Annual Monitoring Report

FINAL

Little Pine Creek II

Monitoring Year 2 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 2021 – October 2021
Date Submitted: December 2021

Prepared for:

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

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EQUINOX
balance through proper planning

December 23, 2021

Harry Tsomides
Project Manager
NCDEQ – Division of Mitigation Services
5 Ravenscroft Drive,
Suite 102, Asheville, NC 28801

Subject: RE: Draft MY02 Monitoring Report
Little Pine Creek II Mitigation Project, Alleghany County
DMS Project # 856
DEQ Contract #LP082819

Dear Harry,

Please find the attached responses to the official comments on the LPCII MY2 Report.

DMS has completed the review of the Little Pine Creek II Draft MY02 Monitoring Report. Following are the review comments/questions:

- *The report overall is clear, accurate and error free, DMS appreciates EWS's efforts on the project and report.*

- *Please add a footnote to Table 12 (bank full events) indicating that the multiple listed dates for 2021 (and represented by the same photo) were based on precipitation and stage recorder data were recorded over the specified time period.* *Footnote added.*

- *If possible please include one photo each of the three scoured/eroded "areas of concern" on LPC (110+25, 120+75, and 121+50). DMS has observed these recently as well and will continue to assess them over time.* *Photos and descriptions added to Appendix B.*

- *Vegetation – please indicate that DMS is currently under a 4-year contract to manage and treat the various small pockets of invasive vegetation.* *Text added.*

DIGITAL SUPPORT FILES

- *Please include the random plot data across all years in the input template so that these data are included in the output Vegetation Performance Standards Summary Table.* *Random Plot data collected during MY1 was mistakenly collected using warranty plot methodology and is not compatible with entry into the DMS Veg Tool. Random Plot data will be retained within the input*

table in future monitoring reports. The MY1 stem density table for random plots has been included in the digital support files.

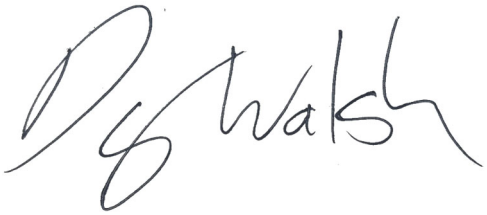
- *Before calculating the BHR, all points outside of the main channel (as defined by the low bank height) must be excluded from the cross-sectional area using Omit BKF. Otherwise, when the user adjusts the bankfull elevation to determine the elevation that achieves the MY0 bankfull area, those areas outside of the main channel will be included. For example, XS11 should exclude point stations 0.00- 18.38 and 25.02-42.1 before adjusting the bankfull stage to achieve a cross sectional area of 6.5. The resulting BHR would be 0.6. Please ensure this is done consistently for all cross sections. Data and BHR calculations checked for consistency and revised within the tables and figures.*

- *Please report the current year's cross-sectional area rather than the MY0 cross sectional area in cross section figures and Table 11a. Updated tables to reflect field identified BKF.*

Please submit two final hard copies, in addition to a flash drive or CD with a PDF of the report and all digital support files (addressing any comments) in the correct file structure. Please include a copy of your response letter, inserted inside the front cover of each hard copy report (and included in the final PDF).

If you have any questions about these comments, please contact me at (828) 545-7057 or email me at harry.tsomides@ncdenr.gov before running any final copies."

Sincerely,



Danvey Walsh
Environmental Scientist

Prepared by:

37 Haywood Street, Suite 100

Asheville, NC 28801

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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.

1.5. Project Performance

1.5.1 Vegetation

Visual assessment of vegetation indicates that the herbaceous vegetation is well established throughout the project. MY2 stems/acre and ranged from 243 to 729 planted stems per acre. Eight species were documented within the vegetation monitoring plots. A supplemental planting of 1450, 18-24" bare root seedlings was conducted on February 9, 2021. Species planted included tulip poplar (*Liriodendron tulipifera*), swamp chestnut oak (*Quercus michauxii*), river birch (*Betula nigra*), sycamore (*Platanus occidentalis*, and water oak (*Quercus nigra*).

Monitoring of both permanent (n=8) and random vegetation plots (n = 4) was completed in October 2021. Summary tables and photographs associated with MY2 vegetation monitoring are located in Appendix B and Appendix C. MY2 monitoring data indicates that all but vegetation plot 6 were meeting the MY3 interim success criteria of 320 planted stems per acre (Table 7 and 8, Appendix C.)

Three areas of low stem density were identified in MY2. The first area of concern is overbank scour located mid-reach at STA 112+00 has some vegetation reestablishment but was still considered a problem area in MY2. The second area was located adjacent to Veg Plot 7 and is an area of poor soil with limited ground cover establishment. The third area called out in MY2 is located at Station 124+50, the downstream boundary of the project and is an area of bank scour with sparse vegetation (Table 6 and CCPV, Appendix B). An area noted in MY1 between Cross-sections 3 and 5 continues to receive overbank deposition but impacts to existing planted stems seem to be less in MY2. Thus, this area was removed from the areas of concern. These areas will continue to be monitored in future site visits for further signs of instability.

Vegetation problem areas continue to be restricted to the immediate floodplain of Little Pine Creek Some of the low stem density areas noted in MY0 and MY1 are still present, particularly within the channel belt width on Reach 2A (Table 6 and CCPV, Appendix B).

Areas of exotic vegetation are depicted within the CCPV (n=29). Multiflora rose (*Rosa multiflora*), Oriental bittersweet (*Celastrus orbiculatus*) and Japanese honeysuckle (*Lonicera japonica*) were the dominant

observed species. Some pockets of cat tail (*Typha latifolia*) were identified in the wetter areas of the right descending floodplain. Invasive vegetation was identified in low density pockets throughout LPC Reach 1 and 2A. The most contiguous area of invasives noted within the CCPV contains a significant density of oriental bittersweet. The location and density of invasive vegetation will continue to be monitored in future site visits. DMS is currently under a 4-year contract to manage invasive vegetation within the site.

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 portions of Reach 2A continue to experience overbank deposition (Cross Section figures, Tables 11a and b, Appendix D). The floodplain erosion noted in MY1 at the left descending bank of Cross-section 1 has filled in somewhat and appeared stable in MY2 (Cross-section graphics and photos, Appendix D). The transverse riffle near STA 101+50 identified in MY1 is still present but is not contributing any problems to the area. This area will continue to be monitored for any changes in stability.

Geomorphic data for MY1 was collected during October 2021. 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. All Little Pine Creek Reach 1 cross-sections and Tributaries A, B, and C showed evidence of sediment deposition and/or bank forming (Appendix D, Cross-Section overlays and Table 11a). Cross-sections 10 and 12 showed the most drastic difference in dimension due to deposition from multiple storm events during MY2. Riffle dimensions for Reach 2 remained relatively similar between baseline conditions and MY2 monitoring. Similar to Reach 1, new overbank deposits are evident from the cross-sectional surveys (Appendix D, Table 11b).

Three areas of bank scour or slumping (110+25, 120+75, and 121+50) were identified at the LPC II Project in MY2. At Station 110+25 the outside bend has notable scour and some bank slump. The second area of instability (Station 120+75) has a similar amount of scour along the outer bend leading to the confluence with Trib D. At the final problem area (Station 121+50) in Reach 2b, the bank at the first set of log-drop structures has a significant amount of scour (Problem area photos and Table 5, Appendix B). This scour is not currently impacting the stability of the structure. The site will continue to be monitored for signs of instability.

The water-gate at the beginning of Reach 2A had been damaged during a high flow event and was no longer intact. No areas of encroachment or fence failure were observed during the assessment. The next site visit is planned for spring 2022.

1.5.3 Hydrology

Since project completion in late 2019, twelve bankfull events have been documented at the LPC II Site (Table 12, Appendix E). Six events were recorded on Little Pine Creek, and one event was recorded at the Tributary C, and one at Tributary B. Visual evidence of at least one bankfull event was recorded on Trib A during MY2, evidence from wrack lines. This event was not recorded on the crest gauge due to a significant amount of deposition and plugging of the intake orifices. Based on precipitation and stage recorder data the events were recorded over 6 days: March 25th, June 12th, July 2nd, August 8th, August 18th, and October 9th, 2021.

Groundwater data from both wetland gages met established criteria during MY2. MW 1 at Wetland 1 recorded 142 consecutive days (84.5%) during the MY2 growing season. MW 2 at Wetland 2 recorded 66 consecutive days (39%). Hydrology will continue to be monitored throughout the life of the project.

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 MY2 was monitored at 8 permanent monitoring plots in conjunction with 4 random vegetation plots. Permanent vegetation plot monitoring follows the CVS-EEP Level 2 Protocol for Recording Vegetation, version 4.2 (Lee et al. 2008). Data was processed using the NC DMS vegetation 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. Random vegetation plots were 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 origin corner of each plot were temporarily marked.

2.3 Hydrology

Two crest gages, two continuous stage recorders, two groundwater gages, and a rain gage were used 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

NCDENR. 2021. DMS Veg Table Production Tool, Version 8/23/2021. Retrieved from https://ncdms.shinyapps.io/Veg_Table_Tool/.

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

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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
Monitoring Year-2	Supplemental Planting		Feb-21
	Stream Survey	Oct-21	Dec-21
	Vegetation Survey	Oct-21	Dec-21

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

Mitigation Services
ENVIRONMENTAL QUALITY

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

Conservation Easement
ReachBreak
OHW
Utility Easement

Streams
Non-Credit
Preservation
Restoration

Wetlands
Enhancement
Preservation
Vernal Pool

N

0 125 250 500 Feet

Mitigation Services
ENVIRONMENTAL QUALITY

Integrated CCPV
MY2
Little Pine Creek II
Alleghany County, NC

Sheet 1 of 3

- OHW
- Utility Easement
- Photopoints
- Crest gauge
- Cross Sections
- Non-Credit
- Restoration
- Bank_Erosion
- Present
- Enhancement
- LPCII Easement

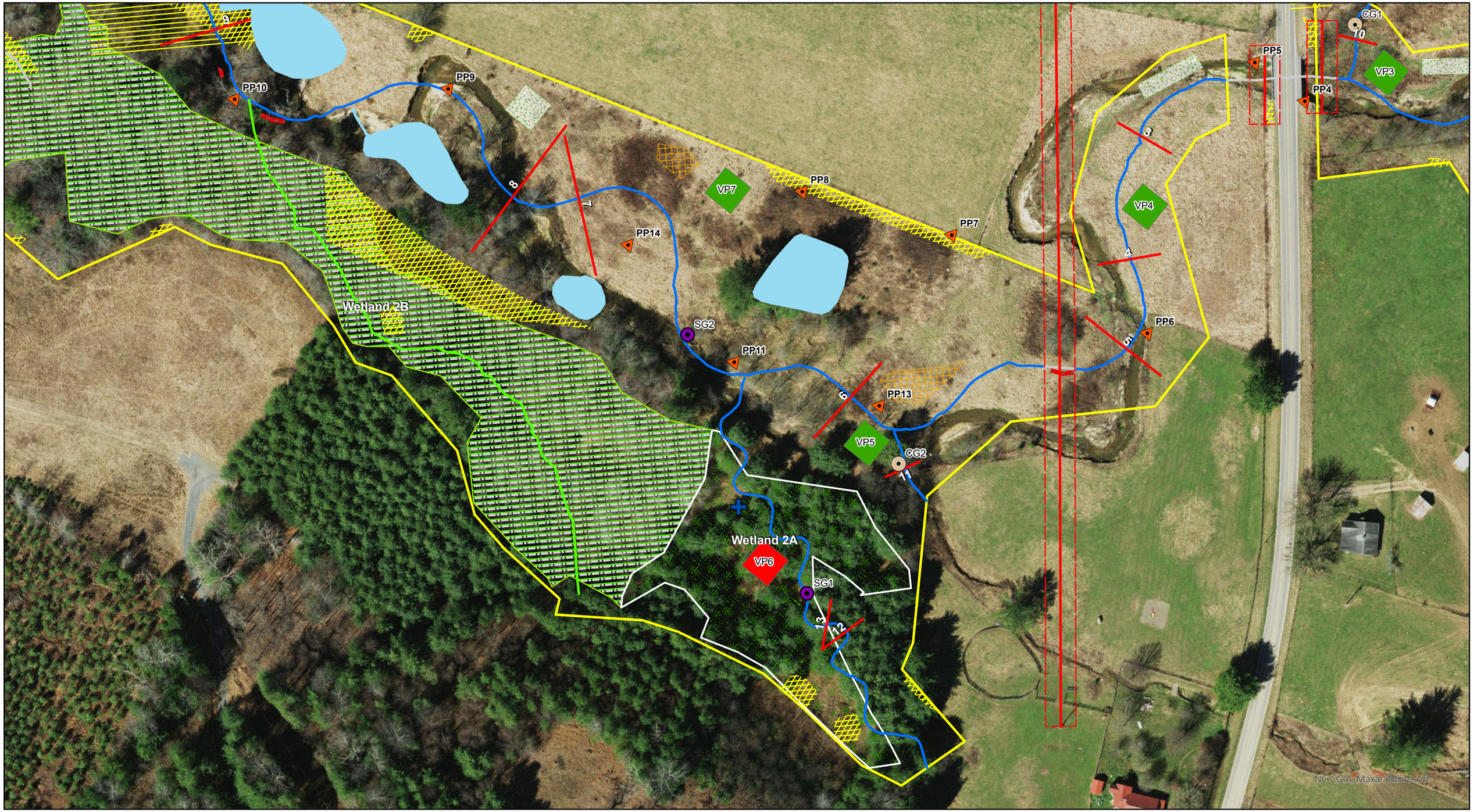
Wetland gauge
Criteria
- Meeting

Random Vegetation Plot
Criteria
- Meeting

Permanent Vegetation Plot
Criteria
- Failing
- Meeting

N

0 25 50 100 Feet



Mitigation Services
ENVIRONMENTAL QUALITY

Integrated CCPV
MY2
Little Pine Creek II
Alleghany County, NC

Sheet 2 of 3

OHW
Utility Easement
Vernal Pool
Photopoints
Crest gauge
Stream gauge
Cross Sections
Non-Credit
Preservation
Restoration
Bank_Erosion
Low Stem Density Areas
Present
Enhancement
Preservation
LPCII Easement

Wetland gauge
Criteria
Meeting

Random Vegetation Plot
Criteria
Meeting

Permanent Vegetation Plot
Criteria
Failing
Meeting

N

0 50 100 200
Feet

Mitigation Services
ENVIRONMENTAL QUALITY

Integrated CCPV
MY2
Little Pine Creek II
Alleghany County, NC

Sheet 3 of 3

Vernal Pool
Photopoints
Cross Sections
Non-Credit
Preservation
Restoration
Bank_Erosion
Low Stem Density Areas
Present
Preservation
LPCII Easement

Wetland gauge
Criteria
Meeting

Random Vegetation Plot
Criteria
Meeting

Permanent Vegetation Plot
Criteria
Failing
Meeting

N

0 37.5 75 150
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 / Assessment Date 10/11/2021

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.	19	19			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 2a - Restoration (P1)
Assessed Length 1506 feet / Assessment Date 10/11/2021

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.			1	26	98%	0	0	98%
	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.			1	24	98%	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	50	97%	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 / Assessment Date 10/11/2021

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.			1	9	97%	N/A	N/A	N/A
				Totals	1	9	97%	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 / Assessment Date 10/11/2021

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 / Assessment Date 10/11/2021

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 / Assessment Date 10/11/2021

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 / Assessment Date 10/12/2021						
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		3	0.07	0.50%
			Total	3	0.07	0.50%
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	3	0.07	0.50%
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		29	0.63	4.50%
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

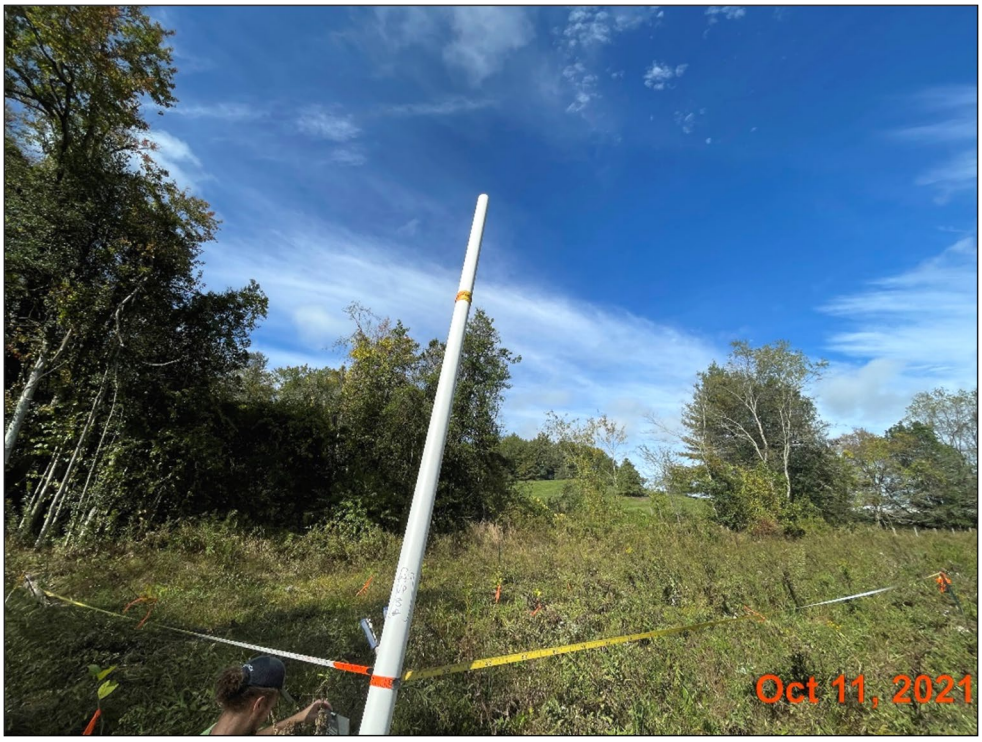
Vegetation Monitoring Plot 3

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 Station 7a, 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

Problem Area Photos

LPCII Reach 2A undercut bank and slump, Station 110+25

LPCII Reach 2A Bank Scour, Station 120+75

LPCII Reach 2B, Bank Scour, Station 121+50

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Appendix C
Vegetation Plot Data

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https://ncdms.shinyapps.io/Veg_Table_Tool/

Table 7. Vegetation Plot Data

Planted Acreage	7.7
Date of Initial Plant	2019-04-30
Date(s) of Supplemental Plant(s)	2021-02-09
Date(s) Mowing	#N/A
Date of Current Survey	2021-10-11
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F		Veg Plot 6 F		Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 R	Veg Plot 10 R	Veg Plot 11 R	Veg Plot 12 R
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Total	Total	Total	Total
Species Included in Approved Mitigation Plan	Acer rubrum	red maple	Tree	FAC	3	3											3	3	2	2				
	Betula nigra	river birch	Tree	FACW	3	3	1	1	2	2	7	7	2	2			2	2	2	2	4	2		3
	Cornus amomum	silky dogwood	Shrub	FACW	2	2	5	5	1	1			2	2	1	1			1	1	1		1	
	Fraxinus pennsylvanica	green ash	Tree	FACW	6	6			4	4	1	1	4	4					2	2	2	8	4	9
	Ilex verticillata	common winterberry	Tree	FACW											2	2								
	Liriodendron tulipifera	tuliptree	Tree	FACU							1	1							4	4				
	Platanus occidentalis	American sycamore	Tree	FACW	4	4	3	3	4	4	1	1			2	2	3	3	4	4	11	5	8	1
	Quercus michauxii	swamp chestnut oak	Tree	FACW									1	1	1	1			1	1				
Sum	Performance Standard				18	18	9	9	11	11	10	10	9	9	6	6	8	8	16	16	18	15	13	13
Mitigation Plan Performance Standard	Current Year Stem Count					18		9		11		10		9		6		8		16	18	15	13	13
	Stems/Acre					729		364		445		405		364		243		324		648	729	607	526	526
	Species Count					5		3		4		4		4		4		3		7	4	3	3	3
	Dominant Species Composition (%)					33		56		36		70		44		33		38		25	61	53	62	69
	Average Plot Height					1		2		4		3		2		1		2		1	4	3	3	3
	% Invasives					0		0		0		0		0		0		0		0	0	0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					18		9		11		10		9		6		8		16	18	15	13	13
	Stems/Acre					729		364		445		405		364		243		324		648	729	607	526	526
	Species Count					5		3		4		4		4		4		3		7	4	3	3	3
	Dominant Species Composition (%)					33		56		36		70		44		33		38		25	61	53	62	69
	Average Plot Height					1		2		4		3		2		1		2		1	4	3	3	3
	% Invasives					0		0		0		0		0		0		0		0	0	0	0	0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 8. Vegetation Performance Standards Summary Table

	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	729		5	0	364		3	0	445		4	0
Monitoring Year 1	729		5	0	364		3	0	445		4	0
Monitoring Year 0	729		5	0	364		3	0	445		4	0
	Veg Plot 4 F				Veg Plot 5 F				Veg Plot 6 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	405		4	0	364		4	0	243		4	0
Monitoring Year 1	405		4	0	364		4	0	243		4	0
Monitoring Year 0	405		4	0	364		4	0	243		4	0
	Veg Plot 7 F				Veg Plot 8 F				Veg Plot Group 1 R			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	324		3	0	648		7	0	729		4	0
Monitoring Year 1	324		3	0	648		7	0				
Monitoring Year 0	324		3	0	648		7	0				
	Veg Plot Group 2 R				Veg Plot Group 3 R				Veg Plot Group 4 R			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	607		3	0	526		3	0	526		3	0
Monitoring Year 1												
Monitoring Year 0												

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

Table 9. Vegetation Plot Criteria Attainment
LPCII Stream and Wetland Mitigation Site

Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
VP1	Yes	91.7%
VP2	Yes	
VP3	Yes	
VP4	Yes	
VP5	Yes	
VP6	No	
VP7	Yes	
VP8	Yes	
RVP1	Yes	
RVP2	Yes	
RVP3	Yes	
RVP4	Yes	

Appendix D
Stream Geomorphology Data

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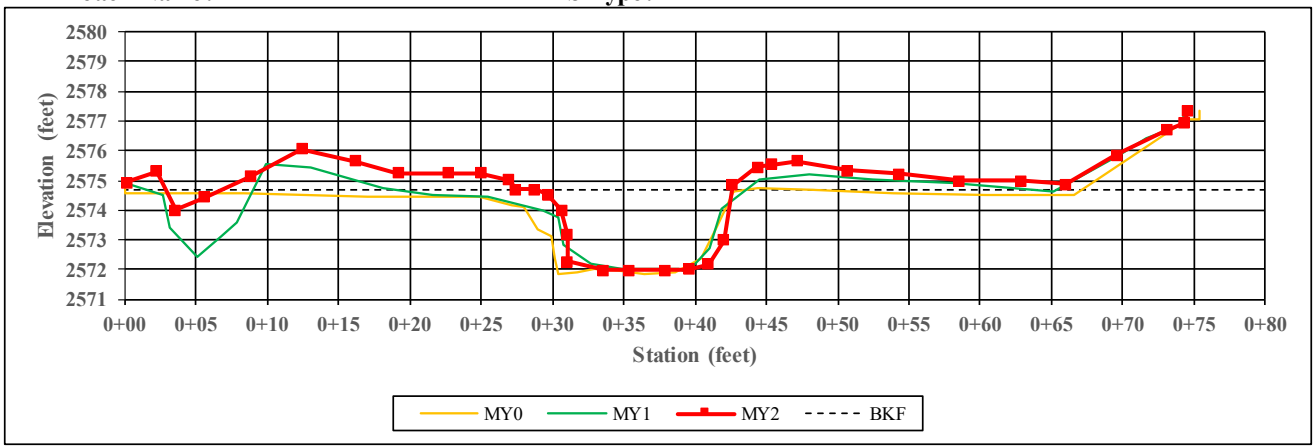
Project Name: LPC II **XS Number:** 1 **Station:** 100+77

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



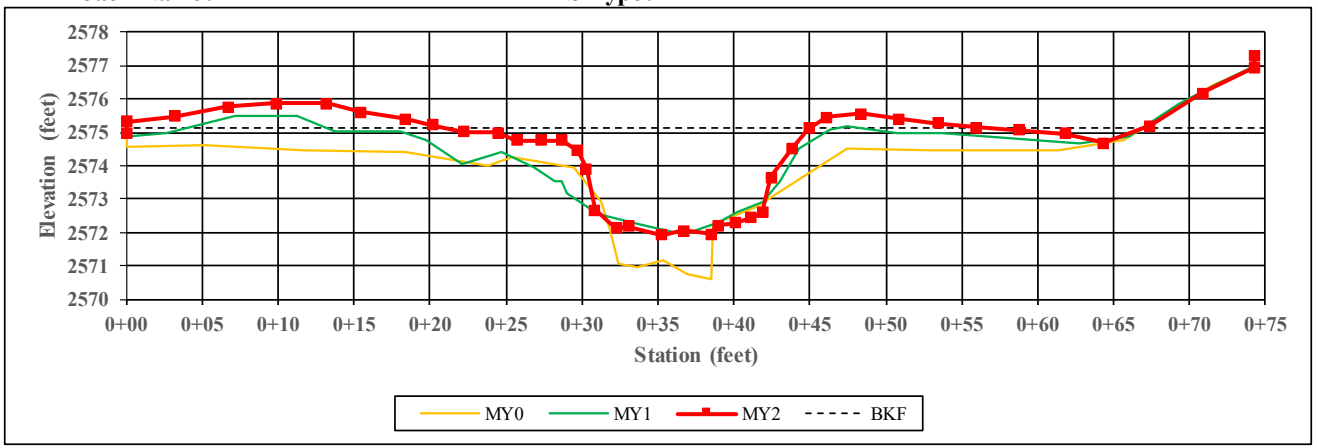
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	25.5	12.6	13.8	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	100.0	-	-	-	-	-
Bankfull Mean Depth (ft)	1.2	2.7	2.2	-	-	-	-	-
Bankfull Max Depth (ft)	2.7	3.3	2.7	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	31.6	34.5	29.8	-	-	-	-	-
Width/Depth Ratio	20.6	4.6	6.4	-	-	-	-	-
Entrenchment Ratio	3.9	8.0	7.2	-	-	-	-	-
Bank Height Ratio	1.1	0.8	1.2	-	-	-	-	-

Left Descending Bank

Right Descending Bank

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

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



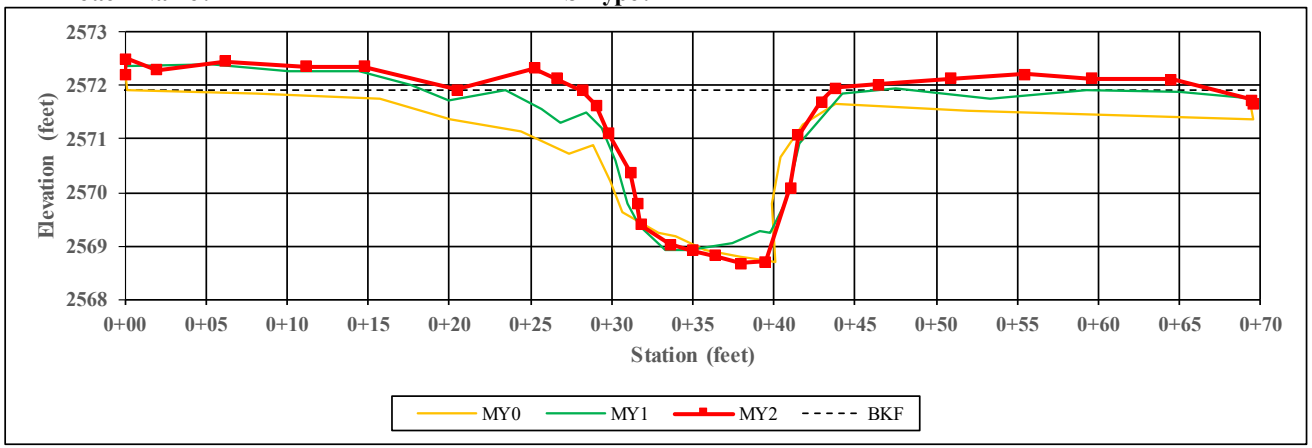
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	23.7	20.9	14.1	-	-	-	-	-
Floodprone Width (ft)	70.0	70.0	70.0	-	-	-	-	-
Bankfull Mean Depth (ft)	1.8	1.8	2.6	-	-	-	-	-
Bankfull Max Depth (ft)	4.0	2.8	3.2	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	42.3	37.3	36.3	-	-	-	-	-
Width/Depth Ratio	13.3	11.7	5.5	-	-	-	-	-
Entrenchment Ratio	3.0	3.4	5.0	-	-	-	-	-
Bank Height Ratio	1.0	0.8	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



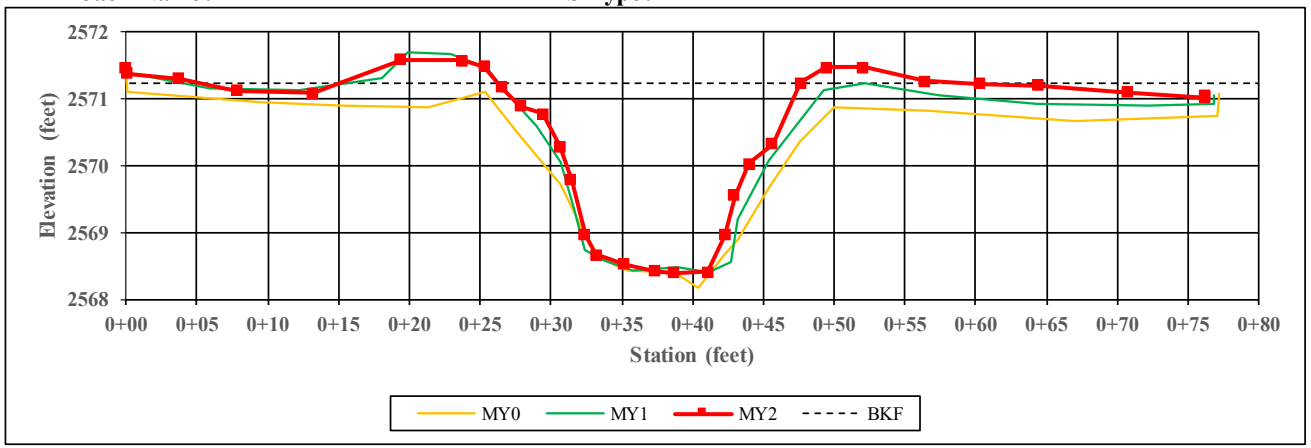
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	27.0	24.0	14.8	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	100.0	-	-	-	-	-
Bankfull Mean Depth (ft)	1.3	1.4	2.1	-	-	-	-	-
Bankfull Max Depth (ft)	3.0	3.0	3.2	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	34.3	34.2	31.5	-	-	-	-	-
Width/Depth Ratio	21.3	16.8	6.9	-	-	-	-	-
Entrenchment Ratio	3.7	4.2	6.8	-	-	-	-	-
Bank Height Ratio	1.0	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



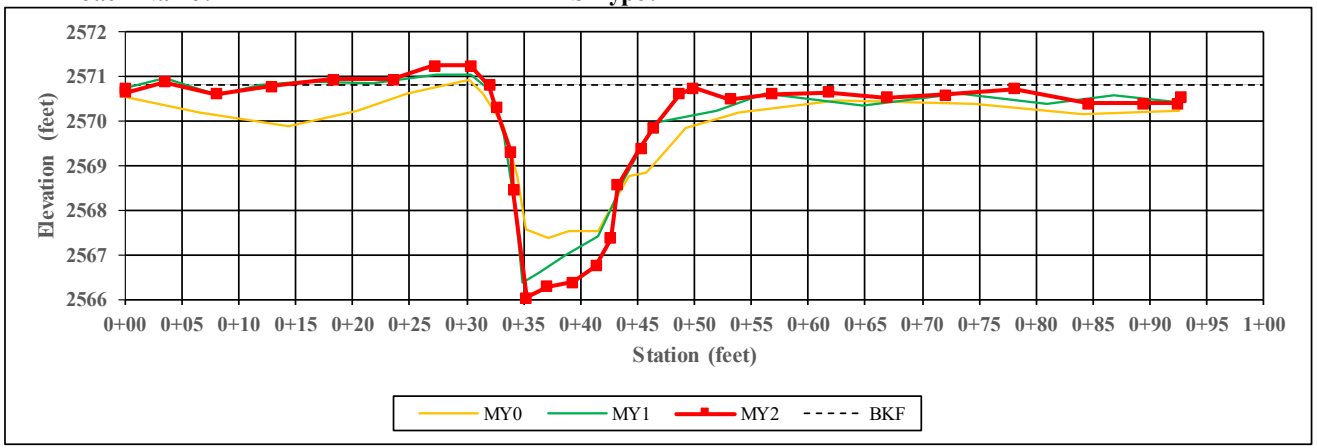
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	21.3	22.5	21.1	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	100.0	-	-	-	-	-
Bankfull Mean Depth (ft)	1.7	1.8	1.7	-	-	-	-	-
Bankfull Max Depth (ft)	2.7	2.8	2.8	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	36.4	41.0	36.8	-	-	-	-	-
Width/Depth Ratio	12.5	12.4	12.1	-	-	-	-	-
Entrenchment Ratio	4.7	4.4	4.7	-	-	-	-	-
Bank Height Ratio	1.1	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



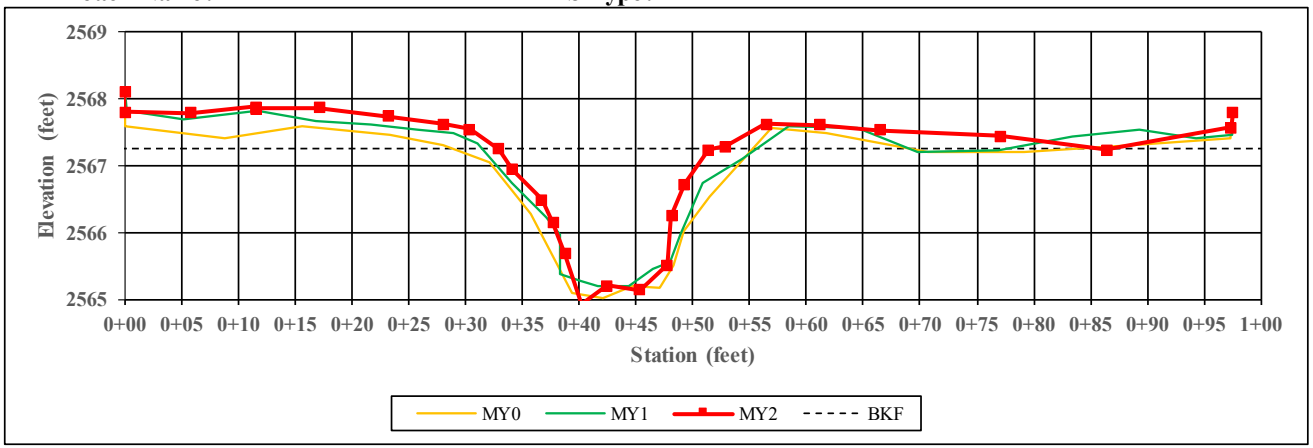
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	22.2	30.4	16.1	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	100.0	-	-	-	-	-
Bankfull Mean Depth (ft)	1.7	1.3	2.8	-	-	-	-	-
Bankfull Max Depth (ft)	3.1	4.2	4.8	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	37.9	40.1	45.7	-	-	-	-	-
Width/Depth Ratio	13.0	23.0	5.6	-	-	-	-	-
Entrenchment Ratio	4.5	3.3	6.2	-	-	-	-	-
Bank Height Ratio	1.1	1.0	1.1	-	-	-	-	-

Left Descending Bank

Looking Downstream

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

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



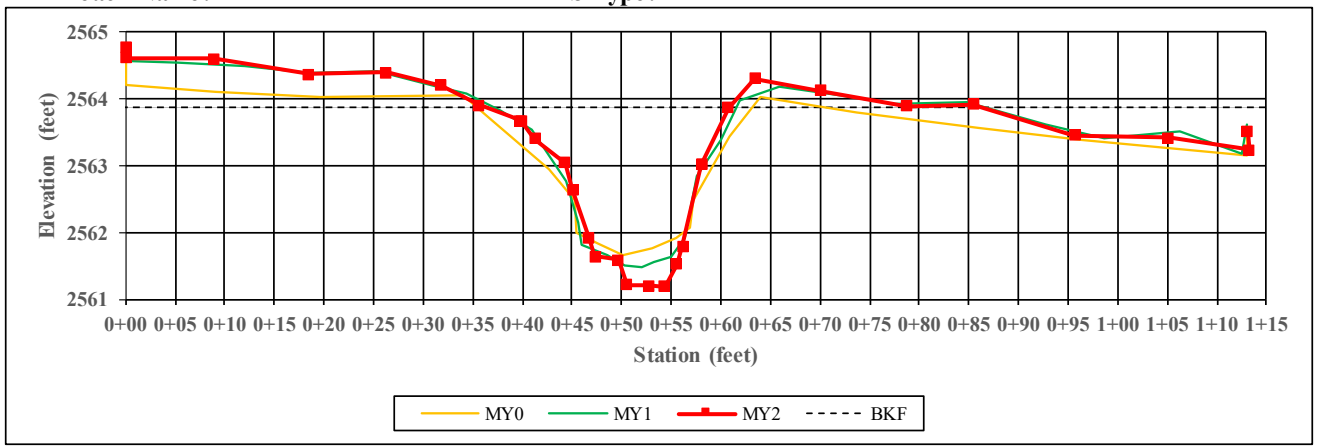
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	40.4	28.5	18.9	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	100.0	-	-	-	-	-
Bankfull Mean Depth (ft)	0.9	1.3	1.3	-	-	-	-	-
Bankfull Max Depth (ft)	2.6	2.4	2.3	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	37.4	35.7	24.2	-	-	-	-	-
Width/Depth Ratio	43.6	22.7	14.8	-	-	-	-	-
Entrenchment Ratio	2.5	3.5	5.3	-	-	-	-	-
Bank Height Ratio	1.0	1.0	0.9	-	-	-	-	-

Left Descending Bank

Right Descending Bank

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

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



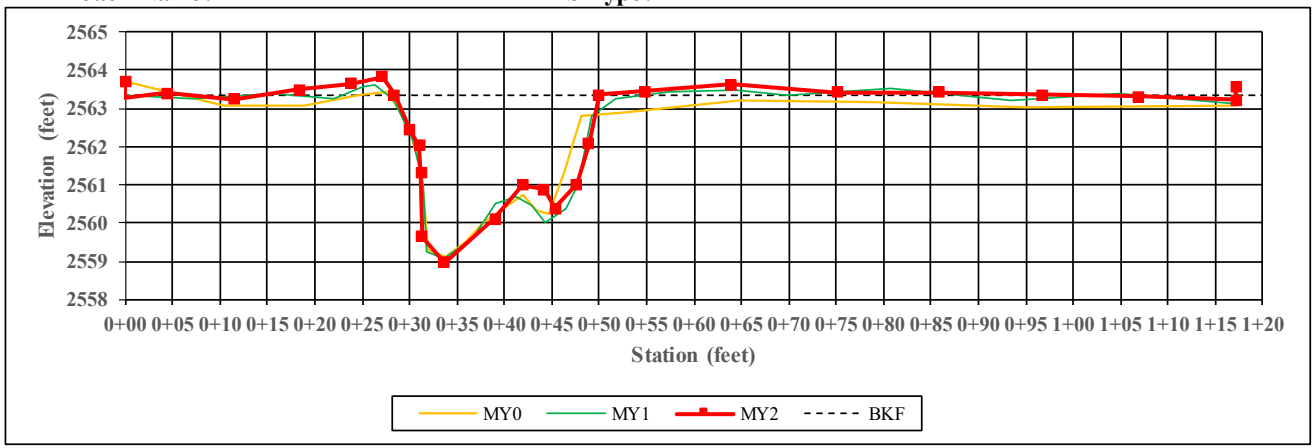
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	29.7	23.6	21.0	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	100.0	-	-	-	-	-
Bankfull Mean Depth (ft)	1.3	1.3	1.6	-	-	-	-	-
Bankfull Max Depth (ft)	2.4	2.3	2.7	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	39.2	31.4	33.0	-	-	-	-	-
Width/Depth Ratio	22.5	17.7	13.3	-	-	-	-	-
Entrenchment Ratio	3.4	4.2	4.8	-	-	-	-	-
Bank Height Ratio	1.0	1.2	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



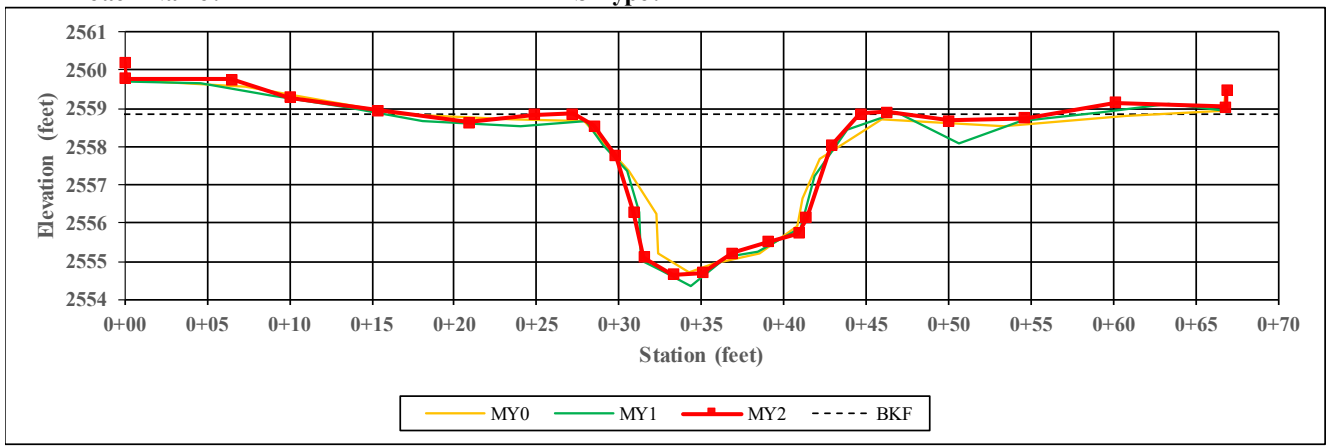
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	22.8	23.4	18.9	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	100.0	-	-	-	-	-
Bankfull Mean Depth (ft)	2.3	2.5	3.0	-	-	-	-	-
Bankfull Max Depth (ft)	4.1	4.2	4.4	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	52.8	58.2	56.6	-	-	-	-	-
Width/Depth Ratio	9.9	9.4	6.3	-	-	-	-	-
Entrenchment Ratio	4.4	4.3	5.3	-	-	-	-	-
Bank Height Ratio	1.0	1.0	0.9	-	-	-	-	-

Left Descending Bank

Right Descending Bank

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

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



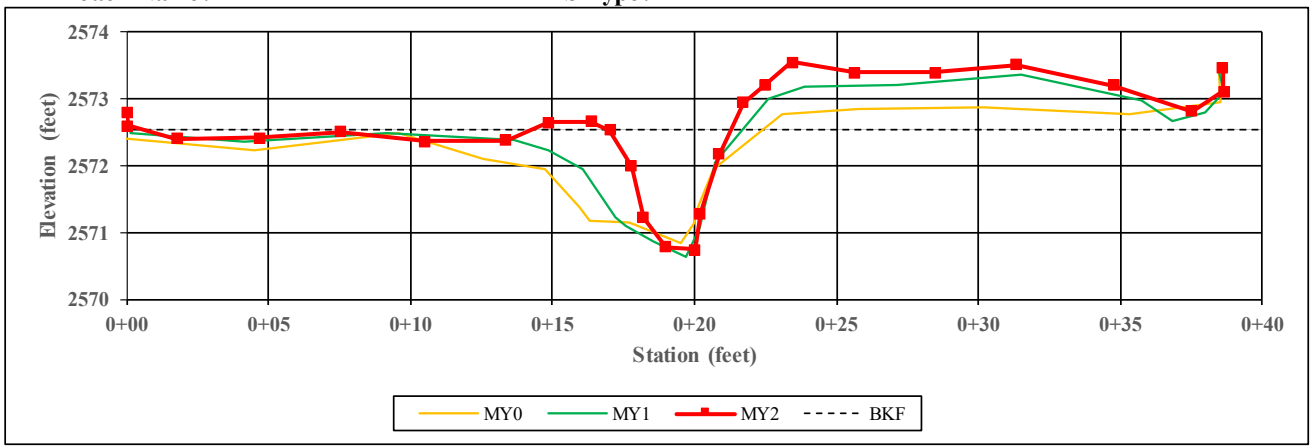
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	36.7	25.7	14.3	-	-	-	-	-
Floodprone Width (ft)	100.0	100.0	100.0	-	-	-	-	-
Bankfull Mean Depth (ft)	1.2	1.9	3.1	-	-	-	-	-
Bankfull Max Depth (ft)	4.1	4.5	4.2	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	42.3	47.9	44.2	-	-	-	-	-
Width/Depth Ratio	31.9	13.8	4.7	-	-	-	-	-
Entrenchment Ratio	2.7	3.9	7.0	-	-	-	-	-
Bank Height Ratio	1.0	1.0	1.0	-	-	-	-	-

Left Descending Bank

Right Descending Bank

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

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



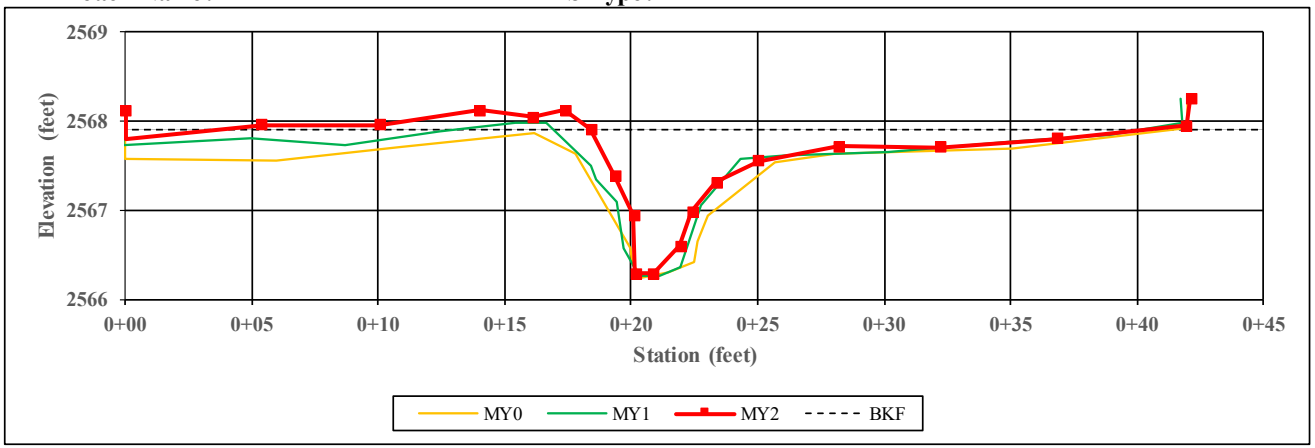
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	12.6	7.0	3.8	-	-	-	-	-
Floodprone Width (ft)	40.0	40.0	40.0	-	-	-	-	-
Bankfull Mean Depth (ft)	0.7	0.9	1.2	-	-	-	-	-
Bankfull Max Depth (ft)	1.6	1.7	1.8	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	9.2	6.1	4.4	-	-	-	-	-
Width/Depth Ratio	17.4	8.0	3.3	-	-	-	-	-
Entrenchment Ratio	3.2	5.7	10.5	-	-	-	-	-
Bank Height Ratio	1.2	0.9	0.7	-	-	-	-	-

Left Descending Bank

Right Descending Bank

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

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



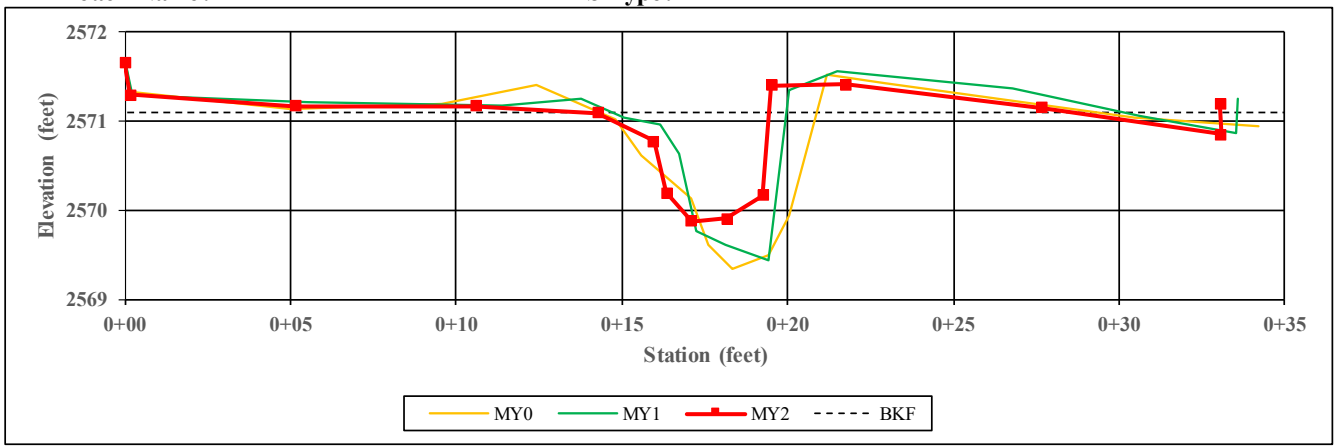
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	10.6	5.9	4.0	-	-	-	-	-
Floodprone Width (ft)	30.0	30.0	30.0	-	-	-	-	-
Bankfull Mean Depth (ft)	0.6	0.8	1.1	-	-	-	-	-
Bankfull Max Depth (ft)	1.4	1.4	1.6	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	6.5	4.6	4.6	-	-	-	-	-
Width/Depth Ratio	17.1	7.5	3.5	-	-	-	-	-
Entrenchment Ratio	2.8	5.1	7.4	-	-	-	-	-
Bank Height Ratio	1.1	0.8	0.6	-	-	-	-	-

Left Descending Bank

Right Descending Bank

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

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



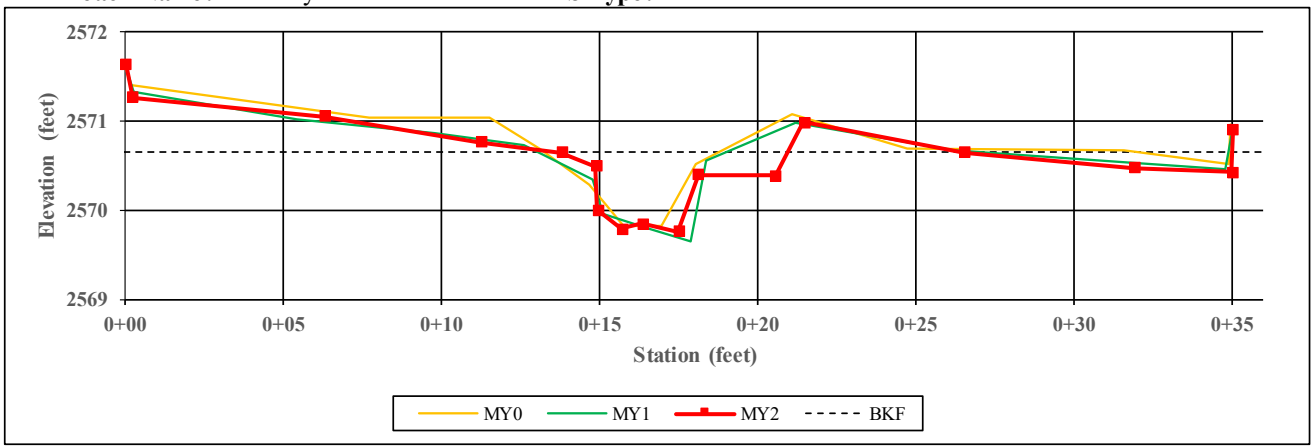
CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	8.7	4.3	2.2	-	-	-	-	-
Floodprone Width (ft)	40.0	40.0	40.0	-	-	-	-	-
Bankfull Mean Depth (ft)	1.0	0.9	1.0	-	-	-	-	-
Bankfull Max Depth (ft)	2.1	1.6	1.2	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	8.7	3.7	2.3	-	-	-	-	-
Width/Depth Ratio	8.7	5.0	2.1	-	-	-	-	-
Entrenchment Ratio	4.6	9.3	18.1	-	-	-	-	-
Bank Height Ratio	1.0	0.7	0.3	-	-	-	-	-

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	5.4	5.7	-	-	-	-	-
Floodprone Width (ft)	40.0	40.0	40.0	-	-	-	-	-
Bankfull Mean Depth (ft)	0.6	0.6	0.5	-	-	-	-	-
Bankfull Max Depth (ft)	1.2	1.0	0.9	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	5.3	3.2	3.1	-	-	-	-	-
Width/Depth Ratio	16.4	9.3	10.5	-	-	-	-	-
Entrenchment Ratio	4.3	7.4	7.1	-	-	-	-	-
Bank Height Ratio	1.0	1.0	0.7	-	-	-	-	-

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	2575.2	2574.7						2574.5	2574.8	2575.1						2571.7	2571.9	2571.9					
Low Bank Height Elevation (datum) Used	2574.7	2574.5	2575.2						2574.5	2574.4	2574.8						2571.7	2571.9	2572.0					
Bankfull Width (ft)	25.5	12.6	13.8						23.7	20.9	14.1						28.0	24.0	14.8					
Floodprone Width (ft)	100.0	100.0	100.0						70.0	70.0	70.0						100.0	100.0	100.0					
Bankfull Mean Depth (ft)	1.2	2.7	2.2						1.8	1.8	2.6						1.3	1.4	2.1					
Bankfull Max Depth (ft)	2.7	3.3	2.7						4.0	2.8	3.2						3.1	3.0	3.2					
Bankfull Cross Sectional Area (ft^2)	31.6	34.5	29.8						42.3	37.3	36.3						36.7	34.2	31.5					
Bankfull Width/Depth Ratio	20.6	4.6	6.4						13.3	11.7	5.5						21.4	16.8	6.9					
Bankfull Entrenchment Ratio	3.9	8.0	7.2						3.0	3.4	5.0						3.6	4.2	6.8					
Bankfull Bank Height Ratio	1.1	0.8	1.2						1.0	0.8	0.8						1.0	1.0	1.0					
Low Top of Bank Depth (ft)	2.8	2.5	3.2						3.9	2.4	2.8						3.1	3.0	3.3					

	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	2571.2	2571.2						2570.9	2570.6	2570.8						2567.6	2567.6	2567.3					
Low Bank Height Elevation (datum) Used	2571.1	2571.2	2571.5						2570.9	2570.6	2570.7						2567.6	2567.6	2567.5					
Bankfull Width (ft)	21.3	22.5	21.1						22.2	30.4	16.1						40.4	28.5	18.9					
Floodprone Width (ft)	100.0	100.0	100.0						100.0	100.0	100.0						100.0	100.0	100.0					
Bankfull Mean Depth (ft)	1.7	1.8	1.7						1.7	1.3	2.8						1.6	1.3	1.3					
Bankfull Max Depth (ft)	2.7	2.8	2.8						3.1	4.2	4.8						2.5	2.4	2.3					
Bankfull Cross Sectional Area (ft^2)	36.4	41.0	36.8						37.9	40.1	45.7						37.4	35.7	24.2					
Bankfull Width/Depth Ratio	12.5	12.4	12.1						13.0	23.0	5.6						14.7	22.7	14.8					
Bankfull Entrenchment Ratio	4.7	4.4	4.7						4.5	3.3	6.2						4.3	3.5	5.3					
Bankfull Bank Height Ratio	1.1	1.1	1.1						1.1	1.0	1.1						1.0	1.0	0.9					
Low Top of Bank Depth (ft)	2.9	2.8	3.1						3.6	4.2	4.7						2.6	2.4	2.6					

	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	2563.8	2563.9						2563.4	2563.3	2563.4						2558.8	2558.9	2558.9					
Low Bank Height Elevation (datum) Used	2564.1	2564.2	2563.9						2563.4	2563.4	2563.4						2558.8	2558.7	2558.9					
Bankfull Width (ft)	29.7	23.6	21.0						24.4	23.4	18.9						36.7	25.7	14.3					
Floodprone Width (ft)	100.0	100.0	100.0						100.0	100.0	100.0						100.0	100.0	100.0					
Bankfull Mean Depth (ft)	1.3	1.3	1.6						2.2	2.5	3.0						1.2	1.9	3.1					
Bankfull Max Depth (ft)	2.4	2.3	2.7						4.1	4.2	4.4						4.1	4.5	4.2					
Bankfull Cross Sectional Area (ft^2)	39.2	31.4	33.0						53.2	58.2	56.6						42.3	47.9	44.2					
Bankfull Width/Depth Ratio	22.5	17.7	13.3						11.2	9.4	6.3						31.9	13.8	4.7					
Bankfull Entrenchment Ratio	3.4	4.2	4.8						4.1	4.3	5.3						2.7	3.9	7.0					
Bankfull Bank Height Ratio	1.0	1.0	0.9						1.0	1.1	1.0						1.0	1.0	1.0					
Low Top of Bank Depth (ft)	2.4	2.7	2.7						4.3	4.4	4.4						4.1	4.3	4.2					

	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	2572.4	2572.5						2567.9	2567.6	2567.9						2571.4	2571.0	2571.1					
Low Bank Height Elevation (datum) Used	2572.8	2572.4	2572.7						2567.9	2567.6	2567.5						2571.4	2571.2	2571.1					
Bankfull Width (ft)	12.6	7.0	3.8						10.6	5.9	4.0						8.7	4.3	2.2					
Floodprone Width (ft)	40.0	40.0	40.0						30.0	30.0	30.0						40.0	40.0	40.0					
Bankfull Mean Depth (ft)	0.7	0.9	1.2						0.6	0.8	1.1						1.0	0.9	1.0					
Bankfull Max Depth (ft)	1.6	1.7	1.8						1.4	1.4	1.6						2.1	1.6	1.2					
Bankfull Cross Sectional Area (ft^2)	9.2	6.1	4.4						6.5	4.6	4.6						8.7	3.7	2.3					
Bankfull Width/Depth Ratio	17.4	8.0	3.3						17.1	7.5	3.5						8.7	5.0	2.1					
Bankfull Entrenchment Ratio	3.2	5.7	10.5						2.8	5.1	7.4						4.6	9.3	18.1					
Bankfull Bank Height Ratio	1.2	0.9	0.7						1.1	0.8	0.6						1.0	0.7	0.3					
Low Top of Bank Depth (ft)	1.9	1.7	1.9						1.6	1.3	1.3						2.1	1.8	1.2					

	Cross Section 13 (Riffle) Tributary C							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record Elevation (datum) Used	2571.1	2570.7	2570.6					
Low Bank Height Elevation (datum) Used	2571.1	2571.0	2570.6					
Bankfull Width (ft)	9.3	5.4	5.7					
Floodprone Width (ft)	40.0	40.0	40.0					
Bankfull Mean Depth (ft)	0.6	0.6	0.5					
Bankfull Max Depth (ft)	1.2	1.0	0.9					
Bankfull Cross Sectional Area (ft^2)	5.3	3.2	3.1					
Bankfull Width/Depth Ratio	16.4	9.3	10.5					
Bankfull Entrenchment Ratio	4.3	7.4	7.1					
Bankfull Bank Height Ratio	1.0	1.0	0.7					
Low Top of Bank Depth (ft)	1.3	1.3	0.9					

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	-	12.6	-	-	-	1	-	13.8	-	-	-	1																		
Floodprone Width (ft)	-	100.0	-	-	-	1	-	100.0	-	-	-	1	-	100.0	-	-	-	1																		
Bankfull Mean Depth (ft)	-	1.2	-	-	-	1	-	2.7	-	-	-	1	-	2.2	-	-	-	1																		
Bankfull Max Depth (ft)	-	2.7	-	-	-	1	-	3.3	-	-	-	1	-	2.7	-	-	-	1																		
Bankfull Cross-Sectional Area (ft^2)	-	31.6	-	-	-	1	-	34.5	-	-	-	1	-	29.8	-	-	-	1																		
Width/Depth Ratio	-	20.6	-	-	-	1	-	4.6	-	-	-	1	-	6.4	-	-	-	1																		
Entrenchment Ratio	-	3.9	-	-	-	1	-	8.0	-	-	-	1	-	7.2	-	-	-	1																		
Bank Height Ratio	-	1.1	-	-	-	1	-	0.8	-	-	-	1	-	1.2	-	-	-	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	22.5	24.9	23.6	28.5	3.20	3	18.9	20.3	21.0	21.1	1.2	3																		
Floodprone Width (ft)	100.0	100.0	100.0	100.0	0.0	3	100	100	100	100	0.00	3	100	100	100	100	0.0	3																		
Bankfull Mean Depth (ft)	1.3	1.5	1.6	1.7	0.2	3	1.3	1.5	1.3	1.8	0.31	3	1.3	1.5	1.6	1.7	0.2	3																		
Bankfull Max Depth (ft)	2.4	2.5	2.5	2.7	0.1	3	2.3	2.5	2.4	2.8	0.29	3	2.3	2.6	2.7	2.8	0.3	3																		
Bankfull Cross-Sectional Area (ft^2)	36.4	37.6	37.4	39.2	1.2	3	31.4	36.1	35.7	41.0	4.79	3	24.2	31.3	33.0	36.8	6.5	3																		
Width/Depth Ratio	12.5	16.6	14.7	22.5	4.3	3	12.4	17.6	17.7	22.7	5.18	3	12.1	13.4	13.3	14.8	1.3	3																		
Entrenchment Ratio	3.4	4.1	4.3	4.7	0.5	3	3.5	4.1	4.2	4.4	0.49	3	4.7	4.9	4.8	5.3	0.3	3																		
Bank Height Ratio	1.0	1.0	1.0	1.1	0.1	3	1.0	1.0	1.0	1.1	0.06	3	0.9	1.0	0.9	1.1	0.1	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	-	5.9	-	-	-	1	-	4.0	-	-	-	1																		
Floodprone Width (ft)	-	30.0	-	-	-	1	-	30	-	-	-	1	-	30	-	-	-	1																		
Bankfull Mean Depth (ft)	-	0.6	-	-	-	1	-	0.8	-	-	-	1	-	1.1	-	-	-	1																		
Bankfull Max Depth (ft)	-	1.4	-	-	-	1	-	1.4	-	-	-	1	-	1.6	-	-	-	1																		
Bankfull Cross-Sectional Area (ft^2)	-	6.5	-	-	-	1	-	4.6	-	-	-	1	-	4.6	-	-	-	1																		
Width/Depth Ratio	-	17.1	-	-	-	1	-	7.5	-	-	-	1	-	3.5	-	-	-	1																		
Entrenchment Ratio	-	2.8	-	-	-	1	-	5.1	-	-	-	1	-	7.4	-	-	-	1																		
Bank Height Ratio	-	1.1	-	-	-	1	-	0.8	-	-	-	1	-	0.6	-	-	-	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_{blf}) (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	-	5.4	-	-	-	1	-	5.7	-	-	-	1																		
Floodprone Width (ft)	-	40.0	-	-	-	1	-	40.0	-	-	-	1	-	40	-	-	-	1																		
Bankfull Mean Depth (ft)	-	0.6	-	-	-	1	-	0.6	-	-	-	1	-	0.5	-	-	-	1																		
Bankfull Max Depth (ft)	-	1.2	-	-	-	1	-	1.0	-	-	-	1	-	0.9	-	-	-	1																		
Bankfull Cross-Sectional Area (ft^2)	-	5.3	-	-	-	1	-	3.2	-	-	-	1	-	3.1	-	-	-	1																		
Width/Depth Ratio	-	16.4	-	-	-	1	-	9.3	-	-	-	1	-	10.5	-	-	-	1																		
Entrenchment Ratio	-	4.3	-	-	-	1	-	7.4	-	-	-	1	-	7.1	-	-	-	1																		
Bank Height Ratio	-	1.0	-	-	-	1	-	1.0	-	-	-	1	-	0.7	-	-	-	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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1. Wrack lines and sediment deposits, LPCII Tributary A.

2. Residual wrack lines and sediment deposits, LPCII Reach 1

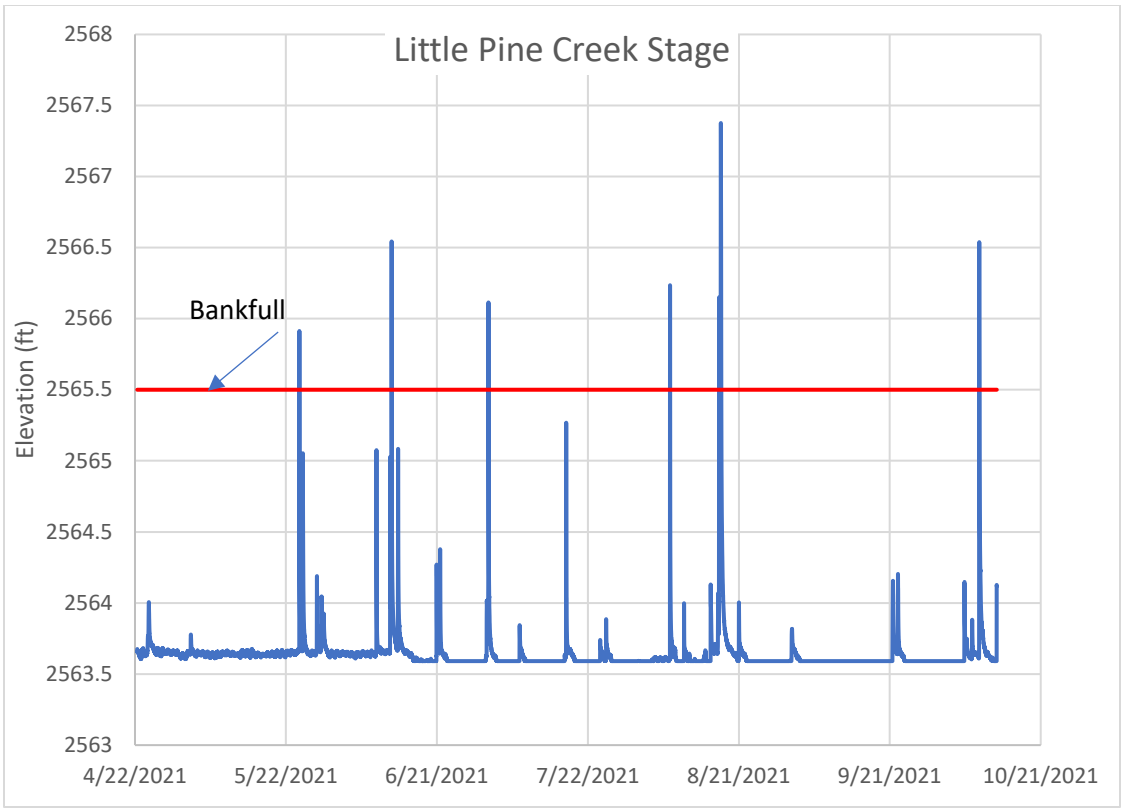
3. Residual wrack lines and sediment deposits, LPCII Reach 2a

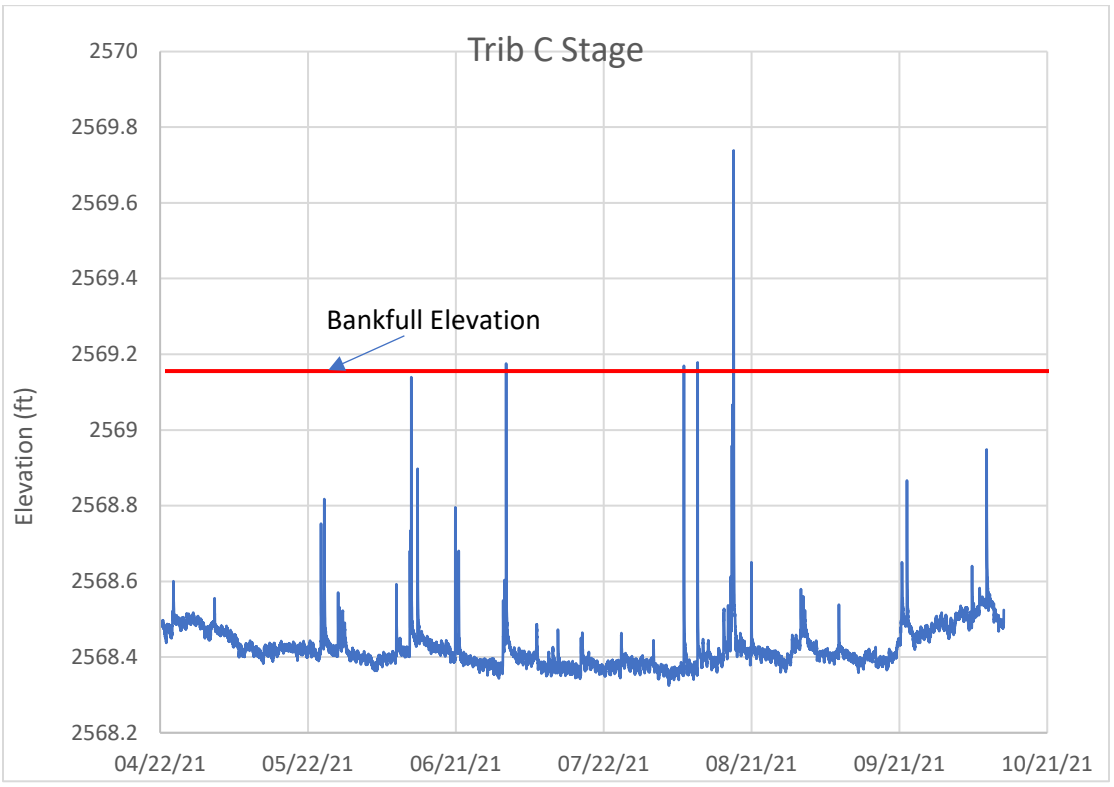
4. Tributary B Crest Gage.

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
	10/11/2020	Unknown	Wrack Lines	2
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
	10/12/2021	5/25/2021	Stage Recorder	3
	10/12/2021	6/12/2021	Stage Recorder	3
	10/12/2021	7/2/2021	Stage Recorder	3
	10/12/2021	8/7/2021	Stage Recorder	3
	10/12/2021	8/18/2021	Stage Recorder	3
	10/12/2021	10/9/2021	Stage Recorder	3
Tributary A	10/11/2021	Unknown	Wrack Lines	1
Tributary B	10/6/2020	5/21/2020	Crest Gage	n/a
	10/11/2021	Unknown	Crest Gage	n/a
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
	10/12/2021	8/18/2021	Stage Recorder	4

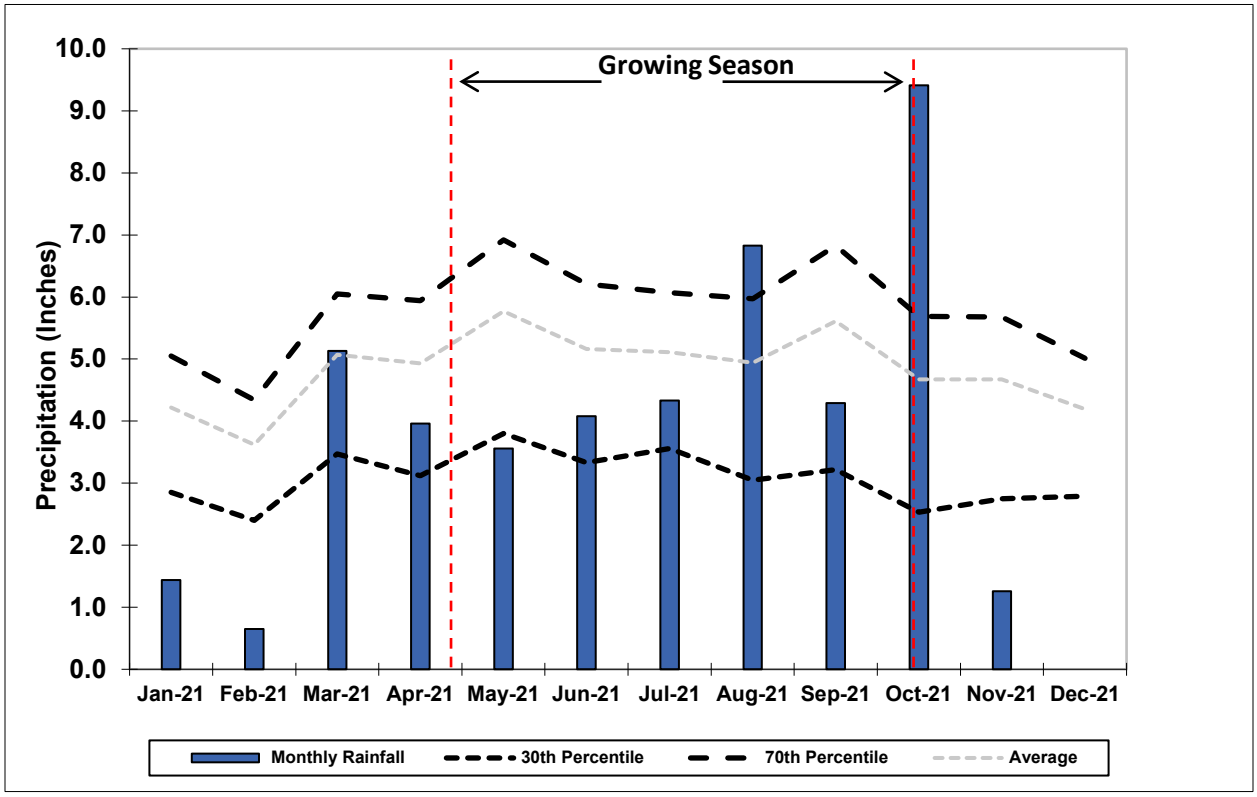
*Stage recorder buried during this event.

+ The multiple listed dates for 2021 are based on precipitation and stage recorder data from January thru October, 2021

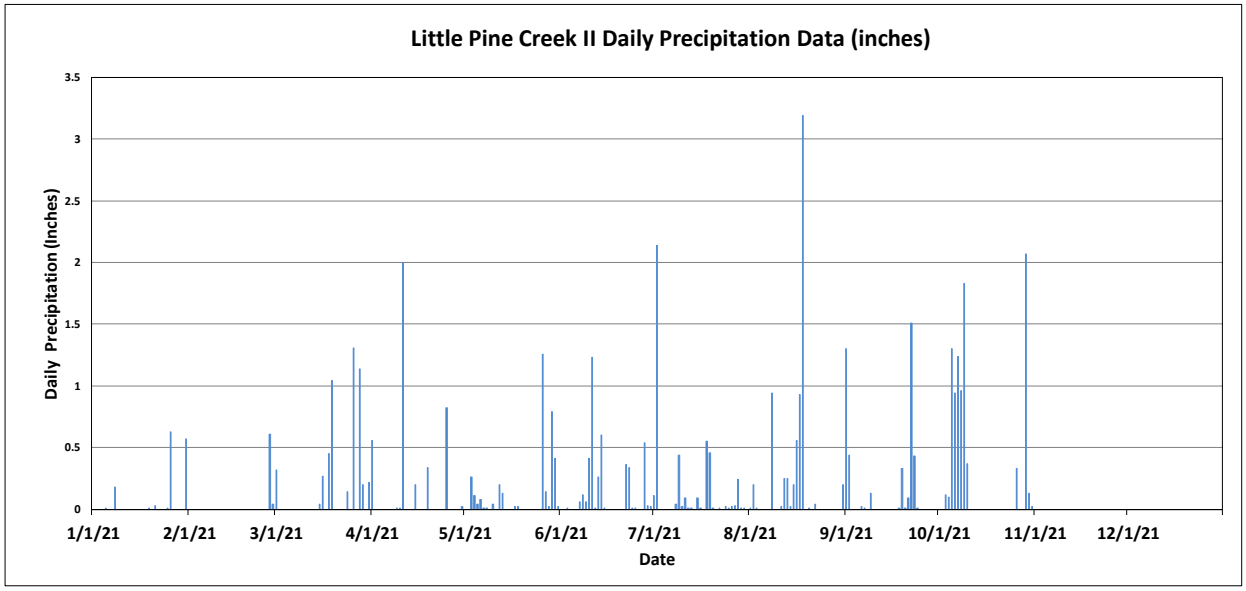

Little Pine Creek Stage
Bankfull
Elevation (ft)
2568
2567.5
2567
2566.5
2566
2565.5
2565
2564.5
2564
2563.5
2563
4/22/2021
5/22/2021
6/21/2021
7/22/2021
8/21/2021
9/21/2021
10/21/2021


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
04/22/21
05/22/21
06/21/21
07/22/21
08/21/21
09/21/21
10/21/21

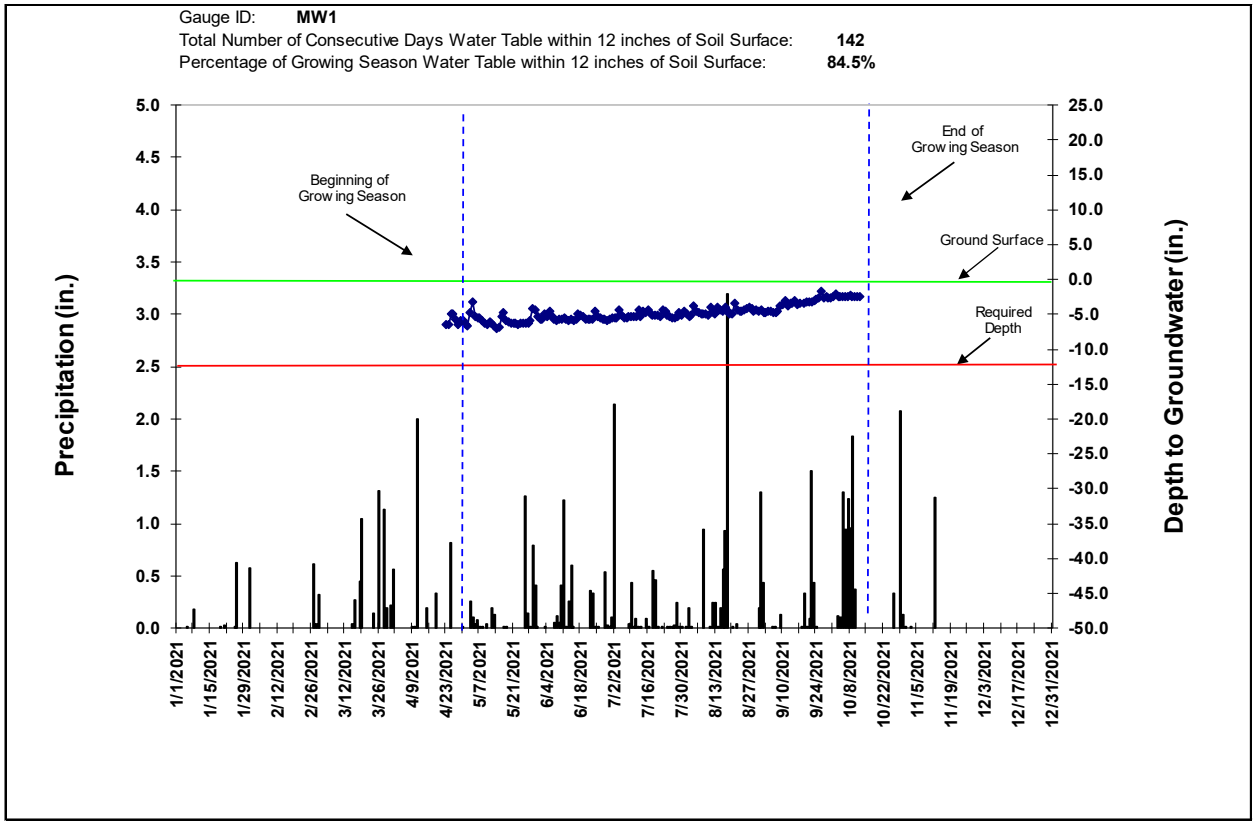
Little Pine Creek II Stream and Wetland Mitigation Site Precipitation Graphic

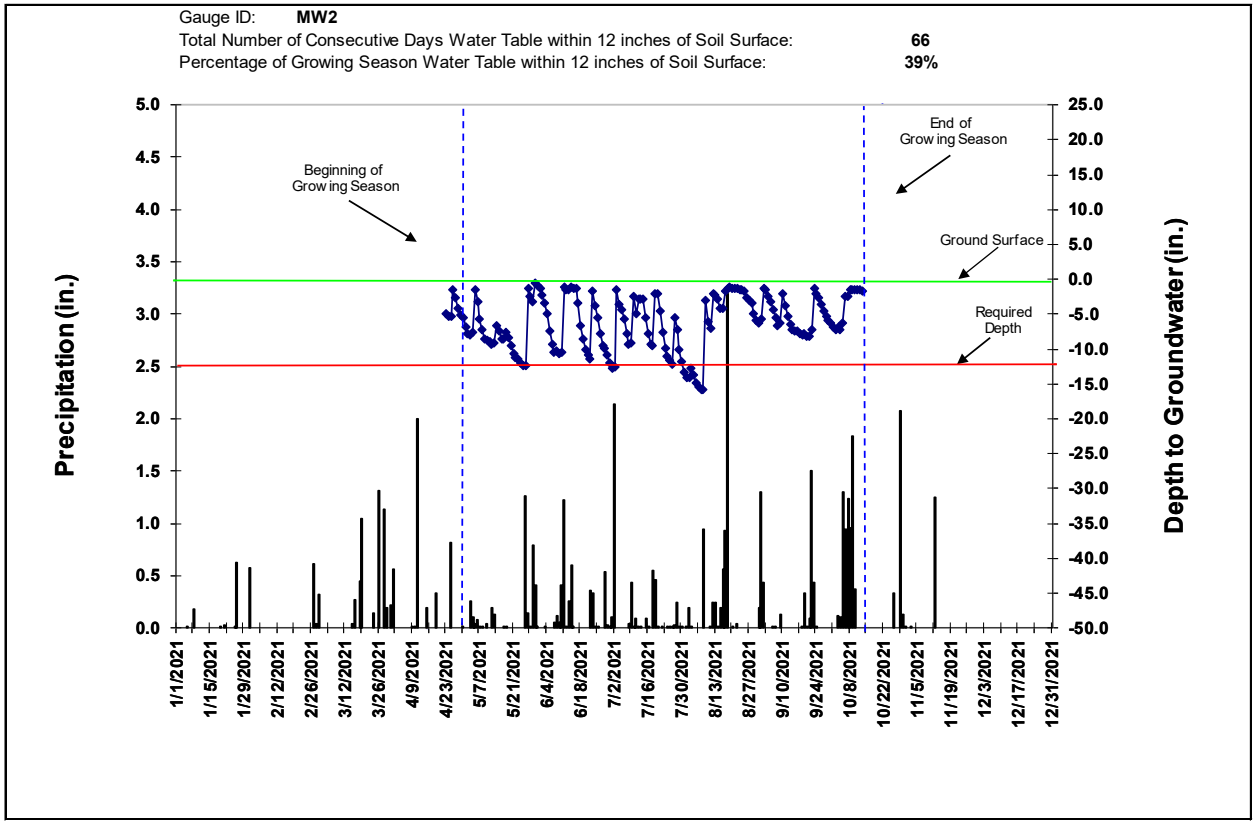


Monthly Rain Gauge Data Little Pine Creek II Stream and Wetland Mitigation Site						
Month	Monthly Rainfall	Monthly Rainfall	Monthly Rainfall	30th Percentile	70th Percentile	Average
Jan-21	1.44	0.00	0.00	2.85	5.05	4.22
Feb-21	0.65	0.00	0.00	2.4	4.34	3.62
Mar-21	5.13	0.00	0.00	3.47	6.05	5.07
Apr-21	3.96	0.00	0.00	3.12	5.94	4.93
May-21	3.56	0.00	0.00	3.8	6.92	5.77
Jun-21	4.08	0.00	0.00	3.33	6.21	5.16
Jul-21	4.33	0.00	0.00	3.56	6.07	5.11
Aug-21	6.83	0.00	0.00	3.05	5.97	4.94
Sep-21	4.29	0.00	0.00	3.22	6.83	5.61
Oct-21	9.41	0.00	0.00	2.53	5.69	4.67
Nov-21	1.26	0.00	0.00	2.75	5.68	4.67
Dec-21	-	0.00	0.00	2.79	5.01	4.19
Total	44.94	0.00	0.00	50.95	63.38	


Little Pine Creek II Daily Precipitation Data (inches)
Daily Precipitation (Inches)
3.5
3
2.5
2
1.5
1
0.5
0
1/1/21
2/1/21
3/1/21
4/1/21
5/1/21
6/1/21
7/1/21
8/1/21
9/1/21
10/1/21
11/1/21
12/1/21
Date

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





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Appendix F
Other

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