bankfull Cross Sectional Area (ft ²)	5.7	14.0	14.9	16.6	17.3	14.9	15.6	3.7	4.3	4.5	3.0	2.3	1.5	1.4	5.1	5.7	5.4	5.9	4.4	4.9	5.4
Bankfull Width/Depth Ratio	---	---	---	---	---	---	---	12.2	9.1	9.6	13.2	17.9	6.7	7.8	13.0	12.5	13.9	13.4	11.5	4.8	6.2
Bankfull Entrenchment Ratio	---	---	---	---	---	---	---	2.4	2.8	2.7	2.3	2.2	4.7	4.2	3.5	3.6	3.5	3.5	4.2	6.7	5.9
Bankfull Bank Height Ratio	---	---	---	---	---	---	---	1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	<1.0	1.1	<1.0	1.0	1.0
Dimension ^{1,2}	Cross-Section 13, UT2 Reach 1 Lower (Pool)							Cross-Section 14, UT2 Reach 2 (Riffle)							Cross-Section 15, UT2 Reach 2 (Pool)						
	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6
Bankfull Elevation (ft)	2,573.3	2,573.3	2,573.3	2,573.4	2,573.3	2,573.4	2,573.4	2,547.2	2,547.2	2,547.2	2,547.5	2,547.6	2,546.8	2,546.0	2,539.1	2,539.1	2,539.1	2,539.1	2,539.2	2,539.2	2,539.3
Low Bank Elevation (ft)	2,573.3	2,573.3	2,573.3	2,573.4	2,573.3	2,573.4	2,573.4	2,547.2	2,547.2	2,547.1	2,547.4	2,547.7	2,547.4	2,547.8	2,539.1	2,539.0	2,539.2	2,539.1	2,539.2	2,539.2	2,539.3
Bankfull Width (ft)	9.8	10.1	10.4	10.2	10.0	9.9	9.4	10.8	8.0	9.2	6.9	7.6	5.9	7.8	12.2	11.6	12.0	11.4	11.4	9.7	10.3
Floodprone Width (ft)	---	---	---	---	---	---	---	21.5	23.2	23.5	25.0	25.0	26.0	26.0	---	---	---	---	---	---	---
Bankfull Mean Depth (ft)	1.3	1.2	1.4	1.6	1.5	1.7	1.6	0.5	0.8	0.7	0.7	0.8	1.5	2.3	1.5	1.0	1.2	1.2	1.0	1.9	2.1
Bankfull Max Depth (ft)	2.2	1.9	2.5	3.0	2.8	2.9	2.6	1.1	1.2	1.2	1.2	1.3	2.6	3.4	3.1	1.7	2.2	1.9	1.7	2.7	3.5
Bankfull Cross Sectional Area (ft ²)	12.8	12.5	15.0	16.6	15.0	17.3	15.4	5.9	6.6	6.6	4.6	6.3	8.8	17.6	18.7	11.9	14.4	13.9	11.4	18.8	21.6
Bankfull Width/Depth Ratio	---	---	---	---	---	---	---	20.1	9.7	13.0	10.5	9.3	3.9	3.5	---	---	---	---	---	---	---
Bankfull Entrenchment Ratio	---	---	---	---	---	---	---	2.0	2.9	2.5	3.6	3.3	4.4	3.3	---	---	---	---	---	---	---
Bankfull Bank Height Ratio	---	---	---	---	---	---	---	1.0	1.0	<1.0	<1.0	1.0	1.3	2.1	---	---	---	---	---	---	---
Dimension ^{1,2}	Cross-Section 16, UT2 Reach 2 (Riffle)							Cross-Section 17, UT2 Reach 2 (Riffle)							Cross-Section 18, UT2 Reach 2 (Pool)						
	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY0	MY1	MY2	MY3	MY4	MY5	MY6
Bankfull Elevation (ft)	2,535.0	2,535.0	2,535.0	2,535.4	2,535.5	2,535.3	2,535.6	2,531.2	2,531.2	2,531.2	2,531.2	2,531.3	2,532.0	2,531.9	2,530.4	2,530.4	2,530.4	2,530.0	2,530.4	2,530.5	2,530.6
Low Bank Elevation (ft)	2,535.0	2,535.0	2,535.1	2,535.5	2,535.6	2,535.7	2,535.7	2,531.2	2,531.2	2,531.2	2,531.2	2,531.3	2,531.7	2,531.6	2,530.4	2,579.7	2,530.1	2,530.0	2,530.4	2,530.5	2,530.6
Bankfull Width (ft)	8.9	10.0	6.9	8.7	6.4	7.1	6.9	12.8	12.9	13.6	12.6	11.2	10.4	10.9	19.3	19.5	21.4	8.5	8.8	7.3	9.6
Floodprone Width (ft)	>200	>200	>200	>39.5	>40.6	>42	>41	>200	>200	>200	>71.0	>71.0	>71.0	>71	---	---	---	---	---	---	---
Bankfull Mean Depth (ft)	0.5	0.5	0.4	0.6	0.8	1.0	0.7	0.9	0.9	0.9	1.0	1.0	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.1	1.0
Bankfull Max Depth (ft)	1.1	0.8	0.6	0.9	1.2	1.5	1.1	2.1	1.8	1.9	2.1	1.9	1.2	1.3	2.0	2.3	2.1	2.4	2.0	1.5	1.6
Bankfull Cross Sectional Area (ft ²)	4.2	5.0	2.8	4.9	4.8	6.7	4.6	12.0	12.0	12.0	12.0	11.4	8.3	8.8	15.8	16.3	16.9	8.9	8.5	8.4	9.5
Bankfull Width/Depth Ratio	19.2	19.9	17.1	15.6	8.5	7.4	10.5	13.6	13.8	15.4	13.2	11.0	13.0	13.5	---	---	---	---	---	---	---
Bankfull Entrenchment Ratio	>22.4	>20.0	>28.9	>4.5	>6.3	>6.0	>5.9	>15.7	>15.5	>14.7	>5.6	>6.3	>6.8	>6.5	---	---	---	---	---	---	---
Bankfull Bank Height Ratio	1.0	1.1	1.2	1.1	1.1	1.4	1.1	1.0	1.0	1.0	1.0	1.0	<1.0	<1.0	---	---	---	---	---	---	---

---: not applicable

¹Prior to MY3, bankfull dimensions were calculated using a fixed bankfull elevation.

²MY3-MY5 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by NCIRT and NCDMS (9/2018). The remainder of the bankfull dimensions are calculated based on the current year's low bank height. MY3 dimensions were updated in MY4.

Table 13a. Monitoring Data - Stream Reach Data Summary
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

Little Pine Reach 1

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle														
Bankfull Width (ft)	30.3	33.5	29.9	32.9	30.8	32.3	29.5	29.5	23.7	29.1	25.3	25.5	22.5	25.0
Floodprone Width (ft)	133	>200	135	>200	135	>200	>106	>215	>106	>215	>106	>215	>106	>215
Bankfull Mean Depth	1.6	1.8	1.6	1.7	1.6	1.7	1.8	1.9	1.9	2.3	2.1	2.4	1.8	3.0
Bankfull Max Depth	2.7	3.2	2.8	3.1	3.0	3.2	3.1	3.5	3.1	3.5	3.7	4.4	3.5	4.5
Bankfull Cross-sectional Area (ft ²)	52.2	53.5	49.8	51.8	52.2	52.8	53.6	55.9	54.7	55.6	54.2	61.8	44.3	67.0
Width/Depth Ratio	17.1	21.4	18	20.9	18	20	15.6	16.3	10.3	15.3	10.5	11.8	7.6	14.1
Entrenchment Ratio	4.4	>6.0	4.5	>6.1	4.4	>6.2	>3.6	>6.9	>3.6	>9.1	>4.2	>8.4	>4.2	>9.5
Bank Height Ratio	0.8	1.0	0.8	1.0	0.9	1.0	1.0		1.0		1.0	1.1	<1.0	1.2
D50 (mm)	50.7		56.9		45.0		48.5		26.9		45.0		42.5	
Profile														
Riffle Length (ft)	28	81	21	47	32	76	12	50	20	96	33	70	28	65
Riffle Slope (ft/ft)	0.0040	0.0275	0.0064	0.0283	0.0052	0.0183	0.0029	0.0191	0.0067	0.0280	0.0013	0.0205	0.0032	0.0248
Pool Length (ft)	44	96	66	176	49	177	58	176	63	166	36	182	42	216
Pool Max Depth (ft)	3.5	5.8	3.0	4.7	3.9	6.2	4.2	5.8	4.1	6.4	3.9	6.5	3.6	6.5
Pool Spacing (ft)	71	191	77	224	94	210	81	225	73	223	83	213	82	226
Pool Volume (ft ³)														
Pattern														
Channel Beltwidth (ft)	45	154												
Radius of Curvature (ft)	60	96												
Rc:Bankfull Width (ft/ft)	2.0	2.9												
Meander Wave Length (ft)	207	313												
Meander Width Ratio	1.5	4.6												
Additional Reach Parameters														
Rosgen Classification	C4		C4		C4		C4		C4		C4		C4	
Channel Thalweg Length (ft)	1,444		1,444		1,444		1,444		1,444		1,444		1,444	
Sinuosity (ft)	1.22													
Water Surface Slope (ft/ft)	0.0049		0.0049		0.0050		0.0049		0.0060		0.0054		0.0057	
Bankfull Slope (ft/ft)	0.0051		0.0043		0.0045		0.0048		0.0059		0.0054		0.0044	
Ri%/Ru%/P%/G%/S%														
SC%/Sa%/G%/C%/B%/Be%														
d16/d35/d50/d84/d95/d100	0.22/0.48/2.0/88/147/362		0.22/3.4/22/81/123/362		0.13/0.38/11/789/180/1024		0.35/7.45/16/90/128/180		0.1/0.2/8.7/77.7/113.6/180		0.4/1.8/23.8/87.8/151.8/1024		0.9/6.6/19.0/90.6/152.4/512	
% of Reach with Eroding Banks	0%		0%		1%		3%		6%		2%		2%	

Table 13b. Monitoring Data - Stream Reach Data Summary
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

Little Pine Reach 2a

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle														
Bankfull Width (ft)	29.1	30.7	29.3	31.3	28.5	31.0	31.0	31.4	27.9	31.5	25.4	29.2	24.4	31.2
Floodprone Width (ft)	>200		>200		>200		>90	>189	>79.5	>189	>93	>189	>93	>189
Bankfull Mean Depth	1.6	1.9	1.6	1.8	1.8	1.9	1.9	2.0	2.2	2.6	2.5	2.8	2.3	2.7
Bankfull Max Depth	2.6	3.9	2.6	3.6	2.9	3.5	3.6	3.9	4.1	5.4	3.6	4.4	3.6	4.3
Bankfull Cross-sectional Area (ft ²)	46.6	56.9	46.4	56.7	49.8	58.2	57.8	63.1	62.6	82.3	71.1	72.2	66.8	73.1
Width/Depth Ratio	16.6	18.1	17.2	18.5	16.2	16.5	15.6	16.6	12.0	12.5	9.1	11.8	8.9	13.3
Entrenchment Ratio	>6.5	>6.9	>6.4	>6.8	>6.5	>7.0	>2.9	>6.1	>2.5	>6.8	>3.2	>7.4	>3.0	>7.0
Bank Height Ratio	1.0		1.0		1.0		1.1		1.2		1.2		1.3	
D50 (mm)	87.6		72.4		75.9		85.0		72.1		64.0		74.8	
Profile														
Riffle Length (ft)	38	68	19	49	27	55	26	54	29	60	22	55	14	62
Riffle Slope (ft/ft)	0.0101	0.0274	0.0112	0.0471	0.0143	0.0280	0.0139	0.0300	0.0065	0.0316	0.0015	0.0247	0.0177	0.0238
Pool Length (ft)	39	109	39	145	66	186	84	178	77	218	69	185	87	214
Pool Max Depth (ft)	4.7	5.8	4.3	6.6	4.0	6.7	4.3	6.0	4.2	6.7	4.7	7.5	4.3	8.5
Pool Spacing (ft)	132	206	78	206	121	279	57	263	96	268	74	252	89	303
Pool Volume (ft ³)														
Pattern														
Channel Beltwidth (ft)	48	108												
Radius of Curvature (ft)	63	77												
Rc:Bankfull Width (ft/ft)	2.2	2.5												
Meander Wave Length (ft)	288	337												
Meander Width Ratio	1.6	3.5												
Additional Reach Parameters														
Rosgen Classification	C4		C4		C4		C4		C4		C4		C4	
Channel Thalweg Length (ft)	1,083		1,083		1,083		1,083		1,083		1,083		1,083	
Sinuosity (ft)	1.24													
Water Surface Slope (ft/ft)	0.0072		0.0073		0.0075		0.0074		0.0076		0.0076		0.0082	
Bankfull Slope (ft/ft)	0.0074		0.0059		0.0067		0.0070		0.0070		0.0073		0.0073	
Ri%/Ru%/P%/G%/S%														
SC%/Sa%/G%/C%/B%/Be%														
d16/d35/d50/d84/d95/d100	0.22/1.0/38/112/161/256		0.29/11/36/90/157/1024		0.21/12.5/523/121/168/1024		0.32/6.7/49.8/136/274/512		0.2/0.6/24.7/103.6/161.1/256		0.3/12.8/45/153.5/227.6/362		0.4/8.2/24.2/116.6/203.6/512	
% of Reach with Eroding Banks	0%		0%		2%		3%		5%		3%		3%	

Table 13c. Monitoring Data - Stream Reach Data Summary
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

Little Pine Reach 2b

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle														
Bankfull Width (ft)	28.7	31.9	29.8	30.7	29.3	29.4	30.3	31.2	31.8	32.7	28.8	29.8	26.8	29.2
Floodprone Width (ft)	>200		>200		>200		>110	>121	>110	>121	>110	>121	>110	>121
Bankfull Mean Depth	2.0	2.1	2.0	2.1	2.0	2.1	2.2	2.3	2.3	2.4	2.6	2.7	2.5	2.9
Bankfull Max Depth	3.1	3.4	3.2	3.6	3.0	3.4	3.7	4.2	3.9	4.5	4.2	4.7	4.0	4.6
Bankfull Cross-sectional Area (ft ²)	58.8	64.2	61.2	62.3	59.8	60.2	67.4	68.3	74.3	77.5	76.6	77.4	73.9	77.7
Width/Depth Ratio	14.0	15.9	14.5	15.2	14.2	14.4	13.5	14.4	13.1	14.3	10.9	11.5	9.3	11.5
Entrenchment Ratio	>6.3	>7	>6.5	>6.7	>6.8	>6.9	>3.5	>4.0	>3.4	>3.8	>3.8	>4.1	>3.8	>4.5
Bank Height Ratio	1.0		1.0		1.0		1.0	1.1	1.1	1.2	1.1	1.2	1.1	1.2
D50 (mm)	47.4		72.0		70.2		62.1		65.7		56.1		47.7	
Profile														
Riffle Length (ft)	30	132	26	102	26	44	35	59	28	85	20	52	49	55
Riffle Slope (ft/ft)	0.0055	0.0236	0.0169	0.0254	0.0116	0.0177	0.0040	0.0133	0.0070	0.0242	0.0062	0.0218	0.0024	0.0227
Pool Length (ft)	41	99	55	153	26	149	24	152	76	140	55	152	71	151
Pool Max Depth (ft)	2.6	5.4	3.8	6.3	3.7	5.0	3.6	5.5	4.3	6.8	4.4	6.6	5.1	5.9
Pool Spacing (ft)	88	190	12	129	8	175	69	162	80	287	52	191	51	196
Pool Volume (ft ³)														
Pattern														
Channel Beltwidth (ft)	89													
Radius of Curvature (ft)	82	124												
Rc:Bankfull Width (ft/ft)	2.9	3.9												
Meander Wave Length (ft)	334	329												
Meander Width Ratio	3.1													
Additional Reach Parameters														
Rosgen Classification	C4		C4		C4		C4		C4		C4		C4	
Channel Thalweg Length (ft)	493		493		493		493		493		493		493	
Sinuosity (ft)	1.04													
Water Surface Slope (ft/ft)	0.0118		0.0101		0.0082		0.0105		0.0121		0.0118		0.0123	
Bankfull Slope (ft/ft)	0.0101		0.0107		0.0103		0.0102		0.0101		0.0096		0.0114	
Ri%/Ru%/P%/G%/S%														
SC%/Sa%/G%/C%/B%/Be%														
d16/d35/d50/d84/d95/d100	0.38/22/47/122/209/362		0.22/10/29/111/171/362		0.3/8.0/29.0/107.3/180/362		0.71/5.6/28/93/152/512		0.2/1.0/8.9/94.5/136.1/256		0.4/2.0/22.6/107.3/168.1/362		1.3/6.4/14.4/132.1/208.8/362	
% of Reach with Eroding Banks	0%		0%		0%		3%		6%		7%		10%	

Table 13d. Monitoring Data - Stream Reach Data Summary
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

UT2 Reach 1 Lower

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle														
Bankfull Width (ft)	8.1		8.4		8.6		8.9		7.1		4.9		5.8	
Floodprone Width (ft)	28.4		30.0		30.0		31.4		29.5		32.7		34.1	
Bankfull Mean Depth	0.6		0.7		0.6		0.7		0.6		1.0		0.9	
Bankfull Max Depth	1.0		1.3		1.2		1.4		1.2		1.5		1.8	
Bankfull Cross-sectional Area (ft ²)	5.1		5.7		5.4		5.9		4.4		4.9		5.4	
Width/Depth Ratio	13.0		12.5		13.9		13.4		11.5		4.8		6.2	
Entrenchment Ratio	3.5		3.6		3.5		3.5		4.2		6.7		5.9	
Bank Height Ratio	1.0		1.0		0.9		1.1		<1.0		1.0		1.0	
D50 (mm)	56.9		39.8		38.7		43.8		42.9		26.3		35.6	
Profile														
Riffle Length (ft)	11	25	13	39	5	24	6	20	10	22	6	38	7	53
Riffle Slope (ft/ft)	0.0360	0.0853	0.0136	0.0730	0.0253	0.0793	0.0109	0.0624	0.0234	0.0884	0.0255	0.1066	0.0081	0.1588
Pool Length (ft)	5	22	2	15	4	17	5	21	2	25	3	18	5	37
Pool Max Depth (ft)	1.9	5.0	1.0	2.9	2.0	3.8	1.1	3.5	1.4	2.6	0.9	2.5	1.1	3.2
Pool Spacing (ft)	7	34	8	52	6	53	6	34	7	140	5	69	5	117
Pool Volume (ft ³)														
Pattern														
Channel Beltwidth (ft)	---													
Radius of Curvature (ft)	---													
Rc:Bankfull Width (ft/ft)	---													
Meander Wave Length (ft)	---													
Meander Width Ratio	---													
Additional Reach Parameters														
Rosgen Classification	B4a		B4a		B4a		B4a		B4a		B4a		B4a	
Channel Thalweg Length (ft)	433		433		433		433		433		433		433	
Sinuosity (ft)	1.05													
Water Surface Slope (ft/ft)	0.0560		0.0477		0.0481		0.0475		0.0502		0.0509		0.0455	
Bankfull Slope (ft/ft)	0.0563		0.0483		0.0485		0.0455		0.0451		0.0484		0.0461	
Ri%/Ru%/P%/G%/S%														
SC%/Sa%/G%/C%/B%/Be%														
d16/d35/d50/d84/d95/d100	0.25/11/28/96/143/256		6.1/14/23/75/153/256		0.7/11/28/76/118/256		1.2/18/37/113/180/362		1.6/23.8/35.1/94.3/122.1/256		17.7/34.1/47.3/123/175/362		6.3/17.7/29.8/131.7/180/256	
% of Reach with Eroding Banks	0%		6%		2%		1%		6%		6%		8%	

Table 13e. Monitoring Data - Stream Reach Data Summary
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

UT2 Reach 2

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle														
Bankfull Width (ft)	8.9	12.8	8.0	12.9	6.9	13.6	6.9	12.6	6.4	11.2	5.9	10.4	6.9	10.9
Floodprone Width (ft)	22	>200	23	>200	24	>200	25	>71	25	>71	26	>71	26	26
Bankfull Mean Depth	0.5	0.9	0.5	0.9	0.4	0.9	0.6	1.0	0.8	1.0	0.8	1.5	0.7	2.3
Bankfull Max Depth	1.1	2.1	0.8	1.8	0.6	1.9	0.9	2.1	1.2	1.9	1.2	2.6	1.1	3.4
Bankfull Cross-sectional Area (ft ²)	4.2	12.0	5.0	12.0	2.8	12.0	4.6	12.0	4.8	11.4	6.7	8.8	4.6	17.6
Width/Depth Ratio	13.6	20.1	9.7	19.9	13.0	17.1	10.5	15.6	8.5	11.0	3.9	13.0	3.5	13.5
Entrenchment Ratio	2.0	>22.4	2.9	>20.0	2.5	>28.9	3.6	>5.6	3.3	>6.3	4.4	>6.8	3.3	>6.5
Bank Height Ratio	1.0		1.0		0.9	1.2	<1.0	1.1	1.0	1.1	1.3	1.4	<1.0	2.1
D50 (mm)	44	53	15	90	34.5	34.8	45.0	48.2	32.0	39.3	29.8	36.4	22.0	27.9
Profile														
Riffle Length (ft)	17	29	10	36	5	62	4	68	6	36	6	56	4	31
Riffle Slope (ft/ft)	0.0262	0.0575	0.0141	0.0658	0.0093	0.0773	0.0122	0.1161	0.0111	0.0725	0.0046	0.0811	0.0063	0.0895
Pool Length (ft)	13	46	4	40	6	35	4	39	6	67	6	41	4	52
Pool Max Depth (ft)	1.6	3.2	1.5	3.8	1.1	4.6	1.9	4.8	1.5	3.2	1.6	3.7	1.5	3.7
Pool Spacing (ft)	24	98	8	113	10	207	7	156	3	162	15	160	4	156
Pool Volume (ft ³)														
Pattern														
Channel Beltwidth (ft)	61	66												
Radius of Curvature (ft)	19	63												
Rc:Bankfull Width (ft/ft)	2.1	4.9												
Meander Wave Length (ft)	105	135												
Meander Width Ratio	7	5												
Additional Reach Parameters														
Rosgen Classification	C4b		C4b		C4b		C4b		C4b		C4b		C4b	
Channel Thalweg Length (ft)	1,318		1,318		1,318		1,318		1,318		1,318		1,318	
Sinuosity (ft)	1.2													
Water Surface Slope (ft/ft)	0.0231		0.0225		0.0235		0.0237		0.0240		0.0249		0.0248	
Bankfull Slope (ft/ft)	0.0237		0.0214		0.0245		0.0247		0.0241		0.0232		0.0235	
Ri%/Ru%/P%/G%/S%														
SC%/Sa%/G%/C%/B%/Be%														
d16/d35/d50/d84/d95/d100	0.25/11/28/96/143/256		6.1/14/23/75/153/256		0.7/11/28/76/118/256		1.2/18/37/113/180/362		1.6/23.8/35.1/94.3/122.1/256		17.7/34.1/47.3/123/175/362		6.3/17.7/29.8/131.7/180/256	
% of Reach with Eroding Banks	0%		0%		4%		7%		2%		4%		5%	

Table 13f. Monitoring Data - Stream Reach Data Summary
 Little Pine III Stream & Wetland Restoration Project
 DMS Project No. 94903
 Monitoring Year 7 - 2022

UT2b

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle														
Bankfull Width (ft)	6.7		6.3		6.6		6.3		6.4		3.2		3.4	
Floodprone Width (ft)	15.9		17.7		17.9		14.3		14.1		14.9		14.2	
Bankfull Mean Depth	0.5		0.7		0.7		0.5		0.4		0.5		0.4	
Bankfull Max Depth	0.9		1.1		1.1		0.8		0.8		0.8		0.8	
Bankfull Cross-sectional Area (ft ²)	3.7		4.3		4.5		3.0		2.3		1.5		1.4	
Width/Depth Ratio	12.2		9.1		9.6		13.2		17.9		6.7		7.8	
Entrenchment Ratio	2.4		2.8		2.7		2.3		2.2		4.7		4.2	
Bank Height Ratio	1.0		1.0		0.9		<1.0		<1.0		<1.0		<1.0	
D50 (mm)	43.0		35.9		32.0		23.5		24.4		10.5		20.7	
Profile														
Riffle Length (ft)	4	23	7	24	7	25	6	32	5	21	4	45	5	46
Riffle Slope (ft/ft)	0.0448	0.0659	0.0276	0.0451	0.0127	0.0702	0.0125	0.0494	0.0117	0.0394	0.0160	0.0499	0.0007	0.0422
Pool Length (ft)	3	14	3	8	4	15	3	11	3	9	3	12	4	11
Pool Max Depth (ft)	0.6	2.1	2.0	3.9	0.8	3.8	0.9	4.0	0.7	3.5	1.0	3.3	1.0	3.2
Pool Spacing (ft)	3	33	4	30	3	30	2	32	3	30	2	30	5	52
Pool Volume (ft ³)														
Pattern														
Channel Beltwidth (ft)	---													
Radius of Curvature (ft)	---													
Rc:Bankfull Width (ft/ft)	---													
Meander Wave Length (ft)	---													
Meander Width Ratio	---													
Additional Reach Parameters														
Rosgen Classification	B4a		B4a		B4a		B4a		B4a		B4a		B4a	
Channel Thalweg Length (ft)	253		253		253		253		253		253		253	
Sinuosity (ft)	1.10													
Water Surface Slope (ft/ft)	0.0616		0.0614		0.0557		0.0608		0.0610		0.0591		0.0621	
Bankfull Slope (ft/ft)	0.0536		0.0608		0.0612		0.0612		0.0602		0.0599		0.0604	
Ri%/Ru%/P%/G%/S%														
SC%/Sa%/G%/C%/B%/Be%														
d16/d35/d50/d84/d95/d100	0.78/29/42/85/123/180		0.28/7.4/23/82/128/362		0.5/13/26/87/143/256		0.50/6.7/14/100/161/256		8.9/20.6/29.8/81.3/119.3/180		5.3/17.5/32.4/101.8/158.7/256		11/11.6/18.2/76.6/135.9/180	
% of Reach with Eroding Banks	0%		0%		0%		0%		0%		4%		4%	

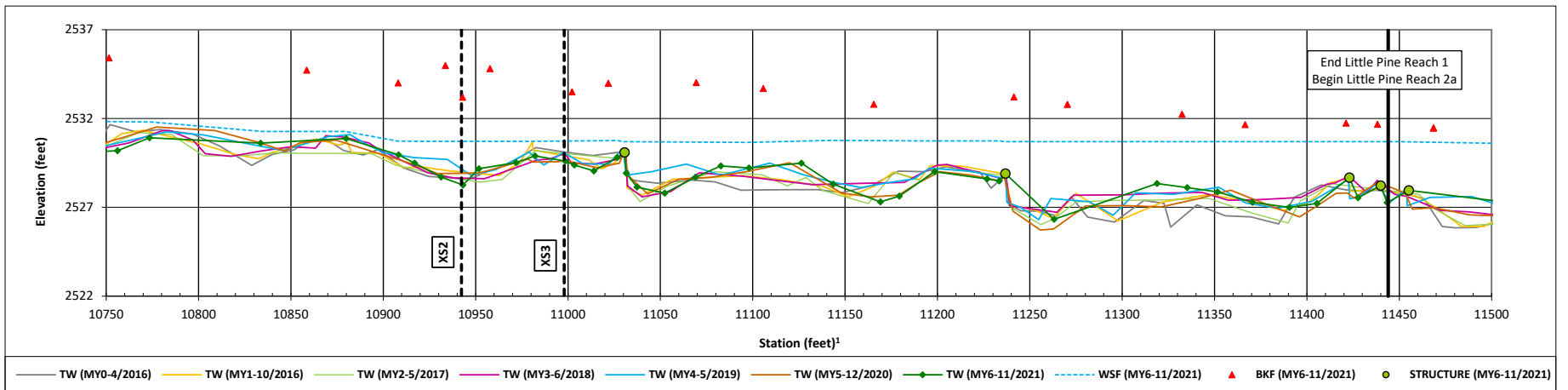
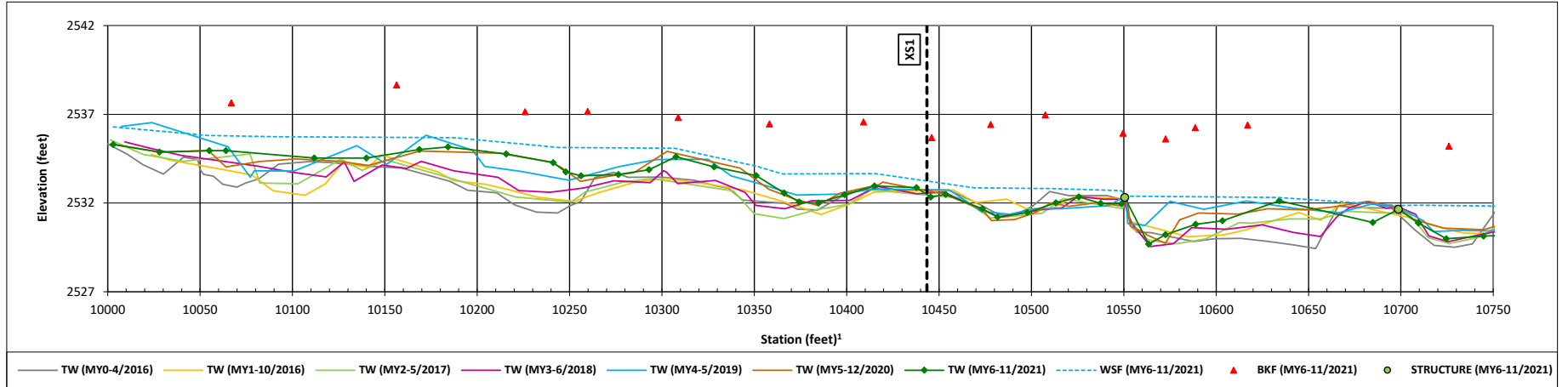
Longitudinal Profile Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Little Pine Reach 1 (STA 100+00 - 114+44)



¹ Profile stationing derived from as-built thalweg alignment.

² Stream repairs completed in fall 2020 on Little Pine Creek Reach 1 (STA 100+43 to 101+75) and Reach 2a (STA 121+25 to 122+50).

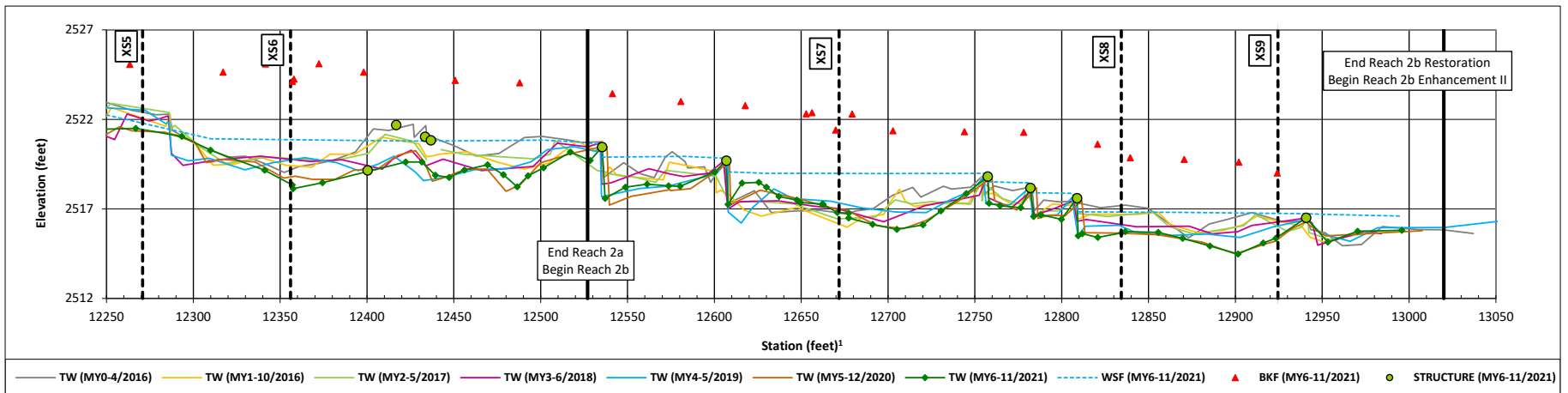
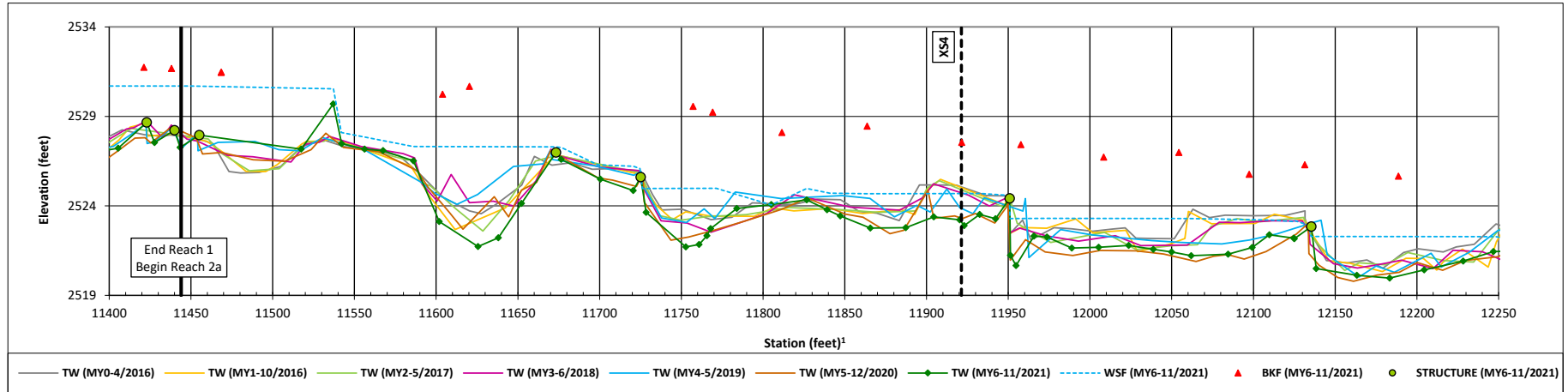
Longitudinal Profile Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Little Pine Reach 2a (114+44-125+27) and Reach 2b (125+27-130+20)



¹ Profile stationing derived from as-built thalweg alignment.

² Stream repairs completed in fall 2020 on Little Pine Creek Reach 1 (STA 100+43 to 101+75) and Reach 2a (STA 121+25 to 122+50).

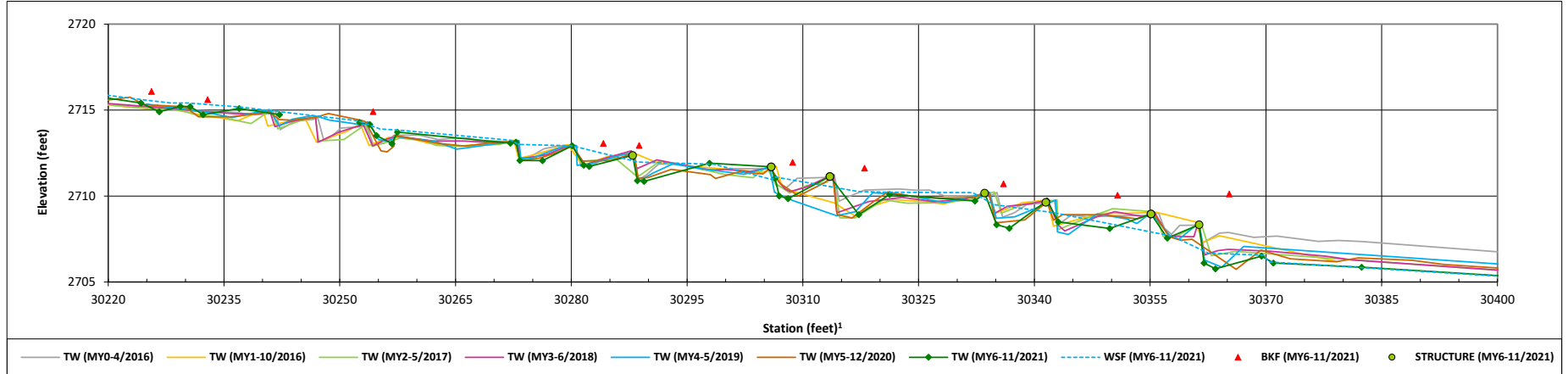
Longitudinal Profile Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

UT2 Reach 1 Upper (STA 297+18 - 325+67)



¹ Profile stationing derived from as-built thalweg alignment.

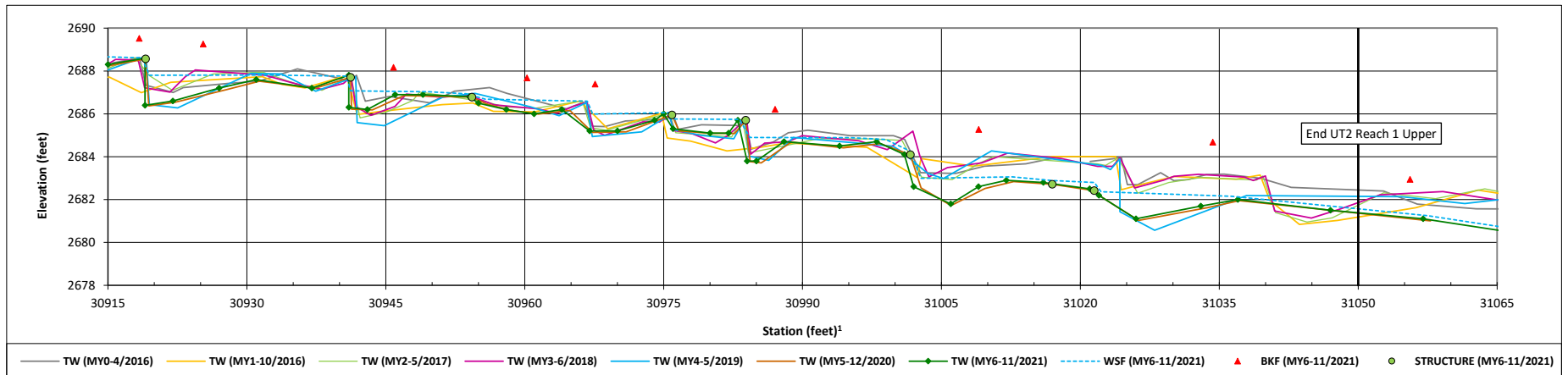
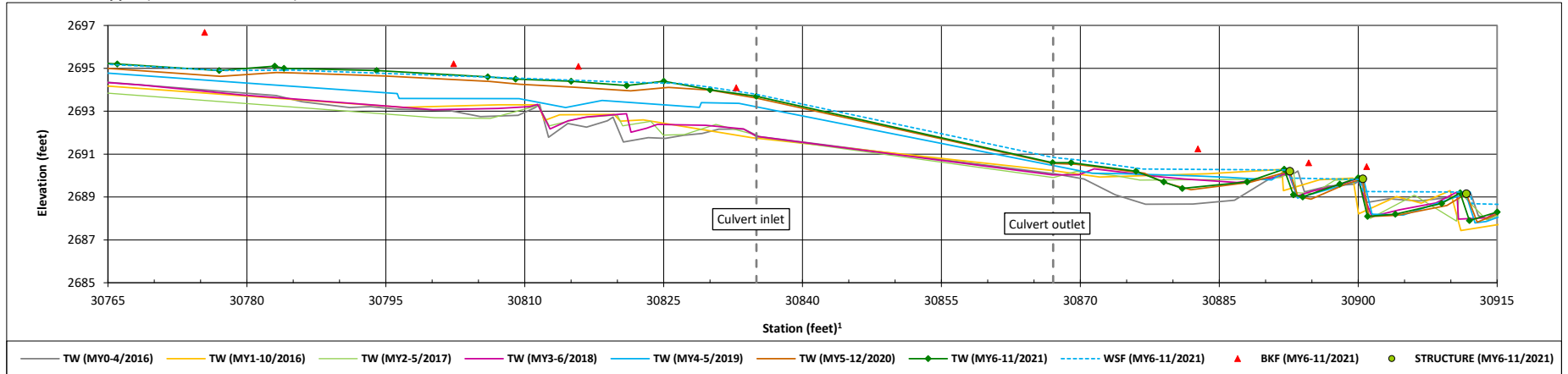
Longitudinal Profile Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

UT2 Reach 1 Upper (STA 297+18 - 325+67)



¹ Profile stationing derived from as-built thalweg alignment.

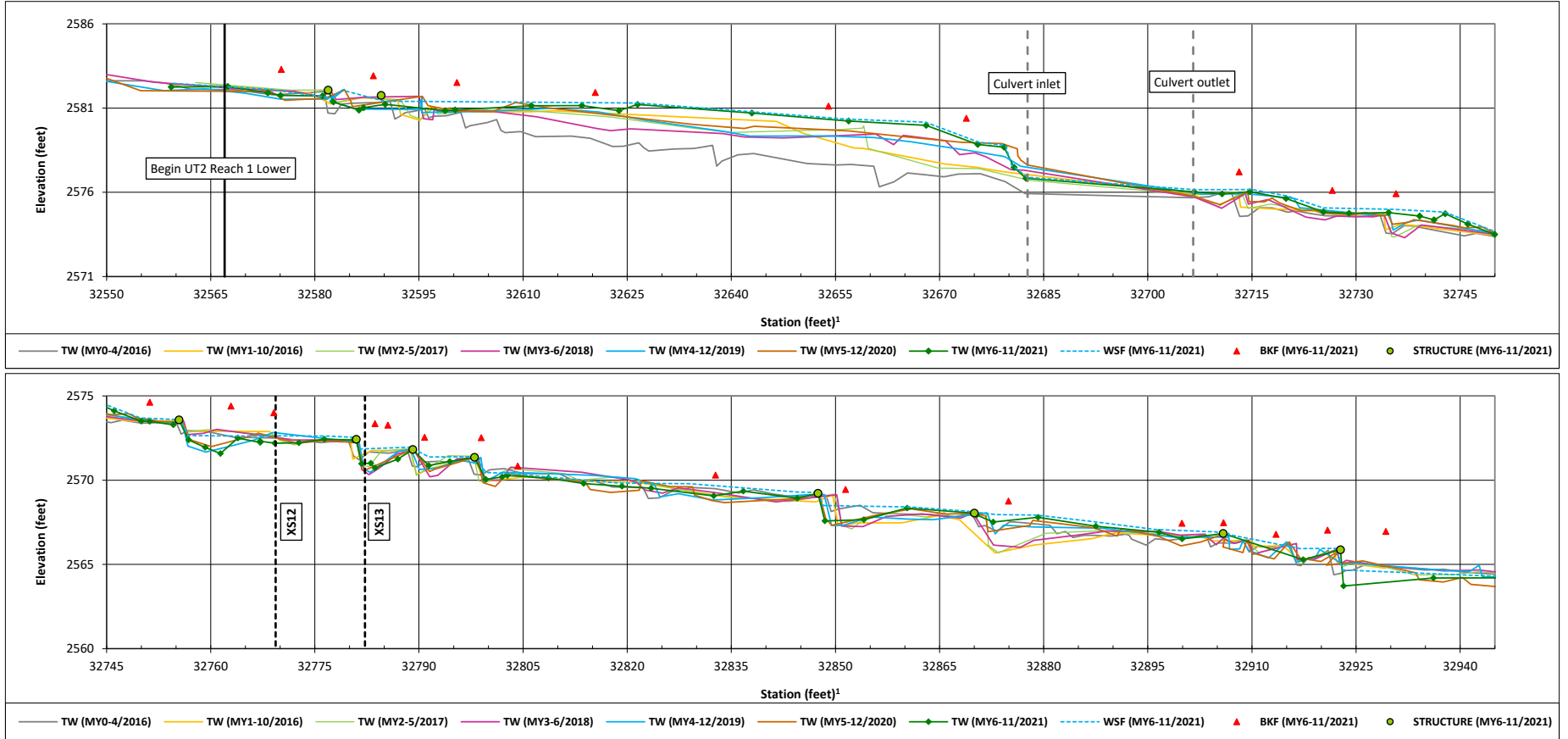
Longitudinal Profile Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

UT2 Reach 1 Lower (STA 325+67 - 330+00)



¹ Profile stationing derived from as-built thalweg alignment.

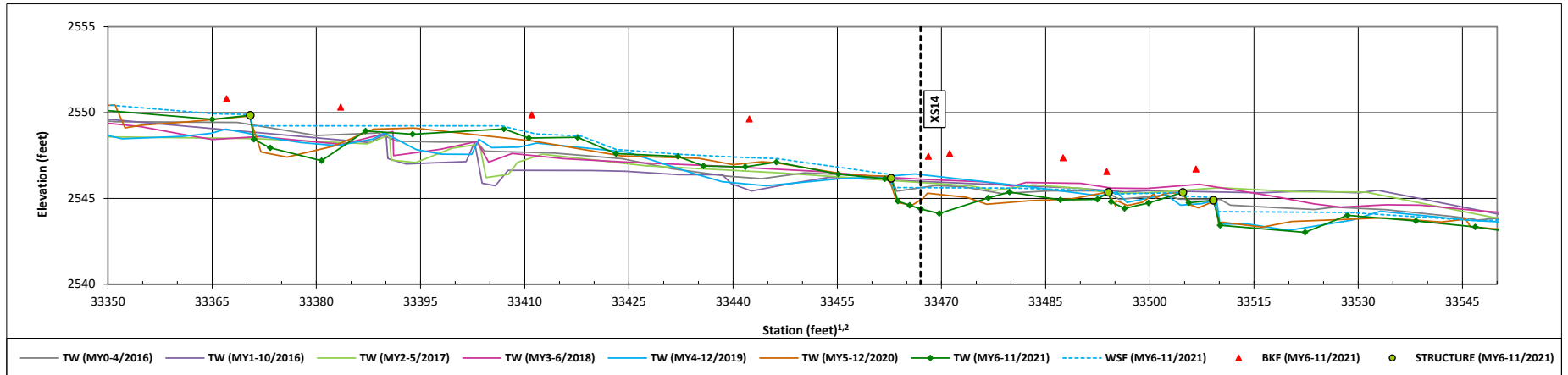
Longitudinal Profile Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

UT2 Reach 2 (STA 330+00 - 343+18)



¹ Profile stationing derived from as-built thalweg alignment.

² Stream repairs completed in September 2019 on UT2 Reach 2 STA 332+25 to 339+15.

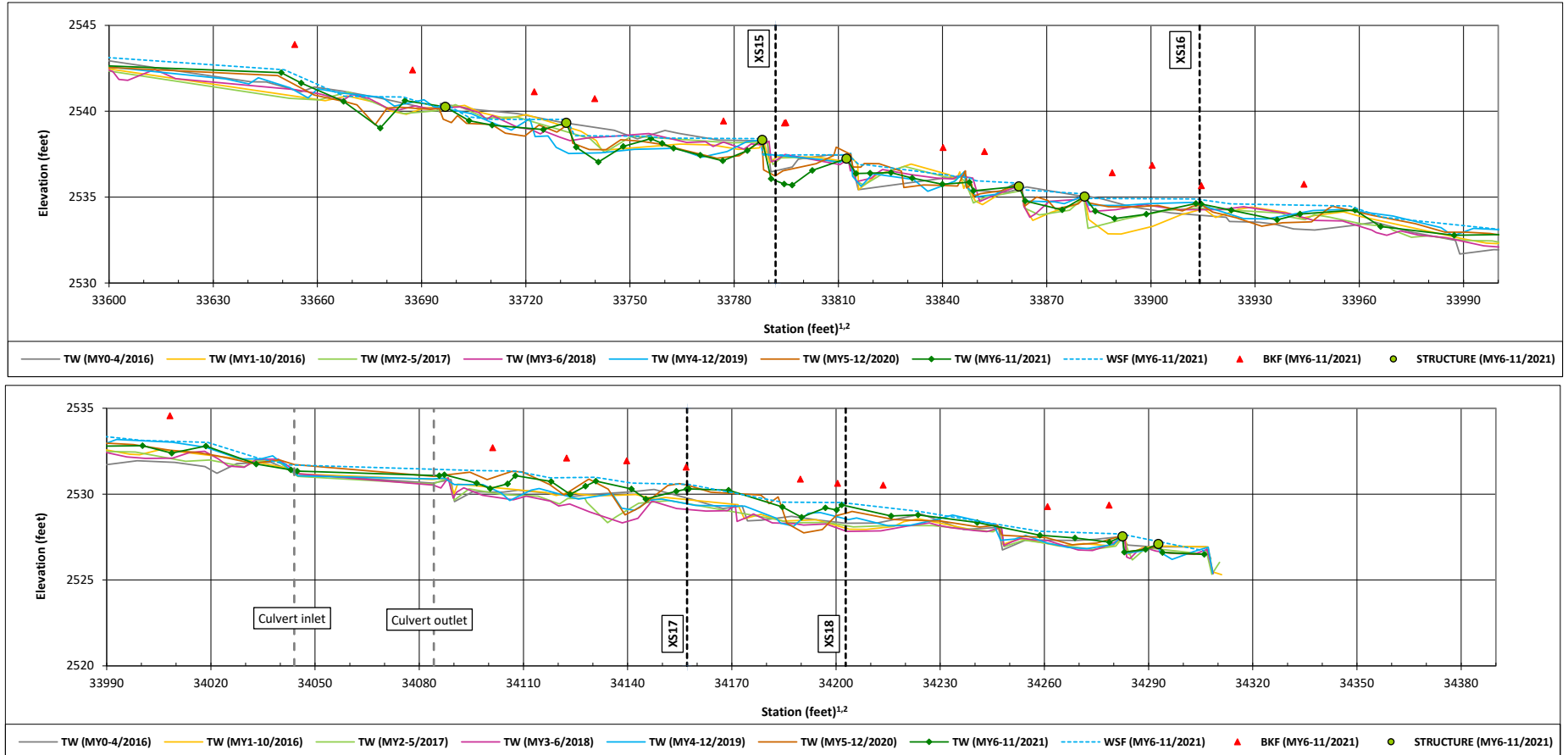
Longitudinal Profile Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

UT2 Reach 2 (STA 330+00 - 343+18)



¹ Profile stationing derived from as-built thalweg alignment.

² Stream repairs completed in September 2019 on UT2 Reach 2 STA 332+25 to 339+15.

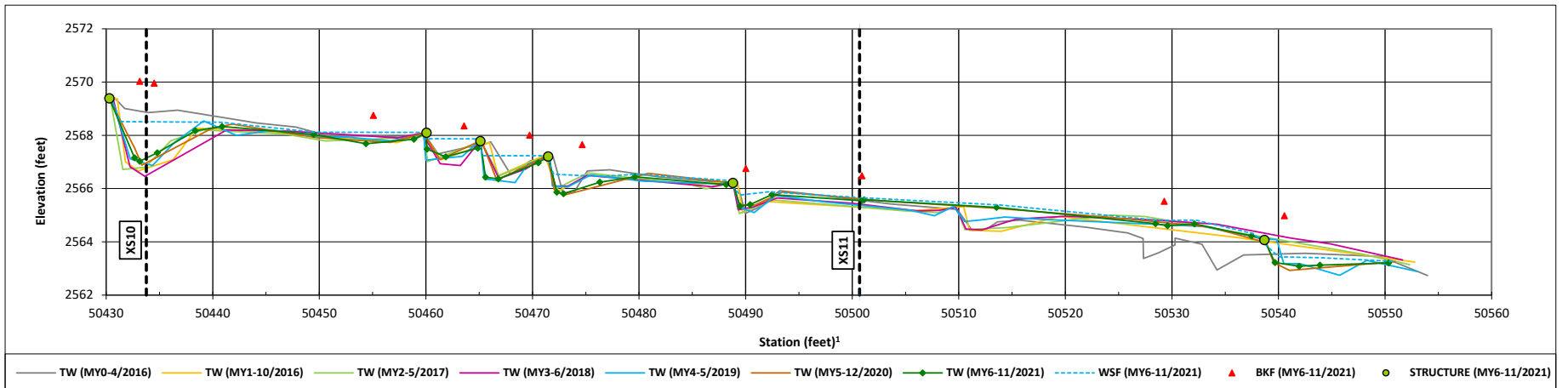
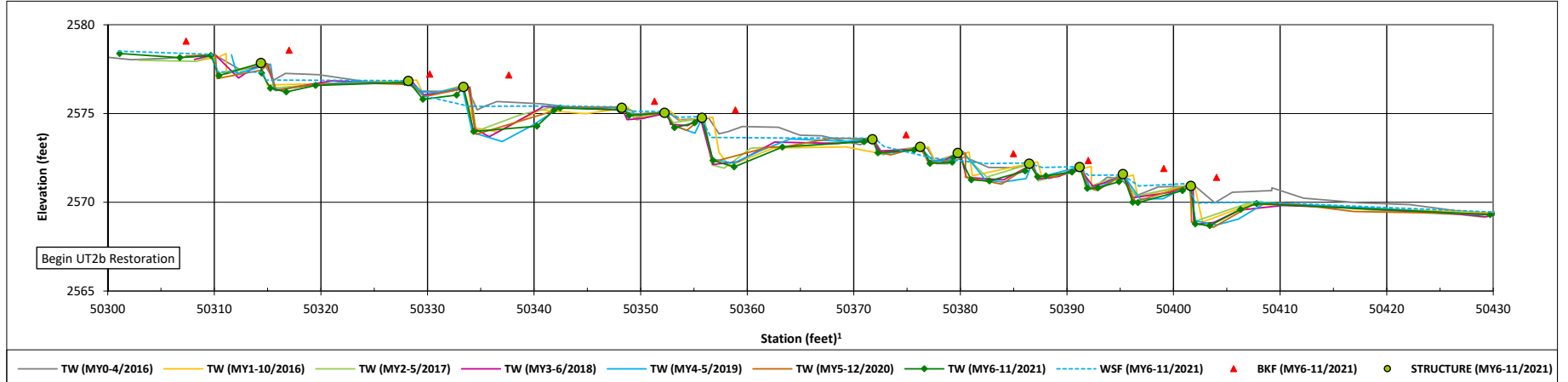
Longitudinal Profile Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

UT2b (STA 503+00 - 505+53)



¹ Profile stationing derived from as-built thalweg alignment.

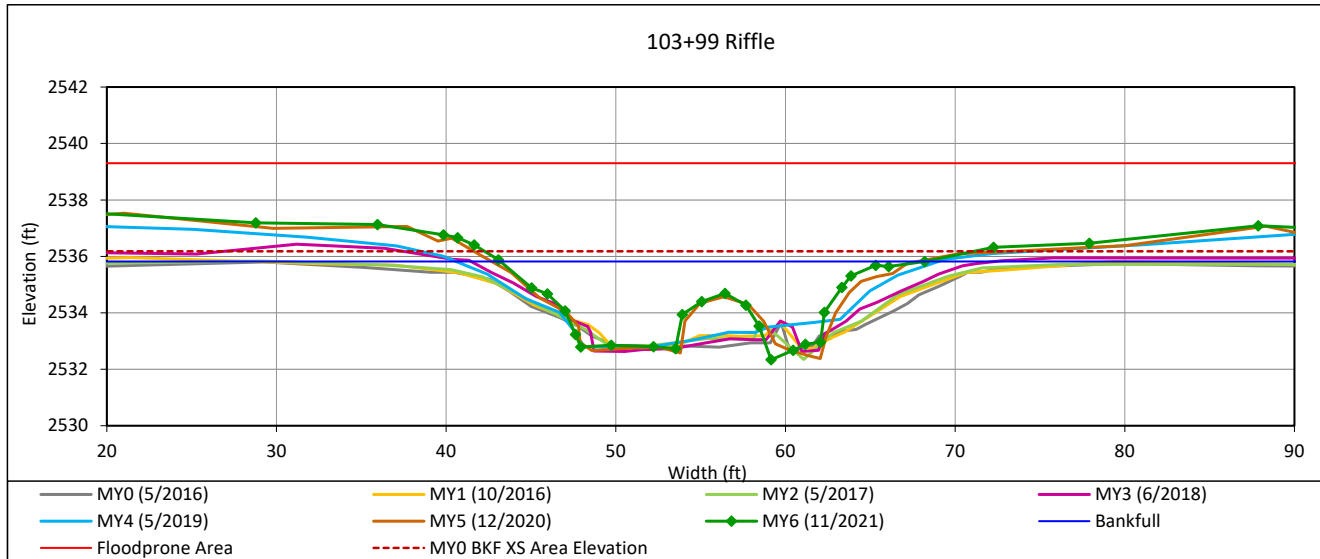
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 1- Little Pine Reach 1



Bankfull Dimensions

44.3	x-section area (ft.sq.)
25.0	width (ft)
1.8	mean depth (ft)
3.5	max depth (ft)
29.5	wetted perimeter (ft)
1.5	hydraulic radius (ft)
14.1	width-depth ratio
105.5	W flood prone area (ft)
4.2	entrenchment ratio
0.9	low bank height ratio

Survey Date: 11/2021

Field Crew: Wildlands Engineering



View Downstream

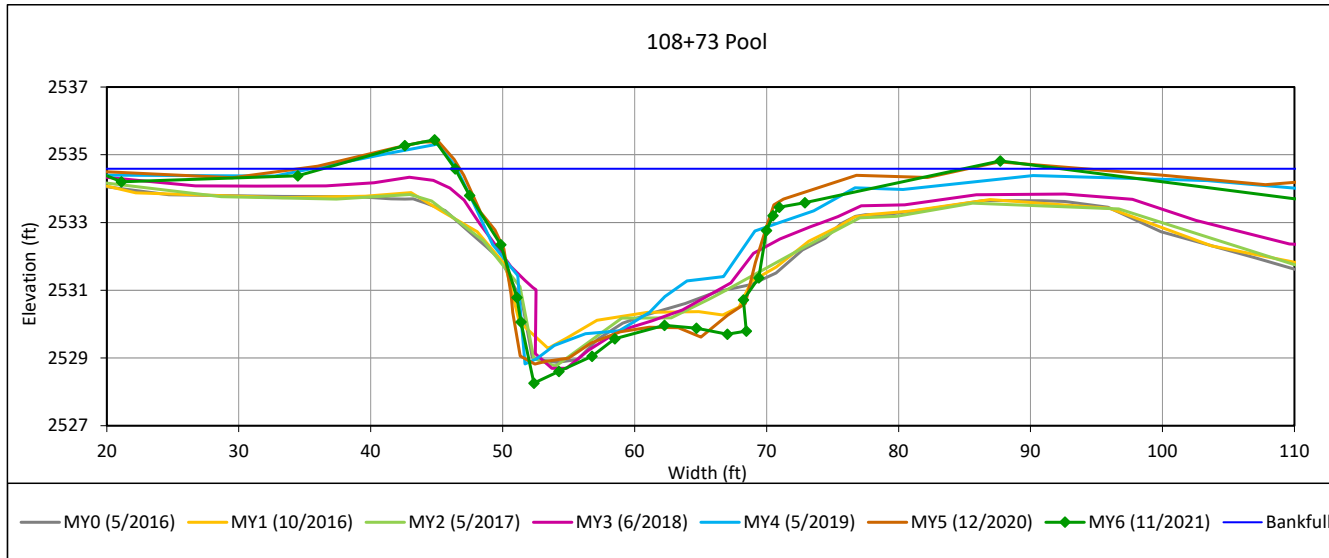
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 2- Little Pine Reach 1



Bankfull Dimensions

103.2	x-section area (ft.sq.)
24.6	width (ft)
4.2	mean depth (ft)
6.3	max depth (ft)
30.2	wetted perimeter (ft)
3.4	hydraulic radius (ft)
5.8	width-depth ratio

Survey Date: 11/2021

Field Crew: Wildlands Engineering



View Downstream

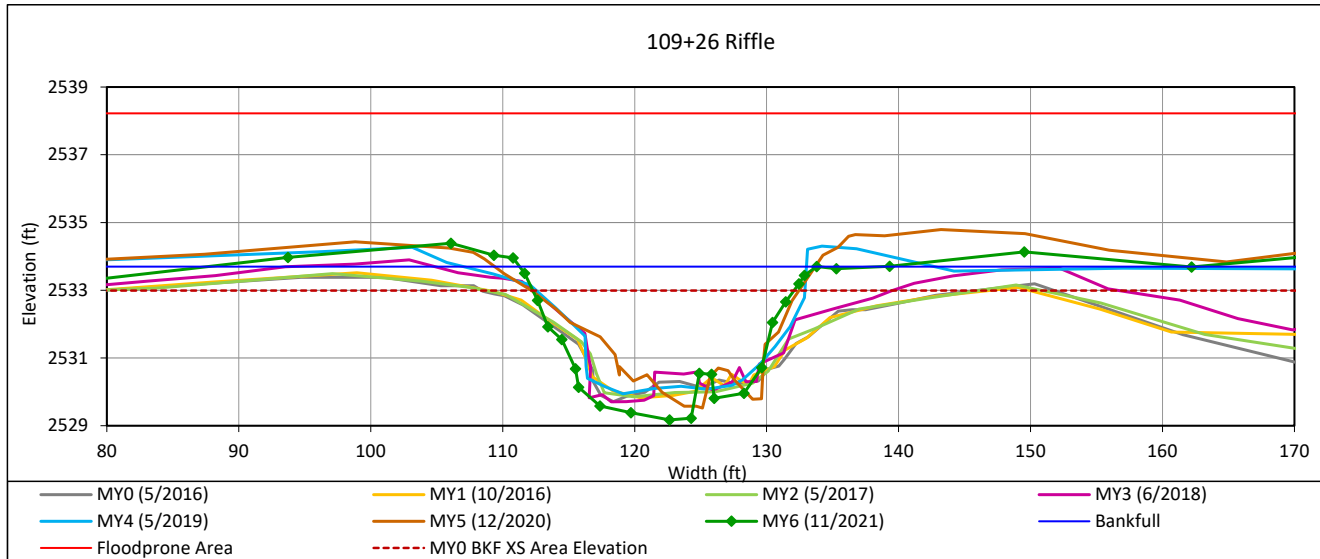
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 3- Little Pine Reach 1



Bankfull Dimensions

67.0	x-section area (ft.sq.)
22.5	width (ft)
3.0	mean depth (ft)
4.5	max depth (ft)
26.7	wetted perimeter (ft)
2.5	hydraulic radius (ft)
7.6	width-depth ratio
214.1	W flood prone area (ft)
9.5	entrenchment ratio
1.2	low bank height ratio

Survey Date: 11/2021

Field Crew: Wildlands Engineering



View Downstream

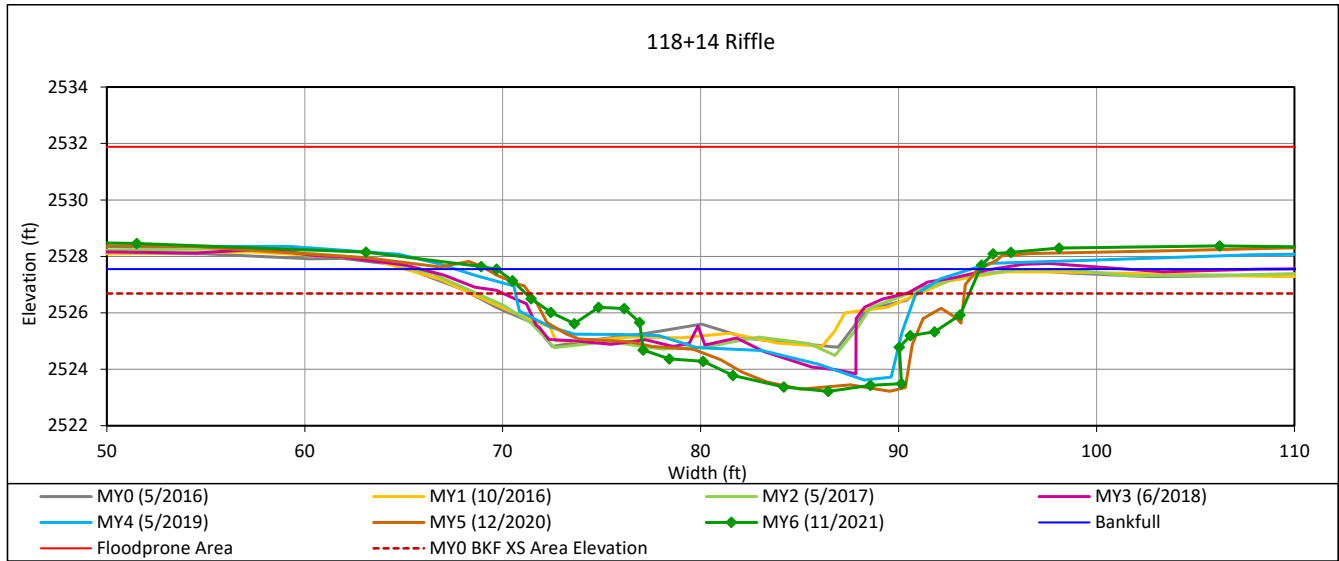
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 4 - Little Pine Reach 2a



Bankfull Dimensions

66.8	x-section area (ft.sq.)
24.4	width (ft)
2.7	mean depth (ft)
4.3	max depth (ft)
28.7	wetted perimeter (ft)
2.3	hydraulic radius (ft)
8.9	width-depth ratio
188.7	W flood prone area (ft)
7.7	entrenchment ratio
1.2	low bank height ratio

Survey Date: 11/2021

Field Crew: Wildlands Engineering



View Downstream

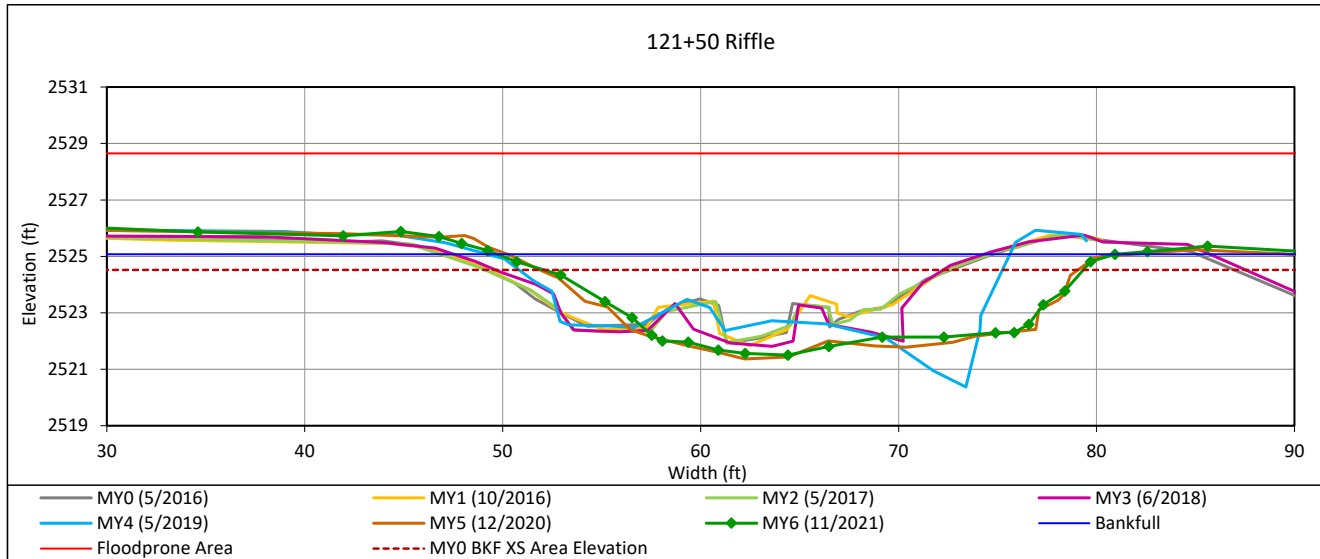
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 5- Little Pine Reach 2a

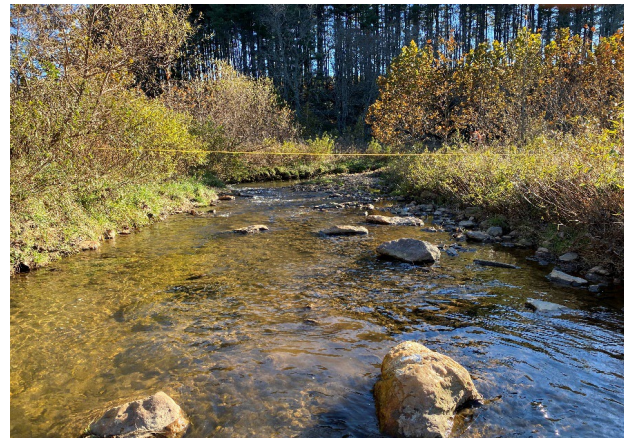


Bankfull Dimensions

73.1	x-section area (ft.sq.)
31.2	width (ft)
2.3	mean depth (ft)
3.6	max depth (ft)
32.7	wetted perimeter (ft)
2.2	hydraulic radius (ft)
13.3	width-depth ratio
93.1	W flood prone area (ft)
3.0	entrenchment ratio
1.2	low bank height ratio

Survey Date: 11/2021

Field Crew: Wildlands Engineering



View Downstream

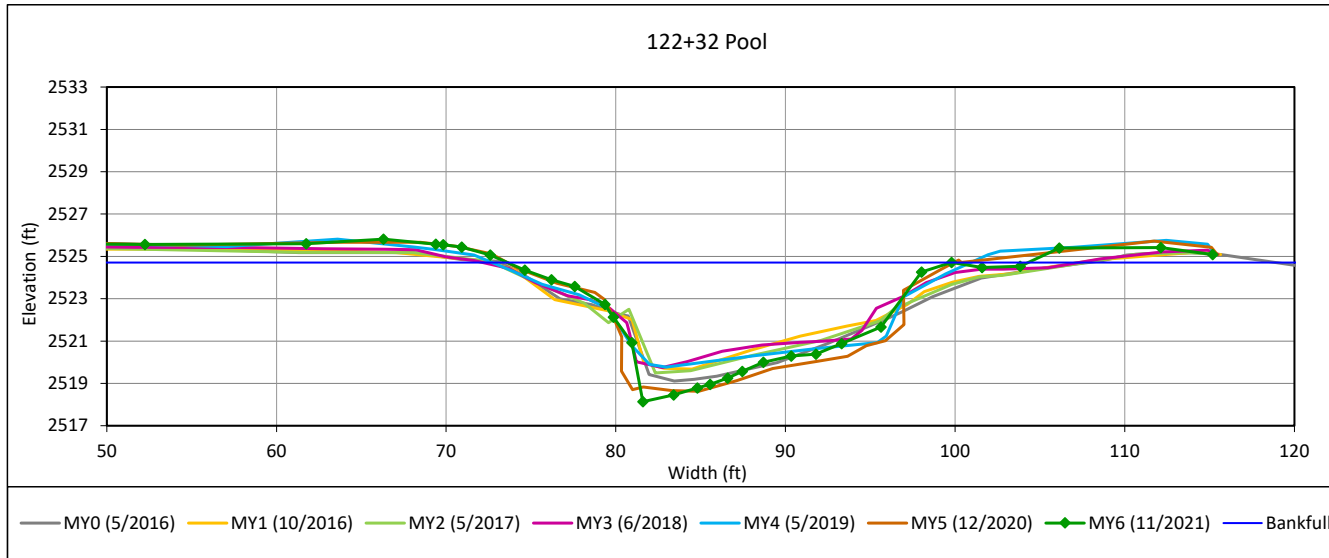
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 6- Little Pine Reach 2a



Bankfull Dimensions

86.8	x-section area (ft.sq.)
26.2	width (ft)
3.3	mean depth (ft)
6.6	max depth (ft)
31.2	wetted perimeter (ft)
2.8	hydraulic radius (ft)
7.9	width-depth ratio

Survey Date: 11/2021

Field Crew: Wildlands Engineering



View Downstream

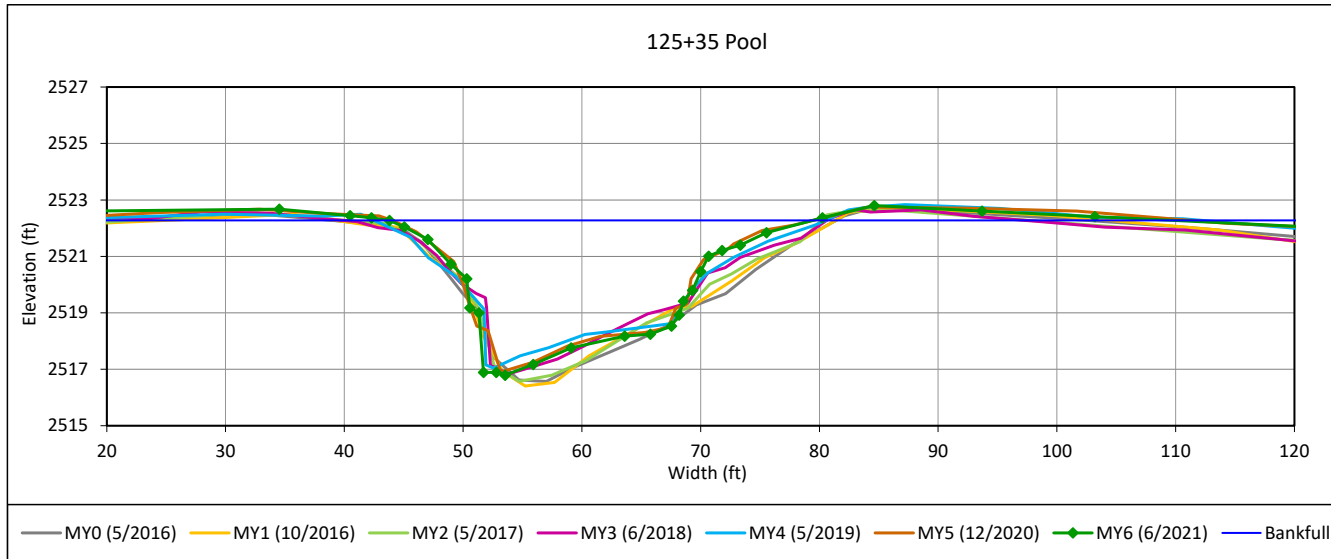
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 7 - Little Pine Reach 2b



Bankfull Dimensions

94.0	x-section area (ft.sq.)
29.5	width (ft)
3.2	mean depth (ft)
5.5	max depth (ft)
33.6	wetted perimeter (ft)
2.8	hydraulic radius (ft)
9.3	width-depth ratio

Survey Date: 6/2021

Field Crew: Wildlands Engineering



View Downstream

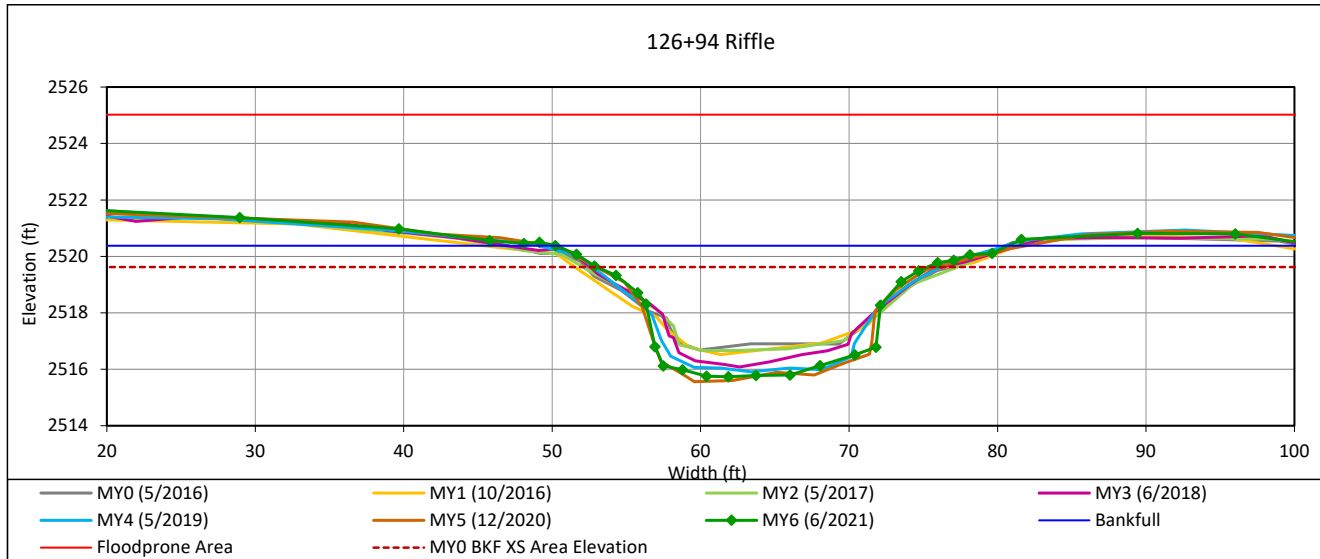
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 8 - Little Pine Reach 2b



Bankfull Dimensions

77.7	x-section area (ft.sq.)
26.8	width (ft)
2.9	mean depth (ft)
4.6	max depth (ft)
30.2	wetted perimeter (ft)
2.6	hydraulic radius (ft)
9.3	width-depth ratio
121.4	W flood prone area (ft)
4.5	entrenchment ratio
1.2	low bank height ratio

Survey Date: 6/2021

Field Crew: Wildlands Engineering



View Downstream

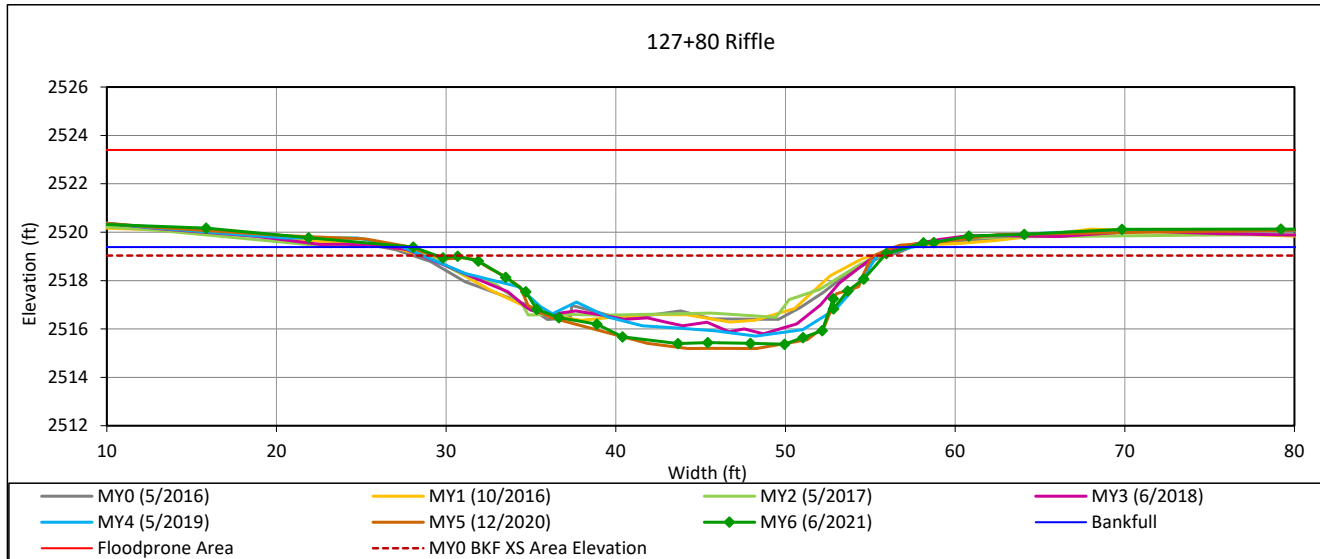
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 9 - Little Pine Reach 2b



Bankfull Dimensions

73.9	x-section area (ft.sq.)
29.2	width (ft)
2.5	mean depth (ft)
4.0	max depth (ft)
32.1	wetted perimeter (ft)
2.3	hydraulic radius (ft)
11.5	width-depth ratio
110.0	W flood prone area (ft)
3.8	entrenchment ratio
1.1	low bank height ratio

Survey Date: 6/2021

Field Crew: Wildlands Engineering



View Downstream

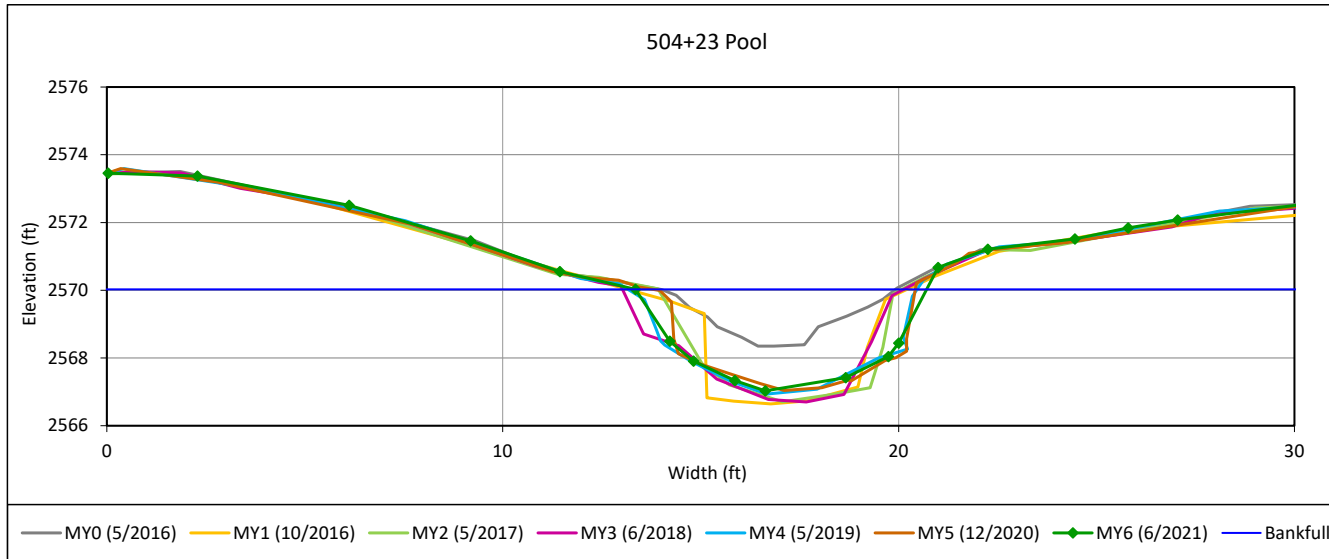
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 10 - UT2b



Bankfull Dimensions

15.6	x-section area (ft.sq.)
7.4	width (ft)
2.1	mean depth (ft)
3.0	max depth (ft)
10.1	wetted perimeter (ft)
1.5	hydraulic radius (ft)
3.5	width-depth ratio

Survey Date: 6/2021

Field Crew: Wildlands Engineering



View Downstream

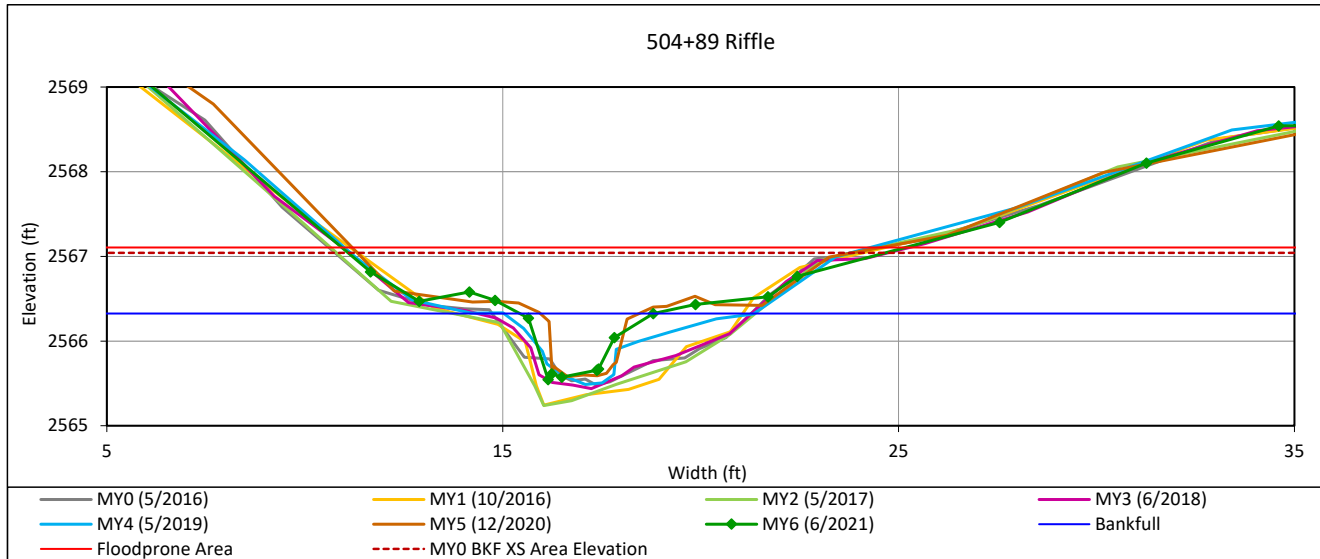
Cross-Section Plots (MY0 - MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 11 - UT2b



Bankfull Dimensions

1.4	x-section area (ft.sq.)
3.4	width (ft)
0.4	mean depth (ft)
0.8	max depth (ft)
4.0	wetted perimeter (ft)
0.4	hydraulic radius (ft)
7.8	width-depth ratio
14.2	W flood prone area (ft)
4.2	entrenchment ratio
0.5	low bank height ratio

Survey Date: 6/2021

Field Crew: Wildlands Engineering



View Downstream

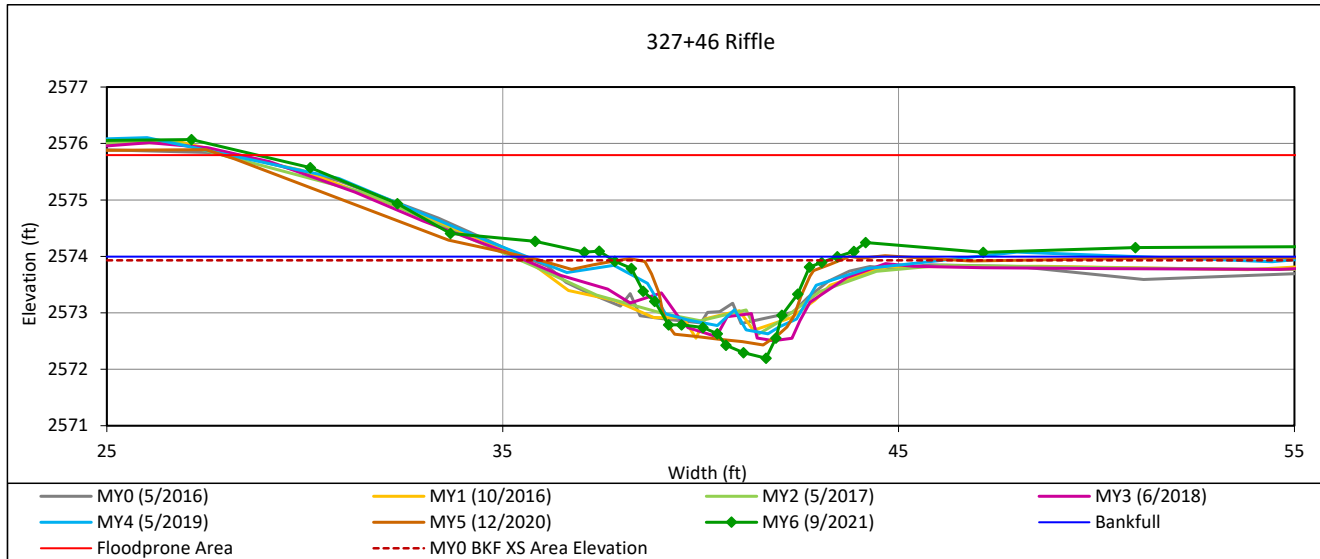
Cross-Section Plots (MY0-MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 12 - UT2



Bankfull Dimensions

5.4	x-section area (ft.sq.)
5.8	width (ft)
0.9	mean depth (ft)
1.8	max depth (ft)
7.3	wetted perimeter (ft)
0.7	hydraulic radius (ft)
6.2	width-depth ratio
34.1	W flood prone area (ft)
5.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 9/2021

Field Crew: Wildlands Engineering



View Downstream

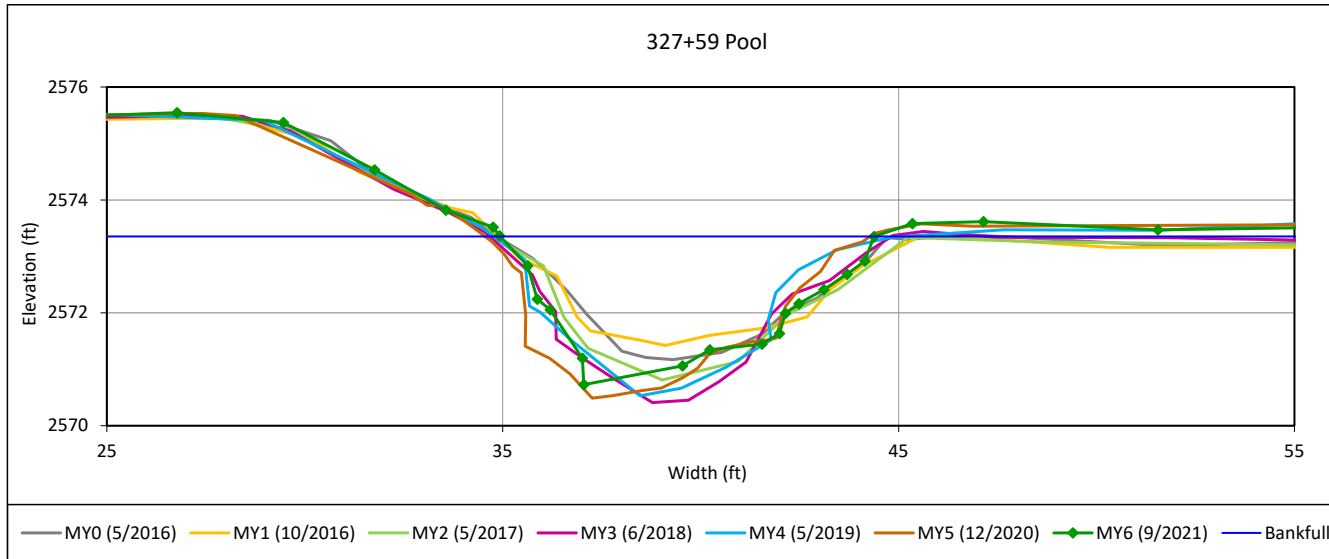
Cross-Section Plots (MY0-MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 13 - UT2



Bankfull Dimensions

15.4	x-section area (ft.sq.)
9.4	width (ft)
1.6	mean depth (ft)
2.6	max depth (ft)
11.7	wetted perimeter (ft)
1.3	hydraulic radius (ft)
5.8	width-depth ratio

Survey Date: 9/2021

Field Crew: Wildlands Engineering



View Downstream

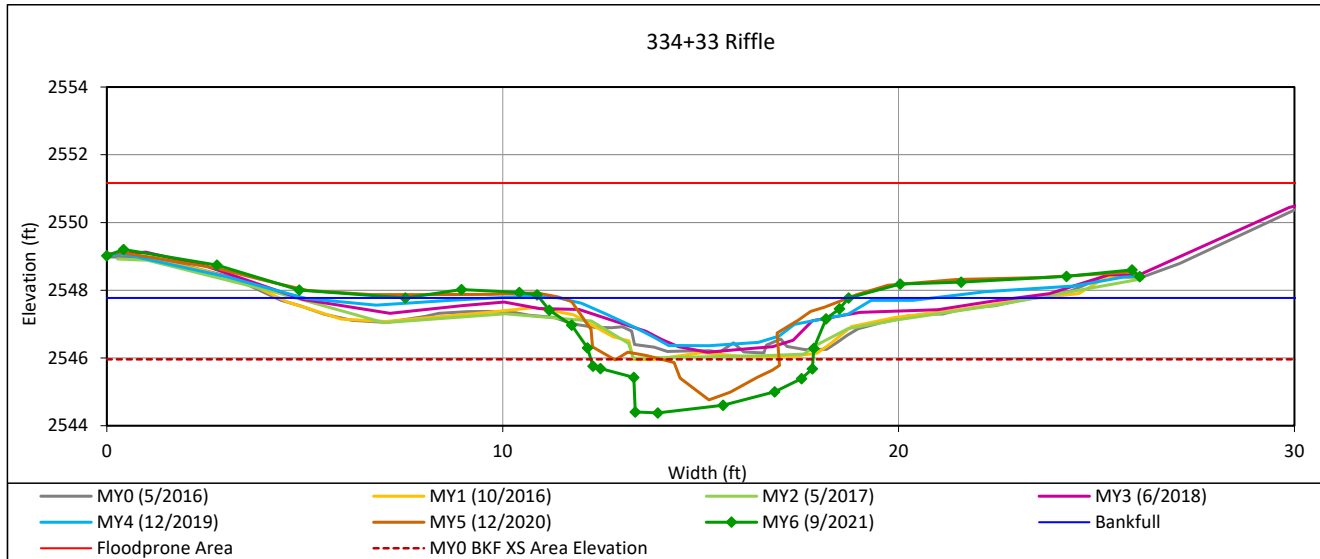
Cross-Section Plots (MY0-MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 14 - UT2



Bankfull Dimensions

17.6	x-section area (ft.sq.)
7.8	width (ft)
2.3	mean depth (ft)
3.4	max depth (ft)
11.7	wetted perimeter (ft)
1.5	hydraulic radius (ft)
3.5	width-depth ratio
26.0	W flood prone area (ft)
3.3	entrenchment ratio
2.1	low bank height ratio

Survey Date: 9/2021

Field Crew: Wildlands Engineering



View Downstream

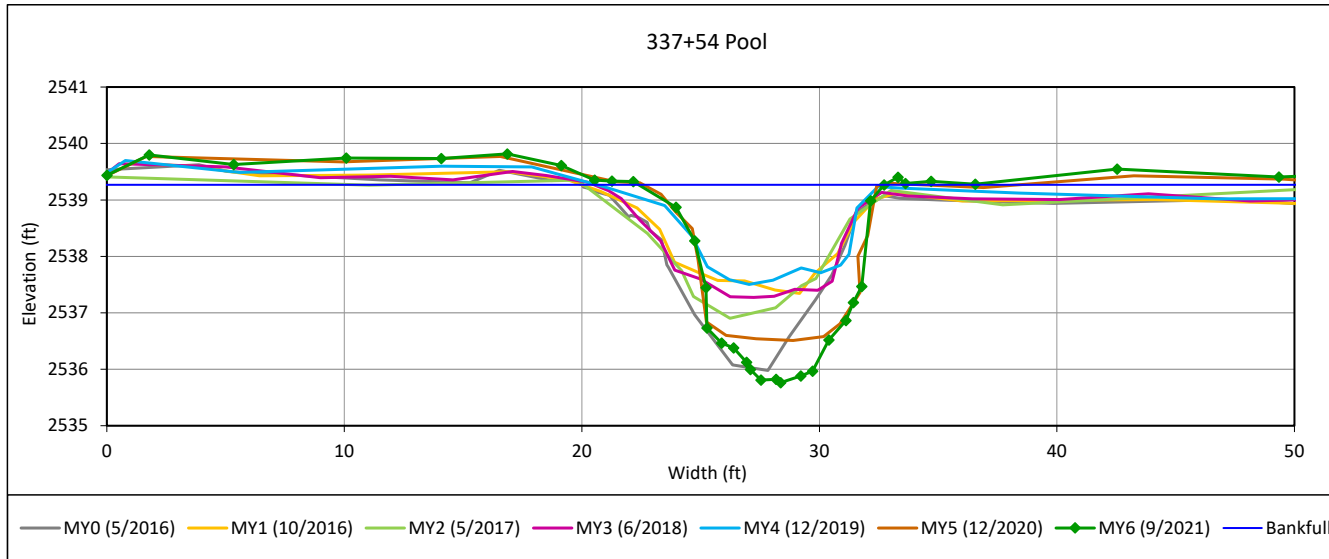
Cross-Section Plots (MY0-MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 15 - UT2



Bankfull Dimensions

21.6	x-section area (ft.sq.)
10.3	width (ft)
2.1	mean depth (ft)
3.5	max depth (ft)
13.7	wetted perimeter (ft)
1.6	hydraulic radius (ft)
4.9	width-depth ratio

Survey Date: 9/2021

Field Crew: Wildlands Engineering



View Downstream

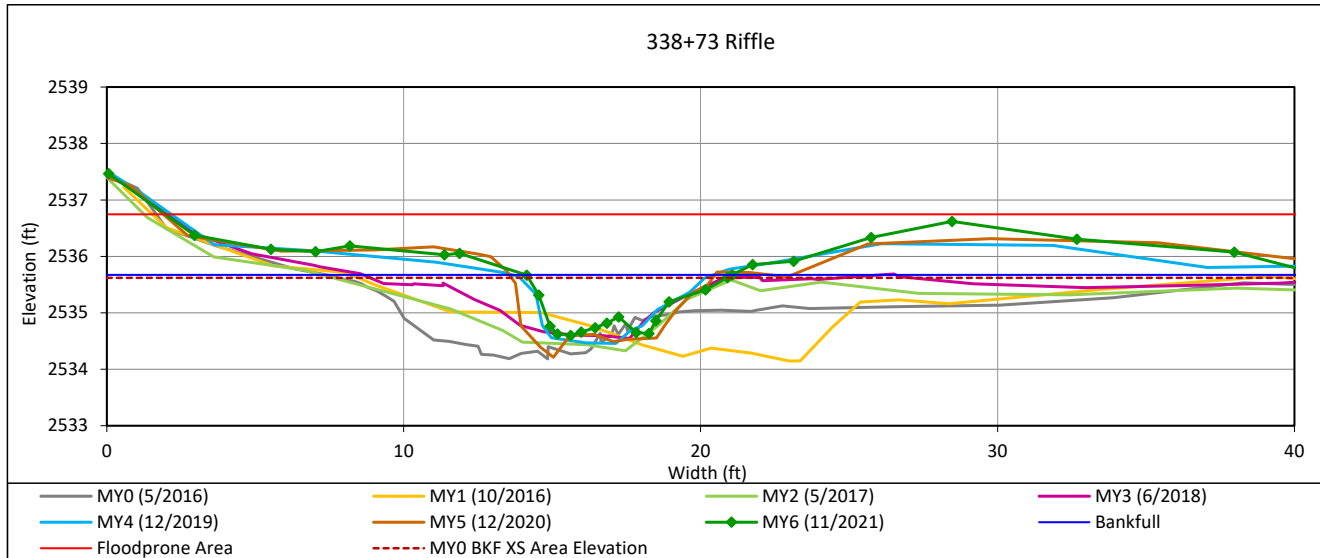
Cross-Section Plots (MY0-MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 16 - UT2



Bankfull Dimensions

4.6	x-section area (ft.sq.)
6.9	width (ft)
0.7	mean depth (ft)
1.1	max depth (ft)
7.8	wetted perimeter (ft)
0.6	hydraulic radius (ft)
10.5	width-depth ratio
40.6	W flood prone area (ft)
5.9	entrenchment ratio
1.1	low bank height ratio

Survey Date: 11/2021

Field Crew: Wildlands Engineering



View Downstream

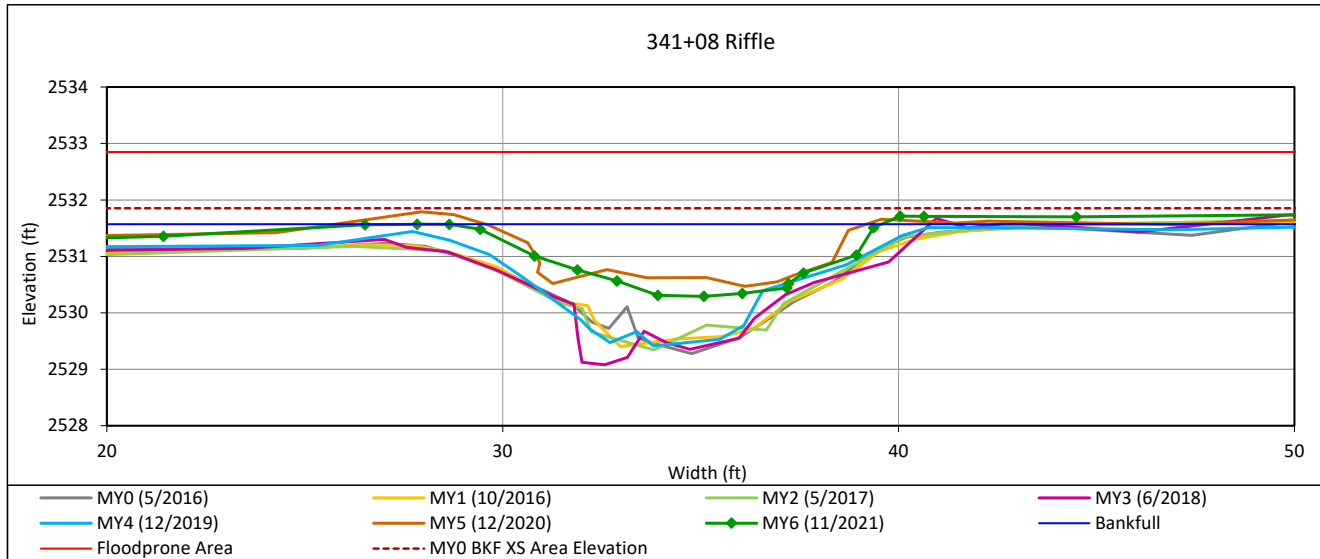
Cross-Section Plots (MY0-MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 17 - UT2



Bankfull Dimensions

8.8	x-section area (ft.sq.)
10.9	width (ft)
0.8	mean depth (ft)
1.3	max depth (ft)
11.4	wetted perimeter (ft)
0.8	hydraulic radius (ft)
13.5	width-depth ratio
71.0	W flood prone area (ft)
6.5	entrenchment ratio
0.8	low bank height ratio

Survey Date: 11/2021

Field Crew: Wildlands Engineering



View Downstream

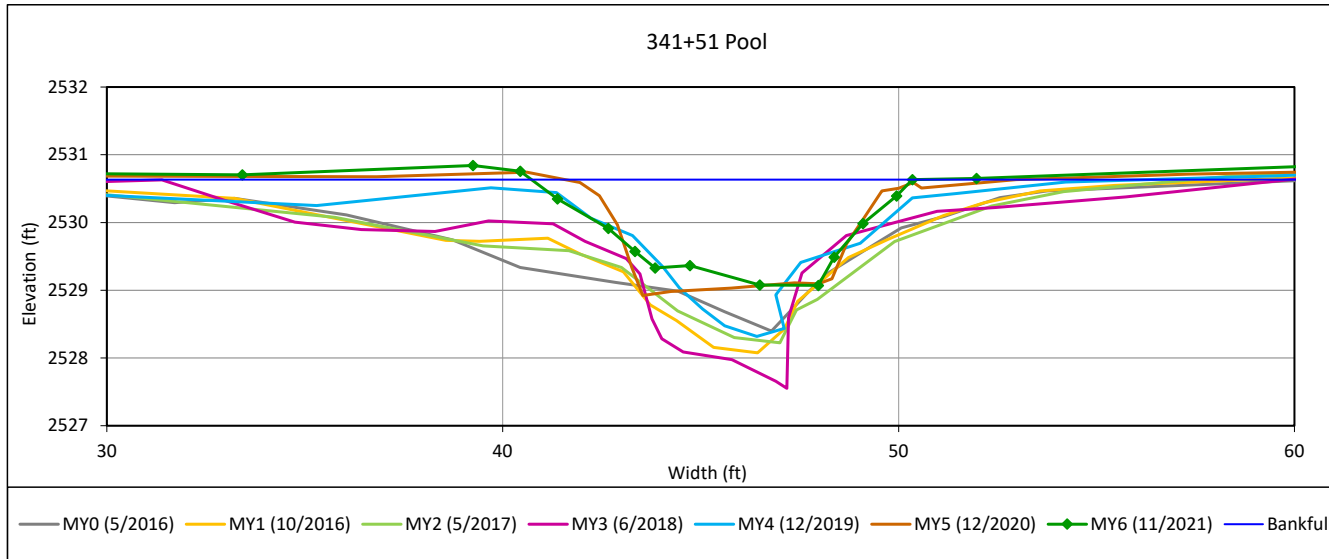
Cross-Section Plots (MY0-MY6)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 18 - UT2



Bankfull Dimensions

9.5	x-section area (ft.sq.)
9.6	width (ft)
1.0	mean depth (ft)
1.6	max depth (ft)
10.4	wetted perimeter (ft)
0.9	hydraulic radius (ft)
9.8	width-depth ratio

Survey Date: 11/2021
Field Crew: Wildlands Engineering



View Downstream

Table 14. Dimensional Parameters - Cross-Sections (Repair Areas)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Dimension ^{1,2}	Cross-Section R1, Little Pine Creek Reach 1 (Riffle)							Cross-Section R2, Little Pine Creek Reach 2a (Riffle)							Cross-Section R3, Little Pine Creek Reach 2a (Riffle)																													
	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7																				
Bankfull Elevation (ft)	N/A							2,538.3	N/A							2,525.8	N/A							2,524.1																				
Low Bank Elevation (ft)								2,538.3								2,525.8								2,524.1																				
Bankfull Width (ft)								29.2								24.6								33.8																				
Floodprone Width (ft)								>91								>80								>89																				
Bankfull Mean Depth (ft)								2.4								2.3								2.6																				
Bankfull Max Depth (ft)								3.8								3.5								4.4																				
Bankfull Cross Sectional Area (ft ²)								69.3								57.0								88.0																				
Bankfull Width/Depth Ratio								12.3								10.6								13.0																				
Bankfull Entrenchment Ratio								>3.1								>3.3								>2.6																				
Bankfull Bank Height Ratio								1.0								1.0								1.0																				
Dimension^{1,2}																																												
								Cross-Section R4, Little Pine Creek Reach 2b (Riffle)								Cross-Section 5/R5, Little Pine Creek Reach 2a (Riffle)								Cross-Section R6, Little Pine Creek Reach 2b (Riffle)																				
								MY0								MY1								MY2	MY3	MY4	MY5	MY6	MY7	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7	MY0	MY1	MY2	MY3	MY4	MY5	MY6
Bankfull Elevation (ft)	N/A							2,522.0	2,525.4	2,525.4	2,525.4	2,525.2	2,524.9	2,524.4	2524.5	2524.5	N/A							2,517.1																				
Low Bank Elevation (ft)								2,522.0	2,525.4	2,525.3	2,525.4	2,525.4	2,525.8	2,524.9	2525.1	2525.0								2,517.1																				
Bankfull Width (ft)								25.5	30.7	31.3	31.0	31.4	31.5	29.2	31.2	31.3								37.7																				
Floodprone Width (ft)								>87	>200	>200	>200	>90	>79.5	>93	>93	>72								>92																				
Bankfull Mean Depth (ft)								2.2	1.9	1.8	1.9	2.0	2.6	2.5	2.3	2.3								3.0																				
Bankfull Max Depth (ft)								3.3	3.9	3.6	3.5	3.6	5.4	3.6	3.6	3.7								5.1																				
Bankfull Cross Sectional Area (ft ²)								55.3	56.9	56.7	58.2	63.1	82.3	72.2	73.1	71.8								114.2																				
Bankfull Width/Depth Ratio								11.7	16.6	17.2	16.5	15.6	12.0	11.8	13.3	13.6								12.5																				
Bankfull Entrenchment Ratio								>3.4	>6.5	>6.4	>6.5	>2.9	>2.5	>3.2	>3.0	>2.3								2.4																				
Bankfull Bank Height Ratio								1.0	1.0	1.0	1.0	1.0	1.1	1.2	1.2	1.2								1.0																				
Dimension^{1,2}																																												
								Cross-Section R7, UT2 Reach 1 Upper (Riffle)							Cross-Section R8, UT2 Reach 1 Lower (Riffle)																													
								MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7	MY0								MY1	MY2	MY3	MY4	MY5	MY6	MY7														
Bankfull Elevation (ft)	N/A							2,694.2	N/A							2,579.9																												
Low Bank Elevation (ft)								2,694.2								2,579.9																												
Bankfull Width (ft)								3.5								9.1																												
Floodprone Width (ft)								27.9								62.4																												
Bankfull Mean Depth (ft)								0.7								0.9																												
Bankfull Max Depth (ft)								0.9								1.9																												
Bankfull Cross Sectional Area (ft ²)								2.4								8.3																												
Bankfull Width/Depth Ratio								5.4								9.9																												
Bankfull Entrenchment Ratio								7.9								6.9																												
Bankfull Bank Height Ratio								1.0								1.0																												

N/A: not applicable

¹Prior to MY3, bankfull dimensions were calculated using a fixed bankfull elevation.

²MY3-MY5 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by NCIRT and NCDMS (9/2018). The remainder of the bankfull dimensions are calculated based on the current year's low bank height. MY3 dimensions were updated in MY4.

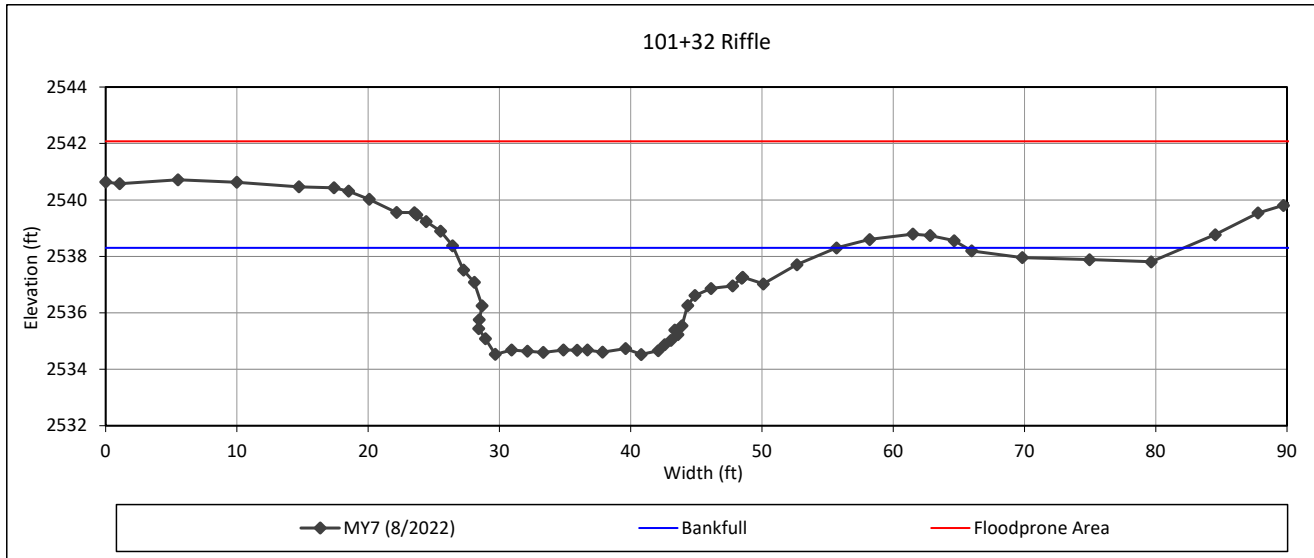
Cross-Section Plots (Repair Areas)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section R1 - Little Pine Reach 1



Bankfull Dimensions

69.3	x-section area (ft.sq.)
29.2	width (ft)
2.4	mean depth (ft)
3.8	max depth (ft)
32.9	wetted perimeter (ft)
2.1	hydraulic radius (ft)
12.3	width-depth ratio
91.3	W flood prone area (ft)
3.1	entrenchment ratio
1.0	low bank height ratio

Survey Date: 8/2022

Field Crew: Wildlands Engineering



View Downstream

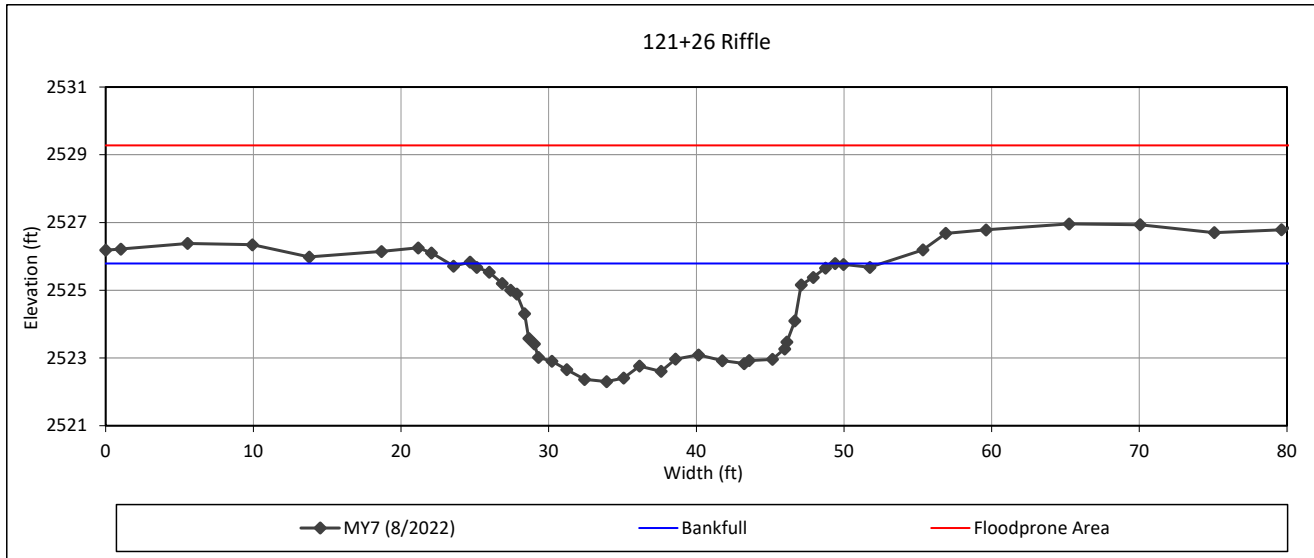
Cross-Section Plots (Repair Areas)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section R2 - Little Pine Reach 2a



Bankfull Dimensions

57.0	x-section area (ft.sq.)
24.6	width (ft)
2.3	mean depth (ft)
3.5	max depth (ft)
27.2	wetted perimeter (ft)
2.1	hydraulic radius (ft)
10.6	width-depth ratio
80.6	W flood prone area (ft)
3.3	entrenchment ratio
1.0	low bank height ratio

Survey Date: 8/2022

Field Crew: Wildlands Engineering



View Downstream

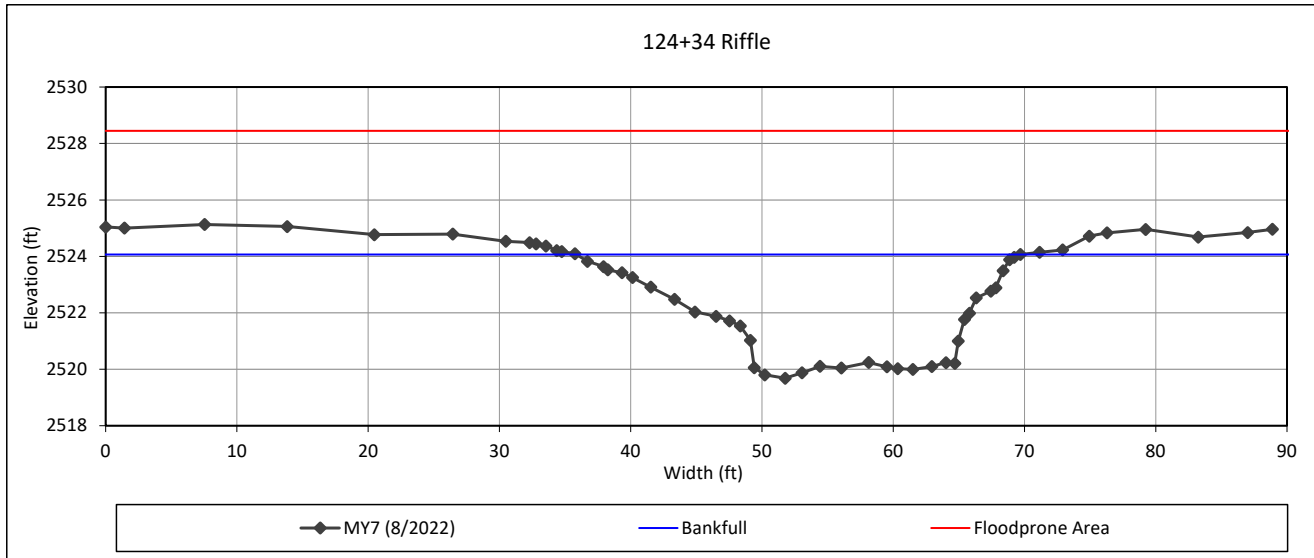
Cross-Section Plots (Repair Areas)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section R3 - Little Pine Reach 2a



Bankfull Dimensions

88.0	x-section area (ft.sq.)
33.8	width (ft)
2.6	mean depth (ft)
4.4	max depth (ft)
36.9	wetted perimeter (ft)
2.4	hydraulic radius (ft)
13.0	width-depth ratio
88.9	W flood prone area (ft)
2.6	entrenchment ratio
1.0	low bank height ratio

Survey Date: 8/2022

Field Crew: Wildlands Engineering



View Downstream

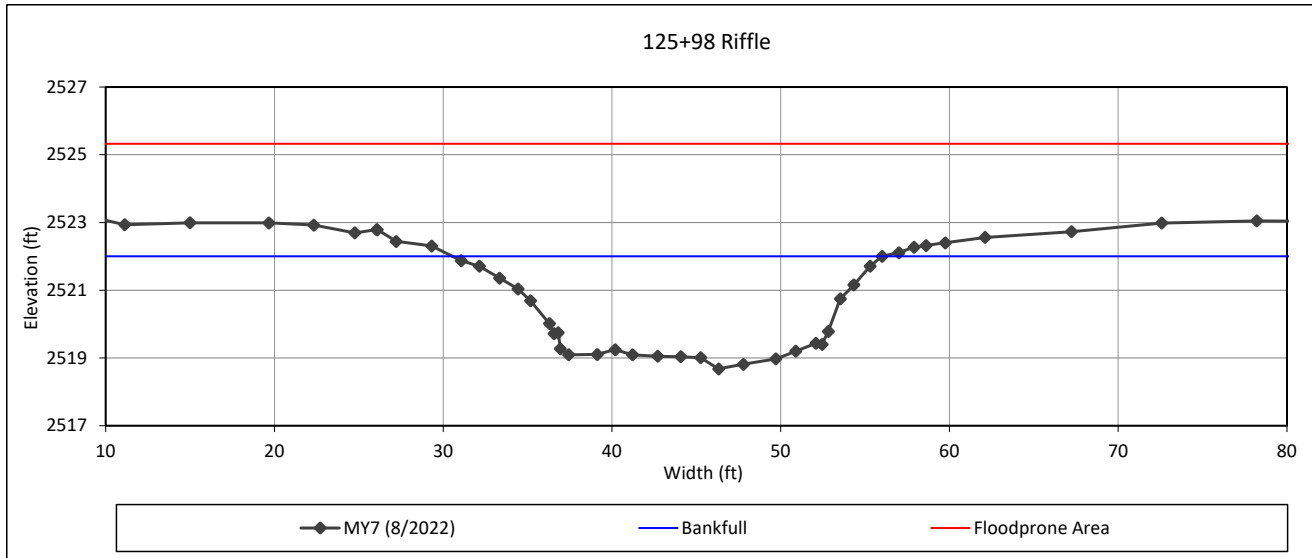
Cross-Section Plots (Repair Areas)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section R4 - Little Pine Reach 2b



Bankfull Dimensions

55.3	x-section area (ft.sq.)
25.5	width (ft)
2.2	mean depth (ft)
3.3	max depth (ft)
27.5	wetted perimeter (ft)
2.0	hydraulic radius (ft)
11.7	width-depth ratio
86.9	W flood prone area (ft)
3.4	entrenchment ratio
1.0	low bank height ratio

Survey Date: 8/2022

Field Crew: Wildlands Engineering



View Downstream

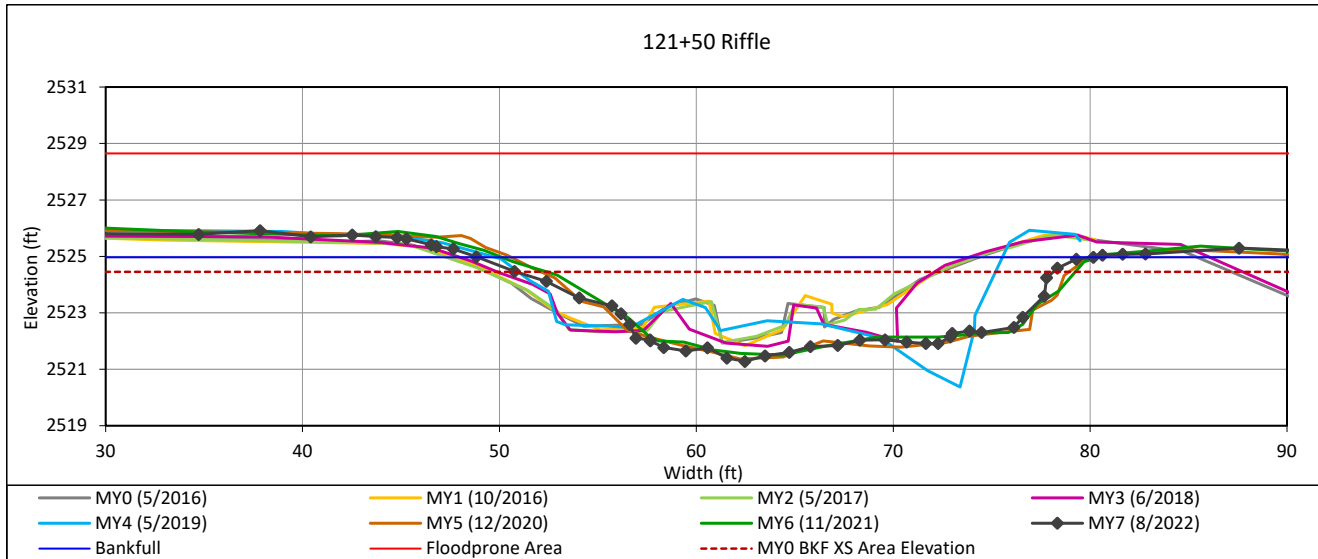
Cross-Section Plots (Repair Areas)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section 5- Little Pine Reach 2a

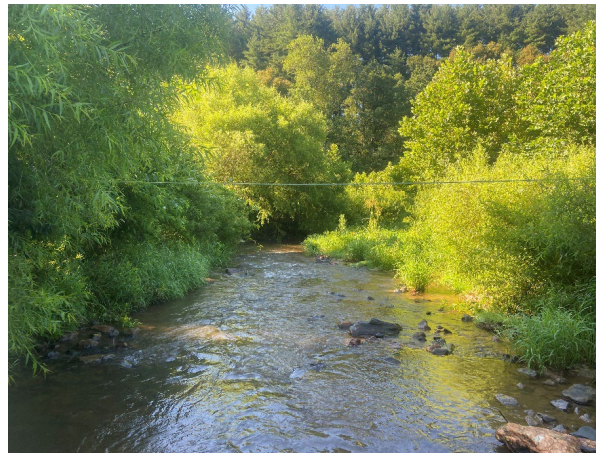


Bankfull Dimensions

71.8	x-section area (ft.sq.)
31.3	width (ft)
2.3	mean depth (ft)
3.7	max depth (ft)
33.4	wetted perimeter (ft)
2.2	hydraulic radius (ft)
13.6	width-depth ratio
71.5	W flood prone area (ft)
2.3	entrenchment ratio
1.2	low bank height ratio

Survey Date: 8/2022

Field Crew: Wildlands Engineering



View Downstream

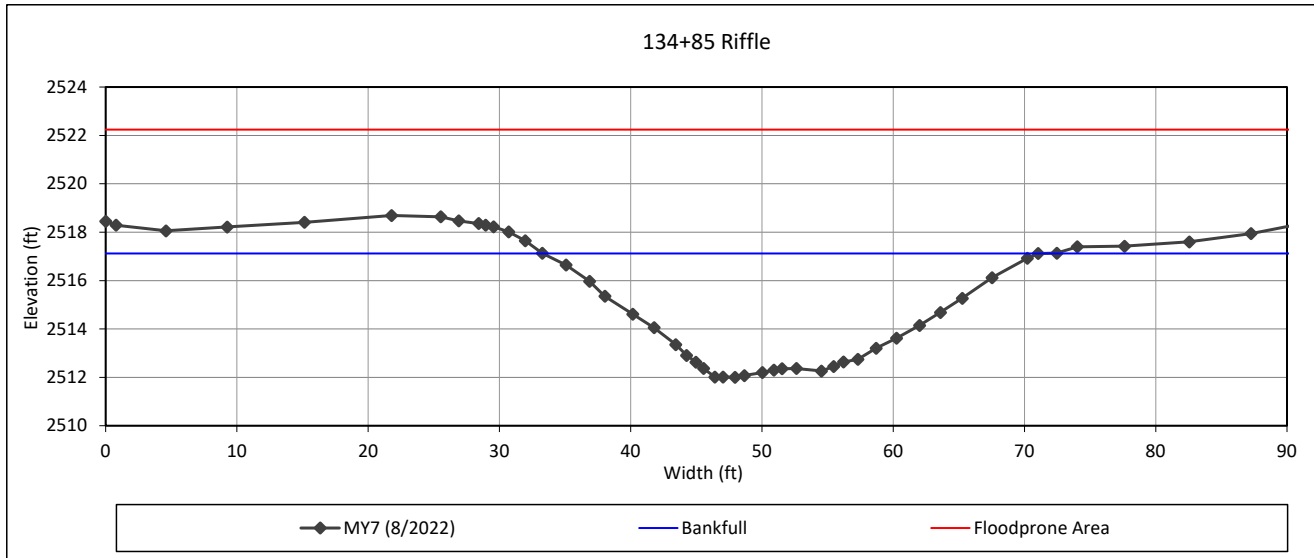
Cross-Section Plots (Repair Areas)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section R6 - Little Pine Reach 2b



Bankfull Dimensions

114.2	x-section area (ft.sq.)
37.7	width (ft)
3.0	mean depth (ft)
5.1	max depth (ft)
39.5	wetted perimeter (ft)
2.9	hydraulic radius (ft)
12.5	width-depth ratio
91.7	W flood prone area (ft)
2.4	entrenchment ratio
1.0	low bank height ratio

Survey Date: 8/2022

Field Crew: Wildlands Engineering



View Downstream

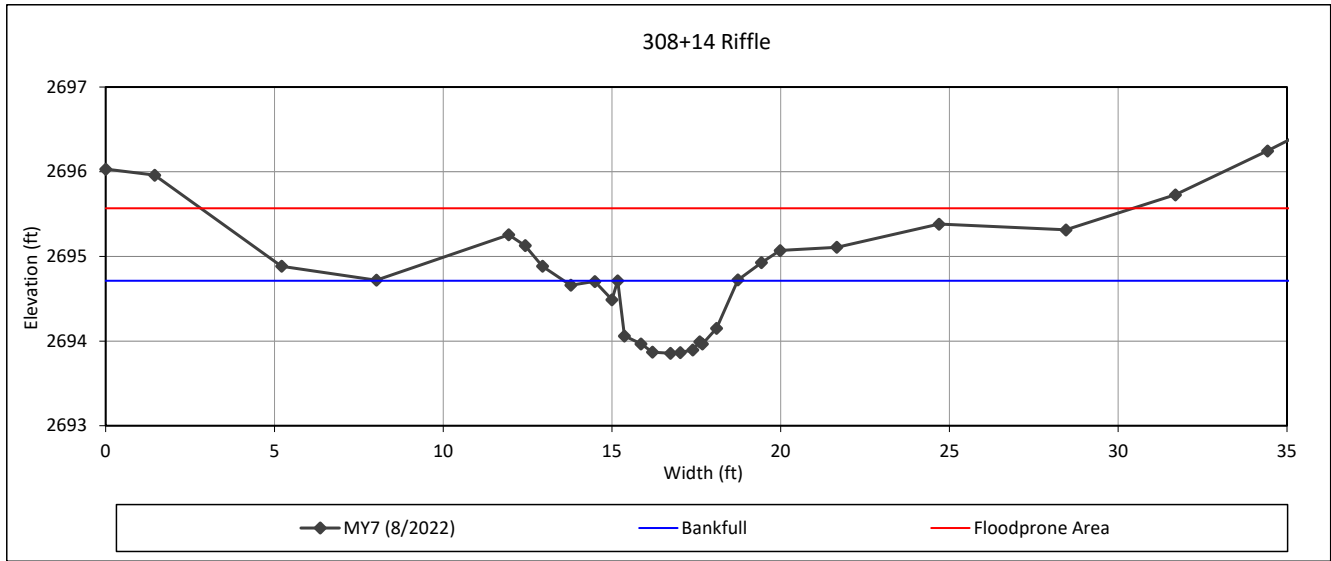
Cross-Section Plots (Repair Areas)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section R7 - UT2 Reach 1 Upper



Bankfull Dimensions

2.4	x-section area (ft.sq.)
3.5	width (ft)
0.7	mean depth (ft)
0.9	max depth (ft)
4.3	wetted perimeter (ft)
0.5	hydraulic radius (ft)
5.4	width-depth ratio
27.9	W flood prone area (ft)
7.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 8/2022

Field Crew: Wildlands Engineering



View Downstream

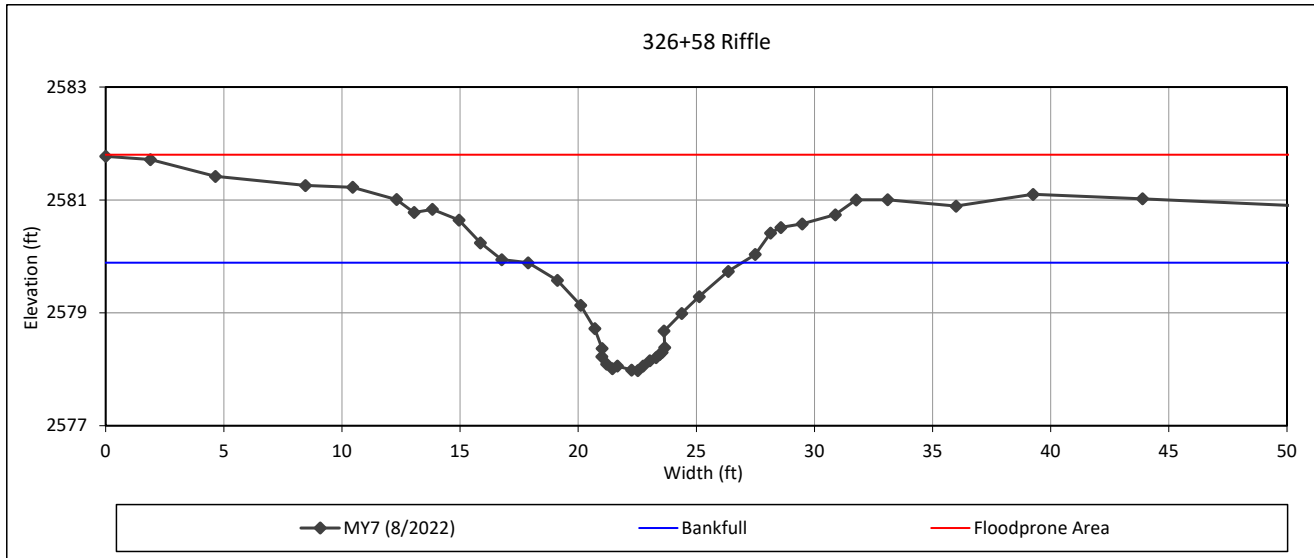
Cross-Section Plots (Repair Areas)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Cross Section R8 - UT2 Reach 1 Lower



Bankfull Dimensions

8.3	x-section area (ft.sq.)
9.1	width (ft)
0.9	mean depth (ft)
1.9	max depth (ft)
10.3	wetted perimeter (ft)
0.8	hydraulic radius (ft)
9.9	width-depth ratio
62.4	W flood prone area (ft)
6.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 8/2022

Field Crew: Wildlands Engineering



View Downstream

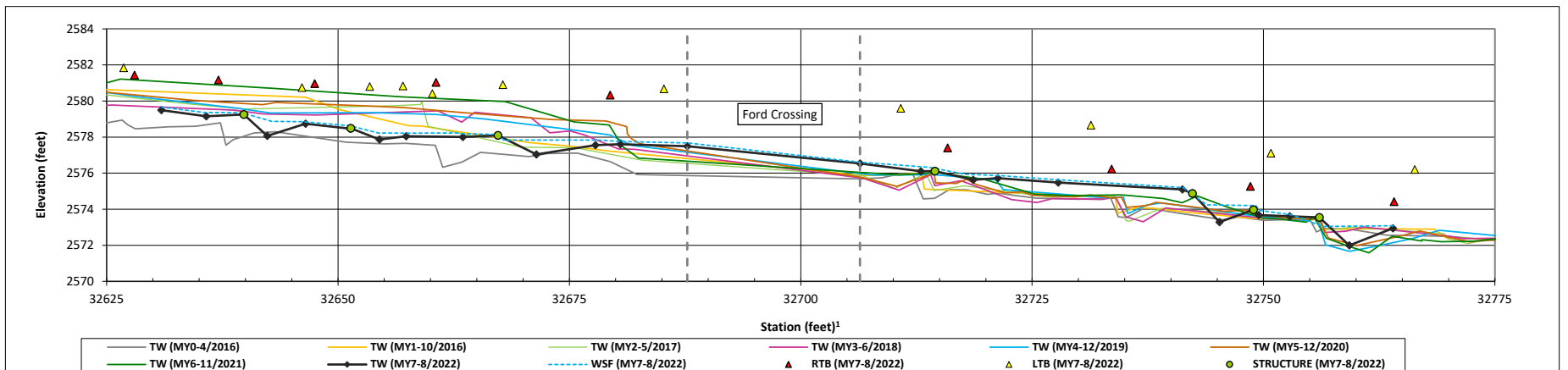
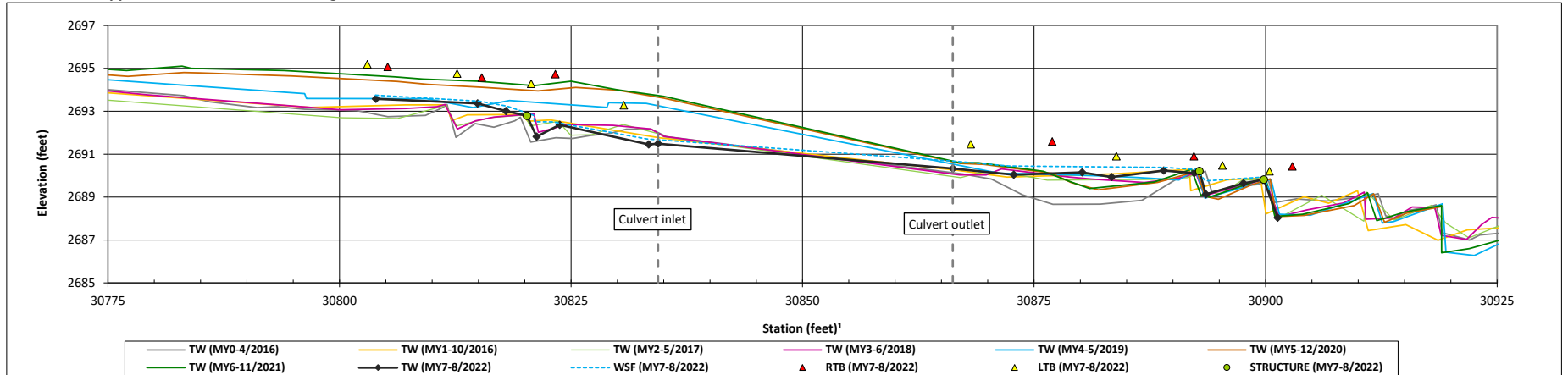
Longitudinal Profile Plot (Repair Areas)

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

UT2 Reach 1 Upper and Lower Internal Crossings



¹ Profile stationing derived from as-built thalweg alignment.

APPENDIX 5. Hydrology Summary Data and Plots

Table 15. Verification of Bankfull Events

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Reach	Year of Occurrence	Date of Data Collection	Date of Occurrence	Method
Little Pine Creek	MY1	9/25/2016	unknown	Crest Gage
	MY2	5/23/2017	unknown	Wrack Lines and alluvial sediment deposit
	MY3	4/2/2018	unknown	Wrack Lines and alluvial sediment deposit
	MY4	9/18/2019	unknown	Crest Gage
	MY5	8/20/2020	unknown	Wrack Lines and alluvial sediment deposit
	MY6	9/13/2021	unknown	Wrack Lines and alluvial sediment deposit
	MY7	12/7/2022	unknown	Wrack Lines and alluvial sediment deposit
UT2	MY1	10/5/2016	unknown	Crest Gage
	MY2	5/23/2017	unknown	Crest Gage
	MY3	4/2/2018	unknown	Wrack Lines and alluvial sediment deposit
	MY4	12/3/2019	unknown	Wrack Lines and alluvial sediment deposit
	MY5	8/20/2020	unknown	Wrack Lines and alluvial sediment deposit
	MY6	6/7/2021	unknown	Wrack Lines and alluvial sediment deposit
	MY7	12/7/2022	unknown	Wrack Lines and alluvial sediment deposit
UT2B	MY1	9/27/2016	unknown	Crest Gage
	MY3	4/2/2018	unknown	Wrack Lines and alluvial sediment deposit
	MY4	9/18/2019	unknown	Crest Gage
	MY5	8/20/2020	unknown	Crest Gage
	MY6	6/7/2021	unknown	Crest Gage
	MY7	12/7/2022	unknown	Crest Gage

Table 16. Wetland Gage Attainment Summary

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Summary of Groundwater Gage Results for MY6						
Gage	Success Criteria Achieved/Max Consecutive Days During Growing Season ¹ (%)					
	Year 1 (2016)	Year 2 (2017)	Year 3 (2018)	Year 4 (2019)	Year 5 (2020)	Year 6 (2021)
Wetland FF	Yes/112 Days (66.6%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)

No wetland success criteria established

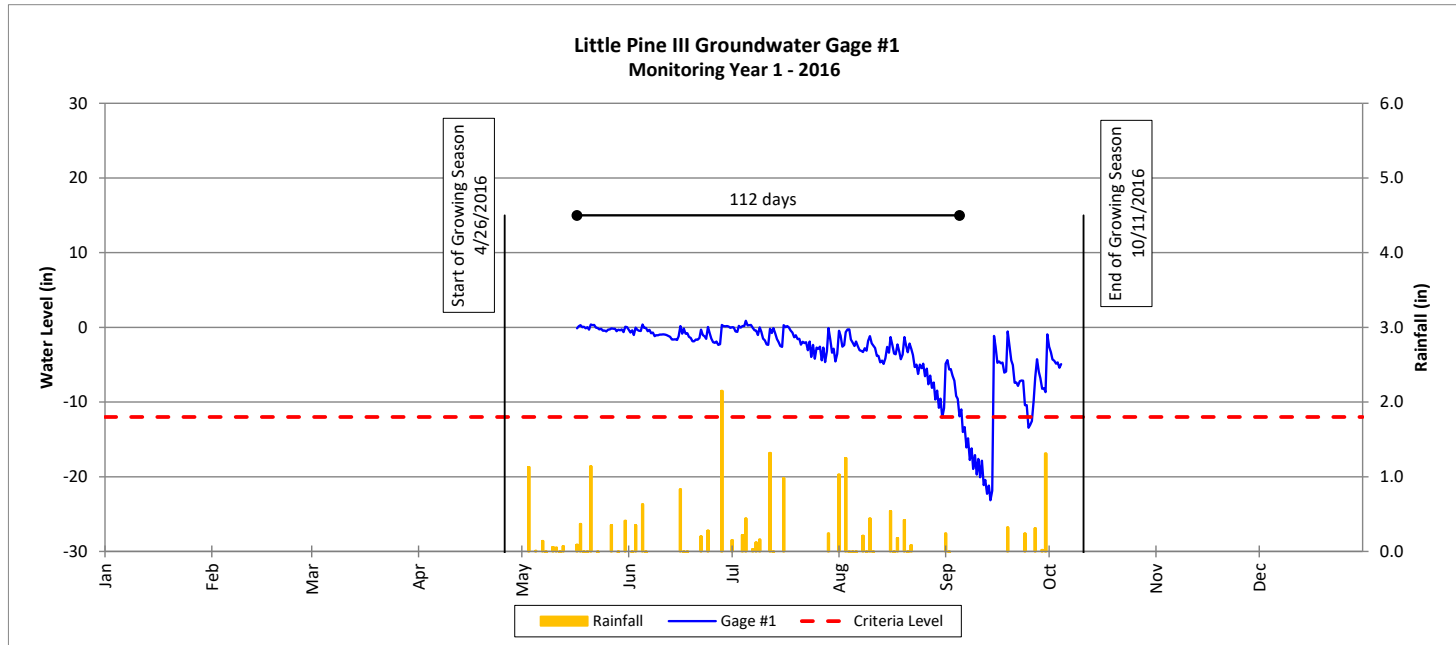
¹Growing season starts April 26 and ends October 11.

Groundwater Gage Plots (MY1 - MY6)

Little Pine III Stream & Wetland Mitigation Project
DMS Project No. 94903

Monitoring Year 7 - 2022

Wetland FF

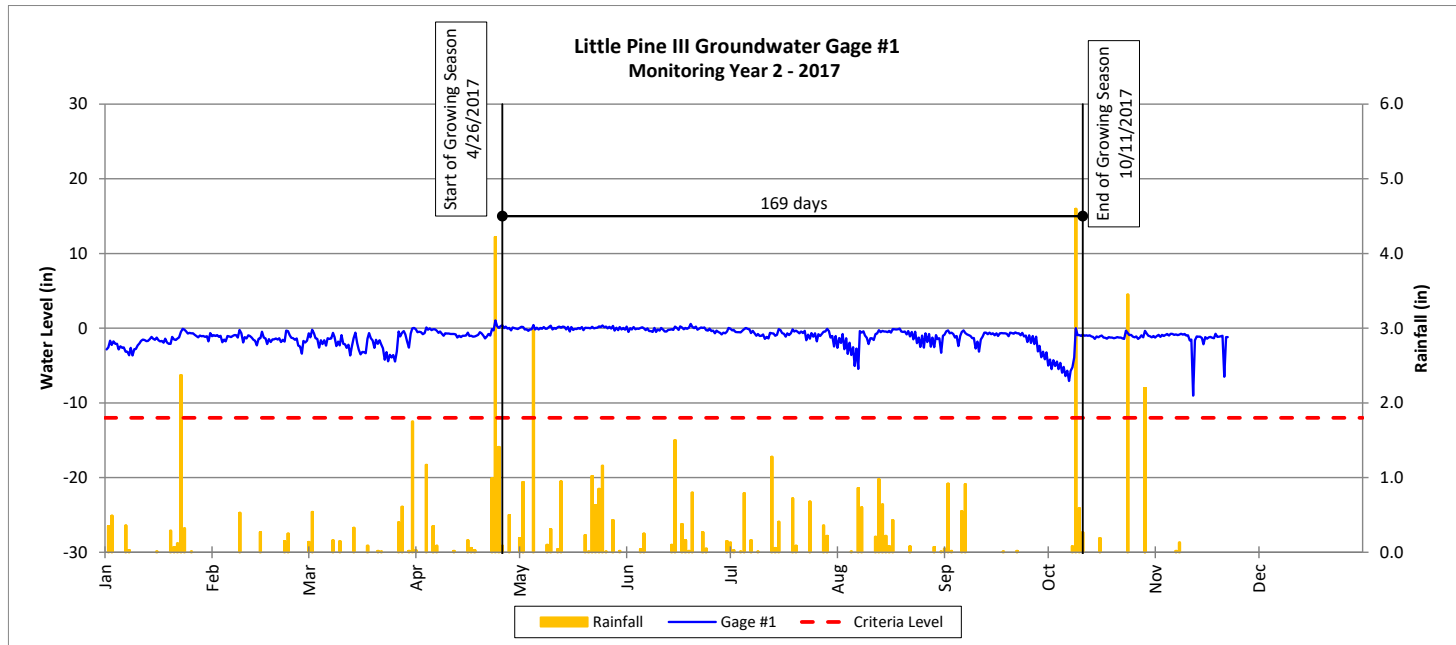


Groundwater Gage Plots (MY1 - MY6)

Little Pine III Stream & Wetland Mitigation Project
DMS Project No. 94903

Monitoring Year 7 - 2022

Wetland FF



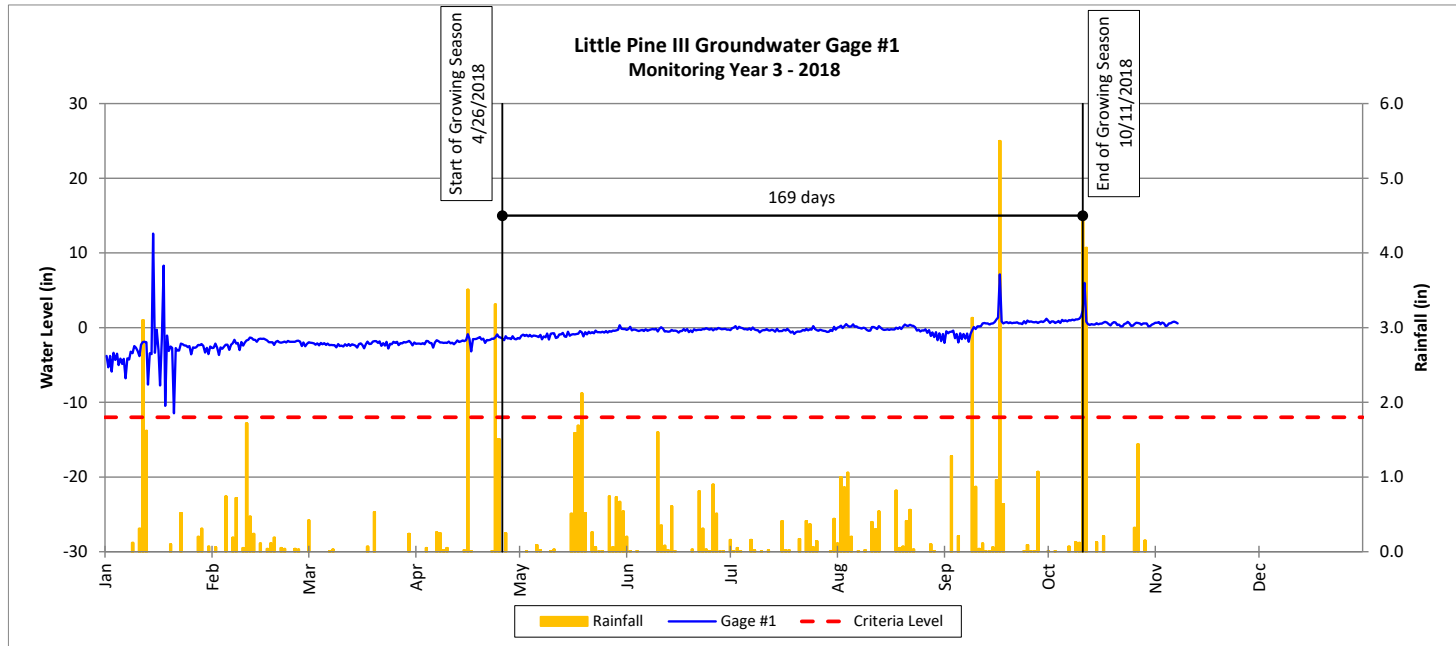
Groundwater Gage Plots (MY1 - MY6)

Little Pine III Stream & Wetland Mitigation Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Wetland FF



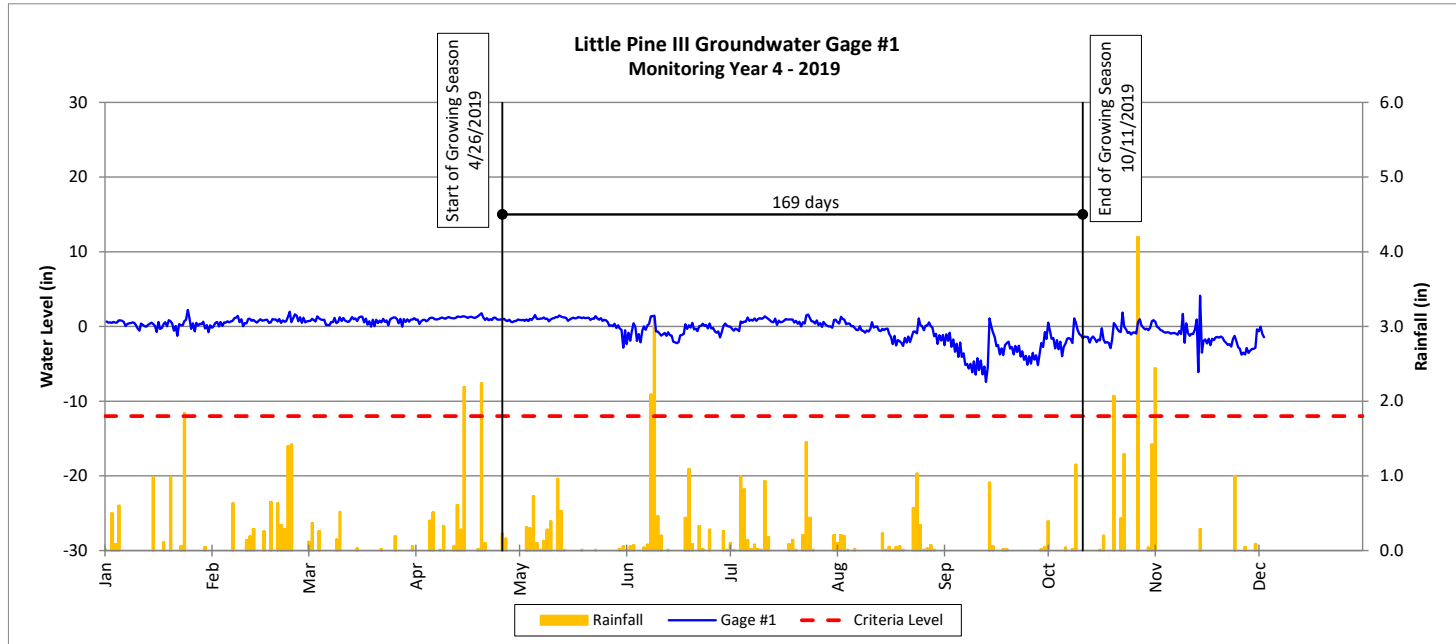
Groundwater Gage Plots (MY1 - MY6)

Little Pine III Stream & Wetland Mitigation Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Wetland FF



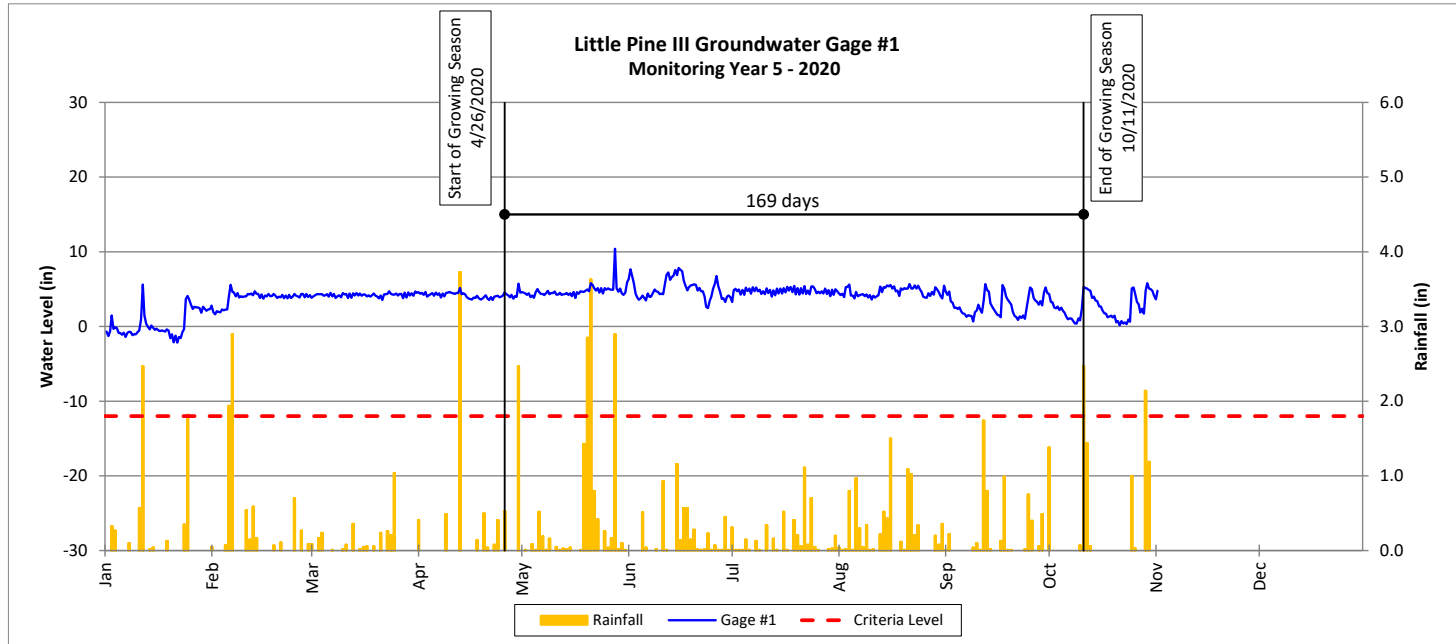
Groundwater Gage Plots (MY1 - MY6)

Little Pine III Stream & Wetland Mitigation Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Wetland FF



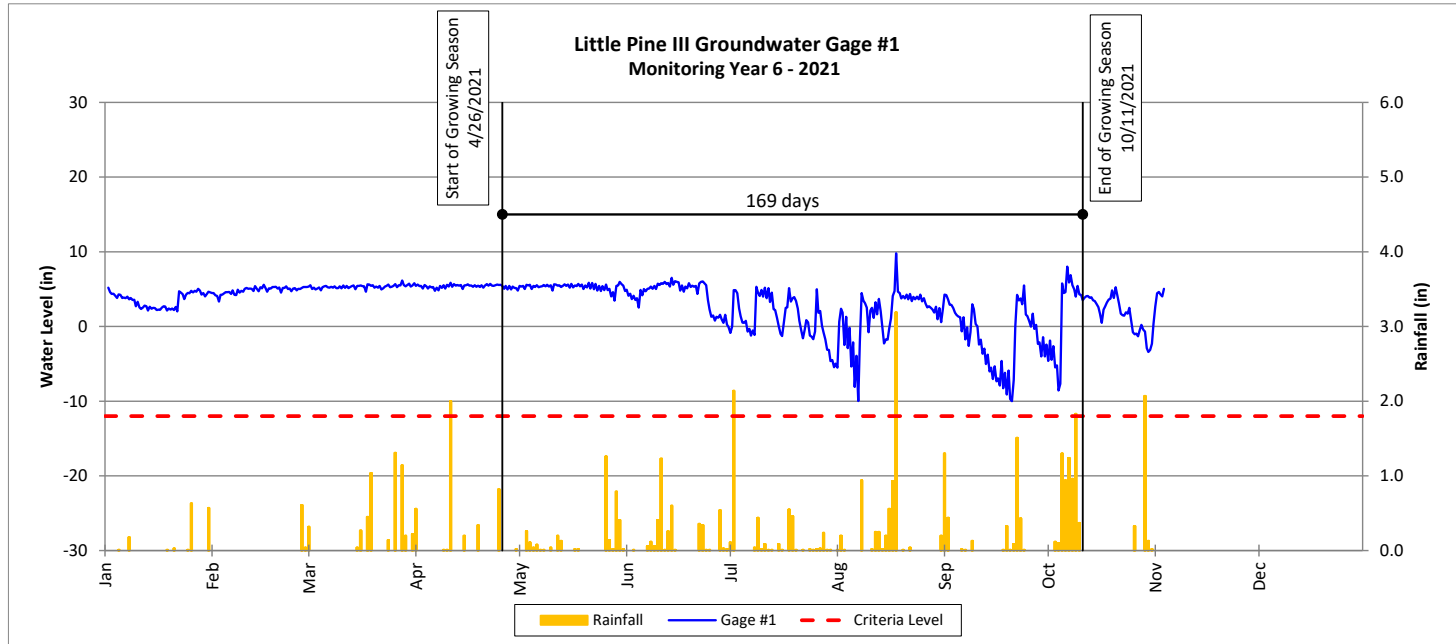
Groundwater Gage Plots (MY1 - MY6)

Little Pine III Stream & Wetland Mitigation Project

DMS Project No. 94903

Monitoring Year 7 - 2022

Wetland FF

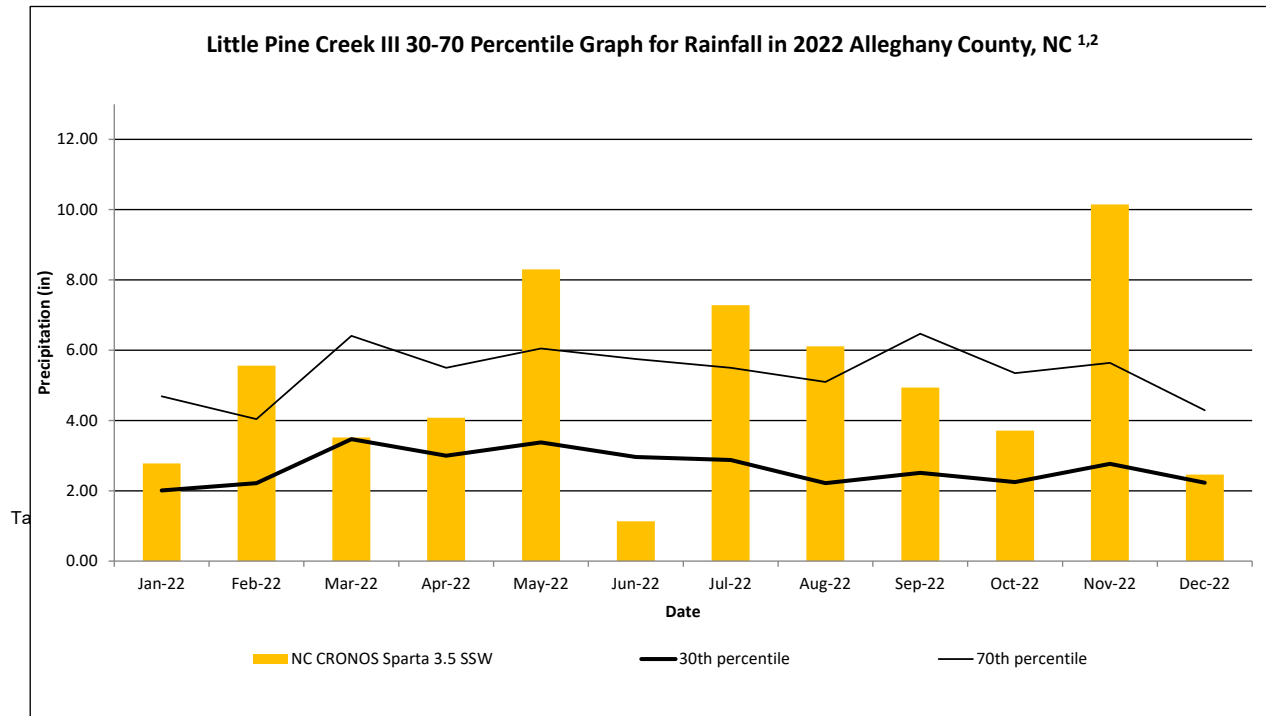


Monthly Rainfall Data

Little Pine III Stream & Wetland Restoration Project

DMS Project No. 94903

Monitoring Year 7 - 2022



¹ 2022 rainfall collected from NC CRONOS Station Name: Sparta 3.5 SSW (NCSU, 2022)

² 30th and 70th percentile rainfall data collected from weather station Sparta, NC8158 (USDA, 2022)