Annual Monitoring Report

Final

Little Pine Creek II

Monitoring Year 1 of 7

NCDMS Project No. 856
DWR Project No. 20090048 (v.2)
Contract No. LP082819
USACE Action ID: SAW-2009-00591
Alleghany County, North Carolina
Data Collected: April 2020 – October 2020
Date Submitted: February 2021

Mitigation Services
ENVIRONMENTAL QUALITY

Prepared for:
NCDEQ-Division of Mitigation Services
1652 Mail Service Center
Raleigh NC 27699-1652

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Mitigation Project Name	**Little Pine Creek II**	**County**	**Alleghany**	**USACE Action ID**	**2009-00591**
DMS ID	**856**	**Date Project Instituted**	**12/21/2007**	**NCDWR Permit No**	**2009-0048**
River Basin	**NEW**	**Date Prepared**	**3/6/2020**		
Cataloging Unit	**05050001**				

Credit Release Milestone	Stream Credits						Wetland Credits							
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riverine	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Date (Wetland)
Potential Credits (Mitigation Plan)				3,302.600					1.484					
Potential Credits (As-Built Survey)				3,195.000					1.484					
1 (Site Establishment)	N/A				N/A	N/A	N/A				N/A		N/A	N/A
2 (Year 0 / As-Built)	30%			958.500	2020	3/6/2020	30%		0.445		30%		2020	3/6/2020
3 (Year 1 Monitoring)	10%				2021		10%				10%		2021	
4 (Year 2 Monitoring)	10%				2022		10%				15%		2022	
5 (Year 3 Monitoring)	10%				2023		15%				20%		2023	
6 (Year 4 Monitoring)	5%				2024		5%				10%		2024	
7 (Year 5 Monitoring)	10%				2025		15%				15%		2025	
8 (Year 6 Monitoring)	5%				2026		5%				N/A		2026	
9 (Year 7 Monitoring)	10%				2027		10%				N/A		2027	
Stream Bankfull Standard	10%						N/A				N/A			
Total Credits Released to Date				958.500					0.445					

NOTES:

CONTINGENCIES:

BROWNING.KIMBERLY.DANIELLE.1527683510

Digitally signed by BROWNING.KIMBERLY.DANIELLE.1527683510
Date: 2020.04.03 11:33:16 -04'00'

Signature of Wilmington District Official Approving Credit Release

20200403

Date

1 - For NCDMS, no credits are released during the first milestone

2 - For NCDMS projects, the second credit release milestone occurs when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCDMS Portal, provided the following criteria have been met:
1) Approval of the final Mitigation Plan
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
4) Receipt of necessary DA permit authorization or written DA approval for porjects where DA permit issuance is not required

3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met

Mitigation Project Name	**Little Pine Creek II**		**County**	**Alleghany**		**USACE Action ID**	**2009-00591**
DMS ID	**856**		**Date Project Instituted**	**12/21/2007**		**NCDWR Permit No**	**2009-0048**
River Basin	**NEW**		**Date Prepared**	**3/6/2020**			
Cataloging Unit	**05050001**						

DEBITS (released credits only)

			Ratios	1	1.5	2.5	5.0	1	3	2	5	1	3	2	5	1	3	2	5
				Stream Restoration	Stream Enhancment I	Stream Enhancement II	Stream Preservation	Riparian Restoration	Riparian Creation	Riparian Enhancement	Riparian Preservation	Nonriparian Restoration	Nonriparian Creation	Nonriparian Enhancement	Nonriparian Preservation	Coastal Marsh Restoration	Coastal Marsh Creation	Coastal Marsh Enhancement	Coastal Marsh Preservation
IRT Approved Amounts (feet and acres)				3,064.000			655.000			1.200	4.420								
IRT Approved Amounts (mitigation credits)				3,064.000			131.000			0.600	0.884								
Percentage Released				30%			30%			30%	30%								
Released Amounts (feet / acres)				919.200			196.500			0.360	1.326								
Released Amounts (credits)				919.200			39.300			0.180	0.265								
NCDWR Permit	USACE Action ID	Project Name																	
1997-0616	1997-07161	NCDOT TIP R-0529BA / BB / BD - US 421 Improvements		919.200															
2014-0762	2012-00882	NCDOT TIP R-2915E - US 221 Widening					196.500			0.360	1.326								
Remaining Amounts (feet / acres)				0.000			0.000			0.000	0.000								
Remaining Amounts (credits)				0.000			0.000			0.000	0.000								

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February 3, 2021

Danvey Walsh, Project Manager

EW Solutions

37 Haywood Street, Suite 100

Asheville, NC 28801

Subject:Draft MY01 Monitoring Report

Little Pine Creek II Mitigation Project, Alleghany County

DMS Project # 856

DEQ Contract #LP082819

Dear Harry,

Equinox has completed the review of the Little Pine Creek II Draft MY01 Monitoring Report comments. Following are the responses to those comments (in Red)

Report and tables

- Cover page contract # / ID info is not all correct (DWR project number). Please use the correct info from the approved MY0/Baseline report cover. Updated
- References throughout of the stream to "LPCII Creek" should be changed to "LPC" or "Little Pine Creek". If referencing the project name, it should be LPC II or Little Pine Creek II. Updated within text, tables, and graphics.
- Please include the IRT's 4/3/2020 **MY0 approval email (attached)** in the MY1 Appendices for reference. Please also reference the approval email in the report text. Inserted in Appendix F and Referenced in the document.
- Please include the responses to the IRT's 4/3/2020 MY0 approval comments (attached) in the MY1 Appendices for reference. Inserted in Appendix F and referenced in the document.
- Please correct the indentation inconsistencies in the project sections and subsections. Reviewed and edited indentation structure.
- Appendices/ tables etc – Except for CCPVs, if possible all pages should all be letter sized; 11x17 tables and figures should be formatted to fit the letter size report. Please tri-fold any 11x17 CCPV foldout sheets in the final hard copies. Condensed tables and figures to letter size pages where legibility can be maintained.
- Section 1.4 project components - Credits stated do not reflect approved MY0/Baseline report. Please correct. Please also take out credits to the appropriate decimal places to match the asset

table. Please indicate that the project credits reflect those that were approved as part of the **Little Pine Creek II – Project As-Built Update and Mitigation Plan Addendum (downward adjustment)** and include that memo in an addendum (attached). Eliminate the reference to the as-built survey as this was handled in the baseline report. Credits and number formatting updated in Table 1 and text, Credit reference updated and added to Appendix F.

- *Table 1 / Assets* – Credits listed do not reflect approved MY0/Baseline report. Please correct. Please also tabulate credits to the appropriate decimal places to match the asset table. Attached is the current table format needed. This is basically the same as what you all used for the Fletcher MY0/baseline, with some minor changes. Updated Table 1,
- Table 2 – Annual monitoring report delivery should not be a separate project event. The monitoring report delivery date (month-year) should be reflective of each year's stream and vegetation surveys. Updated table accordingly.
- Please indicate that a supplemental warranty-related planting will occur in January 2021 by the construction contractor. The results of this planting event will be summarized in the MY02 report. This need not be captured in the events table in this MY1 report, as it was not during calendar year 2020. Inserted in Section 1.5.1
- Table 4 – All project restoration reaches were listed in the PCN and permitted as perennial. Please change the designation in this table of the tributary C listed as intermittent. Updated.
- Hydrology/ Verification of bankfull events (Table 12) – Crest gage and stage recorder data is missing, in this table and the graphs. Please provide as contracted (2 crest gages on Tribs A and B, and 2 stage recorders on LPC and Trib C), and list bankfull event verifications from these devices. If there was a problem with the equipment it should be explained in the Project Performance section. Text and graphics updated/added to report and supporting files.
- Bankfull events with no data should not be listed. Events table should appear as the following example or similar: Updated table

Reach	MY of Occurrence	Date of Occurrence (Approximate)	Method
UT1	MY1	7/11/2016	Crest Gage
	MY2	6/20/2017	Crest Gage/Stream Gage
	MY3	9/17/2018	Stream Gage
		10/12/2018	
		10/27/2018	
		11/5/2018	
	MY4	4/5/2019	
	MY5	2/7/2020	Stream Gage, Photos
		3/25/2020	
		4/30/2020	
		5/21/2020	
		5/28/2020	
		8/10/2020	
		8/15/2020	
		9/25/2020	
		10/11/2020	
		11/1/2020	
UT2	MY1	7/11/2016	Crest Gage
		10/8/2016	
	MY2	6/20/2017	
	MY3	11/5/2018	Wrack Line
	MY4	4/5/2019	Bankfull Flow Photo
	MY5	3/25/2020	Wrack Line
		11/1/2020	Wrack Line

Section 2.2 (vegetation) indicates "warranty" plots. Please change this to reference "random" plots per the IRT guidance. Report text changed. Likewise. "temporary" plots should be indicated as "random" plots in Table 8. Table 8 has been updated accordingly. Random plots should be shown as polygons appropriately shaped/sized on the CCPVs. Random plots and CVS plots should be combined into the

sitewide average as follows; random plots should be speciated; random plots should be incorporated into Table 9 as the example that follows:

Table 9. Stem Count Total and Planted by Plot Species

Catbird			Current Plot Data (MY1 2020)												Random Plot Data			Annual Means					
			100022-01-0001			100022-01-0002			100022-01-0003			100022-01-0004			RVP 1			MY1 (2020)			MY0 (2020)		
Scientific Name	Common Name	Species Type	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
Acer negundo	boxelder	Tree			5															5			
Betula nigra	river birch	Tree				3	3	3	1	1	1	7	7	7	8	8	8	19	19	19	17	17	17
Celtis laevigata	sugarberry	Tree																			1	1	1
Cercis canadensis	eastern redbud	Tree				1	1	1				2	2	2				3	3	3	4	4	4
Cornus amomum	silky dogwood	Shrub				2	2	2										2	2	2	4	4	4
Diospyros virginiana	common persimmon	Tree							12	12	12	1	1	1				13	13	13	15	15	15
Fraxinus pennsylvanica	green ash	Tree	10	10	10	2	2	2	5	5	5							17	17	17	18	18	18
Juglans nigra	black walnut	Tree																			4	4	4
Liriodendron tulipifera	tuliptree	Tree							1	1	1							1	1	1	8	8	8
Malus angustifolia	southern crabapple	Tree																			3	3	3
Platanus occidentalis	American sycamore	Tree	3	3	3	5	5	5	1	1	1	4	4	4				13	13	13	8	8	8
Quercus	oak	Tree																			31	31	31
Quercus nigra	water oak	Tree	2	2	2							5	5	5	1	1	1	8	8	8	5	5	5
Quercus phellos	willow oak	Tree	6	6	6	1	1	1	5	5	5	3	3	3	3	3	3	18	18	18	9	9	9
Quercus rubra	northern red oak	Tree	1	1	1	1	1	1				1	1	1	1	1	1	4	4	4	7	7	7
Salix nigra	black willow	Tree									6									6			
		Stem count	22	22	27	15	15	15	25	25	31	23	23	23	13	13	13	97	97	109	163	163	163
		size (ares)	1			1			1			1			1			5			5		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.12			0.10		
		Species count	5	5	6	7	7	7	6	6	7	7	7	7	4	4	4	10	10	12	14	14	14
		Stems per ACRE	890	890	1093	607	607	607	1012	1012	1255	931	931	931	526	526	526	785	785	882	1649	1649	1649

Species information was not collected for RVP in MY1, but will be included in subsequent monitoring events and displayed accordingly in future monitoring reports.

- Per IRT guidance, plot vegetation data collected must include:
  1. Within each fixed plot: species, height, grid location, planted versus volunteer, and age (based on the year the stem was planted, or first observed for volunteers)
  2. Within each random plot: species and height
     Due to a misunderstanding regarding the data collection parameters for random vegetation plots (RVP), species and height information were not recorded during MY1 RVP monitoring. Species and height parameters will be recorded during RVP monitoring for the remainder of the monitoring years. The report text has been updated accordingly.
  3. For both fixed and random plots, all woody stems, including exotic and invasive species, should be counted (exotic/invasive species will not count toward success of performance standards).
- Please add all common names to CVS table; please only use one common name per species (see MY0 report). Table updated to include common names.

CCPVs

- If possible, please refine invasives polygons to better reflect field conditions; the larger areas shown on the map are not reflective of the scattered invasive occurrences on the ground. Adjust Table 6 accordingly. Current polygons were reflective of invasive presence on the ground in addition to vines within the woodline. Report text and the CCPV updated to better describe the density and composition of invasive vegetation.
- Failing vegetation plots should be colored orange or red and captured in the legend. Failing vegetation plots are colored red.
- Reach break between LPC 2A and 2B should be shown on the CCPVs. Reach break inserted.
- Continuous stage recorders and crest gages are missing from the CCPVs and legend. Please add. Continuous stage recorders and crest gauges added to CCPVs.
- Please change the color of the OHW to gray/neutral color so as not to conflict with the cross sections. OHW line color changed to gray.

DIGITAL SUPPORT FILES

From MY0 to MY1 the length of Reach 2A increased by 30 feet, but it is unclear why. Please explain, and either provide an updated feature or fix the asset table. An incorrectly segmented line was submitted for the draft report. An updated feature has been provided which matches the asset table.

Please include the temporary veg plot features as polygons rather than points. Temporary random vegetation plots added as polygons.

- Please include features illustrating the undercut and habitat segments that were outlined in Table 5 in the CCPV and submit these features. Observations from LPC Reach 1 were reviewed and deemed insignificant for mapping at this time. Table 5 updated and the text was expanded to better describe the current conditions and concerns.
- DMS has 13 photo point features, but the photos submitted indicate that there are 14 photo points. Please include a feature for photo point 14 and resubmit. Feature included for photo point 14.
- The report suggests that the 2 crest gauges and continuous stage recorders displayed in the MY0 CCPV are still on site, but they are not represented spatially in the MY1 CCPV, and the data for the continuous stage recorders were not included in the report. Please either include these data, or explain why these gauges were removed. Continuous stage recorder and crest gauge geospatial and hydrologic data has been added to geodatabase and report.

Sincerely,

Danvey Walsh

Equinox Monitoring Manager

Prepared by:

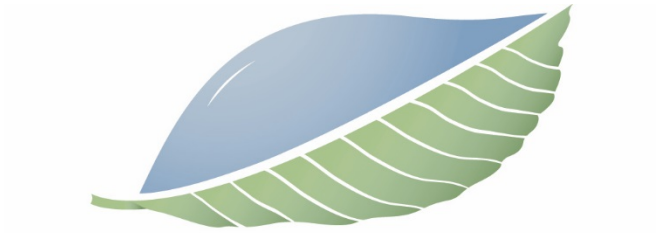

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Table of Contents

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1.0 PROJECT SUMMARY

1.1. Project Setting and Background

The Site is located in eastern Alleghany County, NC, approximately eight miles east of the Town of Sparta, NC and approximately four miles south of the Virginia border. The Site is within the New River Basin; 14-digit Hydrologic Unit Code (HUC) 05050001030030 and located in the Blue Ridge Belt of the Blue Ridge Province (USGS, 1998), (Figure 1).

The Site is located within a TLW in the New River RBRP plan (NCDENR, 2009), and is identified in the Little River and Brush Creek LWP Project Atlas (NCDENR, 2007). Numerous stressors were identified including heavily grazed buffers, livestock access to streams, eroded stream banks, land-disturbing activities on steep slopes, and storm water runoff. The LWP Project Atlas identified the Little Pine Creek II Stream and Wetland Restoration Project (LPC1-04, LPC1-W10) as a stream and wetland restoration opportunity with the potential to improve water quality, habitat, and hydrology within the Brush Creek watershed. Tables 1-4 in Appendix A present the project details.

1.2. Goals and Objectives

The following goals are outlined in the Final Mitigation Plan, and include:

- Restore riparian buffers
- Exclude cattle
- Stabilize eroding banks
- Construct stream channels that are laterally and vertically stable
- Improve stream habitat
- Improve channel and floodplain connectivity
- Permanently protect the project site from harmful uses

The following project objectives are proposed for accomplishing the goals as outlined in the Final Mitigation Plan:

- Plant native tree and understory species in the riparian zone.
- Install fencing along the conservation easement and cattle pasture boundaries
- Reconstruct stream channels with stable dimensions, add bank revetments and in-stream structures to protect restored/enhanced streams.
- Construct stream channels that will maintain a stable pattern and profile considering the hydrologic and sediment inputs to the system, landscape setting and the watershed condition.
- Install habitat features such as constructed riffles and brush toed into restored/enhanced streams, add woody materials to channel bed, and construct pools of varying depth.
- Reconstruct stream channels with bankfull at or near the floodplain elevation and bank height ratios ranging from 1.0- 1.1.
- Establish a conservation easement on the site.

1.3. Restoration Type and Approach

The project includes six restoration reaches; three Priority 1 (P1) reaches on Little Pine Creek, one Priority 2 (P2) reach on Tributary A, one P1 reach on Tributary B, and one P1 reach on Tributary C. The preservation portion of the Site includes Tributaries D, E, and F. The wetland portion of the LPC II Site

includes three wetland zones. Wetland 1 is a riparian, non-riverine wetland enhancement zone. Wetland 2A is a riparian, non-riverine wetland enhancement zone. Wetland 2B is preservation only.

1.4. Project Components and Success Criteria

The LPC II Site is expected to provide 3,195 SMUs and 1.484 WMUs. The components and mitigation credits Project credits reflect those approved as part of the March 13, 2020 Little Pine Creek II-Project As-Built Update and Mitigation Plan Addendum (downward adjustment), Appendix F. Refer to the Project Assets Map (Figure 2) for the stream and wetland features and Table 1 and 4 for the project components, assets, and mitigation credit information for the LPC II Site (Appendix A).

The initial credit release for LPC II was received on April 3, 2020. A copy of the Notice of Initial Credit Release and the responses to the IRT Review of the Little Pine Creek II Initial Credit Release can be found in Appendix F.

1.5. Project Performance

1.5.1 Vegetation

Visual assessment of vegetation indicates that the herbaceous vegetation is well established throughout the project. MY1 annual mean for planted stems was 331 stems/acre and ranged from 121 to 607 planted stems per acre. Eight species were documented within the vegetation monitoring plots.

Monitoring of both permanent (n=8) and random vegetation plots (n = 6) was completed in October 2020. Summary tables and photographs associated with MY1 vegetation monitoring are located in Appendix B and Appendix C. MY1 monitoring data indicates that all but one permanent vegetation plot was failing to meet the MY3 interim success criteria of 320 planted stems per acre (Table 7 and 8, Appendix C.)

Vegetation problem areas appear to be restricted to the immediate floodplain of Little Pine Creek where areas of scour and deposition have had the greatest impact on stem density. Some of the low stem density areas noted in MY0 are still present, particularly those within the channel belt width on Reach 2A (Table 6 and CCPC, Appendix B). A supplemental warranty-related planting is scheduled for January 2021.

Areas of exotic vegetation are depicted within the CCPV. Multiflora rose (*Rosa multiflora*), Oriental bittersweet (*Celastrus orbiculatus*) and Japanese honeysuckle (*Lonicera japonica*) were the dominant observed species. Invasive vegetation was identified in low density throughout LPC Reach 2A. In the most contiguous area of invasives noted within the CCPV, a more significant density of oriental bittersweet was identified along the forested edge and within the canopy. While the size of the polygon is significant, the overall density of invasive vegetation is low. The location and density of invasive vegetation will continue to be monitored in future site visits.

1.5.2 Geomorphology

Visual assessment of the stream channel was performed to document signs of instability, such as eroding banks, structural instability, or excessive sedimentation. Reaches 1 and 2 both experienced some impacts due to a high flow events in April and May of 2020. The first area on LPC II Reach 1 is located on the left descending bank of Cross-section 1. In this area, overbank flows have eroded a portion of the left descending floodplain and is depicted within the cross-section and photos. The

second area in Reach 1 is located near STA 101+50. In this area a transverse riffle has formed and is currently directing stream flow towards the left descending bank. This area is not currently considered a problem area but will be monitored for any changes in stability. Two areas of concern were noted on LPC II Reach 2. The first is located between Cross-sections 3 and 5. This area has received a significant level of overbank deposition and debris wracking along the easement boundary. The second area of concern is a line of scour located mid-reach at STA 112+00. This area is located along the midline of the right descending bank floodplain and drains to a vernal pool. High flows and increased velocity coming out of the straight portion of Little Pine Creek exiting the NCDOT bridge right-of-way have scoured out this area for approximately 20 feet. These areas were not identified as stream problem areas as they have stabilized over the course of MY1. Low stem density was identified as the only residual effect, (Table 6 and CCPV, Appendix B). These areas will continue to be monitored in future site visits for further signs of instability.

Geomorphic data for MY1 was collected during October 2020. Summary tables and cross-section data plots related to stream morphology are located in Appendix D. Cross-sectional dimensions remained relatively stable between baseline conditions and MY1 monitoring efforts. The most substantial changes took place at cross-sections 1, 2, 3, and 4. Cross-section 1 had the bankfull width increase by 7.3 feet and the width/ depth ratio decreased by 10.1. Additionally, a significant change in the flood-prone area was noted with both, scour and deposition visible in MY1. Cross-section 2, has shown a significant change in dimension between MY0 and MY1. Bankfull max depth decreased by 1.1 feet and significant over-bank deposits were observed. Cross-sections 3 and 4 had a less drastic change in dimension, showing distinct over-bank deposits (Appendix D, Cross-Section overlays and Table 11a). Riffle dimensions for Reach 2 remained relatively similar between baseline conditions and MY1 monitoring. Similarly to Reach 1, new overbank deposits are evident from the cross-sectional surveys (Appendix D, Table 11b). No areas of instability were noted. The site will continue to be monitored for signs of instability.

Additionally, the condition of the water-gate at the beginning of Reach 2A was documented and a photo is included below. No areas of encroachment or fence failure were observed during the assessment, although a significant amount of flood debris has accumulated on the fence line at the start of LPC II Reach 2. The next site visit is planned for spring 2021.

1.5.3 **Hydrology**

Since project completion in late 2019, a minimum of five bankfull events have been documented at the LPC II Site. Based on precipitation and stage recorder data the events were recorded over 6 days; January 12, January 24th, February 7, April 13, April 29, July 19, and May 21, 2020 (Table 12, Appendix E). Five events were recorded on Little Pine Creek, and three events were recorded at the Tributary C, and one at Tributary B. No bankfull events were recorded on Trib A during MY1. Data indicated that the May 21, 2020 storm event buried the continuous stage recorder located on Little Pine Creek. This recorder was subsequently recovered, downloaded, and reset during the MY1 geomorphology monitoring.

2.0 **METHODS**

2.1 **Geomorphology**

Geomorphic measurements were taken during low flow conditions using a Nikon NPR 332 Total Station. Three-dimensional coordinates associated with cross-section data were collected in the field

and geo-referenced (NAD83 State Plane feet FIPS 3200). Morphological data were collected at 13 cross-sections. Survey data was imported into CAD, ArcGIS, and Microsoft Excel for data processing and analysis. Channel substrate was characterized using a Wolman Pebble Count as outlined in Harrelson et al (1994) and processed using Microsoft Excel.

2.2 Vegetation

Vegetation success in MY1 is being monitored at 8 permanent monitoring plots in conjunction with random vegetation plots. Permanent vegetation plot monitoring follows the CVS-EEP Level 2 Protocol for Recording Vegetation, version 4.2 (Lee et al. 2008) and includes analysis of species composition and density of planted species. Data is processed using the CVS data entry tool. In the field, the four corners of each permanent plot were permanently marked with metal t-posts and PVC pipe. Photos of each plot were taken from the plot origin each monitoring year. In MY1, random vegetation plot monitoring was conducted erroneously using the warranty vegetation plot protocol of total planted stems per plot. In future monitoring years random vegetation plots will be monitored as per Section V of the Wilmington District Stream and Wetland Compensatory Mitigation Update (USACE 2016). Data is processed analogous to the CVS data entry tool. In the field, the four corners of each plot were temporarily marked.

2.3 Hydrology

Two crest gages, two continuous stage recorders, two groundwater gages, and a rain gage were utilized to monitor, meteorological, surface, and groundwater within the site. Additionally, visual observations of bankfull event indicators will be documented throughout the project. Data will be recorded and reported through subsequent monitoring reports.

3.0 REFERENCES

Harrelson, Cheryl C., Rawlins, C. L., Potyondy, John, P., (1994) Stream Channel Reference Sites: An illustrated guide to field technique.

Lee, Michael T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation, Version 4.2 (http://cvs.bio.unc.edu/methods.htm)

NCDENR. 2009. New River Basin Restoration Priorities. Retrieved from http://deq.nc.gov/about/divisions/mitigation-services/dms-planning/watershed-planning-documents/new-river-basin

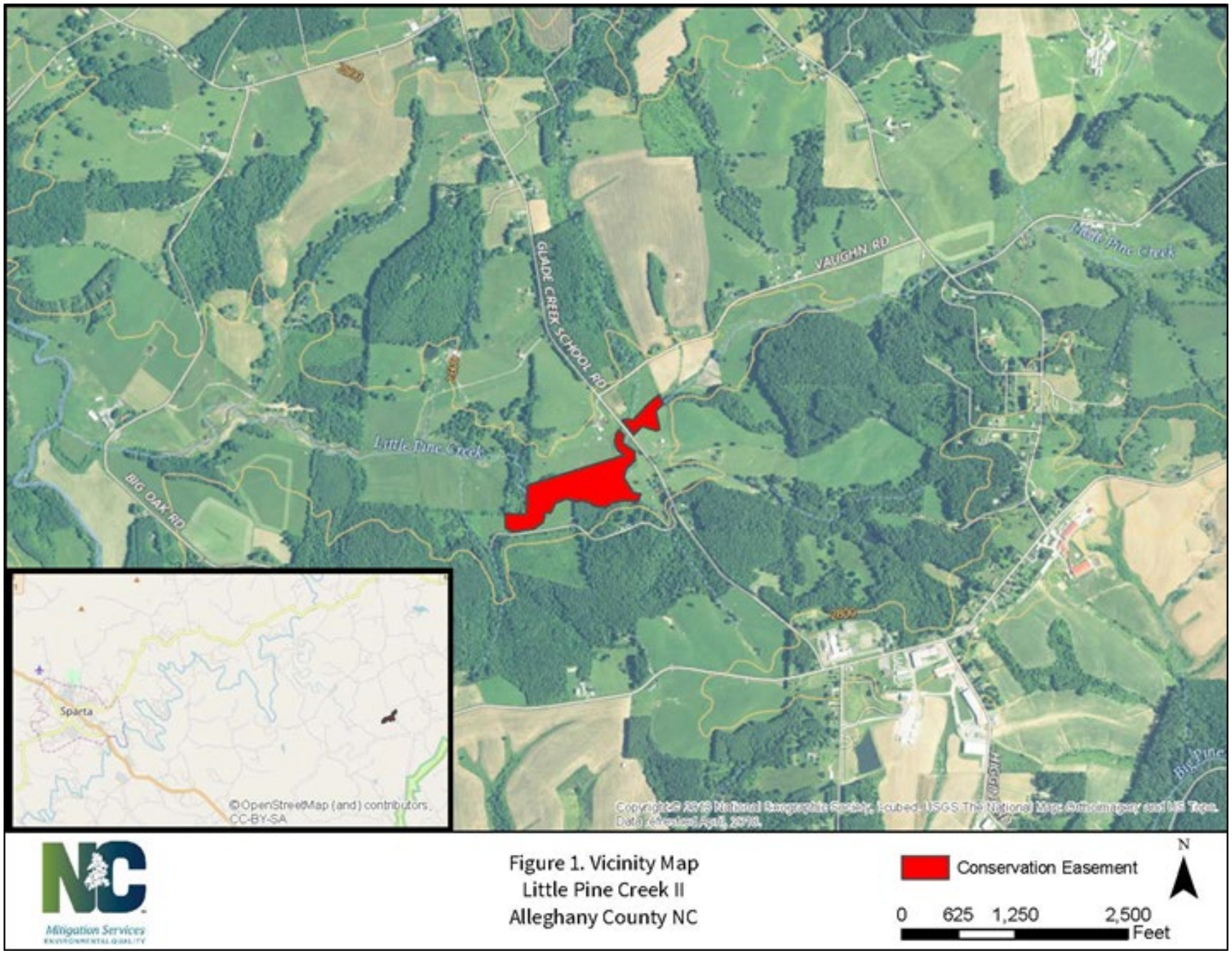
NCDENR. 2007. Little River & Brush Creek Local Watershed Plan (LWP) Project Atlas. Retrieved from http://deq.nc.gov/about/divisions/mitigation-services/dms-planning/watershed-planning-documents/new-river-basin

Turner Land Surveying. 2019. As-Built Survey of Little Pine Creek II Stream and Wetland Restoration Project. Prepared for North Carolina Department of Environmental Quality, Division of Mitigation Services.

United States Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. USACE, NCDENR-DWQ, USEPA, NCWRC.

United States Army Corps of Engineers (USACE), 2016. Wilmington District Stream and Wetland Compensatory Mitigation Update (October 24, 2016). USACE, NCDENR- DWQ, USEPA, NCWRC.

Wildlands Engineering. 2019. Restoration Plan Addendum – Little Pine Creek II Restoration Project Prepared for North Carolina Department of Environmental Quality, Division of Mitigation Services. DMS Project No. 856.


GLADE CREEK SCHOOL RD
VAUGHN RD
Little Pine Creek
BIG OAK RD
Sparta
©OpenStreetMap (and) contributors, CC-BY-SA
Mitigation Services
Figure 1. Vicinity Map
Little Pine Creek II
Alleghany County NC
Conservation Easement
N
0 625 1,250 2,500
Feet

Appendix A
Background Tables

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Table 1. Project Mitigation Assets and Components Little Pine Creek II Stream and Wetland Mitigation Site/Project No. 856								
Project Segment	Mitigation Plan Footage or Acreage*	As-Built Centerline Footage or Acreage^	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Mitigation Plan Credits*		Comments
Reach 1	530	517	Cold	R	1:1	517.000		20' LF Not-credited due to OHW ROW, minor change in as-built length
Reach 2A	1,512	1,476	Cold	R	1:1	1,476.000		Began farther downstream due to cattle crossing; 30' LF Not-credited due to OHW ROW
Reach 2B	321	334	Cold	R	1:1	334.000		Additional 13' LF at end of project
Tributary A	86	82	Cold	R	1:1	82.000		Sinuosity less than design; confluence with Reach 2A farther upstream than proposed
Tributary B	104	78	Cold	R	1:1	78.000		Confluence with Reach 2A farther upstream than proposed
Tributary C	578	577	Cold	R	1:1	577.000		
Tributary D	655	655	Cold	P	5:1	131.000		
Tributary E	50	50	Cold	P	5:1	10.000		Not-credited due to poor as-built condition
Tibutary F	153	153	Cold	P	5:1	30.600		Not-credited due to poor as-built condition
Wetland 1	0.32	0.322	R	E	2:1	0.161		
Wetland 2A	0.88	0.878	R	E	2:1	0.439		
Wetland 2B	4.42	4.420	R	P	5:1	0.884		

* Mitigation plan footage accounts for breaks in conservation easements and are based on design stream stationing and taken from the approved mitigation plan.

^ Based on centerline calculations from the as-built survey, accounts for breaks in conservation easement and utility right-of-ways.

Project Credits

	Stream			Riparian Wetland		Non-Rip	Coastal
Restoration Level	Warm	Cool	Cold	Riverine	Non-Riv	Wetland	Marsh
Restoration	-	-	3,064	-	-	-	-
Re-establishment				-	-	-	-
Rehabilitation				-	-	-	-
Enhancement				-	0.600	-	-
Enhancement I	-	-	-				
Enhancement II	-	-	-				
Creation				-	-	-	-
Preservation	-	-	131	-	0.884	-	
Total Credits[%]	**-**	**-**	**3,195**	**-**	**1.484**	**-**	**-**

[%] Project credits reflect the sum of credits consistent with as-built condition.

Total Stream Credit **3,195.000**

Total Wetland Credit **1.484**

Wetland Mitigation Category

CM	Coastal Marsh
R	Riparian
NR	Non-Riparian

Restoration Level

HQP	High Quality Preservation
P	Preservation
E	Wetland Enhancement - Veg and Hydro
EII	Stream Enhancement II
EI	Stream Enhancement I
C	Wetland Creation
RH	Wetland Rehabilitation - Veg and Hydro
REE	Wetland Re-establishment Veg and Hydro
R	Restoration

Table 2. Project Activity and Reporting History Little Pine Creek II Stream and Wetland Mitigation Site/Project No.856			
Activity or Report		Data Collection Complete	Completion or Delivery
Project Institution Date (Contract Date)		-	Dec-2007
Restoration Plan		-	Jan-2016
Construction (substantial construction complete 05/21/19)		-	May-2019
Planting		-	Apr-2019
As-built – MY0	Stream Survey	Jan-2020	Mar-2020
	Vegetation Survey	Nov-2019	Mar-2020
Monitoring Year-1	Stream Survey	Oct-20	Dec-20
	Vegetation Survey	Oct-20	Dec-20

Table 3. Project Contacts Table Little Pine Creek II Stream and Wetland Mitigation Site/Project No. 856	
Designer Primary project design POC	Wildland Engineering, Inc / 1430 South Mint St #104 Charlotte NC 282013 Jeff Keaton / 919.851.9986
Construction Contractor Construction contractor POC	Wright Contracting / 453 Silk Hope Liberty Rd Siler City, NC 27344 Ross Kennedy/336.736.4585
Survey Contractor Survey contractor POC	Turner Surveying / P.O. Box 148 Swannanoa, NC 28778 David Turner/ 919.827.0745
Planting Contractor Planting contractor POC	Carolina Silvics 908 Indian Trail Rd, Edenton, NC 27932 Mary Margaret McKinney 252.482.8491
Seeding Contractor Contractor point of contact	Wright Contracting / 453 Silk Hope Liberty Rd Siler City, NC 27344 Ross Kennedy/336.736.4585
Seed Mix Sources	Green Resource, LLC
Nursery Stock Suppliers	Mellow Marsh Farm
Monitoring Performers	Equinox / 37 Haywood St Suite 100 Asheville NC 28801
Stream Monitoring POC	Danvey Walsh/828.253.6856
Vegetation Monitoring POC	Owen Carson/828.253.6856
Wetland Monitoring POC	Danvey Walsh/828.506.6856

Table 4. Project Baseline Information and Attributes

Project Information

Project Name	Little Pine Creek II Stream and Wetland Mitigation Site
County	Alleghany
Project Area (acres)	14.61
Project Coordinates (latitude and longitude)	36.5069° N, -80.9878° W

Project Watershed Summary Information

Physiographic Province		Blue Ridge	
River Basin		New River	
USGS Hydrologic Unit 8-digit	5050001	USGS Hydrologic Unit 14-digit	5050001030030
DWR Sub-basin		05-07-03	
Project Drainage Area (acres)		3.34	
Project Drainage Area Percentage of Impervious Area		< 1%	
CGIA Land Use Classification		Pasture/Hay	

Reach Summary Information

Parameters	Little Pine Creek Reach 1	Little Pine Creek 2A	Little Pine Creek 2B	Tributary A	Tributary B	Tributary C	Tributary D	Tributary E	Tributary F
Length of Reach (linear feet) ^	533	1,506	334	82	77	577	899	50	153
Valley Confinement (Rosgen)	VI	VI	VI	VI	VI	VI	VI	VI	VI
Drainage area (miles^2)	2.93	3.31	3.34	0.39	0.26	0.11	0.13	0.04	0.05
Perrenial, Intermittent, Ephemeral	Perrenial	Perrenial	Perrenial	Perrenial	Perrenial	Perrenial	Perrenial	Perrenial	Perrenial
NCDWR Water Quality Classification	C	C	C	C	C	C	C	C	C
Stream Classification (existing)	C	C	C	C	C	G	C	C	C
Stream Classification (proposed)	C	C	C	C	C	C	C	C	C
FEMA classification	-	-	-	-	-	-	-	-	-

Wetland Summary Information

Parameters	Wetland 1	Wetland 2A	Wetland 2B
Size of Wetland (acres)	0.32	0.88	4.42
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian	Riparian	Riparian
Mapped Soil Series	Alluvial land, wet (nikwasi)	Alluvial land, wet (nikwasi)	Alluvial land, wet (nikwasi)
Drainage class	Very Poorly	Very Poorly	Very Poorly
Soil Hydric Status	Hydric	Hydric	Hydric
Source of Hydrology	Spring	Spring	Spring
Hydrologic Impairment	Agriculture/ Livestock Grazing	Agriculture/ Livestock Grazing	Agriculture/ Livestock Grazing
Native vegetation community	Mountain Bottomland Forest	Mountain Bottomland Forest	Mountain Bottomland Forest
Percent composition of exotic invasive vegetation	0%	0%	0%

Regulatory Considerations

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States – Section 404	Yes	Yes	Jurisdictional Determination
Waters of the United States – Section 401	Yes	Yes	Jurisdictional Determination
Endangered Species Act	Yes	Yes	ERTR
Historic Preservation Act	No	N/A	ERTR
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	Yes
Essential Fisheries Habitat	No	N/A	N/A

^ Based on actual thalweg calculations from the as-built survey, accounts for breaks in conservation easement and utility right-of-ways.

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Appendix B
Visual Assessment Data

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Sheet 2
Sheet 3
Sheet 4
Reach 1
Trib A
Wetland 1
Reach 2A
Trib B
Reach 2B
Trib C
Trib D
Wetland 2A
Wetland 2B
NC Center for Geographic Information & Analysis

Mitigation Services
ENVIRONMENTAL QUALITY

Integrated CCPV
MY1
Little Pine Creek II
Alleghany County, NC
Overview

Conservation Easement
ReachBreak
OHW
Utility Easement

Streams
Non-Credit
Preservation
Restoration

Wetlands
Enhancement
Preservation
Vernal Pool

N

0 125 250 500 Feet

Integrated CCPV
MY1
Little Pine Creek II
Alleghany County, NC

Sheet 2 of 4

Mitigation Services
ENVIRONMENTAL QUALITY

- Conservation Easement
- OHW
- Utility Easement
- Photopoints
- Crest Gauge
- Wetland gauge
- Cross Sections

Permanent Vegetation Plot
- Failing>10%
- Meeting>10%

Random Vegetation Plot
- Meeting>10%

Streams
- Non-Credit
- Restoration

Invasive Problem Areas
- Present
- Low Stem Density Areas

Wetlands
- Enhancement

N

0 20 40 80 Feet

Integrated CCPV
MY1
Little Pine Creek II
Alleghany County, NC

Sheet 3 of 4

Mitigation Services
ENVIRONMENTAL QUALITY

- Conservation Easement
- ReachBreak
- OHW
- Utility Easement
- Rain Gauge
- Photopoints
- Crest Gauge
- Stream Gauge
- Wetland gauge
- Cross Sections

Permanent Vegetation Plot
- Failing>10%
- Meeting>10%

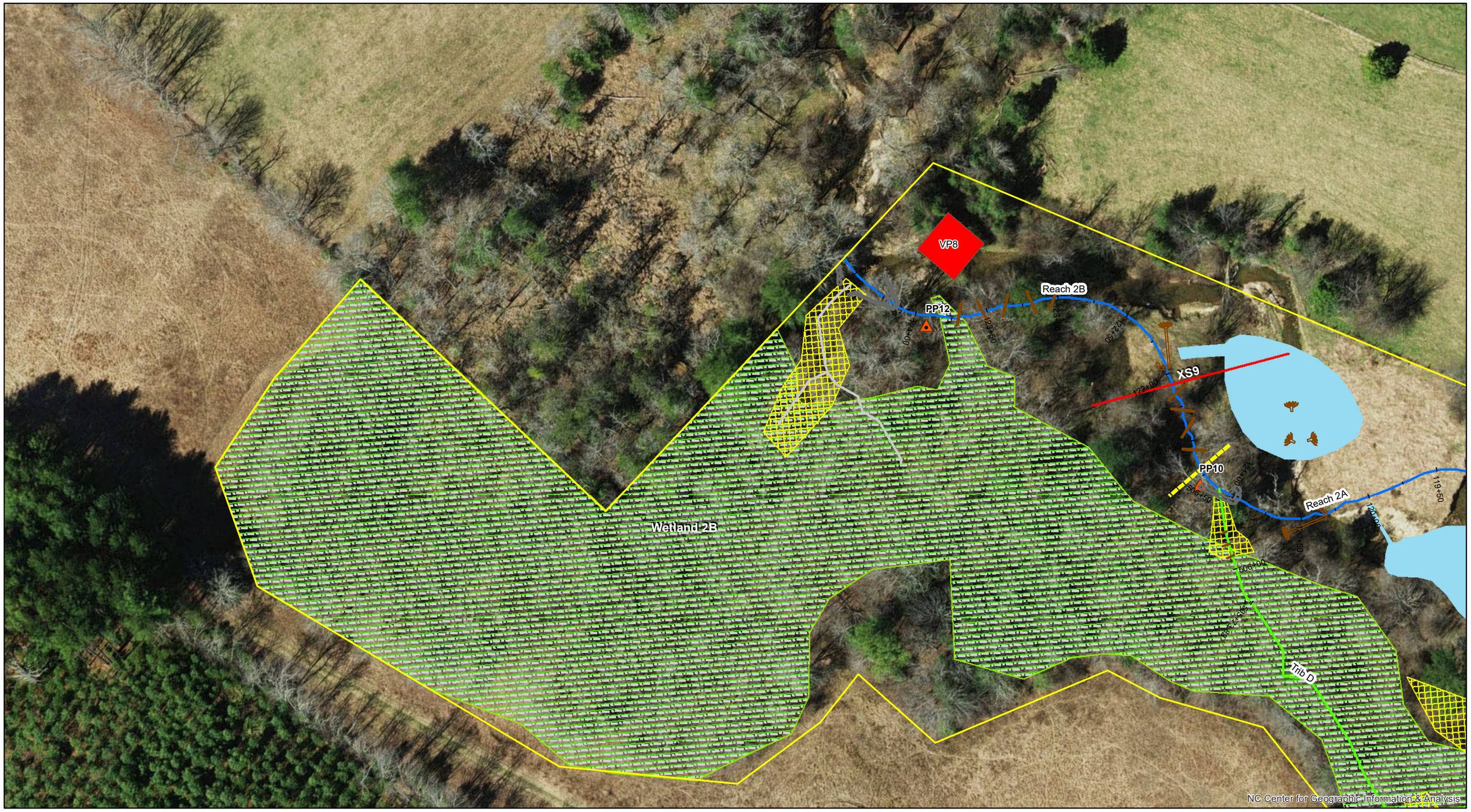
Random Vegetation Plot
- Meeting>10%

Streams
- Non-Credit
- Preservation
- Restoration

Invasive Problem Areas
- Present
- Low Stem Density Areas

Wetlands
- Enhancement
- Preservation
- Vernal Pool

0 40 80 160 Feet



Integrated CCPV
MY1
Little Pine Creek II
Alleghany County, NC

Sheet 4 of 4

Mitigation Services
ENVIRONMENTAL QUALITY

Conservation Easement
ReachBreak
Photopoints
Cross Sections
Permanent Vegetation Plot
Failing>10%
Streams
Non-Credit
Preservation
Restoration
Invasive Problem Areas
Present
Wetlands
Preservation
Vernal Pool

N

0 30 60 120 Feet

Table 5. Visual Stream Morphology Stability Assessment
Little Pine Creek II Stream and Wetland Mitigation Site - Little Pine Creek Reach 1 - Restoration (P2)
Assessed Length 533 feet

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	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	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. 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 : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	18	19			95%			

N/A - Item does not apply.

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Little Pine Creek II Stream and Wetland Mitigation Site - Little Pine Creek Reach 2a - Restoration (P1)
Assessed Length 1506 feet

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	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	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
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	22	22			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	22	22			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	22	22			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	22	22			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	22	22			100%			

N/A - Item does not apply.

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Little Pine Creek II Stream and Wetland Mitigation Site - Little Pine Creek Reach 2b - Restoration (P1)
Assessed Length 334 feet

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	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	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
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	12	12			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	12	12			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	12	12			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	12	12			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	12	12			100%			

N/A - Item does not apply.

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Little Pine Creek II Stream and Wetland Mitigation Site - Trib A - Restoration (P2)
Assessed Length 82 feet

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	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	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
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	1	1			100%			

N/A - Item does not apply.

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Little Pine Creek II Stream and Wetland Mitigation Site - Trib B - Restoration (P1)
Assessed Length 77 feet

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	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	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
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	1	1			100%			

N/A - Item does not apply.

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Little Pine Creek II Stream and Wetland Mitigation Site - Trib C - Restoration (P1)
Assessed Length 577 feet

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	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	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
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	42	42			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	42	42			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	42	42			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	42	42			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	42	42			100%			

N/A - Item does not apply.

Table 6. Vegetation Condition Assessment Little Pine Creek II Stream and Wetland Mitigation Site						
Planted Acreage: 7.7						
Vegetation Category	**Definitions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Planted Acreage**
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	n/a	0	0	0.00%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres		10	0.29	2.07%
			Total	10	0.29	2.07%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	n/a	0	0	0.00%
			Cumulative Total	10	0.29	2.07%
Easement Acreage:	**14**					
Vegetation Category	**Definitions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Easement Acreage**
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF		7	0.42	3.00%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	n/a	0	0	0.00%

Permanent Vegetation Plot Photos

Vegetation Monitoring Plot 1

Vegetation Monitoring Plot 2

Vegetation Monitoring Plot 3

Vegetation Monitoring Plot 4

Vegetation Monitoring Plot 5

Vegetation Monitoring Plot 6

Vegetation Monitoring Plot 7

Vegetation Monitoring Plot 8

Permanent Photo Stations

Little Pine Creek II – Permanent Photo Station 1
Looking Upstream

Little Pine Creek II – Permanent Photo Station 2a
Looking Upstream

Little Pine Creek II – Permanent Photo Station 2b
Looking Downstream

Little Pine Creek II – Permanent Photo Station 3a
Looking Downstream

Little Pine Creek II – Permanent Photo Station 3b
Looking Upstream

Little Pine Creek II – Permanent Photo Station 4a
Looking Upstream

Little Pine Creek II – Permanent Photo Station 4b
Little Pine Creek confluence with Trib A

Little Pine Creek II – Permanent Photo Station 5
Looking Downstream

Little Pine Creek II – Permanent Photo Station 6a
Looking Upstream

Little Pine Creek II – Permanent Photo Station 6b
Looking Downstream

Little Pine Creek II – Permanent Photo Station7a
Looking Northeast

Little Pine Creek II – Permanent Photo Station 7b
Looking East

Little Pine Creek II – Permanent Photo Station 7c
Looking Southwest

Little Pine Creek II – Permanent Photo Station 8a
Looking over vernal pool

Little Pine Creek II – Permanent Photo Station 8b
Looking Downstream

Little Pine Creek II – Permanent Photo Station 9a
Looking Upstream

Little Pine Creek II – Permanent Photo Station 9b
Looking Downstream

Little Pine Creek II – Permanent Photo Station 10a
Looking Upstream

Little Pine Creek II – Permanent Photo Station 10b
Looking Downstream

Little Pine Creek II – Permanent Photo Station 11a
Looking Upstream Trib D

Little Pine Creek II – Permanent Photo Station 11b
Looking Downstream

Little Pine Creek II – Permanent Photo Station 11c
Looking North

Little Pine Creek II – Permanent Photo Station 12a
Looking Downstream

Little Pine Creek II – Permanent Photo Station 12b
Looking Upstream

Little Pine Creek II – Permanent Photo Station 13a
Confluence with Trib B

Little Pine Creek II – Permanent Photo Station 13b
Looking Downstream

Little Pine Creek II – Permanent Photo Station 14a
Looking at floodplain pool

Little Pine Creek II – Permanent Photo Station 14b
Looking Upstream

Little Pine Creek II – Permanent Photo Station 14c
Looking North

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Appendix C
Vegetation Plot Data

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Table 7. Planted Stem and Total Stem Counts (Species by Plot)
Little Pine Creek II Stream and Wetland Mitigation Site/ Project No. 856

			Current Plot Data (MY1 2020)																									
			082819-01-0001			082819-01-0002			082819-01-0003			082819-01-0004			082819-01-0005			082819-01-0006			082819-01-0007			082819-01-0008		
Scientific Name	Common Name	Species Type	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	PnoLS	P-all	T
Acer rubrum	Red Maple	Tree																			2	2	2			
Betula nigra	River Birch	Tree				1	1	1	1	1	1	4	4	4	1	1	1				2	2	2	1	1	1
Cornus amomum	Silky Dogwood	Shrub Tree				2	2	2	1	1	1				1	1	1									
Fraxinus pennsylvanica	Green Ash	Tree	2	2	2				5	5	5				3	3	3							2	2	2
Ilex verticillata	Winterberry	Shrub Tree																2	2	2						
Liriodendron tulipifera	Tulip Poplar	Tree																						1	1	1
Platanus occidentalis	Sycamore	Tree	1	1	1				3	3	3	1	1	1				1	1	1	2	2	2			
Salix nigra	Black Willow	Tree																								1
Unidentified Planted stem	N/A	Tree																								
		Stem count	3	3	3	3	3	3	10	10	10	5	5	5	5	5	5	3	3	3	6	6	6	4	4	5
		size (ares)	1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	2	2	2	2	2	2	4	4	4	2	2	2	3	3	3	2	2	2	3	3	3	3	3	4
		Stems per ACRE	121.4	121.4	121.4	121.4	121.4	121.4	404.7	404.7	404.7	202.3	202.3	202.3	202.3	202.3	202.3	121.4	121.4	121.4	242.8	242.8	242.8	161.9	161.9	202.3

Table 7. Planted Stem and Total Stem Counts (Species by Plot)
Little Pine Creek II Stream and Wetland Mitigation Site/ Project No. 856

			Random Plot Data (MY1 2020)																		Annual Means					
			*RVP 0001			*RVP 0002			*RVP 0003			*RVP 0004			*RVP 0005			*RVP 0006			MY1 (2020)			MY0 (2019)		
Scientific Name	Common Name	Species Type	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	PnoLS	P-all	T
Acer rubrum	Red Maple	Tree																			2	2	2	10	10	10
Betula nigra	River Birch	Tree																			10	10	10	18	18	18
Cornus amomum	Silky Dogwood	Shrub Tree																			4	4	4	9	9	9
Fraxinus pennsylvanica	Green Ash	Tree																			12	12	12	6	6	6
Ilex verticillata	Winterberry	Shrub Tree																			2	2	2			
Liriodendron tulipifera	Yellow Poplar	Tree																			1	1	1	4	4	4
Platanus occidentalis	Sycamore	Tree																			8	8	8	7	7	7
Salix nigra	Black Willow	Tree																					1			
Unidentified Planted stem	N/A	Tree	11	11	11	15	15	15	13	13	13	9	9	9	10	10	10	9	9	9	67	67	67			
		Stem count	11	11	11	15	15	15	13	13	13	9	9	9	10	10	10	9	9	9	106	106	107	54	54	54
		size (ares)	1			1			1			1			1			1			8			8		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.32			0.20		
		Species count	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	8	9	6	6	6
		Stems per ACRE	445.2	445.2	445.2	607	607	607	526.1	526.1	526.1	364.2	364.2	364.2	404.7	404.7	404.7	364.2	364.2	364.2	331.3	331.3	334.4	273.2	273.2	273.2

* Species and heights not recorded in MY1

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%

Table 8. Total Planted and Natural Stem Recruits (Random Plots) LPC II / Project No. 856						
	Temporary Plot 1 10m x 10m	Temporary Plot 2 5m x 20m	Temporary Plot 3 5m x 20m	Temporary Plot 4 5m x 20m	Temporary Plot 5 10m x 10m	Temporary Plot 6 10m x 10m
Stem Count	11	15	13	9	10	9
Size (Ares)	1	1	1	1	1	1
Size (Acres)	0.02	0.02	0.02	0.02	0.02	0.02
Stems Per Acre	445	607	526	364	405	364

* Specific species were not collected per plot however the majority of the stems included *Betula nigra* , *Fraxinus pennsylvanicum* , *Liriodendron tulipifera* , *Acer rubrum* , *Plantanus occidentalis, Salix nigra, and Cornus amomum*.

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%

Table 9. Vegetation Plot Criteria Attainment LPCII Stream and Wetland Mitigation Site		
Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
VP1	No	50.0%
VP2	No	
VP3	Yes	
VP4	No	
VP5	No	
VP6	No	
VP7	No	
VP8	No	
RVP1	Yes	
RVP2	Yes	
RVP3	Yes	
RVP4	Yes	
RVP5	Yes	
RVP6	Yes	

Appendix D
Stream Geomorphology Data

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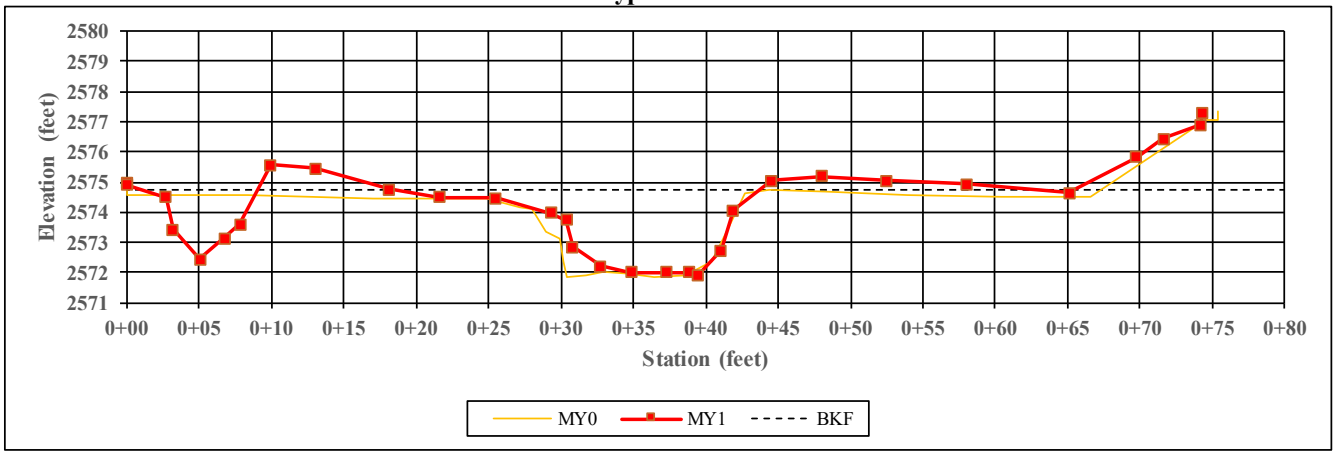
Project Name: LPC II **XS Number:** 1 **Station:** 100+77

Reach Name: Little Pine Creek **XS Type:** Riffle



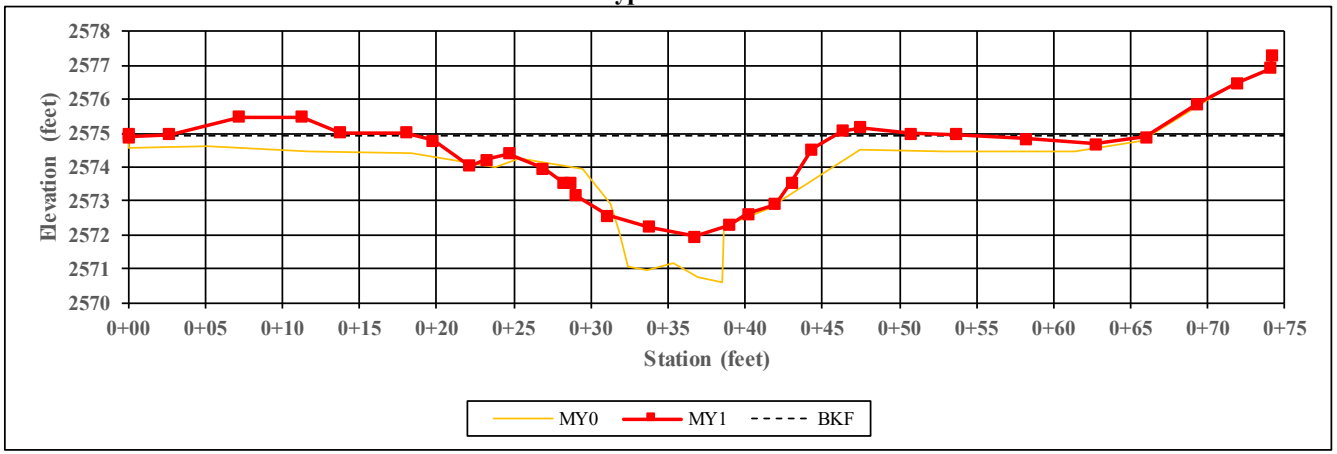
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	25.5	18.2	-	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.2	1.7	-	-	-	-	-	-
Bankfull Max Depth (ft)	2.7	2.8	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	31.6	31.6	-	-	-	-	-	-
Width/Depth Ratio	20.6	10.5	-	-	-	-	-	-
Entrenchment Ratio	3.9	5.5	-	-	-	-	-	-
Bank Height Ratio	1.1	0.9	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: LPC II **XS Number:** 2 **Station:** 100+91

Reach Name: Little Pine Creek **XS Type:** Pool



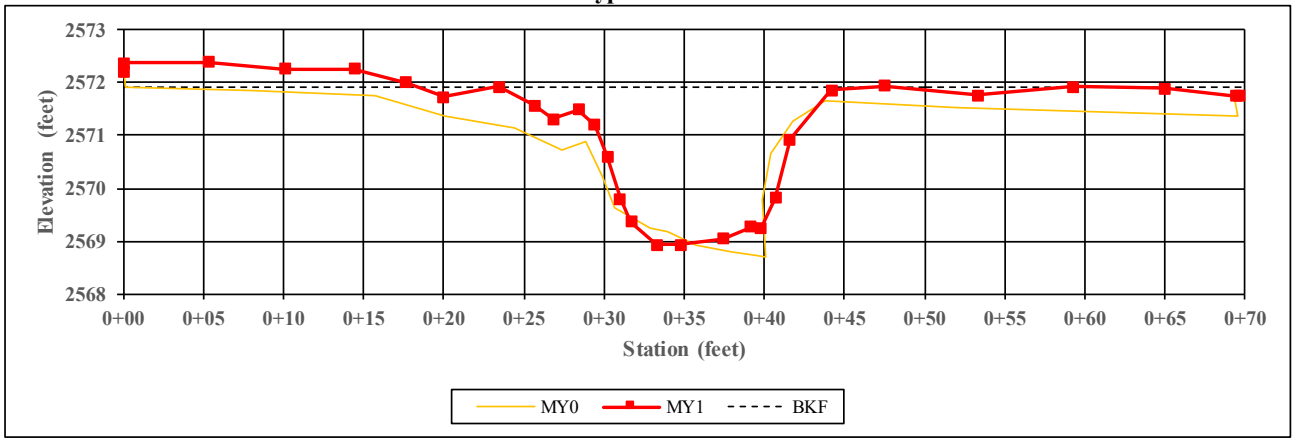
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	23.7	25.9	-	-	-	-	-	-
Floodprone Width (ft)	70.0	70.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.8	1.6	-	-	-	-	-	-
Bankfull Max Depth (ft)	4.0	2.9	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	42.3	42.3	-	-	-	-	-	-
Width/Depth Ratio	13.3	15.8	-	-	-	-	-	-
Entrenchment Ratio	3.0	2.7	-	-	-	-	-	-
Bank Height Ratio	1.1	0.8	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: LPC II **XS Number:** 3 **Station:** 107+50

Reach Name: Little Pine Creek **XS Type:** Pool



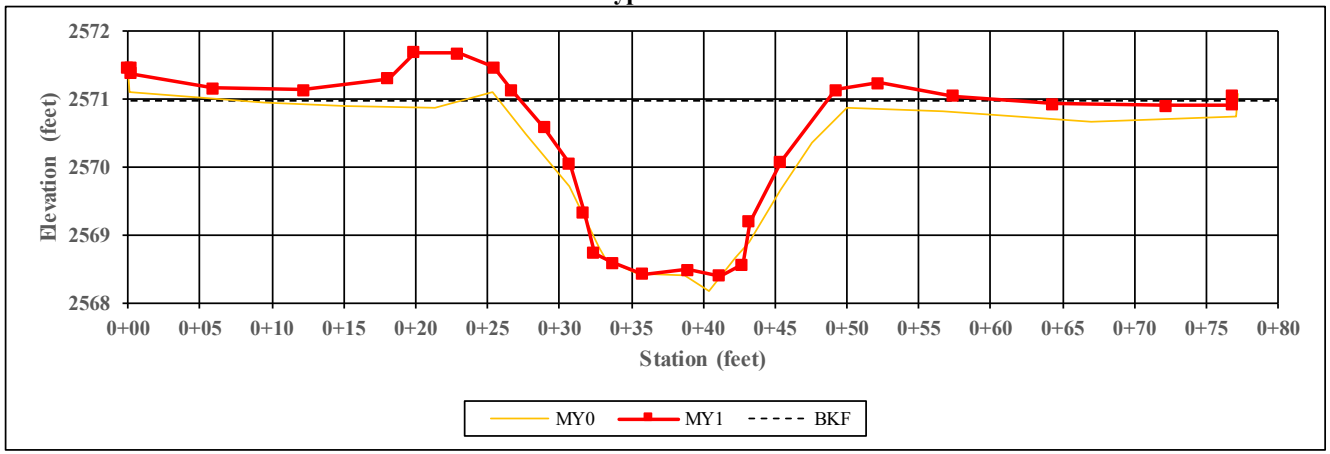
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	27.0	24.0	-	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.3	1.4	-	-	-	-	-	-
Bankfull Max Depth (ft)	3.0	3.0	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	34.3	34.2	-	-	-	-	-	-
Width/Depth Ratio	21.3	16.8	-	-	-	-	-	-
Entrenchment Ratio	3.7	4.2	-	-	-	-	-	-
Bank Height Ratio	1.0	1.0	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: LPC II **XS Number:** 4 **Station:** 108+69

Reach Name: Little Pine Creek **XS Type:** Riffle



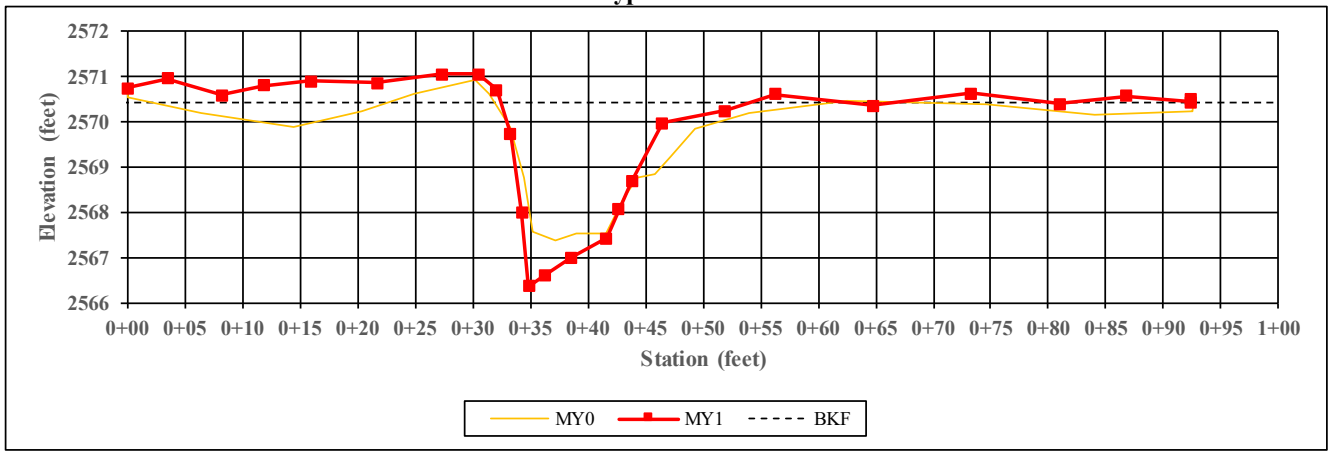
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	21.3	37.2	-	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.7	1.0	-	-	-	-	-	-
Bankfull Max Depth (ft)	2.7	2.6	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	36.4	36.4	-	-	-	-	-	-
Width/Depth Ratio	12.5	38.1	-	-	-	-	-	-
Entrenchment Ratio	4.7	2.7	-	-	-	-	-	-
Bank Height Ratio	1.1	1.1	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: LPC II **XS Number:** 5 **Station:** 109+64

Reach Name: Little Pine Creek **XS Type:** Pool



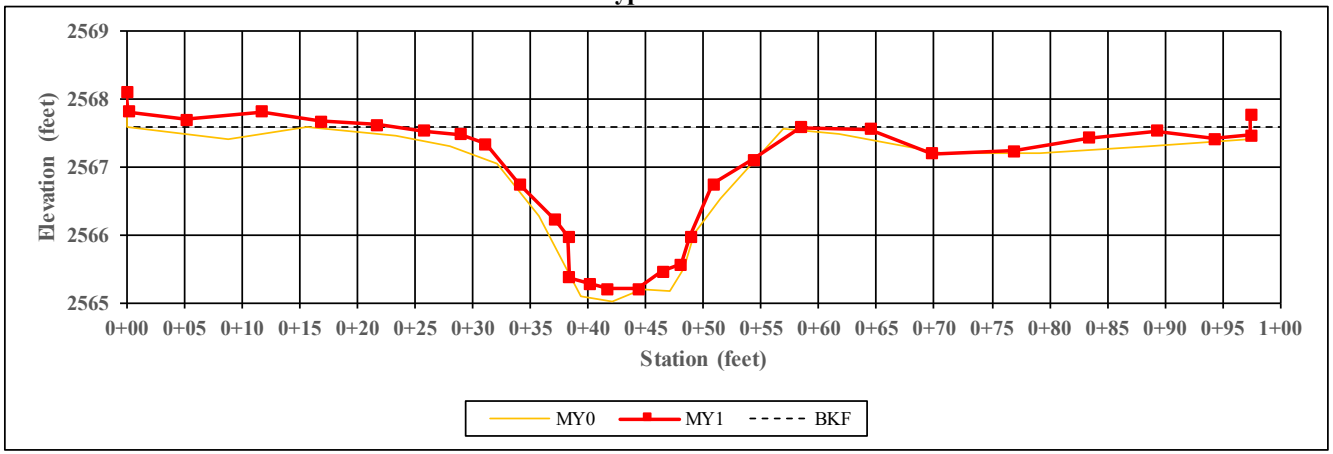
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	22.2	27.3	-	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.7	1.4	-	-	-	-	-	-
Bankfull Max Depth (ft)	3.1	4.1	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	37.9	37.9	-	-	-	-	-	-
Width/Depth Ratio	13.0	19.7	-	-	-	-	-	-
Entrenchment Ratio	4.5	3.7	-	-	-	-	-	-
Bank Height Ratio	1.1	1.0	-	-	-	-	-	-

Looking Downstream

Looking Upstream

Project Name: LPC II **XS Number:** 6 **Station:** 112+81

Reach Name: Little Pine Creek **XS Type:** Riffle



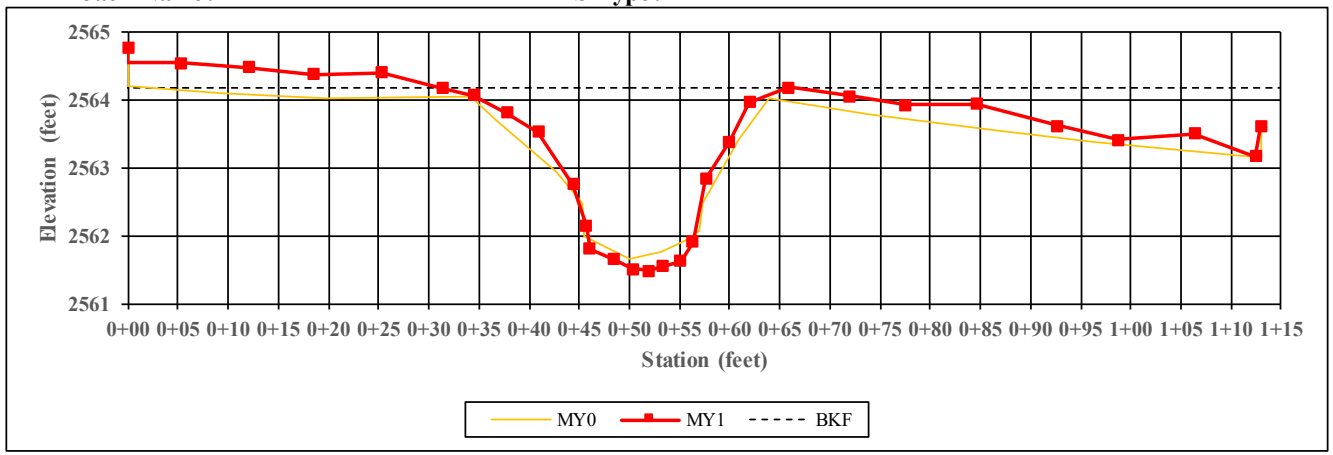
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	40.4	42.0	-	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.9	0.9	-	-	-	-	-	-
Bankfull Max Depth (ft)	2.6	2.4	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	37.4	37.4	-	-	-	-	-	-
Width/Depth Ratio	43.6	47.1	-	-	-	-	-	-
Entrenchment Ratio	2.5	2.4	-	-	-	-	-	-
Bank Height Ratio	1.0	1.0	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: LPC II **XS Number:** 7 **Station:** 117+00

Reach Name: Little Pine Creek **XS Type:** Riffle



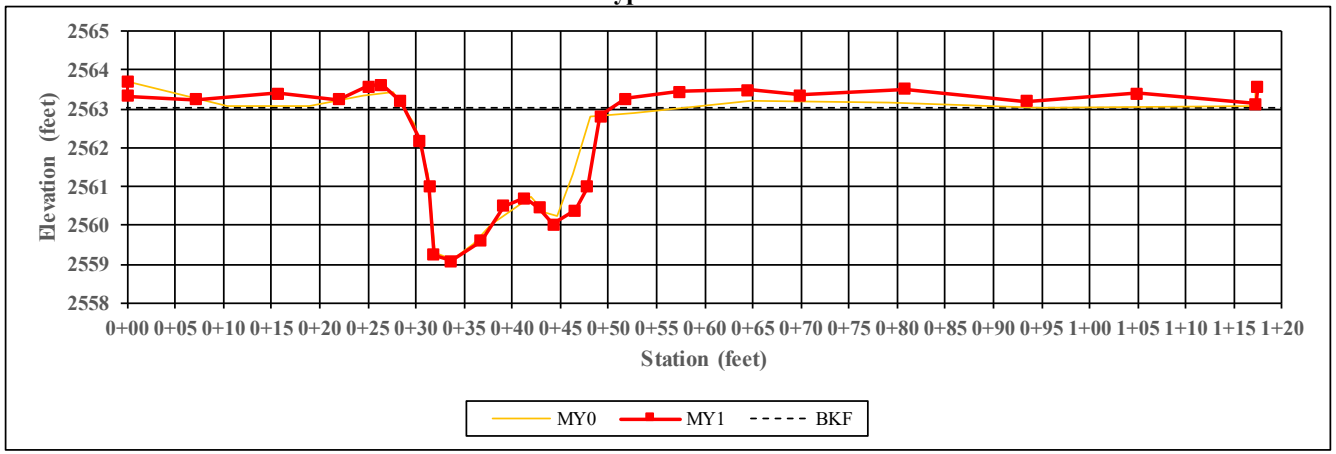
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	29.7	22.2	-	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.3	1.8	-	-	-	-	-	-
Bankfull Max Depth (ft)	2.4	2.7	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	39.2	39.2	-	-	-	-	-	-
Width/Depth Ratio	22.5	12.6	-	-	-	-	-	-
Entrenchment Ratio	3.4	4.5	-	-	-	-	-	-
Bank Height Ratio	1.0	1.0	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: LPC II **XS Number:** 8 **Station:** 117+79

Reach Name: Little Pine Creek **XS Type:** Pool



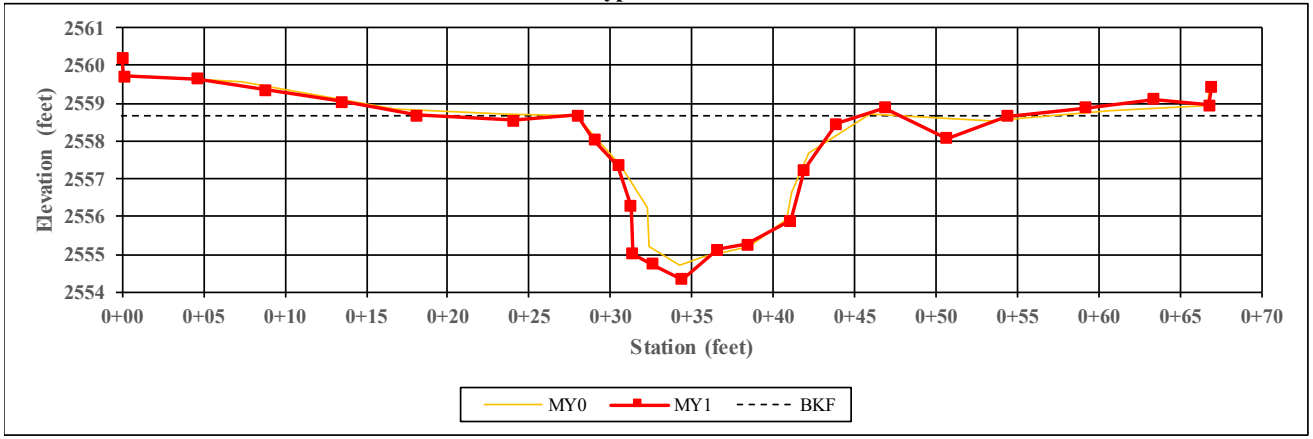
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	22.8	20.1	-	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	2.3	2.6	-	-	-	-	-	-
Bankfull Max Depth (ft)	4.1	4.0	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	52.8	52.8	-	-	-	-	-	-
Width/Depth Ratio	9.9	7.7	-	-	-	-	-	-
Entrenchment Ratio	4.4	5.0	-	-	-	-	-	-
Bank Height Ratio	1.1	1.1	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: LPC II **XS Number:** 9 **Station:** 122+77

Reach Name: Little Pine Creek **XS Type:** Pool



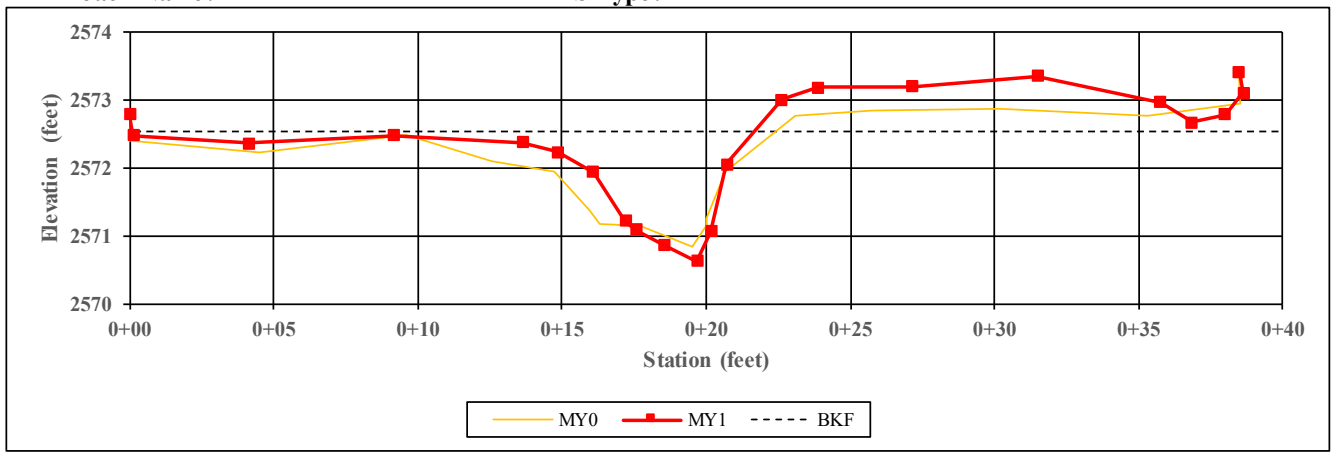
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	36.7	23.6	-	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.2	1.8	-	-	-	-	-	-
Bankfull Max Depth (ft)	4.1	4.3	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	42.3	42.3	-	-	-	-	-	-
Width/Depth Ratio	31.9	13.2	-	-	-	-	-	-
Entrenchment Ratio	2.7	4.2	-	-	-	-	-	-
Bank Height Ratio	1.0	1.0	-	-	-	-	-	-

Looking Upstream XS9

Left Descending Bank

Project Name: LPC II **XS Number:** 10 **Station:** 200+31

Reach Name: Trib A **XS Type:** Pool



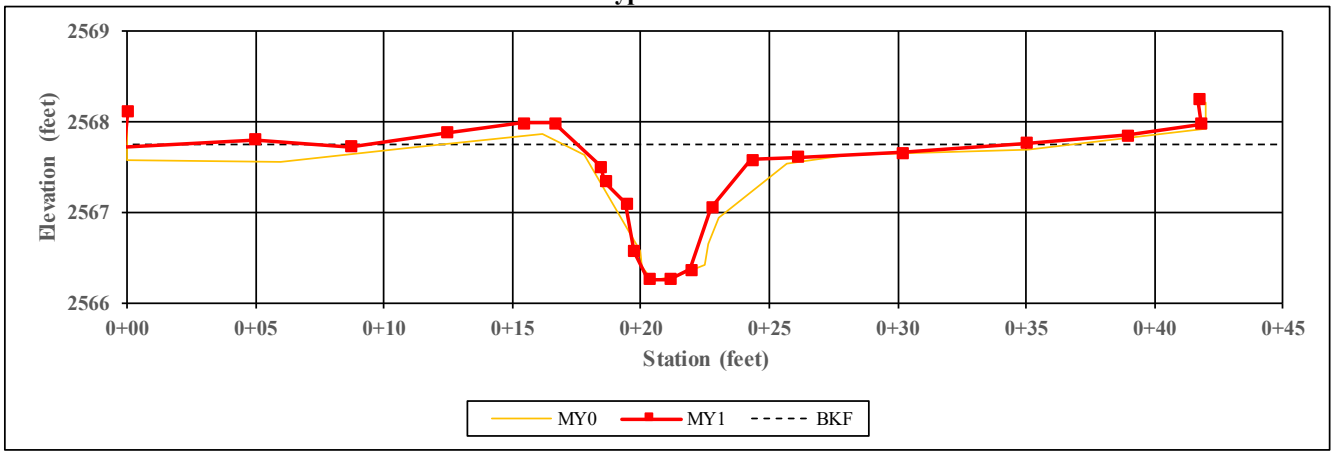
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	12.6	21.6	-	-	-	-	-	-
Floodprone Width (ft)	40.0	40.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.7	0.4	-	-	-	-	-	-
Bankfull Max Depth (ft)	1.6	1.9	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	9.2	9.2	-	-	-	-	-	-
Width/Depth Ratio	17.4	50.3	-	-	-	-	-	-
Entrenchment Ratio	3.2	1.9	-	-	-	-	-	-
Bank Height Ratio	1.2	0.9	-	-	-	-	-	-

Left Descending Bank


Right Descending Bank

Project Name: LPC II **XS Number:** 11 **Station:** 300+45

Reach Name: Trib B **XS Type:** Riffle



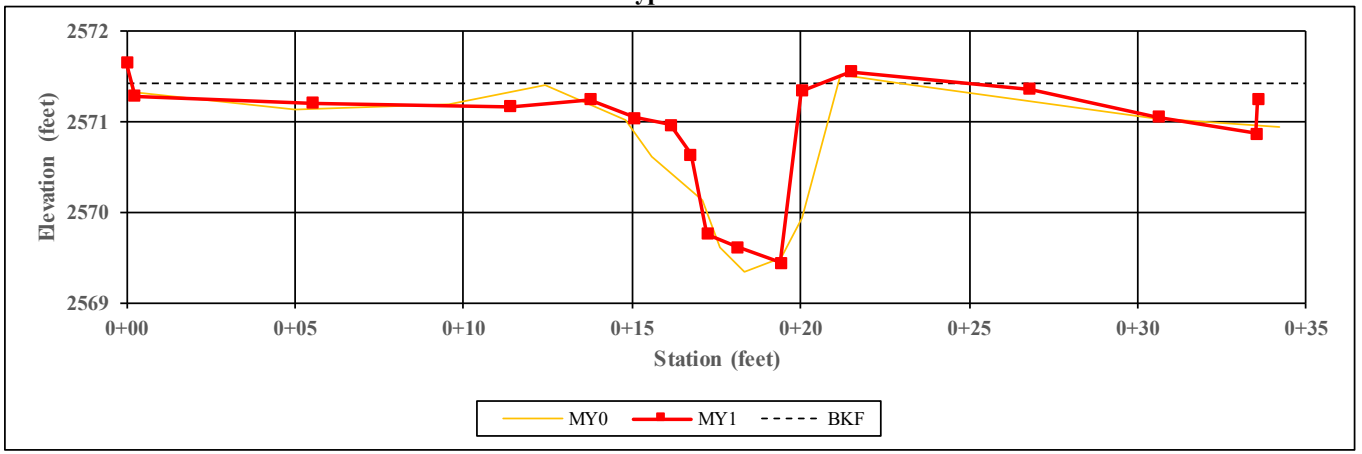
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	10.6	16.1	-	-	-	-	-	-
Floodprone Width (ft)	30.0	30.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.6	0.4	-	-	-	-	-	-
Bankfull Max Depth (ft)	1.4	1.5	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	6.5	6.5	-	-	-	-	-	-
Width/Depth Ratio	17.1	40.1	-	-	-	-	-	-
Entrenchment Ratio	2.8	1.9	-	-	-	-	-	-
Bank Height Ratio	1.1	0.9	-	-	-	-	-	-

Left Descending Bank

Looking Downstream

Project Name: LPC II **XS Number:** 12 **Station:** 402+52

Reach Name: Trib C **XS Type:** Pool



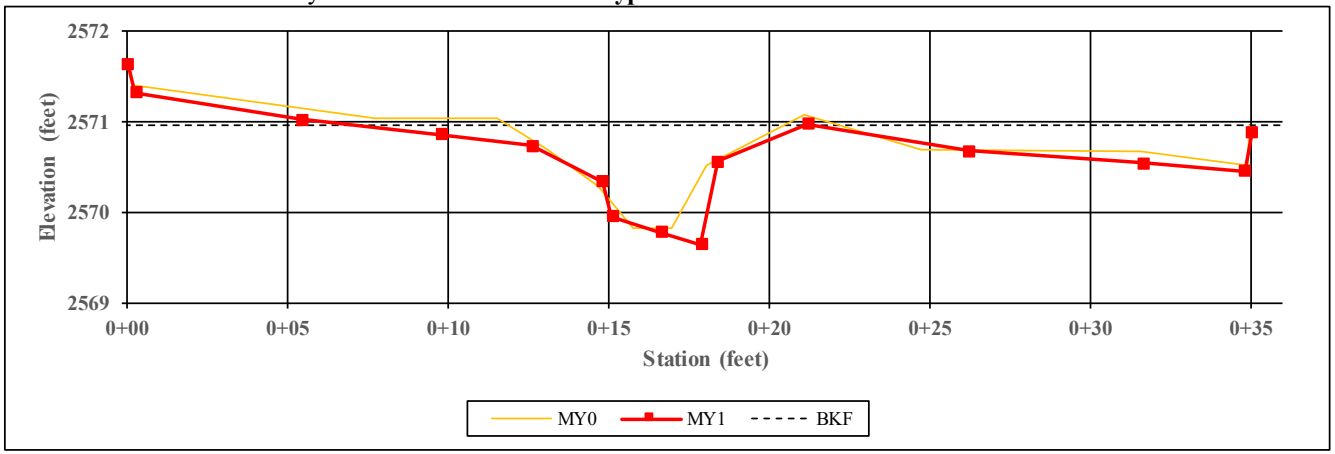
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	8.7	19.2	-	-	-	-	-	-
Floodprone Width (ft)	40.0	40.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.0	0.5	-	-	-	-	-	-
Bankfull Max Depth (ft)	2.1	2.0	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	8.7	8.7	-	-	-	-	-	-
Width/Depth Ratio	8.7	42.2	-	-	-	-	-	-
Entrenchment Ratio	4.6	2.1	-	-	-	-	-	-
Bank Height Ratio	1.0	0.9	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: LPC II **XS Number:** 13 **Station:** 402+75

Reach Name: Tributary C **XS Type:** Riffle



CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	9.3	8.6	-	-	-	-	-	-
Floodprone Width (ft)	40.0	40.0	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.6	0.6	-	-	-	-	-	-
Bankfull Max Depth (ft)	1.2	1.3	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	5.3	5.3	-	-	-	-	-	-
Width/Depth Ratio	16.4	14.0	-	-	-	-	-	-
Entrenchment Ratio	4.3	4.6	-	-	-	-	-	-
Bank Height Ratio	1.0	1.0	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Table 10. Baseline Stream Data Summary
Little Pine Creek II Mitigation Site - Little Pine Creek Reach 1 (533 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)				-	23.7	-	-	-	1	16.4	-	-	21.4	-	2	-	24.0	-	-	25.5	-	-	-	1
Floodprone Width (ft)				-	100+	-	-	-	1	70.0	-	-	200	-	2	-	>50	-	-	100.0	-	-	-	1
Bankfull Mean Depth (ft)				-	1.9	-	-	-	1	1.9	-	-	2.1	-	2	-	1.7	-	-	1.2	-	-	-	1
Bankfull Max Depth (ft)				-	3.4	-	-	-	1	2.5	-	-	3.1	-	2	-	2.5	-	-	2.7	-	-	-	1
Bankfull Cross Sectional Area (ft^2)				-	45.6	-	-	-	1	18.0	-	-	27.2	-	2	-	41.3	-	-	31.6	-	-	-	1
Width/Depth Ratio				-	12.3	-	-	-	1	12.0	-	-	14.0	-	2	-	14.0	-	-	20.6	-	-	-	1
Entrenchment Ratio				-	4.1+	-	-	-	1	>2.2	-	-	>2.3	-	2	-	>2.2	-	-	3.9	-	-	-	1
Bank Height Ratio				-	1.4	-	-	-	1	1.0	-	-	1.1	-	2	-	1.0	-	-	1.1	-	-	-	1
d50 (mm)				-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-				36.4	58.4	52.5	80.1	19.8	12
Riffle Slope (ft/ft)				-	-	-	-	-	-	-	-	-	-	-	-	0.006	0.010	0.013	0.003	0.004	0.004	0.005	0.001	12
Pool Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-				16.4	25.0	26.5	32.2	6.0	5
Pool Max Depth (ft)				-	-	-	-	-	-	-	-	-	-	-	-				2.6	4.2	4.5	5.4	1.1	5
Pool Spacing (ft)				-	-	-	-	-	-	-	-	-	-	-	-	36.0	87.0	138.0	66.1	105.5	107.1	128.2	25.3	5
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	46.0	-	53.0	35.4	46.0	47.9	52.6	6.8	4
Radius of Curvature (ft)				-	-	-	-	-	-	-	-	-	-	-	-	48.0	-	96.0	51.0	55.0	54.0	60.0	3.7	3
Rc: Bankfull Width (ft/ft)				-	-	-	-	-	-	-	-	-	-	-	-	2.0	-	4.0	2.0	2.2	2.2	2.4	0.1	3
Meander Wavelength (ft)				-	-	-	-	-	-	-	-	-	-	-	-	168.0	-	288.0	160.0	170.0	170.0	180.0	7.5	2
Meander Width Ratio				-	-	-	-	-	-	-	-	-	-	-	-	2.0	-	5.0	1.4	1.8	1.9	2.1	0.3	4
Substrate, Bed and Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2				-						-						0.74			-					
Max Part Size (mm) Mobilized at Bankfull				-						-						122			-					
Stream Power (Transport Capacity) W/m^2				-						-						-			-					
Additional Reach Parameters																								
Drainage Area (mi^2)				2.57						2.4; 6.8						2.93			2.93					
Rosgen Classification				C						E4; C4						C4			C4					
Bankfull Velocity (fps)				-						5.1						3.4			-					
Bankfull Discharge (cfs)				-						224						140			-					
Valley Length (ft)				-						-						-			-					
^Channel Thalweg Length (ft)				-						-						-			-					
Sinuosity				-						1.1						1.09			1.09					
Water Surface Slope (ft/ft)				-						-						-			0.004					
Bankfull Slope (ft/ft)				-						0.01						-			0.005					
Bankfull Floodplain Area (acres)				-						-						-								
% of Reach with Eroding Banks				-						-						-								
Channel Stability or Habitat Metric				-						-						-								
Biological or Other				-						-						-								

- Information unavailable.

Non-Applicable.

^ Channel Centerline (ft): Based on stream centerline stationing from design stream stationing; accounts for breaks in conservation easement and utility right-of-ways.

Table 10. Baseline Stream Data Summary
Little Pine Creek II Mitigation Site - Little Pine Creek Reach 2A (1,506 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)				-	31.9	-	-	-	1	16.4	-	-	21.4	-	2	-	24.0	-	21.3	24.8	23.5	29.7	3.5	3
Floodprone Width (ft)				-	106+	-	-	-	1	70.0	-	-	200	-	2	-	>53	-	100.0	100.0	100.0	100.0	0.0	3
Bankfull Mean Depth (ft)				-	1.9	-	-	-	1	1.9	-	-	2.1	-	2	-	1.6	-	1.3	1.5	1.6	1.7	0.2	3
Bankfull Max Depth (ft)				-	3.4	-	-	-	1	2.5	-	-	3.1	-	2	-	2.3	-	2.4	2.5	2.5	2.7	0.1	3
Bankfull Cross Sectional Area (ft^2)				-	45.6	-	-	-	1	18.0	-	-	27.2	-	2	-	39.3	-	36.4	37.6	37.4	39.2	1.2	3
Width/Depth Ratio				-	12.3	-	-	-	1	12.0	-	-	14.0	-	2	-	14.6	-	12.5	16.6	14.7	22.5	4.3	3
Entrenchment Ratio				-	4.1+	-	-	-	1	>2.2	-	-	>2.3	-	2	-	>2.2	-	3.4	4.1	4.3	4.7	0.5	3
Bank Height Ratio				-	1.4	-	-	-	1	1.0	-	-	1.1	-	2	-	1.0	-	1.0	1.0	1.0	1.1	0.1	3
d50 (mm)				-	72.0	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-		
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-				22.1	50.4	52.3	86.9	18.7	12
Riffle Slope (ft/ft)				-	-	-	-	-	-	-	-	-	-	-	-	0.004	-	0.06	0.006	0.016	0.014	0.030	0.007	12
Pool Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-				14.0	56.6	53.9	109.4	26.4	16
Pool Max Depth (ft)				-	-	-	-	-	-	-	-	-	-	-	-				1.6	4.6	4.1	7.3	1.6	16
Pool Spacing (ft)				-	-	-	-	-	-	-	-	-	-	-	-	36	-	168	35.0	122.6	124.9	215.4	49.9	15
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	48.0	-	120.0	52.5	86.4	86.2	109.4	15.8	8
Radius of Curvature (ft)				-	-	-	-	-	-	-	-	-	-	-	-	48.0	-	96.0	54.2	63.6	61.5	78.8	8.3	7
Rc: Bankfull Width (ft/ft)				-	-	-	-	-	-	-	-	-	-	-	-	2.0	-	4.0	2.2	2.6	2.5	3.2	0.3	7
Meander Wavelength (ft)				-	-	-	-	-	-	-	-	-	-	-	-	168	-	288	172.9	242.1	232.3	301.3	39.6	8
Meander Width Ratio				-	-	-	-	-	-	-	-	-	-	-	-	2	-	5.0	2.1	3.5	3.5	4.4	0.6	8
Substrate, Bed and Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2				-						-						0.74			-					
Max Part Size (mm) Mobilized at Bankfull				-						-						122			-					
Stream Power (Transport Capacity) W/m^2				-						-						-			-					
Additional Reach Parameters																								
Drainage Area (mi^2)				3.31						4.4						3.31			3.31					
Rosgen Classification				C/F						E4/C4						C4			4					
Bankfull Velocity (fps)				-						5.1						4.5			-					
Bankfull Discharge (cfs)				-						224						170.0			-					
Valley Length (ft)				-						-						-			1,840					
^Channel Thalweg Length (ft)				-						-						-			1,479					
Sinuosity				-						1.1						1.23			1.24					
Water Surface Slope (ft/ft)				-						-						0.013			0.010					
Bankfull Slope (ft/ft)				-						-						0.011			0.010					
Bankfull Floodplain Area (acres)				-						-						-								
% of Reach with Eroding Banks				-						-						-								
Channel Stability or Habitat Metric				-						-						-								
Biological or Other				-						-						-								

- Information unavailable.

Non-Applicable.

^ Channel Centerline (ft): Based on stream centerline stationing from design stream stationing; accounts for breaks in conservation easement and utility right-of-ways.

Table 10. Baseline Stream Data Summary
Little Pine Creek II Mitigation Site - Little Pine Creek Reach 2B (334 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	-	-	31.9	-	-	-	1	16.4	-	-	21.4	-	2	-	24.0	-						
Floodprone Width (ft)				-	106+	-	-	-	1	70.0	-	-	>200	-	2	-	>53	-						
Bankfull Mean Depth (ft)				-	1.9	-	-	-	1	1.9	-	-	2.1	-	2	-	1.6	-						
Bankfull Max Depth (ft)				-	3.4	-	-	-	1	2.5	-	-	3.1	-	2	-	2.3	-						
Bankfull Cross Sectional Area (ft^2)		-		-	45.6	-	-	-	1	18.0	-	-	27.2	-	2	-	39.3	-						
Width/Depth Ratio				-	12.3	-	-	-	1	12.0	-	-	14.0	-	2	-	14.6	-						
Entrenchment Ratio				-	4.1+	-	-	-	1	>2.2	-	-	>2.3	-	2	-	>2.2	-						
Bank Height Ratio				-	1.4	-	-	-	1	1.0	-	-	1.1	-	2	-	1.0	-						
d50 (mm)				-	72.0	-	-	-	1	-	-	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-				36.9	50.2	50.2	63.5	18.8	2
Riffle Slope (ft/ft)				-	-	-	-	-	-	-	0.024		-	-	-	0.004	-	0.06	0.02	0.02	0.00	0.02	-	2
Pool Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-				14.0	54.6	47.5	109.4	43.4	4
Pool Max Depth (ft)				-	-	-	-	-	-	-	3.1	-	-	-	-				6.2	6.7	6.7	7.3	0.5	4
Pool Spacing (ft)				-	-	-	-	-	-	-	224	-	-	-	-	36	-	168	35.0	90.2	96.3	133.2	46.6	4
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	105.0	-	-	-	-	48.0	-	120.0	-	83.5	-	-	-	1
Radius of Curvature (ft)				-	-	-	-	-	-	76.7	-	-	133.8	-	-	48.0	-	96.0	-	70.9	-	-	-	1
Rc: Bankfull Width (ft/ft)				-	-	-	-	-	-	2.5	-	-	4.36	-	-	2.0	-	4.0	-	2.9	-	-	-	1
Meander Wavelength (ft)				-	-	-	-	-	-	-	350	-	-	-	-	168	-	288	-	256.3	-	-	-	1
Meander Width Ratio				-	-	-	-	-	-	-	3.2	-	-	-	-	2	-	5.0	-	3.4	-	-	-	1
Substrate, Bed and Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2				-						-						0.74			-					
Max Part Size (mm) Mobilized at Bankfull				-						-						122			-					
Stream Power (Transport Capacity) W/m^2				-						-						-			-					
Additional Reach Parameters																								
Drainage Area (mi^2)				3.34						4.4						3.34			3.34					
Rosgen Classification				C/F						E4/C4						C4			C4					
Bankfull Velocity (fps)				-						5.1						4.5			-					
Bankfull Discharge (cfs)				-						224						170			-					
Valley Length (ft)				-						-						-			282					
^Channel Thalweg Length (ft)				-						-						-			334					
Sinuosity				-						1.1						1.23			1.18					
Water Surface Slope (ft/ft)				-						-						0.013			0.017					
Bankfull Slope (ft/ft)				-						-						0.011			0.010					
Bankfull Floodplain Area (acres)				-						-						-								
% of Reach with Eroding Banks				-						-						-								
Channel Stability or Habitat Metric				-						-						-								
Biological or Other				-						-						-								

- Information unavailable.

Non-Applicable.

^ Channel Centerline (ft): Based on stream centerline stationing from design stream stationing; accounts for breaks in conservation easement and utility right-of-ways.

Table 10. Baseline Stream Data Summary
Little Pine Creek II Mitigation Site - Little Pine Creek Tributary A (82 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)				-	6.6	-	-	-	1	6.2	6.8	-	12.6	5.8	3	-	9.5	-						
Floodprone Width (ft)				-	61.1	-	-	-	1	14.3	23.7	-	46.3	22.7	3	-	>18	-						
Bankfull Mean Depth (ft)				-	1.6	-	-	-	1	0.05	0.8	-	0.7	0.16	3	-	0.72	-						
Bankfull Max Depth (ft)				-	2.2	-	-	-	1	0.8	1.0	-	1.03	0.02	3	-	1.1	-						
Bankfull Cross Sectional Area (ft^2)				-	10.5	-	-	-	1	3.8	3.1	-	5.1	2.05	3	-	6.8	-						
Width/Depth Ratio				-	4.1	-	-	-	1	9.1	12.7	-	24.3	11.7	3	-	13.2	-						
Entrenchment Ratio				-	9.3	-	-	-	1	1.3	4.3	-	7.5	3.25	3	-	>2.2	-						
Bank Height Ratio				-	1.0	-	-	-	1	1.0	1.6	-	2.1	0.55	3	-	1.0	-						
d50 (mm)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.8	25.2	25.2	34.5	13.3	2
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.04	-	-	0.05	-	2	0.018	-	0.032	0.011	0.017	0.017	0.023	0.008	2
Pool Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.4	7.8	7.8	8.2	0.6	2
Pool Max Depth (ft)				-	-	-	-	-	-	0.7	1.7	1.9	2.5	0.7	4	-	1.1	-	1.7	1.7	1.7	1.7	0.0	2
Pool Spacing (ft)				-	-	-	-	-	-	15.8	61.4	78	90.5	32.7	3	14	-	67	-	15.3	-	-	-	1
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	19.0	-	-	26.0	-	2	19.0		77.0	10.1	12.0	12.0	13.9	1.9	2
Radius of Curvature (ft)				-	-	-	-	-	-	22.0	-	-	66.0	-	2	19.0	-	43.0	-	21.4	-	-	-	1
Rc: Bankfull Width (ft/ft)				-	-	-	-	-	-	2.65	-	-	8.75	-	2	2.0	-	4.0	-	1.9	-	-	-	1
Meander Wavelength (ft)				-	-	-	-	-	-	55	-	-	140	-	2	77	-	124	-	51.1	-	-	-	1
Meander Width Ratio				-	-	-	-	-	-	7.3	-	-	18.6	-	2	2.0		5.0	-	4.6	-	-	-	1
Substrate, Bed and Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2							-						-				-					-		
Max Part Size (mm) Mobilized at Bankfull							-						-				-					-		
Stream Power (Transport Capacity) W/m^2							-						-				-					-		
Additional Reach Parameters																								
Drainage Area (mi^2)							0.37						0.051; 0.12				0.38					0.38		
Rosgen Classification							E						B4/C4; A/B4				C					C5		
Bankfull Velocity (fps)							-						-				3.7					-		
Bankfull Discharge (cfs)							-						-				28.0					-		
Valley Length (ft)							-						-				-					78		
^Channel Thalweg Length (ft)							-						-				-					82		
Sinuosity							-						-				1.06					1.04		
Water Surface Slope (ft/ft)							-						-				-					0.013		
Bankfull Slope (ft/ft)							-						-				-					0.007		
Bankfull Floodplain Area (acres)							-						-				-							
% of Reach with Eroding Banks							-						-				-							
Channel Stability or Habitat Metric							-						-				-							
Biological or Other							-						-				-							

- Information unavailable.

Non-Applicable.

^ Channel Centerline (ft): Based on stream centerline stationing from design stream stationing; accounts for breaks in conservation easement and utility right-of-ways.

Table 10. Baseline Stream Data Summary
Little Pine Creek II Mitigation Site - Little Pine Creek Tributary B (77 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)				-	-	-	-	-	-	6.2	6.8	-	12.6	5.8	2	-	11.0	-	-	10.6	-	-	-	1
Floodprone Width (ft)				-	-	-	-	-	-	14.3	23.7	-	46.3	22.7	2	-	>18	-	-	30.0	-	-	-	1
Bankfull Mean Depth (ft)				-	-	-	-	-	-	0.05	0.8	-	0.7	0.16	2	-	0.8	-	-	0.6	-	-	-	1
Bankfull Max Depth (ft)				-	-	-	-	-	-	0.8	1.0	-	1.03	0.02	2	-	1.1	-	-	1.4	-	-	-	1
Bankfull Cross Sectional Area (ft^2)				-	-	-	-	-	-	3.8	3.1	-	5.1	2.05	2	-	8.5	-	-	6.5	-	-	-	1
Width/Depth Ratio				-	-	-	-	-	-	9.1	12.7	-	24.3	11.7	2	-	14.3	-	-	17.1	-	-	-	1
Entrenchment Ratio				-	-	-	-	-	-	1.3	4.3	-	7.5	3.25	2	-	>2.2	-	-	2.8	-	-	-	1
Bank Height Ratio				-	-	-	-	-	-	1.0	1.6	-	2.1	0.55	2	-	1.0	-	-	1.1	-	-	-	1
d50 (mm)				-	-	-	-	-	-		-	-		-	-	-	-	-	-	-	-	-	-	
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19.4	21.0	21.0	22.6	2.3	2
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.04	-	-	0.05	-	2	0.008	-	0.015	0.005	0.015	0.015	0.025	0.014	2
Pool Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.19	9.16	9.16	14.1	7.04	2
Pool Max Depth (ft)				-	-	-	-	-	-	0.7	1.7	1.9	2.5	0.7	4	-	1.1	-	1.1	1.4	1.4	1.7	0.4	2
Pool Spacing (ft)				-	-	-	-	-	-	15.8	61.4	78	90.5	32.7	3	17	-	77	-	32.5	-	-	-	1
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	19.0	-	-	26.0	-	2	22.0	-	77.0	-	5.5	-	-	-	1
Radius of Curvature (ft)				-	-	-	-	-	-	22.0	-	-	66.0	-	2	22.0	-	44.0	21.8	24.6	-	27.3	-	2
Rc: Bankfull Width (ft/ft)				-	-	-	-	-	-	2.65	-	-	8.75	-	2	2.0	-	4.0	2.1	2.4	-	2.6	-	2
Meander Wavelength (ft)				-	-	-	-	-	-	55	-	-	140	-	2	77	-	132	-	-	-	-	-	-
Meander Width Ratio				-	-	-	-	-	-	7.3	-	-	18.6	-	2	2.0	-	5.0	-	-	-	-	-	-
Substrate, Bed and Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2				-						-						-			-					
Max Part Size (mm) Mobilized at Bankfull				-						-						-			-					
Stream Power (Transport Capacity) W/m^2				-						-						-			-					
Additional Reach Parameters																								
Drainage Area (mi^2)				0.11						0.051; 0.12						0.26			0.26					
Rosgen Classification				-						B4/C4; A/B4						C			C5					
Bankfull Velocity (fps)				-						-						2.5			-					
Bankfull Discharge (cfs)				-						-						21.0			-					
Valley Length (ft)				-						-						-			75.6					
* Channel Thalweg Length (ft)				-						-						-			77.8					
^ Channel Centerline (ft)				-						-						-			-					
Sinuosity				-						-						1.09			1.03					
Water Surface Slope (ft/ft)				-						-						-			0.015					
Bankfull Slope (ft/ft)				-						-						-			0.008					
Bankfull Floodplain Area (acres)				-						-						-								
% of Reach with Eroding Banks				-						-						-								
Channel Stability or Habitat Metric				-						-						-								
Biological or Other				-						-						-								

- Information unavailable.

Non-Applicable.

* Channel Thalweg Length (ft): Based on actual thalweg calculations from the as-built survey, accounts for breaks in conservation easement and utility right-of-ways.

^ Channel Centerline (ft): Based on stream centerline stationing from design stream stationing; accounts for breaks in conservation easement and utility right-of-ways.

Table 10. Baseline Stream Data Summary
Little Pine Creek II Mitigation Site - Little Pine Creek Tributary C (577 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)				-	8.0	-	-	-	1	6.2	6.8	-	12.6	5.8	2	-	6.5	-	-	9.3	-	-	-	1
Floodprone Width (ft)				-	16.9	-	-	-	1	14.3	23.7	-	46.3	22.7	2	-	>13	-	-	40.0	-	-	-	1
Bankfull Mean Depth (ft)				-	0.9	-	-	-	1	0.05	0.8	-	0.7	0.16	2	-	0.5	-	-	0.6	-	-	-	1
Bankfull Max Depth (ft)				-	1.6	-	-	-	1	0.8	1.0	-	1.03	0.02	2	-	0.7	-	-	1.2	-	-	-	1
Bankfull Cross Sectional Area (ft^2)				-	7.1	-	-	-	1	3.8	3.1	-	5.1	2.05	2	-	3.1	-	-	5.3	-	-	-	1
Width/Depth Ratio				-	8.9	-	-	-	1	9.1	12.7	-	24.3	11.7	2	-	13.7	-	-	16.4	-	-	-	1
Entrenchment Ratio				-	2.1	-	-	-	1	1.3	4.3	-	7.5	3.25	2	-	>2.2	-	-	4.3	-	-	-	1
Bank Height Ratio				-	2.0	-	-	-	1	1.0	1.6	-	2.1	0.55	2	-	1.0	-	-	1.0	-	-	-	1
d50 (mm)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.4	24.3	20.2	52.9	13.4	13
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.04	-	-	0.05	-	2	0.023	-	0.042	0.005	0.021	0.010	0.042	0.013	13
Pool Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5	12.3	12.4	21.1	5.7	15
Pool Max Depth (ft)				-	-	-	-	-	-	0.7	1.7	1.9	2.5	0.7	4	-	0.7	-	0.6	1.5	1.3	2.6	0.8	15
Pool Spacing (ft)				-	-	-	-	-	-	15.8	61.4	78	90.5	32.7	3	10.0	-	46.0	15.7	33.3	28.1	56.6	14.1	14
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	19.0	-	-	26.0	-	2	13.0	-	46.0	13.3	24.2	23.8	32.1	4.9	13
Radius of Curvature (ft)				-	-	-	-	-	-	22.0	-	-	66.0	-	2	13.0	-	26.0	9.3	14.3	13.3	25.8	4.0	13
Rc: Bankfull Width (ft/ft)				-	-	-	-	-	-	2.65	-	-	8.75	-	2	2.0	-	4.0	1.0	1.5	1.4	2.8	0.4	13
Meander Wavelength (ft)				-	-	-	-	-	-	55	-	-	140	-	2	46	-	78	44.3	59.0	58.7	75.5	11.0	8
Meander Width Ratio				-	-	-	-	-	-	7.3	-	-	18.6	-	2	2.0	-	5.0	1.4	2.5	2.5	3.5	0.6	13
Substrate, Bed and Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2						-						-					-				-			
Max Part Size (mm) Mobilized at Bankfull						-						-					-				-			
Stream Power (Transport Capacity) W/m^2						-						-					-				-			
Additional Reach Parameters																								
Drainage Area (mi^2)						0.11						0.051; 0.12					0.11				0.11			
Rosgen Classification						G						B4/C4; A/B4					C				C			
Bankfull Velocity (fps)						-						-					2.9				-			
Bankfull Discharge (cfs)						-						-					10.0				-			
Valley Length (ft)						-						-					-				1,616			
* Channel Thalweg Length (ft)						-						-					-				577			
^ Channel Centerline (ft)						-						-					-				-			
Sinuosity						-						-					1.23				1.31			
Water Surface Slope (ft/ft)						-						-					-				0.022			
Bankfull Slope (ft/ft)						-						-					-				0.021			
Bankfull Floodplain Area (acres)						-						-					-							
% of Reach with Eroding Banks						-						-					-							
Channel Stability or Habitat Metric						-						-					-							
Biological or Other						-						-					-							

- Information unavailable.

Non-Applicable.

* Channel Thalweg Length (ft): Based on actual thalweg calculations from the as-built survey, accounts for breaks in conservation easement and utility right-of-ways.

^ Channel Centerline (ft): Based on stream centerline stationing from design stream stationing; accounts for breaks in conservation easement and utility right-of-ways.

Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Little Pine Creek II Stream and Wetland Mitigation Site

	Cross Section 1 (Riffle) Little Pine Creek Reach 1								Cross Section 2 (Pool) Little Pine Creek Reach 1								Cross Section 3 (Pool) Little Pine Creek Reach 2A							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record Elevation (datum) Used	2574.7	2574.7							2574.5	2574.9							2571.7	2571.9						
Low Bank Height Elevation (datum) Used	2574.7	2574.5							2574.5	2574.4							2571.7	2571.9						
Bankfull Width (ft)	25.5	18.2							23.7	25.9							28.0	24.0						
Floodprone Width (ft)	100.0	100.0							70.0	70.0							100.0	100.0						
Bankfull Mean Depth (ft)	1.2	1.7							1.8	1.6							1.3	1.4						
Bankfull Max Depth (ft)	2.7	2.8							4.0	2.9							3.1	3.0						
Bankfull Cross Sectional Area (ft^2)	31.6	31.6							42.3	42.3							36.7	34.2						
Bankfull Width/Depth Ratio	20.6	10.5							13.3	15.8							21.4	16.8						
Bankfull Entrenchment Ratio	3.9	5.5							3.0	2.7							3.6	4.2						
Bankfull Bank Height Ratio	1.1	0.9							1.0	0.8							1.0	1.0						
Low Top of Bank Depth (ft)	2.8	2.5							3.9	2.4							3.1	3.0						

	Cross Section 4 (Riffle) Little Pine Creek Reach 2A								Cross Section 5 (Pool) Little Pine Creek Reach 2A								Cross Section 6 (Riffle) Little Pine Creek Reach 2A							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record Elevation (datum) Used	2571.1	2571.0							2570.9	2570.4							2567.6	2567.6						
Low Bank Height Elevation (datum) Used	2571.1	2571.2							2570.9	2570.6							2567.6	2567.6						
Bankfull Width (ft)	21.3	37.2							22.2	27.3							40.4	42.0						
Floodprone Width (ft)	100.0	100.0							100.0	100.0							100.0	100.0						
Bankfull Mean Depth (ft)	1.7	1.0							1.7	1.4							1.6	0.9						
Bankfull Max Depth (ft)	2.7	2.6							3.1	4.1							2.5	2.4						
Bankfull Cross Sectional Area (ft^2)	36.4	36.4							37.9	37.9							37.4	37.4						
Bankfull Width/Depth Ratio	12.5	38.1							13.0	19.7							14.7	47.1						
Bankfull Entrenchment Ratio	4.7	2.7							4.5	3.7							4.3	2.4						
Bankfull Bank Height Ratio	1.1	1.1							1.1	1.0							1.0	1.0						
Low Top of Bank Depth (ft)	2.9	2.8							3.6	4.2							2.6	2.4						

	Cross Section 7 (Riffle) Little Pine Creek Reach 2A								Cross Section 8 (Pool) Little Pine Creek Reach 2A								Cross Section 9 (Pool) Little Pine Creek Reach 2B							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record Elevation (datum) Used	2564.1	2564.2							2563.4	2563.1							2558.8	2558.7						
Low Bank Height Elevation (datum) Used	2564.1	2564.2							2563.4	2563.4							2558.8	2558.7						
Bankfull Width (ft)	29.7	22.2							24.4	20.1							36.7	23.6						
Floodprone Width (ft)	100.0	100.0							100.0	100.0							100.0	100.0						
Bankfull Mean Depth (ft)	1.3	1.8							2.2	2.6							1.2	1.8						
Bankfull Max Depth (ft)	2.4	2.7							4.1	4.0							4.1	4.3						
Bankfull Cross Sectional Area (ft^2)	39.2	39.2							53.2	52.8							42.3	42.3						
Bankfull Width/Depth Ratio	22.5	12.6							11.2	7.7							31.9	13.2						
Bankfull Entrenchment Ratio	3.4	4.5							4.1	5.0							2.7	4.2						
Bankfull Bank Height Ratio	1.0	1.0							1.0	1.1							1.0	1.0						
Low Top of Bank Depth (ft)	2.4	2.7							4.3	4.4							4.1	4.3						

	Cross Section 10 (Pool) Tributary A								Cross Section 11 (Riffle) Tributary B								Cross Section 12 (Pool) Tributary C							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record Elevation (datum) Used	2572.8	2572.5							2567.9	2567.8							2571.4	2571.4						
Low Bank Height Elevation (datum) Used	2572.8	2572.4							2567.9	2567.6							2571.4	2571.2						
Bankfull Width (ft)	12.6	21.6							10.6	16.1							8.7	19.2						
Floodprone Width (ft)	40.0	40.0							30.0	30.0							40.0	40.0						
Bankfull Mean Depth (ft)	0.7	0.4							0.6	0.4							1.0	0.5						
Bankfull Max Depth (ft)	1.6	1.9							1.4	1.5							2.1	2.0						
Bankfull Cross Sectional Area (ft^2)	9.2	9.2							6.5	6.5							8.7	8.7						
Bankfull Width/Depth Ratio	17.4	50.3							17.1	40.1							8.7	42.2						
Bankfull Entrenchment Ratio	3.2	1.9							2.8	1.9							4.6	2.1						
Bankfull Bank Height Ratio	1.2	0.9							1.1	0.9							1.0	0.9						
Low Top of Bank Depth (ft)	1.9	1.7							1.6	1.3							2.1	1.8						

	Cross Section 13 (Riffle) Tributary C							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record Elevation (datum) Used	2571.1	2571.0						
Low Bank Height Elevation (datum) Used	2571.1	2571.0						
Bankfull Width (ft)	9.3	8.6						
Floodprone Width (ft)	40.0	40.0						
Bankfull Mean Depth (ft)	0.6	0.6						
Bankfull Max Depth (ft)	1.2	1.3						
Bankfull Cross Sectional Area (ft^2)	5.3	5.3						
Bankfull Width/Depth Ratio	16.4	14.0						
Bankfull Entrenchment Ratio	4.3	4.6						
Bankfull Bank Height Ratio	1.0	1.0						
Low Top of Bank Depth (ft)	1.3	1.3						

Table 11b. Monitoring Data - Stream Reach Data Summary
LPCII - Little Pine Creek Reach 1 (533 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 5						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)	-	25.5	-	-	-	1	-	18.2	-	-	-	1																								
Floodprone Width (ft)	-	100.0	-	-	-	1	-	100.0	-	-	-	1																								
Bankfull Mean Depth (ft)	-	1.2	-	-	-	1	-	1.7	-	-	-	1																								
Bankfull Max Depth (ft)	-	2.7	-	-	-	1	-	2.8	-	-	-	1																								
Bankfull Cross-Sectional Area (ft^2)	-	31.6	-	-	-	1	-	31.6	-	-	-	1																								
Width/Depth Ratio	-	20.6	-	-	-	1	-	10.5	-	-	-	1																								
Entrenchment Ratio	-	3.9	-	-	-	1	-	5.5	-	-	-	1																								
Bank Height Ratio	-	1.1	-	-	-	1	-	0.9	-	-	-	1																								
Profile																																				
Riffle Length (ft)	36.4	58.4	52.5	80.1	19.8	12																														
Riffle Slope (ft/ft)	0.003	0.004	0.004	0.005	0.001	12																														
Pool Length (ft)	16.4	25.0	26.5	32.2	6.0	5																														
Pool Max Depth (ft)	2.6	4.2	4.5	5.4	1.1	5																														
Pool Spacing (ft)	66.1	105.5	107.1	128.2	25.3	5																														
Pattern																																				
Channel Belt Width (ft)	35.4	46.0	47.9	52.6	6.8	4																														
Radius of Curvature (ft)	51.0	55.0	54.0	60.0	3.7	3																														
Rc: Bankfull Width (ft/ft)	2.0	2.2	2.2	2.4	0.1	3																														
Meander Wavelength (ft)	160.0	170.0	170.0	180.0	7.5	2																														
Meander Width Ratio	1.4	1.8	1.9	2.1	0.3	4																														
Additional Reach Parameters																																				
Rosgen Classification	C4																																			
Channel Thalweg Length (ft)	533																																			
Sinuosity (ft)	1.11																																			
Water Surface Slope (Channel) (ft/ft)	0.004																																			
Bankfull Slope (ft/ft)	0.005																																			
Ri% / Ru% / P% / G% / S%	50%	10%	21%	19%	0%																															

- Information Unavailable

N/A - Information does not apply.

Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Table 11b Cont'd. Monitoring Data - Stream Reach Data Summary
Little Pine Creek II - Little Pine Creek Reach 2A (1,506 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 5						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)	21.3	24.8	23.5	29.7	3.5	3	22.2	33.8	37.2	42.0	10.32	3																								
Floodprone Width (ft)	100.0	100.0	100.0	100.0	0.0	3	100	100	100	100	0.00	3																								
Bankfull Mean Depth (ft)	1.3	1.5	1.6	1.7	0.2	3	1.0	1.2	1.0	1.8	0.48	3																								
Bankfull Max Depth (ft)	2.4	2.5	2.5	2.7	0.1	3	2.4	2.6	2.6	2.7	0.15	3																								
Bankfull Cross-Sectional Area (ft^2)	36.4	37.6	37.4	39.2	1.2	3	36.4	37.7	37.4	39.2	1.42	3																								
Width/Depth Ratio	12.5	16.6	14.7	22.5	4.3	3	12.6	38.1	38.1	47.2	17.91	3																								
Entrenchment Ratio	3.4	4.1	4.3	4.7	0.5	3	2.4	3.2	2.7	4.5	1.15	3																								
Bank Height Ratio	1.0	1.0	1.0	1.1	0.1	3	1.0	1.0	1.1	1.1	0.06	3																								
Profile																																				
Riffle Length (ft)	22.1	50.4	52.3	86.9	18.7	12																														
Riffle Slope (ft/ft)	0.006	0.016	0.014	0.030	0.007	12																														
Pool Length (ft)	14.0	56.6	53.9	109.4	26.4	16																														
Pool Max Depth (ft)	1.6	4.6	4.1	7.3	1.6	16																														
Pool Spacing (ft)	35.0	122.6	124.9	215.4	49.9	15																														
Pattern																																				
Channel Belt Width (ft)	52.5	86.4	86.2	109.4	15.8	8																														
Radius of Curvature (ft)	54.2	63.6	61.5	78.8	8.3	7																														
Rc: Bankfull Width (ft/ft)	2.2	2.6	2.5	3.2	0.3	7																														
Meander Wavelength (ft)	172.9	242.1	232.3	301.3	39.6	8																														
Meander Width Ratio	2.1	3.5	3.5	4.4	0.6	8																														
Additional Reach Parameters																																				
Rosgen Classification	C4																																			
Channel Thalweg Length (ft)	1,506																																			
Sinuosity (ft)	1.24																																			
Water Surface Slope (Channel) (ft/ft)	0.0099																																			
Bankfull Slope (ft/ft)	0.0082																																			
Ri% / Ru% / P% / G% / S%	32%	3%	48%	16%	0%																															

- Information Unavailable

N/A - Information does not apply.

Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Table 11b Cont'd. Monitoring Data - Stream Reach Data Summary
Little Pine Creek II - Little Pine Creek Reach 2B (334 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 5						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)																																				
Floodprone Width (ft)																																				
Bankfull Mean Depth (ft)																																				
Bankfull Max Depth (ft)																																				
Bankfull Cross-Sectional Area (ft^2)																																				
Width/Depth Ratio																																				
Entrenchment Ratio																																				
Bank Height Ratio																																				
Profile																																				
Riffle Length (ft)	36.9	50.2	50.2	63.5	18.8	2																														
Riffle Slope (ft/ft)	0.02	0.02	0.01	0.02	N/A	2																														
Pool Length (ft)	14.0	54.6	47.5	109.4	43.4	4																														
Pool Max Depth (ft)	6.2	6.7	6.7	7.3	0.5	4																														
Pool Spacing (ft)	35.0	90.2	96.3	133.2	46.6	4																														
Pattern																																				
Channel Belt Width (ft)	-	83.5	-	-	-	1																														
Radius of Curvature (ft)	-	70.9	-	-	-	1																														
Rc: Bankfull Width (ft/ft)	-	2.9	-	-	-	1																														
Meander Wavelength (ft)	-	256.3	-	-	-	1																														
Meander Width Ratio	-	3.4	-	-	-	1																														
Additional Reach Parameters																																				
Rosgen Classification	C4																																			
Channel Thalweg Length (ft)	334																																			
Sinuosity (ft)	1.18																																			
Water Surface Slope (Channel) (ft/ft)	0.017																																			
Bankfull Slope (ft/ft)	0.010																																			
Ri% / Ru% / P% / G% / S%	33%	4%	45%	19%	0%																															

- Information Unavailable

N/A - Information does not apply.

Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Table 11b Cont'd. Monitoring Data - Stream Reach Data Summary
LPC II - Trib A (82 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 5						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)																																				
Floodprone Width (ft)																																				
Bankfull Mean Depth (ft)																																				
Bankfull Max Depth (ft)																																				
Bankfull Cross-Sectional Area (ft^2)																																				
Width/Depth Ratio																																				
Entrenchment Ratio																																				
Bank Height Ratio																																				
Profile																																				
Riffle Length (ft)	15.8	25.2	25.2	34.5	13.3	2																														
Riffle Slope (ft/ft)	0.011	0.017	0.017	0.023	0.008	2																														
Pool Length (ft)	7.4	7.8	7.8	8.2	0.6	2																														
Pool Max Depth (ft)	1.7	1.7	1.7	1.7	0.0	2																														
Pool Spacing (ft)	15.3	15.3	15.3	15.3	N/A	1																														
Pattern																																				
Channel Belt Width (ft)	10.1	12.0	12.0	13.9	1.9	2																														
Radius of Curvature (ft)	9.8	11.0	11.0	12.2	1.2	2																														
Rc: Bankfull Width (ft/ft)	0.9	1.0	1.0	1.1	0.1	2																														
Meander Length (ft)	51.1	51.1	51.1	51.1	N/A	1																														
Meander Length Ratio (L_m/W_{bkf}) (ft)	4.6	4.6	4.6	4.6	N/A	1																														
Additional Reach Parameters																																				
Rosgen Classification	C5																																			
Channel Thalweg Length (ft)	82																																			
Sinuosity (ft)	1.04																																			
Water Surface Slope (Channel) (ft/ft)	0.0130																																			
Bankfull Slope (ft/ft)	0.0070																																			
Ri% / Ru% / P% / G% / S%	61%	11%	19%	9%	0%																															

- Information Unavailable

N/A - Information does not apply.

Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Table 11b Cont'd. Monitoring Data - Stream Reach Data Summary
LPC II - Trib B (77 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 5						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)	-	10.6	-	-	-	1	-	16.1	-	-	-	1																								
Floodprone Width (ft)	-	30.0	-	-	-	1	-	30	-	-	-	1																								
Bankfull Mean Depth (ft)	-	0.6	-	-	-	1	-	0.4	-	-	-	1																								
Bankfull Max Depth (ft)	-	1.4	-	-	-	1	-	1.5	-	-	-	1																								
Bankfull Cross-Sectional Area (ft^2)	-	6.5	-	-	-	1	-	6.5	-	-	-	1																								
Width/Depth Ratio	-	17.1	-	-	-	1	-	40.1	-	-	-	1																								
Entrenchment Ratio	-	2.8	-	-	-	1	-	1.9	-	-	-	1																								
Bank Height Ratio	-	1.1	-	-	-	1	-	0.9	-	-	-	1																								
Profile																																				
Riffle Length (ft)	19.4	21.0	21.0	22.6	2.3	2																														
Riffle Slope (ft/ft)	0.005	0.015	0.015	0.025	0.014	2																														
Pool Length (ft)	4.2	9.2	9.2	14.1	7.0	2																														
Pool Max Depth (ft)	1.1	1.4	1.4	1.7	0.4	2																														
Pool Spacing (ft)	-	32.5	-	-	-	1																														
Pattern																																				
Channel Belt Width (ft)	-	5.5	-	-	-	1																														
Radius of Curvature (ft)	21.8	24.6	-	27.3	-	2																														
Rc: Bankfull Width (ft/ft)	2.1	2.4	-	2.6	-	2																														
Meander Length (ft)	-	-	-	-	-	-																														
Meander Length Ratio (L_M/W_{bkf}) (ft)	-	-	-	-	-	-																														
Additional Reach Parameters																																				
Rosgen Classification	C5																																			
Channel Thalweg Length (ft)	78																																			
Sinuosity (ft)	1.03																																			
Water Surface Slope (Channel) (ft/ft)	0.0150																																			
Bankfull Slope (ft/ft)	0.0080																																			
Ri% / Ru% / P% / G% / S%	54%	6%	24%	16%	0%																															

- Information Unavailable

N/A - Information does not apply.

Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Table 11b Cont'd. Monitoring Data - Stream Reach Data Summary
LPC II - Trib C (577 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)	-	9.3	-	-	-	1	-	8.6	-	-	-	1																								
Floodprone Width (ft)	-	40.0	-	-	-	1	-	40.0	-	-	-	1																								
Bankfull Mean Depth (ft)	-	0.6	-	-	-	1	-	0.6	-	-	-	1																								
Bankfull Max Depth (ft)	-	1.2	-	-	-	1	-	1.3	-	-	-	1																								
Bankfull Cross-Sectional Area (ft^2)	-	5.3	-	-	-	1	-	5.3	-	-	-	1																								
Width/Depth Ratio	-	16.4	-	-	-	1	-	14.0	-	-	-	1																								
Entrenchment Ratio	-	4.3	-	-	-	1	-	4.6	-	-	-	1																								
Bank Height Ratio	-	1.0	-	-	-	1	-	1.0	-	-	-	1																								
Profile																																				
Riffle Length (ft)	9.4	24.3	20.2	52.9	13.4	13																														
Riffle Slope (ft/ft)	0.005	0.021	0.010	0.042	0.013	10																														
Pool Length (ft)	3.5	12.3	12.4	21.1	5.7	15																														
Pool Max Depth (ft)	0.6	1.5	1.3	2.6	0.8	17																														
Pool Spacing (ft)	15.7	33.3	28.1	56.6	14.1	14																														
Pattern																																				
Channel Belt Width (ft)	13.3	24.2	23.8	32.1	4.9	13																														
Radius of Curvature (ft)	9.3	14.3	13.3	25.8	4.0	13																														
Rc: Bankfull Width (ft/ft)	1.0	1.5	1.4	2.8	0.4	13																														
Meander Wavelength (ft)	44.3	59.0	58.7	75.5	11.0	8																														
Meander Width Ratio	1.4	2.5	2.5	3.5	0.6	13																														
Additional Reach Parameters																																				
Rosgen Classification	C4																																			
Channel Thalweg Length (ft)	577																																			
Sinuosity (ft)	1.31																																			
Water Surface Slope (Channel) (ft/ft)	0.022																																			
Bankfull Slope (ft/ft)	0.021																																			
Ri% / Ru% / P% / G% / S%	54%	7%	31%	6%	2%																															

- Information Unavailable

N/A - Information does not apply.

Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

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Appendix E
Hydrologic Data

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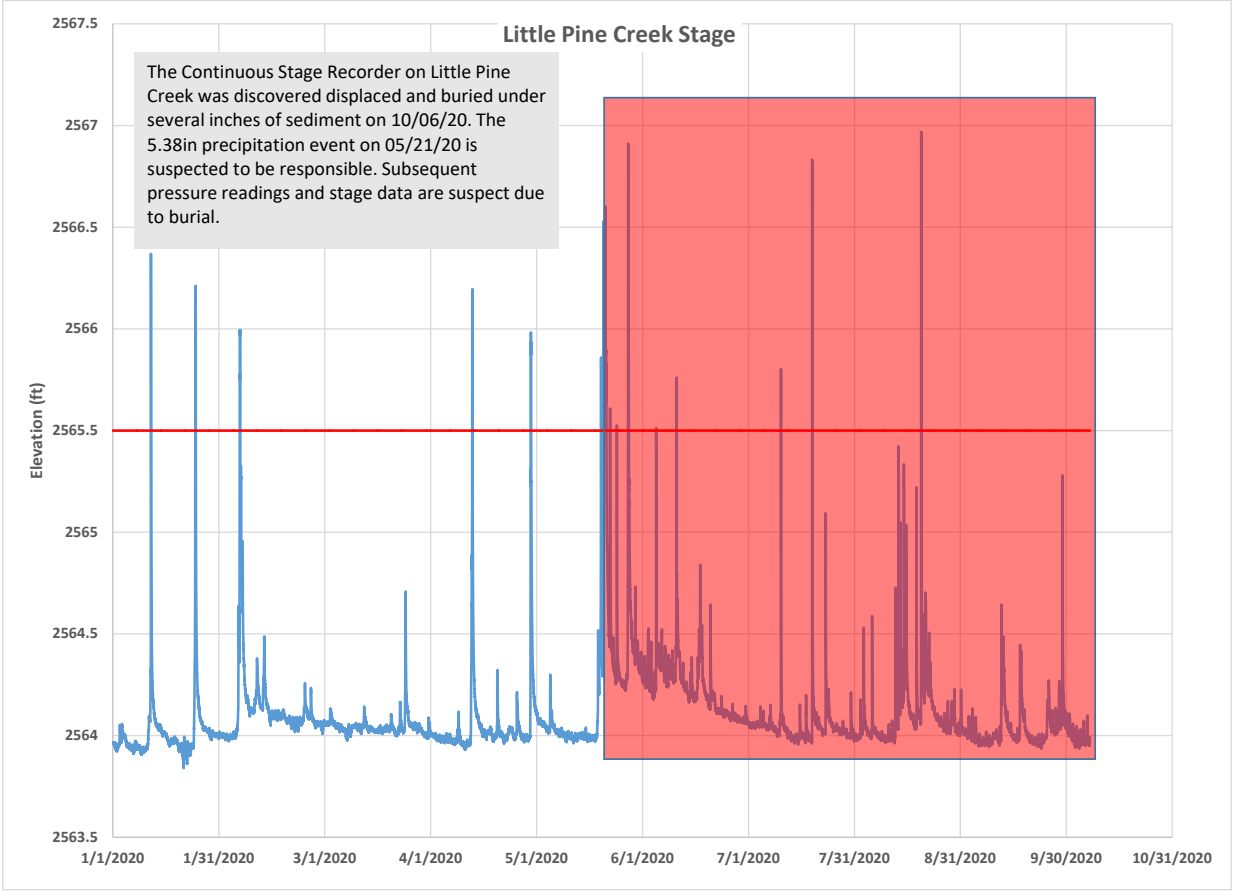
Table 12. Verification of Bankfull Events Little Pine Creek II Stream and Wetland Mitigation Site/Project No 856.				
Reach	**Date of Data Collection**	**Approximate Date of Occurrence**	**Method**	**Photo # (if available)**
LPC Reach 1	4/7/2020	Unknown	Wrack Lines	n/a
	10/6/2020	Unknown	Wrack Lines	n/a
LPC Reach 2A	10/6/2020	1/12/2020	Stage Recorder	n/a
	10/6/2020	1/24/2020	Stage Recorder	n/a
	4/7/2020	2/7/2020	Stage Recorder/Wrack Lines	1
	7/10/2020	4/13/2020	Stage Recorder/Wrack Lines	n/a
	10/6/2020	4/29/2020	Stage Recorder	n/a
	10/6/2020	*5/21/2020	Stage Recorder	n/a
Tributary B	10/6/2020	5/21/2020	Crest Gage	3
Tributary C	10/6/2020	1/12/2020	Stage Recorder	n/a
	10/6/2020	5/21/2020	Stage Recorder	n/a
	10/6/2020	7/19/2020	Stage Recorder	n/a

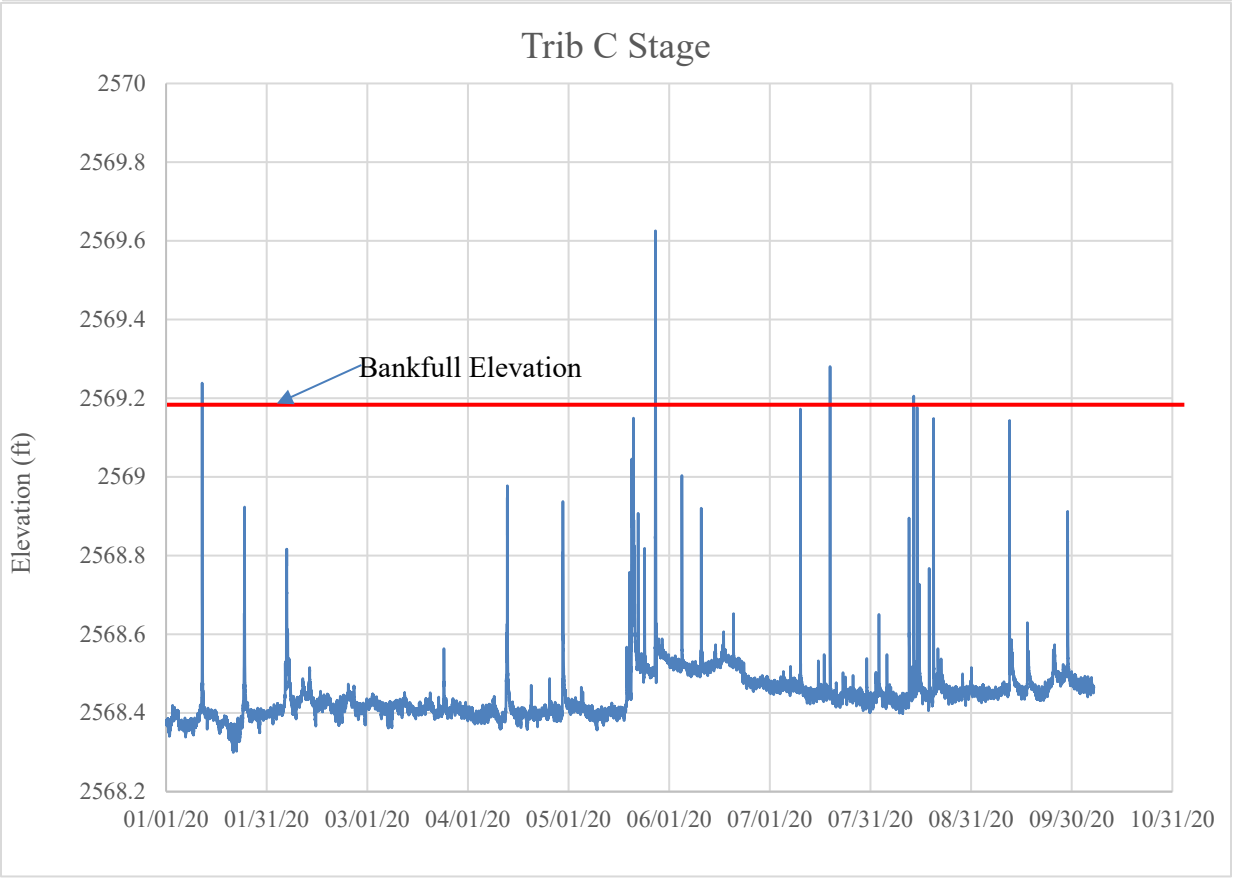
* Stage recorder buried during this event.

1. Wrack lines and sediment deposits, LPCII Reach 2a.

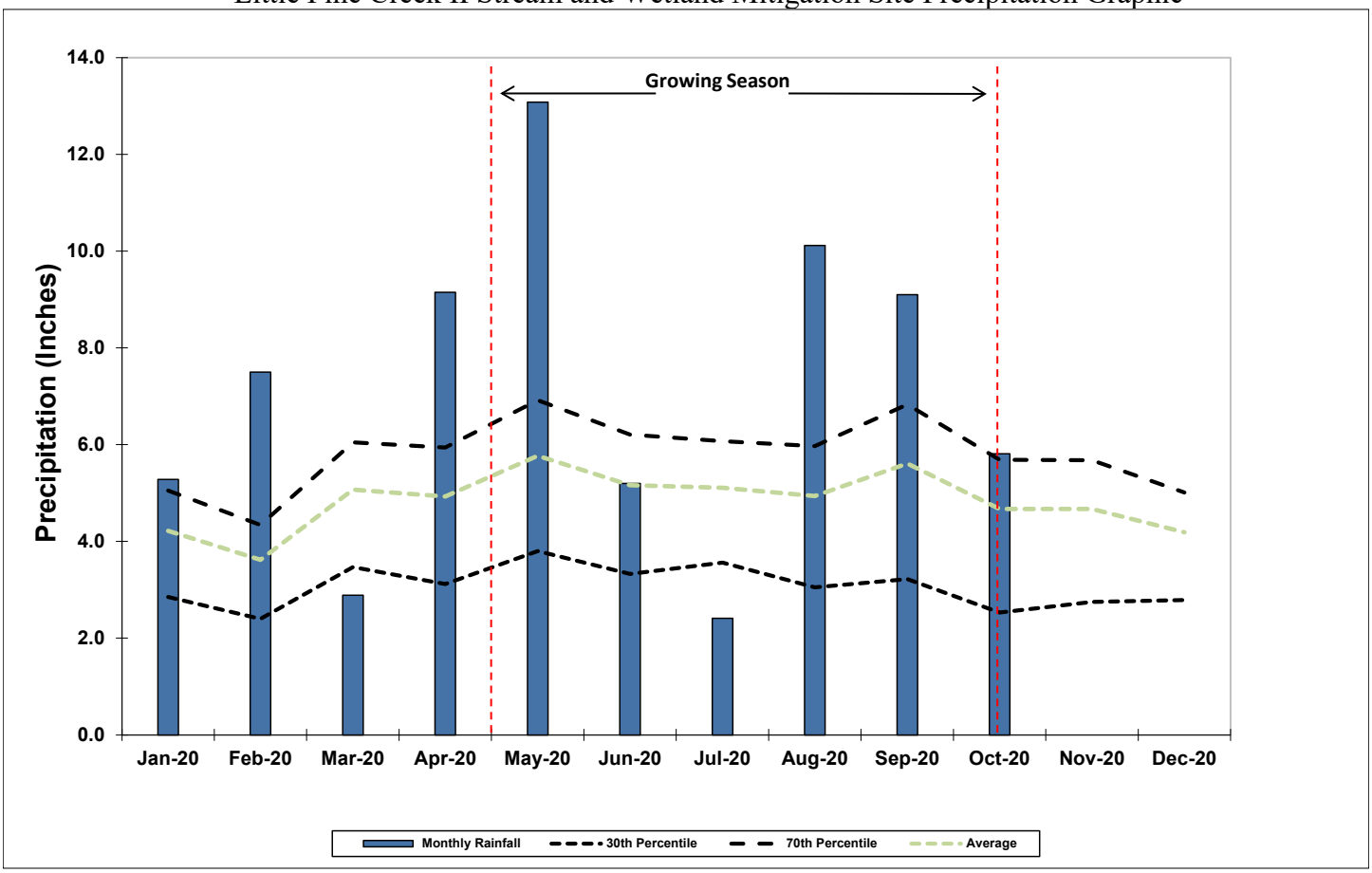
2. Residual wrack lines and sediment deposits, LPCII Reach 2a

3. Crest gage corklines, LPCII Trib B.

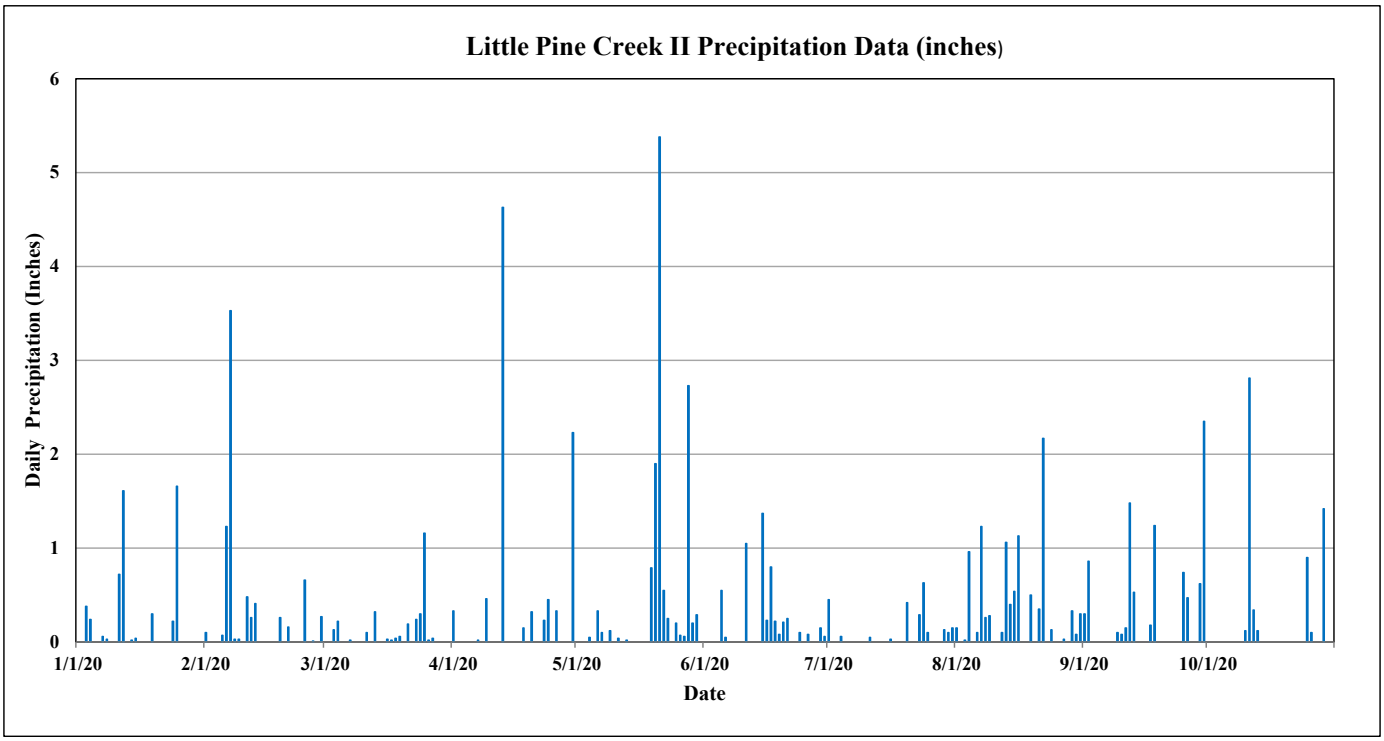

Little Pine Creek Stage
The Continuous Stage Recorder on Little Pine Creek was discovered displaced and buried under several inches of sediment on 10/06/20. The 5.38in precipitation event on 05/21/20 is suspected to be responsible. Subsequent pressure readings and stage data are suspect due to burial.
Elevation (ft)
2567.5
2567
2566.5
2566
2565.5
2565
2564.5
2564
2563.5
1/1/2020
1/31/2020
3/1/2020
4/1/2020
5/1/2020
6/1/2020
7/1/2020
7/31/2020
8/31/2020
9/30/2020
10/31/2020

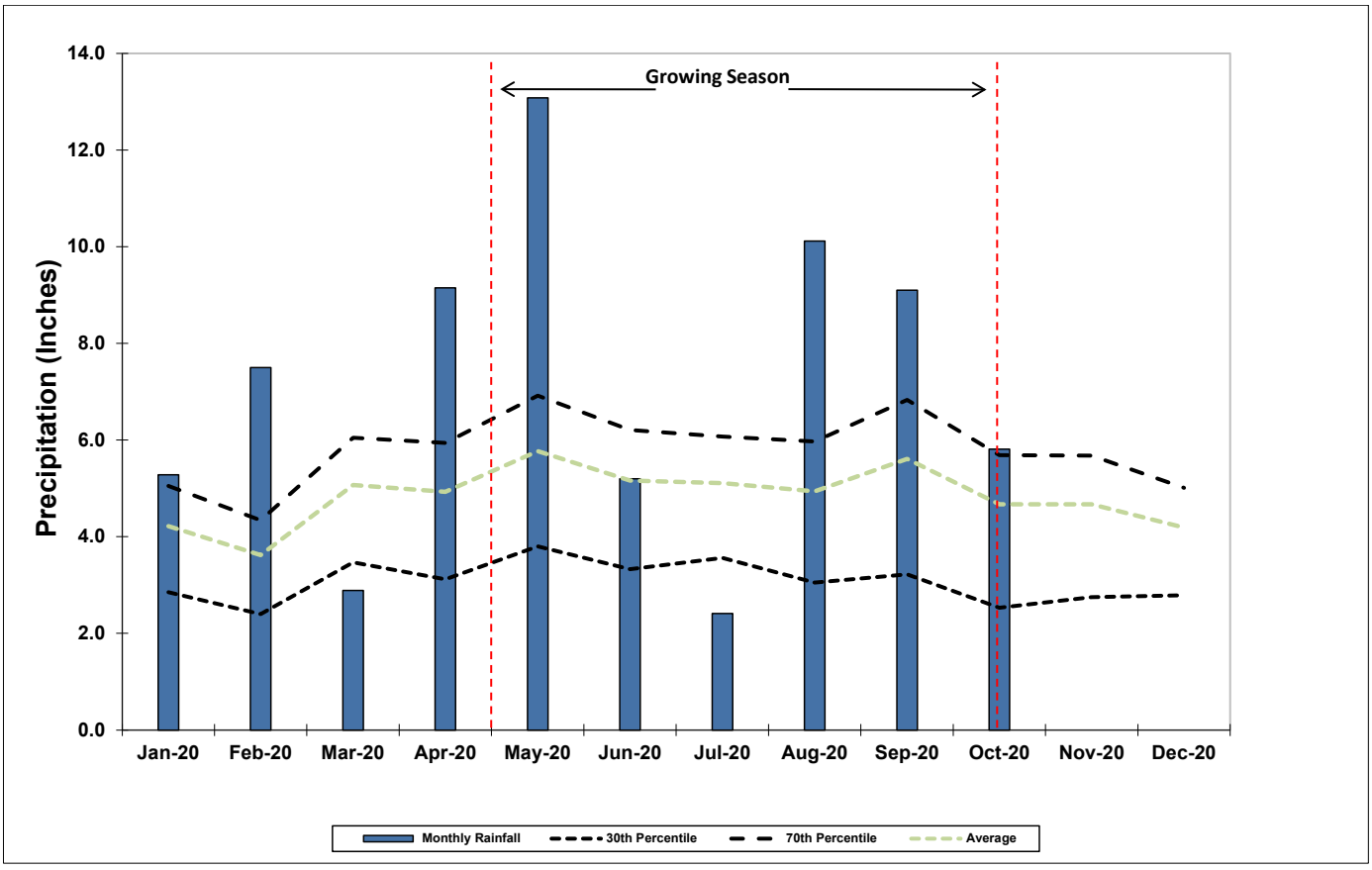

Trib C Stage
Bankfull Elevation
Elevation (ft)
2570
2569.8
2569.6
2569.4
2569.2
2569
2568.8
2568.6
2568.4
2568.2
01/01/20
01/31/20
03/01/20
04/01/20
05/01/20
06/01/20
07/01/20
07/31/20
08/31/20
09/30/20
10/31/20

Little Pine Creek II Stream and Wetland Mitigation Site Precipitation Graphic

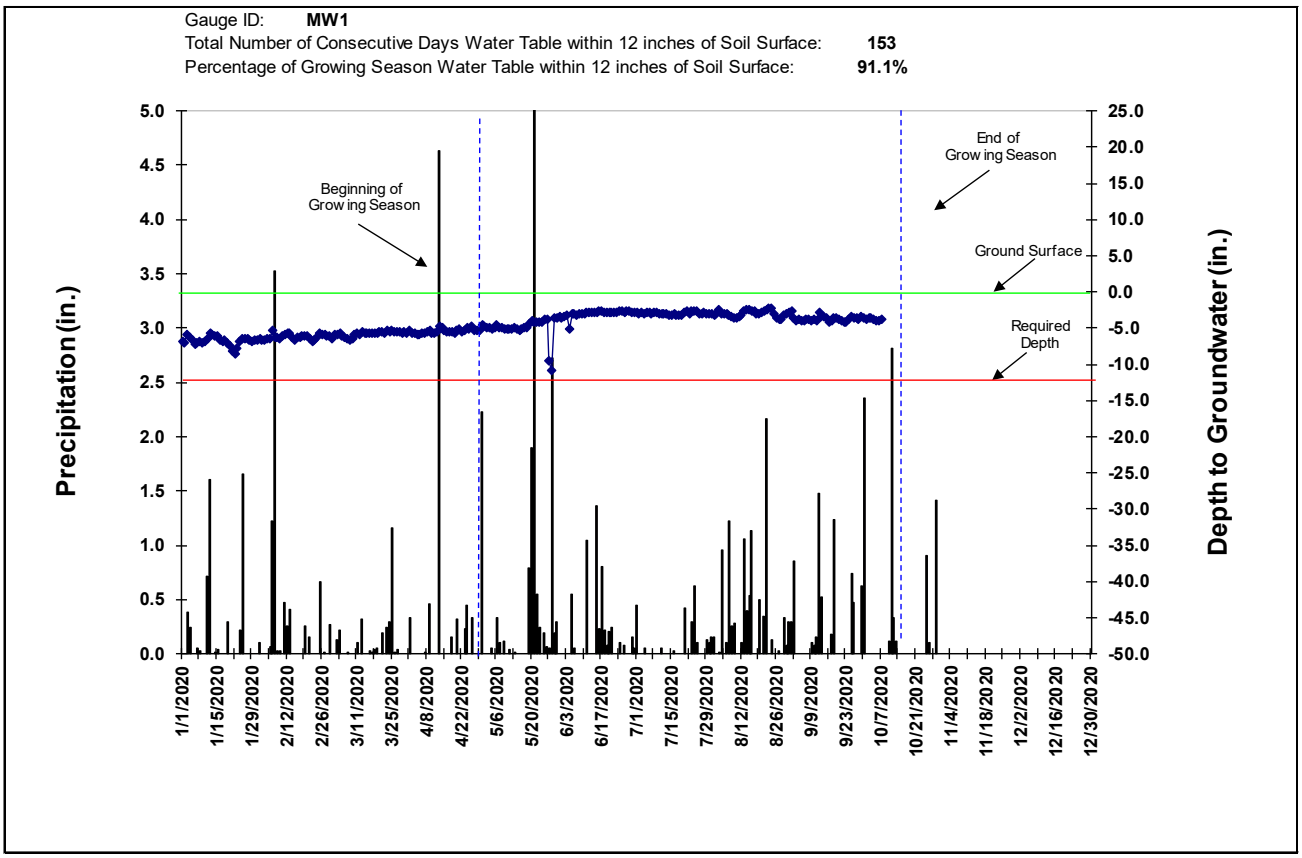


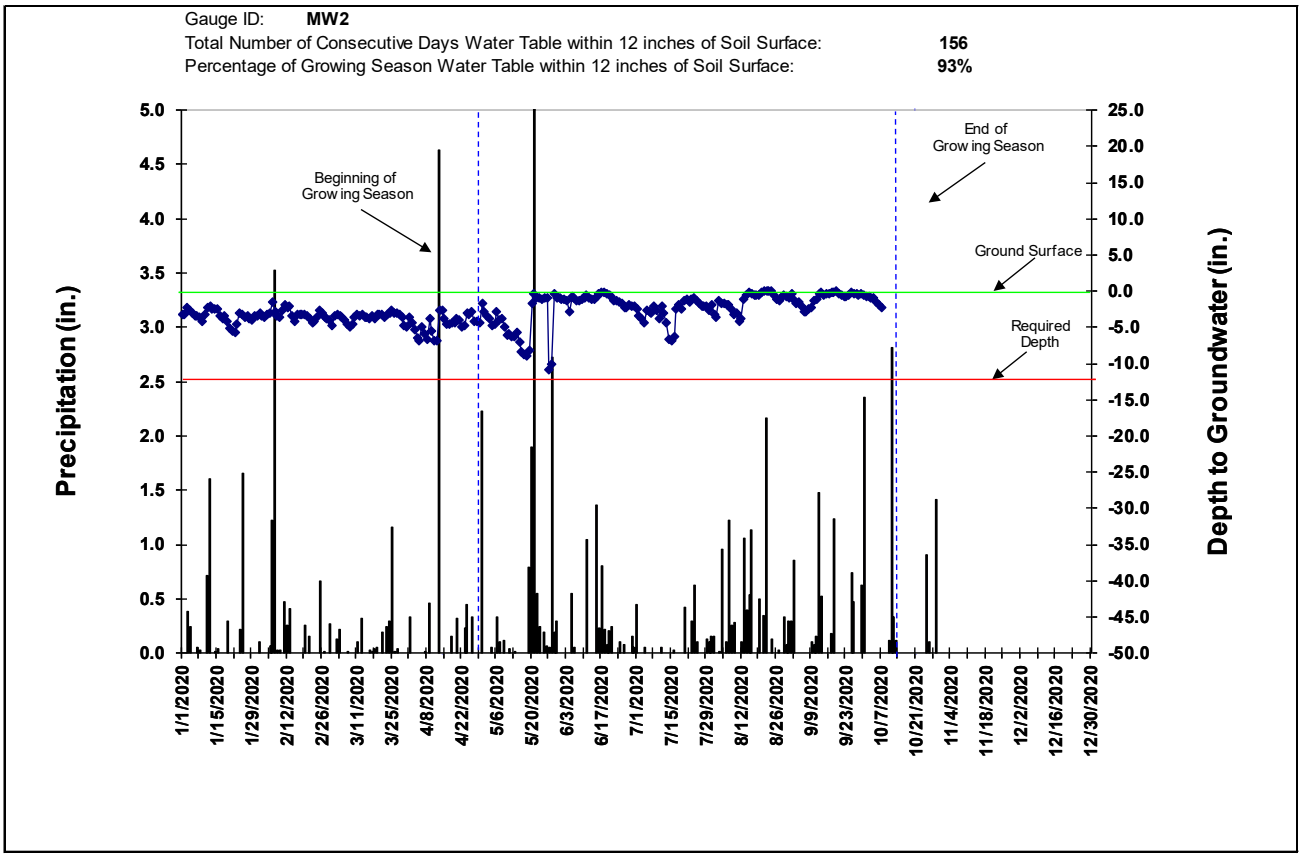
Monthly Rain Gauge Data Little Pine Creek II Stream and Wetland Mitigation Site						
Month	Monthly Rainfall	Monthly Rainfall	Monthly Rainfall	30th Percentile	70th Percentile	Average
Jan-20	5.28	0.00	0.00	2.85	5.05	4.22
Feb-20	7.50	0.00	0.00	2.4	4.34	3.62
Mar-20	2.89	0.00	0.00	3.47	6.05	5.07
Apr-20	9.15	0.00	0.00	3.12	5.94	4.93
May-20	13.08	0.00	0.00	3.8	6.92	5.77
Jun-20	5.20	0.00	0.00	3.33	6.21	5.16
Jul-20	2.41	0.00	0.00	3.56	6.07	5.11
Aug-20	10.12	0.00	0.00	3.05	5.97	4.94
Sep-20	9.10	0.00	0.00	3.22	6.83	5.61
Oct-20	5.81	0.00	0.00	2.53	5.69	4.67
Nov-20	-	0.00	0.00	2.75	5.68	4.67
Dec-20	-	0.00	0.00	2.79	5.01	4.19
Total	70.54	0.00	0.00	50.95	63.38	


Little Pine Creek II Precipitation Data (inches)
Daily Precipitation (Inches)
0
1
2
3
4
5
6
1/1/20
2/1/20
3/1/20
4/1/20
5/1/20
6/1/20
7/1/20
8/1/20
9/1/20
10/1/20
Date


Growing Season
Precipitation (Inches)
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Monthly Rainfall
30th Percentile
70th Percentile
Average

Little Pine Creek II Stream and Wetland Mitigation Site Groundwater Monitoring Well Graphics





Appendix F
Other

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From:	Browning, Kimberly D CIV USARMY CESAW (USA)
To:	Haupt, Mac; Davis, Erin B; Tugwell, Todd J CIV USARMY CESAW (US); Wilson, Travis W.; Bowers, Todd; byron_hamstead@fws.gov; McLendon, C S CIV USARMY CESAW (USA); Jones, M Scott (Scott) CIV USARMY CESAW (USA); Crumbley, Tyler A CIV USARMY CESAW (USA)
Cc:	Allen, Melonie; Stanfill, Jim; Baumgartner, Tim; Tsomides, Harry; Harmon, Beth; Wiesner, Paul
Subject:	[External] Notice of Initial Credit Release / NCDMS Little Pine II Stream and Wetland Site/ SAW-2009-00591/ Alleghany Co.
Date:	Friday, April 3, 2020 11:45:34 AM
Attachments:	Little Pine II_856_New 01 Initial Credit Release_2020 signed.pdf Little Pine II_856_MP Addendum Memo_3-13-20.pdf

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to report.spam@nc.gov<mailto:report.spam@nc.gov>

Good afternoon,
The 15-Day Record Drawing review for the Little Pine II Stream and Wetland Mitigation Site (SAW-2009-00591) ended March 31, 2020. Per Section 332.8(o)(9) of the 2008 Mitigation Rule, this review followed the streamlined review process. All comments received from the NCIRT are incorporated within this email. Please address the IRT concerns by replying to this email. There were no objections to issuing the initial credit release, or approving the Mitigation Plan Addendum. Please find attached the current signed ledger.

DWR Comments:
1. The meeting minutes dated 11/14/2019, state that supplemental planting will be completed during the next dormant period. The MY0 Report CVS Table shows that 5 of the 8 veg plots do not meet success criteria. Yet, the report does not mention plans for supplemental planting. Please confirm. In addition to low stem counts, the veg plots show low species diversity. Only a total of 5 tree species (including Red Maple and Green Ash) and 1 shrub species were identified in all of the veg plots. With an approved planting list of 20 species, please confirm that the species and percent stems noted on As-Built Sheet 3.2 accurately reflect what has been planted. DWR requests that a supplemental planting effort include a variety of the approved species. Due to concerns associated with Emerald Ash Borer, DWR recommends that Green Ash not be included in a supplemental planting effort.
2. During the IRT site walk on 11/5/2019, several bare areas and areas of sparse herb cover were noted along Reach 2A, which may not have been visible during the veg survey with 3-4 inches of snow cover. Please monitor closely during the MY1 to determine if soil amendments and reseeding is warranted.
3. Also during the IRT site walk, there was discussion of relocating the Wetland 2A groundwater gauge and potentially modifying the Wetland 2A target community type. Neither points were mentioned in the MY0 Report, please provide a brief explanation why not.

Please let me know if you have question.
Thanks,
Kim

Kim Browning
Mitigation Project Manager, Regulatory Division I U.S. Army Corps of Engineers
3331 Heritage Trade Dr, Ste. 105 I Wake Forest, NC 27587 I 919.554.4884 x60

BUILDING STRONG (r)er

*NOTE: I am currently teleworking and away from my office. Please contact me via email or at 919.413.6392.

-----Original Message-----
From: Browning, Kimberly D CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Sent: Monday, March 16, 2020 11:29 AM
To: Haupt, Mac <mac.haupt@ncdenr.gov>; Davis, Erin B <erin.davis@ncdenr.gov>; Tugwell, Todd J CIV USARMY CESAW (USA) <Todd.J.Tugwell@usace.army.mil>; travis.wilson@ncwildlife.org; bowers.todd@epa.gov; byron_hamstead@fws.gov; Boggs, Brandee C CIV USARMY CESAD (USA) <Brandee.C.Boggs@usace.army.mil>; McLendon, C S CIV USARMY CESAW (USA) <Scott.C.McLendon@usace.army.mil>; Jones, M Scott (Scott) CIV USARMY CESAW (USA) <Scott.Jones@usace.army.mil>; Crumbley, Tyler A CIV USARMY CESAW (USA) <Tyler.A.Crumbley@usace.army.mil>
Cc: Allen, Melonie <melonie.allen@ncdenr.gov>; Stanfill, Jim <jim.stanfill@ncdenr.gov>; Baumgartner, Tim <tim.baumgartner@ncdenr.gov>; Tsomides, Harry <harry.tsomides@ncdenr.gov>; Harmon, Beth <beth.harmon@ncdenr.gov>; Paul Wiesner (paul.wiesner@ncdenr.gov) <paul.wiesner@ncdenr.gov>; Browning, Kimberly D CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Subject: Notice of NCDMS Record Drawing Review / Little Pine II Stream and Wetland Site/ SAW-2009-00591/ Alleghany Co.

Good morning

The below referenced FINAL Record Drawing Report review has been requested by NCDMS. Per Section 332.8(o)(9) of the 2008 Mitigation Rule, this review follows the streamlined review process, which requires an IRT review period of 15 calendar days from this email notification. Please provide any comments by 5 PM on the 15-day comment deadline shown below. When providing comments please indicate if your concerns are great enough that you intend to request a site visit prior to the initial credit release. Comments

provided after the 15-day comment deadline (shown below) may not be considered.

At the conclusion of this comment period, a copy of all comments will be provided to NCDMS and the NCIRT along with District Engineer's intent to approve or disapprove this Final Record Drawing and initial credit release.

15-Day Comment Start Date: March 16, 2020
15-Day Comment Deadline: March 31, 2020
45-Day Credit Release Approval Deadline: April 30, 2020

*NOTE: If a site visit is requested by the IRT, comments are due 15 days after the site visit is complete.
Mitigation Plan lengths may vary from the record drawing.

**As part of this review request, we are also asking for IRT approval of a Mitigation Plan Addendum for a downward adjustment of the project's stream assets (-107.6 SMUs)

2020 is Monitoring Year 1 for this project. The MY0 report and record drawings are also posted on the DMS portal and IRT SharePoint page for your review.

Project information and location of the FINAL As-Built Baseline Monitoring Report (MY0):
Little Pine II Stream and Wetland Site
DMS Project # 856
Design Bid Build (DBB)
New River Basin
Cataloging Unit 05050001
Alleghany County, North Carolina

Mitigation Plan Project Credits:
3,302.600 SMUs (Cold)
1.484 WMUs (Riparian)

As-Built-MY0 Project Credits:
3,195.000 SMUs (Cold)
1.484 WMUs (Riparian)

Mitigation Plan Lengths/ Acreages:
3,989 ft.
5.62 acres

As-Built-MY0 Lengths/ Acreages:
3,719 ft.
5.62 acres

NCDEQ - DMS PM: Harry Tsomides, harry.tsomides@ncdenr.gov <mailto:harry.tsomides@ncdenr.gov> , (828) 545-7057
FINAL As-Built Baseline Monitoring Report and Record Drawings can be accessed directly on the DMS portal here:

LittlePineCreekII_856_MY0_2019
https://files.nc.gov/ncdeq/Mitigation%20Services/Document%20Management%20Library/Projects/LittlePineCreekII_856_MY0_2019.pdf

LittlePineCreekII_856_AB_2019
https://files.nc.gov/ncdeq/Mitigation%20Services/Document%20Management%20Library/Projects/LITTLE-PINE-II-856-ABFinalSealed-2019.pdf

Thanks,

Kim Browning
Mitigation Project Manager, Regulatory Division I U.S. Army Corps of Engineers
3331 Heritage Trade Dr, Ste. 105 I Wake Forest, NC 27587 I 919.554.4884 x60

BUILDING STRONG (r)

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
TIM BAUMGARTNER
Director

NORTH CAROLINA
Environmental Quality

MEMORANDUM

TO: Todd Tugwell, Chair, North Carolina Interagency Review Team (NCIRT)

FROM: Harry Tsomides, NCDEQ - DMS Project Manager

CC: Paul Wiesner, NCDEQ - DMS Western Regional Supervisor
Melonie Allen, NCDEQ - DMS Credit Release Coordinator
Jim Stanfill, NCDEQ - DMS Asset Manager
Tim Baumgartner, NCDEQ - DMS Division Director

SUBJECT: Little Pine Creek II – Project As-Built Update and Mitigation Plan Addendum (downward adjustment)
DMS # 856
USACE Action ID: SAW-2009-00591
DWR# 09-0048
Alleghany County, North Carolina

DATE: March 13, 2020

DMS requests an amendment to the Little Pine Creek II Restoration Project Mitigation Plan assets to become consistent with the as-built alignment adjustments, recent stream preservation credit deductions, and overhead utility presence not previously accounted for. The following tables summarize the changes requested. This will result in a net change of -107.6 SMUs. Wetland credits remain unchanged. In summary:

- 40.6 SMU reduction due to preservation Tributaries E and F (203 LF total) becoming ineligible for credit as agreed on at 11/5/2019 Site meeting with IRT (see Project Meeting Minutes dated 11/14/2019); this was due to recent downcutting and partial deterioration of channel conditions since original design;

- 50 SMU deduction (all restoration reaches) due to 2 overhead wire (OHW) rights-of-way not accounted for in the IRT-approved Little Pine Creek II Restoration Project Restoration Plan Addendum, January 15, 2016;

- 17 SMU (all restoration reaches) deduction due to as-built alignment adjustments (see following table comments for detail).

Table 1. Project Mitigation Assets and Components Little Pine Creek II Stream and Wetland Mitigation Site									
Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)		As-Built Centerline Footage or Acreage^	Comments
Reach 1	2,894	530	Cold	R	P2	1:1		517	20' LF Not-credited due to OHW ROW; minor change in as built length
Reach 2A		1,512	Cold	R	P1	1:1		1,476	Began farther downstream due to cattle crossing; 30LF not credited due to OHW
Reach 2B		321	Cold	R	P1	1:1		334	Additional 13' LF at end of project
Tributary A	119	86	Cold	R	P2	1:1		82	Sinuosity less than design; confluence with Reach 2A farther upstream than proposed
Tributary B	50	104	Cold	R	P1	1:1		78	Confluence with Reach 2A farther upstream than proposed
Tributary C	299	578	Cold	R	P1	1:1		577	
Tributary D	899	655	Cold	P	N/A	5:1		655	
Tributary E	50	50	Cold	P	N/A	5:1		50	Not credited due to poor as built condition
Tibutary F	153	153	Cold	P	N/A	5:1		153	Not credited due to poor as built condition
Wetland 1	0.32	0.32	RNR	Enh		2:1		0.32	
Wetland 2A	0.88	0.88	RNR	Enh		2:1		0.88	
Wetland 2B	4.42	4.42	RNR	P		5:1		4.42	

* Mitigation plan credits account for breaks in conservation easements and are based on design stream stationing and taken from the approved mitigation plan. Mitigation plan credits are the same as the approved mitigation plan.
^ Based on centerline calculations from the as-built survey, accounts for breaks in conservation easement and utility right-of-ways.

Project Credits - As Built

	Stream			Riparian Wetland		Non-Rip	Coastal
Restoration Level	Warm	Cool	Cold	Riverine	Non-Riv	Wetland	Marsh
Restoration	-	-	3,064.000	-	-	-	-
Re-establishment				-	-	-	-
Rehabilitation				-	-	-	-
Enhancement				-	0.600	-	-
Enhancement I	-	-	-				
Enhancement II	-	-	-				
Creation				-	-	-	-
Preservation	-	-	131.000	-	0.884	-	
Total Credits[%]	-	-	**3,195.000**	-	**1.484**	-	-

[%] Project credits reflect the credits consistent with as-built condition, accounting for OHW, IRT preservation credit deductions, and as built alignment adjustments.

Project Credits - Mitigation Plan

	Stream			Riparian Wetland		Non-Rip	Coastal
Restoration Level	Warm	Cool	Cold	Riverine	Non-Riv	Wetland	Marsh
Restoration	-	-	3,131.000	-	-	-	-
Re-establishment				-	-	-	-
Rehabilitation				-	-	-	-
Enhancement				-	0.600	-	-
Enhancement I	-	-	-				
Enhancement II	-	-	-				
Creation				-	-	-	-
Preservation	-	-	171.600	-	0.884	-	
Total Credits[%]	-	-	**3,302.600**	-	**1.484**	-	-

[%] Project credits reflect the IRT-approved Little Pine Creek II Restoration Project Restoration Plan Addendum, January 15, 2016

The As-Built Baseline Report (MY0) is complete and available for IRT review. The project is entering Monitoring Year 1 (2020). The project credit release and monitoring will follow the monitoring update memo from DMS to IRT, dated 9/19/2019. Please let me know if you have any comments, questions, or concerns.

Sincerely,

Harry Tsomides
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