

Annual Monitoring Report

Monitoring Year 5 of 7

FINAL

Poplin Ridge Stream Restoration Project

NCDMS Contract No.: 004672

NCDMS Project No.: 95359

USACE Permit Action ID: SAW-2012-01079

DWR Project No.: 13-1087

Union County, NC

Data Collected: September 2019

Date Submitted: January 2020



Submitted to:

North Carolina Division of Mitigation Services

NCDEQ-DMS, 1652 Mail Service Center Raleigh NC 27699-1652

Prepared by:



302 Jefferson Street, Suite 110
Raleigh, North Carolina 27605

Mitigation Project Name Poplin Ridge Site
 DMS ID 95359
 River Basin Yadkin
 Cataloging Unit 03040105

County Union
 Date Project Instituted 7/5/2012
 Date Prepared 8/23/2019

USACE Action ID 2012-01079
 NCDWR Permit No 2013-1087

Credit Release Milestone	Stream Credits					Wetland Credits								
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riverine	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Date (Wetland)
Potential Credits (Mitigation Plan)		6,346.268												
Potential Credits (As-Built Survey)		6,365.000												
Potential Credits (IRT Approved)		6,346.266												
1 (Site Establishment)	N/A				N/A	N/A	N/A				N/A		N/A	N/A
2 (Year 0 / As-Built)	30.00%	1,909.500			2015	9/4/2015	N/A				N/A		N/A	N/A
3 (Year 1 Monitoring)	10.00%	636.500			2016	4/25/2016	N/A				N/A		N/A	N/A
IRT Adjustment*		-7.494				10/20/2017							N/A	N/A
4 (Year 2 Monitoring)	10.00%	634.626			2017	No Release	N/A				N/A		N/A	N/A
5 (Year 3 Monitoring)	7.20%	457.052			2018	8/28/2018	N/A				N/A		N/A	N/A
5 (Year 3 Monitoring)	2.80%	177.574			2018	No Release								
6 (Year 4 Monitoring)	5.00%	317.314			2019	7/17/2019	N/A				N/A		N/A	N/A
7 (Year 5 Monitoring)	10.00%				2020		N/A				N/A		N/A	N/A
8 (Year 6 Monitoring)	5.00%				2021		N/A				N/A		N/A	N/A
9 (Year 7 Monitoring)	10.00%				2022		N/A				N/A		N/A	N/A
Stream Bankfull Standard	10.00%	634.626			2017	10/20/2017	N/A				N/A			
Total Credits Released to Date		3,947.498												

NOTES:

10/20/2017: *NOTE: Adjustment required due to IRT concerns on how the as-built credits were calculated

CONTINGENCIES:


 Signature of Wilmington District Official Approving Credit Release

27 Sept 2019

Date

- 1 - For NCDMS, no credits are released during the first milestone
- 2 - For NCDMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCDMS Portal, provided the following criteria have been met:
 - 1) Approval of the final Mitigation Plan
 - 2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
 - 3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
 - 4) Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required
- 3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met

DEBITS (released credits only)



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January 30, 2020

Paul Wiesner
NC DEQ Division of Mitigation Services
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

RE: Poplin Ridge Stream Restoration Site: MY5 Monitoring Report (NCDMS ID 95359)

Listed below are comments provided by DMS on December 3, 2019 regarding the Poplin Ridge Stream Restoration Site: Year 5 Monitoring Report and RES' responses.

General: DMS understands that the adaptive management plan for the site was implemented in September 2019. Once the repair areas are planted (dormant season 2019/2020), please notify DMS and we will request and schedule an IRT site visit to review the repairs and discuss the project's proposed 2019 credit release.

[RES will notify DMS when the planting is completed.](#)

The adaptive management plan indicates that a random vegetation plot will be installed in the relic pond bottom with data collected in MY5, MY6, and MY7. If planting is not completed prior to finalizing the MY5 report, please make sure the random plot data is collected before the start of the MY6 (2020) growing season and reported in the MY6 report accordingly.

[Noted.](#)

Section 1.4.1 – Vegetation: The second paragraph reports “a mean of **57** stems per acre across all plots.” This should be **576**. Please QA/QC this section and correct as necessary.

[Done.](#)

Section 1.4.2 – Stream Geomorphology: The second paragraph reports “**MY3**”. This should be **MY5**. Please QA/QC this section and correct as necessary.

[Done.](#)

This section also notes a beaver pond/ beaver dam on UT2-4. Cross section 8 indicates that the beaver dam has been removed. Please confirm in the revised report and indicate the date removed. If not removed, the beaver dam location should also be shown on the CCPV sheets. DMS recommends removing beaver dams as soon as possible to avoid potential project damage and additional maintenance.

[The beaver dam was removed in September 2019. This has been added to Section 1.4.2.](#)



CCPV Sheets: The vegetation plot section of the CCPV legend indicates a 320 planted stem per acre success (green vs. orange). The success criteria in MY5 is 260 planted stems per acre in MY5. DMS recommends updating the sheet legends accordingly.

Done.

CCPV Sheets and Table 6: The Poplin Ridge site has had significant exotic invasive populations in previous monitoring years. No exotic invasive treatments appear to have been completed in MY5 (2019). Additionally, no invasive areas are shown on the CCPV maps. Please confirm that current invasives on the site are beneath the mapping threshold (1,000 SqFt) or revise the CCPV map and Table 6 accordingly.

Invasive species treatments were not administered in 2019. Follow up treatments will be performed in 2020.

Table 5: The table reports 100% of all projects reaches visually assessed are stable and performing as intended. Please confirm that this is an accurate reflection of the MY5 project conditions.

This is an accurate reflection of the MY5 conditions.

2019 Photo Stations: Some of the photos provided appear to show dry channels on portions of both UT-1 and UT-2. Please discuss and provide further detail in the report text. The NCIRT requires at least 30 days of continuous flow on intermittent channels proposed for mitigation credit. RES should consider adding additional monitoring equipment if it is likely that dry channels will be an issue at project closeout.

RES has added this to Section 1.4.3: "Additionally, RES observed some dry reaches during monitoring in July and October. RES believes this is characteristic for a slate belt site, especially for two months with below average rainfall. RES will continue to monitor flow on UT2-A (the project stream with the smallest drainage area) and if it shows data below that of an intermittent reach, RES will report flow on the crest gauges on UT1-2, UT1-4, and UT2-3."

Appendix D Cover Sheet: The cover references MY4. Please update.

Done.

Chart - MY5 2019 Poplin Ridge UT-2A Flow Gauge – Please add a call out showing the 93 consecutive flow days reported.

Done.

Digital Support File and General Report Comments:

1. Several of the stream GIS features for the project reaches have different lengths than what is in the asset table

UT1-2 - Geometry is 46 feet less than asset table

UT1-3 - Geometry is 32 feet less than asset table

UT1-4 - Geometry is 13 feet more than asset table

UT1-1A Geometry is 84 feet more than asset table

UT1-C Geometry is 23 feet more than asset table

UT2-A Geometry is 19 feet more than asset table

Do the CAD features match the asset table? If so, please provide the GIS features that support the asset table.

The asset table lengths were derived from the CAD stationing. The GIS features exported from CAD are included as well as the CAD file. Features, however, still do not exactly match the CAD because the features had to be broken up by reach in GIS which does not depict stationing.



2. Calculation of XSA and Max depth are to completed using TOB in keeping with methods specified in the Industry Technical Work group memorandum. Please include the Bankfull and LTOB elevations used. For clarity make sure the reader is aware that these methods are being employed. Include a footnote:

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

Done.

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1.0 PROJECT SUMMARY

1.1. Goals and Objectives

The project goals address stressors identified in the TLW, and include the following:

- Nutrient removal,
- Sediment removal,
- Reducing runoff from animal operations,
- Filtration of runoff, and
- Improved aquatic and terrestrial habitat.

The project goals will be addressed through the following project objectives:

- Establishing riparian buffer areas adjacent to CAFOs.
- Converting active farm fields to forested buffers,
- Stabilization of eroding stream banks,
- Reduction in streambank slope,
- Restoration of riparian buffer bottomland hardwood habitats, and
- Construction of in-stream structures designed to improve bedform diversity and trap detritus.

1.2. Success Criteria

The success criteria for the Poplin Ridge Stream Restoration Site follows accepted and approved success criteria presented in the USACE Stream Mitigation Guidelines and subsequent NCDMS and agency guidance. Specific success criteria components are presented below.

1.2.1. Stream Restoration

Bankfull Events - Two bankfull flow events must be documented within the seven-year monitoring period. The two bankfull events must occur in separate years. Otherwise, stream monitoring will continue until two bankfull events have been documented in separate years. Bankfull events will be documented using crest gauges, auto-logging crest gauges, photographs, and visual assessments for evidence of debris wrack lines.

Cross-Sections - There should be little change in as-built cross-section. If changes do take place, they should be evaluated to determine if they represent a movement toward a less stable condition, or minor changes that represent an increase in stability.

Bank Pin Arrays - Bank pin arrays will be used as a supplemental method to monitor erosion on selected meander bends. Bank pin exposure will be recorded at each monitoring event.

Digital Image Stations- Digital images will be used to subjectively evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation, and effectiveness of erosion control measures. Longitudinal images should indicate the absence of developing bars within the channel or an excessive increase in channel depth. Lateral images should not indicate excessive erosion or continuing degradation of banks over time. A series of images over time should indicate successional maturation of riparian vegetation.

1.2.2. Vegetation

Interim measures of vegetative success for the site will be the survival of at least 320 three-year-old trees per acre at the end of Year 3 and 260 five-year old trees per acre at the end of Year-5. The final vegetative success criteria will be the survival of 210 trees per acre at the end of Year 7.

1.3. Project Setting and Background

The Poplin Ridge Stream Restoration Site (Site) encompasses approximately 27.17 acres, of which 4.69 acres are wooded and the remaining 22.48 acres are agricultural fields and pastures. The western and eastern systems, UT1 and UT2 respectively, consist of unnamed tributaries to the East Fork of Stewarts Creek. UT1 is divided into seven reaches and UT2 is divided into five reaches. The Site is located within the Yadkin River Watershed (NCDWR sub basin 03-07-14 and HUC 03040105070050) in Union County, North Carolina, approximately six miles north of Monroe. The Site is located within the Stewarts Creek Watershed, a NCDMS targeted local watershed.

Following 2016 monitoring the NCIRT requested a review of the differential between the Approved Mitigation Plan and Baseline Monitoring Report. The table below details the discrepancies by reach. The primary cause of increased baseline SMUs is survey methodology (thalweg vs. centerline). The Mitigation Plan lengths were based on centerline. Also, UT2-4 had a large decrease in SMUs due to loss of land control. RES has reverted back to the Mitigation Plan (Proposed) SMUs.

Reach	Mitigation Type	Proposed Length (LF)*	Mitigation Ratio	Proposed SMUs	Baseline SMUs
UT1-1	Preservation	572	5:1	114	114
UT1-1	Enhancement I	566	1.5:1	377	377
UT1-2	P1 Restoration	1,171	1:1	1,171	1,178
UT1-3	P1 Restoration	901	1:1	901	893
UT1-4	Enhancement I	1,210	1.5:1	807	815
UT1-A	Enhancement I	217	1.5:1	145	144
UT1-B	Preservation	620	5:1	124	124
UT1-B	Enhancement I	455	1.5:1	303	303
UT1-C	Enhancement I	857	1.5:1	571	586
UT2-1	Enhancement II	490	2.5:1	196	196
UT2-2	P1 Restoration	847	1:1	847	847
UT2-3	P1 Restoration	521	1.5:1	347	347
UT2-4*	P1 Restoration	257	1:1	257	257
UT2-A	Enhancement II	463	2.5:1	185	184
Total		9,147		6,346	6,365

*Reach was shortened due to loss of land control.

**The contracted amount of credits for this Site was 6,944 SMUs

On July 11, 2018, the IRT, DMS, and RES had a site visit to discuss credit release at Poplin Ridge. It was determined that credits from UT2-1, UT2-2, and UT2-A associated with the drained pond bottom would be withheld (812.2 SMUs). Additionally, it was requested that RES submits a Remedial Action Plan to address the issues in the drained pond bottom and that a flow gauge is to be installed on UT2-A to document at least intermittent flow. RES repaired this reach in September 2019 and added the flow gauge to UT2-A. The Adaptive Management Plan is in **Appendix F**.

1.4. Project Performance

Monitoring Year 5 (MY5) data was collected throughout 2019 with the final field visit in October. Monitoring activities included visual assessment of all reaches and the surrounding easement, 17 permanent photo stations, 13 permanent vegetation monitoring plots, and 31 permanent cross sections.

Summary information and data related to the occurrence of items such as beaver activity or easement encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report (formerly the Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on NCDMS' website (<https://deq.nc.gov/about/divisions/mitigation-services/dms-projects>). All raw data supporting the tables and figures in the appendices is available from NCDMS upon request.

1.4.1. Vegetation

Visual assessment of the site indicates that herbaceous vegetation has become well established on-site. The areas of low stem density and poor growth were replanted in February 2018 with 1,000 containerized trees. Two of the vegetation plots (9 and 10) in the replanting areas still did not meet success. RES plans to replant these areas as well as the pond bottom in the winter/spring of 2020. The invasive species treatments from 2018 were effective and treatments will continue as needed throughout the monitoring period. The small encroachment area reported in 2018 was addressed in 2019 and is no longer a problem.

Monitoring of 13 permanent vegetation plots was completed in late August 2019. Summary tables and photographs associated with MY5 monitoring can be found in **Appendix C**. With the exception of Plots 9 and 10, MY5 monitoring data indicates that all vegetation monitoring plots met the MY5 interim success criteria of 260 planted stems per acre. Planted stem densities among the plots ranged from 40 to 931 planted stems per acre with a mean of 576 stems per acre across all plots. When volunteer stems are included, densities ranged between 40 and 1,578 total stems per acre with a mean of 669 stems per acre across all plots. A total of 19 plant species were documented within the monitoring plots. The average planted stem height in plots was 9.3 feet. Low stem densities in plots 9 and 10 are likely attributed to a combination of dry conditions and shallow, rocky soil. The areas in and around these plots were replanted in early 2018 but the replanted stems did not survive.

1.4.2. Stream Geomorphology

Visual assessment of the stream channel was performed in order to document signs of instability, such as eroding banks, structural instability, or excessive sedimentation. Small areas of bank scour, bed aggradation, and bed degradation were reported as problem areas in previous years but are no longer problem areas MY5. RES will continue to monitor these areas during future visits to assess the stability of the channel and the need for any repair.

Geomorphic data for MY5 was collected during June 2019 and October 2019 for XS1,2,8, 30, and 31. Cross-section plots and summary tables related to stream morphology are located in Appendix D. The MY5 stream morphology data indicate that, in general, the stream is stable. Several small changes were noted in the cross-section dimensions; however, these are relatively minor and do not exceed expected adjustments in channel form. Starting in MY5, baseline cross sectional area was used to determine bankfull for BHR and ER calculations and the current year's low top of bank was used to determine bankfull for cross sectional area and max depth. No riffle cross sections documented a BHR over 1.2. Cross section 8 had a beaver dam built directly on it that was removed in September 2019. The cross section plot shows the MY5 condition before and after dam removal. Cross sections 30 and 31 were installed in a riffle and a pool, respectively, on the repaired reach in the pond bottom. Cross sections 1 and 2 were also resurveyed in the

pond bottom to document an as-built condition. These four cross sections will be surveyed again in MY6 and MY7.

Bank pin arrays indicate that no erosion occurred during MY5. Bank pin array data will continue to be collected and analyzed in future monitoring years to monitor bank erosion trends.

Substrate monitoring was performed during MY5. Pebble count D_{50} fell into the coarse gravel range for UT1-1, medium gravel for UT1-2, coarse gravel for UT1-3, medium gravel for UT1-4, coarse gravel for UT1-A, coarse gravel for UT1-B, medium gravel for UT1-C, silty/clay for UT2-3, and medium gravel for UT2-A. A pebble count was not performed on UT2-4 due to a beaver pond. The channel substrate will continue to be monitored in future years for shifts in particle size distributions.

Overall, documented shifts in stream morphology do not exceed expectations between MY3 and MY5 as the stream adjusts to conditions at the site. The project is meeting success criteria regarding stable dimension as well as substrate and sediment transport.

1.4.3. Stream Hydrology

Since project completion in April 2015, six bankfull event have been recorded on UT1-2, 29 on UT1-4, and 29 on UT2-3. MY5 bankfull events are identified by manual crest gauge and transducer gauge readings (**Table 13**). The high number of bankfull events on UT2-3 are likely attributed to the beaver dam that was present for most of the summer. Stream hydrology issues were identified and discussed with the NCIRT during a site visit in July 2018. Per NCIRT request, RES installed a flow gauge downstream of XS-3 on UT2-A in January 2019. The flow gauge recorded 93 consecutive days of flow and 155 total days of flow in MY5. Additionally, RES observed some dry reaches during monitoring in July and October. RES believes this is characteristic for a slate belt site, especially for two months with below average rainfall. RES will continue to monitor flow on UT2-A (the project stream with the smallest drainage area) and if it shows data below that of an intermittent reach, RES will report flow on the crest gauges on UT1-2, UT1-4, and UT2-3.

1.4.4. Adaptive Management

During a site visit with NCIRT and NCDMS at the Poplin Ridge Site in July 2018, several problem areas were identified (**Appendix F**). Per the request of NCIRT, RES provided an Adaptive Management Plan to the IRT August 2019. The work proposed in the Adaptive Management Plan was completed in September 2019. The construction was completed as designed. The pond bottom will be planted in the winter/spring of 2020. Additionally, RES installed the flow gauge discussed in the Adaptive Management Plan, in January 2019 and it recorded 93 consecutive days of flow in MY5.

2.0 METHODS

Visual assessment of the project was performed at the beginning and end of the monitoring year. Permanent photo station photos were also collected during the morphologic and vegetation data collection events. Additionally, photos were taken of vegetation or stream problem areas not revealed in the permanent photo station images.

Geomorphic measurements (MY0, MY1, MY2, MY3, MY5, MY7) were taken during low flow conditions using a Topcon GTS-312 Total Station. Three-dimensional coordinates associated with each cross-section data were collected in the field and geo-referenced (NAD83 State Plane feet FIPS 3200). Morphological data was limited to 29 cross-sections. Survey data were imported into CAD, ArcGIS, and 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.

Vegetation success is being monitored at 13 permanent monitoring plots. Vegetation monitoring follows the CVS-EEP Level 2 Protocol for Recording Vegetation, version 4.2 (Lee et al. 2008) and includes analysis of species composition and density of planted specimens. Data is processed using the CVS data entry tool. In the field, the four corners of each plot were permanently marked with rebar and photos of each plot are taken from the origin each monitoring year.

Precipitation data was collected using an Onset HOBO Data Logging Rain Gauge. Bankfull events were documented with manual crest gauges, which were installed within each of the following reaches - UT1-2, UT1-4, and UT2-3. Crest gauge data was downloaded during quarterly site visits. The flow gauge is a pressure transducer located in a pool. Flow data is calculated by detecting pool water elevations greater than the elevation of the downstream riffle.

3.0 REFERENCES

Environmental Banc & Exchange. 2014. Poplin Ridge Stream Restoration Project Final Mitigation Plan. North Carolina Ecosystems Enhancement Program, Raleigh.

Lee, M.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>; accessed November 2008.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado

Appendix A
General Tables and Figures

**Table 1. Project Components and Mitigation Credits
Poplin Ridge Stream Restoration Project**

Mitigation Credits									
Type	Stream*		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen	Phosphorous
	R	RE	R	RE	R	RE		Nutrient Offset	Nutrient Offset
Totals	6107.87	238.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Project Components									
Project Component -or- Reach ID	As-Built		Existing		Approach (PI, PII etc.)	Restoration - or- Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio	SMUs
	Stationing/Location (LF)		Footage/Acreage						
UT1-1	1+20 to 6+92		572		Preservation	RE	572	1 : 5	114
UT1-1	6+92 to 12+58		566		EI	R	566	1 : 1.5	377
UT1-2	12+58 to 24+96		1,284		PI	R	1,171	1 : 1	1,171
UT1-3	24+96 to 34+50		833		PI	R	901	1 : 1	901
UT1-4	34+50 to 46+73		1,252		EI	R	1,210	1 : 1.5	807
UT1-A	0+73 to 2+89		197		EI	R	217	1 : 1.5	145
UT1-B	0+09 to 6+29		620		Preservation	RE	620	1 : 5	124
UT1-B	6+90 to 11+45		512		EI	R	455	1 : 1.5	303
UT1-C	1+21 to 10+01		883		EI	R	857	1 : 1.5	571
UT2-1	0+00 to 4+90		490		EII	R	490	1 : 2.5	196
UT2-2	4+90 to 13+97		875		PI	R	847	1 : 1	847
UT2-3	13+97 to 19+18		495		PI	R	521	1 : 1.5	347
UT2-4	19+18 to 22+07		270		PI	R	257	1 : 1	257
UT2-A	0+45 to 5+06		365		EII	R	463	1 : 2.5	185
Component Summation									
Restoration Level	Stream	Riparian Wetland		Non-riparian Wetland		Buffer	Upland		
	(linear feet)	(acres)		(acres)		(square feet)	(acres)		
		Riverine	Non-Riverine						
Restoration	3,697								
Enhancement I	3,305								
Enhancement II	953								
Creation									
Preservation	1,192								
High Quality									
Preservation									
BMP Elements									
Element	Location	Purpose/Function				Notes			
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BMP Elements									
BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond; FS = Filter Strip; S = Grassed Swale; LS = Level Spreader; NI = Natural Infiltration Area; FB = Forested Buffer									

**Table 2. Project Activity and Reporting History
Poplin Ridge Stream Restoration Project**

Activity or Report	Data Collection Complete	Completion or Delivery
Mitigation Plan	NA	Jul-14
Final Design – Construction Plans	NA	Oct-14
Construction Completed	Apr-15	Apr-15
Site Planting Completed	Apr-15	Apr-15
Baseline Monitoring Document (Year 0 Monitoring – baseline)	Apr-15	Jul-15
Year 1 Monitoring	Dec-15	Jan-16
Year 2 Monitoring	Sep-16	Oct-16
Invasive Species Treatment	NA	Aug-17
Year 3 Monitoring	Stream: Sep-17	Nov-17
	Vegetation: Sep-17	
Invasive Species Treatment and Supplemental Planting	NA	Feb-18
Invasive Species Treatment	NA	June-18
Invasive Species Treatment	NA	Aug-18
Year 4 Monitoring	Vegetation: Sep-18	Feb-19
Beaver Dam Removal	NA	Sept-19
Stream Adaptive Management (UT2-2 Pond Bottom)	NA	Sept-19
Year 5 Monitoring	Stream: June/July-19	Jan-20
	Vegetation: Aug-19	
Year 6 Monitoring		
Year 7 Monitoring		

**Table 3. Project Contacts Table
Poplin Ridge Stream Restoration Project**

Designer	WK Dickson and Co., Inc. 720 Corporate Center Drive Raleigh, NC 27607 (919) 782-0495 Frasier Mullen, PE
Construction Contractor	Wright Contracting PO Box 545 Siler City, NC 27344 (919) 663-0810 Joseph Wright
Planting Contractor	Resource Environmental Solutions, LLC 302 Jefferson Street, Suite 110 Raleigh, NC 27605 (919) 209-1061 David Godley
Seeding Contractor	Wright Contracting PO Box 545 Siler City, NC 27344 (919) 663-0810 Joseph Wright
Seed Mix Sources	Green Resource
Nursery Stock Suppliers	Arbogen, NC Forestry Services Nursery
Full Delivery Provider	Resource Environmental Solutions, LLC 302 Jefferson Street, Suite 110 Raleigh, NC 27605
Project Manager:	Brad Breslow
Monitoring Performers (MY0)	Resource Environmental Solutions, LLC 302 Jefferson Street, Suite 110 Raleigh, NC 27605 (919) 209-1061
Project Manager:	Brian Hockett, PLS
Monitoring Performers (MY1-MY2) 2015-2016	Equinox 37 Haywood Street, Suite 100 Asheville, NC 28801
Project Manager:	Drew Alderman (828) 253-6856
Monitoring Performers (MY3+) 2017+	Resource Environmental Solutions, LLC 302 Jefferson Street, Suite 110 Raleigh, NC 27605 (919) 741-6268
Project Manager:	Ryan Medric

Table 4. Project Information Poplin Ridge Stream Restoration Project						
Project Name	Poplin Ridge Stream Restoration Project					
County	Union					
Project Area (acres)	27.17					
Project Coordinates (latitude and longitude)	UT1: 35° 03' 15.97" N 80° 34' 21.64" W					
	UT2: 35° 03' 17.99" N 80° 33' 46.77" W					
Project Watershed Summary Information						
Physiographic Province	Piedmont					
River Basin	Yadkin					
USGS Hydrologic Unit 8-digit	3040105					
USGS Hydrologic Unit 14-digit	03040105070050					
DWQ Sub-basin	03-07-14					
Project Drainage Area (acres)	UT1: 1.14 square miles (728 acres)					
	UT2: 1.35 square miles (861 acres)					
Project Drainage Area Percentage of Impervious Area	UT1: 8%					
	UT2: 5%					
CGIA Land Use Classification	developed (open space, low density, med. density, high density), cultivated crops, pasture/hay, deciduous forest, evergreen forest					
Reach Summary Information						
Parameters	UT1-R1	UT1-R2	UT1-R3	UT1-R4	UT1-A	UT1-B
Length of reach (linear feet)	1,138	1,178	893	1,223	216	1,075
Valley Classification	VIII	VIII	VIII	VIII	VIII	VIII
Drainage area (acres)	136	248	384	728	88	120
NCDWQ stream identification score	35	22.5	30	31	35	35
NCDWQ Water Quality Classification	WS-III	WS-III	WS-III	WS-III	WS-III	WS-III
Morphological Description (stream type)	E4	E4	E4	C4	E4	E4/C4
Evolutionary trend	Stage I	Stage II	Stage II	Stage V	Stage I	Stage I/III
Underlying mapped soils	CmB	CmB, TbB2	CmB, TbB2	ChA	CmB	CmB
Drainage class	mod. well	mod. well; well	mod. well; well	somewhat poorly	mod. well	mod. well
Soil Hydric status	Not Hydric	Not Hydric	Not Hydric	Partially Hydric	Not Hydric	Not hydric
Slope	0.48%	0.70%	0.40%	0.50%	1.20%	1.80%
FEMA classification	N/A	N/A	N/A	Zone AE	N/A	N/A
Native vegetation community	mixed hardwood forest, cultivated	cultivated	cultivated	cultivated	cultivated	mixed hardwood forest, cultivated
Percent composition of exotic invasive vegetation	10%	0%	0%	0%	5%	15%

Table 4 Cont'd. Project Information Poplin Ridge Stream Restoration Project						
Reach Summary Information						
Parameters	UT1-C	UT2-R1	UT2-R2	UT2-R3	UT2-R4	UT2-A
Length of reach (linear feet)	880	490	847	521	257	461
Valley Classification	VIII	VIII	VIII	VIII	VIII	VIII
Drainage area (acres)	250	631	726	792	861	49
NCDWQ stream identification score	35	33.5	33.5	22.5	33.5	33.5
NCDWQ Water Quality Classification	WS-III	WS-III	WS-III	WS-III	WS-III	WS-III
Morphological Description (stream type)	E4	C4c	N/A	E4	E4	C4
Evolutionary trend	Stage IV	Stage VI	N/A	Stage II	Stage II	Stage IV
Underlying mapped soils	TbB2	ChA	ChA	ChA, BaB	ChA	ChA, CmA
Drainage class	well	somewhat poorly	somewhat poorly	somewhat poorly; well	somewhat poorly	somewhat poorly; mod. well
Soil Hydric status	Not Hydric	Partially Hydric	Partially Hydric	Partially Hydric	Partially Hydric	Not Hydric
Slope	0.80%	0.27%	0.10%	0.57%	0.31%	1.30%
FEMA classification	N/A	Zone AE	Zone AE	Zone AE	Zone AE	N/A
Native vegetation community	cultivated	woody cover, cultivated	cultivated	cultivated	cultivated	cultivated
Percent composition of exotic invasive vegetation	0%	20%	0%	0%	0%	0%
Regulatory Considerations						
Regulation	Applicable?	Resolved?	Supporting Documentation			
Waters of the United States - Section 404	Yes	Yes	SAW-2012-01079			
Waters of the United States - Section 401	Yes	Yes	DWR# 13-1087			
Endangered Species Act	Yes	Yes	USFWS (Corr. Letter)			
Historic Preservation Act	Yes	Yes	SHPO (Corr. Letter)			
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A			
FEMA Floodplain Compliance	Yes	Yes	EEP Floodplain Requirements Checklist			
Essential Fisheries Habitat	No	N/A	N/A			

Driving Directions: To access the site from the city of Monroe, travel west on West Roosevelt Boulevard, then turn north onto Secrest Shortcut Road. To access UT1, travel 3.6 miles on Secrest Shortcut Road, then turn right onto a gravel farm road and drive approximately 0.6 miles. To access UT2, travel north on Secrest Shortcut Road for 2.8 miles, then turn right onto Roanoke Church Road. After 0.8 miles, turn left onto a gravel farm road. This private road will split just past the pond on the left. At the split stay to the left and travel approximately 800 feet to access the downstream end of UT2.

The subject project site is an environmental restoration site of the NCDMS and encompassed by a recorded conservation easement, but is bordered by land with private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access to the general public is not permitted.

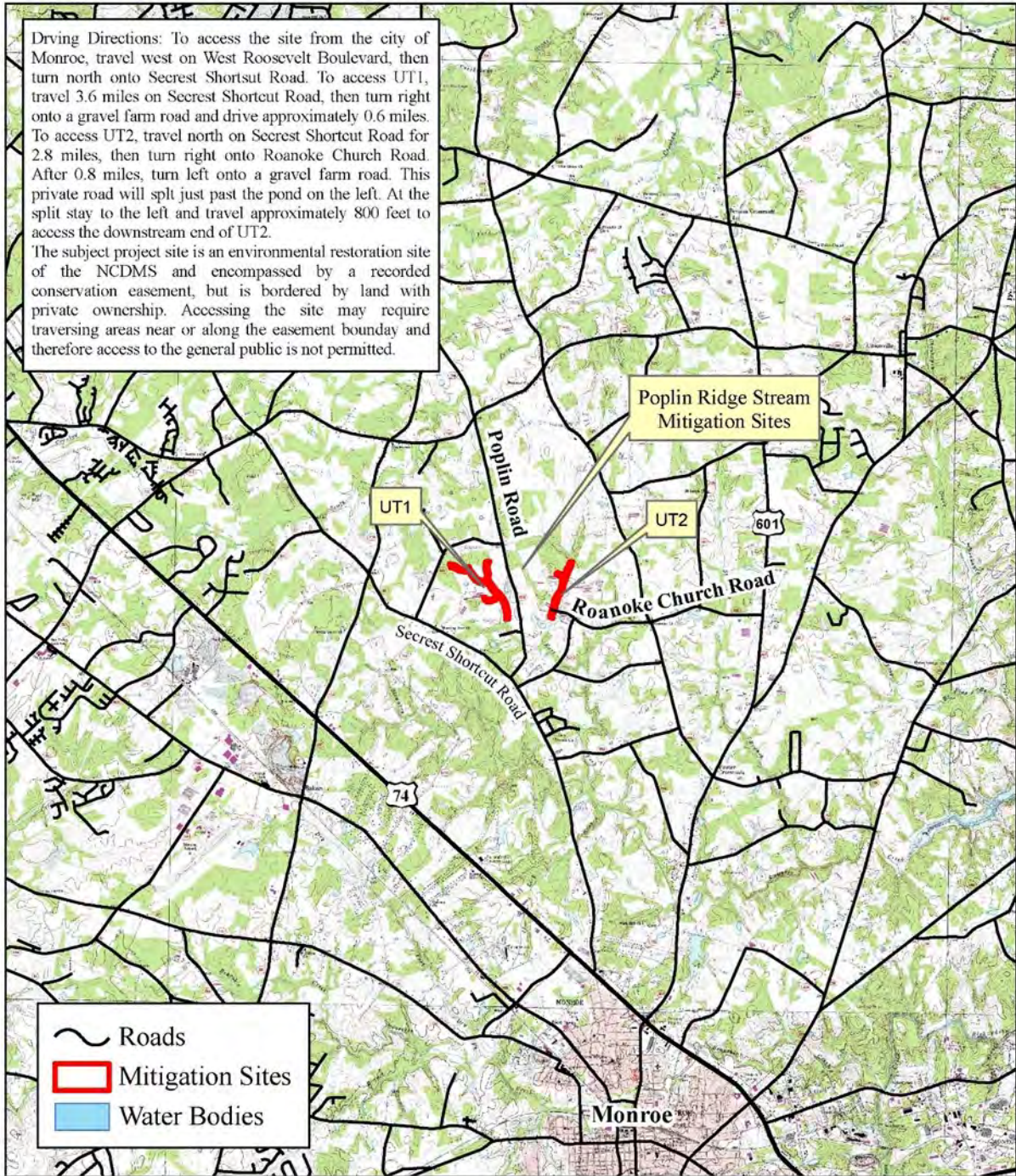
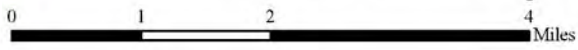


Figure 1
Poplin Ridge Mitigation Site
Project Vicinity Map



Appendix B
Visual Assessment Data

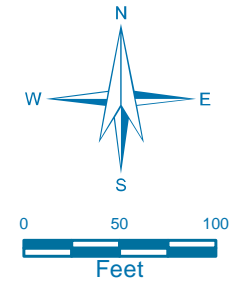


Figure 2
1
Poplin Ridge Stream Restoration Project
MY5 2019
Current Conditions
Plan View

Date: 11/11/2019 Drawn by: RTM

1 inch = 100 feet

LEGEND

- Conservation Easement
- Vegetation Plot**
- >260 stems/acre
- <260 stems/acre
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- + Crest Gauge
- + Flow Gauge
- + Rain Gauge
- ★ Photo Station
- Top of Bank

Vegetation Condition Assessment

		Target Community		
		Present	Marginal	Absent
Invasive Species	Absent	No Fill	No Fill	No Fill
	Present	No Fill	No Fill	No Fill



Source: 2015 NC OneMap Aerial Imagery

NC Center for Geographic Information & Analysis

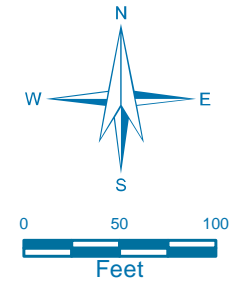


Figure 2
2
Poplin Ridge Stream Restoration Project
MY5 2019
Current Conditions
Plan View

Date: 11/11/2019 Drawn by: RTM

1 inch = 100 feet

LEGEND

- ▭ Conservation Easement
- Vegetation Plot**
- ▭ >260 stems/acre
- ▭ <260 stems/acre
- Cross Section
- - BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- ⊕ Crest Gauge
- ⊕ Flow Gauge
- ⊙ Rain Gauge
- ★ Photo Station
- Top of Bank

Vegetation Condition Assessment

		Target Community		
		Present	Marginal	Absent
Invasive Species	Absent	No Fill	▭	▭
	Present	▭	▭	▭



Source: 2015 NC OneMap Aerial Imagery

NC Center for Geographic Information & Analysis

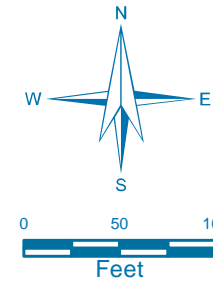


Figure 2
3
Poplin Ridge Stream Restoration Project
MY5 2019
Current Conditions
Plan View

Date: 11/11/2019 Drawn by: RTM

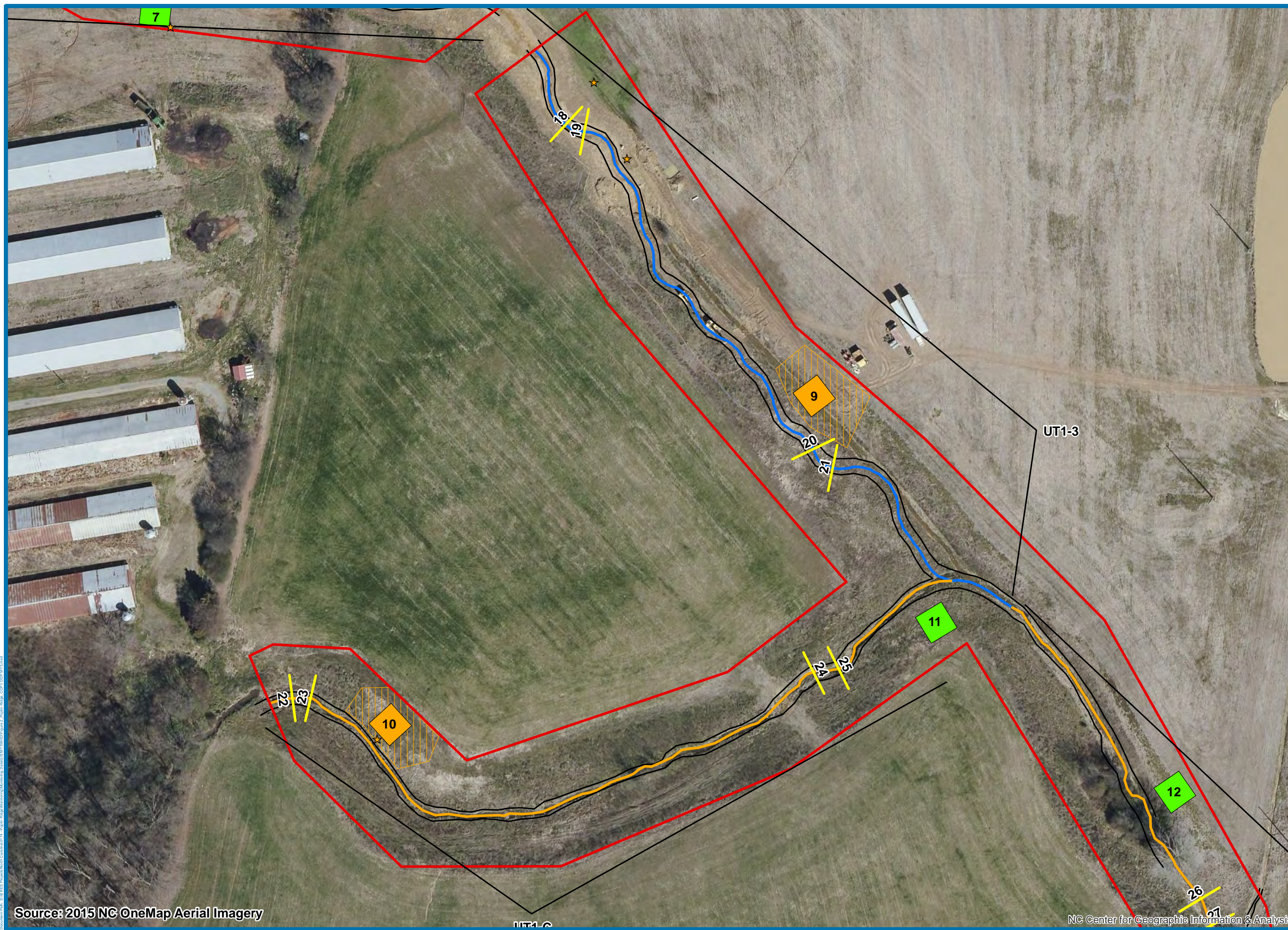
1 inch = 100 feet

LEGEND

- ▭ Conservation Easement
- Vegetation Plot**
- >260 stems/acre
- <260 stems/acre
- Cross Section
- - - BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station
- Top of Bank

Vegetation Condition Assessment

Invasive Species	Target Community		
	Present	Marginal	Absent
Absent	No Fill	No Fill	No Fill
Present	No Fill	No Fill	No Fill



Source: 2015 NC OneMap Aerial Imagery

NC Center for Geographic Information & Analysis

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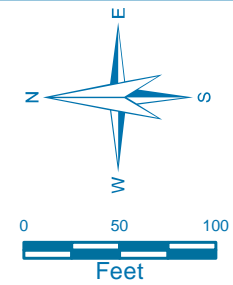


Figure 2
4
Poplin Ridge Stream Restoration Project
MY5 2019
Current Conditions
Plan View

Date: 11/11/2019 Drawn by: RTM

1 inch = 100 feet

LEGEND

- ▭ Conservation Easement
- Vegetation Plot**
- >260 stems/acre
- <260 stems/acre
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- ⊕ Crest Gauge
- ⊕ Flow Gauge
- ⊕ Rain Gauge
- ★ Photo Station
- Top of Bank

Vegetation Condition Assessment

		Target Community		
		Present	Marginal	Absent
Invasive Species	Absent	No Fill	Vertical Lines	Vertical Lines
	Present	Diagonal Lines	Diagonal Lines	Diagonal Lines



Source: 2015 NC OneMap Aerial Imagery

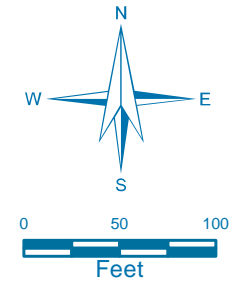


Figure 2
5
Poplin Ridge Stream Restoration Project
MY5 2019
Current Conditions
Plan View

Date: 11/11/2019 Drawn by: RTM

1 inch = 100 feet

LEGEND

- ▭ Conservation Easement
- Vegetation Plot**
- ▭ >260 stems/acre
- ▭ <260 stems/acre
- ▭ Cross Section
- BMP
- ▬ Enhancement I
- ▬ Enhancement II
- ▬ Preservation
- ▬ Restoration
- ▬ Stream Structure
- ⊕ Crest Gauge
- ⊕ Flow Gauge
- ⊕ Rain Gauge
- ★ Photo Station
- ▬ Top of Bank

Vegetation Condition Assessment

		Target Community		
		Present	Marginal	Absent
Invasive Species	Absent	No Fill	No Fill	No Fill
	Present	X	X	X



Source: 2015 NC OneMap Aerial Imagery

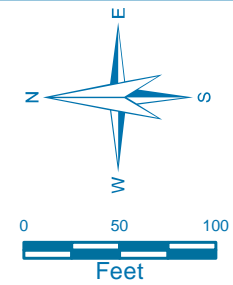


Figure 2
6
Poplin Ridge Stream Restoration Project
MY5 2019
Current Conditions
Plan View

Date: 11/11/2019 Drawn by: RTM

1 inch = 100 feet

LEGEND

- ▭ Conservation Easement
- Vegetation Plot**
- ▭ >260 stems/acre
- ▭ <260 stems/acre
- ▬ Cross Section
- - - BMP
- ▬ Enhancement I
- ▬ Enhancement II
- ▬ Preservation
- ▬ Restoration
- ▬ Stream Structure
- ⊕ Crest Gauge
- ⊕ Flow Gauge
- ⊕ Rain Gauge
- ★ Photo Station
- ▬ Top of Bank

Vegetation Condition Assessment

		Target Community		
		Present	Marginal	Absent
Invasive Species	Absent	No Fill	No Fill	No Fill
	Present	X	X	X



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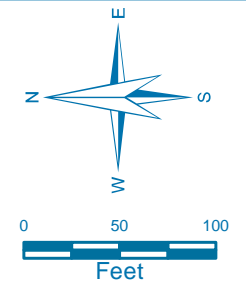


Figure 2
7
Poplin Ridge Stream Restoration Project
MY5 2019
Current Conditions
Plan View

Date: 11/11/2019 Drawn by: RTM

1 inch = 100 feet

LEGEND

- ▭ Conservation Easement
- Vegetation Plot**
- ▭ >260 stems/acre
- ▭ <260 stems/acre
- Cross Section
- - BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- ⊕ Crest Gauge
- ⊕ Flow Gauge
- ⊕ Rain Gauge
- ★ Photo Station
- Top of Bank

Vegetation Condition Assessment

		Target Community		
		Present	Marginal	Absent
Invasive Species	Absent	No Fill	No Fill	No Fill
	Present	X	X	X



**Table 5. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-1 - Enhancement I
Assessed Length 566 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%				
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%				
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	-	-							-
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	-	-						-
	4. Thalweg Position	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	-	-							-
		1. Thalweg centering at upstream of meander bend (Run).	-	-							-
		2. Thalweg centering at downstream of meander bend (Glide).	-	-							-
	2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			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.	3	3				100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3				100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3				100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	3	3				100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	3	3				100%			

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-2 - P1 Restoration
Assessed Length 1,178 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	26	26		100%				
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	25	25		100%				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	25	25		100%				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	25	25		100%				
		2. Thalweg centering at downstream of meander bend (Glide).	25	25		100%				
2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			1	8	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> 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.	3	3		100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3		100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3		100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	3	3		100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio \geq 1.6. Rootwads/logs providing some cover at base-flow.	3	3		100%				

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-3 - P1 Restoration
Assessed Length 893 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	18	18		100%				
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	18	18		100%				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	18	18		100%				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	18	18		100%				
		2. Thalweg centering at downstream of meander bend (Glide).	18	18		100%				
2. 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 <u>NOT</u> 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
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	3	3		100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3		100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3		100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	3	3		100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio \geq 1.6. Rootwads/logs providing some cover at base-flow.	3	3		100%				

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-4 - Enhancement I
Assessed Length 1,223 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%				
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%				
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	-	-							-
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	-	-						-
	4. Thalweg Position	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	-	-							-
		1. Thalweg centering at upstream of meander bend (Run).	-	-							-
	2. Thalweg centering at downstream of meander bend (Glide).	-	-				-				
2. 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 <u>NOT</u> 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.	N/A	N/A				N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A				N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A				N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	N/A	N/A				N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	N/A	N/A				N/A			

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-A - Enhancement I
Assessed Length 216 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%				
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%				
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	-	-							-
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	-	-						-
	4. Thalweg Position	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	-	-							-
		1. Thalweg centering at upstream of meander bend (Run).	-	-							-
	2. Thalweg centering at downstream of meander bend (Glide).	-	-				-				
2. 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 <u>NOT</u> 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.	N/A	N/A				N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A				N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A				N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	N/A	N/A				N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	N/A	N/A				N/A			

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-B - Enhancement I
Assessed Length 455 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation		
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%					
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%					
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	11	11			100%					
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	11			11				100%	
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).		11	11			100%					
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	11	11			100%					
		2. Thalweg centering at downstream of meander bend (Glide).	11	11			100%					
2. Bank	1. <u>Scoured / Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.					0	0	100%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.					0	0	100%	N/A	N/A	N/A
	3. <u>Mass Wasting</u>	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. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	1	1			100%					
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%					
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	1	1			100%					
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	1	1			100%					
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	1	1			100%					

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-C - Enhancement I
Assessed Length 880 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	14	14		100%				
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	13	13		100%				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	13	13		100%				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	13	13		100%				
		2. Thalweg centering at downstream of meander bend (Glide).	13	13		100%				
2. 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 <u>NOT</u> 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.	2	2		100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	2	2		100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2		100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	2	2		100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio \geq 1.6. Rootwads/logs providing some cover at base-flow.	2	2		100%				

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT2-1 - Enhancement II
Assessed Length 490 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	-	-			-			
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	-	-					
	4. Thalweg Position	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	-	-			-			
		1. Thalweg centering at upstream of meander bend (Run).	-	-			-			
	2. Thalweg centering at downstream of meander bend (Glide).	-	-			-				
2. 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
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	2	2			100%			

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT2-2 - P1 Restoration
Assessed Length 847 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%				
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%				
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	5	5							100%
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	5	5						100%
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).		5	5							100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	5	5							100%
		2. Thalweg centering at downstream of meander bend (Glide).	5	5							100%
2. 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 <u>NOT</u> 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.	2	2				100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	2	2				100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2				100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	2	2				100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	2	2				100%			

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT2-3 - P1 Restoration
Assessed Length 521 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	8	8		100%				
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	8	8		100%				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	8	8		100%				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	8	8		100%				
		2. Thalweg centering at downstream of meander bend (Glide).	8	8		100%				
2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.				0	0	100%	0	0
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> 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.	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	3	3			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	3	3			100%			

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT2-4 - P1 Restoration
Assessed Length 257 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation	
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%				
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%				
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	4	4							100%
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	5	5						100%
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).		5	5							100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	5	5							100%
		2. Thalweg centering at downstream of meander bend (Glide).	5	5							100%
2. 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 <u>NOT</u> 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.	N/A	N/A				N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A				N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A				N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	N/A	N/A				N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio \geq 1.6. Rootwads/logs providing some cover at base-flow.	N/A	N/A				N/A			

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT2-A - Enhancement II
Assessed Length 461 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	10	10			100%			
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	13	13			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	13	13			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	13	13			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	13	13			100%			
2. 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 <u>NOT</u> 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
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	5	5			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	5			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	5	5			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	5	5			100%			

**Table 6. Vegetation Condition Assessment
Poplin Ridge Stream Restoration Site**

Planted Acreage : 22.5					
Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	N/A	0	0.00	0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	Orange Simple Hatch	3	0.83	4%
			Totals	3	0.83
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	N/A	0	0.00	0%
			Cumulative Totals	3	0.83
Easement Acreage : 27.1					
Vegetation Category	Definitions	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).	N/A	0	0.00	0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	N/A	0	0.00	0%

N/A - Item does not apply.

Monitoring Year 5 – 2019 Photo Station Photos



**Project Reach UT1-1 – Permanent Photo Station 1
Station 8+53 – Looking Upstream**



**Project Reach UT1-2 – Permanent Photo Station 2
Station 14+58 – Looking Upstream at Crossing
September 27, 2017**



Project Reach UT1-2 – Permanent Photo Station 3
Station 21+50 – Looking Downstream



Project Reach UT1-3 – Permanent Photo Station 4
Station 26+50 – Looking Upstream at Crossing



Project Reach UT1-3 – Permanent Photo Station 5
Station 27+50 – Looking Downstream



Project Reach UT1-4 – Permanent Photo Station 6
Station 47+20 – Looking Upstream



Project Reach UT1-A - Permanent Photo Station 7
Station 2+00 – Looking Downstream



Project Reach UT1-B – Permanent Photo Station 8
Station 9+86 – Looking Downstream



Project Reach UT1-C – Permanent Photo Station 9
Station 2+50 – Looking Upstream



Project Reach UT2-1 – Permanent Photo Station 10
Station 4+50 – Looking Upstream



Project Reach UT2-2– Permanent Photo Station 11
Station 11+00 – Looking Upstream at Pond Bottom
January 2019



Project Reach UT2-2 – Permanent Photo Station 12
Station 11+00 – Looking Downstream



Project Reach UT2-2 – Permanent Photo Station 13
Station 7+59 – Looking Downstream



Project Reach UT2-3 – Permanent Photo Station 14
Station 13+83 – Looking Downstream



Project Reach UT2-4 – Permanent Photo Station 15
Station 20+39 – Looking Downstream



Project Reach UT2-A – Permanent Photo Station 16
Station 1+22 – Looking Upstream



Project Reach UT2-A – Permanent Photo Station 17
Station 2+62 – Looking Downstream

Monitoring Year 5 – 2019 Problem Area Photos



Low Stem Density Area (VP9)



Low Stem Density Area (VP10)

Appendix C
Vegetation Plot Data

Table 7. MY5 Vegetation Plot Criteria Attainment

Plot #	Planted Stems/Acre	Volunteer Stems/Acre	Total Stems/Acre	Success Criteria Met?	Average Planted Stem Height (ft)
1	647	243	890	Yes	9.7
2	324	40	364	Yes	9.0
3	647	81	728	Yes	12.8
4	931	121	1052	Yes	11.6
5	931	647	1578	Yes	7.7
6	769	40	809	Yes	7.7
7	809	0	809	Yes	10.2
8	647	0	647	Yes	5.0
9	121	0	121	No	4.9
10	40	0	40	No	10.8
11	526	81	607	Yes	7.3
12	445	40	486	Yes	12.9
13	647	0	647	Yes	9.0
Project Avg	576	109	669	Yes	9.3

Table 8. CVS Vegetation Plot Metadata Poplin Ridge Stream Restoration Site	
Report Prepared By	Ryan Medric
Date Prepared	9/7/2019 0:00
database name	Poplin Ridge 95359 2019 MY5 CVS Vegetation.mdb
database location	
computer name	
file size	
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY-----	
Project Code	95359
project Name	Poplin Ridge Stream Restoration Project
Description	
River Basin	Yadkin-Pee Dee
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	13

Table 9. Total Planted Stem Counts

Poplin Ridge			Annual Means																	
Scientific Name	Common Name	Species Type	MY5 (2019)			MY4 (2018)			MY3 (2017)			MY2 (2016)			MY1 (2015)			MY0 (2015)		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree			5			5			3									
Acer negundo var. negun	boxelder	Tree												4						
Acer rubrum	red maple	Tree			1			3			123									
Acer rubrum var. rubrum	red maple	Tree											121							
Asimina triloba	pawpaw	Tree							1	1	1	4	4	4	5	5	5	21	21	21
Baccharis halimifolia	eastern baccharis	Shrub																		
Betula nigra	river birch	Tree	12	12	12	12	12	12	7	7	7	9	9	9	9	9	9	27	27	27
Carya	hickory	Tree												6			2			
Carya alba	mockernut hickory	Tree						2			5									
Carya glabra	pignut hickory	Tree			1															
Celtis laevigata	sugarberry	Tree			1			2												
Celtis occidentalis	common hackberry	Tree												32			9			
Diospyros virginiana	common persimmon	Tree	1	1	3	1	1	5	1	1	7			4			2			
DONTKNOW: unsure record																		7	7	7
Fraxinus pennsylvanica	green ash	Tree	4	4	5	4	4	4	1	1	3			3			2			
Juniperus virginiana	eastern redcedar	Tree						2												
Liquidambar styraciflua	sweetgum	Tree			17			14			17			106			8			
Liriodendron tulipifera	tuliptree	Tree	6	6	7	6	6	6	6	6	6	7	7	7	7	7	7	34	34	34
Nyssa sylvatica	blackgum	Tree	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3			
Platanus occidentalis	American sycamore	Tree	27	27	27	27	27	27	21	21	21	21	21	21	20	20	20	26	26	26
Populus deltoides	eastern cottonwood	Tree			2												7			
Pyrus calleryana	Callery pear	Exotic																		
Quercus	oak	Tree										2	2	2	31	31	31	126	126	126
Quercus alba	white oak	Tree													1	1	1	9	9	9
Quercus falcata	southern red oak	Tree													4	4	4	10	10	10
Quercus lyrata	overcup oak	Tree	3	3	3	3	3	3	3	3	3									
Quercus michauxii	swamp chestnut oak	Tree	3	3	3	3	3	3	4	4	4	5	5	5	4	4	4	8	8	8
Quercus nigra	water oak	Tree	56	56	56	59	59	59	65	65	65	79	79	79	69	69	69	22	22	22
Quercus phellos	willow oak	Tree	41	41	41	42	42	42	45	45	45	43	43	43	46	46	46	50	50	50
Quercus rubra	northern red oak	Tree	17	17	17	18	18	18	19	19	19	21	21	21	8	8	17			
Quercus velutina	black oak	Tree	11	11	11	12	12	12	14	14	14	14	14	14	6	6	6			
Sambucus canadensis	Common Elderberry	Shrub			1												2			
Ulmus alata	winged elm	Tree						3			18									
Ulmus rubra	slippery elm	Tree												2						
Stem count			185	185	215	191	191	226	191	191	365	209	209	499	213	213	252	340	340	340
size (ares)			13			13			13			13			13			13		
size (ACRES)			0.32			0.32			0.32			0.32			0.32			0.32		
Species count			12	12	19	12	12	19	13	13	18	11	11	21	13	13	19	11	11	11
Stems per ACRE			576	576	669	595	595	704	595	595	1136	651	651	1553	663	663	784	1058	1058	1058

Monitoring Year 5 – 2019 Vegetation Plot Photos



Poplin Ridge - Vegetation Monitoring Plot 1



Poplin Ridge - Vegetation Monitoring Plot 2



Poplin Ridge - Vegetation Monitoring Plot 3



Poplin Ridge - Vegetation Monitoring Plot 4



Poplin Ridge - Vegetation Monitoring Plot 5



Poplin Ridge - Vegetation Monitoring Plot 6



Poplin Ridge - Vegetation Monitoring Plot 7



Poplin Ridge - Vegetation Monitoring Plot 8



Poplin Ridge - Vegetation Monitoring Plot 9



Poplin Ridge - Vegetation Monitoring Plot 10



Poplin Ridge - Vegetation Monitoring Plot 11



Poplin Ridge - Vegetation Monitoring Plot 12



Poplin Ridge - Vegetation Monitoring Plot 13

Appendix D
Stream Geomorphology Data

Table 10 - Morphological Parameters Summary (Reach UT1)

Project Name/Number: Poplin Ridge Stream Restoration Project

Feature	Reference Reach		Existing										Design				As-Built MY0							
			UT1-R1		UT1-R2		UT1-R3		UT1-R4		UT1-A		UT1-B		UT1-C		UT1-R2		UT1-R3		UT1-R2		UT1-R3	
			Pres.	Enh. I	Rest.	Rest.	Enh. I	Enh. I	Pres.	Enh. I	Pres.	Enh. I	Pres.	Enh. I	Rest.	Rest.	Rest.	Rest.	Rifle	Pool	Rifle	Pool	Rifle	Pool
Drainage Area (ac)	426	426	136	136	248	384	728	88	120	120	250	248	Pool	384	Pool	248	Pool	384	Pool	248	Pool	384	Pool	
NC Regional Curve Discharge (cfs)	69		31	31	47	64	100	22	28	28	47	47	Pool	64	Pool	47	Pool	64	Pool	47	Pool	64	Pool	
Design/Approx. Bankfull Discharge (cfs)	50		22	22	35	55	65	20	15	30	50	35	Pool	52	Pool	35	Pool	52	Pool	35	Pool	52	Pool	
Dimension																								
BF Width (ft)	13.7	15.0	7.9	7.5	9.9	12.8	17.5	6.9	11.2	6.0	10.0	11.8	12.8	13.6	14.8	12.95	14.85	15.35	15.15					
Floodprone Width (ft)	>50	NA	>50	>50	>50	>50	>50	>50	>50	>50	>40	>50	NA	>50	>50	>50	>50	>50	NA					
BF Cross Sectional Area (ft ²)	18.1	23.4	10.1	10.4	14.2	22.2	21.9	6.8	6.1	5.5	10.0	14.5	19.9	18.8	26.9	17.3	19.15	22.4	21.45					
BF Mean Depth (ft)	1.4	1.6	1.3	1.4	1.4	1.7	1.2	1.0	0.5	0.9	1.0	1.2	1.6	1.4	1.8	1.3	1.25	1.45	1.45					
BF Max Depth (ft)	1.7	2.7	2.0	1.8	2.0	2.4	2.3	1.4	1.0	1.1	1.3	1.8	2.4	1.9	2.8	2.1	2.35	2.25	2.55					
Width/Depth Ratio	9.8	9.6	6.2	5.4	7.0	7.4	14.0	6.9	20.4	6.6	10.0	9.8	8.2	9.9	8.1	9.7	11.65	10.5	10.75					
Entrenchment Ratio	>2.2	NA	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	NA	>2.2	NA	>2.2	>2.2	>2.2	>2.2					
Wetted Perimeter (ft)	14.9	16.8	10.4	9.1	11.6	14.5	19.0	8.2	11.8	7.5	11.1	12.6	14	14.7	16.2	13.9	15.95	16.35	16.4					
Hydraulic Radius (ft)	1.2	1.4	1.0	1.1	1.2	1.5	1.2	0.8	0.5	0.7	0.9	1.1	1.4	1.4	1.7	1.25	1.15	1.4	1.3					
Substrate																								
D16 (mm)	2.8		0.062	0.062	0.062	2	3	0.062	2	3	2	2	2	2	2	0.062	1.7							
D50 (mm)	11.0		0.062	16.0	2	8	25	0.1	29	12	11	8	8	8	8	0.062	25							
D84 (mm)	16.0		0.062	63.0	7	25	51	0.4	60	27	45	25	25	25	26	60								
Pattern																								
	Min	Max	Med	---	---	---	---	---	---	---	---	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Channel Beltwidth (ft)	26.3	55.5	37.3	---	---	---	---	---	---	---	---	38	57	44	65	35	60	42	65					
Radius of Curvature (ft)	13.5	103.3	41.2	---	---	---	---	---	---	---	---	18	89	20	103	15	75	17	80					
Radius of Curvature Ratio	1.0	7.6	3.0	---	---	---	---	---	---	---	---	1.5	7.6	1.5	7.6	1.5	7.6	1.5	7.6					
Meander Wavelength (ft)	49.4	66.0	59.7	---	---	---	---	---	---	---	---	38	57	44	65	35	52	37	56					
Meander Width Ratio	3.6	4.8	4.4	---	---	---	---	---	---	---	---	3.2	4.8	3.2	4.8	2.7	4.0	2.7	4.3					
Profile																								
	Min	Max	Med	---	---	---	---	---	---	---	---	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Rifle Length (ft)	6	18	9	---	---	---	---	---	---	---	---	5	16	6	18	6	18	7	22					
Rifle Slope (%)	1.1	3.4	2.3	---	---	---	---	---	---	---	---	1.1	3.4	1.1	3.4	1.0	3.6	1.0	3.7					
Run Length (ft)	7	15	8	---	---	---	---	---	---	---	---	6	13	7	15	6	15	8.0	18.0					
Run Slope (%)	4.8	11.5	8.2	---	---	---	---	---	---	---	---	4.8	11.5	4.8	11.5	4.6	12.0	5.0	11.0					
Glide Length (ft)	5	13	9	---	---	---	---	---	---	---	---	4	11	5	13	4	12	6.0	13.2					
Glide Slope (%)	4.8	9.2	7.0	---	---	---	---	---	---	---	---	4.8	9.2	4.8	9.2	4.7	10.0	5.0	10.9					
Pool Length (ft)	5	42	15	---	---	---	---	---	---	---	---	4	36	5	42	6	42	8.0	50.0					
Pool Slope (%)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.1	2.5	1.1	2.4					
Pool-to-Pool Spacing (ft)	18.0	64.0	30.0	---	---	---	---	---	---	---	---	16	55	18	64	20	60	20	70					
Additional Reach Parameters																								
Valley Length (ft)	279		622	534	1,173	731	1,294	264	573	434	908	---	---	---	---	1,070	1,115							
Channel Length (ft)	318		716	541	1,197	738	1,340	270	618	449	921	---	---	---	---	1,178	1,223							
Sinuosity	1.14		1.2	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1							
Water Surface Slope (ft/ft)	0.0048		NA	NA	NA	0.003	0.004	NA	NA	NA	NA	---	---	---	---	NA	NA							
Channel Slope (ft/ft)	0.0047		0.0048	0.011	0.007	0.004	0.005	0.012	0.012	0.018	0.008	0.0059	0.0046	0.0066	0.0041									
Rosgen Classification	E4		E4	E4	E4	E4	C4	E5	C4	E4	E4	E4	E4	E4	E4	E4	E4							

Table 10 Cont'd - Morphological Parameters Summary (Reach UT2)

Project Name/Number: Poplin Ridge Stream Restoration Project

Feature	Reference Reach		Existing					Design				As-Built MY0				
			UT2-R1	UT2-R2	UT2-R3	UT2-R4	UT2-A	UT1-R2		UT1-R3/R4		UT1-R2		UT1-R3/R4		
			Enh. II	Rest.	Rest.	Rest.	Enh. II	Rest.		Rest.		Rest.		Rest.		
	Riffle	Pool	Riffle	Pond	Riffle	Riffle	Riffle	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	
Drainage Area (ac)	426	426	634	723	742	864	51	723		864		723		864		
NC Regional Curve Discharge (cfs)	69							100		113		100		113		
Design/Approx. Bankfull Discharge (cfs)	50		---	---	---	---	---	52		70		52		70		
Dimension																
BF Width (ft)	13.7	15.0	25.6	---	16.2	12.1	6.1	17.2	18.6	18.2	19.6	21	19.6	17.4	21.1	
Floodprone Width (ft)	>50	NA	>50	---	>50	>50	>50	>50	NA	>50	NA	>50	>50	>50	>50	
BF Cross Sectional Area (ft ²)	18.1	23.4	19.6	---	22.4	12.6	3.0	31.5	42	34.8	47.6	26.5	32.6	30.8	34.4	
BF Mean Depth (ft)	1.4	1.6	0.8	---	1.4	1.0	0.5	1.8	2.3	1.9	2.4	1.3	1.7	1.8	1.6	
BF Max Depth (ft)	1.7	2.7	1.7	---	2.6	1.6	1.2	2.5	3.5	2.6	3.8	2.2	3.1	2.5	3.5	
Width/Depth Ratio	9.8	9.6	33.5	---	11.8	11.6	12.2	9.4	8.2	9.5	8.1	16.6	11.7	9.8	12.9	
Entrenchment Ratio	>2.2	NA	>2.2	---	>2.2	>2.2	>2.2	>2.2	NA	>2.2	NA	>2.2	>2.2	>2.2	>2.2	
Wetted Perimeter (ft)	14.9	16.8	26.2	---	17.9	13.1	7.0	18.5	20.3	19.5	21.5	21.7	21.2	18.5	22.9	
Hydraulic Radius (ft)	1.2	1.4	0.7	---	1.3	1.0	0.4	1.7	2.1	1.8	2.2	1.2	1.5	1.7	1.5	
Substrate																
D16 (mm)	2.8		0.062	---	0.062	1.5	0.062	1.5		1.5		0.062		0.062		
D50 (mm)	11.0		0.062	---	0.062	7.8	0.062	7.8		7.8		0.062		28		
D84 (mm)	16.0		0.72	---	4.8	15.0	0.57	15		15		24		61		
Pattern																
	Min	Max	Med	---	---	---	---	---	Min	Max	Min	Max	Min	Max	Min	Max
Channel Beltwidth (ft)	26	56	37	---	---	---	---	---	55	83	58	87	67	101	56	84
Radius of Curvature (ft)	13	103	41	---	---	---	---	---	26	130	27	138	32	160	26	132
Radius of Curvature Ratio	1.0	7.6	3.0	---	---	---	---	---	1.5	7.6	1.5	7.6	1.5	7.6	1.5	7.6
Meander Wavelength (ft)	49	66	60	---	---	---	---	---	55	83	58	87	67	101	56	84
Meander Width Ratio	1.9	4.1	2.7	---	---	---	---	---	3.2	4.8	3.2	4.8	3.2	4.8	3.2	4.8
Profile																
	Min	Max	Med	---	---	---	---	---	Min	Max	Min	Max	Min	Max	Min	Max
Riffle Length (ft)	6	18	9	---	---	---	---	---	8	23	8	24	9.0	25.0	8.2	26.5
Riffle Slope (%)	1.1	3.4	2.3	---	---	---	---	---	1.1	3.4	1.1	3.4	1.1	3.6	1.2	3.8
Run Length (ft)	7	15	8	---	---	---	---	---	9	19	9	20	11.0	17.0	10.2	21.0
Run Slope (%)	4.8	11.5	8.2	---	---	---	---	---	4.8	11.5	4.8	11.5	4.2	12.0	3.8	11.2
Glide Length (ft)	5	13	9	---	---	---	---	---	6	16	7	17	6.2	18.2	7.5	16.3
Glide Slope (%)	4.8	9.2	7.0	---	---	---	---	---	4.8	9.2	4.8	9.2	5.1	9.6	4.8	9.1
Pool Length (ft)	5	42	15	---	---	---	---	---	6	53	7	56	7.8	47.0	8.5	60.0
Pool Slope (%)	---	---	---	---	---	---	---	---	---	---	---	---	3.5	10.0	4.1	10.1
Pool-to-Pool Spacing (ft)	18.0	64.0	30.0	---	---	---	---	---	23	81	24	85	18.0	90.0	20.5	92.0
Additional Reach Parameters																
Valley Length (ft)	279		410	641	779	1,015	427	---		---		785		710		
Channel Length (ft)	318		443	641	781	1,032	437	---		---		847		778		
Sinuosity	1.14		1.1	1.0	1.0	1.0	1.0	1.1		1.1		1.08		1.1		
Water Surface Slope (ft/ft)	0.0048		NA	NA	NA	0.0027	NA	---		---		---		---		
Channel Slope (ft/ft)	0.0047		0.0027	0.001	0.0057	0.0031	0.013	0.0029		0.0028		0.0061		0.002		
Rosgen Classification	E4		C5c	NA	E5	E4	C5	E4		E4		E4		E4		

**Table 11a. - Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Poplin Ridge Stream Restoration Project**

	Cross Section 1 (Run) Reach UT2-2*							Cross Section 2 (Run) Reach UT2-2*							Cross Section 3 (Riffle) Reach UT2-A							Cross Section 4 (Riffle) Reach UT2-A							Cross Section 5 (Run) Reach UT2-3						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1 ¹	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	577.24	577.24	577.24	577.24	578.14			577.10	577.10	577.10	577.10	577.99			586.40	586.40	586.40	586.40	586.85			585.00	585.00	585.00	585.00	585.39			576.32	576.32	576.32	576.32	576.75		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8			3.0	5.6	5.3	3.9	8.0			8.2	8.0	7.5	7.5	10.7			11.0	8.8	7.5	8.5	16.7			21.0	19.3	18.0	17.1	28.3		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4			>15.2	>15.2	>15.2	11.2	66.2			>50.0	>50.0	>50.0	44.0	>50.5			>44.4	>44.4	>50.0	39.8	>49.8			>50	>50	>50	>50	>50.5		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---			0.4	0.5	0.4	0.1	---			1.0	0.8	0.8	0.6	---			0.7	0.6	0.8	0.5	---			1.3	1.3	1.3	1.1	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8			0.6	1.3	0.8	0.3	1.1			1.7	1.5	1.3	1.2	1.1			1.3	1.1	1.3	1.1	1.0			2.2	2.2	2.4	1.8	2.0		
Low Bank Elevation (ft)	-	-	-	-	578.14			-	-	-	-	577.99			-	-	-	-	586.39			-	-	-	-	584.95			-	-	-	-	576.39		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2			1.1	2.7	2.2	0.5	5.8			7.9	6.7	5.7	4.7	7.9			7.4	5.0	5.7	4.1	3.0			26.5	25.2	22.9	19.0	17.9		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---			7.9	11.5	12.5	28.8	---			8.5	9.5	9.9	11.9	---			16.4	15.6	9.9	17.4	---			16.6	14.9	14.2	15.5	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8			>2.2	>2.7	>2.9	2.9	8.3			>2.2	>6.3	>6.7	5.9	>4.7			>2.2	>5.0	>6.7	4.7	3.0			>2.2	>2.6	>2.8	>2.9	>1.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0			1.0	1.0	1.0	2.0	1.0			1.0	1.0	1.0	1.1	0.7			1.0	1.0	1.0	1.1	0.7			1.0	1.0	1.0	0.9	0.8		
	Cross Section 6 (Pool) Reach UT2-3							Cross Section 7 (Pool) Reach UT2-4							Cross Section 8 (Riffle) Reach UT2-4							Cross Section 9 (Riffle) Reach UT1-1							Cross Section 10 (Pool) Reach UT1-1						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1 ¹	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	576.48	576.48	576.48	576.48	576.99			575.00	575.00	575.00	575.00	575.17			575.01	575.01	575.01	575.01	575.34			602.06	602.06	602.06	602.06	602.07			602.28	602.28	602.28	602.28	602.37		
Bankfull Width (ft) ¹	19.6	19.1	19.4	18.7	22.3			21.1	18.7	18.5	18.8	19.5			17.4	17.1	16.9	17.2	16.2			11.7	11.4	11.4	11.6	14.2			15.2	14.7	14.6	15.5	16.9		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.1			>50.0	>50.0	>50.0	>50.0	>50			>50.0	>50.0	>50.0	>50.0	>50.2			>50.0	>50.0	>50.0	>50.0	>48.7			>50	>50	>50	>50	>50.0		
Bankfull Mean Depth (ft)	1.7	1.6	1.6	1.4	---			1.6	1.7	1.7	1.6	---			1.8	1.7	1.7	1.6	---			1.1	1.1	1.1	1.1	---			1.4	1.3	1.3	1.3	---		
Bankfull Max Depth (ft) ²	3.1	3.0	3.0	2.8	2.1			3.5	3.4	3.4	3.2	3.6			2.5	2.4	2.5	2.3	2.8			1.8	1.8	1.8	1.8	1.6			2.6	2.5	2.5	2.6	1.5		
Low Bank Elevation (ft)	-	-	-	-	576.14			-	-	-	-	575.26			-	-	-	-	575.41			-	-	-	-	601.93			-	-	-	-	601.18		
Bankfull Cross Sectional Area (ft ²) ²	32.6	30.0	30.5	25.6	17.0			34.4	32.0	31.6	31.0	36.0			30.8	28.4	28.5	26.7	32.0			13.0	12.1	12.4	12.3	11.4			21.0	19.8	19.7	20.2	7.6		
Bankfull Width/Depth Ratio	11.7	12.2	12.3	13.7	---			12.9	10.9	10.9	11.4	---			9.8	10.3	10.0	11.0	---			10.4	10.7	10.4	10.9	---			11.1	10.9	10.9	11.9	---		
Bankfull Entrenchment Ratio ¹	>2.2	>2.6	>2.6	N/A	N/A			>2.2	>2.7	>2.7	N/A	N/A			>2.2	>2.9	>3.0	>2.9	>3.1			>2.2	>4.4	>4.4	>4.3	>3.4			>2.2	>3.4	>3.4	N/A	N/A		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	N/A	N/A			1.0	1.0	1.0	N/A	N/A			1.0	1.0	1.0	1.1	1.0			1.0	1.0	1.0	1.0	0.9			1.0	1.0	1.0	N/A	N/A		
	Cross Section 11 (Riffle) Reach UT1-A							Cross Section 12 (Pool) Reach UT1-2							Cross Section 13 (Riffle) Reach UT1-2							Cross Section 14 (Pool) Reach UT1-2							Cross Section 15 (Riffle) Reach UT1-2						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	599.06	599.06	599.06	599.06	599.13			596.26	596.26	596.26	596.26	596.61			595.97	595.97	595.97	595.97	596.09			591.21	591.21	591.21	591.21	591.22			591.48	591.48	591.48	591.48	591.64		
Bankfull Width (ft) ¹	10.0	10.2	10.0	9.6	11.0			17.4	17.4	17.6	17.4	22.7			12.5	12.2	12.3	12.6	14.1			12.3	12.0	11.5	12.1	12.5			13.4	12.9	12.9	13.2	13.4		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.1			>50.0	>50.0	>50.0	>50.0	>50.4			>50.0	>50.0	>50.0	>50.0	>50.2			>50.0	>50.0	>50.0	>50.0	>50.2			>50	>50	>50	>50	>49.8		
Bankfull Mean Depth (ft)	1.0	1.0	1.0	1.1	---			1.4	1.3	1.2	1.1	---			1.2	1.2	1.2	1.2	---			1.1	1.0	1.0	1.0	---			1.4	1.3	1.3	1.3	---		
Bankfull Max Depth (ft) ²	1.7	1.6	1.6	1.6	1.7			2.5	2.4	2.5	2.2	2.5			1.9	1.9	2.0	2.2	2.5			2.2	2.0	2.0	2.1	1.6			2.3	2.2	2.2	2.1	2.3		
Low Bank Elevation (ft)	-	-	-	-	599.12			-	-	-	-	596.44			-	-	-	-	596.00			-	-	-	-	590.71			-	-	-	-	591.64		
Bankfull Cross Sectional Area (ft ²) ²	10.5	10.1	10.1	10.1	10.5			24.4	21.8	21.8	19.9	20.8			15.6	14.4	14.6	14.8	14.4			13.9	11.9	11.5	12.6	8.4			19.0	17.3	17.2	17.0	19.1		
Bankfull Width/Depth Ratio	9.6	10.3	10.0	9.1	---			12.4	13.9	14.2	15.2	---			10.0	10.4	10.3	10.7	---			10.9	12.1	11.6	11.5	---			9.4	9.7	9.7	10.3	---		
Bankfull Entrenchment Ratio ¹	>2.2	>4.9	>5.0	>5.2	>4.6			>2.2	>2.9	>2.8	N/A	N/A			>2.2	>4.1	>4.1	>4.0	>3.6			>2.2	>4.2	>4.3	N/A	N/A			>2.2	>3.9	>3.9	>3.8	>3.7		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	0.9	1.0			1.0	1.0	1.0	N/A	N/A			1.0	1.0	1.0	1.0	1.0			1.0	1.0	1.0	N/A	N/A			1.0	1.0	1.0	1.0	1.0		

¹Calculations updated to show corrected values

Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

*Reach UT2-2 was reconstructed in September 2019

**Table 11a. Cont'd - Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Poplin Ridge Stream Restoration Project**

	Cross Section 16 (Riffle) Reach UT1-B							Cross Section 17 (Pool) Reach UT1-B							Cross Section 18 (Pool) Reach UT1-3							Cross Section 19 (Riffle) Reach UT1-3							Cross Section 20 (Riffle) Reach UT1-3						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	591.84	591.84	591.84	591.84	592.04			590.93	590.93	590.93	590.93	591.07			588.03	588.03	588.03	588.03	588.30			588.19	588.19	588.19	588.19	588.38			586.15	586.15	586.15	586.15	586.33		
Bankfull Width (ft) ¹	11.7	10.8	10.5	11.1	13.6			14.2	13.1	13.2	13.2	14.4			14.5	14.3	13.9	14.2	16.2			15.2	15.1	14.9	15.4	23.1			15.5	16.1	15.2	15.1	16.0		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.0			>50.0	>50.0	>50.0	>50.0	>50.0			>50.0	>50.0	>50.0	>50.0	>50.6			>50.0	>50.0	>50.0	>50.0	>50.2			>50.0	>50.0	>50.0	>50.0	>50.2		
Bankfull Mean Depth (ft)	1.1	1.0	1.1	1.0	---			0.7	0.6	0.7	0.7	---			1.5	1.4	1.4	1.4	---			1.5	1.4	1.4	1.4	---			1.4	1.3	1.3	1.3	---		
Bankfull Max Depth (ft) ²	1.8	1.7	1.7	1.7	1.9			1.4	1.3	1.4	1.6	1.5			2.6	2.6	2.5	2.6	2.7			2.4	2.1	2.2	2.1	2.1			2.1	2.1	2.1	2.1	2.3		
Low Bank Elevation (ft)	-	-	-	-	591.95			-	-	-	-	590.81			-	-	-	-	588.20			-	-	-	-	588.23			-	-	-	-	586.36		
Bankfull Cross Sectional Area (ft ²)	12.3	11.2	11.1	10.8	11.2			10.2	8.5	9.2	9.6	7.1			21.5	19.6	19.7	19.3	19.7			23.0	21.8	21.3	21.0	20.3			21.9	20.9	20.0	19.6	22.4		
Bankfull Width/Depth Ratio	11.2	10.4	9.9	11.3	---			19.7	20.2	19.1	18.3	---			9.8	10.4	9.9	10.5	---			10.1	10.5	10.5	11.2	---			11.0	12.4	11.6	11.6	---		
Bankfull Entrenchment Ratio ¹	>2.2	>4.6	>4.8	>4.5	>3.7			>2.2	>3.8	>3.8	N/A	N/A			>2.2	>3.5	>3.6	N/A	N/A			>2.2	>3.3	>3.3	>3.3	>2.2			>2.2	>3.1	>3.3	>3.3	>3.1		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.1	1.0			1.0	1.0	1.0	N/A	N/A			1.0	1.0	1.0	N/A	N/A			1.0	1.0	1.0	1.0	0.9			1.0	1.0	1.0	1.1	1.0		
	Cross Section 21 (Pool) Reach UT1-3							Cross Section 22 (Riffle) Reach UT1-C							Cross Section 23 (Pool) Reach UT1-C							Cross Section 24 (Riffle) Reach UT1-C							Cross Section 25 (Pool) Reach UT1-C						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	585.60	585.60	585.60	585.60	585.82			592.04	592.04	592.04	592.04	592.33			591.80	591.80	591.80	591.80	592.04			586.30	586.30	586.30	586.30	586.69			585.80	585.80	585.80	585.80	586.15		
Bankfull Width (ft) ¹	15.8	15.0	15.2	15.0	17.2			13.2	12.5	12.5	12.4	15.2			14.6	14.0	13.9	13.7	15.0			14.2	13.8	14.0	14.0	15.1			12.0	11.1	11.2	10.5	12.2		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.2			>50.0	>50.0	>50.0	>50.0	>50.2			>50.0	>50.0	>50.0	>50.0	>50.2			>46.6	>46.6	>46.6	38.0	>50.0			>50.0	>50.0	>50.0	>50.0	>50.2		
Bankfull Mean Depth (ft)	1.4	1.3	1.3	1.3	---			1.3	1.1	1.1	1.0	---			1.3	1.1	1.0	1.0	---			1.0	0.9	0.9	0.8	---			1.3	1.3	1.3	1.3	---		
Bankfull Max Depth (ft) ²	2.5	2.4	2.6	2.7	3.1			1.9	1.6	1.7	1.7	1.1			2.1	1.9	2.0	2.2	1.6			1.7	1.6	1.6	1.6	0.9			2.3	2.1	2.1	2.1	1.5		
Low Bank Elevation (ft)	-	-	-	-	585.95			-	-	-	-	591.27			-	-	-	-	591.07			-	-	-	-	585.71			-	-	-	-	585.48		
Bankfull Cross Sectional Area (ft ²)	21.4	19.1	19.4	19.3	23.7			16.8	13.6	14.2	12.5	5.4			19.1	14.8	14.2	14.3	8.8			14.0	12.2	12.4	10.8	3.8			15.5	14.3	14.5	14.1	9.2		
Bankfull Width/Depth Ratio	11.7	11.8	11.8	11.7	---			10.4	11.5	10.9	12.3	---			11.1	13.3	13.5	13.2	---			14.3	15.6	15.7	18.1	---			9.4	8.6	8.7	7.8	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.3	>3.3	N/A	N/A			>2.2	>4.0	>4.0	>4.0	>3.3			>2.2	>3.6	>3.6	N/A	N/A			>2.2	>3.4	>3.3	2.7	>3.3			>2.2	>4.5	>4.5	N/A	N/A		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	N/A	N/A			1.0	1.0	1.0	0.9	0.5			1.0	1.0	1.0	N/A	N/A			1.0	1.0	1.0	1.5	0.5			1.0	1.0	1.0	N/A	N/A		
	Cross Section 26 (Pool) Reach UT1-4							Cross Section 27 (Riffle) Reach UT1-4							Cross Section 28 (Riffle) Reach UT1-4							Cross Section 29 (Pool) Reach UT1-4							Cross Section 30 (Riffle) Reach UT2-2*						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	581.70	581.70	581.70	581.70	581.62			582.15	582.15	582.15	582.15	582.52			579.70	579.70	579.70	579.70	579.91			579.80	579.80	579.80	579.80	580.04			-	-	-	-	578.55		
Bankfull Width (ft) ¹	14.8	14.1	13.0	11.2	10.3			16.5	15.9	15.6	15.4	17.6			15.9	15.4	15.3	15.0	16.0			20.3	20.8	20.0	19.4	21.7			-	-	-	-	8.7		
Floodprone Width (ft) ¹	>47.0	>47.0	>47.0	>50.0	>50.3			>50.0	>50.0	>50.0	>50.0	>50.0			>50.0	>50.0	>50.0	>50.0	>50.4			>50.0	>50.0	>50.0	>50.0	>42.7			-	-	-	-	30.7		
Bankfull Mean Depth (ft)	1.2	1.2	1.3	1.6	---			1.3	1.2	1.1	1.0	---			1.5	1.4	1.4	1.3	---			1.6	1.4	1.4	1.5	---			-	-	-	-	---		
Bankfull Max Depth (ft) ²	2.1	2.1	2.2	2.3	2.4			2.1	1.9	1.9	1.8	2.6			2.6	2.5	2.5	2.5	3.0			3.1	2.9	2.9	3.0	2.7			-	-	-	-	0.5		
Low Bank Elevation (ft)	-	-	-	-	581.69			-	-	-	-	582.19			-	-	-	-	580.10			-	-	-	-	579.60			-	-	-	-	578.55		
Bankfull Cross Sectional Area (ft ²)	17.6	16.2	17.2	18.2	18.4			21.5	18.3	17.8	15.6	16.2			24.2	21.7	21.9	20.0	27.4			33.2	30.0	28.9	29.2	24.6			-	-	-	-	3.1		
Bankfull Width/Depth Ratio	12.5	12.3	9.7	6.9	---			12.7	13.8	13.6	15.1	---			10.4	10.9	10.8	11.2	---			12.5	14.4	13.9	12.9	---			-	-	-	-	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.3	>3.6	N/A	N/A			>2.2	>3.1	>3.2	>3.3	>2.8			>2.2	>3.3	>3.3	>3.3	>3.2			>2.2	>2.4	>2.5	N/A	N/A			-	-	-	-	3.5		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	N/A	N/A			1.0	1.0	1.0	1.1	0.9			1.0	1.0	1.0	1.1	1.1			1.0	1.0	1.0	N/A	N/A			-	-	-	-	1.0		
	Cross Section 31 (Pool) Reach UT2-2*																																		
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+																												
Bankfull Elevation (ft) - Based on AB-XSA ¹	-	-	-	-	578.37																														
Bankfull Width (ft) ¹	-	-	-	-	9.7																														
Floodprone Width (ft) ¹	-	-	-	-	48.3																														
Bankfull Mean Depth (ft)	-	-	-	-	---																														
Bankfull Max Depth (ft) ²	-	-	-	-	1.5																														
Low Bank Elevation (ft)	-	-	-	-	578.37																														
Bankfull Cross Sectional Area (ft ²)	-	-	-	-	8.8																														
Bankfull Width/Depth Ratio	-	-	-	-	---																														
Bankfull Entrenchment Ratio ¹	-	-	-	-	N/A																														
Bankfull Bank Height Ratio ¹	-	-	-	-	N/A																														

Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

*Reach UT2-2 was reconstructed in September 2019

**Table 11b. Monitoring Data - Stream Reach Data Summary
Poplin Ridge Stream Restoration Project - UT1-2 (1,178 feet)**

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7											
	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	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n						
Bankfull Width (ft) ¹	-	12.95	-	-	-	-	12.2	12.6	12.6	12.9	0.5	2	12.3	12.6	12.6	12.9	0.5	2	12.6	12.9	12.9	13.2	0.42	2							13.4	13.8	13.8	14.1	0.5	2																		
Floodprone Width (ft) ¹	-	>50	-	-	-	-	50.0	50.0	50.0	50.0	0.0	2	50	50	50	50	0.0	2	50.0	50.0	50.0	50.0	0	2							>49.8	>50	>50	>50.2	0.3	2																		
Bankfull Mean Depth (ft)	-	1.3	-	-	-	-	1.2	1.3	1.3	1.3	0.1	2	1.2	1.3	1.3	1.3	0.1	2	1.2	1.3	1.3	1.3	0.07	2							-	-	-	-	-	-																		
Bankfull Max Depth (ft) ²	-	2.1	-	-	-	-	1.9	2.1	2.1	2.2	0.2	2	2.0	2.1	2.1	2.2	0.2	2	2.1	2.2	2.2	2.2	0.07	2							2.3	2.4	2.4	2.5	0.1	2																		
Low Bank Elevation (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							-	-	-	-	-	-																		
Bankfull Cross Sectional Area (ft ²) ²	-	17.3	-	-	-	-	14.4	15.9	15.9	17.3	2.1	2	14.6	15.9	15.9	17.2	1.8	2	14.8	15.9	15.9	17.0	1.56	2							14.4	16.8	16.8	19.1	3.3	2																		
Bankfull Width/Depth Ratio	-	9.7	-	-	-	-	9.7	10.1	10.1	10.4	0.5	2	9.7	10.0	10.0	10.3	0.4	2	10.3	10.5	10.5	10.7	0.28	2							-	-	-	-	-	-																		
Bankfull Entrenchment Ratio ¹	-	>2.2	-	-	-	-	3.9	4.0	4.0	4.1	0.1	2	3.9	4.0	4.0	4.1	0.2	2	3.8	3.9	3.9	4.0	0.14	2							>3.6	>3.65	>3.65	>3.7	0.1	2																		
Bankfull Bank Height Ratio ¹	-	1.0	-	-	-	-	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2							1.0	1.0	1.0	1.0	0.0	2																		
Profile																																																						
Riffle Length (ft)	6.0	-	-	18.0	-	-																																																
Riffle Slope (ft/ft)	0.010	-	-	0.036	-	-																																																
Pool Length (ft)	6.0	-	-	42.0	-	-																																																
Pool Max Depth (ft)	-	-	-	-	-	-																																																
Pool Spacing (ft)	20.0	-	-	60.0	-	-																																																
Pattern																																																						
Channel Belt Width (ft)	35.0	-	-	60.0	-	-																																																
Radius of Curvature (ft)	15.0	-	-	75.0	-	-																																																
Re: Bankfull Width (ft/ft)	1.50	-	-	7.60	-	-																																																
Meander Wavelength (ft)	35.0	-	-	52.0	-	-																																																
Meander Width Ratio	2.7	-	-	4.0	-	-																																																
Additional Reach Parameters																																																						
Rosgen Classification				E4																																																		
Channel Thalweg Length (ft)				1,178																																																		
Sinuosity (ft)				1.1																																																		
Water Surface Slope (Channel) (ft/ft)				-																																																		
Bankfull Slope (ft/ft)				0.0066																																																		
Ri% / Ru% / P% / G% / S%	-	-	-	-	-	-																																																

- Information Unavailable.

N/A - Information does not apply.

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

Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

**Table 11b Cont'd. Monitoring Data - Stream Reach Data Summary
Poplin Ridge Stream Restoration Project - UT1-3 (893 feet)**

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7											
	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	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n						
Bankfull Width (ft) ¹	-	15.35	-	-	-	-	15.1	15.6	15.6	16.1	0.7	2	14.9	15.1	15.1	15.2	0.2	2	15.1	15.3	15.3	15.4	0.21	2							16.0	19.6	19.6	23.1	5.0	2																		
Floodprone Width (ft) ¹	-	>50	-	-	-	-	50.0	50.0	50.0	50.0	0.0	2	50	50	50	50	0.0	2	50.0	50.0	50.0	50.0	0	2							>50.2	>50.2	>50.2	>50.2	0.0	2																		
Bankfull Mean Depth (ft) ¹	-	1.45	-	-	-	-	1.3	1.4	1.4	1.4	0.1	2	1.3	1.4	1.4	1.4	0.1	2	1.3	1.4	1.4	1.4	0.07	2							-	-	-	-	-	-																		
Bankfull Max Depth (ft) ²	-	2.25	-	-	-	-	2.1	2.1	2.1	2.1	0.0	2	2.1	2.1	2.1	2.2	0.1	2	2.1	2.1	2.1	2.1	0	2							2.1	2.2	2.2	2.3	0.1	2																		
Low Bank Elevation (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							-	-	-	-	-	-																		
Bankfull Cross Sectional Area (ft ²) ²	-	22.4	-	-	-	-	20.9	21.4	21.4	21.8	0.6	2	20.0	20.6	20.6	21.3	0.9	2	19.6	20.3	20.3	21.0	0.99	2							20.3	21.4	21.4	22.4	1.5	2																		
Bankfull Width/Depth Ratio	-	10.50	-	-	-	-	10.5	11.5	11.5	12.4	1.3	2	10.5	11.0	11.0	11.6	0.8	2	11.2	11.4	11.4	11.6	0.28	2							-	-	-	-	-	-																		
Bankfull Entrenchment Ratio ¹	-	>2.2	-	-	-	-	3.1	3.2	3.2	3.3	0.1	2	3.3	3.3	3.3	3.3	0.0	2	3.3	3.3	3.3	3.3	0	2							>2.2	>2.65	>2.65	>3.1	0.6	2																		
Bankfull Bank Height Ratio ¹	-	1.0	-	-	-	-	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	1.0	1.1	1.1	1.1	0.07	2							0.9	1.0	1.0	1.0	0.1	2																		
Profile																																																						
Riffle Length (ft)	7.0	-	-	22.0	-	-																																																
Riffle Slope (ft/ft)	0.010	-	-	0.037	-	-																																																
Pool Length (ft)	8.0	-	-	50.0	-	-																																																
Pool Max Depth (ft)	-	-	-	-	-	-																																																
Pool Spacing (ft)	20.0	-	-	70.0	-	-																																																
Pattern																																																						
Channel Belt Width (ft)	42.0	-	-	65.0	-	-																																																
Radius of Curvature (ft)	17.0	-	-	80.0	-	-																																																
Re: Bankfull Width (ft/ft)	1.50	-	-	7.60	-	-																																																
Meander Wavelength (ft)	37.0	-	-	56.0	-	-																																																
Meander Width Ratio	2.7	-	-	4.3	-	-																																																
Additional Reach Parameters																																																						
Rosgen Classification				E4																																																		
Channel Thalweg Length (ft)				893																																																		
Sinuosity (ft)				1.1																																																		
Water Surface Slope (Channel) (ft/ft)				-																																																		
Bankfull Slope (ft/ft)				0.004																																																		
Ri% / Ru% / P% / G% / S%	-	-	-	-	-	-																																																

- Information Unavailable.

N/A - Information does not apply.

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

Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

**Table 11b Cont'd. Monitoring Data - Stream Reach Data Summary
Poplin Ridge Stream Restoration Project - UT2-3 (847 feet)**

Parameter	Baseline						MY - 1 ¹						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
	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	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension & Substrate - Riffle																																																
Bankfull Width (ft) ¹	-	21.0	-	-	-	-	-	19.3	-	-	N/A	1	-	18.0	-	-	N/A	1	-	17.1	-	-	N/A	1																								
Floodprone Width (ft) ¹	-	>50	-	-	-	-	-	50.0	-	-	N/A	1	-	50	-	-	N/A	1	-	50.0	-	-	N/A	1																								
Bankfull Mean Depth (ft)	-	1.3	-	-	-	-	-	1.3	-	-	N/A	1	-	1.3	-	-	N/A	1	-	1.1	-	-	N/A	1																								
Bankfull Max Depth (ft) ²	-	2.2	-	-	-	-	-	2.2	-	-	N/A	1	-	2.4	-	-	N/A	1	-	1.8	-	-	N/A	1																								
Low Bank Elevation (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																								
Bankfull Cross Sectional Area (ft ²) ²	-	26.5	-	-	-	-	-	25.2	-	-	N/A	1	-	22.9	-	-	N/A	1	-	19.0	-	-	N/A	1																								
Bankfull Width/Depth Ratio	-	16.6	-	-	-	-	-	14.9	-	-	N/A	1	-	14.2	-	-	N/A	1	-	15.5	-	-	N/A	1																								
Bankfull Entrenchment Ratio ¹	-	>2.2	-	-	-	-	-	2.6	-	-	N/A	1	-	2.8	-	-	N/A	1	-	2.9	-	-	N/A	1																								
Bankfull Bank Height Ratio ¹	-	1.0	-	-	-	-	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.3	-	-	N/A	1																								
Profile																																																
Riffle Length (ft)	9.0	-	-	25.0	-	-																																										
Riffle Slope (ft/ft)	0.0	-	-	0.036	-	-																																										
Pool Length (ft)	7.8	-	-	47.0	-	-																																										
Pool Max Depth (ft)	-	-	-	-	-	-																																										
Pool Spacing (ft)	18.0	-	-	90.0	-	-																																										
Pattern																																																
Channel Belt Width (ft)	67.0	-	-	101.0	-	-																																										
Radius of Curvature (ft)	32.0	-	-	160.0	-	-																																										
Rc: Bankfull Width (ft/ft)	1.50	-	-	7.60	-	-																																										
Meander Wavelength (ft)	67.0	-	-	101.0	-	-																																										
Meander Width Ratio	3.2	-	-	4.8	-	-																																										
Additional Reach Parameters																																																
Rosgen Classification				E4																																												
Channel Thalweg Length (ft)				847																																												
Sinuosity (ft)				1.08																																												
Water Surface Slope (Channel) (ft/ft)				-																																												
Bankfull Slope (ft/ft)				0.0061																																												
Ri% / Ru% / P% / G% / S%	-	-	-	-	-	-																																										

- Information Unavailable.

N/A - Information does not apply.

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

Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

**Table 11b Cont'd. Monitoring Data - Stream Reach Data Summary
Poplin Ridge Stream Restoration Project - UT2-4 (521 feet)**

Parameter	Baseline						MY - 1					MY - 2					MY - 3					MY - 4					MY - 5					MY - 6					MY - 7																	
	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	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n						
Bankfull Width (ft) ¹	-	17.4	-	-	-	-	-	17.1	-	-	N/A	1	-	16.9	-	-	N/A	1	-	17.2	-	-	N/A	1							-	16.2	-	-	N/A	1																		
Floodprone Width (ft) ¹	-	>50	-	-	-	-	-	50.0	-	-	N/A	1	-	50.0	-	-	N/A	1	-	50.0	-	-	N/A	1							-	>50.2	-	-	N/A	1																		
Bankfull Mean Depth (ft)	-	1.8	-	-	-	-	-	1.7	-	-	N/A	1	-	1.7	-	-	N/A	1	-	1.6	-	-	N/A	1							-	-	-	-	N/A	1																		
Bankfull Max Depth (ft) ²	-	2.5	-	-	-	-	-	2.4	-	-	N/A	1	-	2.5	-	-	N/A	1	-	2.3	-	-	N/A	1							-	2.8	-	-	N/A	1																		
Low Bank Elevation (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							-	-	-	-	-	-																		
Bankfull Cross Sectional Area (ft ²) ²	-	30.8	-	-	-	-	-	28.4	-	-	N/A	1	-	28.5	-	-	N/A	1	-	26.7	-	-	N/A	1							-	32.0	-	-	N/A	1																		
Bankfull Width/Depth Ratio	-	9.8	-	-	-	-	-	10.3	-	-	N/A	1	-	10.0	-	-	N/A	1	-	11.0	-	-	N/A	1							-	-	-	-	N/A	1																		
Bankfull Entrenchment Ratio ¹	-	>2.2	-	-	-	-	-	2.9	-	-	N/A	1	-	3.0	-	-	N/A	1	-	2.9	-	-	N/A	1							-	>3.1	-	-	N/A	1																		
Bankfull Bank Height Ratio ¹	-	1.0	-	-	-	-	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.1	-	-	N/A	1							-	1.0	-	-	N/A	1																		
Profile																																																						
Riffle Length (ft)	8.2	-	-	26.5	-	-																																																
Riffle Slope (ft/ft)	0.012	-	-	0.038	-	-																																																
Pool Length (ft)	8.5	-	-	60.0	-	-																																																
Pool Max Depth (ft)	-	-	-	-	-	-																																																
Pool Spacing (ft)	20.5	-	-	92.0	-	-																																																
Pattern																																																						
Channel Belt Width (ft)	56.0	-	-	84.0	-	-																																																
Radius of Curvature (ft)	32.0	-	-	160.0	-	-																																																
Re: Bankfull Width (ft/ft)	1.5	-	-	7.6	-	-																																																
Meander Wavelength (ft)	56.0	-	-	84.0	-	-																																																
Meander Width Ratio	3.2	-	-	4.8	-	-																																																
Additional Reach Parameters																																																						
Rosgen Classification				E4																																																		
Channel Thalweg Length (ft)				778																																																		
Sinuosity (ft)				1.1																																																		
Water Surface Slope (Channel) (ft/ft)				N/A																																																		
Bankfull Slope (ft/ft)				0.002																																																		
Ri% / Ru% / P% / G% / S%	-	-	-	-	-	-																																																

- Information Unavailable.

N/A - Information does not apply.

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

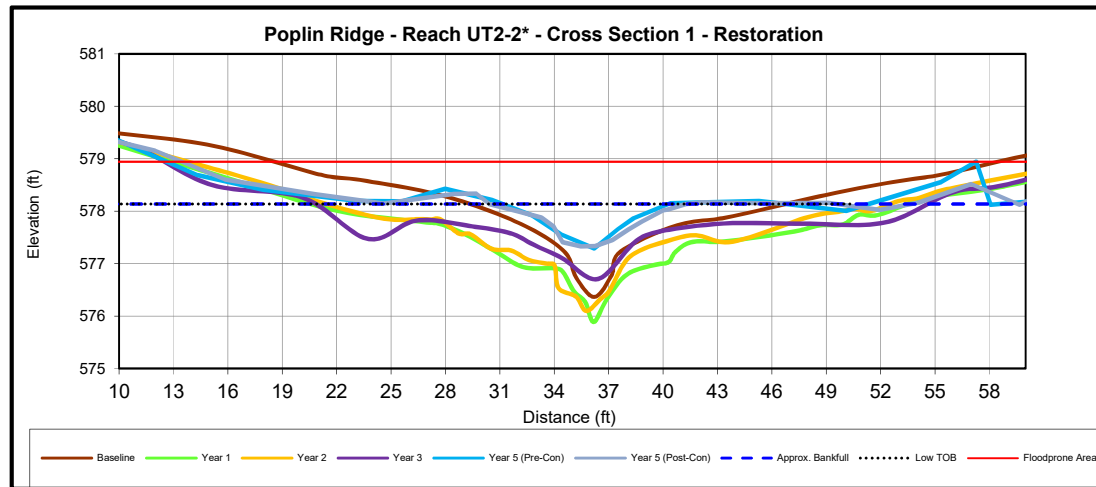
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.



Upstream



Downstream



Dimension	Cross Section 1						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	577.24	577.24	577.24	577.24	578.14		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8		
Low Bank Elevation (ft)	-	-	-	-	578.14		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0		

Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.

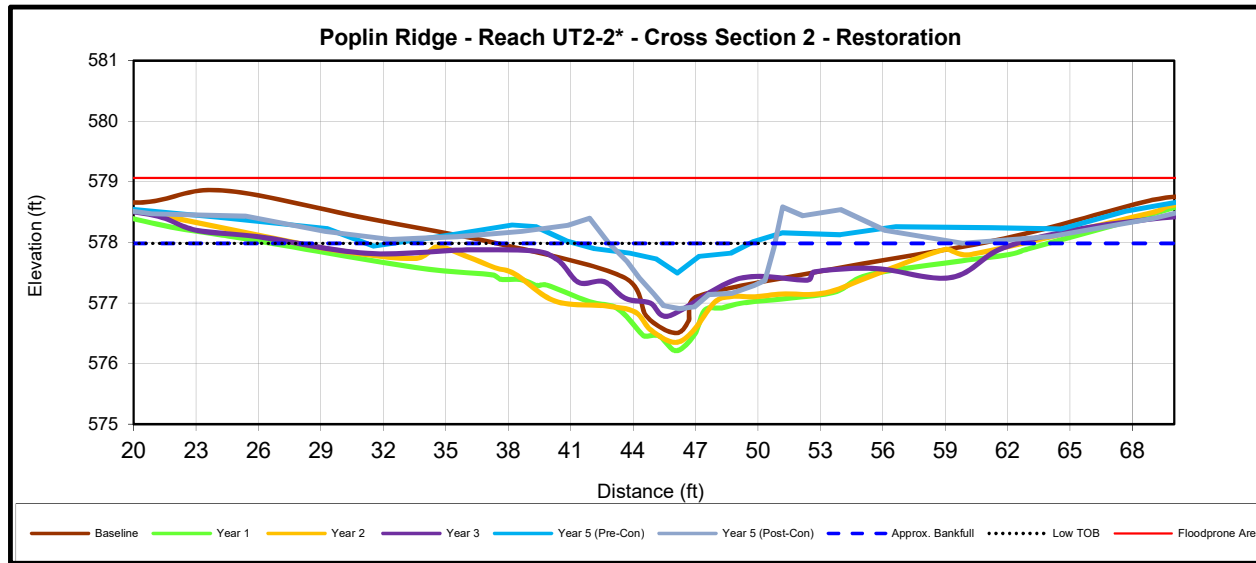
*Reach UT2-2 was reconstructed in September 2019



Upstream



Downstream



Dimension	Cross Section 2						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	577.10	577.10	577.10	577.10	577.99		
Bankfull Width (ft) ¹	3.0	5.6	5.3	3.9	8.0		
Floodprone Width (ft) ¹	>15.2	>15.2	>15.2	11.2	66.2		
Bankfull Mean Depth (ft)	0.4	0.5	0.4	0.1	---		
Bankfull Max Depth (ft) ²	0.6	1.3	0.8	0.3	1.1		
Low Bank Elevation (ft)	-	-	-	-	577.99		
Bankfull Cross Sectional Area (ft ²) ²	1.1	2.7	2.2	0.5	5.8		
Bankfull Width/Depth Ratio	7.9	11.5	12.5	28.8	---		
Bankfull Entrenchment Ratio ¹	>2.2	>2.7	>2.9	2.9	8.3		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	2.0	1.0		

Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.

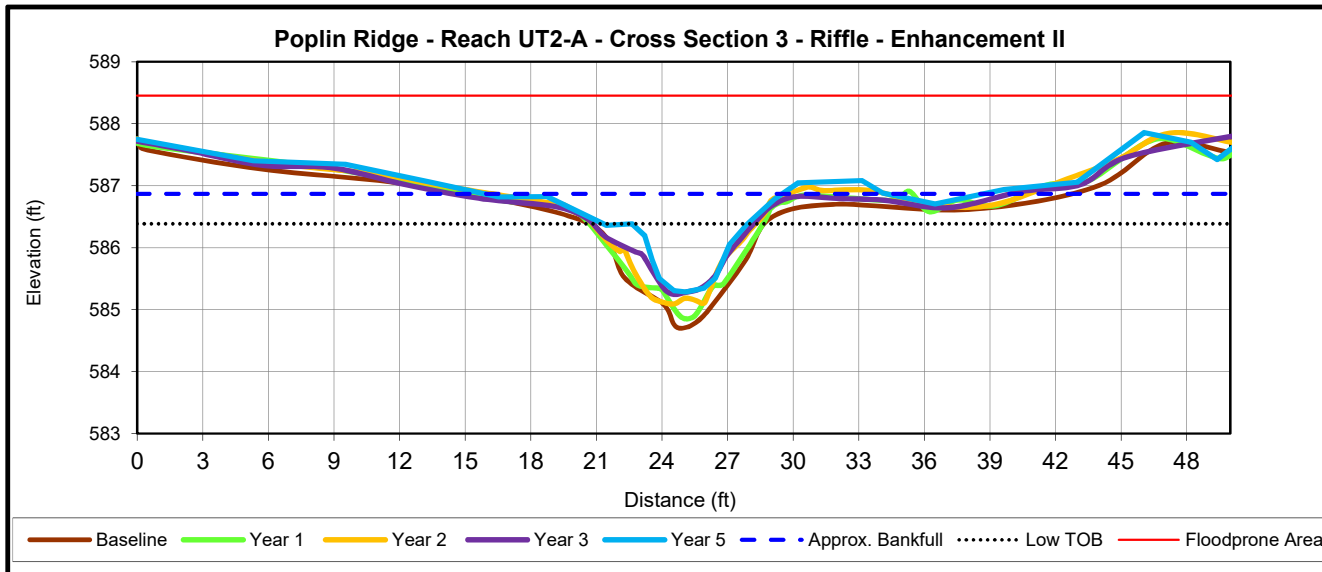
*Reach UT2-2 was reconstructed in September 2019



Upstream



Downstream



Dimension	Cross Section 3 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	586.40	586.40	586.40	586.40	586.85		
Bankfull Width (ft) ¹	8.2	8.0	7.5	7.5	10.7		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	44.0	>50.5		
Bankfull Mean Depth (ft)	1.0	0.8	0.8	0.6	---		
Bankfull Max Depth (ft) ²	1.7	1.5	1.3	1.2	1.1		
Low Bank Elevation (ft)	-	-	-	-	586.39		
Bankfull Cross Sectional Area (ft ²) ²	7.9	6.7	5.7	4.7	7.9		
Bankfull Width/Depth Ratio	8.5	9.5	9.9	11.9	---		
Bankfull Entrenchment Ratio ¹	>2.2	>6.3	>6.7	5.9	>4.7		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.1	0.7		

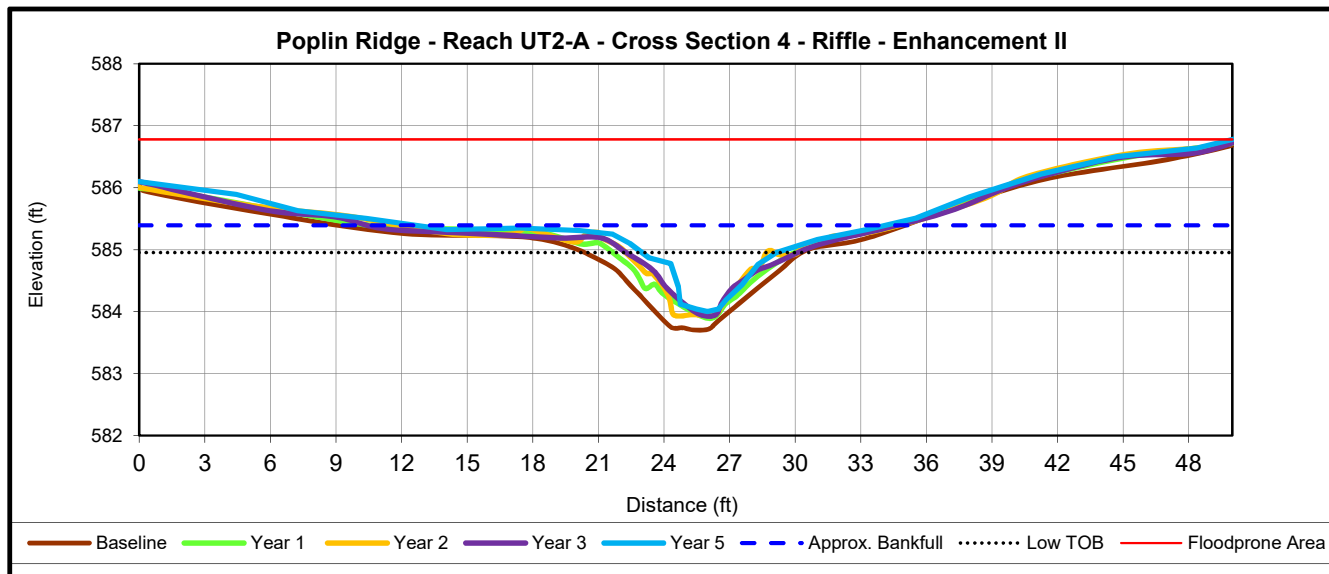
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull



Upstream



Downstream



Dimension	Cross Section 4 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	585.00	585.00	585.00	585.00	585.39		
Bankfull Width (ft) ¹	11.0	8.8	7.5	8.5	16.7		
Floodprone Width (ft) ¹	>44.4	>44.4	>50.0	39.8	>49.8		
Bankfull Mean Depth (ft)	0.7	0.6	0.8	0.5	---		
Bankfull Max Depth (ft) ²	1.3	1.1	1.3	1.1	1.0		
Low Bank Elevation (ft)	-	-	-	-	584.95		
Bankfull Cross Sectional Area (ft ²) ²	7.4	5.0	5.7	4.1	3.0		
Bankfull Width/Depth Ratio	16.4	15.6	9.9	17.4	---		
Bankfull Entrenchment Ratio ¹	>2.2	>5.0	>6.7	4.7	3.0		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.1	0.7		

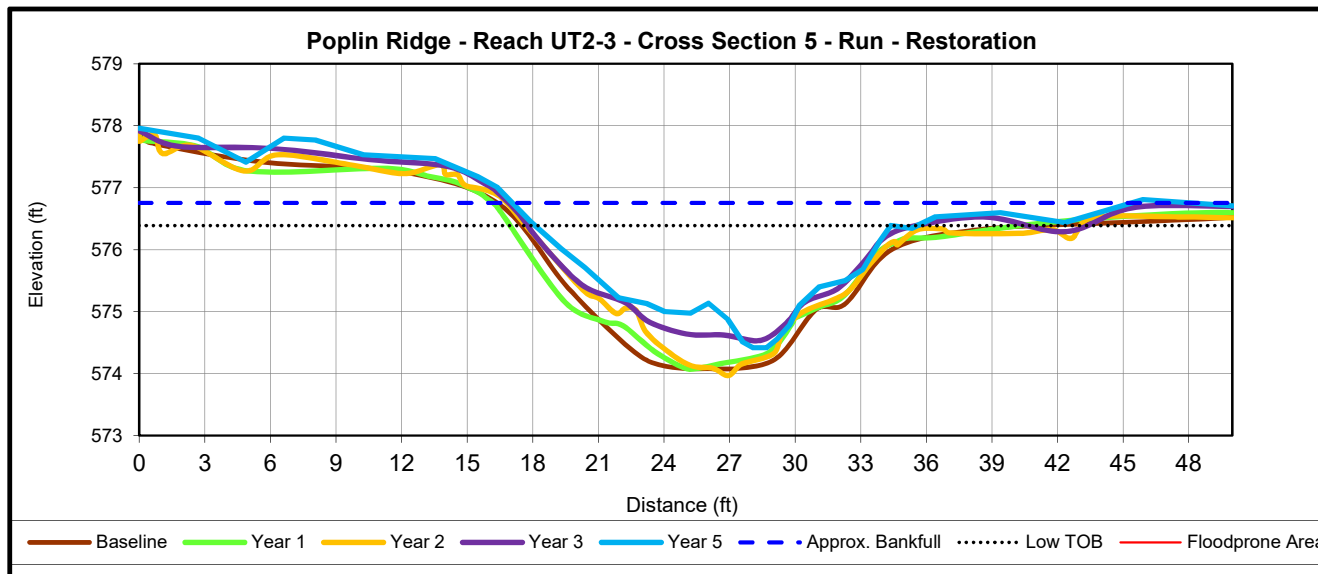
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Cross Section 5 (Run)							
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	576.32	576.32	576.32	576.32	576.75		
Bankfull Width (ft) ¹	21.0	19.3	18.0	17.1	28.3		
Floodprone Width (ft) ¹	>50	>50	>50	>50	>50.5		
Bankfull Mean Depth (ft)	1.3	1.3	1.3	1.1	---		
Bankfull Max Depth (ft) ²	2.2	2.2	2.4	1.8	2.0		
Low Bank Elevation (ft)	-	-	-	-	576.39		
Bankfull Cross Sectional Area (ft ²) ²	26.5	25.2	22.9	19.0	17.9		
Bankfull Width/Depth Ratio	16.6	14.9	14.2	15.5	---		
Bankfull Entrenchment Ratio ¹	>2.2	>2.6	>2.8	>2.9	>1.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	0.9	0.8		

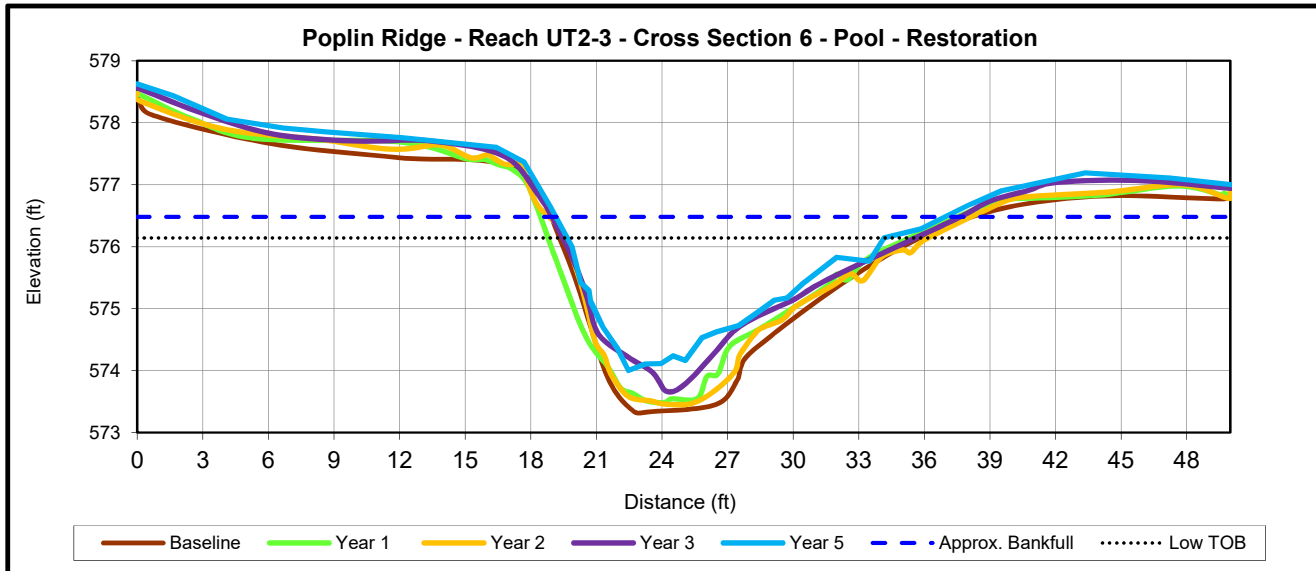
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



	Cross Section 6 (Pool)						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	576.48	576.48	576.48	576.48	576.99		
Bankfull Width (ft) ¹	19.6	19.1	19.4	18.7	22.3		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.1		
Bankfull Mean Depth (ft)	1.7	1.6	1.6	1.4	---		
Bankfull Max Depth (ft) ²	3.1	3.0	3.0	2.8	2.1		
Low Bank Elevation (ft)	-	-	-	-	576.14		
Bankfull Cross Sectional Area (ft ²) ²	32.6	30.0	30.5	25.6	17.0		
Bankfull Width/Depth Ratio	11.7	12.2	12.3	13.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>2.6	>2.6	N/A	N/A		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	N/A	N/A		

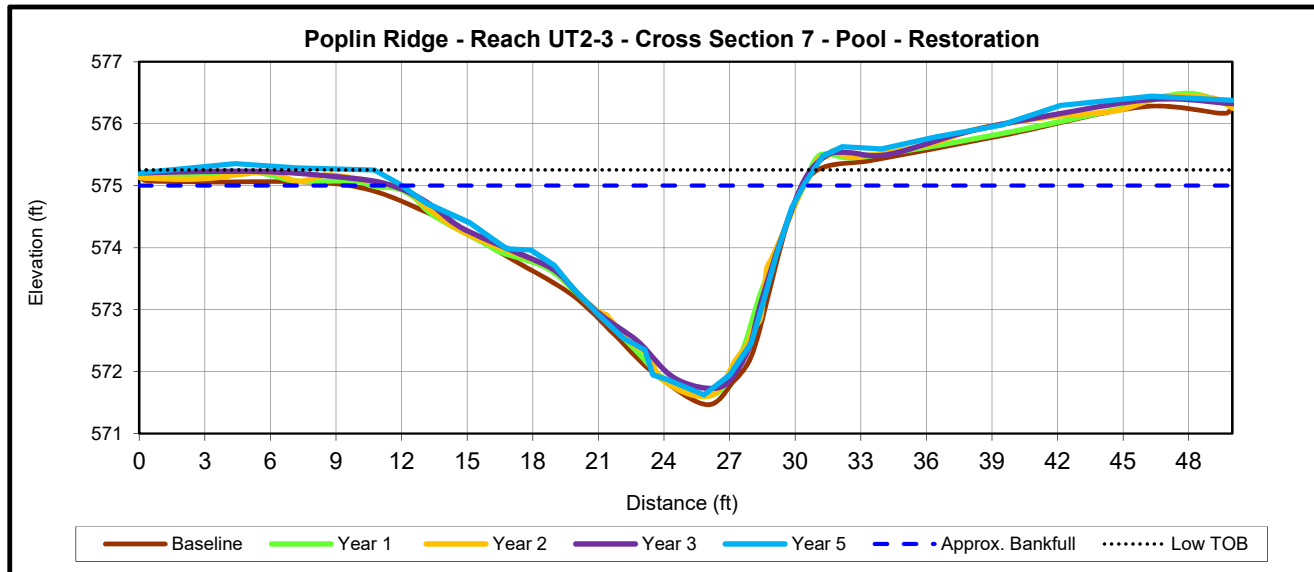
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



	Cross Section 7 (Pool)						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	575.00	575.00	575.00	575.00	575.17		
Bankfull Width (ft) ¹	21.1	18.7	18.5	18.8	19.5		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50		
Bankfull Mean Depth (ft)	1.6	1.7	1.7	1.6	---		
Bankfull Max Depth (ft) ²	3.5	3.4	3.4	3.2	3.6		
Low Bank Elevation (ft)	-	-	-	-	575.26		
Bankfull Cross Sectional Area (ft ²) ²	34.4	32.0	31.6	31.0	36.0		
Bankfull Width/Depth Ratio	12.9	10.9	10.9	11.4	---		
Bankfull Entrenchment Ratio ¹	>2.2	>2.7	>2.7	N/A	N/A		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	N/A	N/A		

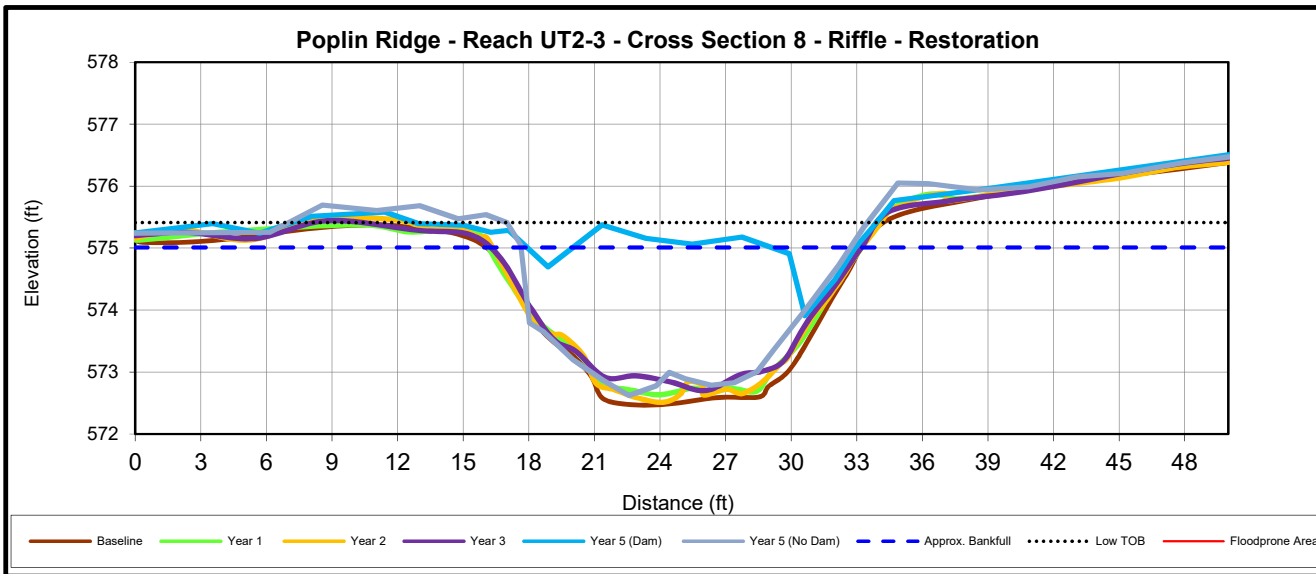
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Before Dam Removal



After Dam Removal



Dimension	Cross Section 8 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	575.01	575.01	575.01	575.01	575.34		
Bankfull Width (ft) ¹	17.4	17.1	16.9	17.2	16.2		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.2		
Bankfull Mean Depth (ft)	1.8	1.7	1.7	1.6	---		
Bankfull Max Depth (ft) ²	2.5	2.4	2.5	2.3	2.8		
Low Bank Elevation (ft)	-	-	-	-	575.41		
Bankfull Cross Sectional Area (ft ²) ²	30.8	28.4	28.5	26.7	32.0		
Bankfull Width/Depth Ratio	9.8	10.3	10.0	11.0	---		
Bankfull Entrenchment Ratio ¹	>2.2	>2.9	>3.0	>2.9	>3.1		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.1	1.0		

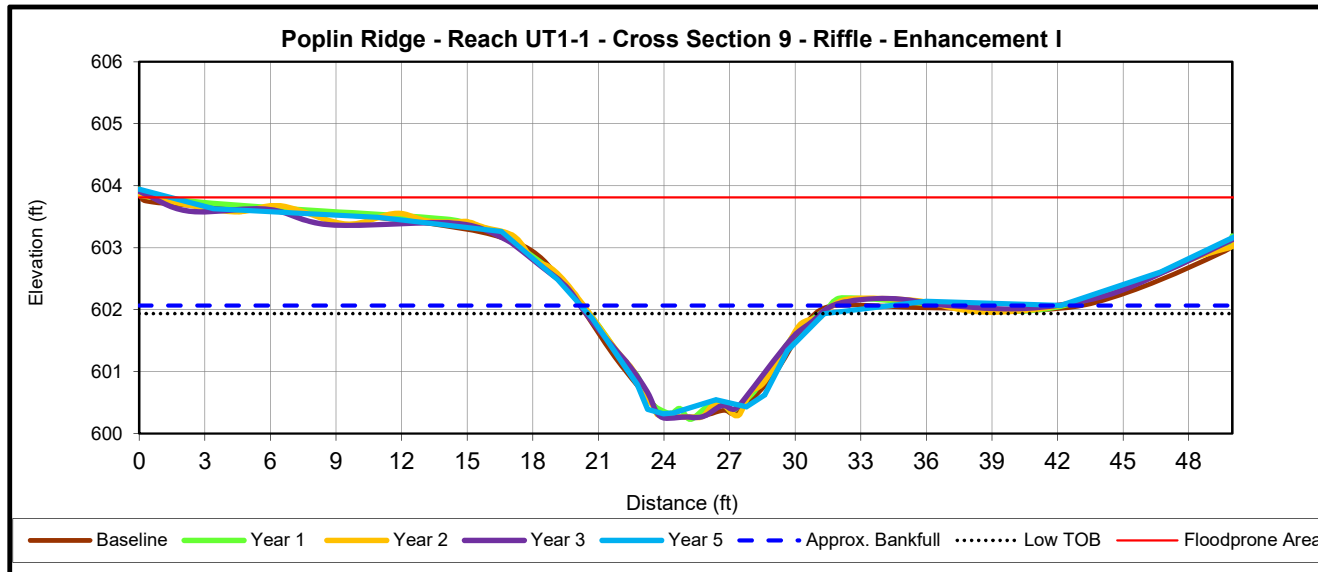
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 9 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	602.06	602.06	602.06	602.06	602.07		
Bankfull Width (ft) ¹	11.7	11.4	11.4	11.6	14.2		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>48.7		
Bankfull Mean Depth (ft)	1.1	1.1	1.1	1.1	---		
Bankfull Max Depth (ft) ²	1.8	1.8	1.8	1.8	1.6		
Low Bank Elevation (ft)	-	-	-	-	601.93		
Bankfull Cross Sectional Area (ft ²) ²	13.0	12.1	12.4	12.3	11.4		
Bankfull Width/Depth Ratio	10.4	10.7	10.4	10.9	---		
Bankfull Entrenchment Ratio ¹	>2.2	>4.4	>4.4	>4.3	>3.4		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.0	0.9		

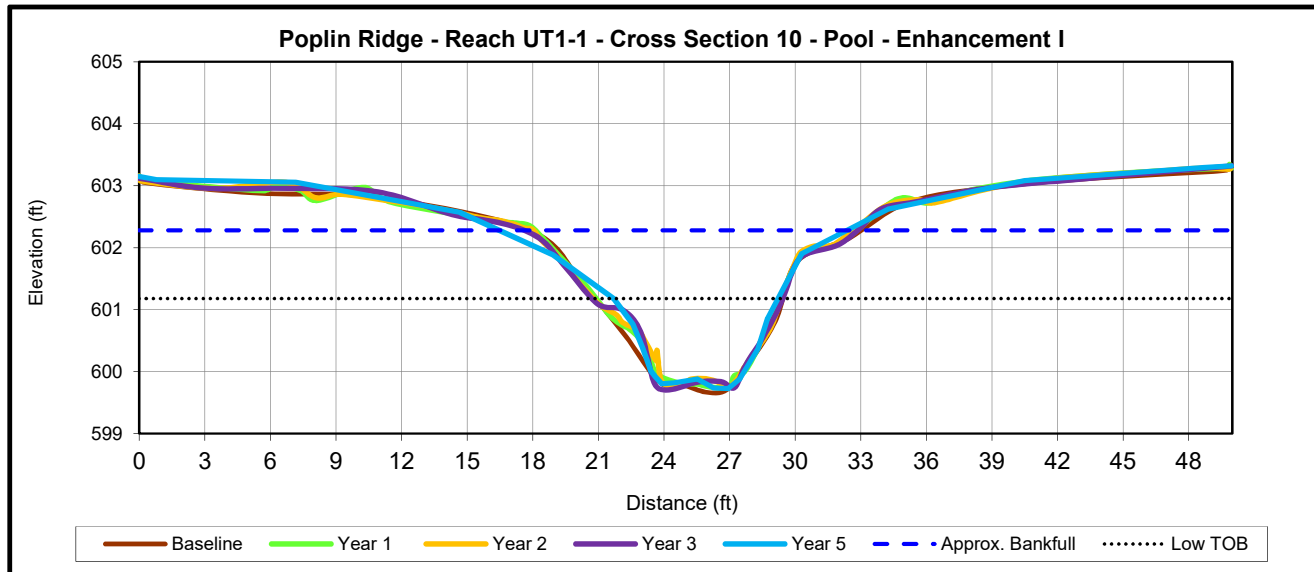
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



	Cross Section 10 (Pool)						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	602.28	602.28	602.28	602.28	602.37		
Bankfull Width (ft) ¹	15.2	14.7	14.6	15.5	16.9		
Floodprone Width (ft) ¹	>50	>50	>50	>50	>50.0		
Bankfull Mean Depth (ft)	1.4	1.3	1.3	1.3	---		
Bankfull Max Depth (ft) ²	2.6	2.5	2.5	2.6	1.5		
Low Bank Elevation (ft)	-	-	-	-	601.18		
Bankfull Cross Sectional Area (ft ²) ²	21.0	19.8	19.7	20.2	7.6		
Bankfull Width/Depth Ratio	11.1	10.9	10.9	11.9	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.4	>3.4	N/A	N/A		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	N/A	N/A		

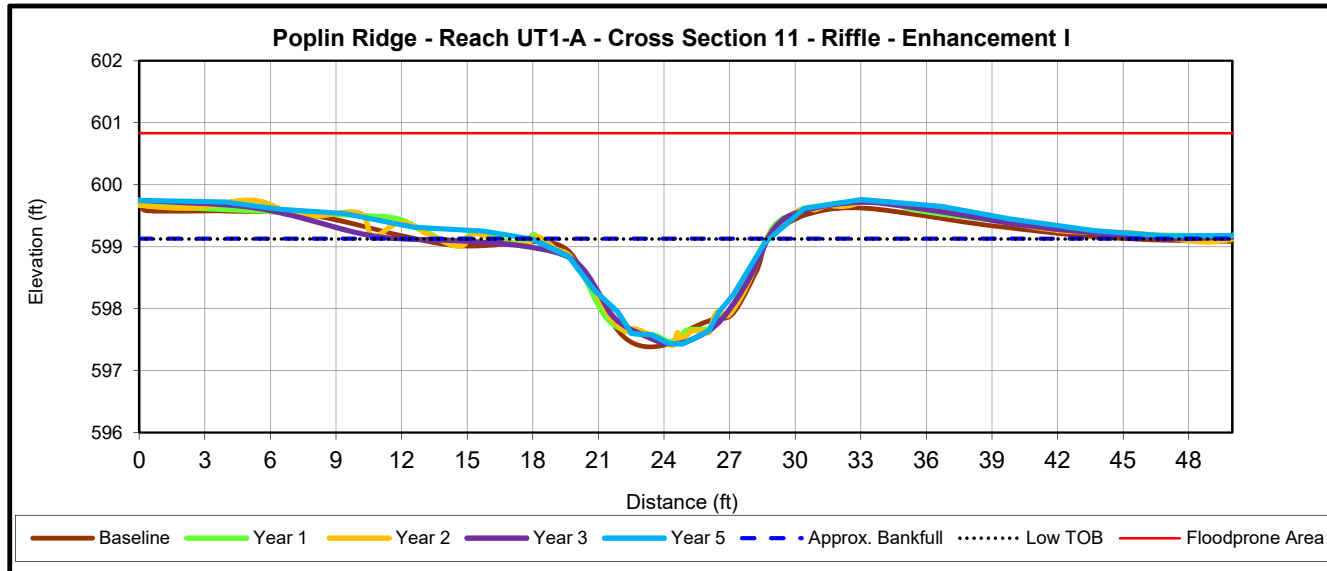
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 11 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	599.06	599.06	599.06	599.06	599.13		
Bankfull Width (ft) ¹	10.0	10.2	10.0	9.6	11.0		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.1		
Bankfull Mean Depth (ft)	1.0	1.0	1.0	1.1	---		
Bankfull Max Depth (ft) ²	1.7	1.6	1.6	1.6	1.7		
Low Bank Elevation (ft)	-	-	-	-	599.12		
Bankfull Cross Sectional Area (ft ²) ²	10.5	10.1	10.1	10.1	10.5		
Bankfull Width/Depth Ratio	9.6	10.3	10.0	9.1	---		
Bankfull Entrenchment Ratio ¹	>2.2	>4.9	>5.0	>5.2	>4.6		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	0.9	1.0		

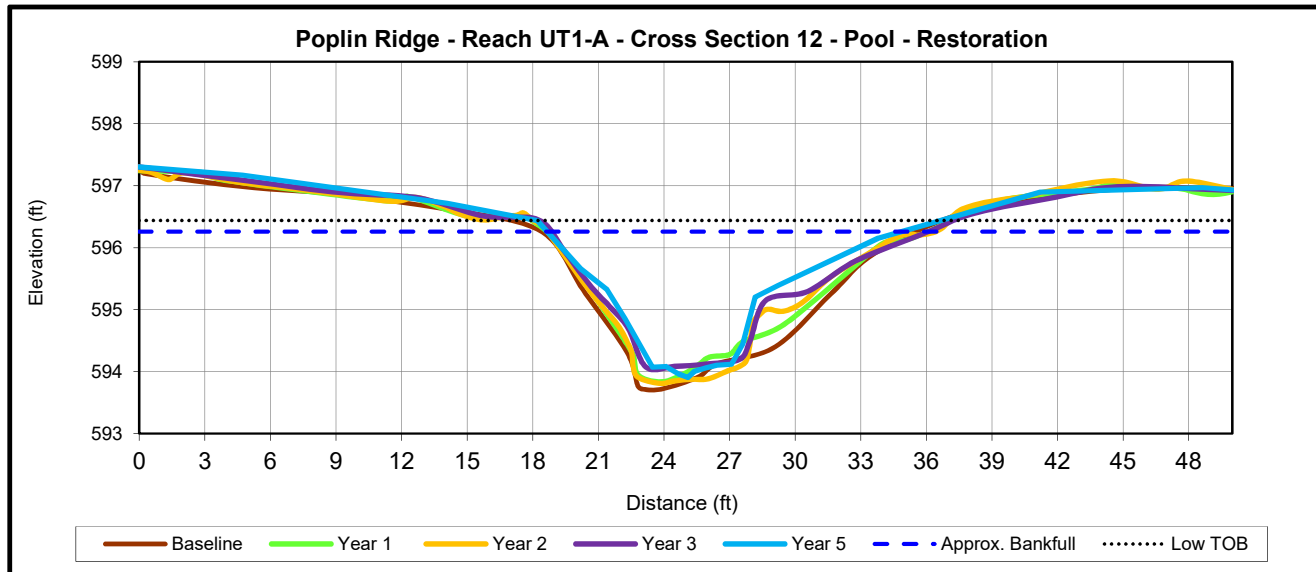
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 12 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	596.26	596.26	596.26	596.26	596.61		
Bankfull Width (ft) ¹	17.4	17.4	17.6	17.4	22.7		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.4		
Bankfull Mean Depth (ft)	1.4	1.3	1.2	1.1	---		
Bankfull Max Depth (ft) ²	2.5	2.4	2.5	2.2	2.5		
Low Bank Elevation (ft)	-	-	-	-	596.44		
Bankfull Cross Sectional Area (ft ²) ²	24.4	21.8	21.8	19.9	20.8		
Bankfull Width/Depth Ratio	12.4	13.9	14.2	15.2	---		
Bankfull Entrenchment Ratio ¹	>2.2	>2.9	>2.8	N/A	N/A		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	N/A	N/A		

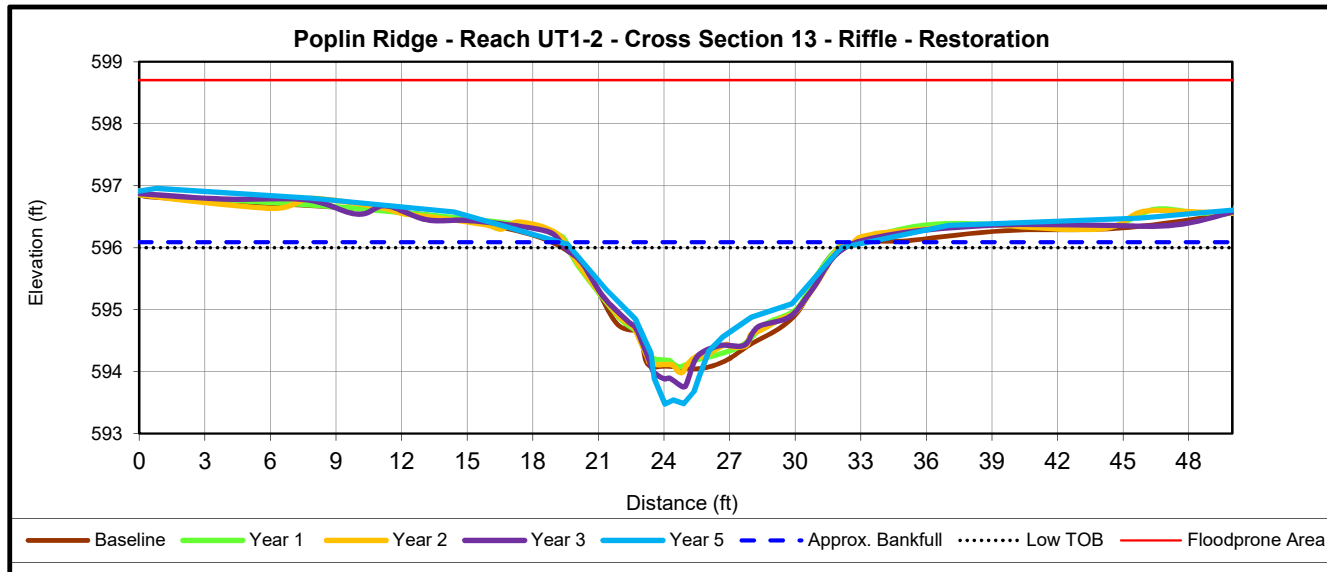
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



	Cross Section 13 (Riffle)						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	595.97	595.97	595.97	595.97	596.09		
Bankfull Width (ft) ¹	12.5	12.2	12.3	12.6	14.1		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.2		
Bankfull Mean Depth (ft)	1.2	1.2	1.2	1.2	---		
Bankfull Max Depth (ft) ²	1.9	1.9	2.0	2.2	2.5		
Low Bank Elevation (ft)	-	-	-	-	596.00		
Bankfull Cross Sectional Area (ft ²) ²	15.6	14.4	14.6	14.8	14.4		
Bankfull Width/Depth Ratio	10.0	10.4	10.3	10.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>4.1	>4.1	>4.0	>3.6		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.0	1.0		

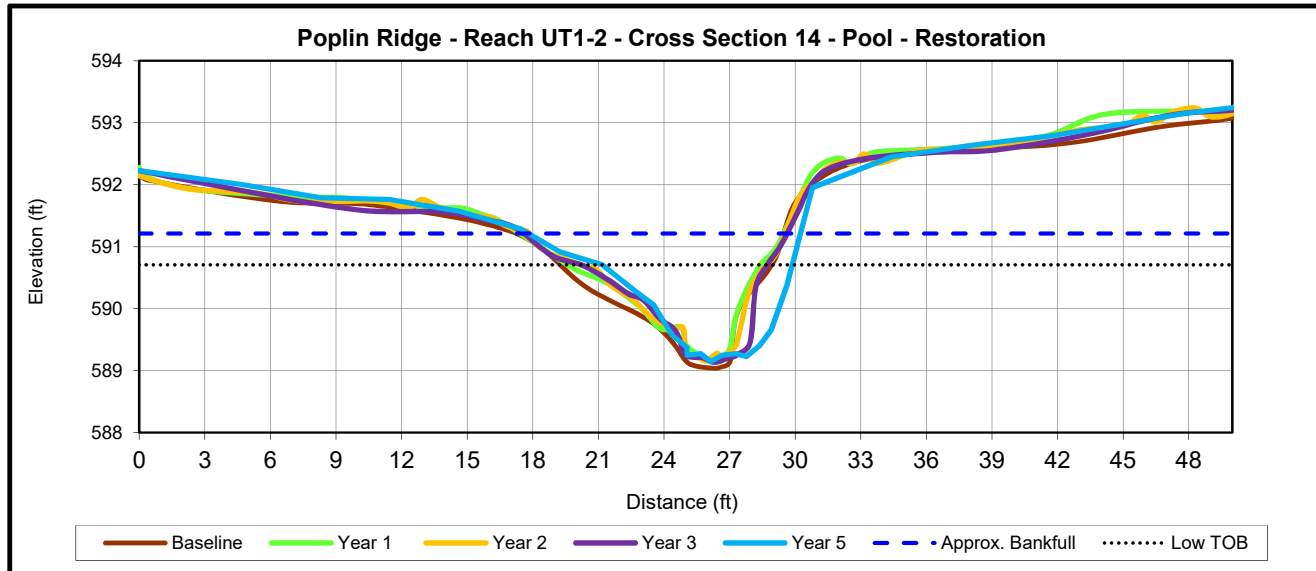
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 14 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	591.21	591.21	591.21	591.21	591.22		
Bankfull Width (ft) ¹	12.3	12.0	11.5	12.1	12.5		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.2		
Bankfull Mean Depth (ft)	1.1	1.0	1.0	1.0	---		
Bankfull Max Depth (ft) ²	2.2	2.0	2.0	2.1	1.6		
Low Bank Elevation (ft)	-	-	-	-	590.71		
Bankfull Cross Sectional Area (ft ²) ²	13.9	11.9	11.5	12.6	8.4		
Bankfull Width/Depth Ratio	10.9	12.1	11.6	11.5	---		
Bankfull Entrenchment Ratio ¹	>2.2	>4.2	>4.3	N/A	N/A		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	N/A	N/A		

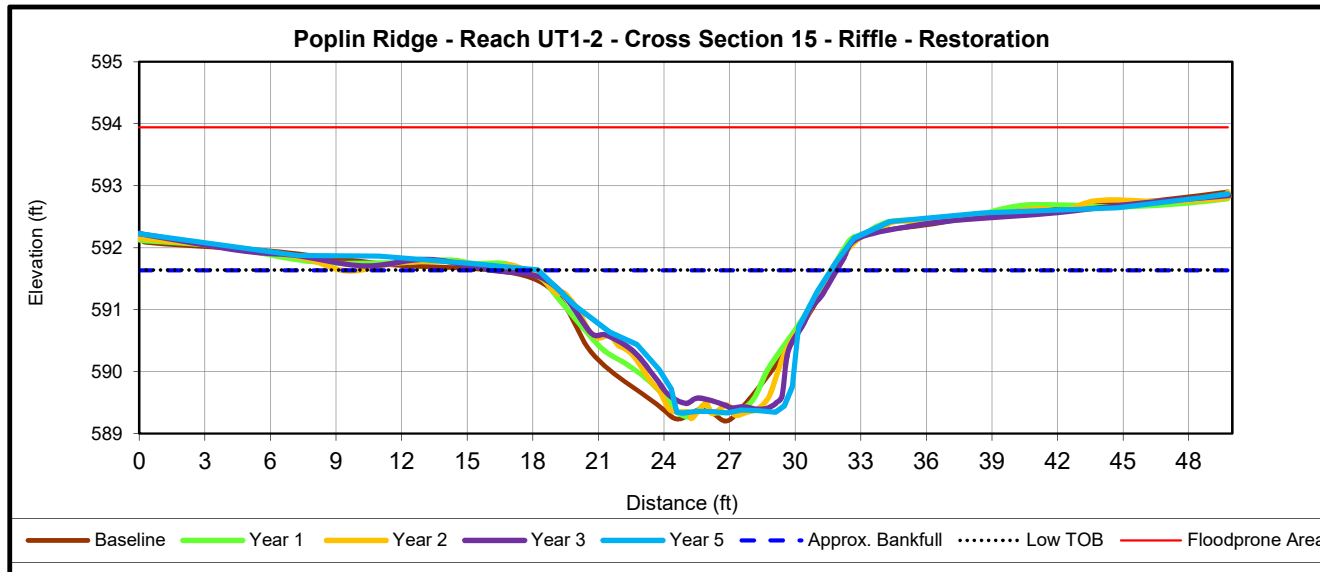
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



	Cross Section 15 (Riffle)						
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	591.48	591.48	591.48	591.48	591.64		
Bankfull Width (ft) ¹	13.4	12.9	12.9	13.2	13.4		
Floodprone Width (ft) ¹	>50	>50	>50	>50	>49.8		
Bankfull Mean Depth (ft)	1.4	1.3	1.3	1.3	---		
Bankfull Max Depth (ft) ²	2.3	2.2	2.2	2.1	2.3		
Low Bank Elevation (ft)	-	-	-	-	591.64		
Bankfull Cross Sectional Area (ft ²) ²	19.0	17.3	17.2	17.0	19.1		
Bankfull Width/Depth Ratio	9.4	9.7	9.7	10.3	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.9	>3.9	>3.8	>3.7		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.0	1.0		

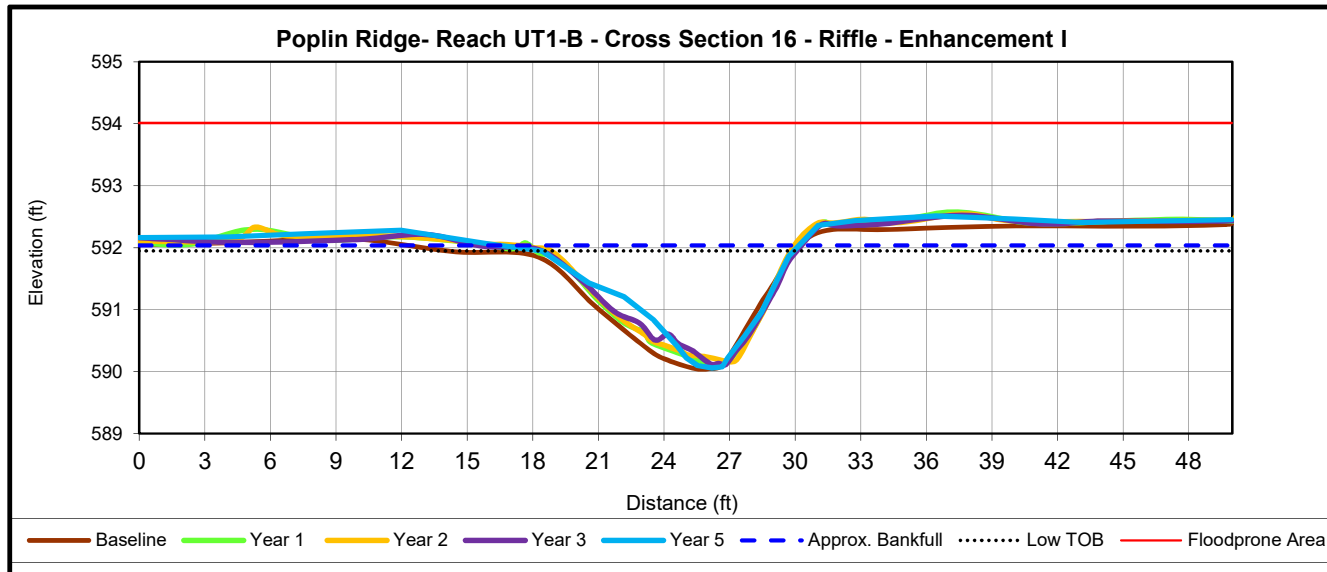
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Cross Section 16 (Riffle)							
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	591.84	591.84	591.84	591.84	592.04		
Bankfull Width (ft) ¹	11.7	10.8	10.5	11.1	13.6		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.0		
Bankfull Mean Depth (ft)	1.1	1.0	1.1	1.0	---		
Bankfull Max Depth (ft) ²	1.8	1.7	1.7	1.7	1.9		
Low Bank Elevation (ft)	-	-	-	-	591.95		
Bankfull Cross Sectional Area (ft ²) ²	12.3	11.2	11.1	10.8	11.2		
Bankfull Width/Depth Ratio	11.2	10.4	9.9	11.3	---		
Bankfull Entrenchment Ratio ¹	>2.2	>4.6	>4.8	>4.5	>3.7		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.1	1.0		

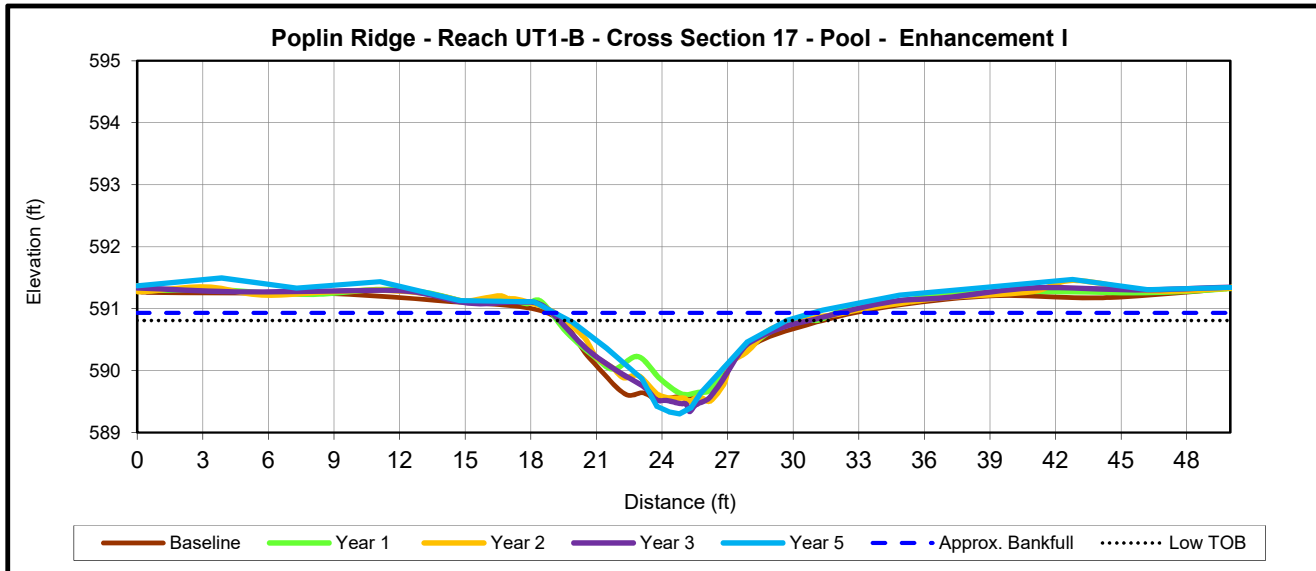
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 17 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	590.93	590.93	590.93	590.93	591.07		
Bankfull Width (ft) ¹	14.2	13.1	13.2	13.2	14.4		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.0		
Bankfull Mean Depth (ft)	0.7	0.6	0.7	0.7	---		
Bankfull Max Depth (ft) ²	1.4	1.3	1.4	1.6	1.5		
Low Bank Elevation (ft)	-	-	-	-	590.81		
Bankfull Cross Sectional Area (ft ²) ²	10.2	8.5	9.2	9.6	7.1		
Bankfull Width/Depth Ratio	19.7	20.2	19.1	18.3	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.8	>3.8	N/A	N/A		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	N/A	N/A		

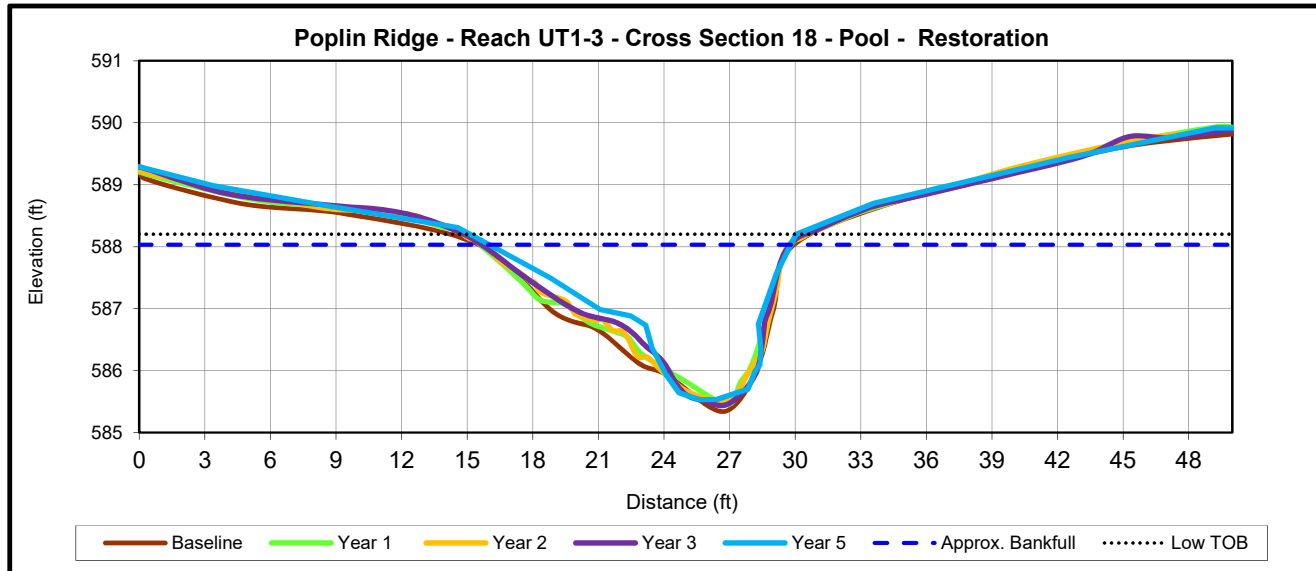
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 18 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	588.03	588.03	588.03	588.03	588.30		
Bankfull Width (ft) ¹	14.5	14.3	13.9	14.2	16.2		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.6		
Bankfull Mean Depth (ft)	1.5	1.4	1.4	1.4	---		
Bankfull Max Depth (ft) ²	2.6	2.6	2.5	2.6	2.7		
Low Bank Elevation (ft)	-	-	-	-	588.20		
Bankfull Cross Sectional Area (ft ²) ²	21.5	19.6	19.7	19.3	19.7		
Bankfull Width/Depth Ratio	9.8	10.4	9.9	10.5	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.5	>3.6	N/A	N/A		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	N/A	N/A		

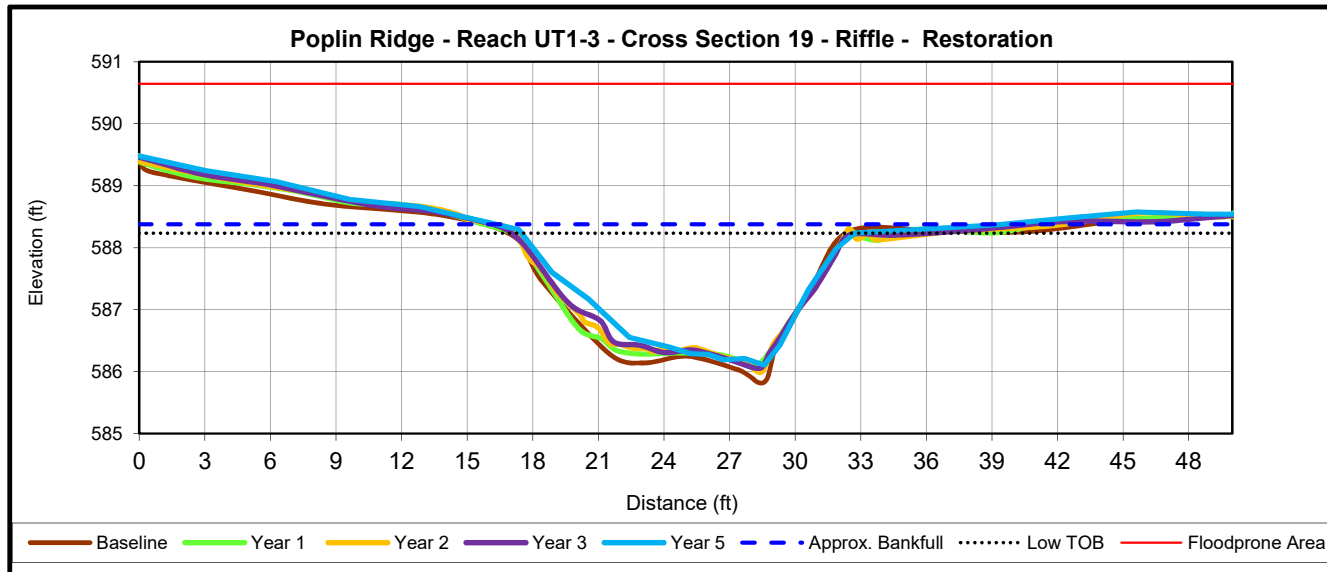
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 19 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA ¹	588.19	588.19	588.19	588.19	588.38		
Bankfull Width (ft) ¹	15.2	15.1	14.9	15.4	23.1		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.2		
Bankfull Mean Depth (ft)	1.5	1.4	1.4	1.4	---		
Bankfull Max Depth (ft) ²	2.4	2.1	2.2	2.1	2.1		
Low Bank Elevation (ft)	-	-	-	-	588.23		
Bankfull Cross Sectional Area (ft ²) ²	23.0	21.8	21.3	21.0	20.3		
Bankfull Width/Depth Ratio	10.1	10.5	10.5	11.2	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.3	>3.3	>3.3	>2.2		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.0	0.9		

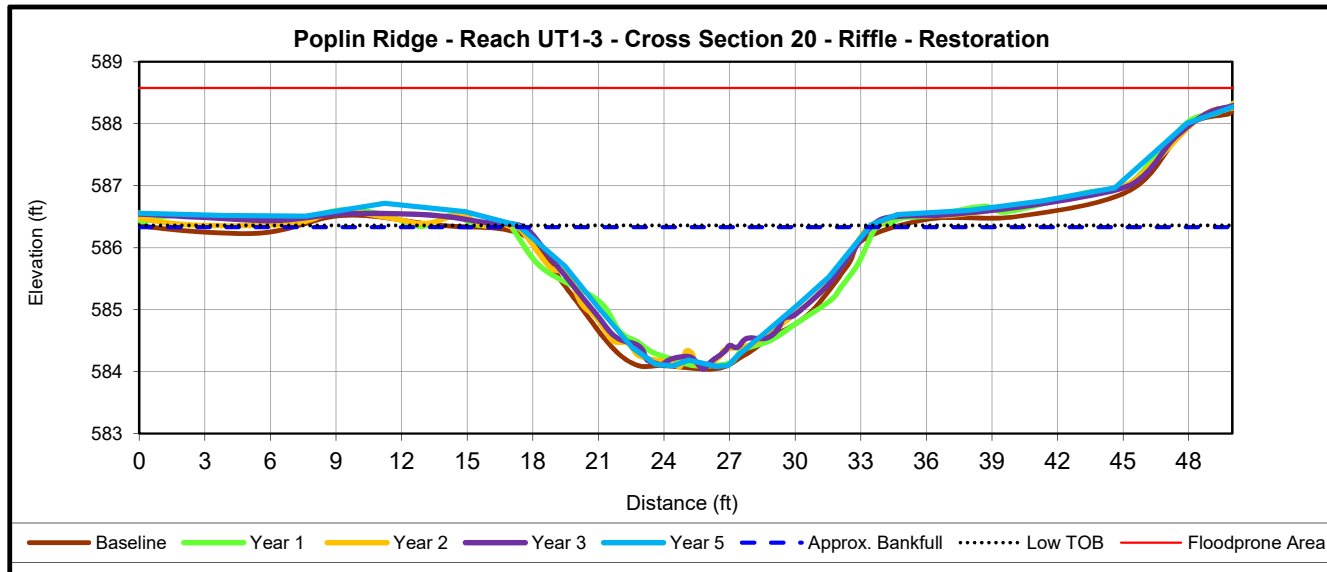
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Cross Section 20 (Riffle)							
Dimension	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA¹	586.15	586.15	586.15	586.15	586.33		
Bankfull Width (ft) ¹	15.5	16.1	15.2	15.1	16.0		
Floodprone Width (ft) ¹	>50.0	>50.0	>50.0	>50.0	>50.2		
Bankfull Mean Depth (ft)	1.4	1.3	1.3	1.3	---		
Bankfull Max Depth (ft) ²	2.1	2.1	2.1	2.1	2.3		
Low Bank Elevation (ft)	-	-	-	-	586.36		
Bankfull Cross Sectional Area (ft ²) ²	21.9	20.9	20.0	19.6	22.4		
Bankfull Width/Depth Ratio	11.0	12.4	11.6	11.6	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	>3.3	>3.1		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.1	1.0		

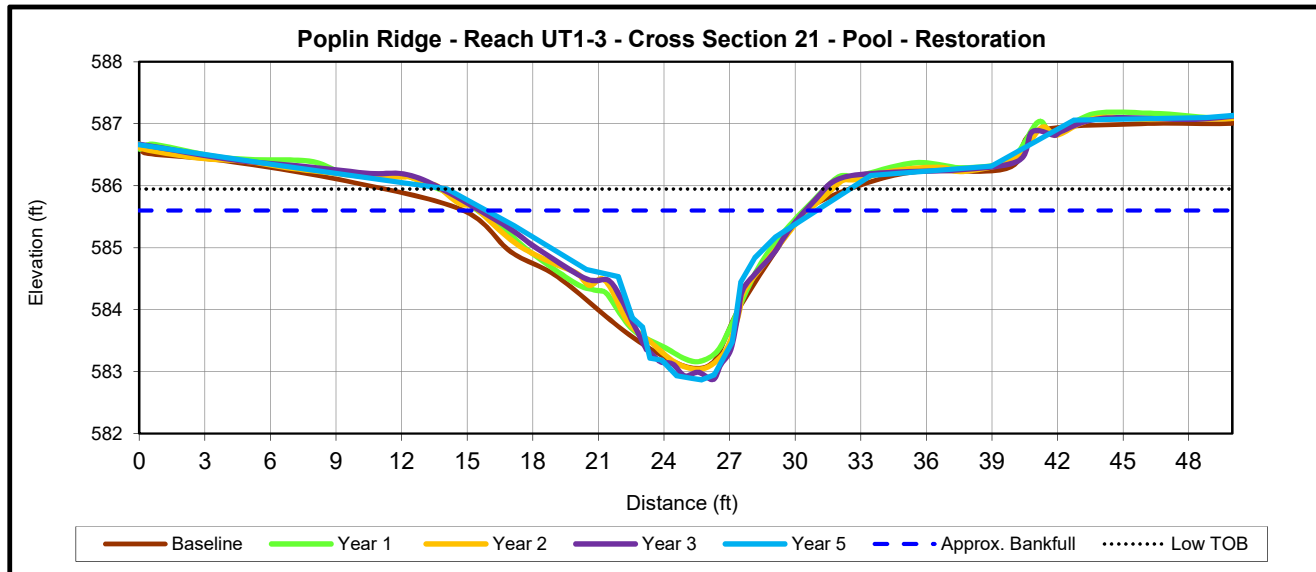
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 21 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	577.24	577.24	577.24	577.24	578.14		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8		
Low Bank Elevation (ft)	-	-	-	-	578.14		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0		

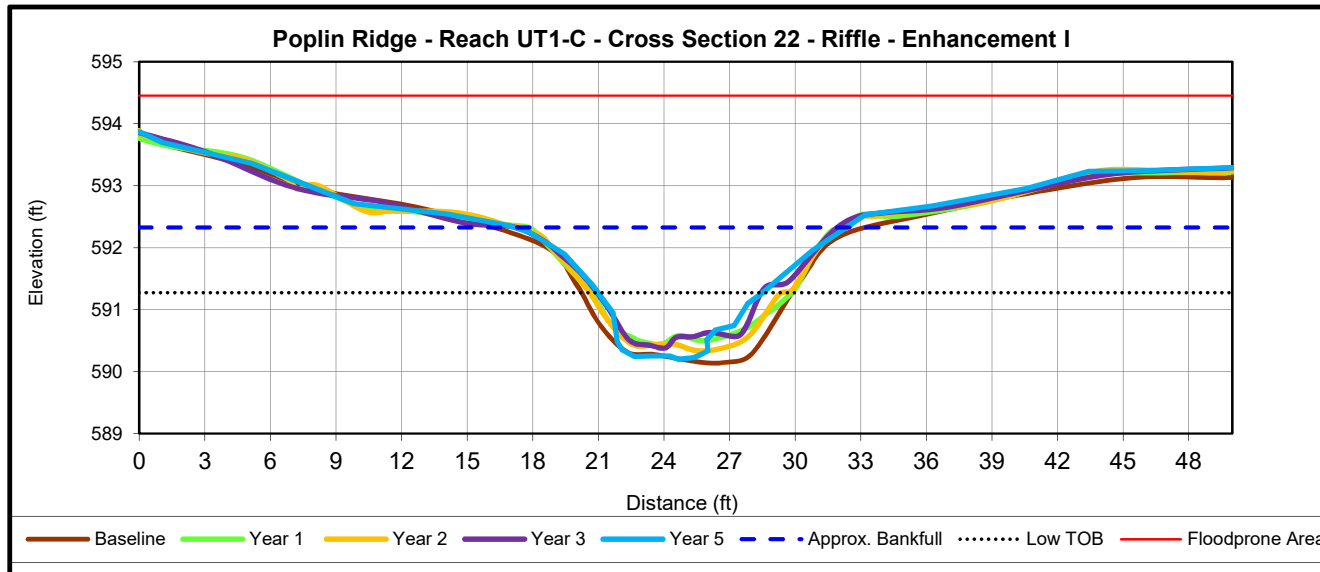
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 22 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	577.24	577.24	577.24	577.24	578.14		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8		
Low Bank Elevation (ft)	-	-	-	-	578.14		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0		

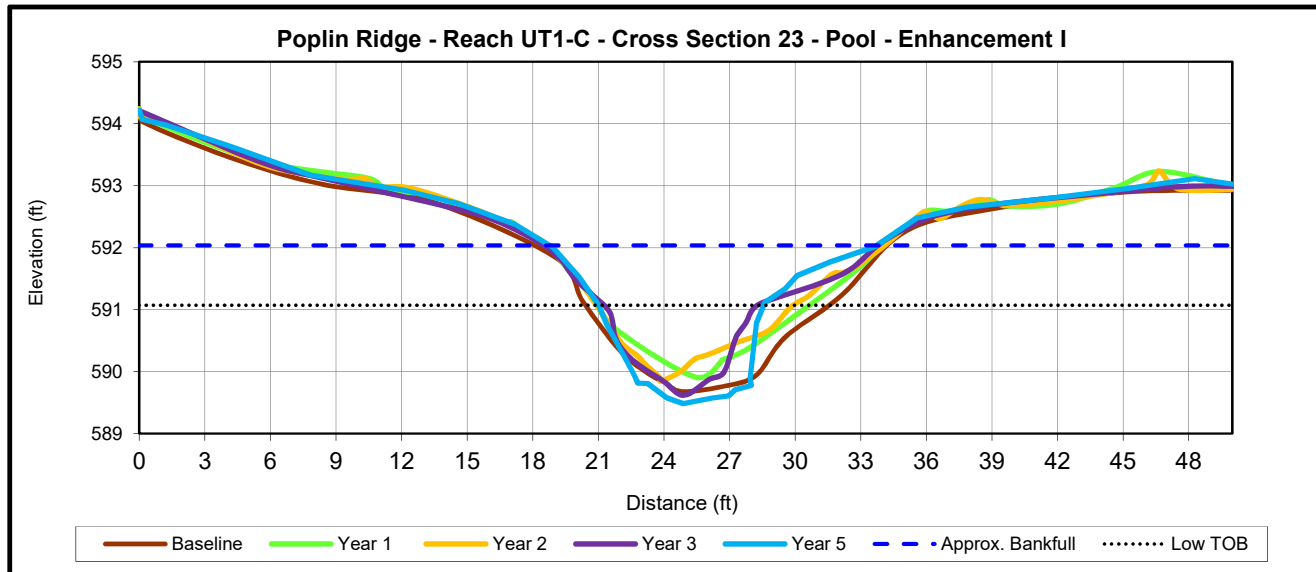
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 23 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	577.24	577.24	577.24	577.24	578.14		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8		
Low Bank Elevation (ft)	-	-	-	-	578.14		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0		

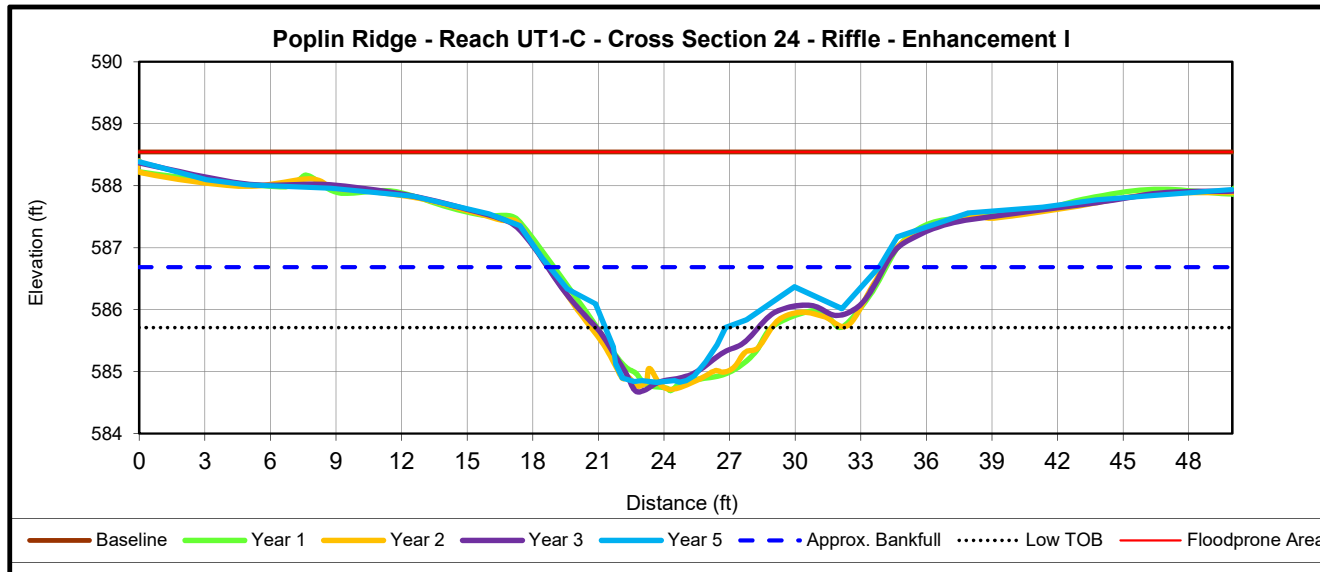
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 24 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	577.24	577.24	577.24	577.24	578.14		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8		
Low Bank Elevation (ft)	-	-	-	-	578.14		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0		

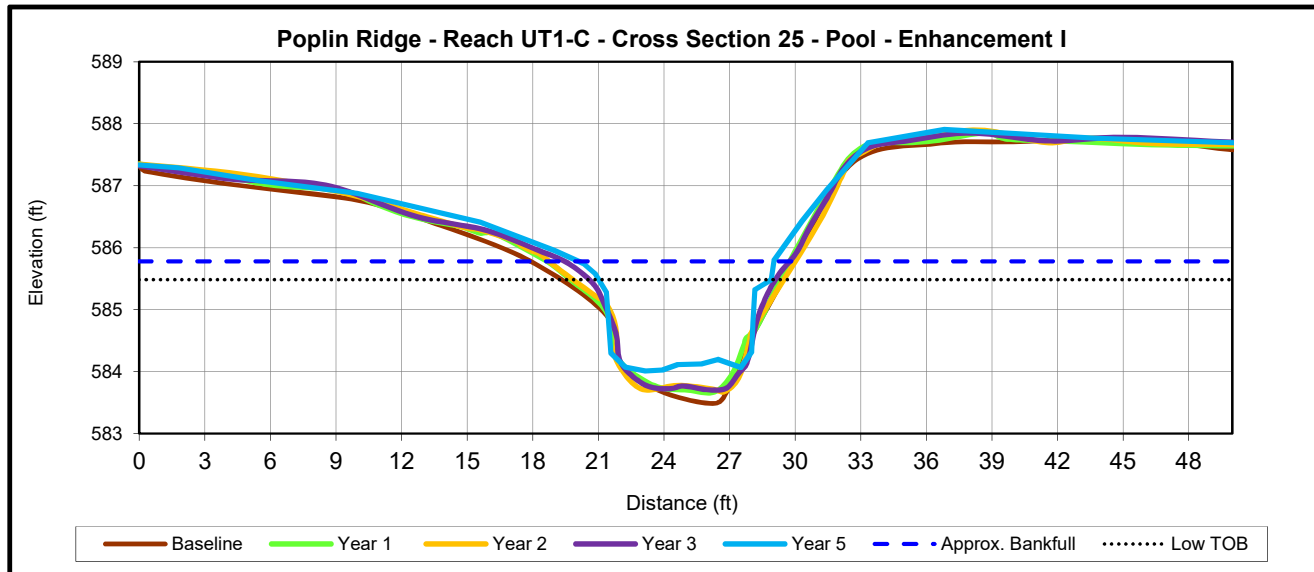
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 25 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	577.24	577.24	577.24	577.24	578.14		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8		
Low Bank Elevation (ft)	-	-	-	-	578.14		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0		

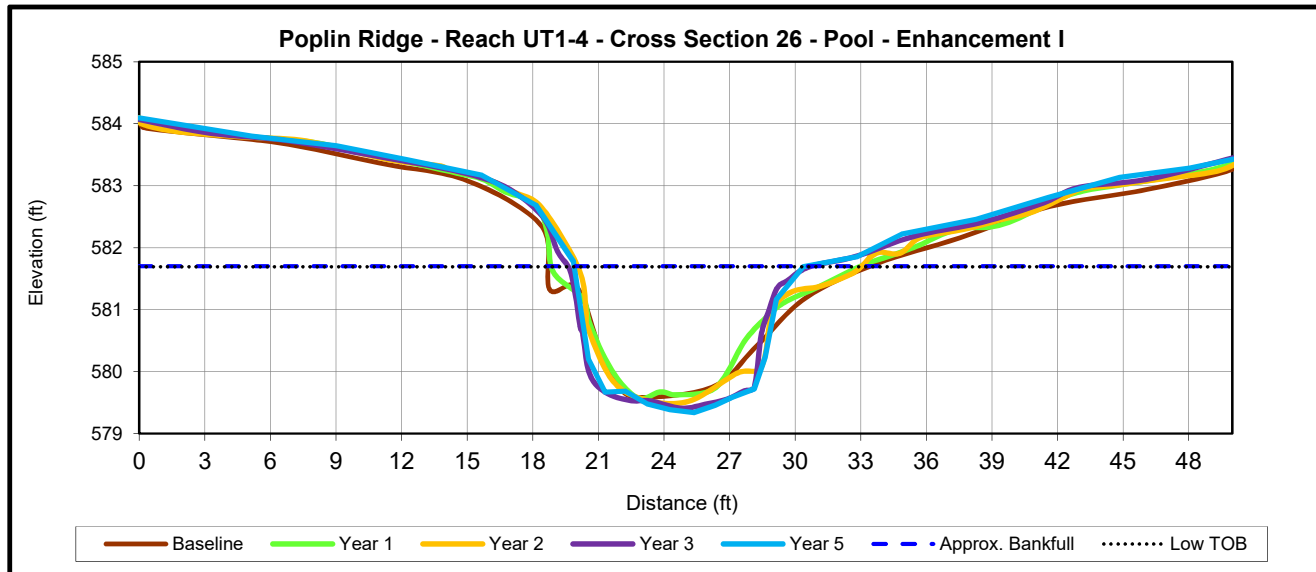
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 26 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	577.24	577.24	577.24	577.24	578.14		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8		
Low Bank Elevation (ft)	-	-	-	-	578.14		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0		

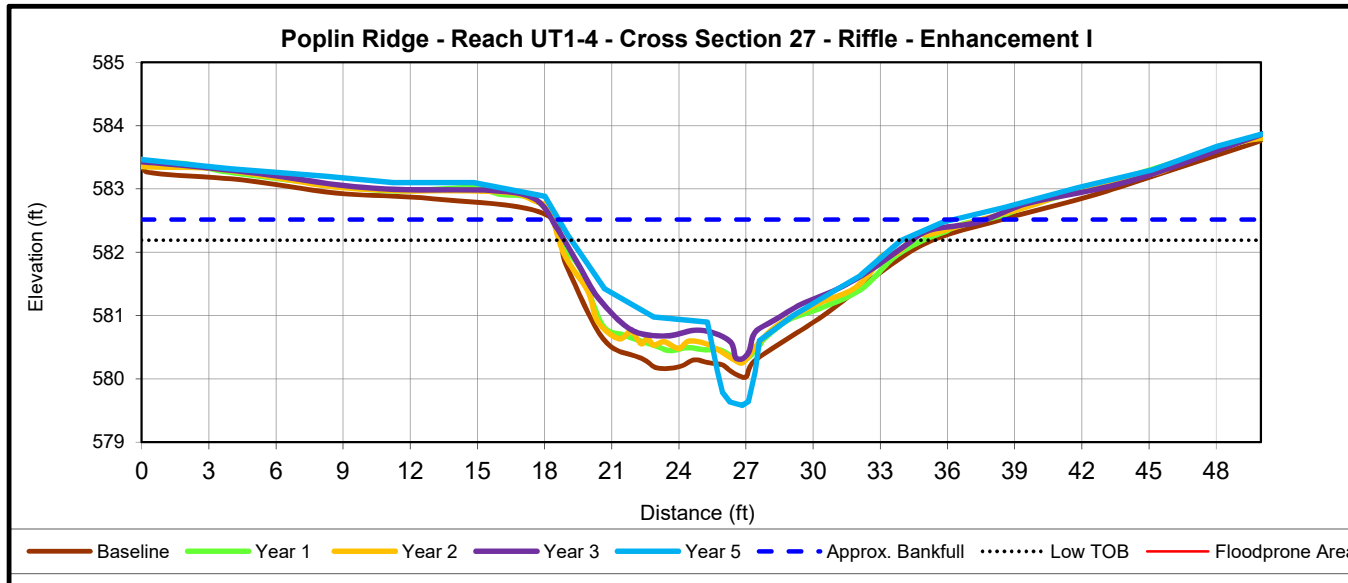
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 27 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	577.24	577.24	577.24	577.24	578.14		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8		
Low Bank Elevation (ft)	-	-	-	-	578.14		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0		

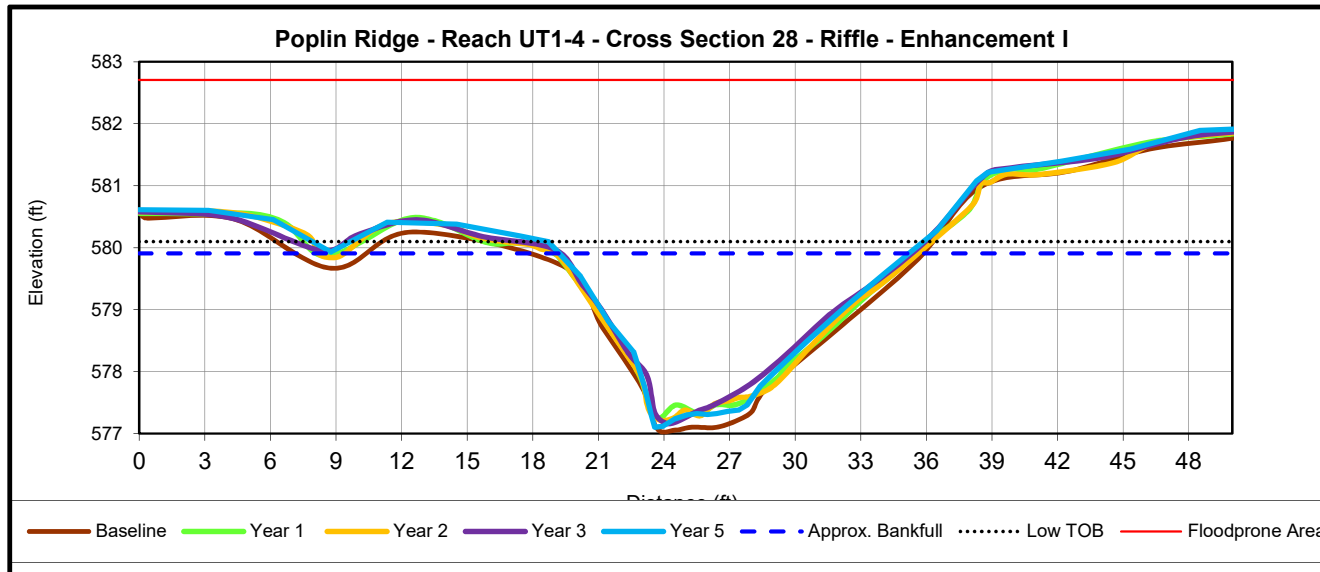
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 28 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	577.24	577.24	577.24	577.24	578.14		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8		
Low Bank Elevation (ft)	-	-	-	-	578.14		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0		

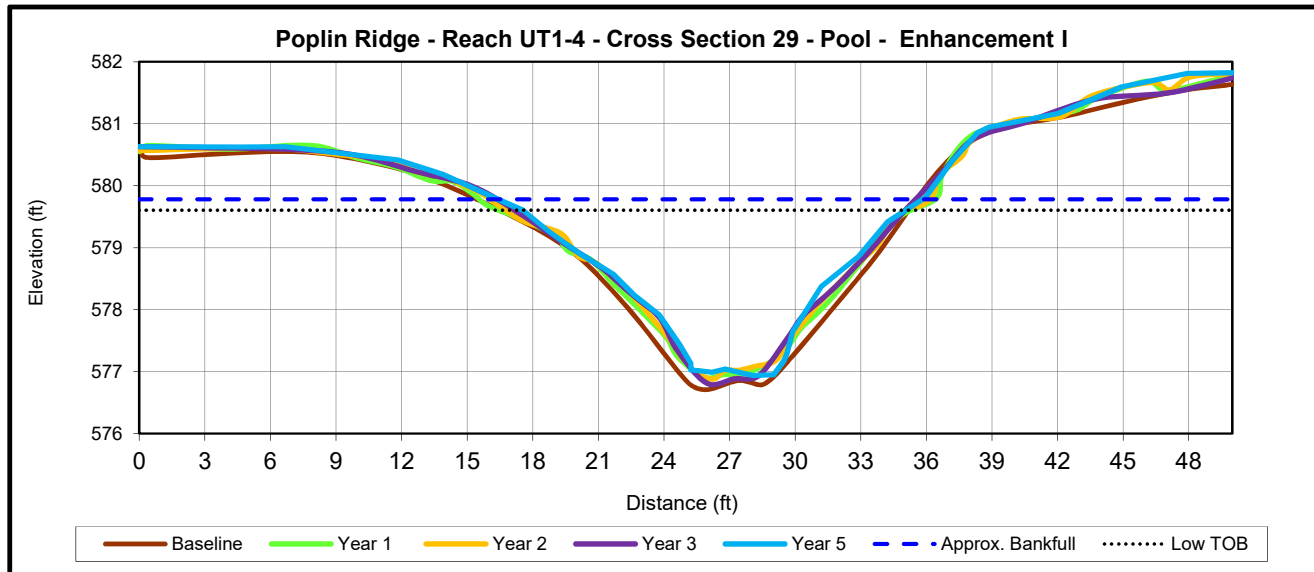
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 29 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	577.24	577.24	577.24	577.24	578.14		
Bankfull Width (ft) ¹	3.2	5.5	5.2	4.3	10.8		
Floodprone Width (ft) ¹	>17.2	>17.2	>17.2	26.2	52.4		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---		
Bankfull Max Depth (ft) ²	0.9	1.4	1.1	0.5	0.8		
Low Bank Elevation (ft)	-	-	-	-	578.14		
Bankfull Cross Sectional Area (ft ²) ²	0.6	3.7	3.3	1.1	4.2		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---		
Bankfull Entrenchment Ratio ¹	>2.2	>3.1	>3.3	6.0	4.8		
Bankfull Bank Height Ratio ¹	1.0	1.0	1.0	1.3	1.0		

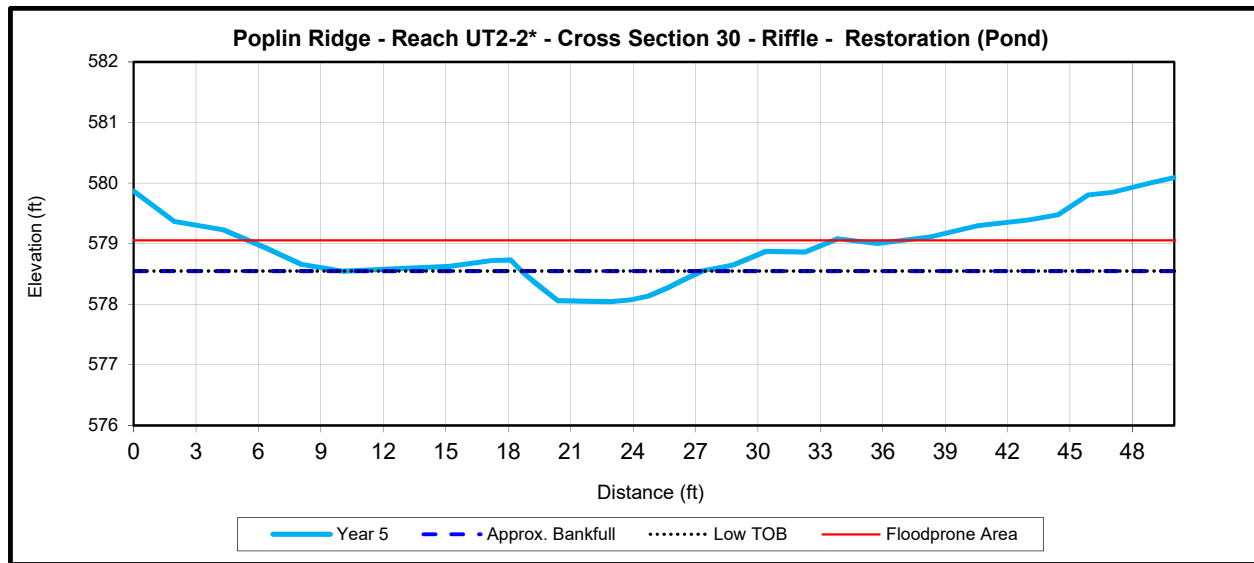
Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.



Upstream



Downstream



Dimension	Cross Section 30 (Riffle)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	-	-	-	-	578.55		
Bankfull Width (ft) ¹	-	-	-	-	8.7		
Floodprone Width (ft) ¹	-	-	-	-	30.7		
Bankfull Mean Depth (ft)	-	-	-	-	---		
Bankfull Max Depth (ft) ²	-	-	-	-	0.5		
Low Bank Elevation (ft)	-	-	-	-	578.55		
Bankfull Cross Sectional Area (ft ²) ²	-	-	-	-	3.1		
Bankfull Width/Depth Ratio	-	-	-	-	---		
Bankfull Entrenchment Ratio ¹	-	-	-	-	3.5		
Bankfull Bank Height Ratio ¹	-	-	-	-	1.0		

Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.

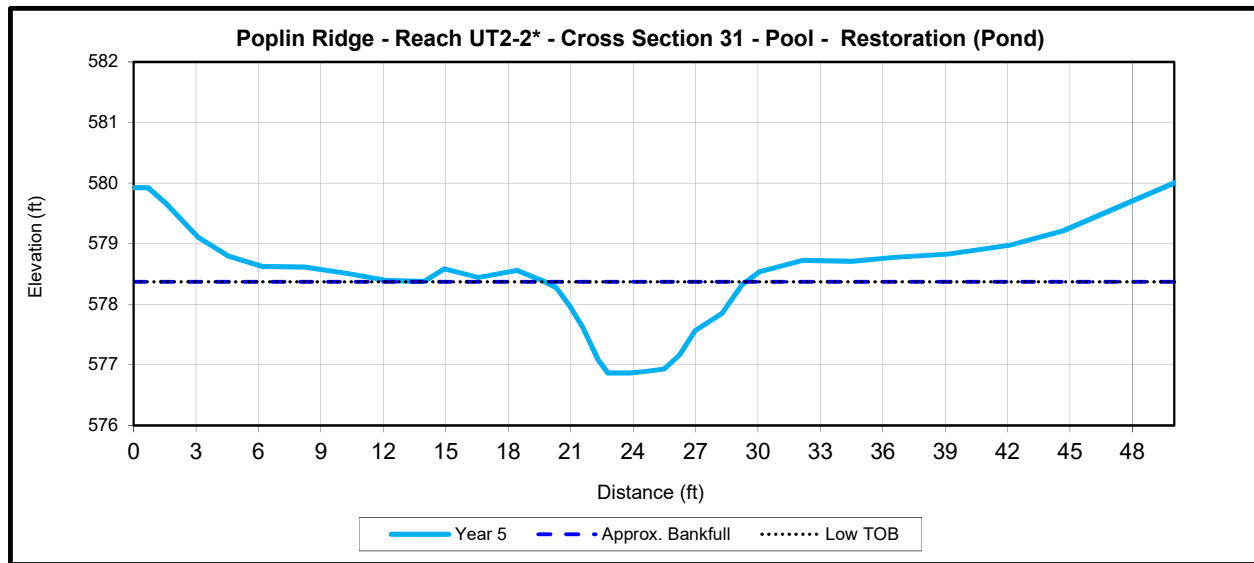
*Reach UT2-2 was reconstructed in September 2019



Upstream



Downstream



Dimension	Cross Section 31 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
XSA ¹	-	-	-	-	578.37		
Bankfull Width (ft) ¹	-	-	-	-	9.7		
Floodprone Width (ft) ¹	-	-	-	-	48.3		
Bankfull Mean Depth (ft)	-	-	-	-	---		
Bankfull Max Depth (ft) ²	-	-	-	-	1.5		
Low Bank Elevation (ft)	-	-	-	-	578.37		
Bankfull Cross Sectional Area (ft ²) ²	-	-	-	-	8.8		
Bankfull Width/Depth Ratio	-	-	-	-	---		
Bankfull Entrenchment Ratio ¹	-	-	-	-	N/A		
Bankfull Bank Height Ratio ¹	-	-	-	-	N/A		

Note: Starting in MY5, the parameters denoted with ¹ were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with ² were calculated using the current years low top of bank as the bankfull.

*Reach UT2-2 was reconstructed in September 2019

Table 12. Pebble Count Data Summary

Stream Reach	MY1 - 2015		MY2 - 2016		MY3 - 2017		MY4 - 2018		MY5 - 2019		MY6 - 2020		MY7 - 2021	
	Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count	
	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)
UT1-1	13	43	5.2	26	48	76			24	43				
UT1-1A	0.15	0.64	0.2	26	0.062	32			11	57				
UT1-B	23	42	4.9	22	27	59			20	35				
UT1-C	9.6	24	3.5	24	9.6	51.5			14.5	25				
UT1-2	0.7	12.3	4.6	25.8	7.5	26.8			10.9	20				
UT1-3	23.5	62.5	7.9	29.5	16.7	80.5			19.5	33.5				
UT1-4	4	15.5	4.2	11.8	27.1	44			10.3	35				
UT2-A	0.062	0.6	0.6	6.1	6.5	14			9	15				
UT2-3	0.062	6.4	1.4	11	0.062	12			0.062	0.062				
UT2-4	0.062	42	0.062	24	28	79			*	*				

Charts 1-11. MY3 Stream Reach Substrate Composition Charts

Chart 1.

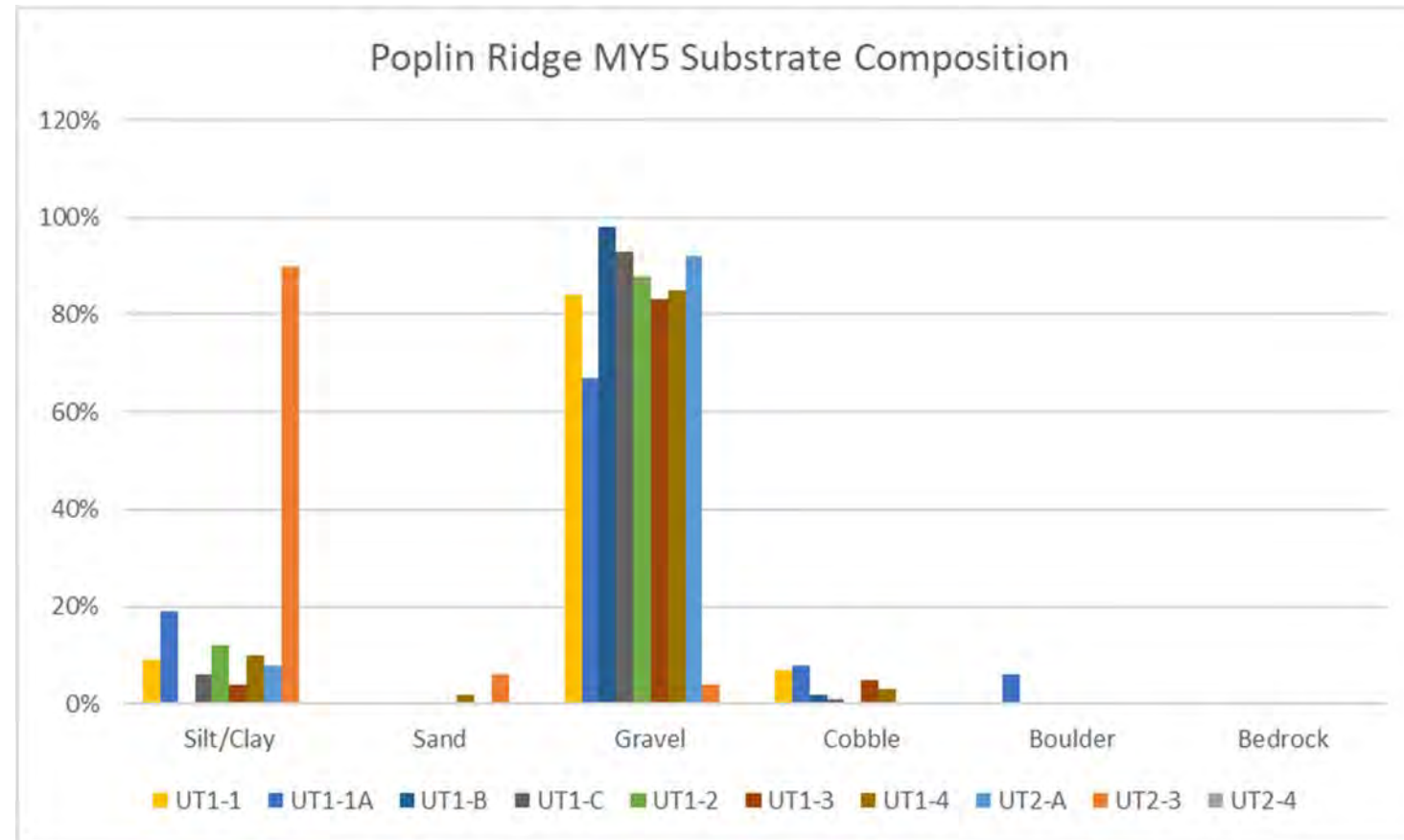


Chart 2.

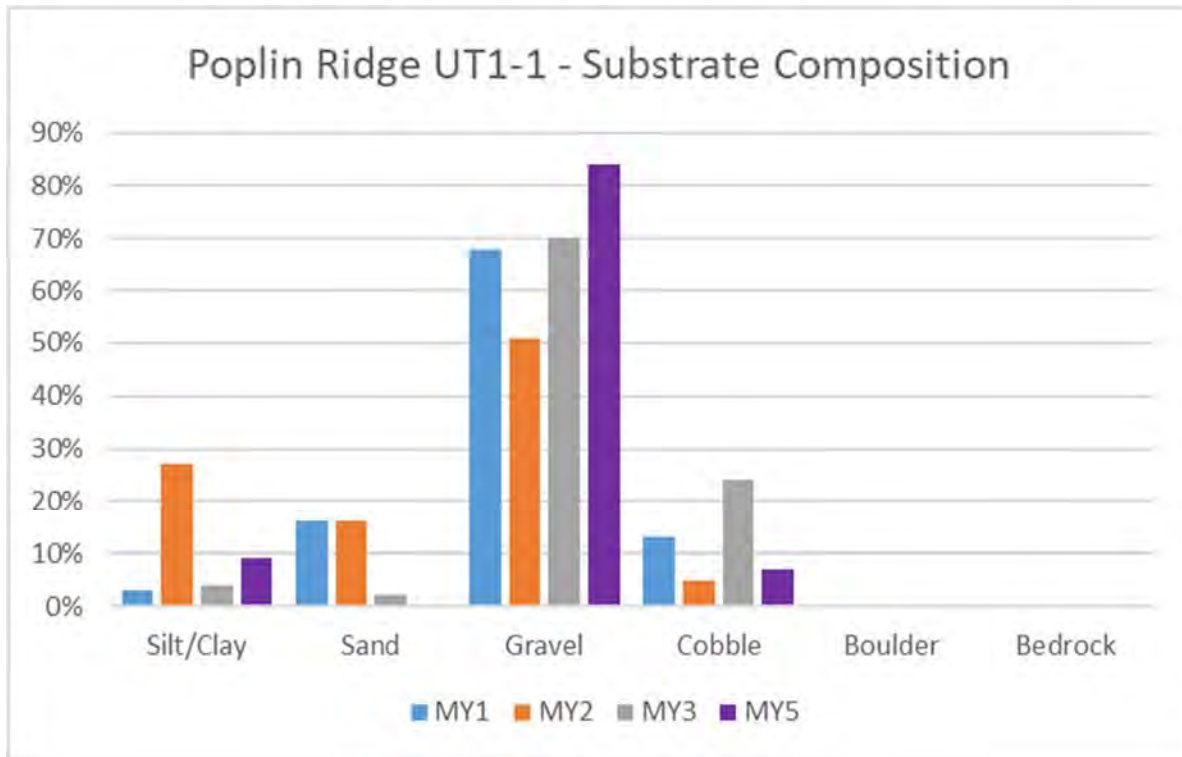


Chart 3.

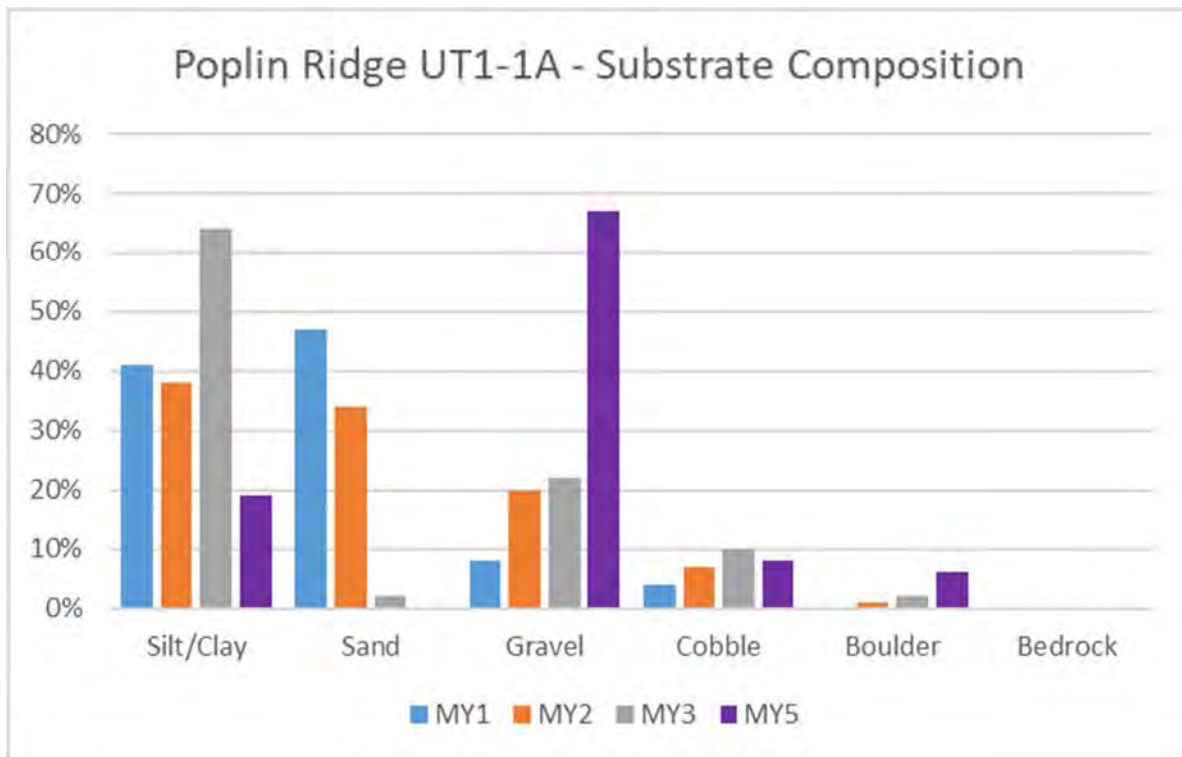


Chart 4.

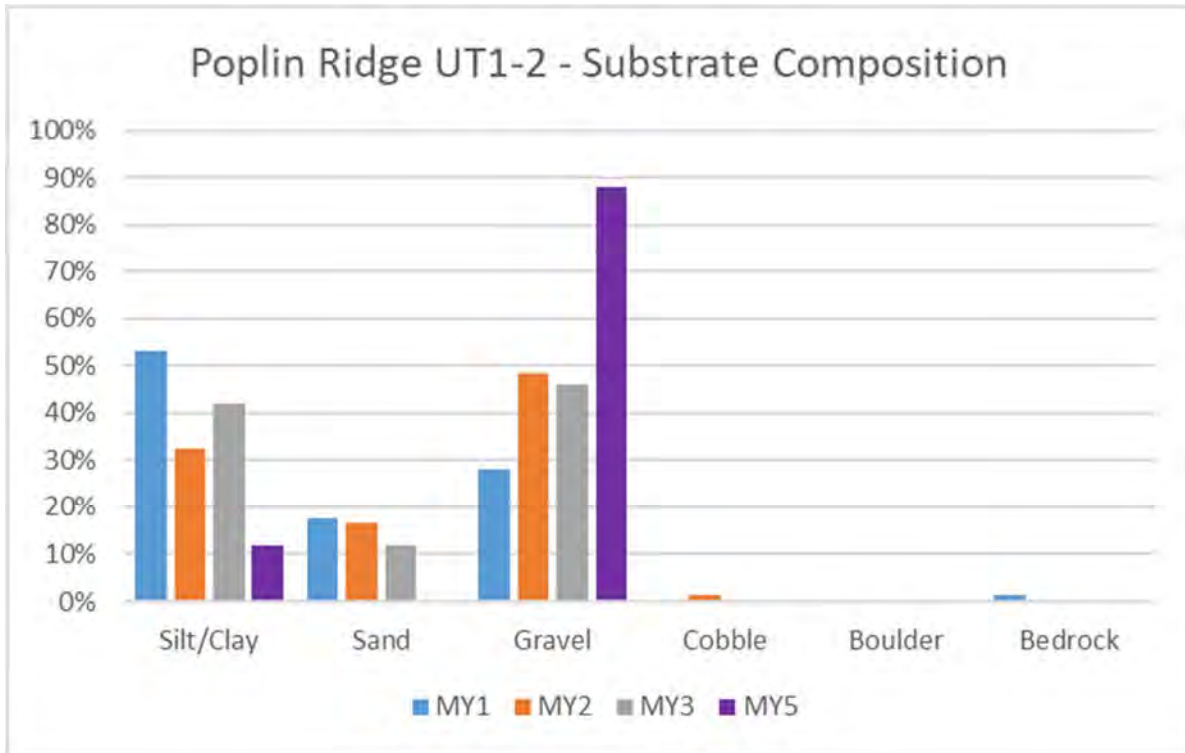


Chart 5.

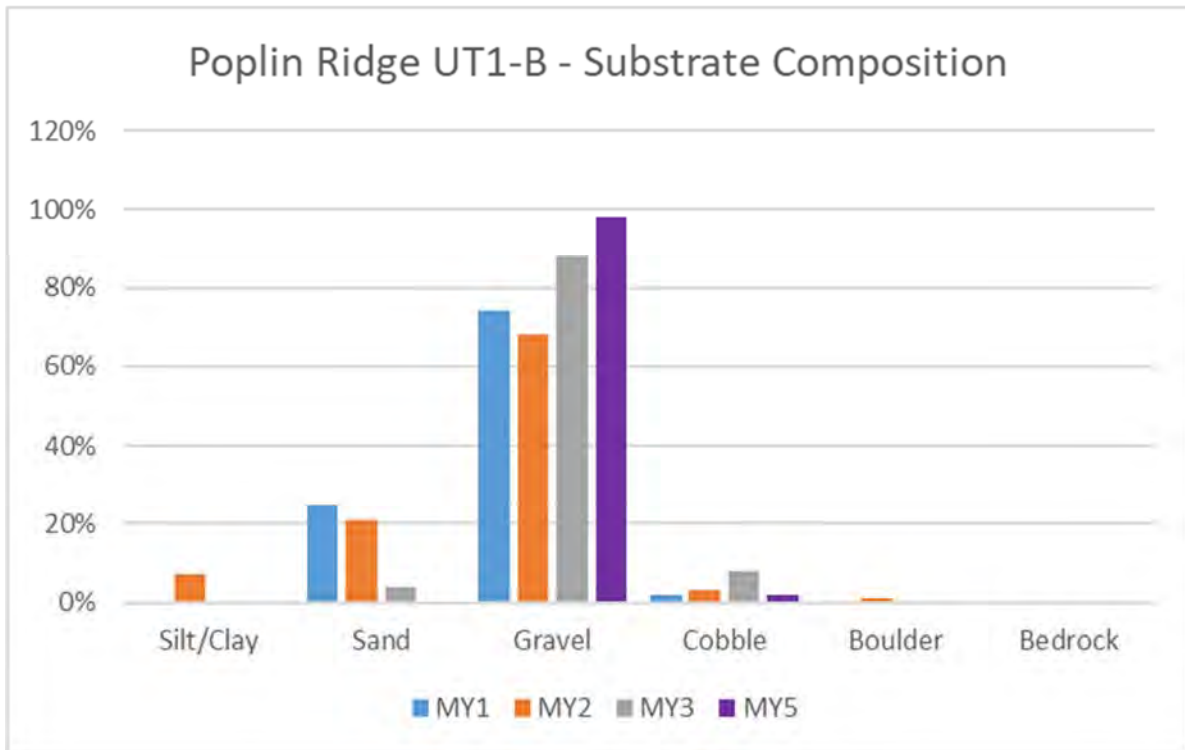


Chart 6.

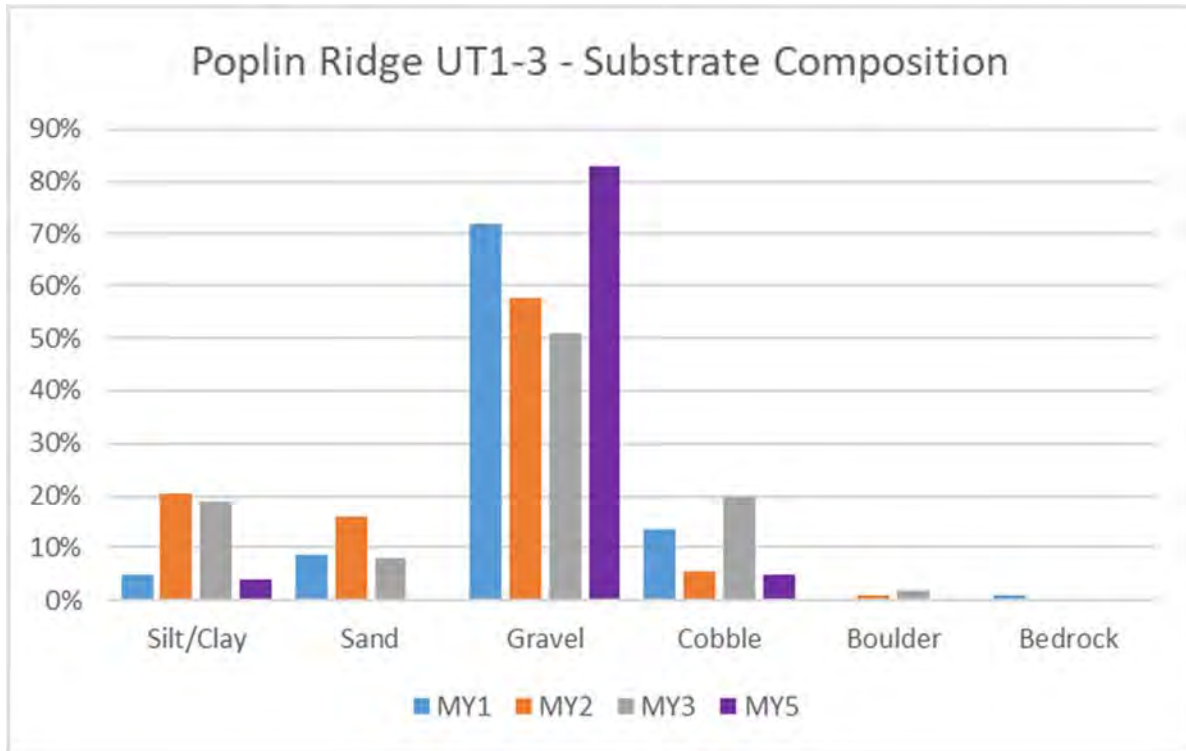


Chart 7.

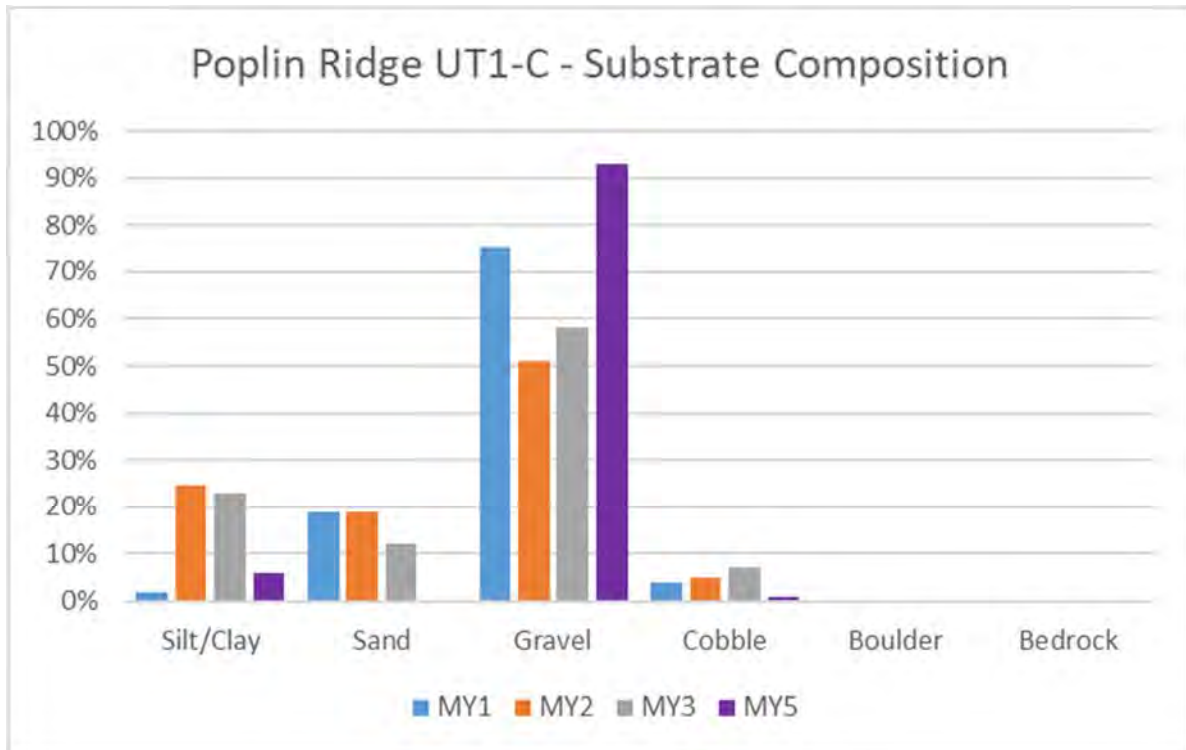


Chart 8.

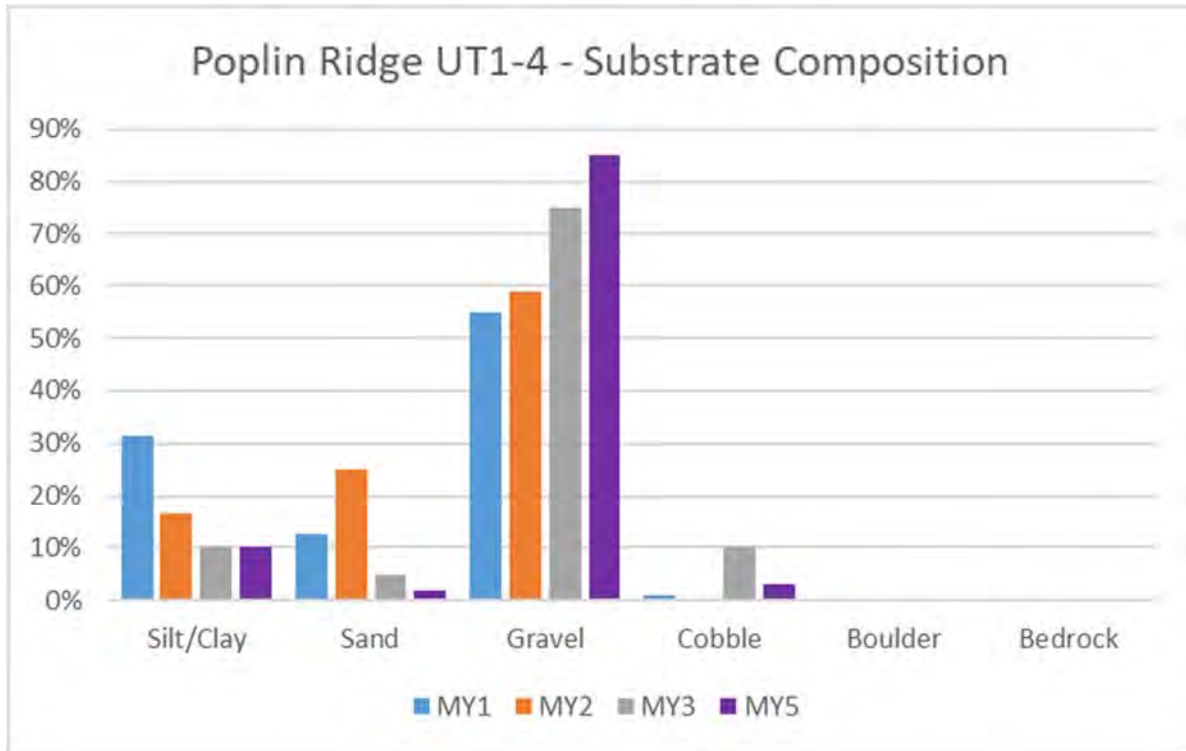


Chart 9.

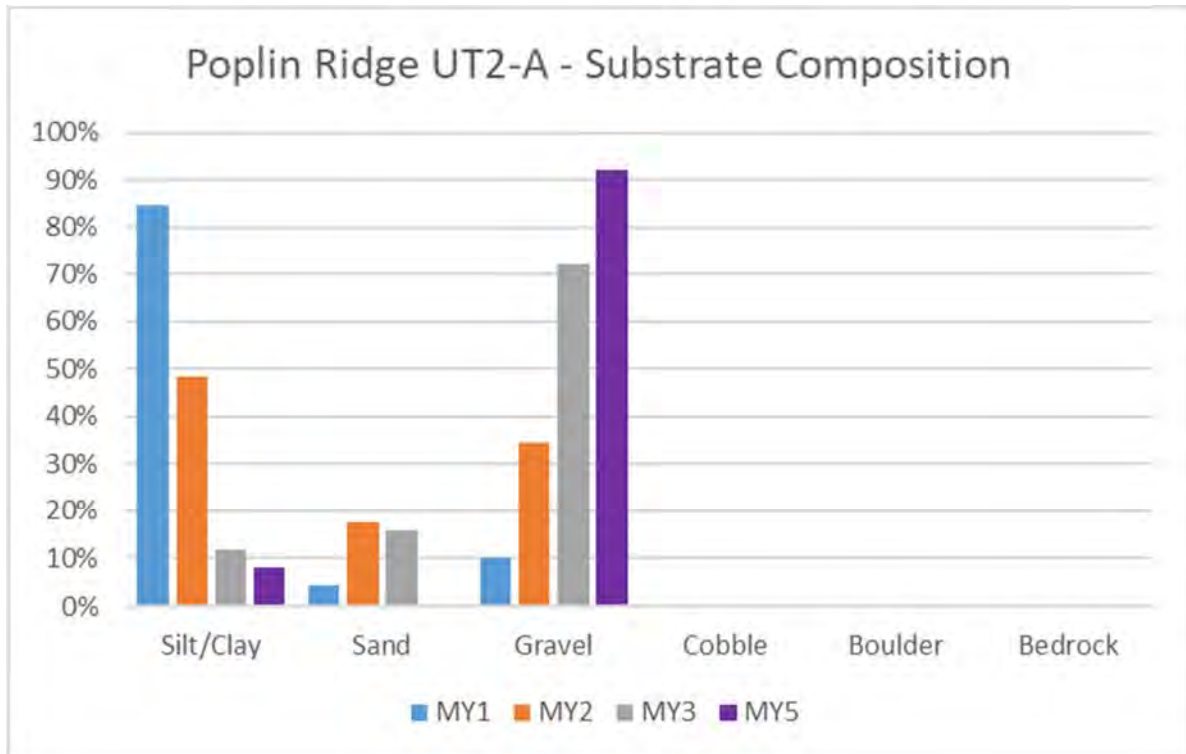


Chart 10.

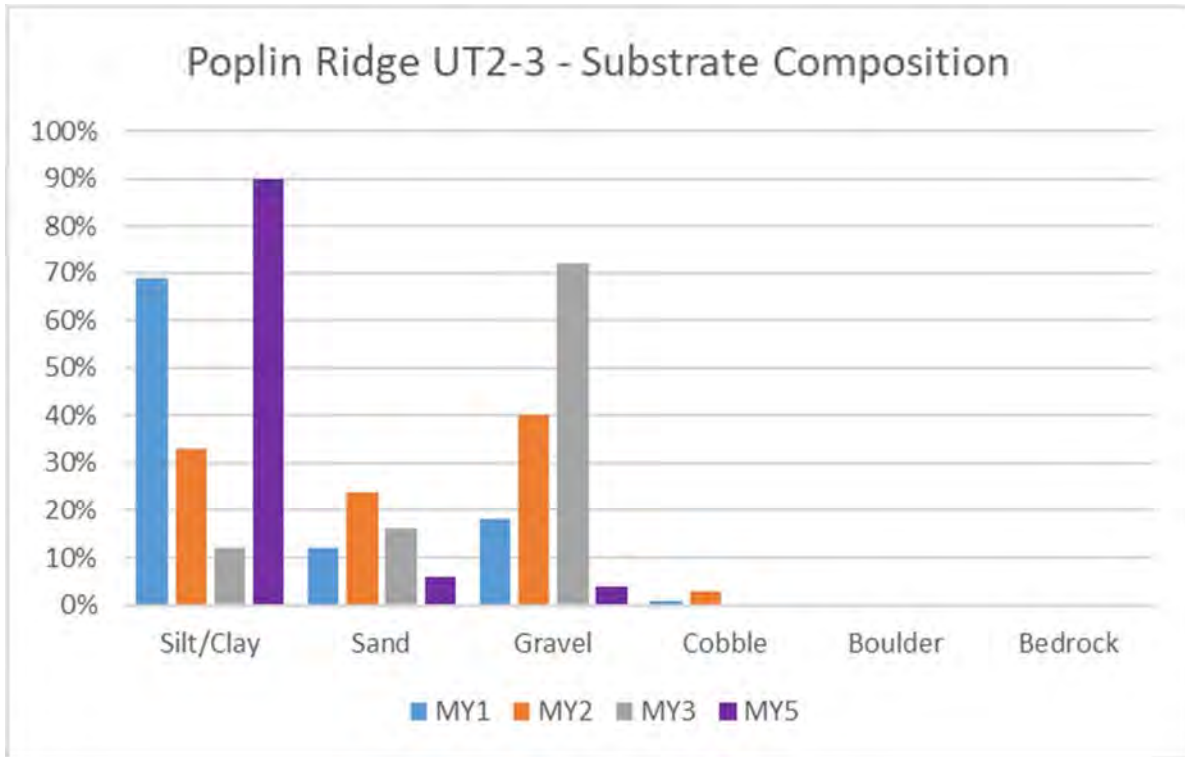


Chart 11.

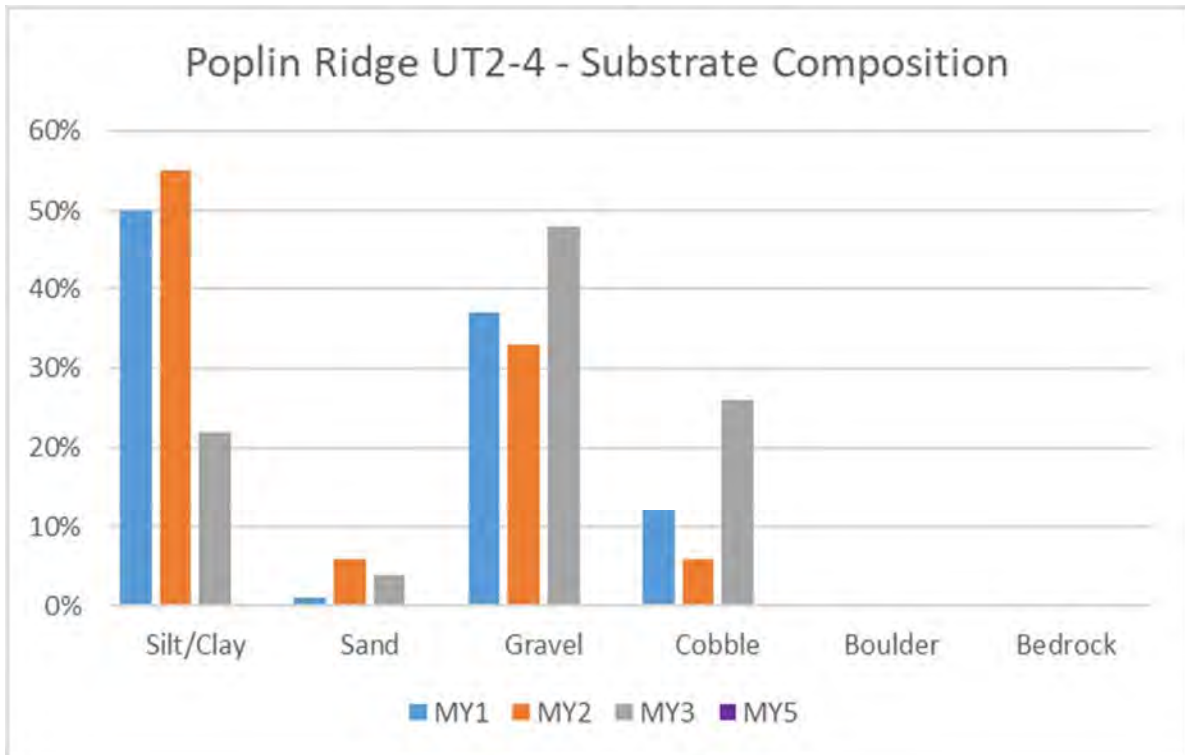


Table 13. Poplin Ridge Bank Pin Array Summary

Bank Pin Location	Position	Year 1 Reading (mm)	Year 2 Reading (mm)	Year 3 Reading (mm)	Year 5 Reading (mm)
Reach UT2-2	Upper	0.0	0.0	0.0	0.0
	Middle	0.0	0.0	0.0	0.0
	Lower	0.0	0.0	0.0	0.0
Reach UT2-3	Upper	0.0	0.0	0.0	0.0
	Middle	0.0	0.0	0.0	0.0
	Lower	0.0	0.0	0.0	0.0
Reach UT1-2	Upper	0.0	44.5	0.0	0.0
	Middle	0.0	0.0	0.0	0.0
	Lower	0.0	0.0	0.0	0.0
Reach UT1-3	Upper	44.5	0.0	0.0	0.0
	Middle	92.3	0.0	0.0	0.0
	Lower	31.8	0.0	0.0	0.0
Reach UT1-C	Upper	0.0	35.6	0.0	0.0
	Middle	0.0	0.0	0.0	0.0
	Lower	139.7	0.0	0.0	0.0
Reach UT1-4	Upper	0.0	31.8	0.0	0.0
	Middle	0.0	0.0	0.0	0.0
	Lower	108.0	0.0	0.0	0.0

Appendix E

Hydrology Data

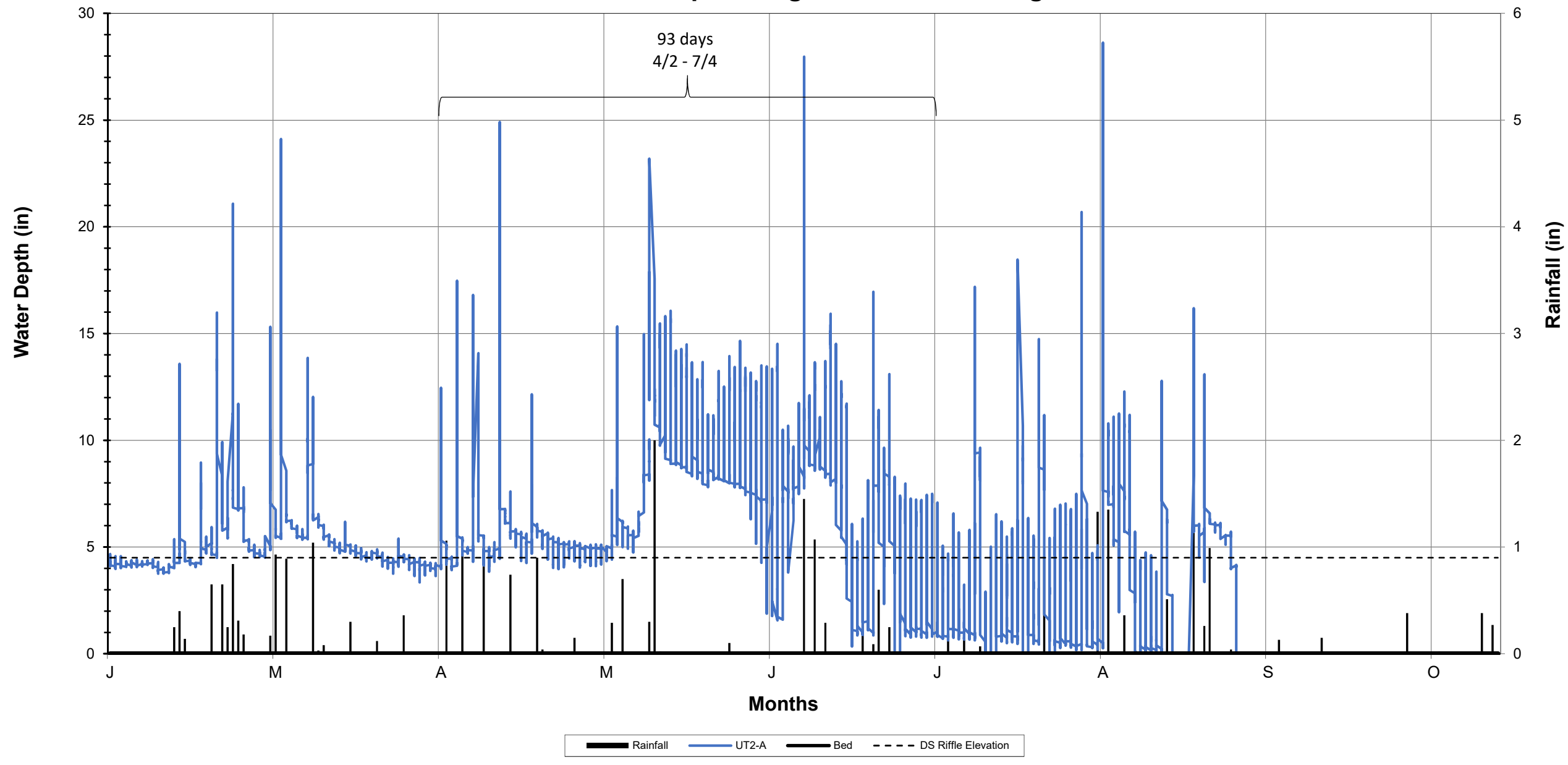
Table 14. Verification of Bankfull Events and Stream Flow Events

Year	Number of Bankfull Events	Maximum Bankfull Height (ft)	
CG1 UT1-2			
MY1	1	0.50	
MY2	0	N/A	
MY3	4	0.49	
MY4	1	0.95	
MY5	0	N/A	
CG2 UT1-4			
MY1	2	2.00	
MY2	5	0.80	
MY3	4	2.60	
MY4	14	4.86	
MY5	4	1.65	
CG3 UT2-3			
MY1	2	4.30	
MY2	5	2.00	
MY3	3	2.83	
MY4	6	3.70	
MY5	13	1.98	
Year	Consecutive Flow Days	Total Flow Days	Number of Flow Events
FG UT2-A			
MY5	93	155	6

Table 15. 2019 Rainfall Summary

Month	Average	Normal Limits		Monroe Station Precipitation
		30 Percent	70 Percent	
January	4.07	2.74	4.87	4.59
February	3.49	2.39	4.17	3.70
March	4.45	3.10	5.29	3.94
April	3.07	1.82	3.72	4.84
May	3.47	2.22	4.18	3.41
June	4.57	2.91	5.50	4.14
July	4.50	2.90	5.42	1.87
August	4.71	2.78	5.18	6.45
September	4.24	2.02	5.18	0.66
October	3.81	2.00	4.57	3.33
November	3.33	1.90	4.05	0.76
December	3.85	2.56	4.62	---
Total	47.56	29.34	56.75	37.69

MY5 2019 Poplin Ridge UT2-A Flow Gauge



Appendix F
Poplin Ridge 2019 Monitoring Adaptive Management Memo



302 Jefferson Street, Suite 110
Raleigh, NC 27605

Corporate Headquarters
5020 Montrose Blvd. Suite 650
Houston, TX 77006
Main: 713.520.5400

August 2, 2019

Paul Wiesner
NCDEQ – DMS
5 Ravenscroft Drive
Asheville, NC 28801

RE: Poplin Ridge Stream Restoration Site – 2019 Monitoring Adaptive Management Memo

Mr. Wiesner,

In July 2018, the IRT, NCDMS, and RES visited Poplin Ridge to evaluate the condition of UT2-2, a passively restored stream reach through a drained pond bottom. The main problem was that a distinct flow path was not obvious and the IRT determined credits were to be withheld above and within the drained pond bottom. In September 2018 and April 2019, RES staff visited the site and determined, using survey and visual assessment, that there is a preferred flow path but there are several issues preventing flow from remaining within and defining a stream channel. At the 2019 Credit Release Meeting, the IRT requested design sheets as part of the Adaptive Management Plan which are attached. Below is an explanation of the work that will be completed.

Area 1

Issue: The log sill at the start of UT2-2 (Sta: 3+61.97) is set too high and is blocking flow during low flow conditions.

Treatment: RES will remove and reset the log sill at an elevation of 580.00' to allow for positive drainage through the reach. See attached Sheet 2.

Area 2

Issue: There are two headcuts forming downstream of Area 1 on UT2-2.

Treatment: RES will repair and stabilize these headcuts by installing several grade control/drop structures as shown on the attached Sheet 2.

Area 3

Issue: The middle section of UT2-2 (Sta: 6+45 to 7+80) is relatively flat and the channel bed and bank is not well defined.

Treatment: RES will excavate a channel per the typical riffle/meander cross sections and detailed profile shown on Sheet 2 along the existing flow path within the old pond bottom. Several woody riffles and brush toes will be installed to add bedform diversity, provide grade control, and improve habitat.

Area 4

Issue: The filter berm elevation at the downstream end of UT2-2 is too high and is therefore impounding water within the lower third of the drained pond bottom.



Treatment: RES will notch the filter berm per the proposed riffle cross section to allow flow to pass through the newly constructed channel and to the culverts.

Area 5

Issue: The confluence of UT2-A and UT2-2 in the drained pond bottom is not well defined.

Treatment: RES will regrade UT2-A from Sta: 4+28 to 5+03 per the typical cross section on Sheet 2 and will confluence with UT2-2 near STA 7+50.

The approach in the approved Final Mitigation Plan for this reach was to use passive restoration, then return in a later monitoring year when the pond bottom dried out to enhance and stabilize the channel with habitat and grade control structures (**Section 7.2**). The pond bottom is still wet but after five years of herbaceous vegetation growth, the soil structure has stabilized, and localized areas of unconsolidated substrate should not hinder the ability to complete the proposed stream construction activities. Additionally, the pond bottom has never shown any signs of surface cracking or loss of hydrology. RES does not anticipate having to amend, remove, or import soil for the adaptive management plan to be successful. In areas where the soil has remained saturated, RES will employ timber mats during construction to minimize disturbance within the pond bottom.

RES plans to plant live stakes along the stream and container trees throughout the whole area to address the lack of woody vegetation throughout the drained pond bottom. Tree species tolerant of very wet conditions like black willow, buttonbush, sycamore, willow oak, and green ash will be planted in the fall/winter of 2019.

Based on the proposed work, the Limits of Disturbance (LOD) will be less than one acre, so no Erosion and Sediment Control Permitting will be required. Regarding 404/401 permitting, RES believes that the proposed work falls within the treatment outlined in the approved Final Mitigation Plan to, "... *enhance and stabilize the baseflow channel and install grade control structures once the pond bed has dried out*". Similar to the work described in the mitigation plan wetland impacts will be minimal and temporary and result from disturbance during grading and structure installation. The original 404/401 authorizations from the approved mitigation plan are attached to the adaptive management plan.

RES plans to have this work done by the end of summer 2019 and will include documentation of the repairs in the MY5 monitoring report. RES will also add two new cross sections to UT2-2 (proposed locations are shown on Sheet 2) that will be surveyed in MY5 and MY7 with an additional survey in MY6. RES will do one random vegetation plot in the pond bottom with data reported in MY5, MY6, and MY7. The location of the random vegetation plot will change in each monitoring year.

Thank you,

Ryan Medric | Ecologist

POPLIN RIDGE STREAM RESTORATION PROJECT

UNION COUNTY, NC

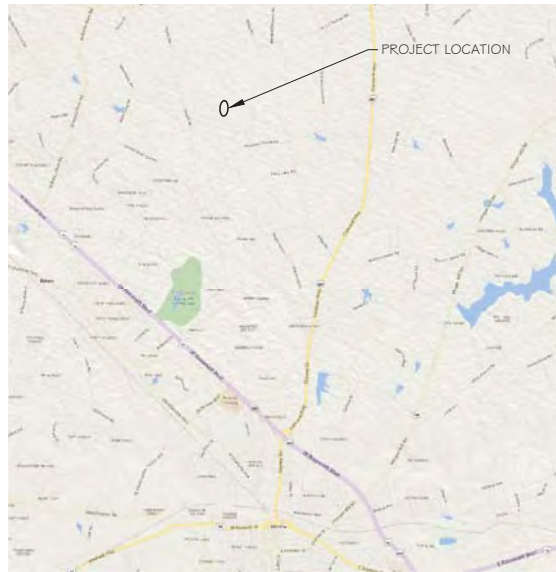
ADAPTIVE MANAGEMENT PLAN

JULY 2019

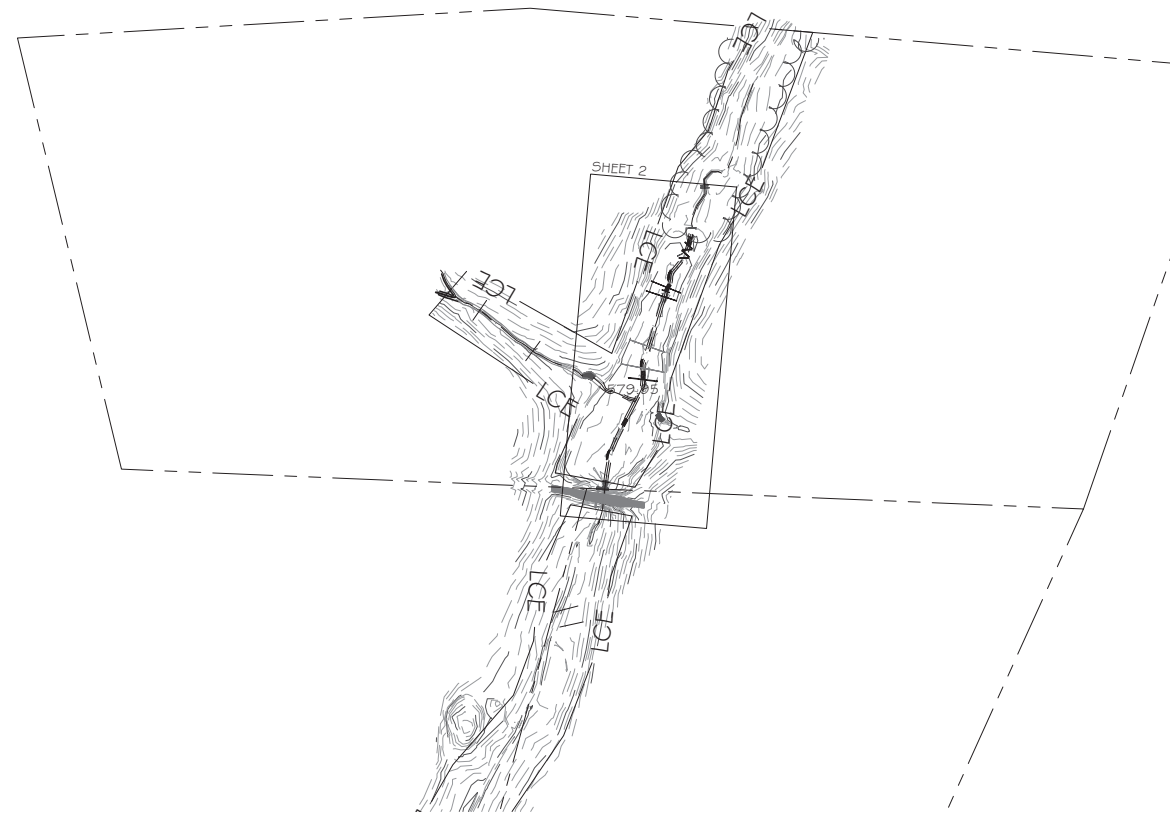
RESOURCE ENVIRONMENTAL SOLUTIONS, LLC

302 JEFFERSON ST, SUITE 110

RALEIGH, NC 27605



VICINITY MAP
NTS



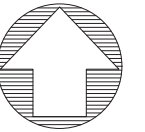
SITE MAP
NTS

DMS PROJECT #: 95359
CONTRACT #: 004672
USACE ACTION ID #: SAW-2012-01079
DWR PROJECT #: 13-1087



302 Jefferson Street, Suite 110
Raleigh, NC 27605
Main: 919.829.9909
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www.res.us

SEAL



MARK	DATE	DESCRIPTION	PLOT DATE:
			7/26/2019
REVISIONS:			
RELEASED FOR:			
PRELIMINARY - NOT FOR CONSTRUCTION			















PROJECT NUMBER:	100910
PROJECT MANAGER:	BPB
DESIGNED:	AFM
DRAWN:	AFM
CHECKED:	BRC

SHEET NUMBER:

STREAM CONSTRUCTION NOTES:

1. ALL PROPOSED CHANNELS AND TEMPORARY AND PERMANENT CROSSINGS SHALL BE CONSTRUCTED IN A DRY CONDITION VIA OFFLINE CONSTRUCTION WHERE POSSIBLE. PUMP AROUND OPERATIONS SHOULD BE LIMITED TO AREAS WHERE THE EXISTING AND PROPOSED CHANNEL ALIGNMENTS OVERLAP.
2. ALL IMPERVIOUS DIKES AND PUMPING APPARATUS SHALL BE REMOVED FROM THE STREAM AT THE END OF EACH DAY TO RESTORE NORMAL FLOW BACK TO THE CHANNEL UNLESS OTHERWISE APPROVED BY THE ENGINEER. WITH APPROVAL, A PUMP AROUND MAY BE ALLOWED TO RUN CONTINUOUSLY IF THERE IS NO FORECAST FOR RAIN OVERNIGHT, AND/OR THE PUMP APPARATUS IS MAINTAINED AND MONITORED CONTINUOUSLY.
3. CONSTRUCT UPSTREAM PORTION OF THE CHANNEL FIRST, WORKING IN AN UPSTREAM TO DOWNSTREAM DIRECTION, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
4. STRUCTURES ARE TO BE INSTALLED IN LOCATIONS SHOWN ON PLAN SHEETS (AS INDICATED ON THE STRUCTURE TABLES) USING METHODS DESCRIBED IN THE DETAIL SHEETS. PRIOR TO FINE GRADING, OBTAIN APPROVAL OF THE ENGINEER ON INSTALLATION OF STRUCTURES.
5. UPON COMPLETION OF FINE GRADING, INSTALL STREAM BANK STABILIZATION INCLUDING, EROSION CONTROL MATTING OR SOD MATS ALONG CHANNEL BANKS.

LEGEND

- EXISTING CONTOUR MAJOR  50
- EXISTING CONTOUR MINOR  40
- PROPERTY LINE 
- EXISTING TREELINE 
- EXISTING TREE 
- PROPOSED TOP OF BANK 
- PROPOSED CENTERLINE OF CHANNEL 
- LIMITS OF PROPOSED CONSERVATION EASEMENT  LCE
- BRUSH TOE PROTECTION (SEE SHEET D3) 
- LOG SILL (SEE SHEET D3) 
- VALLEY SILL (SEE SHEET D3) 
- WOODY RIFFLE (SEE SHEET 4) 
- STEP POOL (SEE SHEET 4) 
- LOG STRUCTURE (PROFILE) 



302 Jefferson Street, Suite 110
 Raleigh, NC 27605
 Main: 919.829.9909
 Fax: 919.829.9913
 www.res.us

SEAL

SCALE: AS SHOWN

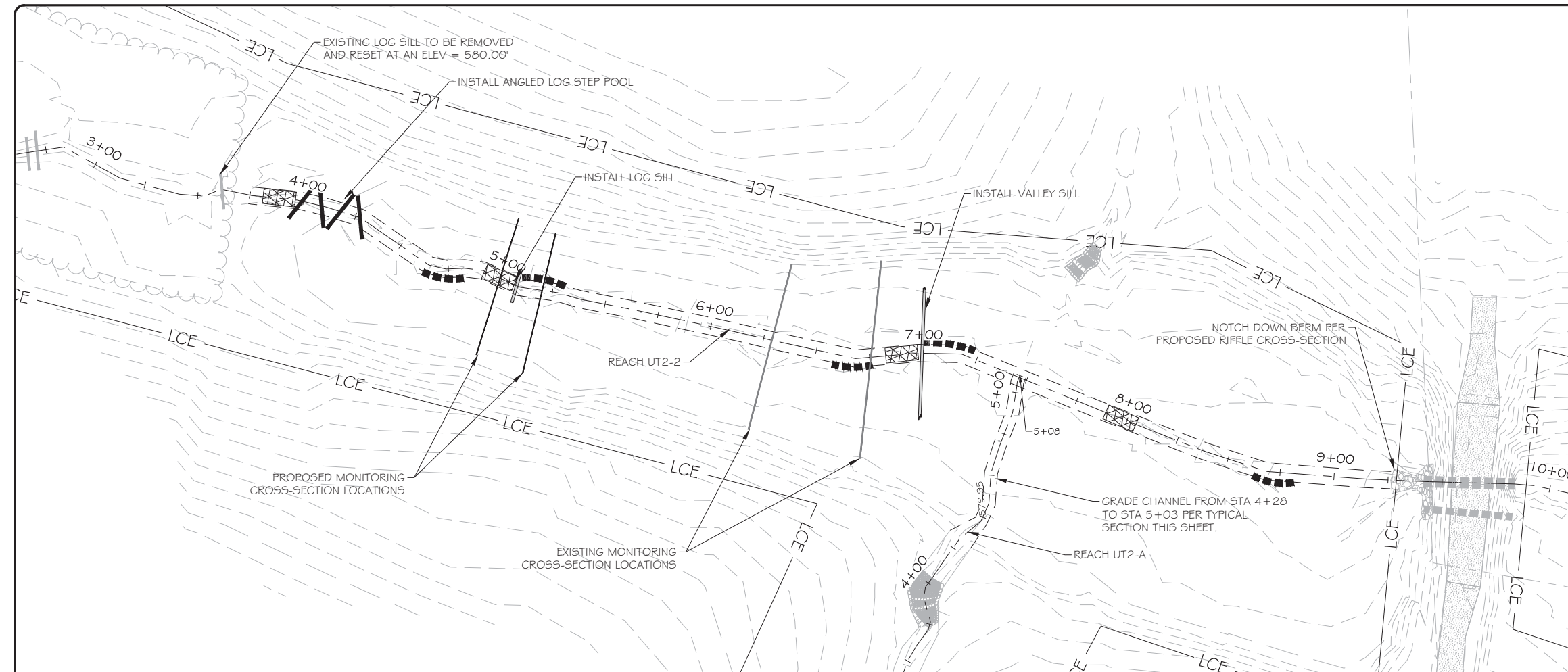
MARK	DATE	DESCRIPTION	PLOT DATE:
			7/26/2019
REVISIONS:			RELEASED FOR:
			PRELIMINARY - NOT FOR CONSTRUCTION

PROJECT NAME:
**POPLIN RIDGE - ADAPTIVE MANAGEMENT
 UNION COUNTY, NC**

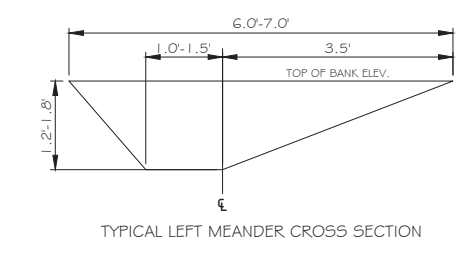
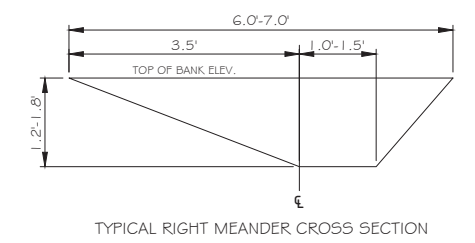
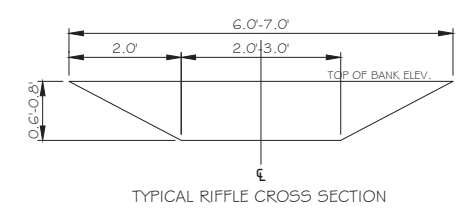
DRAWING TITLE:
NOTES

PROJECT NUMBER: 100910
 PROJECT MANAGER: BPB
 DESIGNED: AFM
 DRAWN: AFM
 CHECKED: BPB

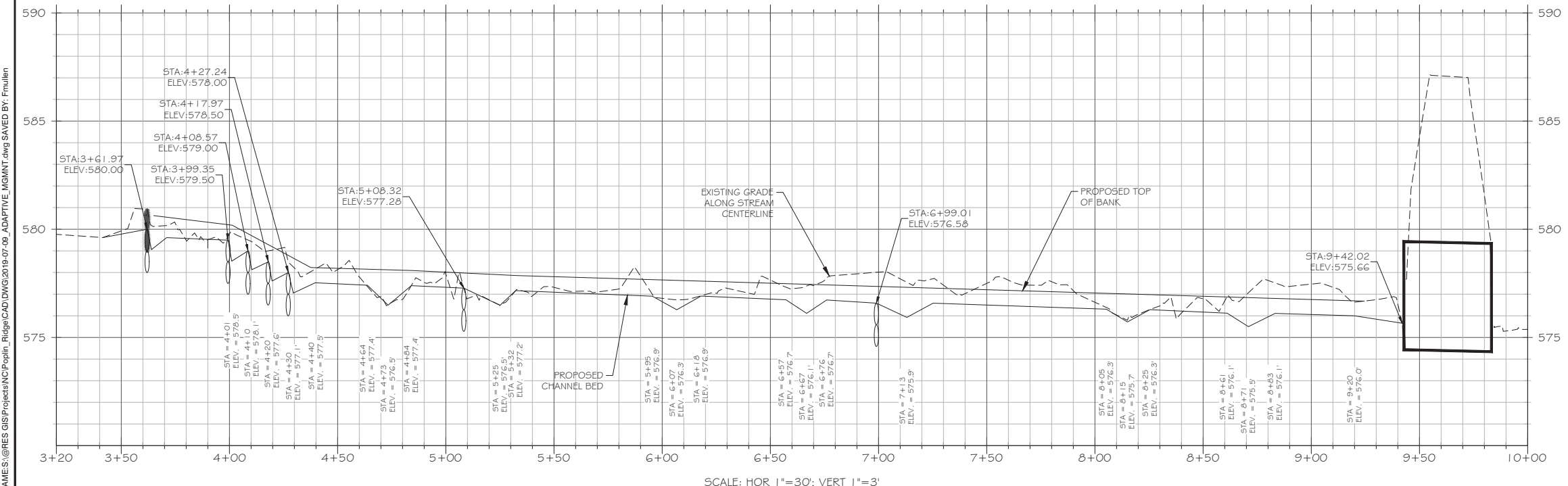
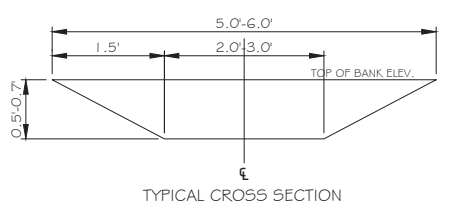
SHEET NUMBER:



REACH UT2 STA 3+70 TO STA 9+20



REACH UT2-A STA 4+28 TO STA 5+03



SCALE: HOR 1"=30'; VERT 1"=3'

SEAL

FULL SCALE: 1"=30'

2" = FULL SCALE
 1" = HALF SCALE

MARK	DATE	DESCRIPTION	REVISIONS:	RELEASED FOR:	PLOT DATE:
				PRELIMINARY - NOT FOR CONSTRUCTION	07/26/2019

PROJECT NAME:
**POPLIN RIDGE - ADAPTIVE MANAGEMENT
 UNION COUNTY, NC**

DRAWING TITLE:
UT2 PLAN & PROFILE

PROJECT NUMBER: 100910
 PROJECT MANAGER: BPB
 DESIGNED: AFM
 DRAWN: AFM
 CHECKED: BPB

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SEAL

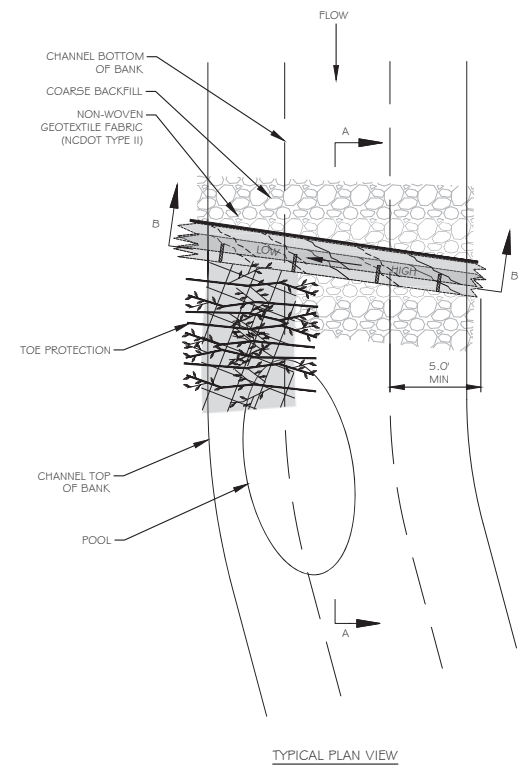
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MARK | DATE | DESCRIPTION
REVISIONS:
RELEASED FOR: PRELIMINARY - NOT FOR CONSTRUCTION
PLOT DATE: 7/26/2019

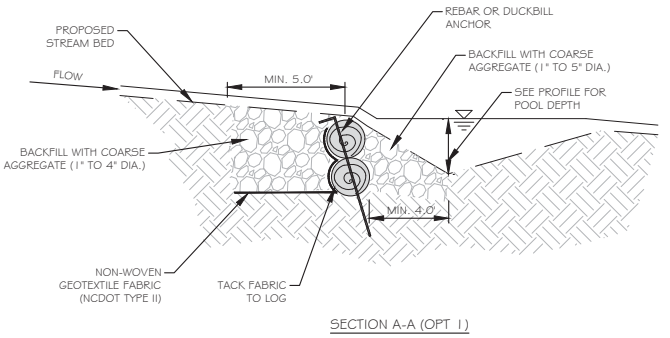
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**POPLIN RIDGE - ADAPTIVE MANAGEMENT
UNION COUNTY, NORTH CAROLINA**
DRAWING TITLE:
DETAILS

PROJECT NUMBER: 100910
PROJECT MANAGER: BPB
DESIGNED: AFM
DRAWN: AFM
CHECKED: BPB

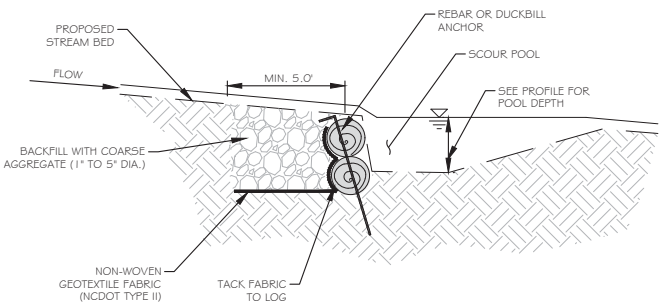
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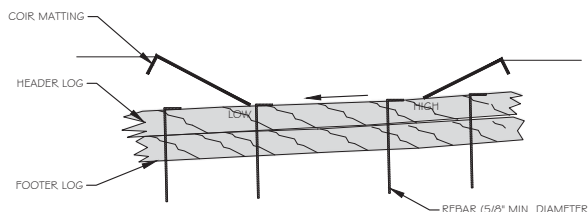
TYPICAL PLAN VIEW



SECTION A-A (OPT 1)



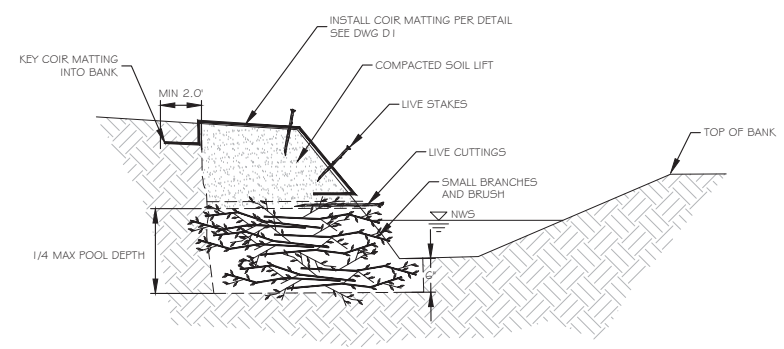
SECTION A-A (OPT 2)



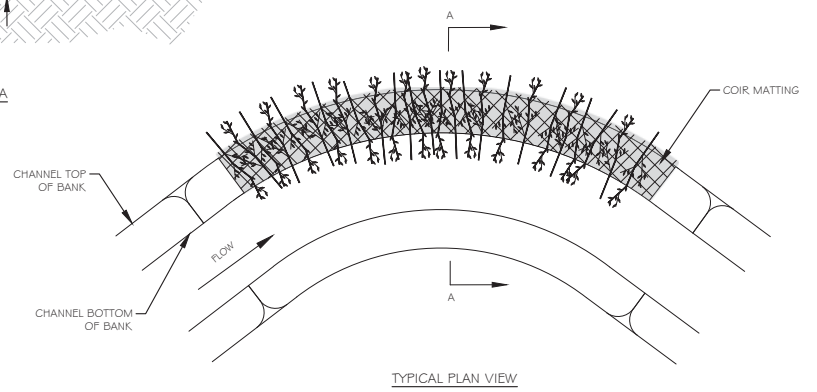
SECTION B-B

LOG SILL
NTS

- NOTES:
- LOGS SHOULD BE RELATIVELY STRAIGHT HARDWOOD AND RECENTLY HARVESTED.
 - HIGH SIDE OF LOG SHALL BE APPROX. 0.2' HIGHER THAN LOW END.
 - LOG DIMENSIONS:
MIN DIAM. = 1.0', MIN LENGTH = 12'
NAIL FILTER FABRIC USING 3" 1.0D GALVANIZED COMMON NAIL EVERY 1.5' ALONG THE LOG
 - DUCKBILL ANCHORS MAY BE USED IN PLACE OF REBAR.

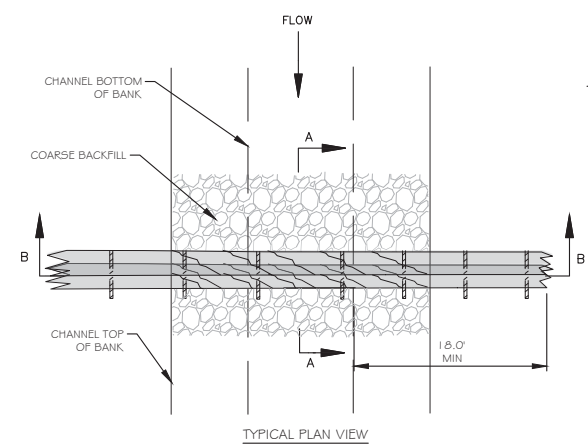


SECTION A-A

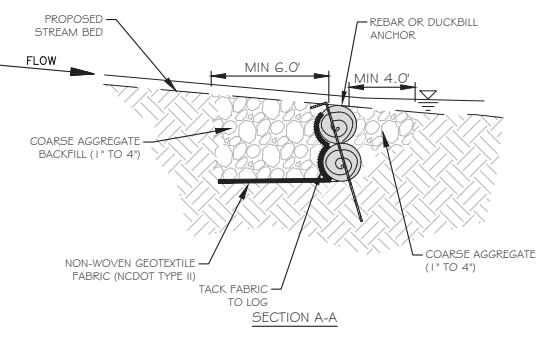


TYPICAL PLAN VIEW

BRUSH TOE
NTS



TYPICAL PLAN VIEW



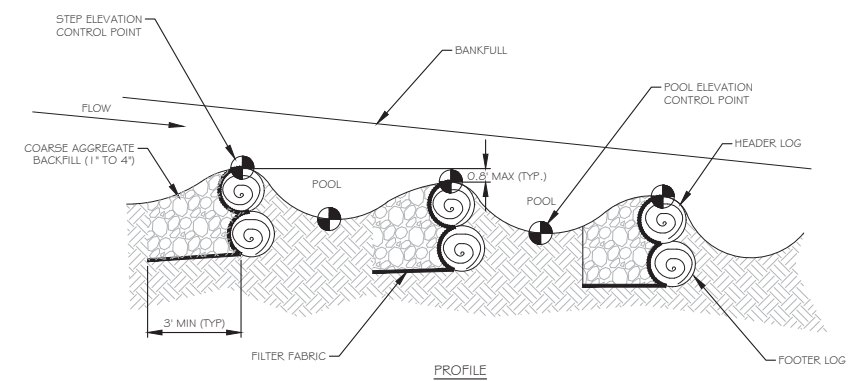
SECTION A-A

VALLEY SILL
NTS

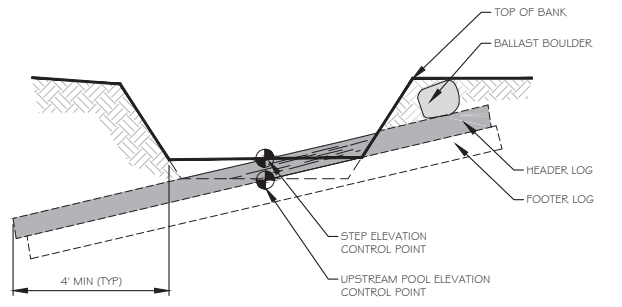
- NOTES:
- LOGS SHOULD BE RELATIVELY STRAIGHT HARDWOOD AND RECENTLY HARVESTED.
 - LOG DIMENSIONS:
MIN DIAM. = 1.0', MIN LENGTH = 40'
 - NAIL FILTER FABRIC USING 3" 1.0D GALVANIZED COMMON NAIL EVERY 1.5' ALONG ENTIRE LENGTH OF THE LOG.
 - DUCKBILL ANCHORS MAY BE USED IN PLACE OF REBAR.

- REBAR (5/8" MIN. DIAMETER, 4' MIN. LENGTH) OR DUCKBILL ANCHORS INSTALLED PER MANUFACTURERS INSTRUCTIONS (TYP.)

- NOTES:
- LOGS SHALL BE OF A MINIMUM OF 1.5' IN LENGTH AND 1.0' IN DIAMETER AND RELATIVELY STRAIGHT HARDWOOD, RECENTLY HARVESTED.
 - A SINGLE LOG MAY BE USED IN LIEU OF A HEADER/FOOTER LOG COMBINATION, PER DIRECTION OF DESIGNER.
 - FILTER FABRIC SHALL BE USED TO SEAL THE GAPS BETWEEN THE LOG(S) AND THE STREAM BED, UNDER THE COARSE BACKFILL MATERIAL. THERE SHALL BE NO FILTER FABRIC VISIBLE IN THE FINISHED WORK; EDGES SHALL BE FOLDED, TUCKED, OR TRIMMED AS NEEDED.
 - COARSE BACKFILL SHALL BE PLACED TO A THICKNESS EQUAL TO THE DEPTH OF THE HEADER (AND ANY FOOTER) LOGS AND SHALL EXTEND OUT FROM THE VANE ARMS TO THE STREAM BANK AND UPSTREAM.
 - AS AN OPTION, FLAT-SIDED BOULDERS MAY BE PLACED AS BALLAST ON TOP OF THE STREAM BANK SIDE OF THE EMBEDDED VANE ARMS. DUCK BILL ANCHORS MAY BE USED IN LIEU OF BALLAST BOULDERS.
 - DUCKBILL ANCHORS WITH GALVANIZED CABLE ATTACHED MAY BE USED TO SECURE LOGS INTO THE STREAM BED AND/OR BANKS. FLAT-SIDED BOULDERS CAN BE USED IN LIEU OF THE LOG INVERT/DUCKBILL ANCHOR SYSTEM.

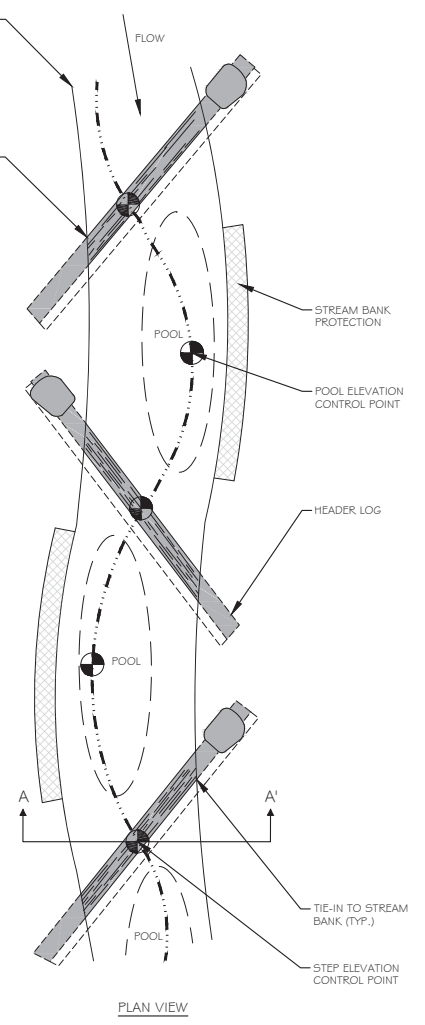


PROFILE



SECTION VIEW

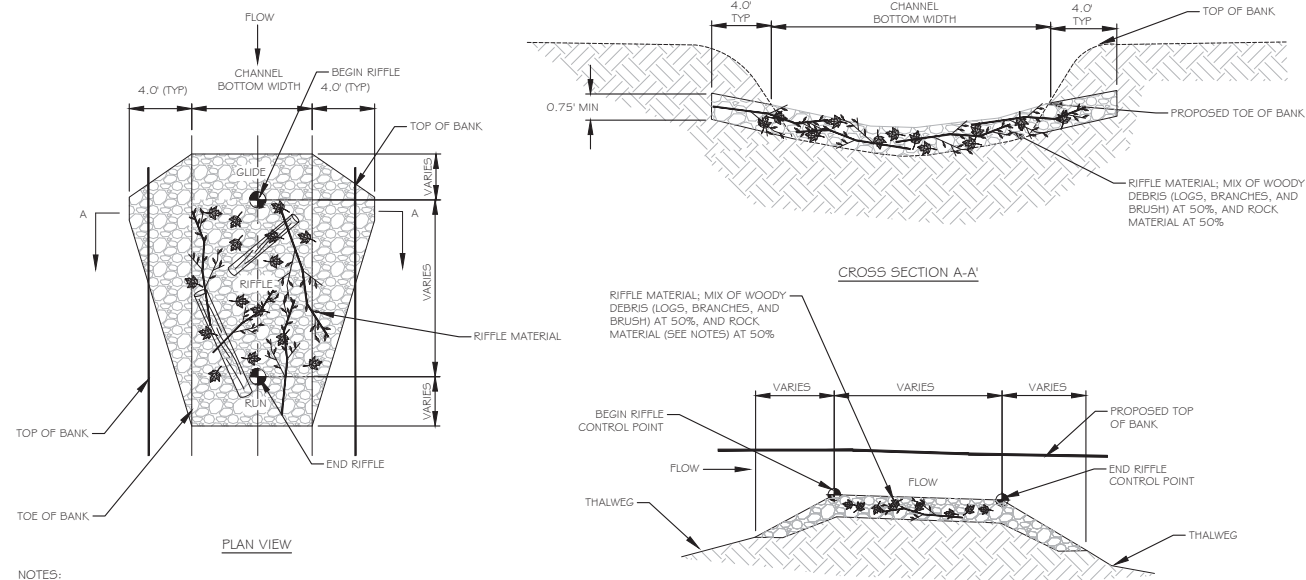
ANGLED LOG STEP POOL
NTS



PLAN VIEW

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NOTES:

1. CONSTRUCTED WOOD RIFFLES SHALL BE INSTALLED IN NEWLY GRADED CHANNEL SECTIONS, AS SPECIFIED BY THE DESIGNER. ELEVATION CONTROL POINTS SHALL BE DESIGNATED AT THE BEGINNING AND END OF RIFFLE POINTS TO ESTABLISH PART OF THE PROFILE OF THE CHANNEL. SURVEY OF CONTROL POINTS SHALL BE REQUIRED TO ESTABLISH ACCURATE RIFFLE INSTALLATION WITHIN A TOLERANCE OF ±0.2'.
2. RIFFLE MATERIAL SHALL BE COMPRISED OF A 50/50 MIX OF WOODY MATERIAL AND ROCKS. WOODY MATERIAL SHALL CONSIST OF LOGS, BRANCHES, AND BRUSH NO GREATER THAN 3" IN DIAMETER. THE ROCK MATERIAL SHALL CONSIST OF AN EQUAL MIX OF #5 / #57 STONE AND SURGE STONE.
3. THE PLACEMENT OF RIFFLE MATERIAL SHALL BE DONE IN A MANNER TO CREATE A SMOOTH PROFILE, WITH NO ABRUPT "JUMP" (TRANSITION) BETWEEN THE UPSTREAM POOL-GLIDE AND THE RIFFLE, AND LIKEWISE NO ABRUPT "DROP" (TRANSITION) BETWEEN THE RIFFLE AND THE DOWNSTREAM RUN-POOL. THE FINISHED CROSS SECTION OF THE RIFFLE MATERIAL SHALL GENERALLY MATCH THE SHAPE AND DIMENSIONS SHOWN ON THE RIFFLE TYPICAL SECTION.
4. THE END OF RIFFLE CONTROL POINT MAY TIE IN TO ANOTHER IN-STREAM STRUCTURE (LOG SILL OR J-HOOK).
5. THE CONSTRUCTED RIFFLE SHALL BE KEYED IN TO THE STREAM BANKS AND/OR BED AS DESIGNATED BY THE DESIGNER. THE "KEY" SHALL EXTEND BEYOND THE TOP OF BANK AT THE BEGINNING (CREST) OF THE RIFFLE. WHERE PRESERVATION OF EXISTING STREAM BANK VEGETATION IS A PRIORITY A "KEY" MAY NOT BE USED (OR THE DIMENSIONS MAY BE ADJUSTED) TO LIMIT DISTURBANCE.

PROFILE

WOODY RIFFLE

NTS



302 Jefferson Street, Suite 110
 Raleigh, NC 27605
 Main: 919.829.9909
 Fax: 919.829.9913
 www.res.us

SEAL

SCALE: AS SHOWN

MARK	DATE	DESCRIPTION	PLOT DATE:
			7/26/2019
REVISIONS:			
RELEASED FOR:			PRELIMINARY - NOT FOR CONSTRUCTION

PROJECT NAME:
**POPLIN RIDGE - ADAPTIVE MANAGEMENT
 UNION COUNTY, NORTH CAROLINA**

DRAWING TITLE:
DETAILS

PROJECT NUMBER: 100910
 PROJECT MANAGER: BPB
 DESIGNED: AFM
 DRAWN: AFM
 CHECKED: BPB

SHEET NUMBER:

**U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT**

Action ID: **SAW-2012-01079**

County: **Union**

USGS Quad: **NC-Bakers**

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

Owner/Applicant: **North Carolina Ecosystem Enhancement Program Attn: Mr. Lin Xu**
Address: **1652 Mail Service Center**
Raleigh, NC 27699-1652

Authorized Agent: **Environmental Banc & Exchange Attn: David Godley**
Address: **909 Cappability Drive**
Raleigh, NC 27606

Size and location of property (waterbody, road name/number, town, etc.): **The project (Poplin Ridge Mitigation Site) is located east and west of Poplin Ridge Road, north of Secrest Short Cut Road, in Union County, NC.**

Site Coordinates: **35.0516 °N -80.5700 °W** Waterway: **East Fork Stewarts Creek** River Basin: **Yadkin**

Description of project area and activity: **This permit authorizes stream channel relocation, excavation, mechanized land clearing, the placement of fill material associated with the construction of the Poplin Ridge Mitigation Project. Authorized impacts to waters of the U.S. are identified on the table on page 2 of this authorization.**

Applicable Law: Section 404 (Clean Water Act, 33 USC 1344)
 Section 10 (Rivers and Harbors Act, 33 USC 403)

Authorization: Nationwide or Regional General Permit Number(s): **27**

SEE ATTACHED NATIONWIDE CONDITIONS AND SPECIAL CONDITIONS ON PAGE 2 OF THIS FORM

Your work is authorized by the above referenced permit provided it is accomplished in strict accordance with the attached conditions and your submitted application and attached information dated August 18, 2014. Any violation of the attached conditions or deviation from your submitted plans may subject the permittee to a stop work order, a restoration order and/or appropriate legal action.

- This verification will remain valid until the expiration date identified below unless the nationwide authorization is modified, suspended or revoked. If, prior to the expiration date identified below, the nationwide permit authorization is reissued and/or modified, this verification will remain valid until the expiration date identified below, provided it complies with all requirements of the modified nationwide permit. If the nationwide permit authorization expires or is suspended, revoked, or is modified, such that the activity would no longer comply with the terms and conditions of the nationwide permit, activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon the nationwide permit, will remain authorized provided the activity is completed within twelve months of the date of the nationwide permit's expiration, modification or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend or revoke the authorization.
- Activities subject to Section 404 (as indicated above) may also require an individual Section 401 Water Quality Certification. You should contact the NC Division of Water Resources (telephone 919-807-6300) to determine Section 401 requirements.
- For activities occurring within the twenty coastal counties subject to regulation under the Coastal Area Management Act (CAMA), prior to beginning work you must contact the N.C. Division of Coastal Management.
- This Department of the Army verification does not relieve the permittee of the responsibility to obtain any other required Federal, State or local approvals/permits.
- If there are any questions regarding this verification, any of the conditions of the Permit, or the Corps of Engineers regulatory program, please contact Todd Tugwell at telephone (919) 846-2564.



TUGWELL.TODD.JASON.1048429

293

Corps Regulatory Official: _____

2014.10.07 13:37:56 -04'00'

Date: **October 7, 2014**

Expiration Date of Nationwide Permit Verification: **March 18, 2017**

Summary of Authorized Impacts and Required Mitigation

NWP / GP #	Open Water (ac)		Wetland (ac)		Unimportant Stream (lf)		Important Stream (lf)		
	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	
27	0	0	0.008	0.007	0	0	8,234	0	
Impact Totals	0	0	0.008	0.007	0	0	8,234	0	
Total Loss of Waters of the U.S. (ac)			0.007		Total Loss of Waters of the U.S. (lf)			0	
Required Wetland Mitigation (ac)			0		Required Stream Mitigation (lf)			0	

Additional Remarks and/or Special Permit Conditions:

1. This Nationwide Permit verification does not imply approval of the suitability of this property for compensatory wetland mitigation for any particular project. The use of any portion of this site as compensatory mitigation for a particular project will be determined during our public interest review and 404 (b) (1) Guidelines analysis during the permit review process for that project.

Copy Furnished:

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at our website at <http://regulatory.usacesurvey.com/> to complete the survey online.

Determination of Jurisdiction

- A. Based on preliminary information, there appear to be waters of the US including wetlands within the above described project area. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).
- B. There are Navigable Waters of the United States within the above described project area subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- C. There are waters of the US and/or wetlands within the above described project area subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- D. The jurisdictional areas within the above described project area have been identified under a previous action. Please reference the jurisdictional determination issued on _____ (Action ID: _____).

Basis of Jurisdictional Determination: The site exhibits stream channels with Ordinary High Water Marks and wetlands meeting the criteria as defined in the 1987 Corps Wetland Delineation Manual and appropriate Regional Supplement.

- E. **Attention USDA Program Participants:** This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.
- F. **Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B and C above):** This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers
South Atlantic Division
Attn: Jason Steele, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801
Phone: (404) 562-5137

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete; that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by _____. **It is not necessary to submit an RFA form to the District Office if you do not object to the determination in this correspondence.**

Corps Regulatory Official: _____



TUGWELL.TODD.JASON.104842929

3

2014.10.07 13:38:59 -04'00'

Date: **October 7, 2014**

Expiration Date of Jurisdictional Determination: **October 7, 2019**

**WILMINGTON DISTRICT
POST-CONSTRUCTION COMPLIANCE FORM**

Action ID Number: **SAW-2012-01079**

County: **Union**

Permittee: **North Carolina Ecosystem Enhancement Program** **Attn: Mr. Lin Xu**

Date Permit Issued: **October 7, 2014**

Project Manager: **Todd Tugwell**

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the address of the Regulatory Field Office indicated below:

Asheville Regulatory Field Office
US Army Corps of Engineers
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006

Washington Regulatory Field Office
US Army Corps of Engineers
2407 West Fifth Street
Washington, NC 27889

Raleigh Regulatory Field Office
US Army Corps of Engineers
3331 Heritage Trade Drive, Suite 105
Wake Forest, North Carolina 27587

Wilmington Regulatory Field Office
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403

Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and condition of the said permit, and required mitigation was completed in accordance with the permit conditions.

Signature of Permittee

Date

RECEIVED

SEP 11 2014

NC ECOSYSTEM
ENHANCEMENT PROGRAM



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

September 9, 2014
DWR# 13-1087
Union County

Mr. Lin Xu
Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699

Subject: APPROVAL of 401 Water Quality Certification with Additional Conditions
Poplin Ridge Stream Restoration

Dear Mr. Xu:

You have our approval, in accordance with the General Certification and those conditions listed below, for the purpose proposed in your application dated August 18, 2014, and received by the Division of Water Resources (the Division) on August 21, 2014. After reviewing your application, we have determined that this project is covered by Water Quality General Certification Number 3885, which can be viewed on our web site at <http://portal.ncdenr.org/web/wq/swp/ws/401>. The General Certification allows you to use Nationwide Permit Number 27 once it is issued to you by the U.S. Army Corps of Engineers (COE). Please note that you should get any other federal, state or local permits before proceeding with your project, including those required by (but not limited to) Sediment and Erosion Control, Non-Discharge, and Water Supply Watershed regulations.

The above noted Certification will expire when the associated 404 permit expires unless otherwise specified in the General Certification. In addition to the requirements of the certification, you must also comply with the following conditions:

1. The Mooresville Regional Office shall be notified in writing once construction at the approved impact areas has commenced.
2. Approved Impacts:

Type of Impact	Amount Approved Temporary Impact	Amount Approved Permanent Impact
Wetlands	0.008	0.007 acre
Stream	8,234 linear ft.	0

3. This approval is only valid for the purpose and design that you described in your application. If you change your project, you must notify us in writing, and you may be required to send us a new application for a new certification. If the property is sold, the new owner must be given a copy of the Certification and approval letter; and is thereby responsible for complying with all conditions.

1617 Mail Service Center, Raleigh, North Carolina 27699-1650
Phone: 919-807-6300 | Internet: www.ncdenr.gov

4. Properly sized and fitted stone shall be utilized for the construction of cross vanes.
5. Riffle runs shall be constructed to ensure that normal stream flow is over the riffle, rather than "through" the riffle.
6. Existing stream substrate should be utilized to seed the new channel to the maximum extent practicable.
7. Diversion Ditches and other storm water conveyances as related to the sediment and erosion control measures shall be matted and/or stabilized to reduce sediment loss and turbidity. This includes interior/exterior slopes of sediment basins.
8. Stormwater discharge structures at this site shall be constructed in a manner such that the potential receiving streams (of the discharge) will not be impacted due to sediment accumulations, scouring or erosion of the stream banks.
9. Sediment and erosion control measures shall not be placed in wetlands or waters to the maximum extent practicable. If placement of sediment and erosion control devices in wetlands and waters is unavoidable, they shall be removed and the natural grade restored within two months of the date the Division of Land Resources has released the project.
10. Upon completion of the project, the applicant shall complete and return the enclosed "Certificate of Completion" form to the 401/Wetlands Unit of the Division.
11. Continuing Compliance. The applicant (Ecosystem Enhancement Program) shall conduct all activities in a manner so as not to contravene any state water quality standard (including any requirements for compliance with section 303(d) of the Clean Water Act) and any other appropriate requirements of state and federal law. If the Division determines that such standards or laws are not being met (including the failure to sustain a designated or achieved use) or that state or federal law is being violated, or that further conditions are necessary to assure compliance, the Division may reevaluate and modify this certification to include conditions appropriate to assure compliance with such standards and requirements in accordance with 15 A NCAC 2H.0507(d). Before codifying the certification, the Division shall notify the applicant and the US Army Corps of Engineers, provide public notice in accordance with 15A NCAC 2H.0503, and provide opportunity for public hearing in accordance with 15A NCAC 2H.0504. Any new or revised conditions shall be provided to the applicant in writing, shall be provided to the United States Army Corps of Engineers for reference in any permit issued pursuant to Section 404 of the Clean Water Act, and shall also become conditions of the 404 Permit for the project.

This Certification can be contested as provided in Articles 3 and 4 of the General Statute 150B by filing a written petition for an administrative hearing to the Office of the Administrative Hearings (hereby known as OAH). A petition form may be obtained from the OAH at <http://www.ncoah.com>/or by calling the OAH Clerk's Office at (919) 431-3000.

Within sixty (60) calendar days of receipt of this notice, a petition must be filed with the OAH. A petition is considered filed when the original and one (1) copy along with any applicable OAH filing fee is received in the OAH during normal office hours (Monday through Friday, 8:00 am to 5:00 pm, excluding state holidays).

The petitions may be faxed to the OAH at (919) 431-3100, provided the original and one (1) copy of the petition along with any applicable OAH filing fee is received by the OAH within five (5) business days following the faxed transmission. Mailing address for the OAH:

If sending via US Postal Service:
Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714

If sending via delivery service (UPS, FedEx, etc.)
Office of Administrative Hearings
1711 New Hope Church Rd.
Raleigh, NC 27609-6285

One (1) copy of the petition must also be served on DENR as follows:

Mr. Lacy Presnell, General Counsel
Department of Environment and Natural Resources
1601 Mail Service Center
Raleigh, NC 27699-1601

This letter completes the review by the Division under Section 401 of the Clean Water Act. If you have any questions, please telephone Mr. Alan Johnson in the Mooresville Regional Office at 704-663-1699 or Ms. Karen Higgins in the Central Office in Raleigh 919-807-6360.

Sincerely,


for Thomas A. Reeder

Attachments

cc: Army Corps of Engineers, Asheville
Karen Higgins, Wetlands Unit
David Godley, Env. Banc & Exchange, 909 Capability Dr. Raleigh, 27606
MRO, Land Quality

CERTIFICATE OF COMPLETION

NCDWR Project No.: _____

County: _____

Applicant: _____

Project Name: _____

Date of Issuance of 401 Water Quality Certification: _____

Certificate of Completion

Upon completion of all work approved within the 401 Water Quality Certification or applicable Buffer Rules, and any subsequent modifications, the applicant is required to return this certificate to the 401 Transportation Permitting Unit, North Carolina Division of Water Resources, 1650 Mail Service Center, Raleigh, NC, 27699-1650. This form may be returned to NCDWR by the applicant, the applicant's authorized agent, or the project engineer. It is not necessary to send certificates from all of these.

Applicant's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date: _____

Agent's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date: _____

Engineer's Certification

_____ Partial _____ Final

I, _____, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project for the Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature _____ Registration No. _____

Date _____