UT to Clarke Creek Stream and Wetland Restoration Site
Annual Final Monitoring Report

DMS # 92500
DENR Contract # 005363
USACE Action ID # SAW-2010-00471
DWR Project # 11-0409
SCO # 09-07763-01
DLR (Land Quality) Project # MECK-2012-034

Monitoring Report Year 4 of 5
Mecklenburg County, North Carolina

Submitted to:

NC Department of Environmental Quality
Division of Mitigation Services
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Data Collection: October 2017
Report Submission: February 2018

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UT to Clarke Creek Stream and Wetland Restoration
DMS Project #92500

Monitoring Report Year 4 of 5
Mecklenburg County, North Carolina

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INTRODUCTION

The UT Clarke Creek Stream and Wetland Restoration Project (Site) is located in Mecklenburg County, North Carolina near the Town of Huntersville. The property parcel is owned by Mecklenburg County and is referred to as Clark's Creek Nature Preserve. The project consisted of approximately 4,594 linear feet of existing streams on the site within the USGS cataloging unit Yadkin 03040105. The project site was assessed in the Upper Rocky River Local Watershed Plan (LWP) that was prepared for DMS by MACTEC in 2004. The LWP identified the major stressors in the watershed: stream bank erosion, lack of adequate forested buffer, stream channelization, agricultural impacts, land use changes, sedimentation, point source in-stream impacts, nutrients, and fecal coliform bacteria.

Restoration goals for this project include:

- Reduce sediment stressors caused by stream bank erosion and shear stress along the reach.
- Improve stream bank stability and sediment transport efficiency.
- Provide for uplift in water quality functions and nutrient filtration.
- Provide for greater overall stream and wetland habitat complexity and quality, and
- Improve and maintain riparian buffer habitat.

The project objectives include:

- Implement a sustainable, reference-based, rehabilitation of the project reaches' dimension to support sediment transport equilibrium.
- Provide a sustainable and functional bankfull floodplain feature and reslope banks at a more stable slope.
- Strategically install stream structures and plantings designed to maintain lateral stability and habitat to the stream channel.
- Install, augment, and maintain appropriate vegetative riparian buffer and riverine wetland community types with sufficient density and vigor to support native vegetation. The buffer should have a minimum width of 50 feet (ft) on each side of project streams and consist of a mix of native species representative of a bottomland hardwood forest, and
- Restore and/or enhance the natural hydrology, vegetation, and soil composition in adjacent wetlands.

This report documents the completion of the restoration construction activities and presents year 4 monitoring data for the post-construction monitoring period. Table 1 (Appendix A) summarizes site conditions before and after restoration, as well as the conditions predicted in the previously approved Mitigation Plan.

1.0 PROJECT SUMMARY

1.1 Project Setting and Background

The UT Clarke Creek stream and wetland restoration project is located in Mecklenburg County, North Carolina, in the Yadkin-Pee Dee River Basin (USGS cataloging unit 03040105), DWR Subbasin 30711 (Figure 1). The project lies within Clark's Creek Nature Preserve, a 57.2 acre property owned by Mecklenburg County. The project restored 3,061 linear feet of stream and preserved 1,152 linear feet of stream and restored or preserved 1.457 acres of wetlands (Table 1). Prior to construction, the project site had problems with channelization, bank instability, and a limited riparian buffer zone. Areas of mass wasting, bank slumping, incision, and sediment deposition were evident in all reaches. Backwater effects from beaver dams also caused aggradation and habitat loss. The project aimed to reduce the major stressors identified in the LWP which include stream bank erosion, lack of adequate forested buffer, stream channelization, and sedimentation.

1.2 Project Goals and Objectives

The goals and objectives of this project focus on improving water quality and restoring physical habitat. These goals and objectives are stated in the UT Clarke Creek Mitigation Plan (2011).

Goals:

1. Reduce sediment stressors caused by stream bank erosion and shear stress along the reach.
2. Improve stream bank stability and sediment transport efficiency.
3. Provide for uplift in water quality functions and nutrient filtration.
4. Provide for greater overall stream and wetland habitat complexity and quality, and
5. Improve and maintain riparian buffer habitat.

Objectives:

1. Implement a sustainable, reference-based, rehabilitation of the project reaches' dimension to support sediment transport equilibrium.
2. Provide a sustainable and functional bankfull floodplain feature and reslope banks at a more stable slope.
3. Strategically install stream structures and plantings designed to maintain lateral stability and habitat to the stream channel.
4. Install, augment, and maintain appropriate vegetative riparian buffer and riverine wetland community types with sufficient density and vigor to support native vegetation. The buffer should have a minimum width of 50 feet on each side of project streams and consist of a mix of native species representative of a bottomland hardwood forest, and

5. Restore and/or enhance the natural hydrology, vegetation, and soil composition in adjacent wetlands.

1.3 Success Criteria

The following success criteria are provided from the NCEEP *Mitigation Plan Document Guidance* and the Army Corps of Engineers (ACOE) (2003).

1.3.1 Stream Morphology and Channel Stability

Restored or enhanced streams should demonstrate morphological stability to be considered successful. Any deviations will be evaluated to determine whether changes are indicative of instability. Stability will be based on permanent cross sections, longitudinal profile, substrate analysis, sediment transport, and evidence of bankfull events.

There have not been substantial changes to cross sections or profiles on either reach from the monitoring year 1 conditions. There is some evidence of channel narrowing, likely due to erosion and sedimentation from development just outside and upstream of the conservation easement. The stream channels are accessing the floodplain and evidence of bankfull events were observed during year 4 monitoring. This evidence includes the presence of wracklines and crest gauge readings of 37.5" above bankfull on UT1 and 45" above bankfull on UT to Clarke Creek. Substrate analysis does not indicate progressive negative change throughout the system on either UT1 or UT to Clarke Creek. Substrate analysis results are generally consistent with a successful project.

On UT to Clarke Creek areas of bare bank which were observed during the March 2017 Site Assessment at Stations 3+00 and 11+00 are still present, but the area at Station 5+00 has filled in and was removed from the CCPV. It is likely that the other areas of bare bank will also fill in over time and do not pose a serious threat to the overall integrity of the site. Station 2+80 continues to erode behind the placed root wad.

Beaver activity was noted throughout the site in the form of chewed stems and slides along the streambanks. Two beaver dams were observed along UT Clarke Creek at Stations 10+70 and 12+15. SEPI removed as much of these dams as possible during monitoring. The US Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) visited the site in July of 2017. During their visit, they trapped beaver and removed existing dams. APHIS made a follow-up visit in November 2017 and didn't note any fresh chewed trees or dams. APHIS will continue to monitor the site quarterly for evidence of beaver and will remove beaver and dams as necessary.

Reach UT1 has not changed since the March 2017 Site Assessment. The area of bare bank from Station 4+78 to 5+00 is still present and there is a large area of bare floodplain along the east

side of UT1 from Station 3+50 to 5+50 and at Station 7+25. It is likely that these areas will also fill in over time and do not pose a serious threat to the overall integrity of the site.

1.3.2 Wetlands

Wetland hydrology attainment will be monitored in accordance to the ACOE (2003) standards. The target wetland hydrological success criterion is saturation or inundation for at least 12.5 percent of the growing season in the lower landscape (floodplain) positions. To achieve the hydrologic success criterion, groundwater levels must be within 12 inches of the ground surface for 29 consecutive days, which is 12.5 percent of the March 22 to November 11 (232 days) growing season. Eight Ecotone Water Level Loggers were established within the wetland restoration, creation, and preservation areas to monitor groundwater levels during the growing season. Three more loggers were placed during the 2015 growing season. Wells 3, 5, 6, 8, 9, 10, and 11 were placed within the wetland boundaries to provide hydrologic data for the restored and enhanced wetland areas. Wells 2, 4, and 7 were placed outside the wetland boundaries to confirm the upland boundaries of the same wetlands. Well 1 was placed within the wetland preservation to provide reference conditions for the restored and enhanced wetlands in the project.

Wells 1 and 9 met the hydrology success criteria for monitoring year 4. Wells 8 and 11 malfunctioned and only recorded 32 and 50 days of data, respectively during the 210-day growing season period recorded prior to monitoring. Batteries in Wells 8 and 11 will be replaced during the site assessment in the Spring and replaced, if needed.

1.3.3 Vegetation

Planted vegetation will be monitored for five years in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-NCDMS Level 2 Protocol (Lee et al., 2006). To achieve vegetative success criteria, the average number of planted stems per acre must exceed or meet 320 stems/acre after the third year of monitoring, 288 stems/acre after four years, and 260 stems/acre after the fifth year of project monitoring. The monitoring year 4 stem counts are located in Tables 7 and 9 in Appendix C. Currently, plots 3, 6, 7, 8, and 9 are meeting the interim measure of success. The project as a whole is exceeding the success criteria by more than 10 percent for monitoring year 4. Overall, vegetation along both reaches appears adequate. Black willow and smooth alder along the stream banks is thriving. Additionally, a large number of volunteer species were observed during monitoring year 4.

Five areas of bare ground with low stem densities and two small populations of kudzu (*Pueraria montana*) were observed during monitoring year 4. These are shown on the Current Condition Plan View maps.

An invasive species treatment will be conducted at the site during the 2018 growing season.

Carolina Silvics completed a supplemental planting effort in the 2015 - 2016 dormant season throughout the project site. In February 2016, Carolina Silvics replanted 1,300 stems in areas where stem densities were still not meeting the vegetative success criteria. These stems were as follows:

- Riparian Areas: 300 *Betula nigra*, 200 *Nyssa sylvatica*, 200 *Quercus coccinea*, 150 *Quercus micahauxii*, 150 *Quercus nigra*, and 200 *Quercus rubra*.
- Wetland Areas: 50 *Quercus michauxii* and 50 *Quercus nigra*.

During the 2016 – 2017 dormant season (February 2017), a second supplemental planting occurred which included a total of 1,213 stems as follows:

- Riparian Areas: 247 *Platanus occidentalis*, 416 *Nyssa sylvatica*, 195 *Celtis laevigata*, and 195 *Quercus coccinea*.
- Wetland Areas: 36 *Platanus occidentalis*, 64 *Nyssa sylvatica*, 30 *Celtis laevigata*, and 30 *Quercus coccinea*.

Summary information/data related to the occurrence of items such as beaver or 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 documentation formerly found in these reports can be found in the Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on DMS's website. All raw data supporting the tables and figures in the appendices is available from DMS upon request.

1.4 Project History, Contacts, and Attribute Data

The UT to Clarke Creek Stream and Wetland Restoration site was designed by JJG, North State Environmental constructed the site, and it will be monitored by SEPI Engineering & Construction. Tables 2, 3, and 4 in Appendix A provide detailed information regarding the Project Activity and Reporting History, Project Contacts, and Project Baseline Information and Attributes.

1.4.1 Construction Deviations

The as-built plan sheets/record drawings depict several engineered instream structures that were not located during baseline monitoring. It was determined the structures were not installed due to constraints that arose during construction, and the record drawings were not updated with that information.

2.0 METHODOLOGY

The following methods were utilized during the year 4 monitoring for data collection and post-processing:

- Geomorphic topographic data collections were performed in the field using a survey grade GPS such that each survey point has three-dimensional coordinates, and is georeferenced (NAD83-State Plane Feet – FIPS3200).
- Longitudinal stationing was developed using the as-built survey thalweg as a baseline.
- The Modified-Wolman pebble count particle size distribution protocol was utilized.
- The CVS Level 2 methodology was utilized for the vegetation plot data collection.

3.0 REFERENCES

Jordan, Jones, and Goulding, Inc. Mitigation Plan: UT Clarke Creek Stream and Wetland Restoration, 2011.

Mactec Engineering and Consulting, Inc. November 30, 2004. *Watershed Management Plan and Recommendations, Lower Yadkin/Upper Rocky River Basin, Local Watershed Planning (Phase II), Cabarrus, Iredell, Rowan and Mecklenburg Counties, North Carolina*. Prepared for North Carolina Ecosystem Enhancement Program.

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Radford, Albert. 1968. *Manual of Vascular Flora of the Carolinas.* The University of North Carolina Press, Chapel Hill. 596 p.

Rosgen, D L. 1996. Applied River Morphology. Wildland Hydrology Books, Pagosa Springs, CO.

U. S. Army Corps of Engineers. 1987. *Wetland Delineation Manual* (Technical Report Y-87-1), Washington, DC.

U. S. Army Corps of Engineers. 2003. *Stream Mitigation Guidelines*. USACOE, USEPA, NCWRC, NCDENR-DWQ.

APPENDIX A

Background Tables

Table 1a. Project Components UT Clarke Creek/DMS Project #92500									
Project Component or Reach ID	**Existing Feet/Acres**	**Restoration Level**	**Approach**	**Footage or Acreage**	**Stationing**	**Mitigation Ratio**	**Mitigation Units**	**BMP Elements**	**Comment**
UT Clarke Creek*	1507 lf	E1	P 2/3	1413 lf	00+00 – 15+87	1.5:1	942.0		Creating bankfull bench, regrading bank slopes, installing structures, planting native vegetation
UT1	723 lf	E1	P 2/3	741 lf	00+00 – 07+48, 07+65 – 07+78	1.5:1	494.0		Creating bankfull bench, regrading bank slopes, installing structures, planting native vegetation
UT1	17 lf	E1	P 2/3	17 lf	07+48 – 07+65	3:1	5.7		Creating bankfull bench, regrading bank slopes, installing structures, planting native vegetation in sewer easement
UT2	308 lf	E2	P 4	308 lf	04+22 – 05+99, 07+16 – 08+47	2.5:1	123.2		Planting of native vegetation, removal of invasive species
UT3	100 lf	E1	P 2/3	84 lf	00+00 – 00+56, 00+72 – 01+03	1.5:1	56.0		Creating bankfull bench, regrading bank slopes, installing structures, planting native vegetation
UT3	16 lf	E1	P 2/3	16 lf	00+56 – 00+72	3:1	5.3		Creating bankfull bench, regrading bank slopes, installing structures, planting native vegetation in sewer easement
UT4	373 lf	E1	P 2/3	363 lf	01+92 – 05+65	1.5:1	242		Creating bankfull bench, regrading bank slopes, installing structures, planting native vegetation
UT5	119 lf	E1	P 2/3	119 lf	03+56 – 04+75	1.5:1	79.3		Creating bankfull bench, regrading bank slopes, installing structures, planting native vegetation
UT6*	1464 lf	P	-	1152 lf	00+00 – 14+64	5:1	230.4		Designated as Preservation
Wetland A**	0.085 ac	R		0.0*		0	0		Restoring aerial extent of riparian wetland adjacent to stream
Wetland B	0.134 ac	P		0.134 ac		5:1	0.027		Designated as Preservation
Weltand C	0.057 ac	E		0.057 ac		2:1	0.029		Includes improving hydrology and vegetation to enhance the riparian wetland adjacent to stream
Wetland D	0.070 ac	R		1.020 ac		1:1	1.02		Restoring aerial extent of riparian wetland adjacent to stream
Wetland E	0.109 ac	E		0.109 ac		2:1	0.055		Includes improving hydrology and vegetation to enhance the riparian wetland adjacent to stream
Wetland E	0.109 ac	C		0.137 ac		3:1	0.046		Includes improving hydrology and vegetation to enhance the riparian wetland adjacent to stream

*DMS cannot receive mitigation credits for streams with conservation easements on only one side of a project stream. A portion of UT Clarke Creek and a portion of UT6 are inelligible for credits, resulting in a deduction of 94 linear feet from the total length of UT Clarke Creek and a deduction of 312 linear feet from the total length of UT6. NOTE - THIS IS AN ADJUSTMENT FROM MY3, WHERE ALL DEDUCTIONS WERE TAKEN FROM UT6.

**One segment of WL A will be incorporated into the enhancement of UT2. The remainder of WL A will be incorporated into the restoration of WL D

Table 1b. Component Summations UT Clarke Creek/DMS Project #92500							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration		1.02					
Enhancement		0.166					
Enhancement I	2,753						
Enhancement II	308						
Creation		0.137					
Preservation	1,152	0.134					
HQ Preservation							
		1.457	0				
Totals (Feet/Acres)	**4,213**	**1.457**					
MU Totals	**2177.9***	**1.177**					

* The MU totals reflect the changes to credits noted in Table 1a.

Non-Applicable

Table 2. Project Activity and Reporting History
UT Clarke Creek/DMS Project #92500

Elapsed Time Since grading complete: 4 years 8 months
Elapsed Time Since planting complete: 4 years 0 months
Number of reporting Years: 4

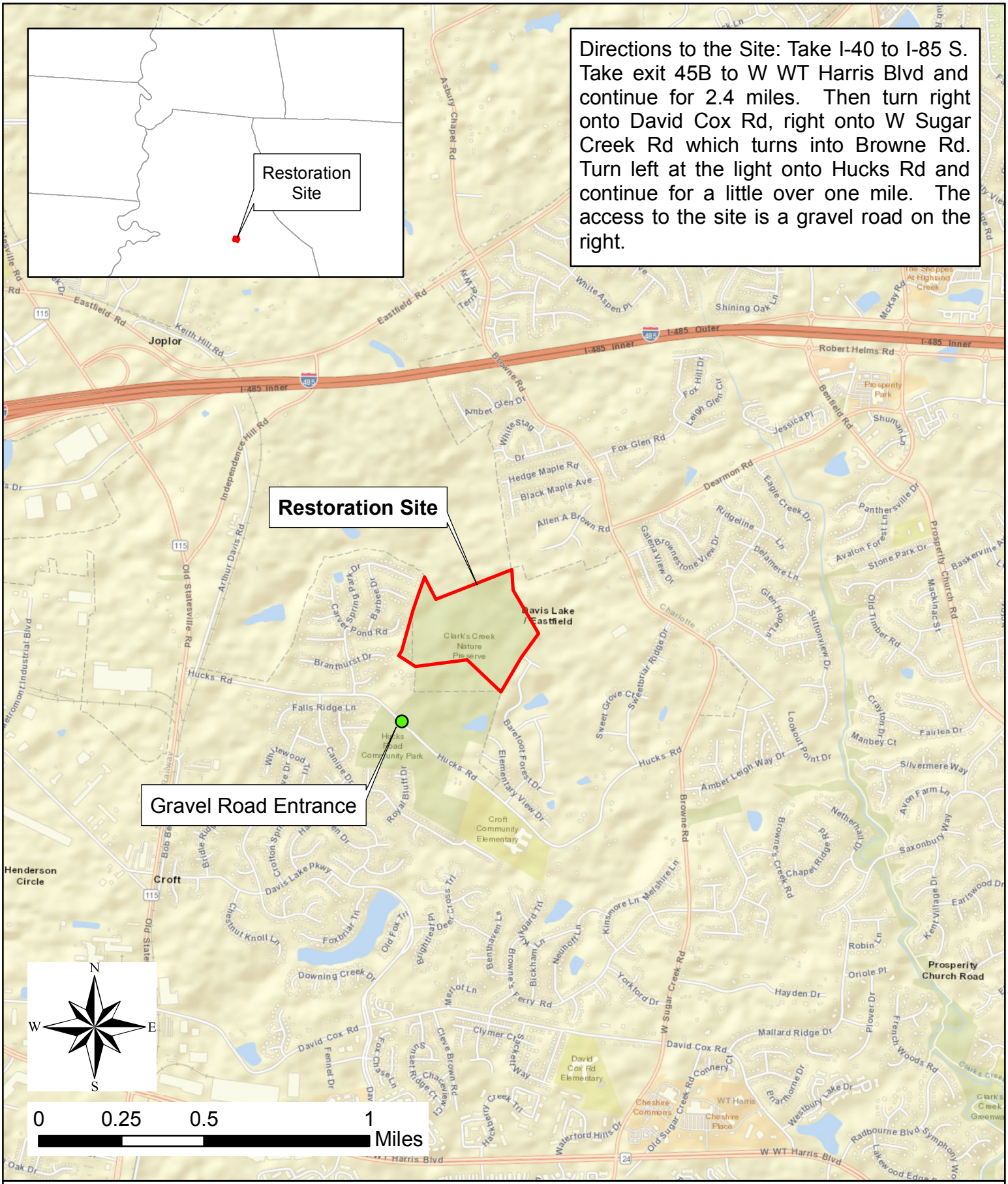
Activity or Deliverable	Data Collection Complete	Completion or Delivery
Institution Date	NA	Sept-2008
404 permit date	NA	Jan-2012
Restoration Plan	Sept-2010	Feb-2011
Final Design – Construction Plans	NA	July-2012
Construction	NA	July-2013
Containerized, bare root and B&B plantings	NA	Feb-2014
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	Mar-2014	June-2014
Year 1 Monitoring	Sept-2014	Nov-2014
Year 2 Monitoring	Sept-Oct-2015	Jan-2016
* Replanting	NA	Feb-2016
Year 3 Monitoring	Oct - 2016	Dec-2016
* Replanting	NA	Feb-2017
Beaver Trapping and Dam Removal	NA	Jul-17
Year 4 Monitoring	Oct - 2017	Feb-2018
Year 5 Monitoring		

Table 3. Project Contacts Table UT to Clarke Creek/DMS Project #92500	
Designer Primary project design POC	Jordan, Jones, and Goulding, Inc. 309 E. Morehead Street, Suite 110, Charlotte, NC 28202 Matthew M. Clabaugh, PE
Construction Contractor Construction contractor POC	North State Environmental 2889 Lowery Street, Winston-Salem, NC 27101 Michael Anderson, (336) 245-1253
Survey Contractor Survey contractor POC	NorthState Environmental 2889 Lowery Street, Winston-Salem, NC 27101 David Keith Alley, PLS
Planting Contractor Planting contractor POC	Carolina Silvics 908 Indian Trail Road, Edenton, NC 27932
Seeding Contractor Contractor point of contact	Canady's Landscaping & Erosion 256 Fairview Acres Road, Lexington, NC 27295 Craig Canady, (336) 236-1182
Seed Mix Sources	
Nursery Stock Suppliers	
Monitoring Performers	SEPI Engineering & Construction 1025 Wade Avenue, Raleigh, NC 27605
Stream Monitoring POC	Susan Westberry, AICP, PWS (910) 550-3257
Vegetation Monitoring POC	
Wetland Monitoring POC	

Table 4. Project Attribute Table UT to Clarke Creek/DMS Project #92500			
Project County	Mecklenburg		
Physiographic Region	Piedmont		
Ecoregion	Southern Outer Piedmont belt		
Project River Basin	Yadkin-Pee Dee		
USGS HUC for Project (14 digit)	03040105010040		
NCDWQ Sub-basin for Project	03-07-11		
Within extent of EEP Watershed Plan?	Upper Rocky River LWP		
WRC Hab Class (Warm, Cool, Cold)	Warm		
% of project easement fenced or demarcated	100%		
Beaver activity observed during design phase?	Yes		
Restoration Component Attribute Table			
	UT Clarke Creek	**UT1**	
Drainage area	1.08	0.46	
Stream order	2	1	
Restored length (feet)	1507	758	
Perennial or Intermittent	Perennial	Perennial	
Watershed type (Rural, Urban, Developing etc.)	Rural		
Watershed LULC Distribution (e.g.)			
Residential	94.60%		
Ag-Row Crop	-		
Ag-Livestock	-		
Forested	-		
Etc.	5.40%		
Watershed impervious cover (%)	16.50%		
NCDWQ AU/Index number	13-17-5-2		
NCDWQ classification	C		
303d listed?	No		
Upstream of a 303d listed segment?	Yes		
Reasons for 303d listing or stressor	5, Ecological/biological integrity		
Total acreage of easement	57.2		
Total vegetated acreage within the easement	57.2		
Total planted acreage as part of the restoration	57.2		
Rosgen classification of pre-existing	E4	B4c	B4c
Rosgen classification of As-built	N/A		
Valley type	VIII		
Valley slope	-		
Valley side slope range (e.g. 2-3.%)	-		
Valley toe slope range (e.g. 2-3.%)	-		
Cowardin classification	N/A		
Trout waters designation	No		
Species of concern, endangered etc.? (Y/N)	No		
Dominant soil series and characteristics	Mo, MeD, EnD		
Series	Monacan, Mecklenburg, Enon		
Depth	-		
Clay%	-		
K	-		
T	-		

APPENDIX B

Visual Assessment Data



Restoration Site Vicinity

UT to Clarke Creek

Monitoring Year 4 Mecklenburg County, NC

February 2018 Project # 92500 Figure 1

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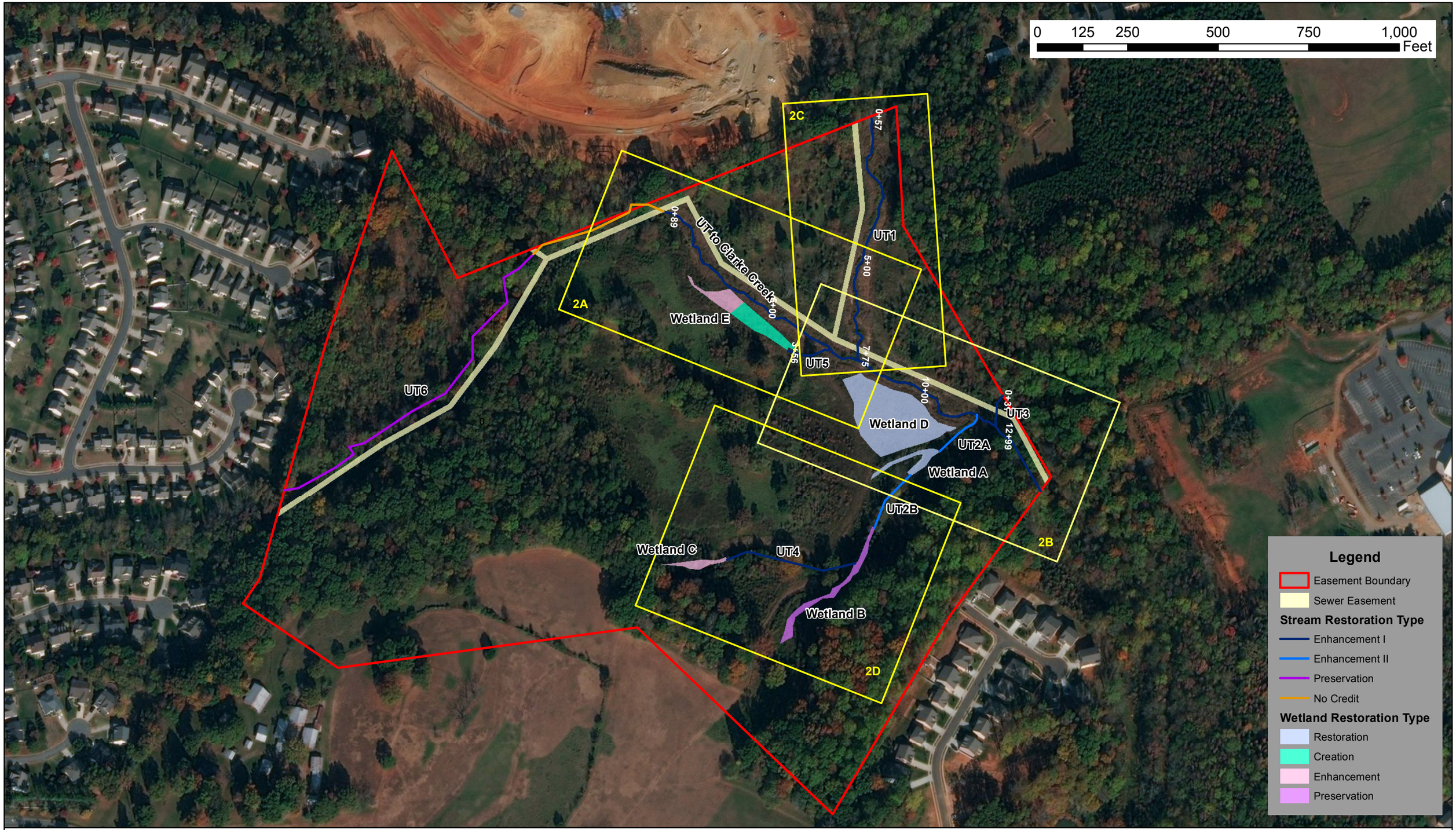

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UT to Clarke Creek Monitoring Year 4

Current Conditions Plan View - Index Map

February 2018 Project # 92500 Figure 2 Mecklenburg County, NC

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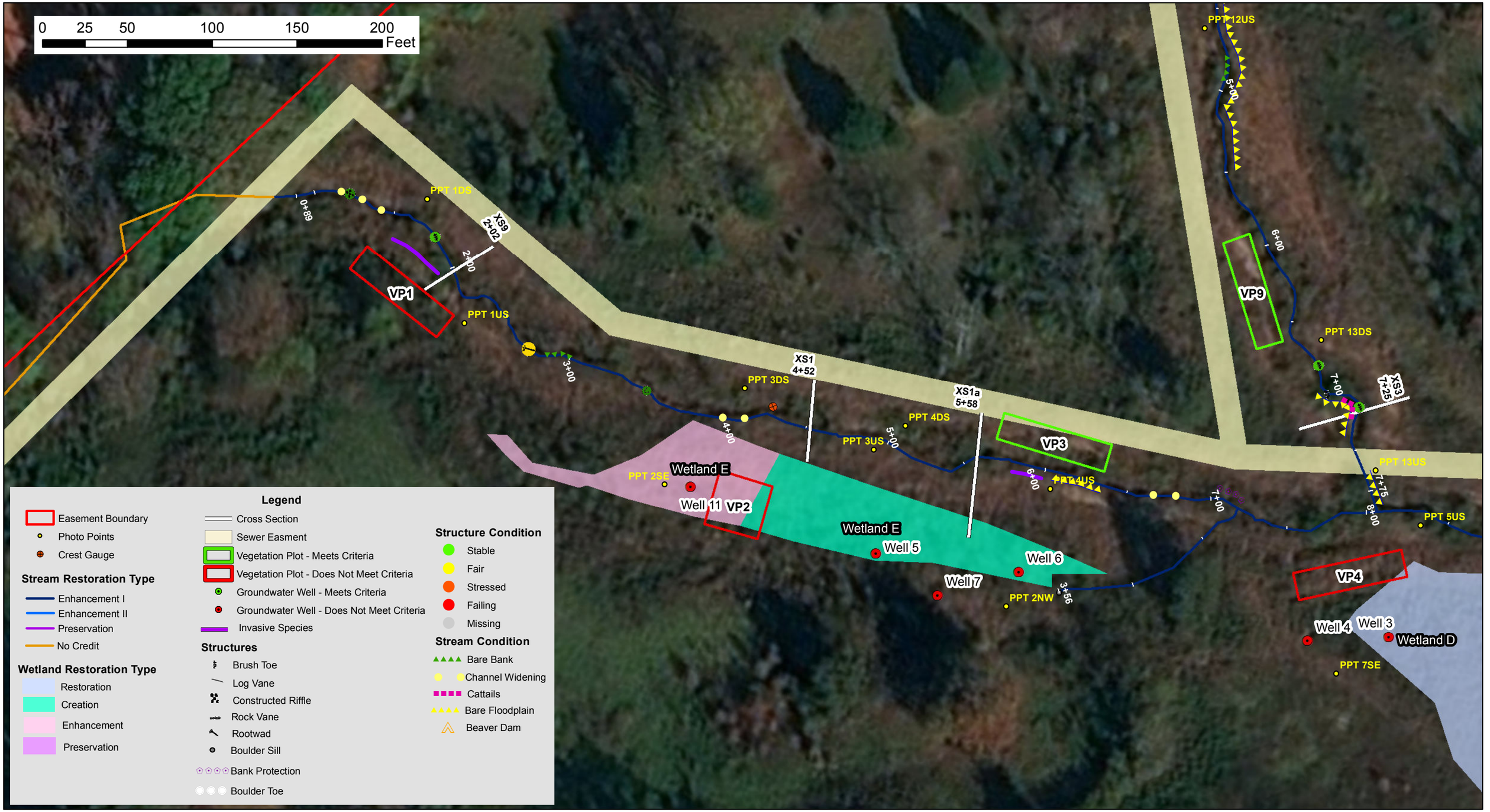

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UT to Clarke Creek Monitoring Year 4

Current Conditions Plan View - UT Clarke Creek above Confluence

February 2018 Project # 92500 Figure 2A Mecklenburg County, NC

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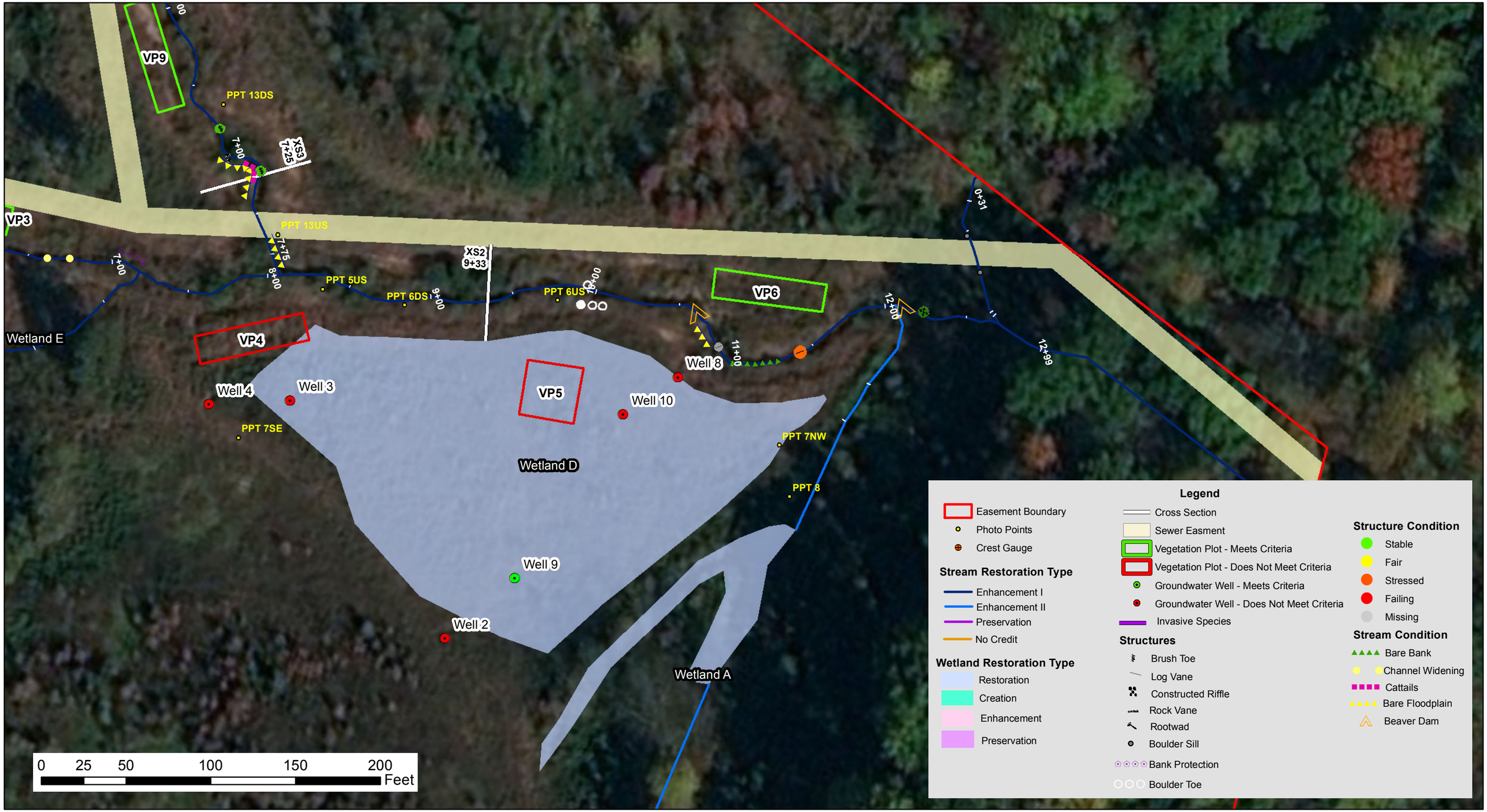

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UT to Clarke Creek Monitoring Year 4

Current Conditions Plan View - UT Clarke Creek below Confluence

February 2018 Project # 92500 Figure 2B Mecklenburg County, NC

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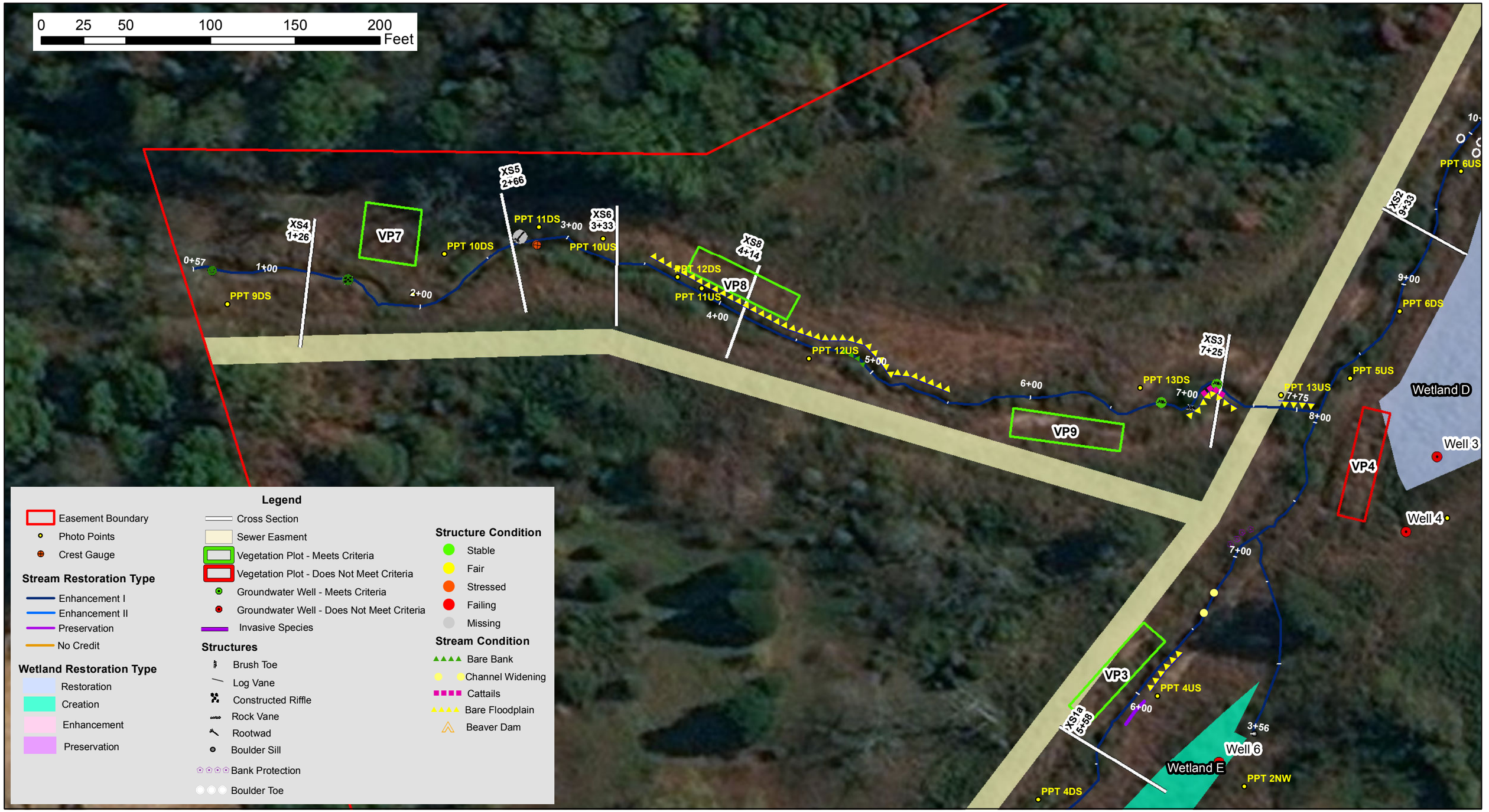

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UT to Clarke Creek Monitoring Year 4

Current Conditions Plan View - UT 1

February 2018 Project # 92500 Figure 2C Mecklenburg County, NC

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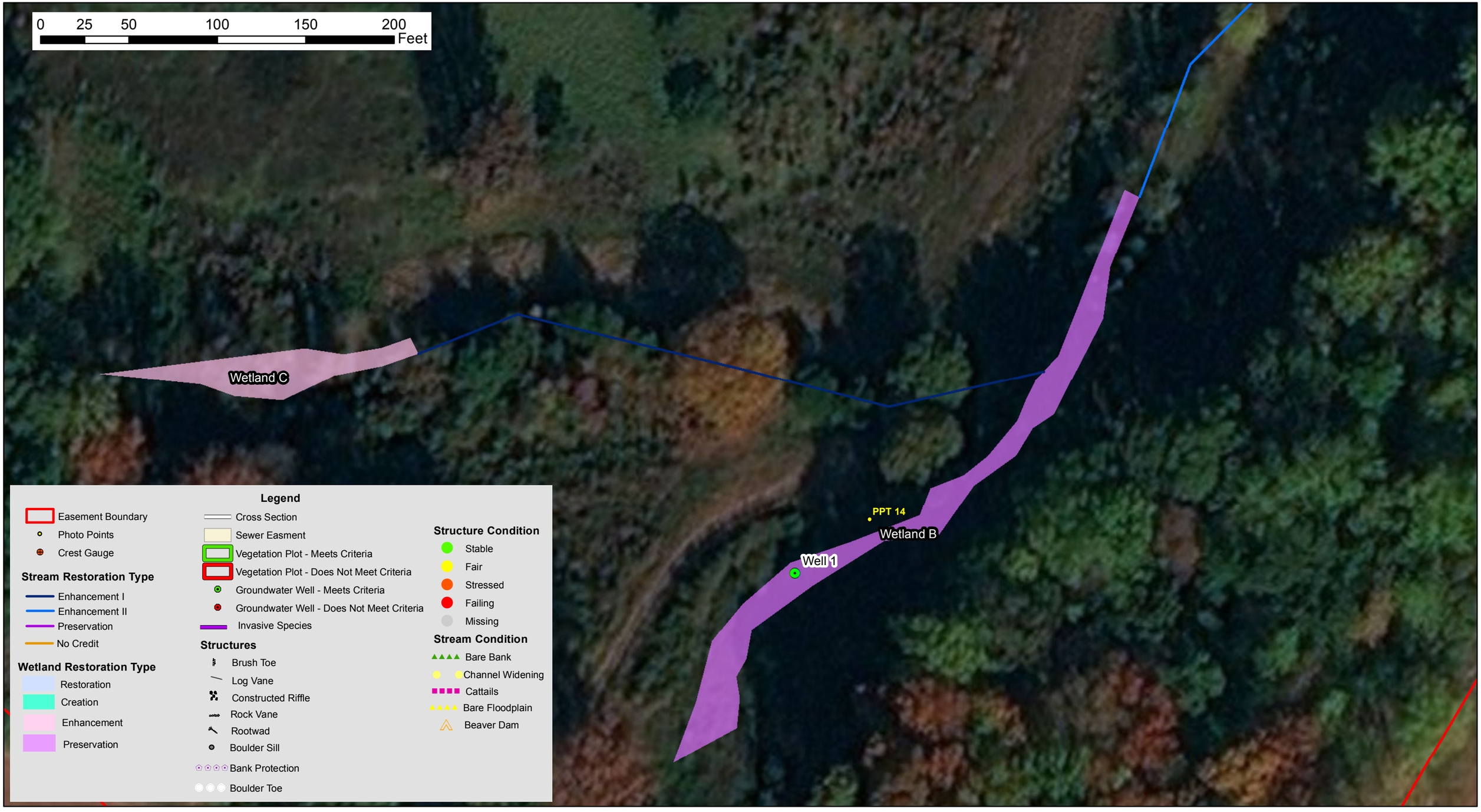

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UT to Clarke Creek Monitoring Year 4

Current Conditions Plan View - UT 4

February 2018 Project # 92500 Figure 2D Mecklenburg County, NC

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UT to Clarke Creek Monitoring Year 4

Components Map

February 2018 Project # 92500 Figure 3 Mecklenburg County, NC

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N W E S

Table 5a **Visual Stream Morphology Stability Assessment**
Reach ID **UT to Clarke Creek**
Assessed Length **1507**

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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	10	10			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	9	10			90%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	10	10			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	10	10			100%			
		2. Thalweg centering at downstream of meander (Glide)	10	10			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	39	99%	1	39	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%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	1	39	99%	1	39	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	5	7			71%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	7	8			88%			
	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 5b **Visual Stream Morphology Stability Assessment**
Reach ID **UT1**
Assessed Length **758**

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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	5	5			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	4	6			67%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	6	6			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	6	6			100%			
		2. Thalweg centering at downstream of meander (Glide)	6	6			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	42	97%	0	0	97%
	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%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	1	42	97%	0	0	97%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	6	7			86%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	7	8			88%			
	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 6 Vegetation Condition Assessment

Planted Acreage[1] **13**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	5	0.10	0.8%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Pattern and Color	5	0.10	0.8%
			Total	10	0.20	1.5%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
			Cumulative Total	10	0.20	1.5%

Easement Acreage[2] **57.2**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	2	0.01	0.0%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

Photo Station 1 Downstream-XS9 (MY4 – 10/18/2017)

Photo Station 1 Upstream-XS9 (MY4 – 10/18/2017)

Photo Station 2 Northeast-Wetland E (MY4 – 10/18/2017)

Photo Station 2 Southeast-Wetland E (MY4 – 10/18/2017)

Photo Station 3 Downstream-XS1 (MY4 – 10/18/2017)

Photo Station 3 Upstream-XS1 (MY4 – 10/18/2017)

Photo Station 4 Downstream-XS1A (MY4 – 10/18/2017)

Photo Station 4 Upstream-XS1A (MY4 – 10/18/2017)

Photo Station 5 Upstream-Confluence (MY4 – 10/19/2017)

Photo Station 6 Downstream-XS2 (MY4 – 10/19/2017)

Photo Station 6 Upstream-XS2 (MY4 – 10/19/2017)

Photo Station 7 Northwest- Wetland D (MY4 – 10/19/2017)

Photo Station 7 Southeast-Wetland D (MY4 – 10/18/2017)

Photo Station 8 Downstream-UT2 (MY4 – 10/18/2017)

Photo Station 8 South-Wetland A (MY4 – 10/18/2017)

Photo Station 9 Downstream-XS4 (MY4 – 10/19/2017)

Photo Station 9 Upstream-XS4 (MY4 – 10/19/2017)

Photo Station 10 Downstream-XS5 (MY4 – 10/19/2017)

Photo Station 10 Upstream-XS5 (MY4 – 10/19/2017)

Photo Station 11 Downstream-XS6 (MY4 – 10/19/2017)

Photo Station 11 Upstream-XS6 (MY4 – 10/19/2017)

Photo Station 12 Downstream-XS8 (MY4 – 10/19/2017)

Photo Station 12 Upstream-XS8 (MY4 – 10/19/2017)

Photo Station 13 Downstream-XS3 (MY4 – 10/19/2017)

Photo Station 13 Upstream-XS3 (MY4 – 10/19/2017)

Photo Station 14 North-Wetland B (MY4 – 10/18/2017)

Photo Station 14 South-Wetland B (MY4 – 10/18/2017)

Vegetation Plot 1 – 5m x 20m (MY4 – 10/18/2017)

Vegetation Plot 2 – 10m x 10m (MY4 – 10/18/2017)

Vegetation Plot 3 – 5m x 20m (MY4 – 10/18/2017)

Vegetation Plot 4 – 5m x 20m (MY4 – 10/18/2017)

Vegetation Plot 5 – 5m x 20m (MY4 – 10/19/2017)

Vegetation Plot 6 – 5m x 20m (MY4 – 10/19/2017)

Vegetation Plot 7 – 10m x 10m (MY4 – 10/19/2017)

Vegetation Plot 8 – 5m x 20m (MY3 – 10/19/2017)

Vegetation Plot 9 – 5m x 20m (MY4 – 10/19/2017)

APPENDIX C

Vegetation Plot Data

Table 7. Vegetation Plot Mitigation Success Sumary UT to Clarke Creek / DMS Project #92500 Year 4 of 5		
Plot #	Stems/Acre	Success Criteria Met?
1	121.4	No
2	80.9	No
3	404.7	Yes
4	161.9	No
5	242.8	No
6	445.2	Yes
7	526.1	Yes
8	323.7	Yes
9	526.1	Yes

Table 8 - CVS Vegetation Metadata
UT Clarke Creek / DMS Project #92500

Report Prepared By	Susan Westberry
Date Prepared	11/3/2017 13:29
database name	UTClarkeCr_92500_MY4_2017_CVS_Database.mdb
database location	
computer name	W259
file size	66662400

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	92500
project Name	UT Clarke Creek
Description	Stream and Wetland Restoration
River Basin	Yadkin-Pee Dee
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	9

EEP Project Code 92500. Project Name: UT Clarke Creek

			Current Plot Data (MY4 2017)																																					Annual Means																	
			92500-01-0001			92500-01-0002			92500-01-0003			92500-01-0004			92500-01-0005			92500-01-0006			92500-01-0007			92500-01-0008			92500-01-0009			MY4 (2017)			MY3 (2016)			MY2 (2015)			MY1 (2014)			MY0 (2014)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Alnus serrulata	hazel alder	Shrub																1	1	1			7			1	2	2	5	3	3	14	1	1	2	1	1	11			3			1
Amelanchier arborea	common serviceberry	Tree										1	1	1																1	1	1	3	3	3	3	3	3	1	1	2	1	1	1
Asimina triloba	pawpaw	Tree																																						1					
Baccharis halimifolia	eastern baccharis	Shrub																																						1					
Betula nigra	river birch	Tree				1	1	1	3	3	3							4	4	6	3	3	3				3	3	3	14	14	16	17	17	17	20	20	21	6	6	6	8	8	8
Carpinus caroliniana	American hornbeam	Tree																																					2	2	2	2	2	2
Carya glabra	pignut hickory	Tree																																									1	1	1
Celtis occidentalis	common hackberry	Tree																					4									4												
Chionanthus virginicus	white fringetree	Shrub Tree							1	1	1																			1	1	1	1	1	1	3	3	3						
Cornus amomum	silky dogwood	Shrub															1											2	3		2	4	1	5	5	1	5	6		3	3		6	6
Diospyros virginiana	common persimmon	Tree												2																		2					2			3			
Fraxinus pennsylvanica	green ash	Tree										2	2	2			2	2	2	3	1	1	1				2	2	2	7	7	10	8	8	18	15	15	18	11	11	12	15	15	15
Ilex verticillata	common winterberry	Shrub													1	1	1													1	1	1										1	1	1
Juglans	walnut	Tree																																											
Juglans nigra	black walnut	Tree																																						1					1
Liquidambar styraciflua	sweetgum	Tree			12			4															7									23			2			10			7			4
Liriodendron tulipifera	tuliptree	Tree																																			3	3	3	5	5	5	12	12	12
Nyssa sylvatica	blackgum	Tree																			4	4	4	3	3	4				7	7	8	3	3	3	3	3	3						
Pinus taeda	loblolly pine	Tree																					13			1			2			16			10			9					
Platanus occidentalis	American sycamore	Tree	1	1	1			1	1	1	2							1	1	1	2	2	3	1	1	4	2	2	3	8	8	15	8	8	8	15	15	15	4	4	4	7	7	7
Populus deltoides	eastern cottonwood	Tree			7									1			3						6						3			20			9			21			13			
Quercus coccinea	scarlet oak	Tree							2	2	2										1	1	1	4	4	4	1	1	1	8	8	8												
Quercus falcata	southern red oak	Tree							1	1	1	1	1	1	1	1	1	2	2	2	1	1	1							6	6	6	11	11	11	19	19	19	13	13	13	26	26	26
Quercus michauxii	swamp chestnut oak	Tree	2	2	2	1	1	1	2	2	2				2	2	2										1	1	1	8	8	8	6	6	8	11	11	11						
Quercus nigra	water oak	Tree																1	1	1										1	1	1	1	1	1	3	3	3	4	4	4	8	8	8
Quercus phellos	willow oak	Tree																			1	1	1							1	1	1	1	1	1	2	2	2	1	1	1			
Quercus rubra	northern red oak	Tree													1	1	1										1	1	1	2	2	2	2	2	7	3	3	3	1	1	1	1	1	1
Salix nigra	black willow	Tree			27			6		4	4				1	1	6			1			2				1	1	5	2	6	51	1	5	63		4	120		2	73		5	98
Sambucus canadensis	Common Elderberry	Shrub																																				2					
		Stem count	3	3	49	2	2	13	10	14	15	4	4	7	6	6	17	11	11	15	13	13	53	8	8	14	13	15	29	70	76	212	64	72	169	102	110	286	48	53	154	82	93	192
		size (ares)	1			1			1			1			1			1			1			1			1			9			9			9			9			9		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.22			0.22			0.22			0.22			0.22		
		Species count	2	2	5	2	2	5	6	7	7	3	3	5	5	5	8	6	6	7	7	7	13	3	3	5	8	9	11	15	16	21	14	14	17	14	15	21	10	12	18	11	13	16
		Stems per ACRE	121.4	121.4	1983	80.94	80.94	526.1	404.7	566.6	607	161.9	161.9	283.3	242.8	242.8	688	445.2	445.2	607	526.1	526.1	2145	323.7	323.7	566.6	526.1	607	1174	314.8	341.7	953.3	287.8	323.7	759.9	458.6	494.6	1286	215.8	238.3	692.5	368.7	418.2	863.3

APPENDIX D

Stream Survey Data

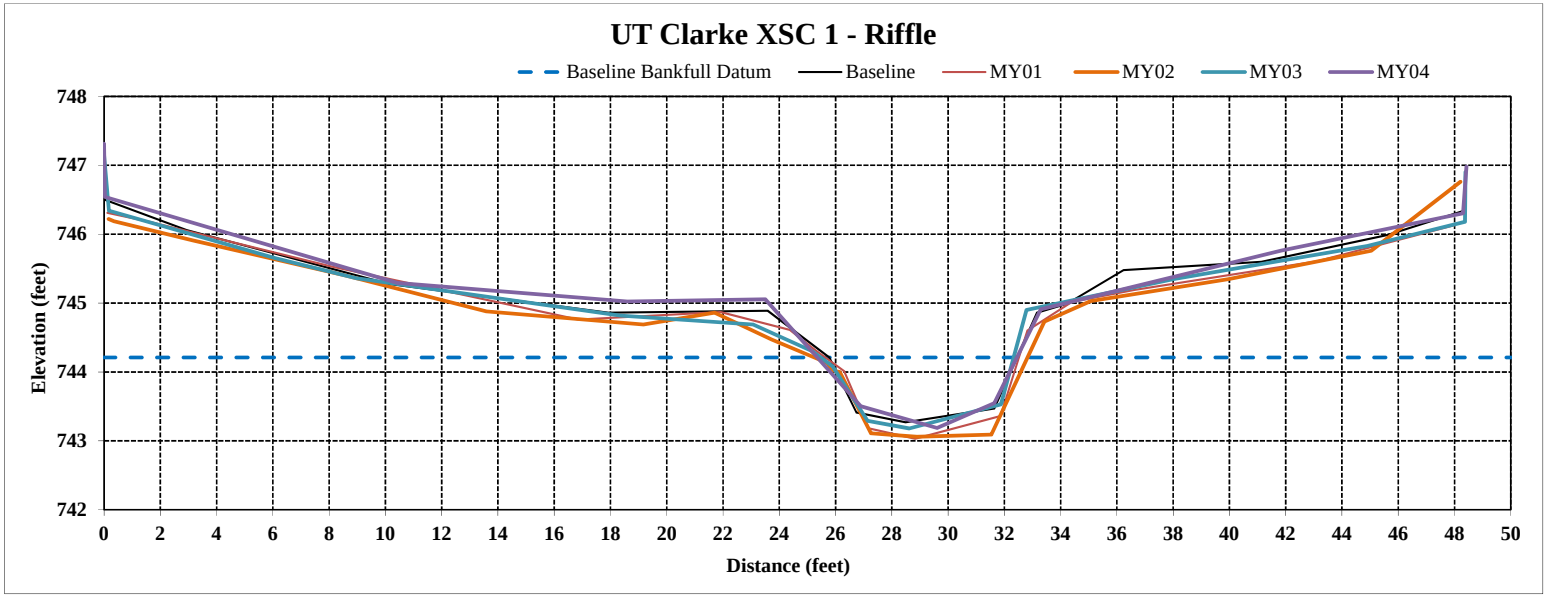
Station	Elevation
0	747.3118
0.03110063	746.5408
10.4580523	745.2906
18.6084326	745.0247
23.5171859	745.0542
26.9161436	743.5023
29.6282949	743.1872
29.7053838	743.4792
31.6717572	743.5481
33.316085	744.9096
41.8484269	745.7625
48.3036638	746.3038
48.420666	746.9796

Reach	UT to Clarke Creek
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-1, Riffle, 4+52
Drainage Area (Sq Mi)	1.08
Date	10/18/2017
Observers	C. Dustin, K. Stubbs

SUMMARY DATA	
Baseline Bankfull Datum, ft	744.21
Bankfull Cross Sectional Area, ft^2	4.80
Bankfull Width, ft	7.10
Max Depth at Bankfull, ft	1.00
Mean Depth at Bankfull, ft	0.70
Width/Depth Ratio	10.40
Flood Prone Width, ft	23.50
Flood Prone Area Elevation	744.91
Entrenchment Ratio	3.30
Bank Height Ratio	1.00

Stream Type	E4

Sta. 4+52 Looking Downstream



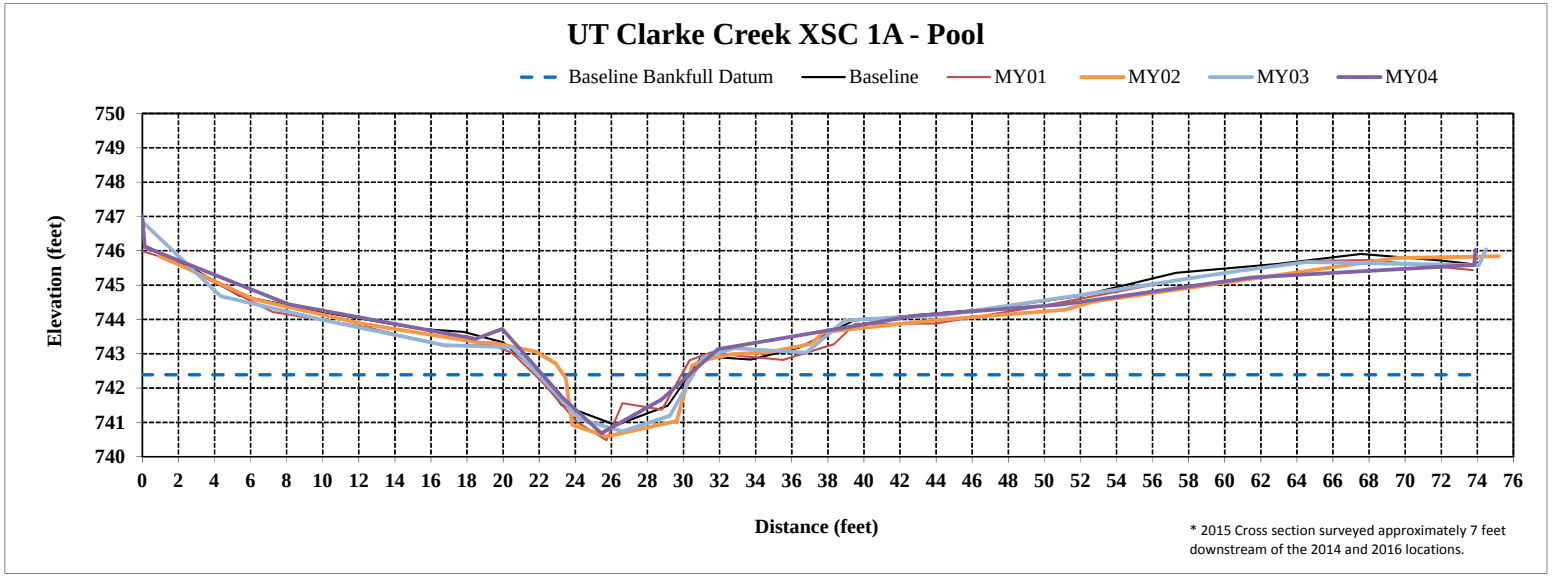
Station	Elevation
0.00	747.01
0.14	746.11
8.09	744.44
18.48	743.43
19.96	743.72
23.30	741.71
25.44	740.68
28.79	741.67
31.90	743.14
42.83	744.11
50.99	744.43
61.50	745.22
73.82	745.59
73.91	746.03

Reach	UT to Clarke Creek
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-1A, Pool, 5+58
Drainage Area (Sq Mi)	1.08
Date	10/18/2017
Observers	C. Dustin, K. Stubbs

SUMMARY DATA	
Baseline Bankfull Datum, ft	742.39
Bankfull Cross Sectional Area, ft^2	7.50
Bankfull Width, ft	8.10
Max Depth at Bankfull, ft	1.70
Mean Depth at Bankfull, ft	0.90
Width/Depth Ratio	8.80
Flood Prone Width, ft	31.10
Flood Prone Area Elevation	743.14
Entrenchment Ratio	3.84
Bank Height Ratio	1.40

Stream Type	E4

Sta. 5+58 Looking Downstream

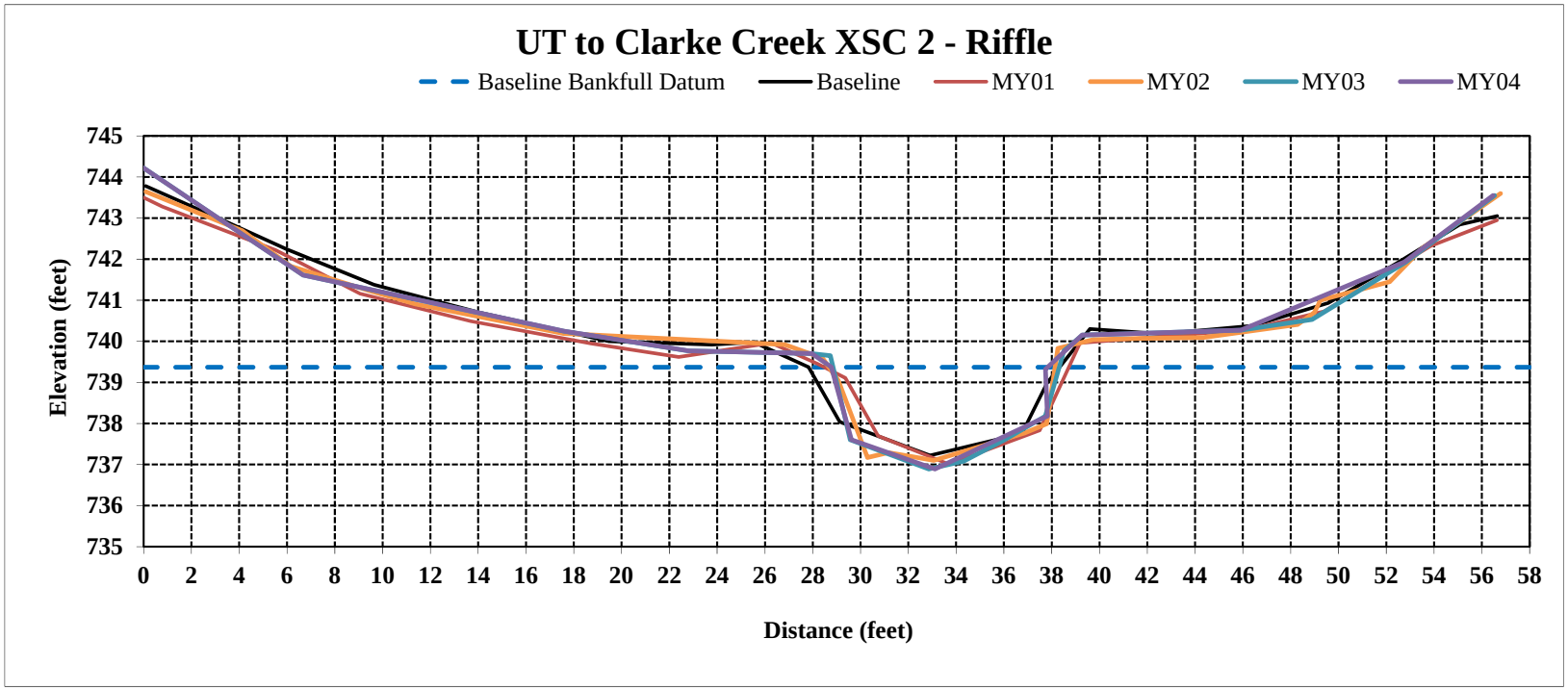


Station	Elevation
0.00	744.22
6.67	741.61
17.59	740.25
22.81	739.77
27.96	739.70
28.78	739.37
29.62	737.60
33.11	736.89
37.82	738.18
37.74	739.32
39.27	740.15
41.11	740.18
45.92	740.27
52.75	741.93
56.47	743.55
56.51	742.97

Reach	UT to Clarke Creek
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-2, Riffle, 9+33
Drainage Area (Sq Mi)	1.08
Date	10/19/2017
Observers	C. Dustin, K. Stubbs

SUMMARY DATA	
Baseline Bankfull Datum, ft	739.37
Bankfull Cross Sectional Area, ft^2	16.80
Bankfull Width, ft	9.10
Max Depth at Bankfull, ft	2.50
Mean Depth at Bankfull, ft	1.90
Width/Depth Ratio	4.90
Flood Prone Width, ft	46.40
Flood Prone Area Elevation	740.15
Entrenchment Ratio	5.10
Bank Height Ratio	1.10

Stream Type E4 **Sta. 9+33 Looking Downstream**



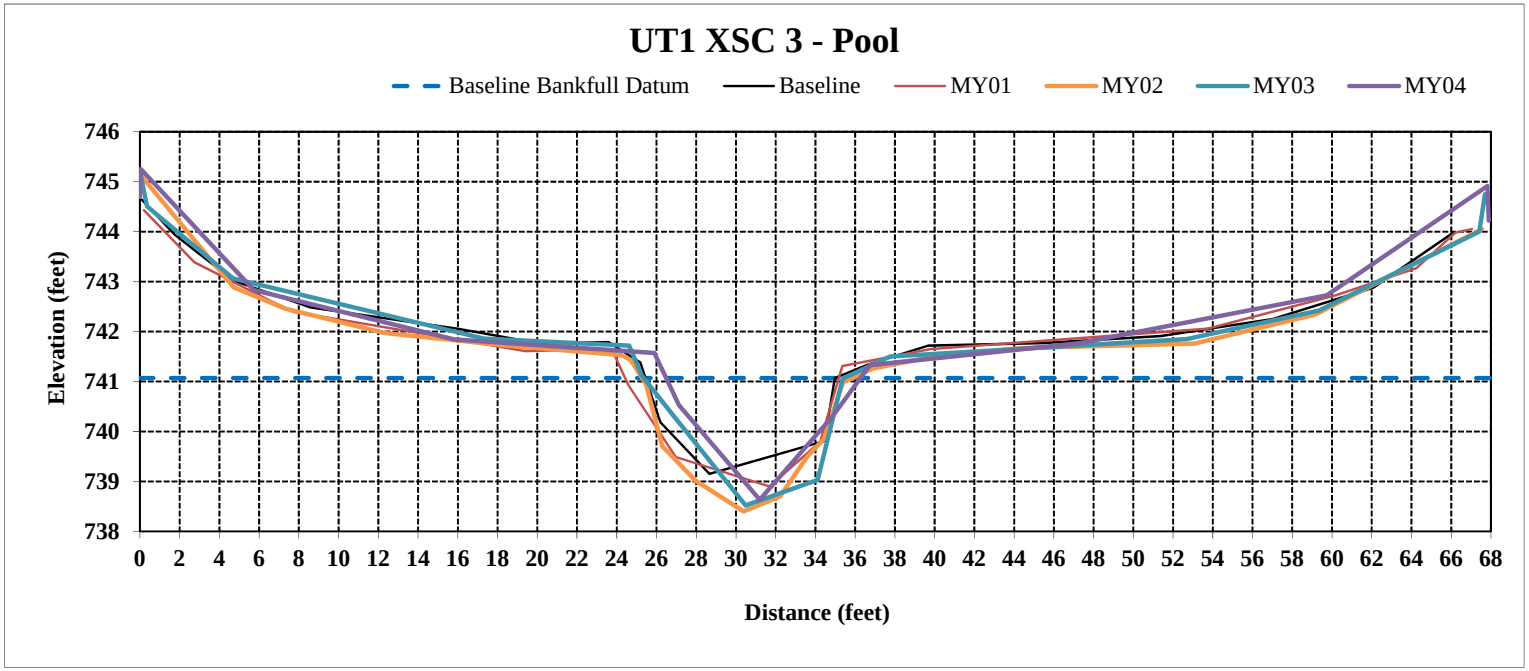
Station	Elevation
0.00	744.70
0.04	745.25
5.74	742.83
15.80	741.84
25.89	741.57
27.13	740.53
31.20	738.63
34.85	740.30
36.74	741.33
47.27	741.77
59.73	742.72
67.83	744.91
67.89	744.22

Reach	UT1
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-3, Pool, 7+25
Drainage Area (Sq Mi)	0.46
Date	10/19/2017
Observers	C. Dustin, K. Stubbs

SUMMARY DATA	
Baseline Bankfull Datum, ft	741.07
Bankfull Cross Sectional Area, ft^2	12.60
Bankfull Width, ft	9.80
Max Depth at Bankfull, ft	2.40
Mean Depth at Bankfull, ft	1.30
Width/Depth Ratio	7.60
Flood Prone Width, ft	58.50
Flood Prone Area Elevation	741.32
Entrenchment Ratio	6.00
Bank Height Ratio	1.10

Stream Type	B4c

Sta. 7+25 Looking Downstream



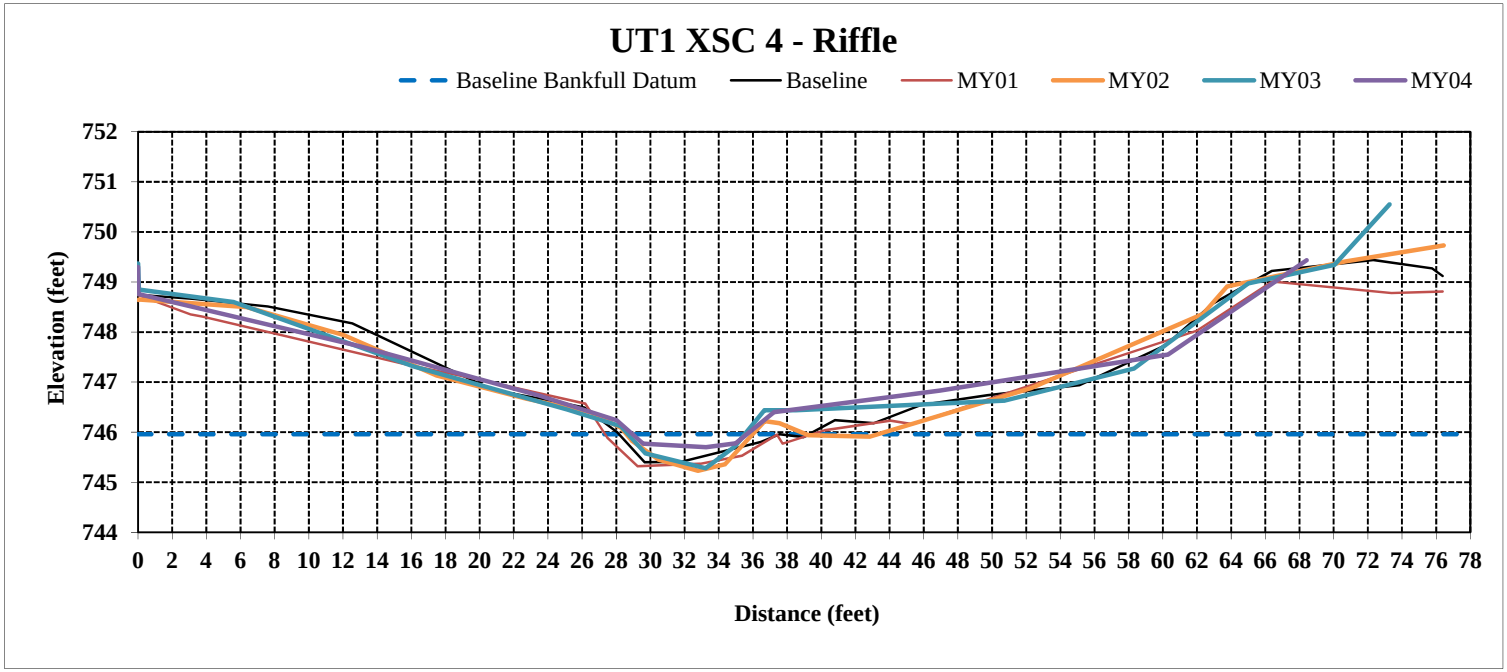
Station	Elevation
0	749.2989
0.01629	748.7609
13.0043	747.7144
23.4761	746.7336
28.0323	746.2383
29.5754	745.7691
33.2571	745.7003
34.992	745.7758
37.2302	746.3992
46.9549	746.8324
60.3068	747.5512
68.4171	749.4344

Reach	UT1
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-4, Riffle, 1+26
Drainage Area (Sq Mi)	0.46
Date	10/19/2017
Observers	C. Dustin, K. Stubbs

SUMMARY DATA	
Baseline Bankfull Datum, ft	745.80
Bankfull Cross Sectional Area, ft^2	1.30
Bankfull Width, ft	6.7
Max Depth at Bankfull, ft	0.30
Mean Depth at Bankfull, ft	0.20
Width/Depth Ratio	33.70
Flood Prone Width, ft	8.5
Flood Prone Area Elevation	746.24
Entrenchment Ratio	1.30
Bank Height Ratio	2.10

Stream Type	B4c

Sta. 1+26 Looking Downstream



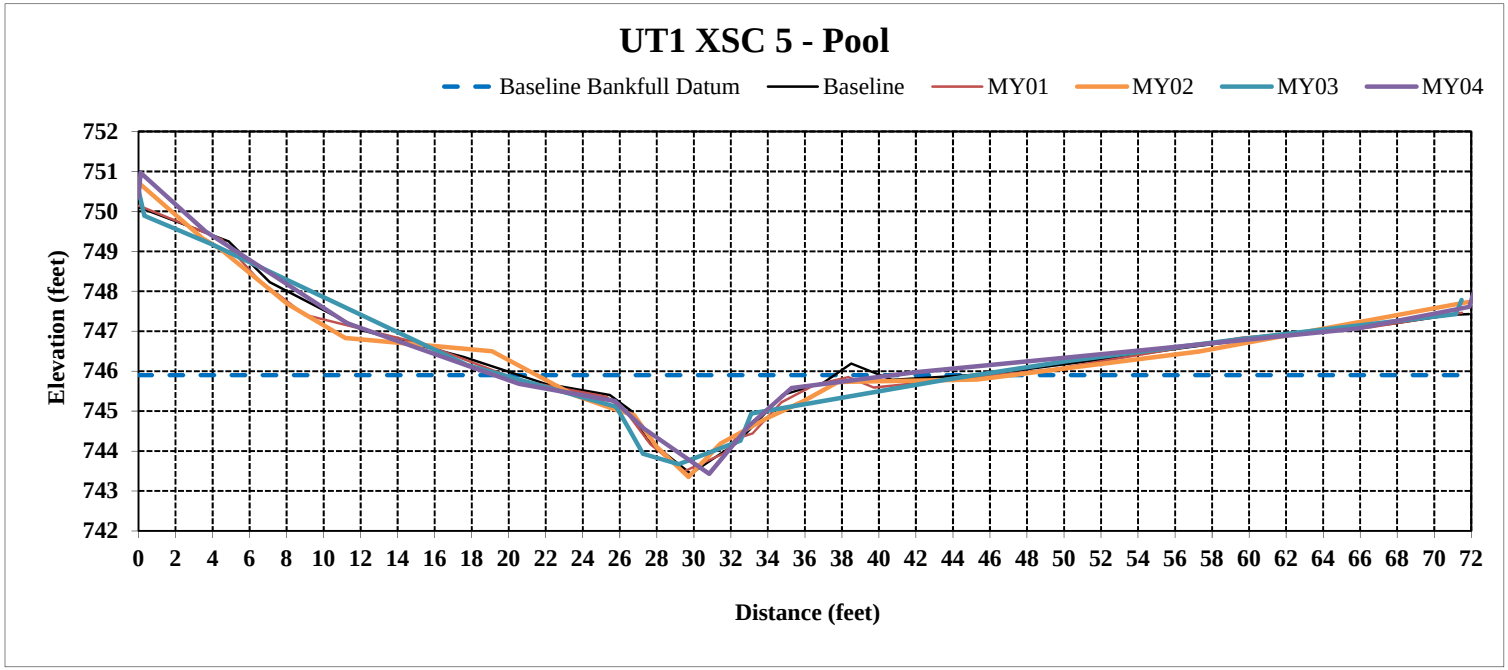
Station	Elevation
0.00	750.35
0.11	750.97
3.60	749.51
11.25	747.21
20.53	745.68
25.73	745.25
27.26	744.57
30.84	743.43
32.94	744.62
35.28	745.58
42.00	745.98
54.55	746.54
65.86	747.07
71.90	747.61
72.11	747.94

Reach	UT1
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-5, Pool, 2+66
Drainage Area (Sq Mi)	0.46
Date	10/19/2017
Observers	C. Dustin, K. Stubbs

SUMMARY DATA	
Baseline Bankfull Datum, ft	745.90
Bankfull Cross Sectional Area, ft^2	17.40
Bankfull Width, ft	21.5
Max Depth at Bankfull, ft	2.50
Mean Depth at Bankfull, ft	0.80
Width/Depth Ratio	26.60
Flood Prone Width, ft	45.33
Flood Prone Area Elevation	747
Entrenchment Ratio	2.10
Bank Height Ratio	0.50

Stream Type	B4c

Sta. 2+66 Looking Downstream



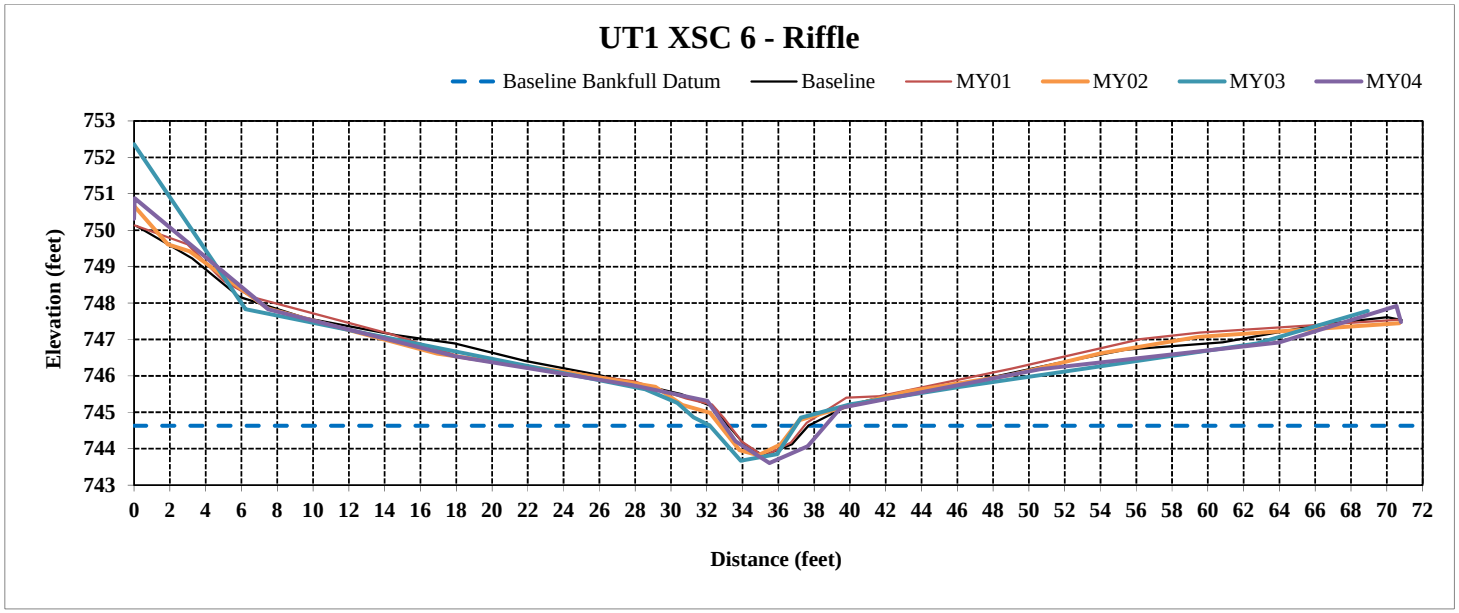
Station	Elevation
0.00	750.31
0.04	750.88
7.50	747.83
17.97	746.54
27.81	745.75
32.03	745.31
33.61	744.20
35.50	743.61
37.64	744.06
39.48	745.12
50.64	746.18
64.00	746.92
70.54	747.92
70.79	747.48

Reach	UT1
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-6, Riffle, 3+33
Drainage Area (Sq Mi)	0.46
Date	10/19/2017
Observers	C. Dustin, K. Stubbs

SUMMARY DATA	
Baseline Bankfull Datum, ft	744.63
Bankfull Cross Sectional Area, ft^2	3.50
Bankfull Width, ft	5.6
Max Depth at Bankfull, ft	1.00
Mean Depth at Bankfull, ft	0.60
Width/Depth Ratio	9.10
Flood Prone Width, ft	16.4
Flood Prone Area Elevation	745.12
Entrenchment Ratio	2.90
Bank Height Ratio	1.50

Stream Type	B4c

Sta. 3+33 Looking Downstream



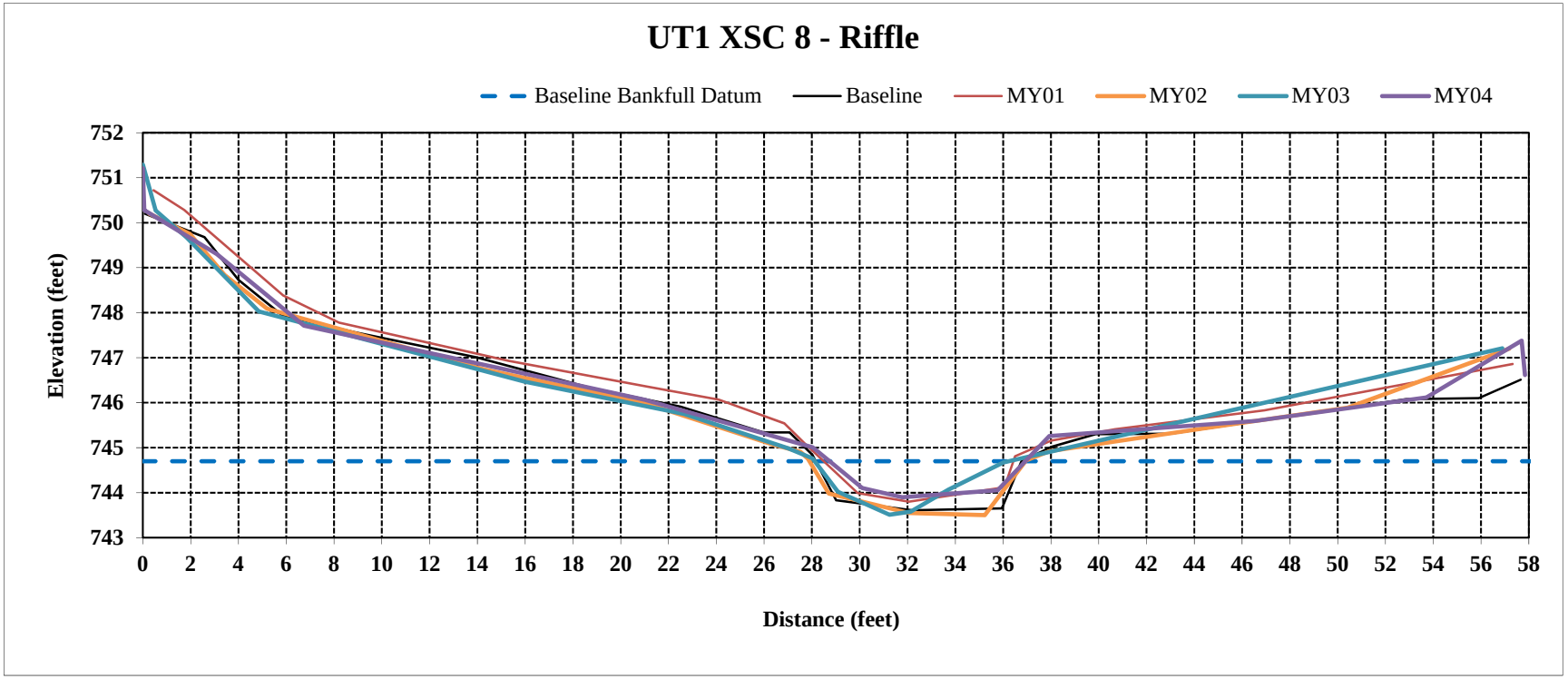
Station	Elevation
0	751.2084
0.0594	750.2799
3.108	749.299
6.7453	747.7144
21.002	746.0644
28.032	745.0081
30.106	744.1026
31.767	743.8992
35.773	744.0535
37.938	745.2576
46.554	745.5957
53.717	746.1176
57.704	747.3775
57.841	746.6164

Reach	UT1
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-8, Riffle, 4+14
Drainage Area (Sq Mi)	0.46
Date	10/19/2017
Observers	C. Dustin, K. Stubbs

SUMMARY DATA	
Baseline Bankfull Datum, ft	744.70
Bankfull Cross Sectional Area, ft^2	4.80
Bankfull Width, ft	8.2
Max Depth at Bankfull, ft	0.80
Mean Depth at Bankfull, ft	0.60
Width/Depth Ratio	13.90
Flood Prone Width, ft	19.4
Flood Prone Area Elevation	745.01
Entrenchment Ratio	2.40
Bank Height Ratio	1.20

Stream Type	B4c

Sta. 4+14 Looking Downstream



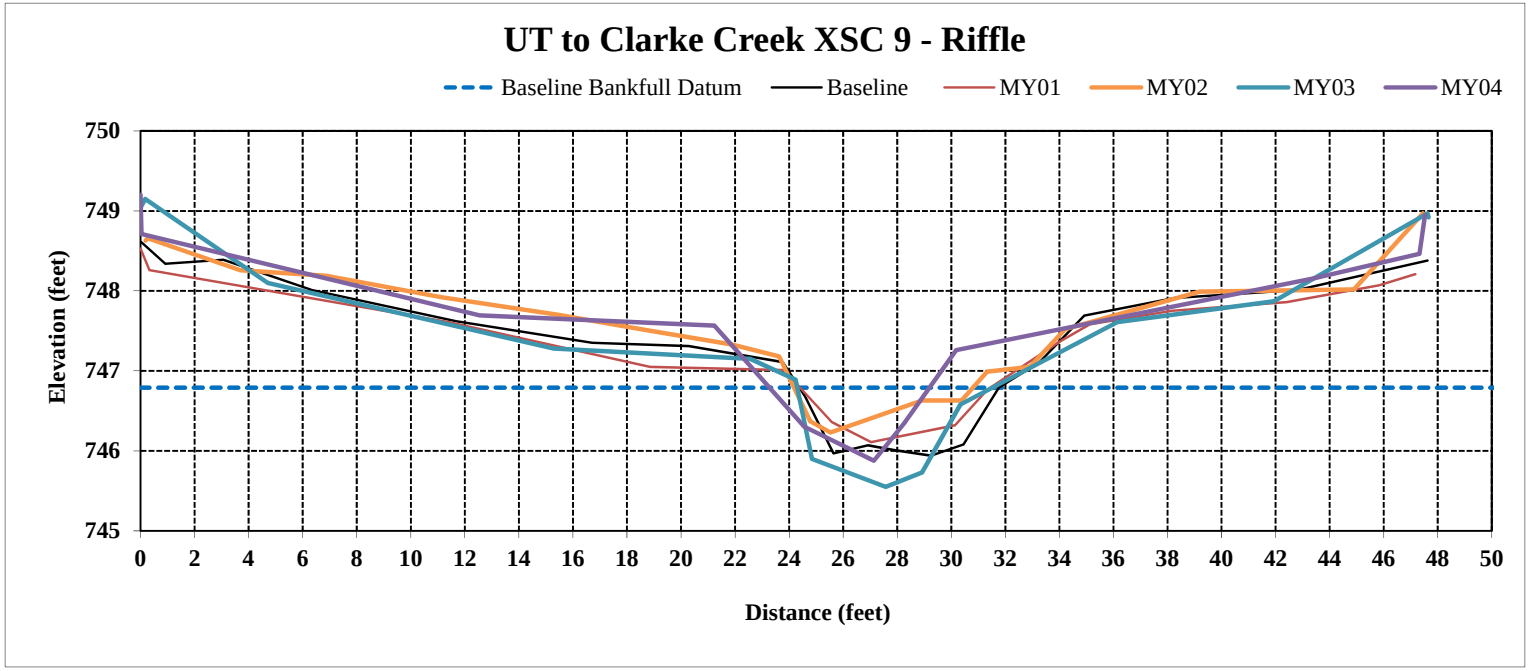
Station	Elevation
0.00	749.20
0.03	748.71
12.53	747.69
21.23	747.57
24.55	746.30
27.14	745.88
28.25	746.34
30.18	747.26
43.42	748.16
47.33	748.46
47.53	748.95

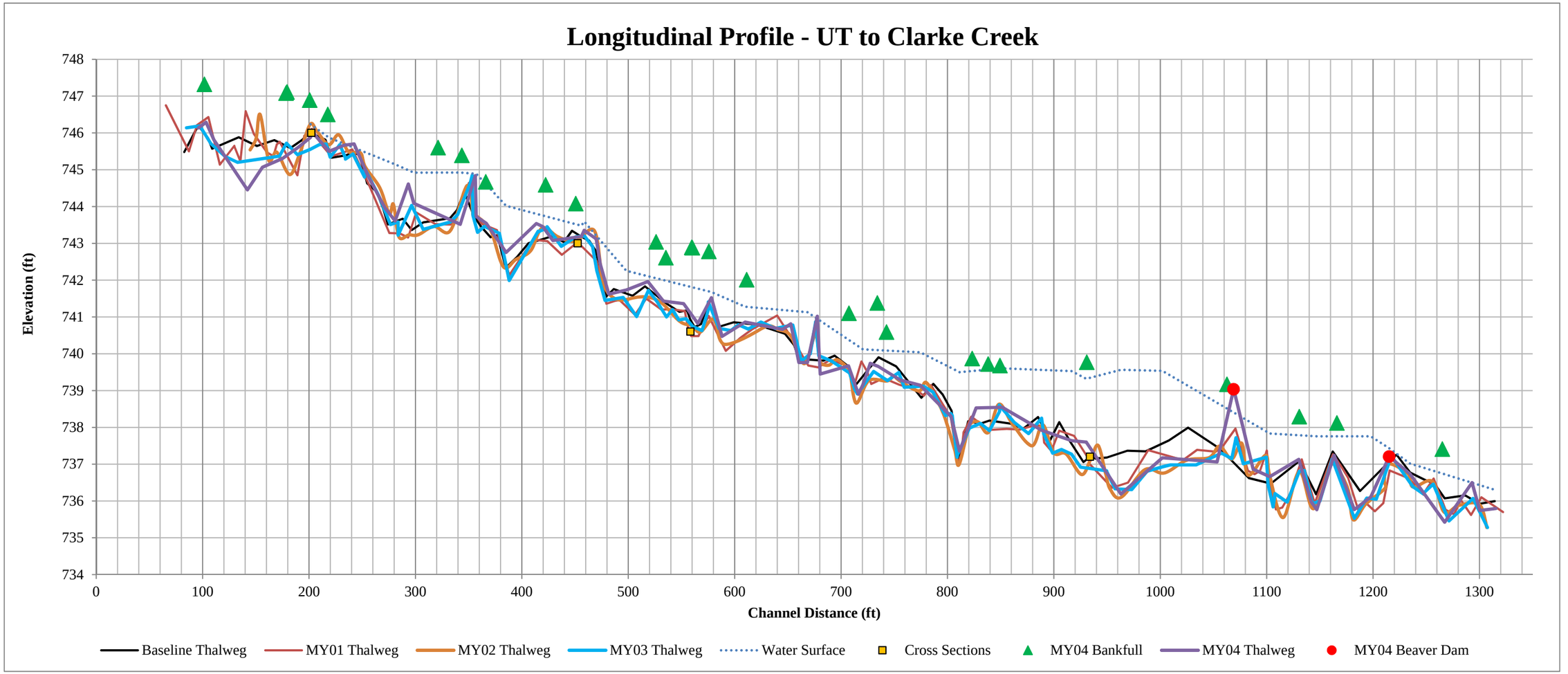
Reach	UT to Clarke Creek
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-9, Riffle, 2+02
Drainage Area (Sq Mi)	1.08
Date	10/18/2017
Observers	C. Dustin, K. Stubbs

SUMMARY DATA	
Baseline Bankfull Datum, ft	746.79
Bankfull Cross Sectional Area, ft^2	3.10
Bankfull Width, ft	5.9
Max Depth at Bankfull, ft	0.90
Mean Depth at Bankfull, ft	0.50
Width/Depth Ratio	11.30
Flood Prone Width, ft	24.3
Flood Prone Area Elevation	747.25
Entrenchment Ratio	4.10
Bank Height Ratio	1.50

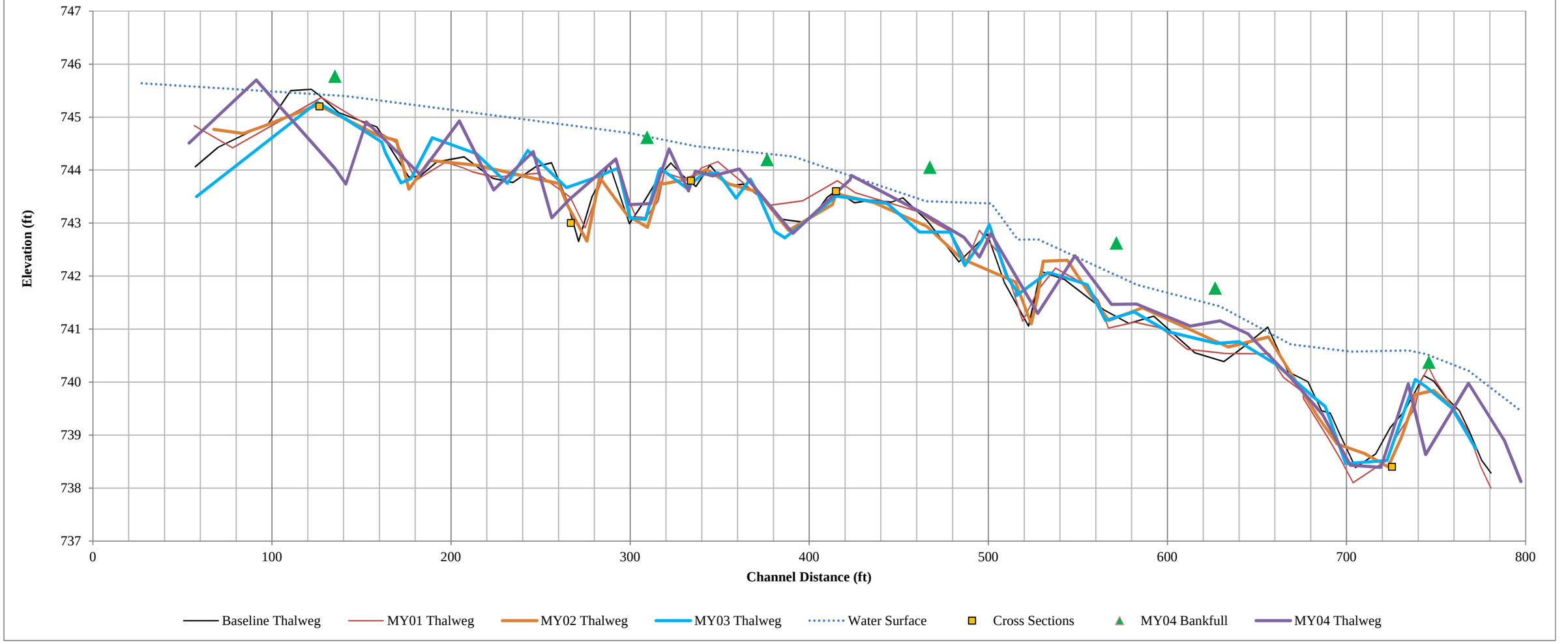
Stream Type	E4

Sta. 2+02 Looking Downstream




Longitudinal Profile - UT to Clarke Creek
Elevation (ft)
748
747
746
745
744
743
742
741
740
739
738
737
736
735
734
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
Channel Distance (ft)
Baseline Thalweg
MY01 Thalweg
MY02 Thalweg
MY03 Thalweg
Water Surface
Cross Sections
MY04 Bankfull
MY04 Thalweg
MY04 Beaver Dam

Longitudinal Profile - UT 1

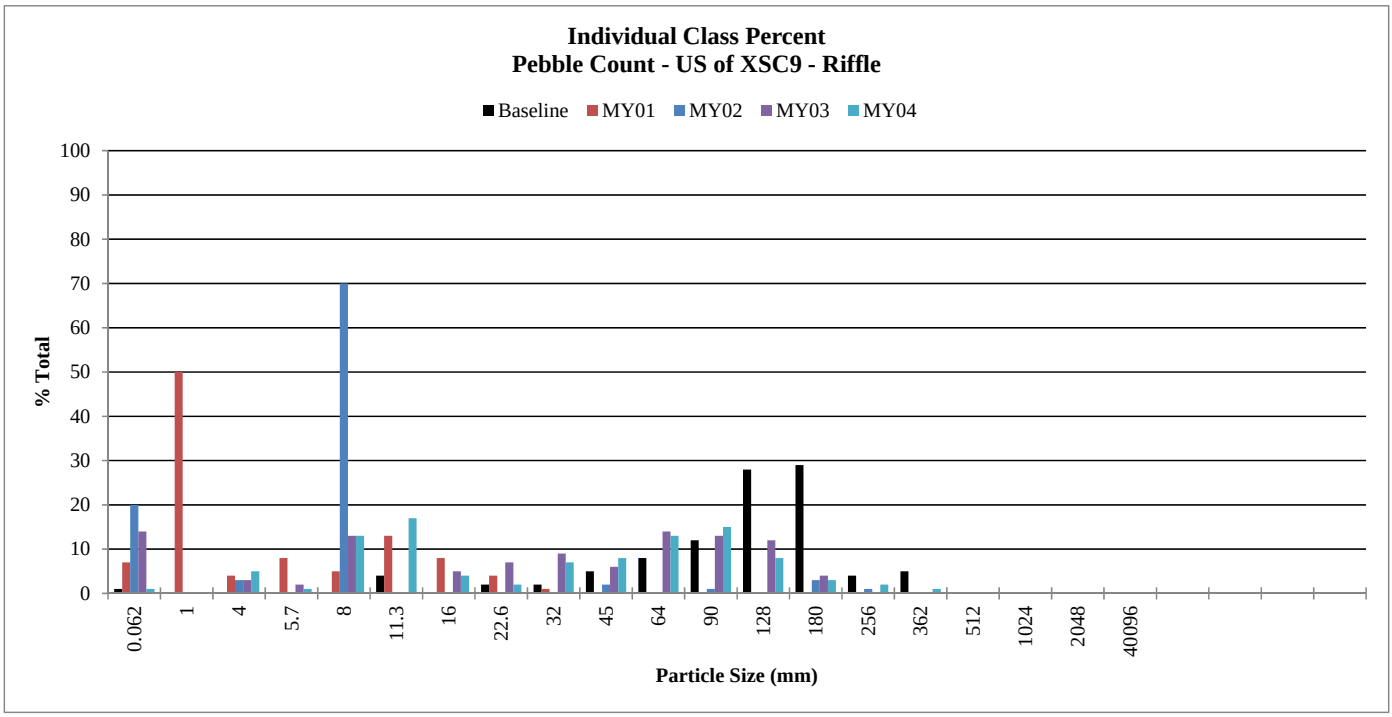


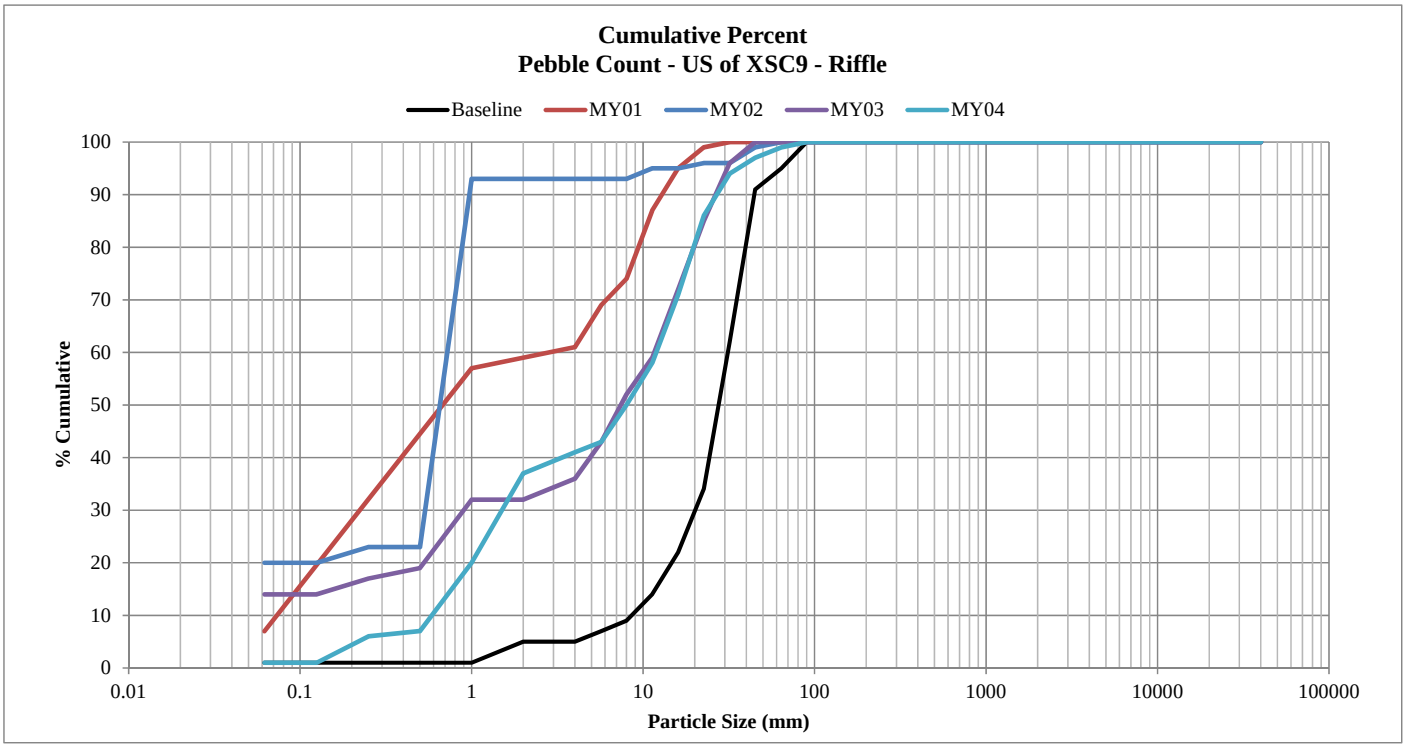
UT to Clarke Creek - US of XS9 - Riffle Pebble Count

Location: STA 2+02

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062	SAND	1	1	1
	Very Fine	0.062-0.125		0	0	1
	Fine	0.125-0.25		5	5	6
	Medium	0.25-0.50		1	1	7
	Coarse	0.50-1.0		13	13	20
0.04-0.08	Very Coarse	1.0-2		17	17	37
0.08-0.16	Very Fine	2-4	GRAVEL	4	4	41
0.16-0.22	Fine	4-5.7		2	2	43
0.22-0.31	Fine	5.7-8		7	7	50
0.31-0.44	Medium	8-11.3		8	8	58
0.44-0.63	Medium	11.3-16		13	13	71
0.63-0.89	Coarse	16-22.6		15	15	86
0.89-1.26	Coarse	22.6-32		8	8	94
1.26-1.77	Very Coarse	32-45		3	3	97
1.77-2.5	Very Coarse	45-64		2	2	99
2.5-3.5	Small	64-90	COBBLE	1	1	100
3.5-5.0	Small	90-128		0	0	100
5.0-7.1	Medium	128-180		0	0	100
7.1-10.1	Large	180-256		0	0	100
10.1-14.3	Small	256-362	BOULDER	0	0	100
14.3-20	Small	362-512		0	0	100
20-40	Medium	512-1024		0	0	100
40-80	Large	1024-2048		0	0	100
	Bedrock	Bedrock	Bedrock	0	0	100
			Total Counted	100		

Summary Data	
D50	7.5
D84	22
D95	31


Individual Class Percent
Pebble Count - US of XSC9 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Total
Particle Size (mm)
0.062
1
4
5.7
8
11.3
16
22.6
32
45
64
90
128
180
256
362
512
1024
2048
40096

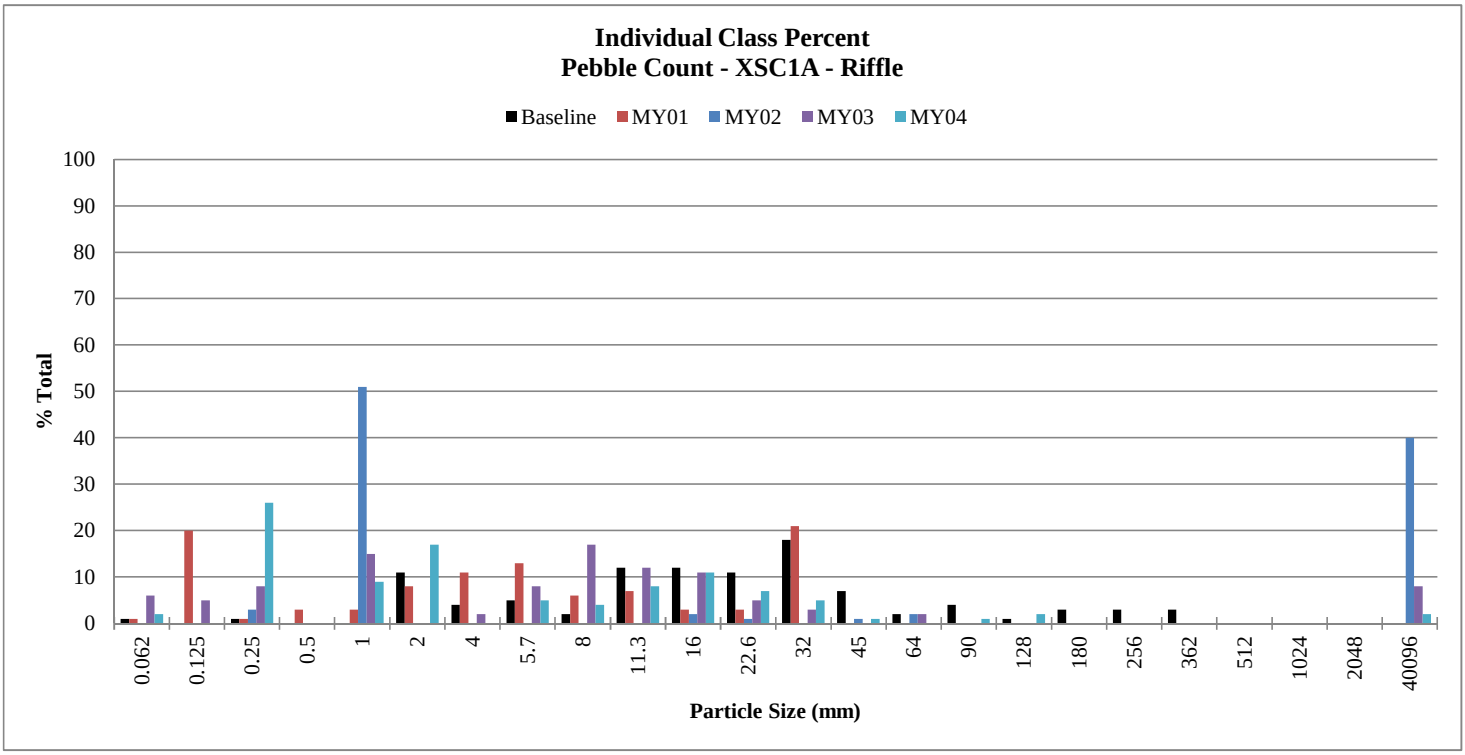

Cumulative Percent
Pebble Count - US of XSC9 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Cumulative
Particle Size (mm)
0.01
0.1
1
10
100
1000
10000
100000

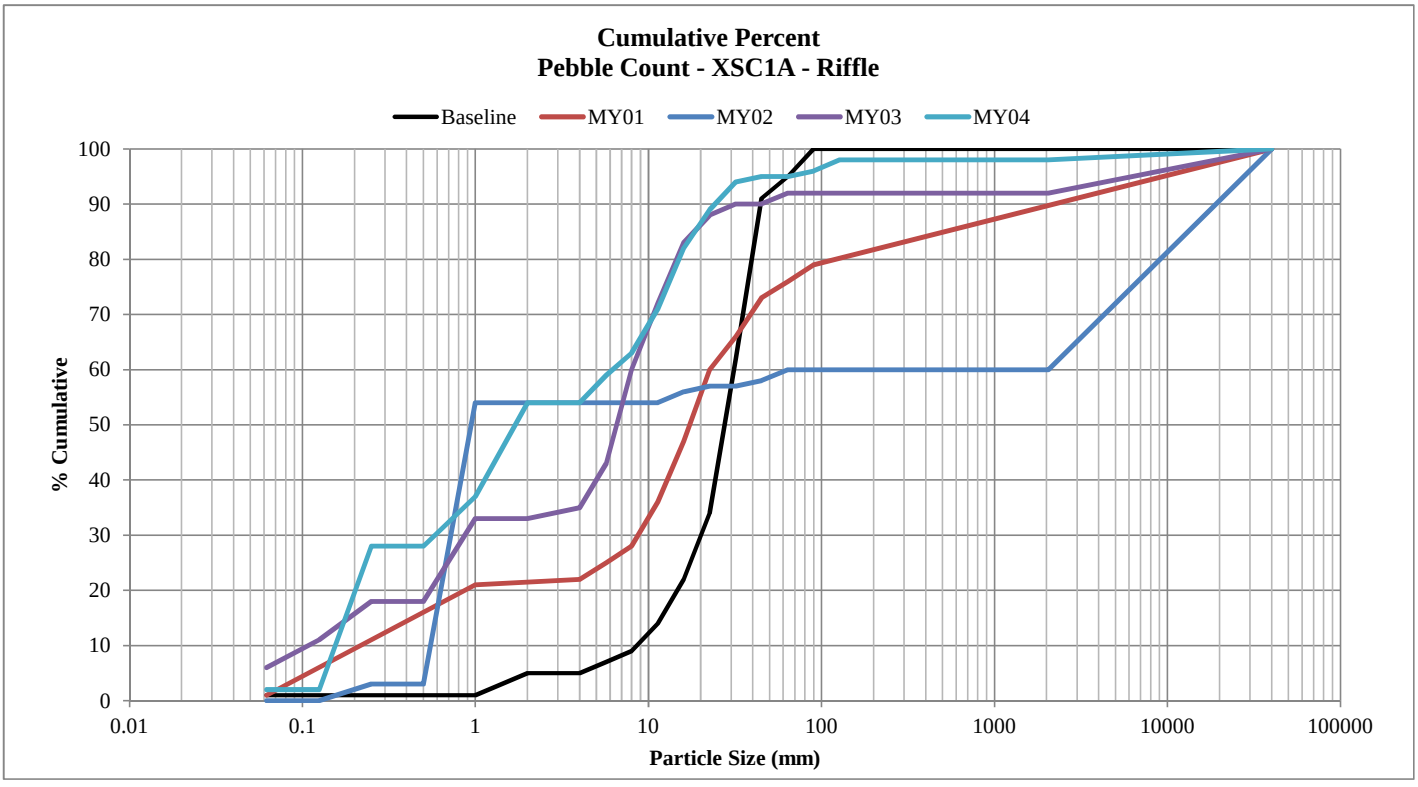
UT to Clarke Creek - XS1A - Riffle Pebble Count

Location: STA 5+58

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062	SAND	2	2	2
	Very Fine	0.062-0.125			0	2
	Fine	0.125-0.25		26	26	28
	Medium	0.25-0.50			0	28
	Coarse	0.50-1.0		9	9	37
0.04-0.08	Very Coarse	1.0-2		17	17	54
0.08-0.16	Very Fine	2-4	GRAVEL		0	54
0.16-0.22	Fine	4-5.7		5	5	59
0.22-0.31	Fine	5.7-8		4	4	63
0.31-0.44	Medium	8-11.3		8	8	71
0.44-0.63	Medium	11.3-16		11	11	82
0.63-0.89	Coarse	16-22.6		7	7	89
0.89-1.26	Coarse	22.6-32		5	5	94
1.26-1.77	Very Coarse	32-45		1	1	95
1.77-2.5	Very Coarse	45-64			0	95
2.5-3.5	Small	64-90	COBBLE	1	1	96
3.5-5.0	Small	90-128		2	2	98
5.0-7.1	Medium	128-180		0	0	98
7.1-10.1	Large	180-256		0	0	98
10.1-14.3	Small	256-362	BOULDER	0	0	98
14.3-20	Small	362-512		0	0	98
20-40	Medium	512-1024		0	0	98
40-80	Large	1024-2048		0	0	98
	Bedrock	Bedrock	Bedrock	2	2	100
			Total Counted	100		

Summary Data	
D50	6.75
D84	18
D95	3,000


Individual Class Percent
Pebble Count - XSC1A - Riffle
Baseline
MY01
MY02
MY03
MY04
% Total
100
90
80
70
60
50
40
30
20
10
0
0.062
0.125
0.25
0.5
1
2
4
5.7
8
11.3
16
22.6
32
45
64
90
128
180
256
362
512
1024
2048
40096
Particle Size (mm)

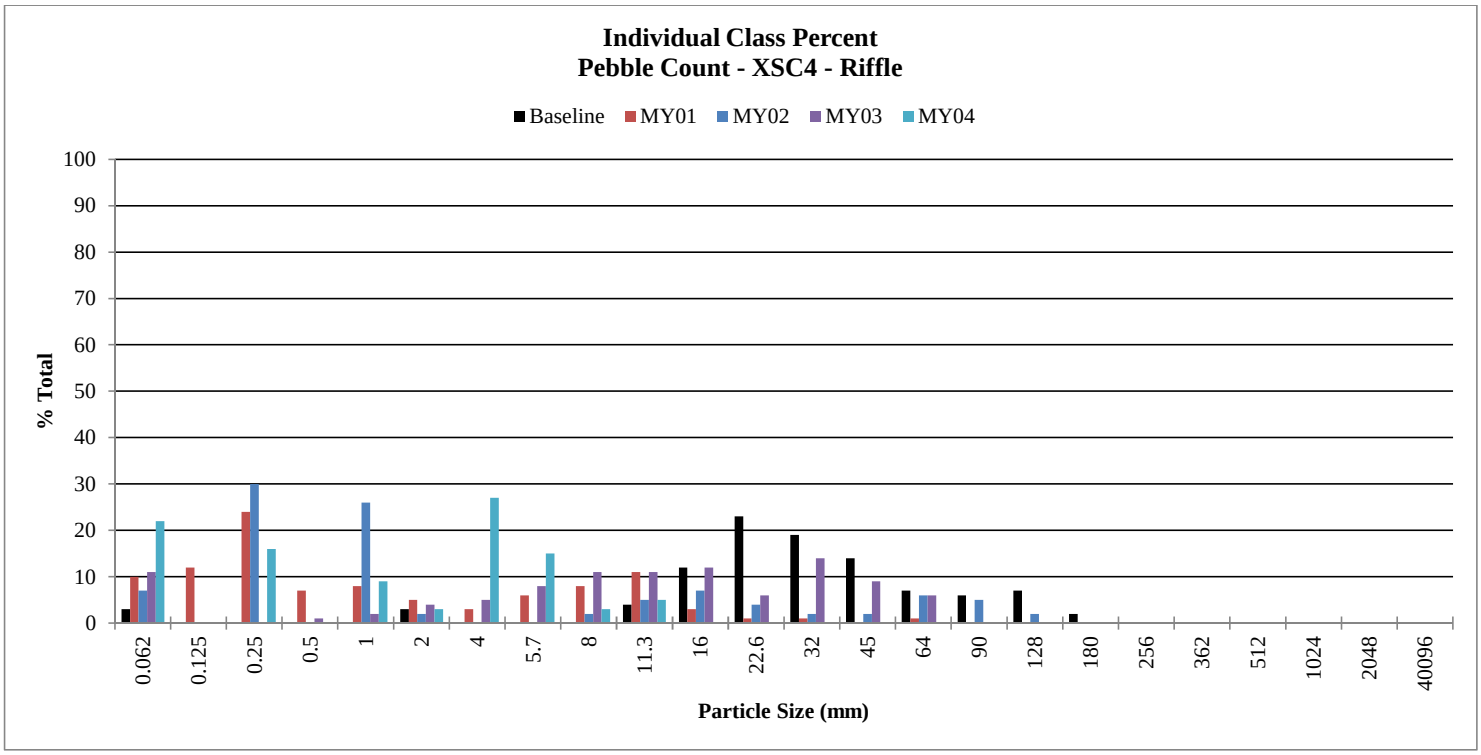

Cumulative Percent
Pebble Count - XSC1A - Riffle
Baseline
MY01
MY02
MY03
MY04
% Cumulative
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
100000
Particle Size (mm)

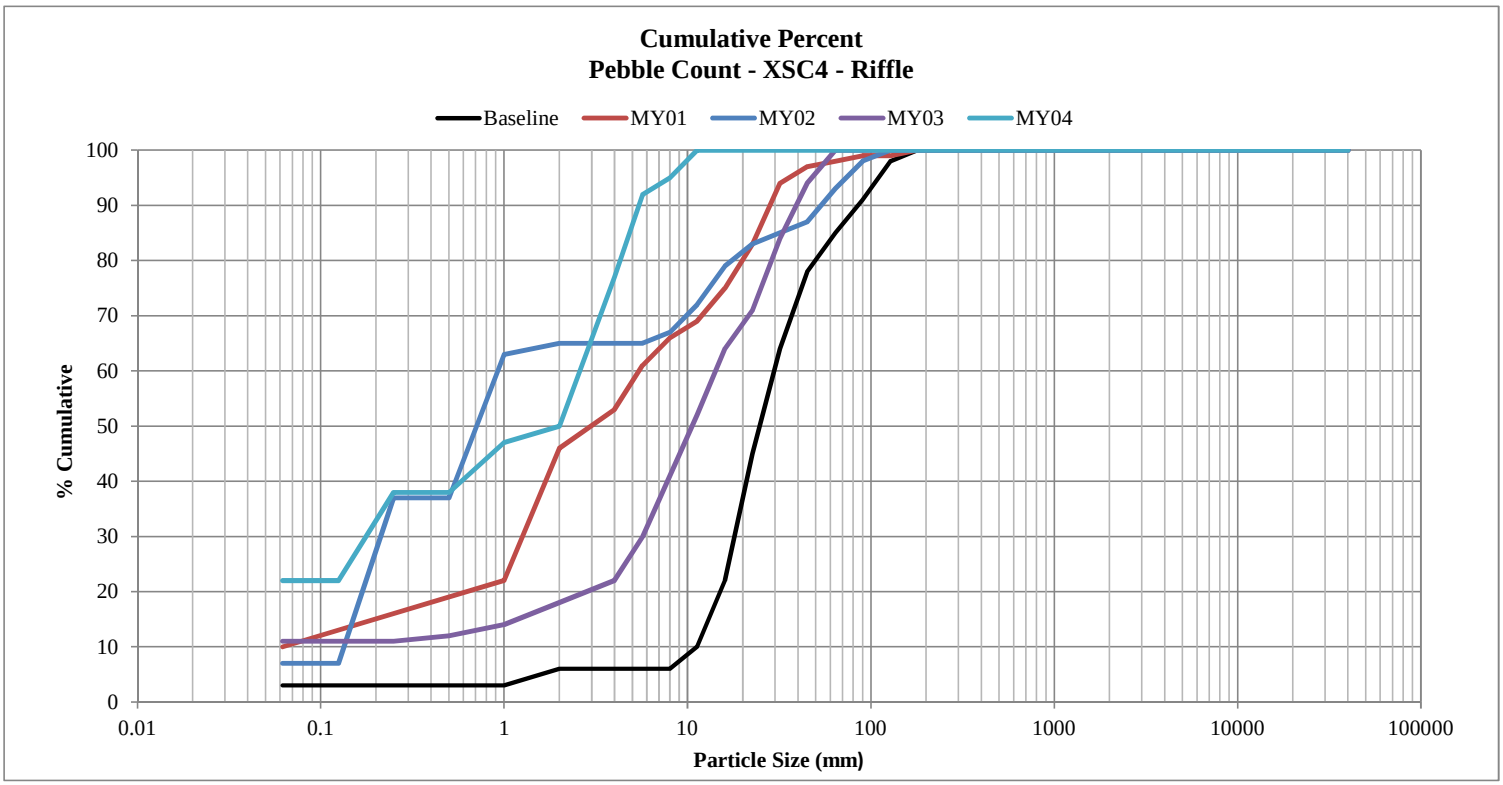
UT to Clarke Creek - Reach: UT1 - XS4 - Riffle Pebble Count

Location: STA 1+29

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062	SAND	22	22	22
	Very Fine	0.062-0.125		0	0	22
	Fine	0.125-0.25		16	16	38
	Medium	0.25-0.50		0	0	38
	Coarse	0.50-1.0		9	9	47
0.04-0.08	Very Coarse	1.0-2		3	3	50
0.08-0.16	Very Fine	2-4	GRAVEL	27	27	77
0.16-0.22	Fine	4-5.7		15	15	92
0.22-0.31	Fine	5.7-8		3	3	95
0.31-0.44	Medium	8-11.3		5	5	100
0.44-0.63	Medium	11.3-16		0	0	100
0.63-0.89	Coarse	16-22.6		0	0	100
0.89-1.26	Coarse	22.6-32		0	0	100
1.26-1.77	Very Coarse	32-45		0	0	100
1.77-2.5	Very Coarse	45-64		0	0	100
2.5-3.5	Small	64-90	COBBLE	0	0	100
3.5-5.0	Small	90-128		0	0	100
5.0-7.1	Medium	128-180		0	0	100
7.1-10.1	Large	180-256		0	0	100
10.1-14.3	Small	256-362	BOULDER	0	0	100
14.3-20	Small	362-512		0	0	100
20-40	Medium	512-1024		0	0	100
40-80	Large	1024-2048		0	0	100
	Bedrock	Bedrock	Bedrock	0	0	100
			Total Counted	100		

Summary Data	
D50	10.5
D84	32
D95	46


Individual Class Percent
Pebble Count - XSC4 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Total
100
90
80
70
60
50
40
30
20
10
0
0.062
0.125
0.25
0.5
1
2
4
5.7
8
11.3
16
22.6
32
45
64
90
128
180
256
362
512
1024
2048
40096
Particle Size (mm)

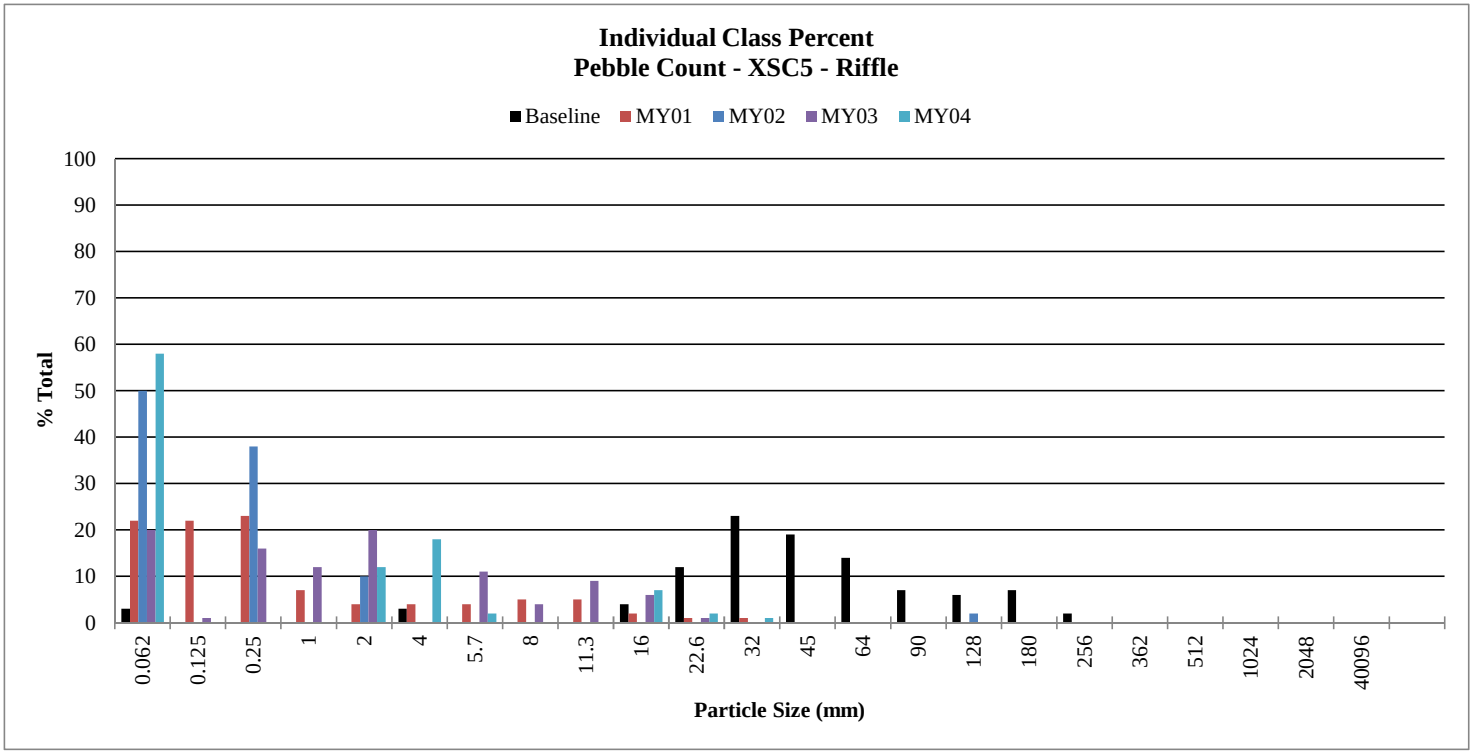

Cumulative Percent
Pebble Count - XSC4 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Cumulative
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
100000
Particle Size (mm)

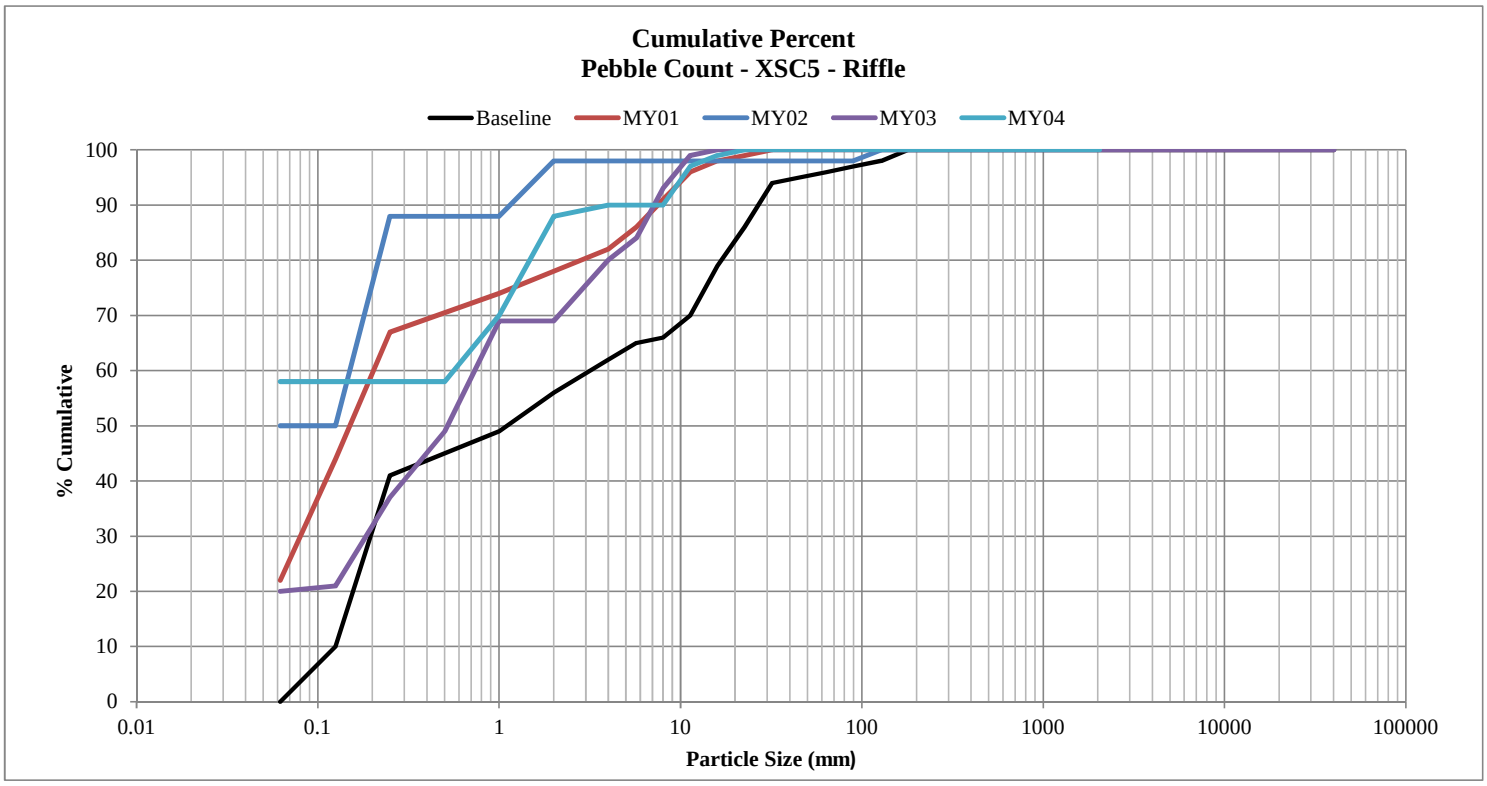
UT to Clarke Creek - Reach: UT1 - XS5 - Riffle Pebble Count

Location: STA 2+69

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062	SAND	58	58	58
	Very Fine	0.062-0.125		0	0	58
	Fine	0.125-0.25		0	0	58
	Medium	0.25-0.50		0	0	58
	Coarse	0.50-1.0		12	12	70
0.04-0.08	Very Coarse	1.0-2		18	18	88
0.08-0.16	Very Fine	2-4	GRAVEL	2	2	90
0.16-0.22	Fine	4-5.7		0	0	90
0.22-0.31	Fine	5.7-8		0	0	90
0.31-0.44	Medium	8-11.3		7	7	97
0.44-0.63	Medium	11.3-16		2	2	99
0.63-0.89	Coarse	16-22.6		1	1	100
0.89-1.26	Coarse	22.6-32		0	0	100
1.26-1.77	Very Coarse	32-45		0	0	100
1.77-2.5	Very Coarse	45-64		0	0	100
2.5-3.5	Small	64-90	COBBLE	0	0	100
3.5-5.0	Small	90-128		0	0	100
5.0-7.1	Medium	128-180		0	0	100
7.1-10.1	Large	180-256		0	0	100
10.1-14.3	Small	256-362	BOULDER	0	0	100
14.3-20	Small	362-512		0	0	100
20-40	Medium	512-1024		0	0	100
40-80	Large	1024-2048		0	0	100
	Bedrock	Bedrock	Bedrock		0	100
			Total Counted	100		

Summary Data	
D50	0.55
D84	5.7
D95	8.5


Individual Class Percent
Pebble Count - XSC5 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Total
100
90
80
70
60
50
40
30
20
10
0
0.062
0.125
0.25
1
2
4
5.7
8
11.3
16
22.6
32
45
64
90
128
180
256
362
512
1024
2048
40096
Particle Size (mm)

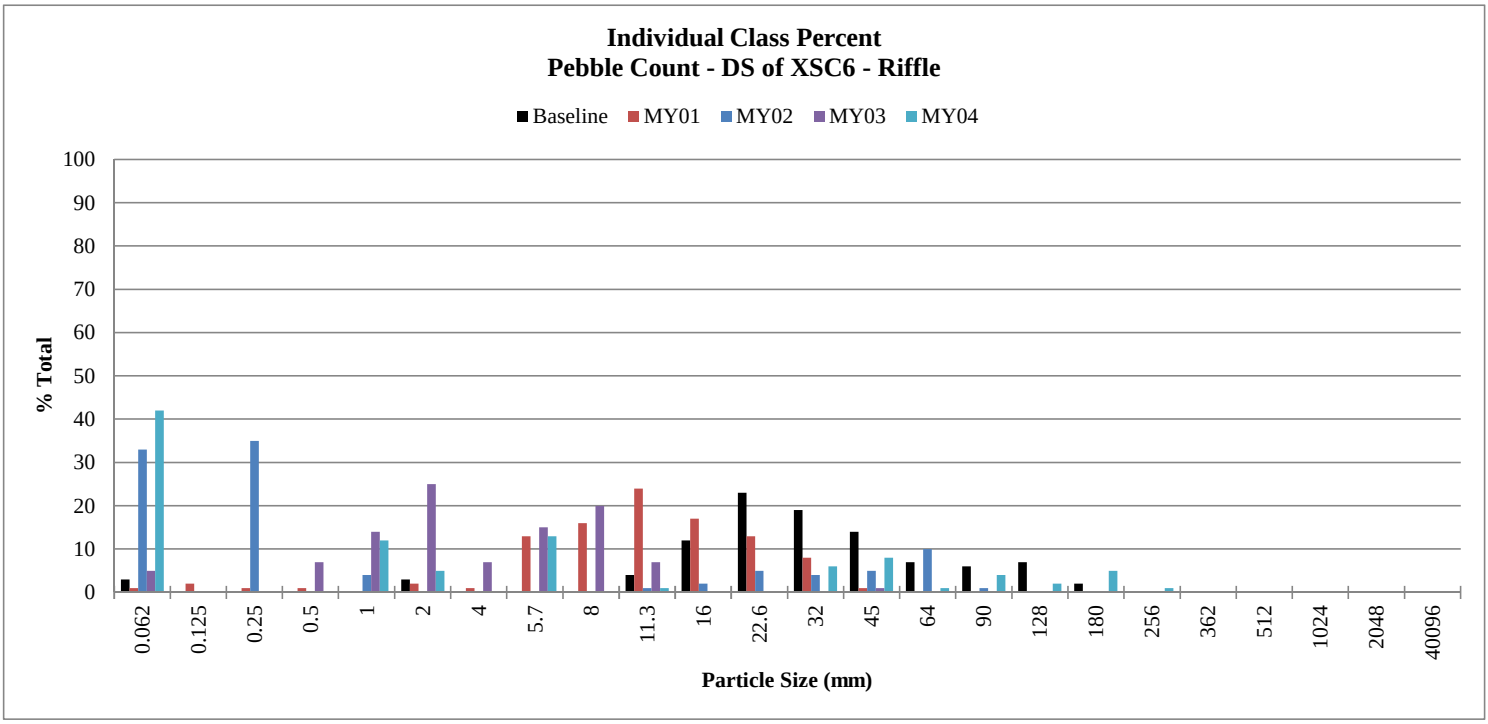

Cumulative Percent
Pebble Count - XSC5 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Cumulative
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
100000
Particle Size (mm)

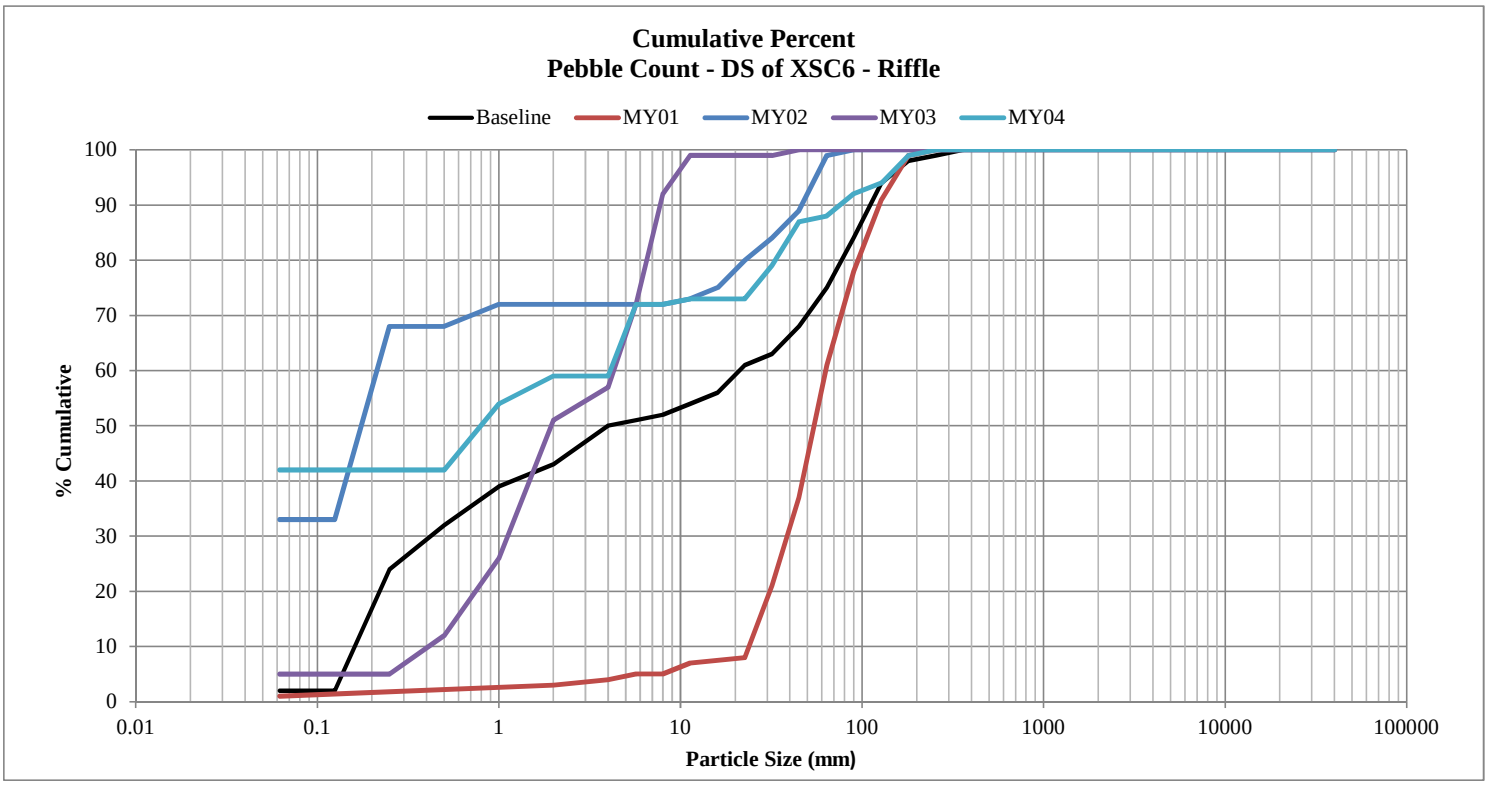
UT to Clarke Creek - Reach: UT1 - DS of XS6 - Riffle Pebble Count

Location: STA 3+34

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062	SAND	42	42	42
	Very Fine	0.062-0.125		0	0	42
	Fine	0.125-0.25		0	0	42
	Medium	0.25-0.50		0	0	42
	Coarse	0.50-1.0		12	12	54
0.04-0.08	Very Coarse	1.0-2		5	5	59
0.08-0.16	Very Fine	2-4	GRAVEL	0	0	59
0.16-0.22	Fine	4-5.7		13	13	72
0.22-0.31	Fine	5.7-8		0	0	72
0.31-0.44	Medium	8-11.3		1	1	73
0.44-0.63	Medium	11.3-16		0	0	73
0.63-0.89	Coarse	16-22.6		0	0	73
0.89-1.26	Coarse	22.6-32		6	6	79
1.26-1.77	Very Coarse	32-45		8	8	87
1.77-2.5	Very Coarse	45-64		1	1	88
2.5-3.5	Small	64-90	COBBLE	4	4	92
3.5-5.0	Small	90-128		2	2	94
5.0-7.1	Medium	128-180		5	5	99
7.1-10.1	Large	180-256		1	1	100
10.1-14.3	Small	256-362	BOULDER	0	0	100
14.3-20	Small	362-512		0	0	100
20-40	Medium	512-1024		0	0	100
40-80	Large	1024-2048		0	0	100
	Bedrock	Bedrock	Bedrock	0	0	100
			Total Counted	100		

Summary Data	
D50	1.9
D84	7
D95	9


Individual Class Percent
Pebble Count - DS of XSC6 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Total
100
90
80
70
60
50
40
30
20
10
0
0.062
0.125
0.25
0.5
1
2
4
5.7
8
11.3
16
22.6
32
45
64
90
128
180
256
362
512
1024
2048
40096
Particle Size (mm)

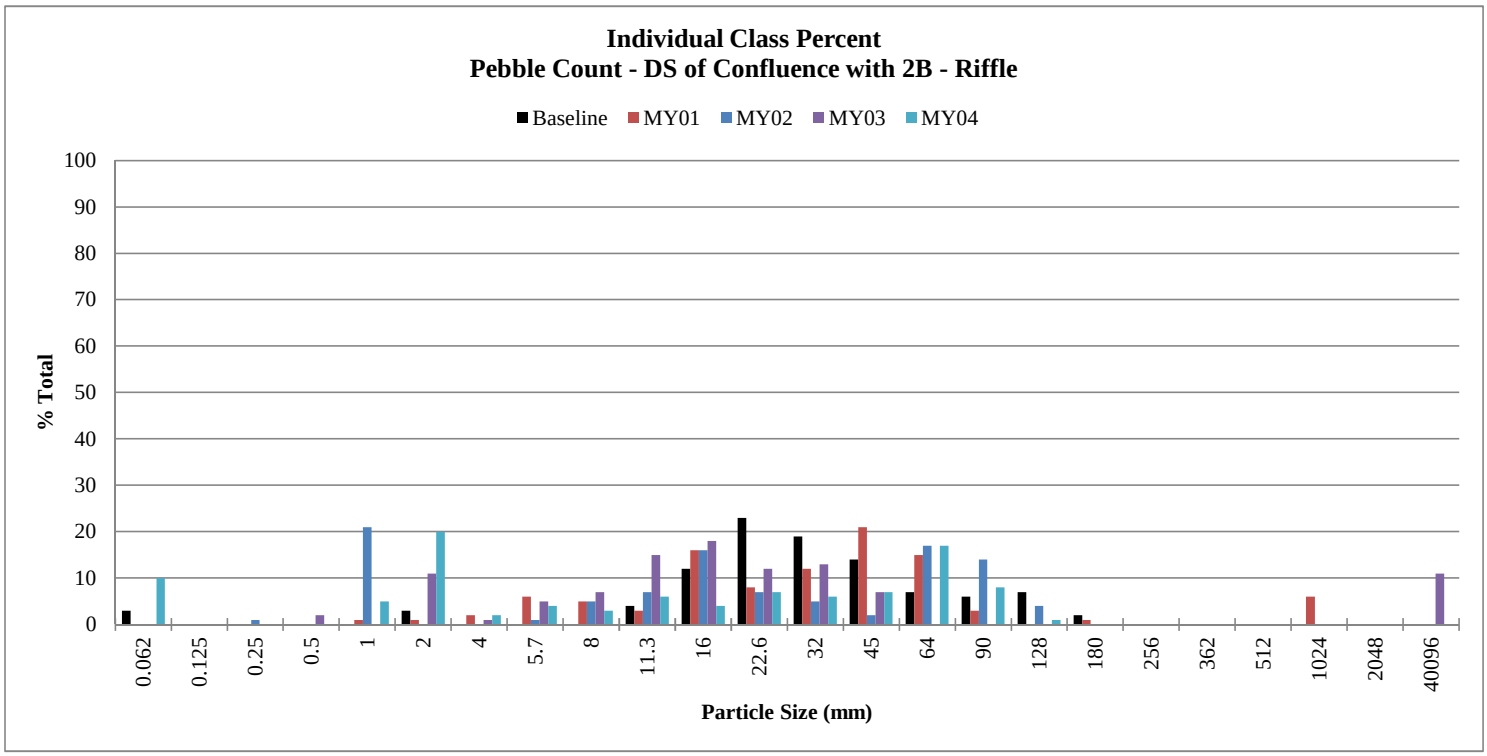

Cumulative Percent
Pebble Count - DS of XSC6 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Cumulative
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
100000
Particle Size (mm)

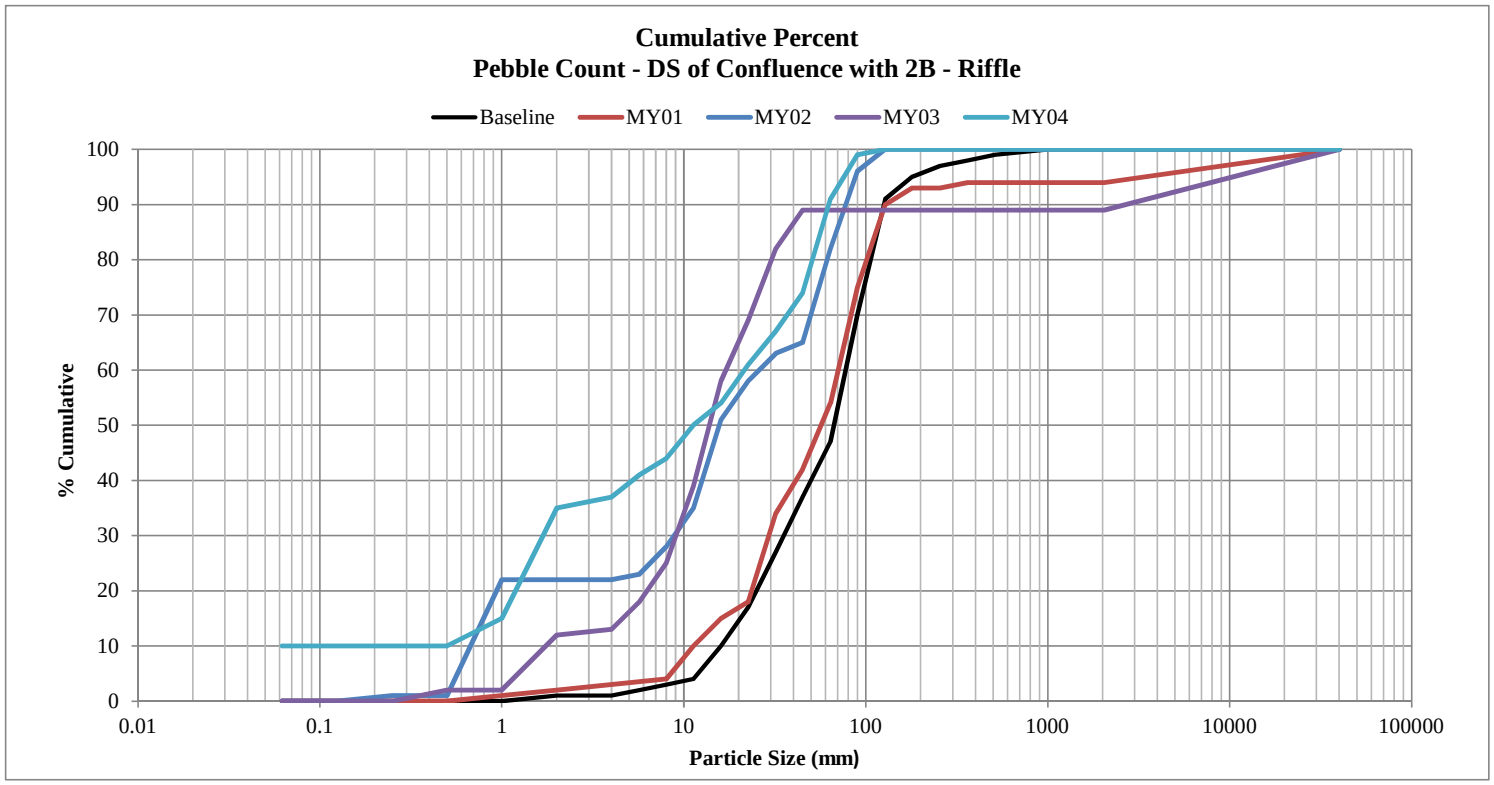
UT to Clarke Creek - DS of Confluence with 2B - Riffle Pebble Count

Location: STA 12+00

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062	SAND	10	10	10
	Very Fine	0.062-0.125			0	10
	Fine	0.125-0.25			0	10
	Medium	0.25-0.50			0	10
	Coarse	0.50-1.0		5	5	15
0.04-0.08	Very Coarse	1.0-2		20	20	35
0.08-0.16	Very Fine	2-4	GRAVEL	2	2	37
0.16-0.22	Fine	4-5.7		4	4	41
0.22-0.31	Fine	5.7-8		3	3	44
0.31-0.44	Medium	8-11.3		6	6	50
0.44-0.63	Medium	11.3-16		4	4	54
0.63-0.89	Coarse	16-22.6		7	7	61
0.89-1.26	Coarse	22.6-32		6	6	67
1.26-1.77	Very Coarse	32-45		7	7	74
1.77-2.5	Very Coarse	45-64		17	17	91
2.5-3.5	Small	64-90	COBBLE	8	8	99
3.5-5.0	Small	90-128		1	1	100
5.0-7.1	Medium	128-180		0	0	100
7.1-10.1	Large	180-256		0	0	100
10.1-14.3	Small	256-362	BOULDER	0	0	100
14.3-20	Small	362-512		0	0	100
20-40	Medium	512-1024		0	0	100
40-80	Large	1024-2048		0	0	100
	Bedrock	Bedrock	Bedrock		0	100
			Total Counted	100		

Summary Data	
D50	15
D84	35
D95	10000


Individual Class Percent
Pebble Count - DS of Confluence with 2B - Riffle
Baseline
MY01
MY02
MY03
MY04
% Total
100
90
80
70
60
50
40
30
20
10
0
0.062
0.125
0.25
0.5
1
2
4
5.7
8
11.3
16
22.6
32
45
64
90
128
180
256
362
512
1024
2048
40096
Particle Size (mm)

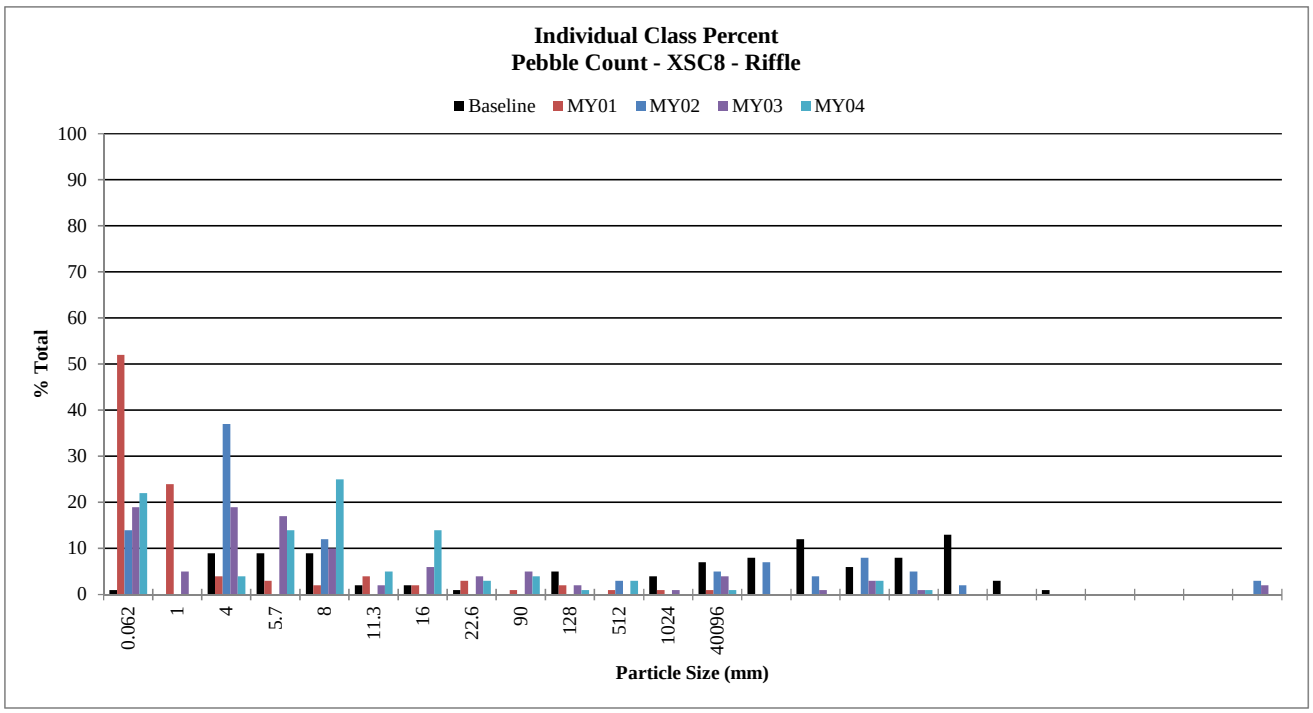

Cumulative Percent
Pebble Count - DS of Confluence with 2B - Riffle
Baseline
MY01
MY02
MY03
MY04
% Cumulative
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
100000
Particle Size (mm)

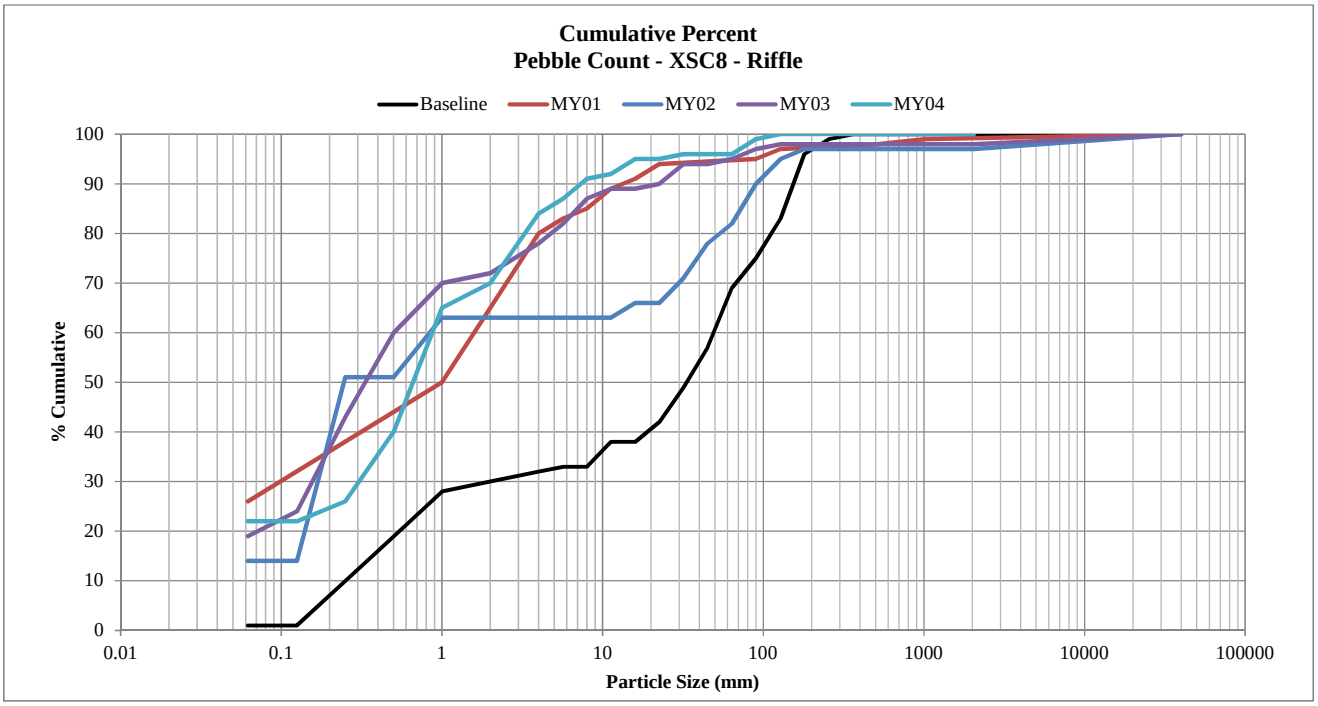
UT to Clarke Creek - Reach: UT1 - XS8 - Riffle Pebble Count

Location: STA 4+14

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062	SAND	22	22	22
	Very Fine	0.062-0.125		0	0	22
	Fine	0.125-0.25		4	4	26
	Medium	0.25-0.50		14	14	40
	Coarse	0.50-1.0		25	25	65
0.04-0.08	Very Coarse	1.0-2		5	5	70
0.08-0.16	Very Fine	2-4	GRAVEL	14	14	84
0.16-0.22	Fine	4-5.7		3	3	87
0.22-0.31	Fine	5.7-8		4	4	91
0.31-0.44	Medium	8-11.3		1	1	92
0.44-0.63	Medium	11.3-16		3	3	95
0.63-0.89	Coarse	16-22.6		0	0	95
0.89-1.26	Coarse	22.6-32		1	1	96
1.26-1.77	Very Coarse	32-45		0	0	96
1.77-2.5	Very Coarse	45-64		0	0	96
2.5-3.5	Small	64-90	COBBLE	3	3	99
3.5-5.0	Small	90-128		1	1	100
5.0-7.1	Medium	128-180		0	0	100
7.1-10.1	Large	180-256		0	0	100
10.1-14.3	Small	256-362	BOULDER	0	0	100
14.3-20	Small	362-512		0	0	100
20-40	Medium	512-1024		0	0	100
40-80	Large	1024-2048		0	0	100
	Bedrock	Bedrock	Bedrock	0	0	100
			Total Counted	100		

Summary Data	
D50	0.2
D84	7
D95	30


Individual Class Percent
Pebble Count - XSC8 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Total
100
90
80
70
60
50
40
30
20
10
0
0.062
1
4
5.7
8
11.3
16
22.6
90
128
512
1024
40096
Particle Size (mm)

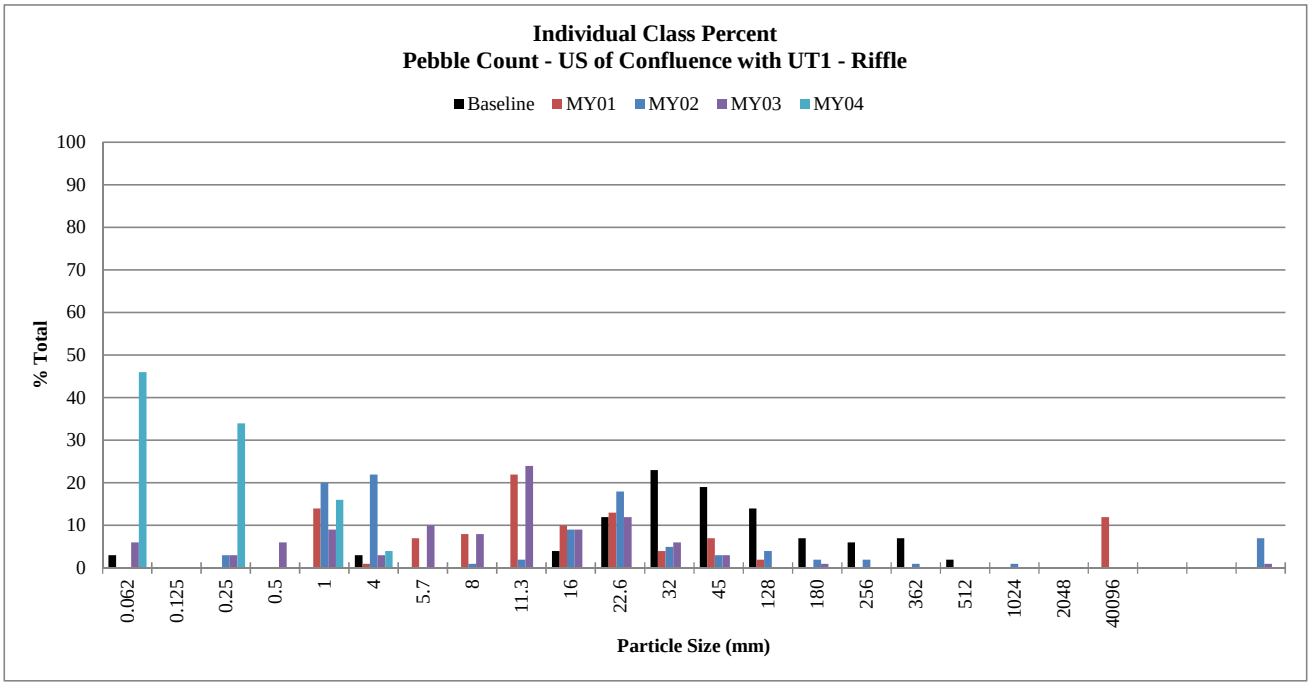

Cumulative Percent
Pebble Count - XSC8 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Cumulative
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
100000
Particle Size (mm)

UT to Clarke Creek - US of Confluence with UT1 - Riffle Pebble Count

Location: STA 7+50

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062	SAND	46	46	46
	Very Fine	0.062-0.125		0	0	46
	Fine	0.125-0.25		34	34	80
	Medium	0.25-0.50		0	0	80
	Coarse	0.50-1.0		16	16	96
0.04-0.08	Very Coarse	1.0-2		4	4	100
0.08-0.16	Very Fine	2-4	GRAVEL	0	0	100
0.16-0.22	Fine	4-5.7		0	0	100
0.22-0.31	Fine	5.7-8		0	0	100
0.31-0.44	Medium	8-11.3		0	0	100
0.44-0.63	Medium	11.3-16		0	0	100
0.63-0.89	Coarse	16-22.6		0	0	100
0.89-1.26	Coarse	22.6-32		0	0	100
1.26-1.77	Very Coarse	32-45		0	0	100
1.77-2.5	Very Coarse	45-64		0	0	100
2.5-3.5	Small	64-90	COBBLE	0	0	100
3.5-5.0	Small	90-128		0	0	100
5.0-7.1	Medium	128-180		0	0	100
7.1-10.1	Large	180-256		0	0	100
10.1-14.3	Small	256-362	BOULDER	0	0	100
14.3-20	Small	362-512		0	0	100
20-40	Medium	512-1024		0	0	100
40-80	Large	1024-2048		0	0	100
	Bedrock	Bedrock	Bedrock	0	0	100
			Total Counted	100		

Summary Data	
D50	5
D84	15
D95	22


Individual Class Percent
Pebble Count - US of Confluence with UT1 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Total
100
90
80
70
60
50
40
30
20
10
0
0.062
0.125
0.25
0.5
1
4
5.7
8
11.3
16
22.6
32
45
128
180
256
362
512
1024
2048
40096
Particle Size (mm)

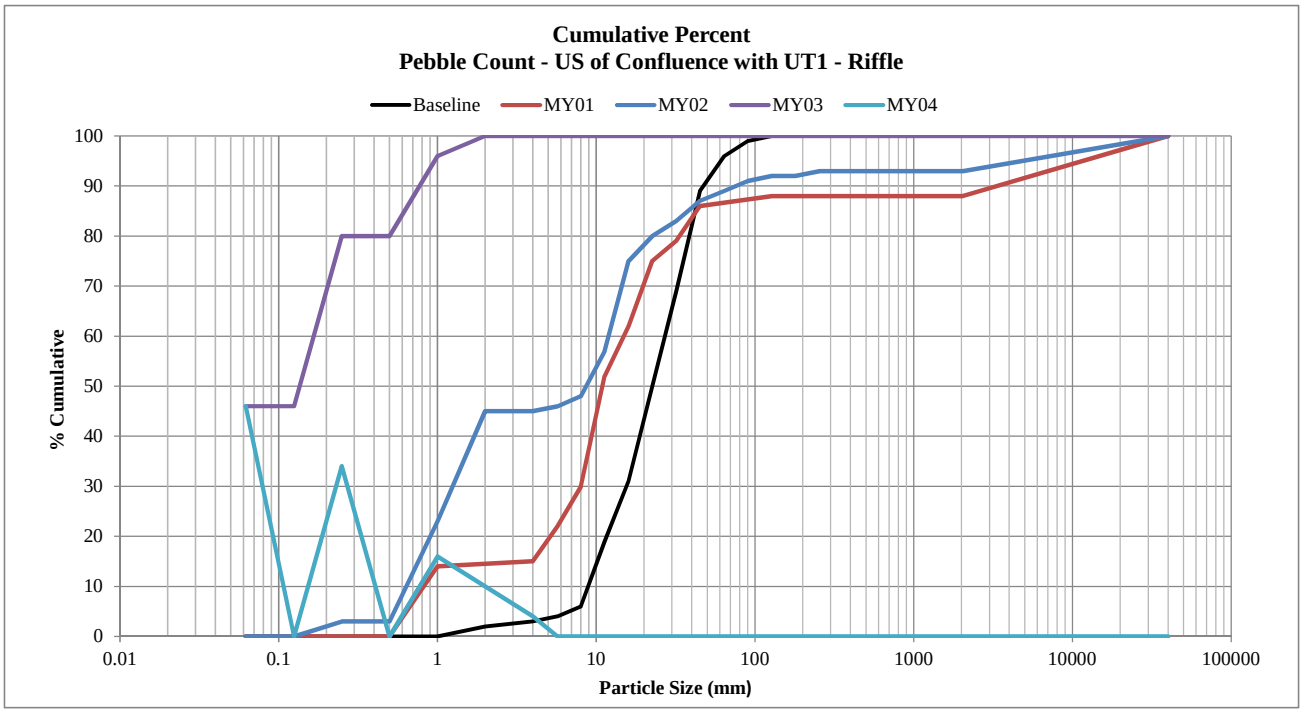

Cumulative Percent
Pebble Count - US of Confluence with UT1 - Riffle
Baseline
MY01
MY02
MY03
MY04
% Cumulative
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
100000
Particle Size (mm)

Table 10a. Baseline Stream Data Summary

UT to Clarke Creek/EEP #92500 - UT Clarke Creek (1507 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)		7	30	3	11.38			12.62			8.26			10.93			10.57		12.2	6.72	7.95	7.17	9.97	-	3
Floodprone Width (ft)					36.14			49.08			11.69			19.17			54.63		63.43	18.7	25.233	22.4	34.6	-	3
Bankfull Mean Depth (ft)		1	2.5	1.17	1.77			1.83			1.02			1.98			1.22		1.46	0.39	0.9	0.76	1.55	-	3
[1]Bankfull Max Depth (ft)											1.57			2.05			1.89		2.21	0.85	1.3133	0.94	2.15	-	3
Bankfull Cross Sectional Area (ft^2)		5	40	8.47	20.88			22.29			8.42			17.17			12.89		17.86	2.8	7.8033	5.11	15.5	-	3
Width/Depth Ratio					6.22			7.13			6.96			8.1			8.36		8.66	6.41	11.203	8.84	18.36	-	3
Entrenchment Ratio					2.86			4.31			1.41			1.86			5.17		5.2	2.61	3.1367	3.33	3.47	-	3
[1]Bank Height Ratio					1.43			1.48			1.86			2.22			1		1	0.82	0.8967	0.87	1	-	3
Profile																									
Riffle Length (ft)																				8.89	19.214	13.85	54.02	13.729	10
Riffle Slope (ft/ft)																				0.008	0.0255	0.0205	0.073	0.0192	10
Pool Length (ft)																				14.37	42.2	34.765	84.52	26.205	10
Pool Max depth (ft)																				0.698	2.0273	2.1405	3.445	0.7927	10
Pool Spacing (ft)																				34.82	82.808	83.19	151.63	36.876	9
Pattern																									
Channel Beltwidth (ft)																				14	14.8	14.5	15.9	-	3
Radius of Curvature (ft)																				10.4	16.167	16.9	21.2	-	3
Rc:Bankfull width (ft/ft)																				1.5	2	2	2.5	-	3
Meander Wavelength (ft)																				67.3	80.1	70	103	-	3
Meander Width Ratio																				1.9	4.6	2.0	9.8	-	3
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					0.74												0.74			-					
Max part size (mm) mobilized at bankfull					1												0.41			-					
Stream Power (transport capacity) W/m^2					-												-			-					
Additional Reach Parameters																									
Rosgen Classification					E4						B4c						E4			E4					
Bankfull Velocity (fps)		-	-	-	5.03												4.4-4.9			-					
Bankfull Discharge (cfs)		25	300	26.78	110.8						28						54.6-63.4								
Valley length (ft)					1612						200									1612					
Channel Thalweg length (ft)					1507						-						-			1507					
Sinuosity (ft)					1.07						-						-			1.07					
Water Surface Slope (Channel) (ft/ft)					0.0075						-						0.0083			0.0089					
BF slope (ft/ft)					0.0083						-						-			0.0092					
[3]Bankfull Floodplain Area (acres)					-						-						-			-					
[4]% of Reach with Eroding Banks					-						-														
Channel Stability or Habitat Metric					-						-														
Biological or Other					-						-														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10b. Baseline Stream Data Summary

UT to Clarke Creek/EEP #92500 - UT 1 (758 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)		6	11	2.07	9.08			11.26			7.09			11.96			10.6		10.77	7.18	8.44	8.60	9.40	0.93	4
Floodprone Width (ft)					19.5			20.02			13.18			39.46			49.4		93.72	11.30	25.48	16.40	57.80	21.83	4
Bankfull Mean Depth (ft)		6	11	0.89	1.51			1.7			0.78			1.33			1.1		1.28	0.37	0.87	0.84	1.43	0.46	4
[1]Bankfull Max Depth (ft)					1.83			2.45			1.11			1.82			1.6		2.14	0.56	1.10	0.96	1.92	0.59	4
Bankfull Cross Sectional Area (ft^2)		6	12	4.73	15.46			17.01			8.69			13.75			11.84		13.54	3.14	7.57	6.84	13.45	4.67	4
Width/Depth Ratio					5.34			7.46			5.81			15.33			8.28		9.79	6.57	12.23	9.83	22.69	7.23	4
Entrenchment Ratio					1.73			2.2			1.85			3.8			4.59		8.84	1.57	2.88	1.90	6.15	2.20	4
[1]Bank Height Ratio					1.34			1.56			1.53			1.6			1		1	0.73	0.93	1.00	1.00	0.14	4
Profile																									
Riffle Length (ft)																				4.82	9.83	8.81	18.46	5.27	5
Riffle Slope (ft/ft)																				0.008	0.023	0.025	0.036	0.011	5
Pool Length (ft)																				22.7	29.14	27.48	39.29	7.208	5
Pool Max depth (ft)																				0.944	1.956	1.857	3.012	0.777	5
Pool Spacing (ft)																				73.48	108.4	116.9	126.4	24.56	4
Pattern																									
Channel Beltwidth (ft)																				13.7	15.7	13.8	19.8	-	3
Radius of Curvature (ft)																				21.9	32.6	34.7	41.1	-	3
Rc:Bankfull width (ft/ft)																				2.5	3.9	3.6	5.6	-	3
Meander Wavelength (ft)																				41.5	64.1	46	105	-	3
Meander Width Ratio																				1.46	1.78	1.59	2.3	-	3
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					0.88												0.59			-					
Max part size (mm) mobilized at bankfull					0.75												4.27			-					
Stream Power (transport capacity) W/m^2					-												-			-					
Additional Reach Parameters																									
Rosgen Classification					B4c						B4c						B4c			B4c					
Bankfull Velocity (fps)		-	-	-	4.11												3.6-4.0			-					
Bankfull Discharge (cfs)		10	200	14.48	64												42.2-53.4								
Valley length (ft)					657						150									657					
Channel Thalweg length (ft)					723						-						-			758					
Sinuosity (ft)					1.1						-						-			1.15					
Water Surface Slope (Channel) (ft/ft)					0.009						-						0.0077			0.0089					
BF slope (ft/ft)					0.009						-						0.009			0.0083					
[3]Bankfull Floodplain Area (acres)					-						-						-			-					
[4]% of Reach with Eroding Banks					-						-														
Channel Stability or Habitat Metric					-						-														
Biological or Other					-						-														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

UT to Clarke Creek/DMS #92500 Segment/Reach: UT to Clarke Creek (1507', XS1, 1A, 2, 9) and UT1 (758', XS 3, 4, 5, 6, 8)

	Cross Section 1 (Riffle)							Cross Section 1A (Pool)							Cross Section 2 (Riffle)							Cross Section 9 (Riffle)													
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	744.2	744.2	744.2	744.2	744.2			742.4	742.4	742.4	742.4	742.4			739.37	739.4	739.4	739.4	739.4			746.7	746.7	746.7	746.7	746.7									
Bankfull Width (ft)	6.7	6.9	7.08	6.89	7.1			9.02	8	7	8.71	8.1			9.97	10.7	9.85	9.77	9.1			7.17	6.35	7.7	6.1	5.9									
Floodprone Width (ft)	22.4	29.5	30.98	21	23.5			25.6	41.79	38	29	31.1			34.6	45	45.14	47.25	46.4			18.7	21.5	12.13	38	24.3									
Bankfull Mean Depth (ft)	0.76	0.67	0.87	0.63	0.7			0.2	0.75	1.1	0.91	0.9			1.55	1.28	1.9	2.06	1.9			0.39	0.39	0.45	0.72	0.5									
Bankfull Max Depth (ft)	0.94	1.17	1.15	1.03	1			1.47	1.91	1.8	1.65	1.7			2.15	2.36	2.27	2.48	2.5			0.85	0.68	0.56	1.24	0.9									
Bankfull Cross Sectional Area (ft^2)	5.11	4.59	6.15	4.35	4.8			1.78	5.96	7.67	7.92	7.5			15.5	13.66	18.7	20.16	16.8			2.8	2.48	3.47	4.41	3.1									
Bankfull Width/Depth Ratio	8.84	10.37	8.15	10.9	10.4			45.71	10.74	6.39	9.58	8.8			6.41	8.38	5.19	4.73	4.9			18.36	16.26	17.09	8.44	11.3									
Bankfull Entrenchment Ratio	3.33	4.28	4.38	3.05	3.3			2.84	5.22	5.43	3.33	3.84			3.47	4.21	4.58	4.84	5.1			2.61	3.39	1.58	6.23	4.1									
Bankfull Bank Height Ratio	1	0.84	0.93	1.09	1			1	1.22	0.94	1.47	1.4			0.82	0.89	1.1	1.09	1.1			0.87	0.97	1.36	1.29	1.5									
Cross Sectional Area between end pins (ft^2)	65.6	60.5	60.6	61.32	65.33			145.9	142.8	132.2	113.9	147.1			187.2	179	178.9	174.7	214.1			52.1	52.4	46.4	71.17	73.1									
d50 (mm)	-	-	-	-	-			17	18	0.9	6.75	6.75			-	-	-	-	-			28	0.6	0.7	7.5	7.5									

	Cross Section 3 (Pool)							Cross Section 4 (Riffle)							Cross Section 5 (Pool)							Cross Section 6 (Riffle)							Cross Section 8 (Riffle)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	741.1	741.1	741.1	741.1	741.1			745.8	745.8	745.8	745.8	745.8			745.9	745.9	745.9	745.9	745.9			744.6	744.6	744.6	744.6	744.6			744.7	744.7	744.7	744.7	744.7		
Bankfull Width (ft)	9.78	10.42	10.81	10.11	9.8			8.4	9.93	8.4	8.41	6.7			8.18	7.88	7.12	7.31	21.5			7.18	5.29	5.42	6	5.6			8.75	8	9.12	5.69	8.2		
Floodprone Width (ft)	57.8	60.8	63	62	58.5			13.3	22.81	28.5	26	8.5			40	40	44	34	45.33			11.3	11.3	12	16	16.4			19.5	16.15	28.94	24	19.4		
Bankfull Mean Depth (ft)	1.66	1.4	1.62	1.93	1.3			0.37	0.4	0.54	0.5	0.2			0.84	0.76	0.68	0.85	0.8			0.64	0.47	0.55	0.71	0.6			1.04	0.8	0.92	1	0.6		
Bankfull Max Depth (ft)	1.92	2.17	2.67	2.55	2.4			0.56	0.64	0.73	0.68	0.3			1.57	1.51	1.65	1.33	2.5			0.82	0.84	0.81	0.96	1			1.09	0.9	1.2	1.19	0.8		
Bankfull Cross Sectional Area (ft^2)	16.24	14.57	17.54	19.48	12.6			3.14	3.95	4.55	4.24	1.3			6.9	5.98	4.86	6.2	17.4			4.59	2.48	2.96	4.23	3.5			9.09	6.4	8.37	5.68	4.8		
Bankfull Width/Depth Ratio	5.89	7.45	6.66	5.25	7.6			22.69	24.96	15.51	16.67	33.7			9.7	10.38	10.43	8.61	26.6			11.23	11.28	9.92	8.51	9.1			8.42	10	9.94	5.7	13.9		
Bankfull Entrenchment Ratio	5.91	5.83	5.83	6.13	6			1.58	2.3	3.39	3.09	1.3			4.89	5.08	6.18	4.65	2.1			1.57	2.14	2.21	2.67	2.9			2.22	2.02	2.02	4.22	2.4		
Bankfull Bank Height Ratio	1	1.11	0.97	1.17	1.1			0.73	0.98	1.16	1.99	2.1			1	1	0.88	1.59	0.5			1	1.09	1.19	1.61	1.5			1	1.12	1.02	1.24	1.2		
Cross Sectional Area between end pins (ft^2)	170.9	174	157.5	140.4	180.4			100.5	115.9	98	112.4	103.9			258.1	258.8	285.7	291.4	274.7			247.5	230.5	271.5	388.2	311			231.5	229.9	226.7	248.5	291.1		
d50 (mm)	-	-	-	-	-			24	2.5	0.7	10.5	10.5			0.5	0.15	0.062	0.55	0.55			4	55	0.2	1.9	1.9			24	0.125	0.25	0.2	0.2		

1 = Widths and depths for monitoring resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
UT to Clarke Creek/DMS #92500 - UT to Clarke Creek (1507 lf)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	6.72	7.953	7.17	9.97	-	3	6.35	7.98	6.9	10.7	-	3	7.08	8.21	7.7	9.85	1.45	3	6.1	7.587	6.89	9.77	1.93	3	5.9	7.4	7.1	9.1	1.6	3						
Floodprone Width (ft)	18.7	25.23	22.4	34.6	-	3	21.5	32	29.5	45	-	3	12.13	29.42	30.98	45.14	16.56	3	21	35.42	38	47.25	13.31	3	23.5	31.4	24.3	46.4	13	3						
Bankfull Mean Depth (ft)	0.39	0.9	0.76	1.55	-	3	0.39	0.78	0.67	1.28	-	3	0.45	1.07	0.87	1.9	0.75	3	0.63	1.137	0.72	2.06	0.80	3	0.5	1	0.7	1.9	0.76	3						
[1]Bankfull Max Depth (ft)	0.85	1.313	0.94	2.15	-	3	0.68	1.40	1.17	2.36	-	3	0.56	1.33	1.15	2.27	0.87	3	1.03	1.583	1.24	2.48	0.78	3	0.9	1.5	1	2.5	0.9	3						
Bankfull Cross Sectional Area (ft^2)	2.8	7.803	5.11	15.5	-	3	2.48	6.91	4.59	13.66	-	3	3.47	9.44	6.15	18.7	8.13	3	4.35	9.64	4.41	20.16	9.11	3	3.1	8.2	4.8	16.8	7.47	3						
Width/Depth Ratio	6.41	11.2	8.84	18.36	-	3	8.38	11.67	10.37	16.26	-	3	5.19	10.14	8.15	17.09	6.2	3	4.73	8.023	8.44	10.9	3.11	3	4.9	8.9	10.4	11.3	3.46	3						
Entrenchment Ratio	2.61	3.137	3.33	3.47	-	3	3.39	3.96	4.21	4.28	-	3	1.58	3.51	4.38	4.58	1.68	3	3.05	4.707	4.84	6.23	1.59	3	3.3	4.2	4.1	5.1	0.9	3						
[1]Bank Height Ratio	0.82	0.897	0.87	1	-	3	0.84	0.90	0.89	0.97	-	3	0.93	1.13	1.1	1.36	0.22	3	1.09	1.157	1.09	1.29	0.12	3	1	1.2	1.1	1.5	0.26	3						
Profile																																				
Riffle Length (ft)	4.82	9.826	8.81	18.46	5.272	5	26.31	57.23	65.37	82.74	24.05	5	14.48	23.41	21.86	37.21	8.65	5	13.39	27.55	23.27	50.39	14.07	5	7.4	15.1	22.9	30.6	11.8	5						
Riffle Slope (ft/ft)	0.008	0.023	0.025	0.036	0.011	5	0.003	0.02	0.01	0.049	0.02	5	0.012	0.04	0.035	0.066	0.02	5	0.003	0.037	0.038	0.087	0.03	5	0.011	0.072	0.076	0.14	0.06	5						
Pool Length (ft)	22.7	29.14	27.48	39.29	7.208	5	15.31	38.0	41.1	55.2	14.79	5	22.87	31.86	34.57	37.04	6.06	5	20.94	33.61	36.44	54.1	11.99	7	9.4	76.5	94.8	180.1	90.9	7						
Pool Max depth (ft)	0.944	1.956	1.857	3.012	0.777	5	2.58	3.1	2.98	3.78	0.49	5	1.72	2.62	2.38	3.81	0.9	5	1.6	2.344	2.25	3.05	0.47	7	0.98	1.55	1.36	2.14	0.44	7						
Pool Spacing (ft)	73.48	108.4	116.9	126.4	24.56	4	94.9	165.4	174.2	218.3	56.67	4	37.47	76.75	83.33	102.9	30.28	4	61.44	107.8	93.69	164.1	36.98	7	40.5	130.1	127.1	303.2	133.5	7						
Pattern																																				
Channel Beltwidth (ft)	14	14.8	14.5	15.9	-	3																														
Radius of Curvature (ft)	10.4	16.17	16.9	21.2	-	3																														
Rc:Bankfull width (ft/ft)	1.5	2	2	2.5	-	3																														
Meander Wavelength (ft)	67.3	80.1	70	103	-	3																														
Meander Width Ratio	1.9	4.6	2.0	9.8	-	3																														

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Additional Reach Parameters																																				
[5]Rosgen Classification	E4						E4						E4						E4						E4											
[5]Channel Thalweg length (ft)	1507						1507						1507						1507						1507											
[5]Sinuosity (ft)	1.07						1.07						1.07						1.07						1.07											
Water Surface Slope (Channel) (ft/ft)	0.0089						0.0091						0.0092						0.009						0.0089											
BF slope (ft/ft)	0.0092						0.009						0.0092						0.0093						0.0088											
[3]Ri% / Ru% / P% / G% / S%	-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-							
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	-						-						-						-						-											
Channel Stability or Habitat Metric	-						-						-						-						-											
Biological or Other	-						-						-						-						-											

Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4 = Of value/needed only if the n exceeds 3
5 = Reflects baseline monitoring values

Exhibit Table 11c. Monitoring Data - Stream Reach Data Summary

UT to Clarke Creek/DMS #92500 - UT1 (758 lf)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	7.18	8.443	8.595	9.4	0.932	4	8	8.965	8.965	9.93	-	2	8.4	8.76	8.76	9.12	-	2	5.69	6.7	6	8.41	1.49	3	5.6	6.8	6.7	8.2	1.31	3						
Floodprone Width (ft)	11.3	25.48	16.4	57.8	21.83	4	16.15	19.48	19.48	22.81	-	2	28.94	50.97	50.97	73	-	2	16	22	24	26	5.29	3	8.5	14.8	16.4	19.4	5.63	3						
Bankfull Mean Depth (ft)	0.37	0.87	0.84	1.43	0.464	4	0.4	0.6	0.6	0.8	-	2	0.54	0.73	0.73	0.92	-	2	0.5	0.737	0.71	1	0.25	3	0.2	0.5	0.6	0.6	0.23	3						
[1]Bankfull Max Depth (ft)	0.56	1.098	0.955	1.92	0.589	4	0.64	0.77	0.77	0.9	-	2	0.73	0.965	0.965	1.2	-	2	0.68	0.943	0.96	1.19	0.26	3	0.3	0.7	0.8	1	0.36	3						
Bankfull Cross Sectional Area (ft^2)	3.14	7.568	6.84	13.45	4.669	4	3.95	5.175	5.175	6.4	-	2	4.55	6.46	6.46	8.37	-	2	4.23	4.717	4.24	5.68	0.83	3	1.3	3.2	3.5	4.8	1.77	3						
Width/Depth Ratio	6.57	12.23	9.825	22.69	7.233	4	10	17.48	17.48	24.96	-	2	9.94	12.73	12.73	15.51	-	2	5.7	10.29	8.51	16.67	5.70	3	9.1	18.9	13.9	33.7	13.04	3						
Entrenchment Ratio	1.57	2.88	1.9	6.15	2.201	4	2.02	2.16	2.16	2.3	-	2	2.02	5.355	5.355	8.69	-	2	2.67	3.327	3.09	4.22	0.80	3	1.3	2.2	2.4	2.9	0.82	3						
[1]Bank Height Ratio	0.73	0.933	1	1	0.135	4	0.98	1.05	1.05	1.12	-	2	1.02	1.09	1.09	1.16	-	2	1.24	1.613	1.61	1.99	0.38	3	1.2	1.6	1.5	2.1	0.46	3						
Profile																																				
Riffle Length (ft)	4.82	9.826	8.81	18.46	5.272	5	16.49	44.86	42	78.79	22.87	5	12.43	33.85	33.74	47.95	14.26	5	18.56	34.4	35.79	46.62	12.67	5	5.6	29.4	46.5	63.6	24.8	5						
Riffle Slope (ft/ft)	0.008	0.023	0.025	0.036	0.011	5	0.004	0.01	0.013	0.02	0.01	5	0.0075	0.016	0.016	0.022	0.005	5	0.012	0.017	0.015	0.024	0.005	5	0.01	0.05	0.08	0.12	0.05	5						
Pool Length (ft)	22.7	29.14	27.48	39.29	7.208	5	14.39	32.24	20.83	59	20.07	5	15.37	48.01	48.01	80.66	46.17	2	22.65	36.02	28.29	57.56	15.77	5	17.5	32.9	7.5	47.9	17.7	5						
Pool Max depth (ft)	0.944	1.956	1.857	3.012	0.777	5	1.01	2.01	2.03	3.57	1.02	5	1.1522	2.047	2.068	2.934	0.648	5	1.29	1.948	1.97	2.54	0.446	5	0.87	1.6	1.6	2.5	0.67	5						
Pool Spacing (ft)	73.48	108.4	116.9	126.4	24.56	4	31.28	107.2	106.5	184.4	62.5	4	43.39	80.66	89.2	99.37	22.12	5	77.75	137.6	132.9	207	53.12	4	32.5	165.9	298	430.3	171	4						
Pattern																																				
Channel Beltwidth (ft)	13.7	15.7	13.8	19.8	-	3																														
Radius of Curvature (ft)	21.9	32.6	34.7	41.1	-	3																														
Rc:Bankfull width (ft/ft)	2.5	3.9	3.6	5.6	-	3																														
Meander Wavelength (ft)	41.5	64.1	46	105	-	3																														
Meander Width Ratio	1.46	1.78	1.59	2.3	-	3																														

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Additional Reach Parameters																																				
[5]Rosgen Classification	B4c						B4c						B4c						B4c						B4c											
[5]Channel Thalweg length (ft)	758						758						758						758						758											
[5]Sinuosity (ft)	1.15						1.15						1.15						1.15						1.3											
Water Surface Slope (Channel) (ft/ft)	0.0089						0.0095						0.0081						0.0086						0.008											
BF slope (ft/ft)	0.0083						0.0082						0.008						0.0093						0.0092											
[3]Ri% / Ru% / P% / G% / S%	-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-							
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	-						-						-																							
Channel Stability or Habitat Metric	-						-						-																							
Biological or Other	-						-						-																							

Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3
5 = Reflects baseline monitoring values

APPENDIX E

Hydrologic Data

Table 12. Verification of Bankfull Events UT to Clarke Creek - DMS Project #92500			
Date of Data Collection	Date of Occurrence	Method	Photo
2/19/2014	2/19/2014	Visual observation of wrack lines	See photo from Baseline Monitoring Report
9/18/2014	Between 2/19/2014 and 9/18/2014	Crest Gauge Reading*: 20" above bankfull (UT1) and 15.5" above bankfull (UT Clarke Creek); Visual observation of wrack lines	See photo from MY01 Annual Monitoring Report
9/18/2014	Between 2/19/2014 and 9/18/2014	Crest Gauge Reading*: 20" above bankfull (UT1) and 15.5" above bankfull (UT Clarke Creek); Visual observation of wrack lines	See photo from MY02 Annual Monitoring Report
4/15/2015	Between 9/18/2014 and 4/15/2015	Crest Gauge Reading: 7" above bankfull (UT1) and 8.5" above bankfull (UT Clarke Creek); Visual observation of bankfull event and wracklines	See photo from MY02 Annual Monitoring Report
10/22/2015	Between 4/15/2015 and 10/22/2015	Crest Gauge Reading*: 20" above bankfull (UT1) and 19" above bankfull (UT Clarke Creek); Visual observation of wrack lines	See photo from MY02 Annual Monitoring Report
5/18/2016	Between 10/22/2015 and 5/18/2016	Crest Gauge Reading* 12.5" above bankfull (UT1) and 24" above bankfull (UT Clarke Creek); visual observation of wrack lines	See photo from MY03 Annual Monitoring Report
10/21/2016	Between 5/18/2016 and 10/21/2016	Crest Gauge Reading* 13" above bankfull (UT1) and 11" above bankfull (UT Clarke Creek)	See photo from MY03 Annual Monitoring Report
3/9/2017	Between 10/21/16 and 3/9/17	Crest Gauge Reading*: 20" above bankfull (UT Clarke Creek) and 26.5" above bankfull (UT1); visual observation of wrack lines	See photo from MY04 Annual Site Assessment
10/19/2017	Between 3/9/17 and 10/19/17	Crest Gauge Reading*: 45" above bankfull (UT Clarke Creek) and 37.5" above bankfull (UT1); visual observation of wrack lines	See photos below

Photo 1: 10/18/17 - Wracklines on UT to Clarke Creek.

Photo 2: 10/19/17 - Wracklines on UT1.

Photo 3: 10/18/17 - Crest Gauge reading on on UT to Clarke Creek.

Photo 4: 10/19/17 - Crest Gauge reading on on UT1.

Figure 4 - Monthly Rainfall Data
UT Clarke Creek / DMS Project #92500

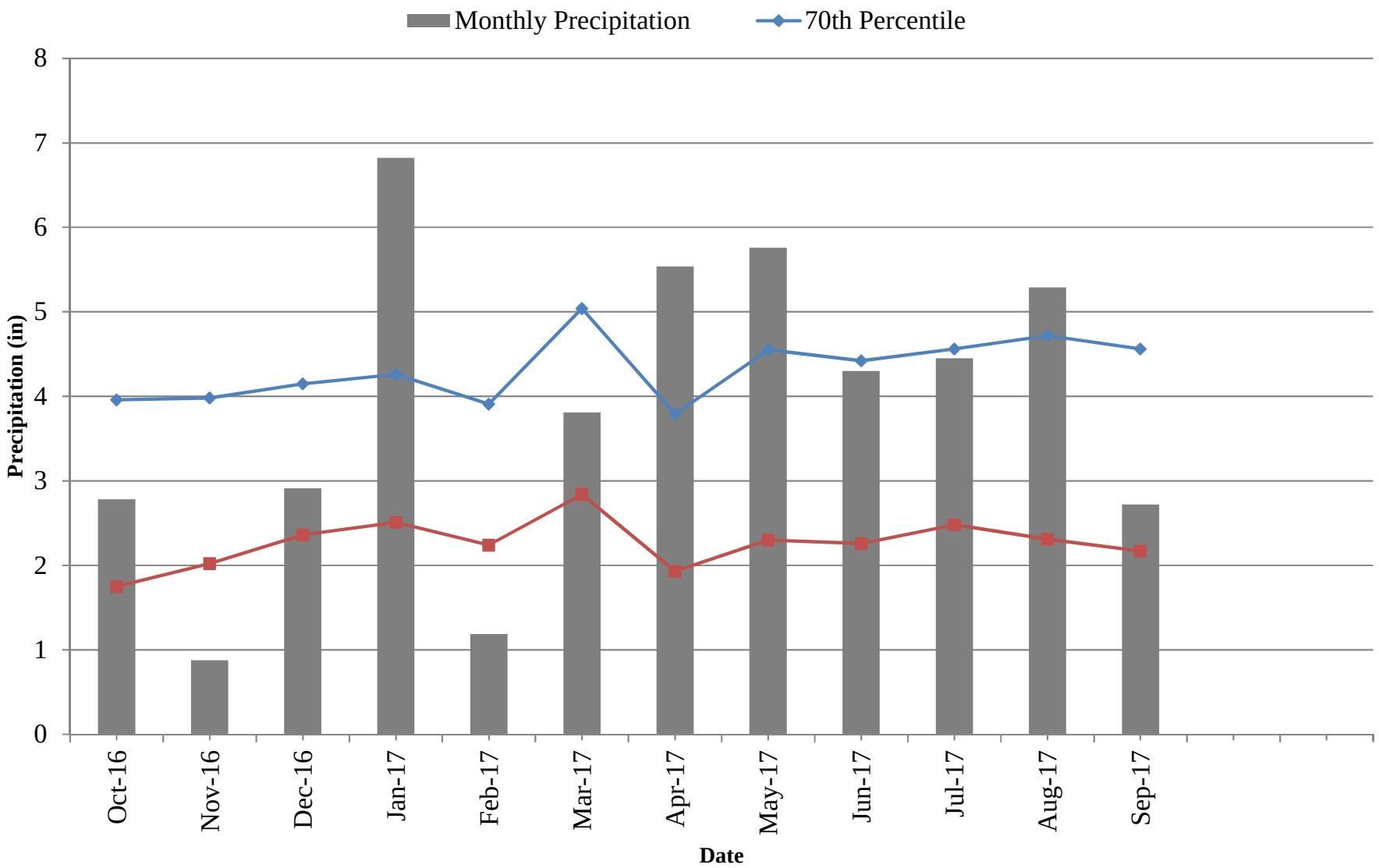


Table 13. Wetland Gauge Attainment Data					
Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)				
	Year 1 (2014)	Year 2 (2015)	Year 3 (2016)	Year 4 (2017)	Year 5 (2018)
1	Yes/236 days (99%)	Yes/177 days (74%)	Yes/213 days (92%)	Yes/211 days (91%)	
2[upland]	No/23 days (10%)	No/25 days (10%)	No/4 days (2%)	No/7 days (3%)	
3	Yes/45 days (19%)	No/24 days (10%)	No/4 days (2%)	No/22 days (9%)	
4[upland]	No/12 days (5%)	No/11 days (5%)	No/1 day (0%)	No/5 days (2%)	
5	Yes/47 days (20%)	No Data[b]	No/6 days (3%)	No/25 days (11%)	
6	Yes/45 days (19%)	No Data[b]	No/6 days (3%)	No/10 days (4%)	
7[upland]	Yes/64 days (27%)	Yes/63 days (26%)	No/9 days (4%)	No/6 days (3%)	
8	No/0 days (0%)	No Data[b]	No/6 days (3%)	No/2 days (1%)[c]	
9[a]	No Data	No/7 days (10% of days with data)	No/19 days (8%)	Yes/56 days (24%)	
10[a]	No Data	No/6 days (8% of days with data)	No/9 days (4%)	No/20 days (9%)	
11[a]	No Data	No/1 day (1% of days with data)	No/15 days (6%)	No/3 days (1%)[d]	

[a]Well installed after start of 2015 growing season; therefore, gauge data not available

[b]Well malfunction - no data during growing season

[c]Well malfunction - only 32 readings over 210 days data collected during growing season

[d]Well malfunction - only 50 readings over 210 days data collected during growing season

Figure 5
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 1 - 2017
WM000013D4BB8F

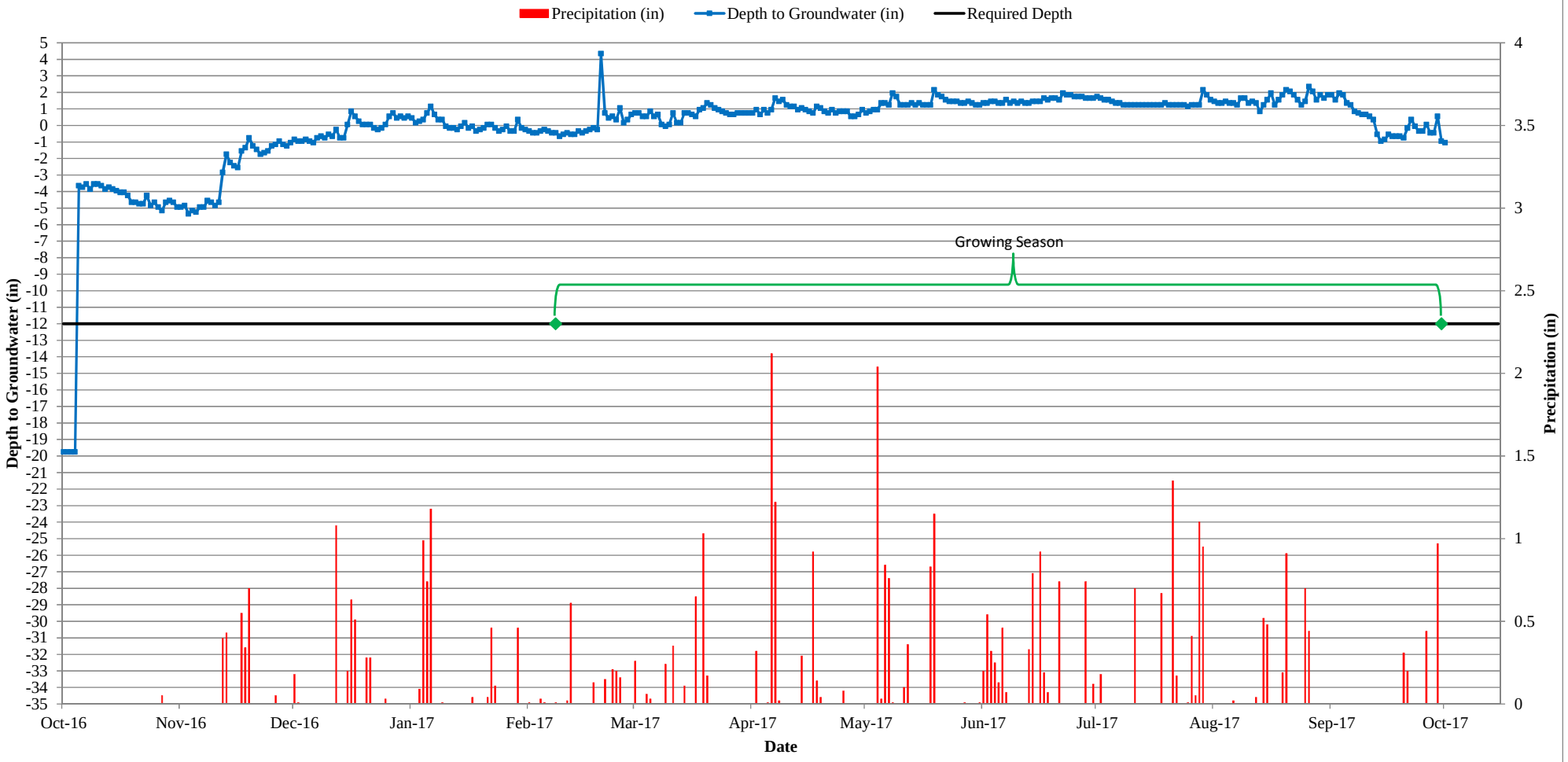


Figure 6
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 2 (upland) - 2017
WM00001130F789

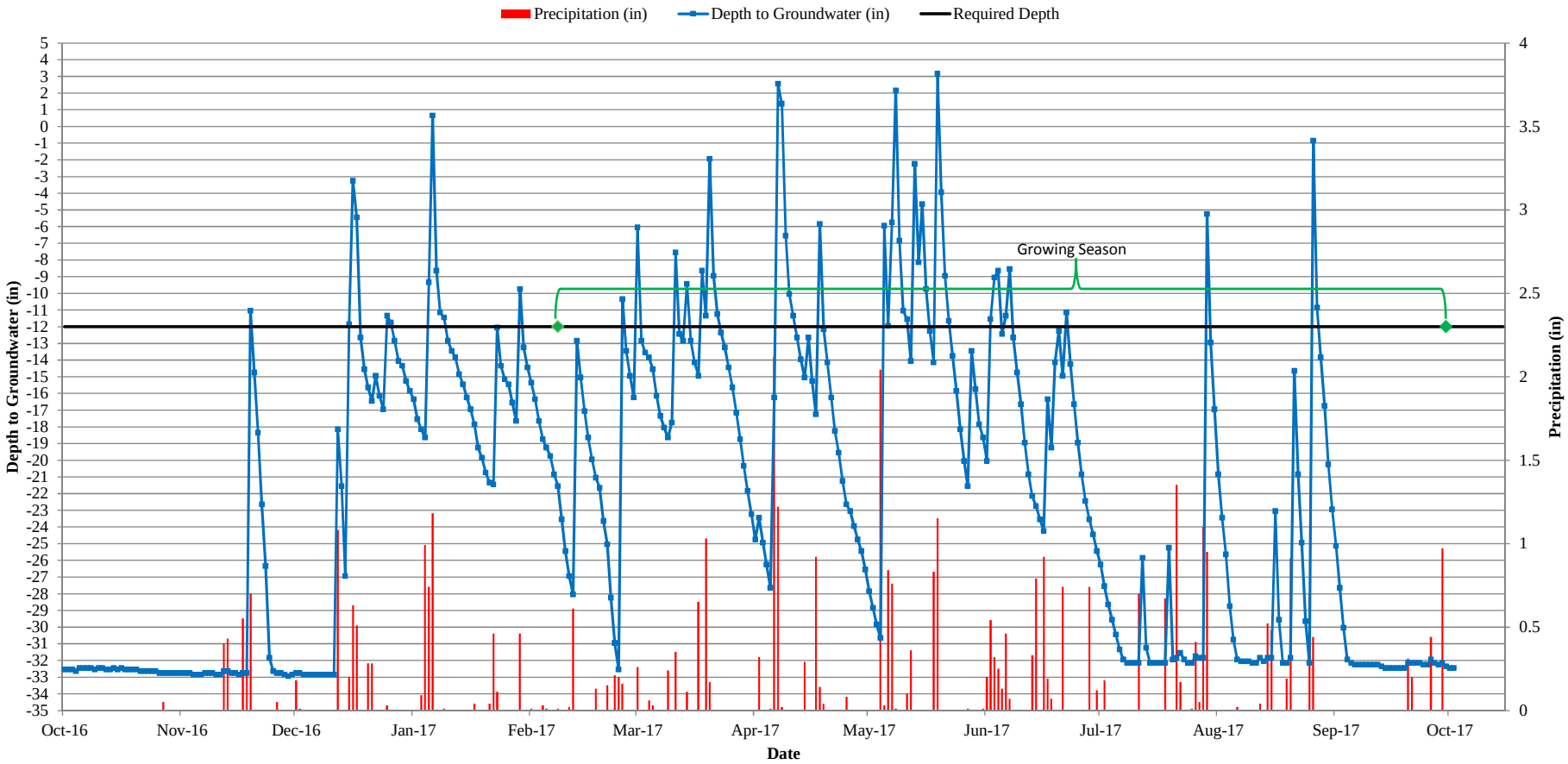


Figure 7
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 3 - 2017
WM0000B651C42

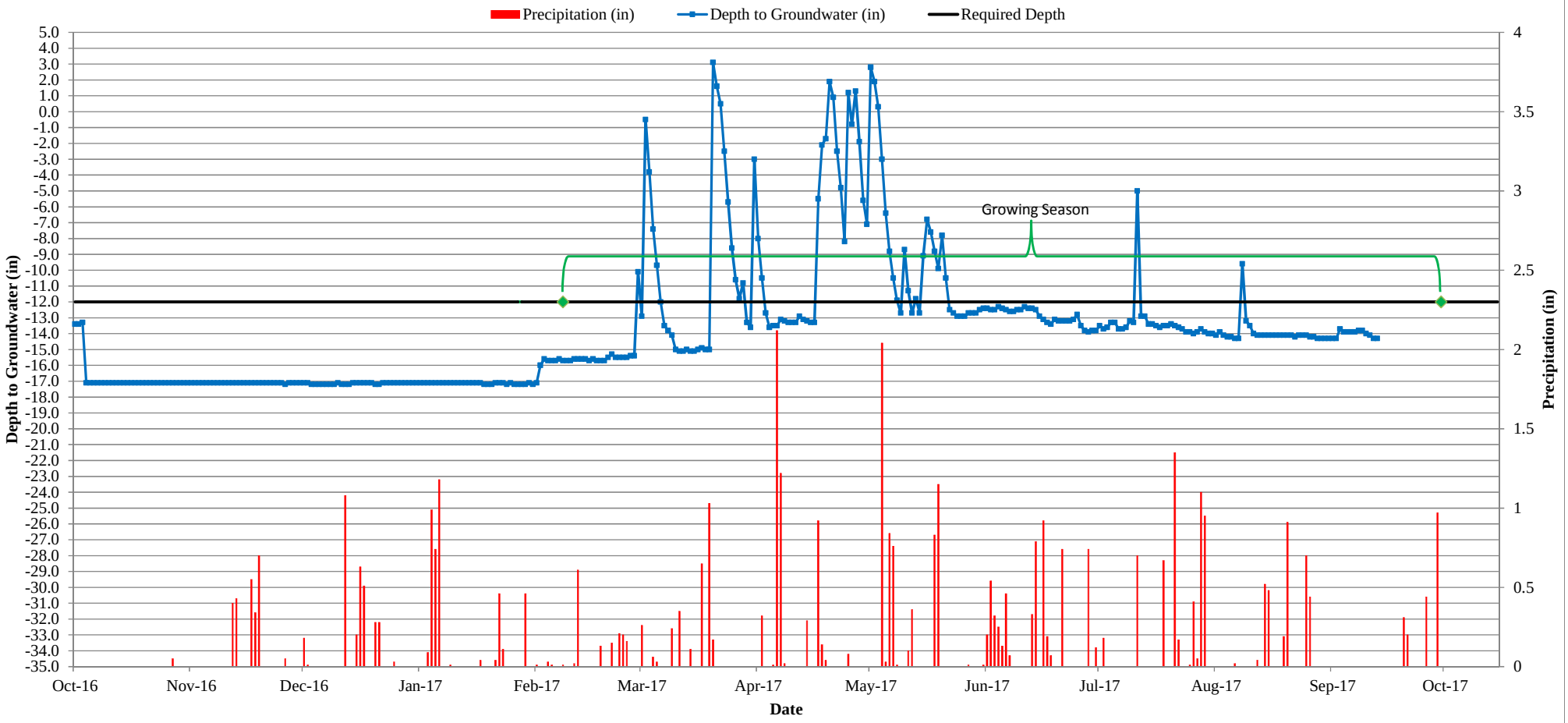


Figure 8
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 4 (upland) - 2017
WM000011312519

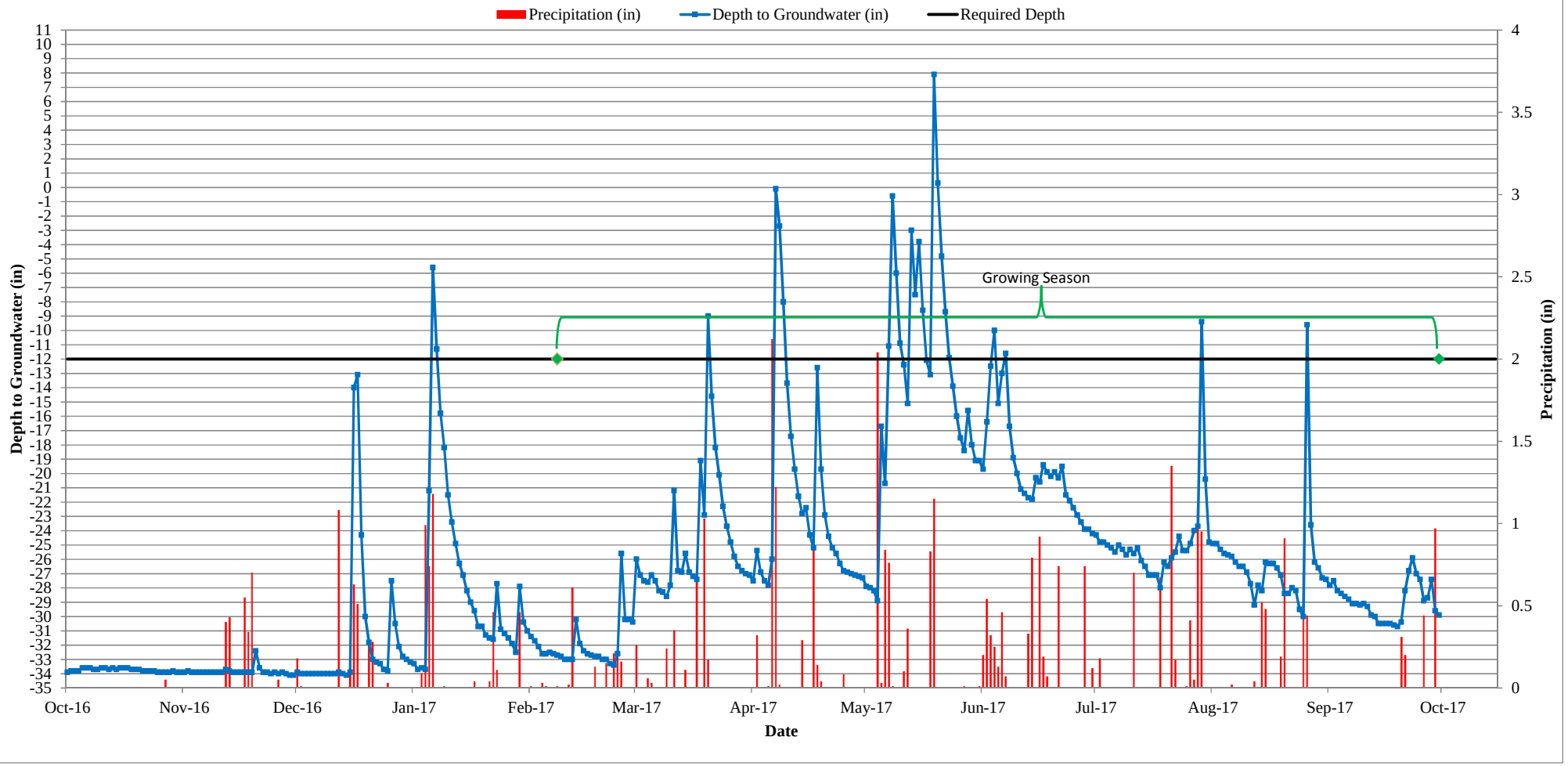


Figure 9
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 5 - 2017
WM0000136AEA8E

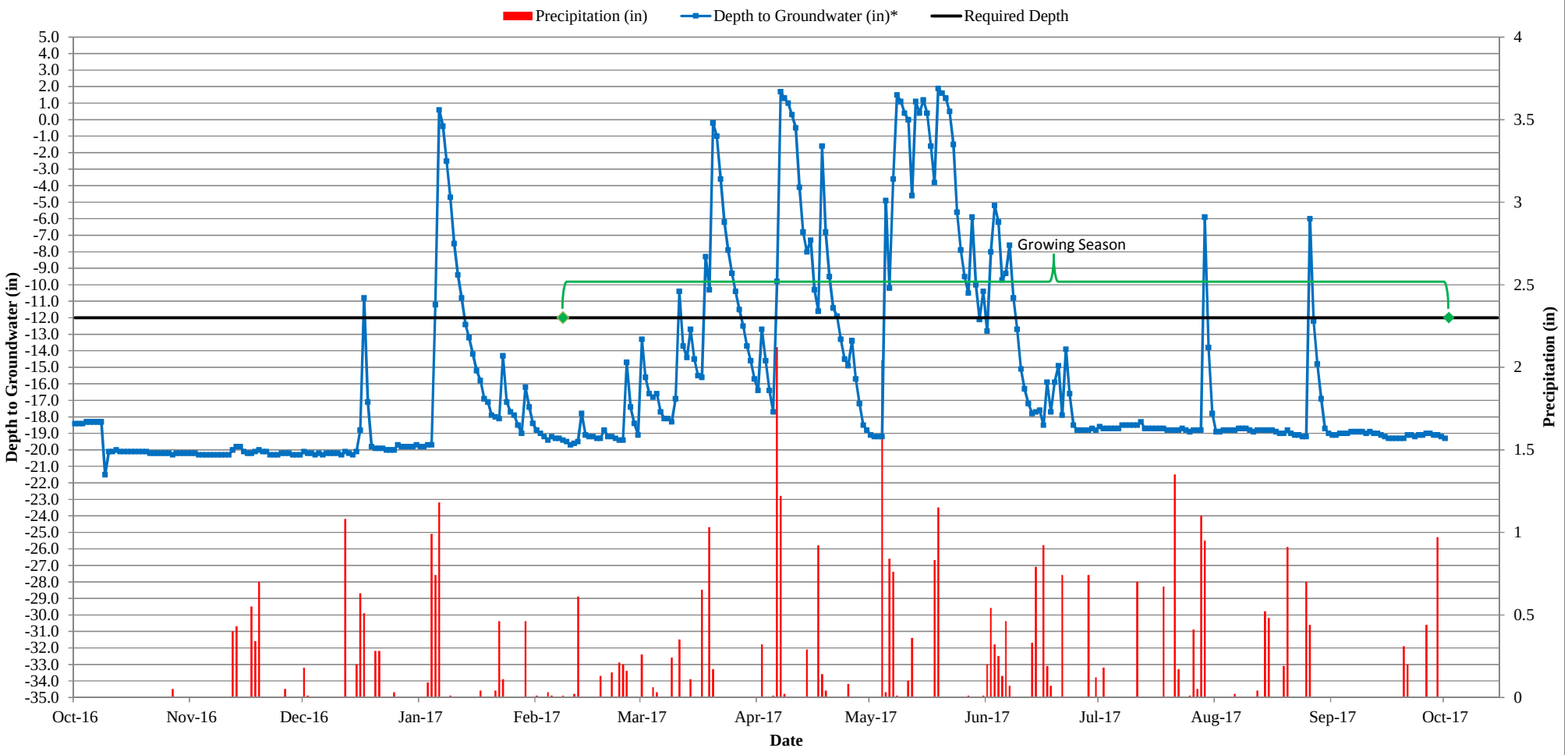


Figure 10
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 6 - 2017
WM000013D4BB73

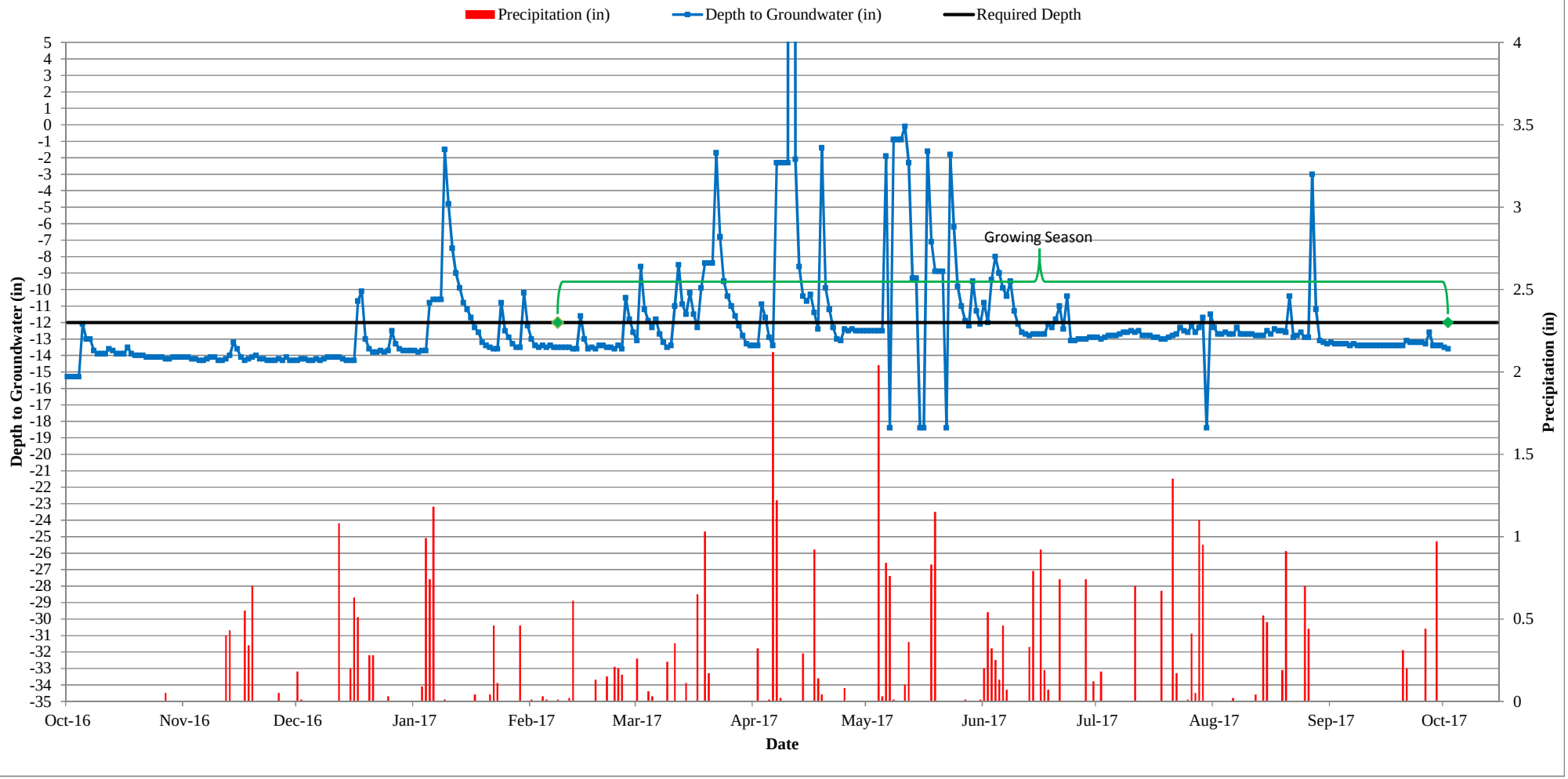


Figure 11
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 7 (upland) - 2017
WM00001315052C

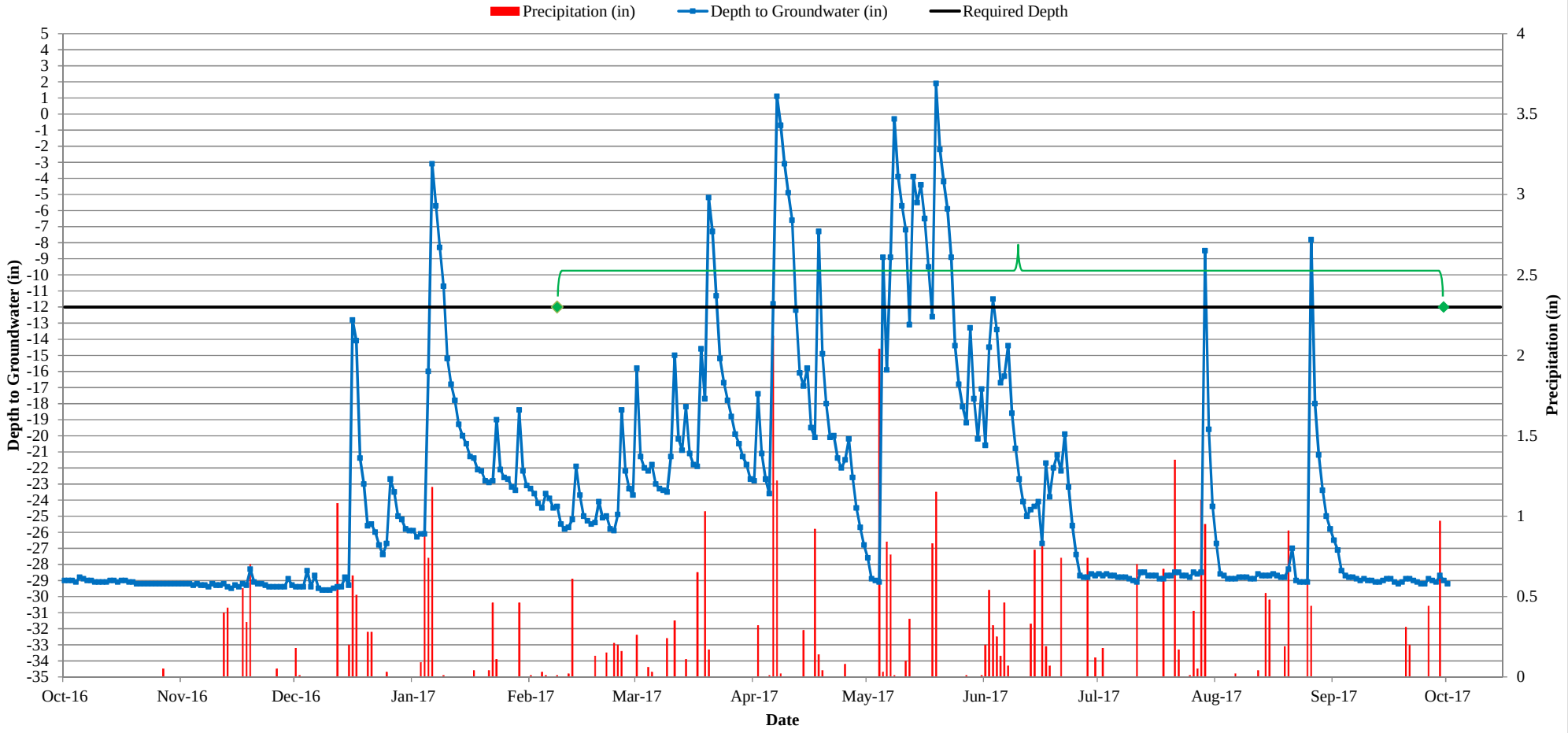


Figure 12
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 8 - 2017
WM000013D482C8

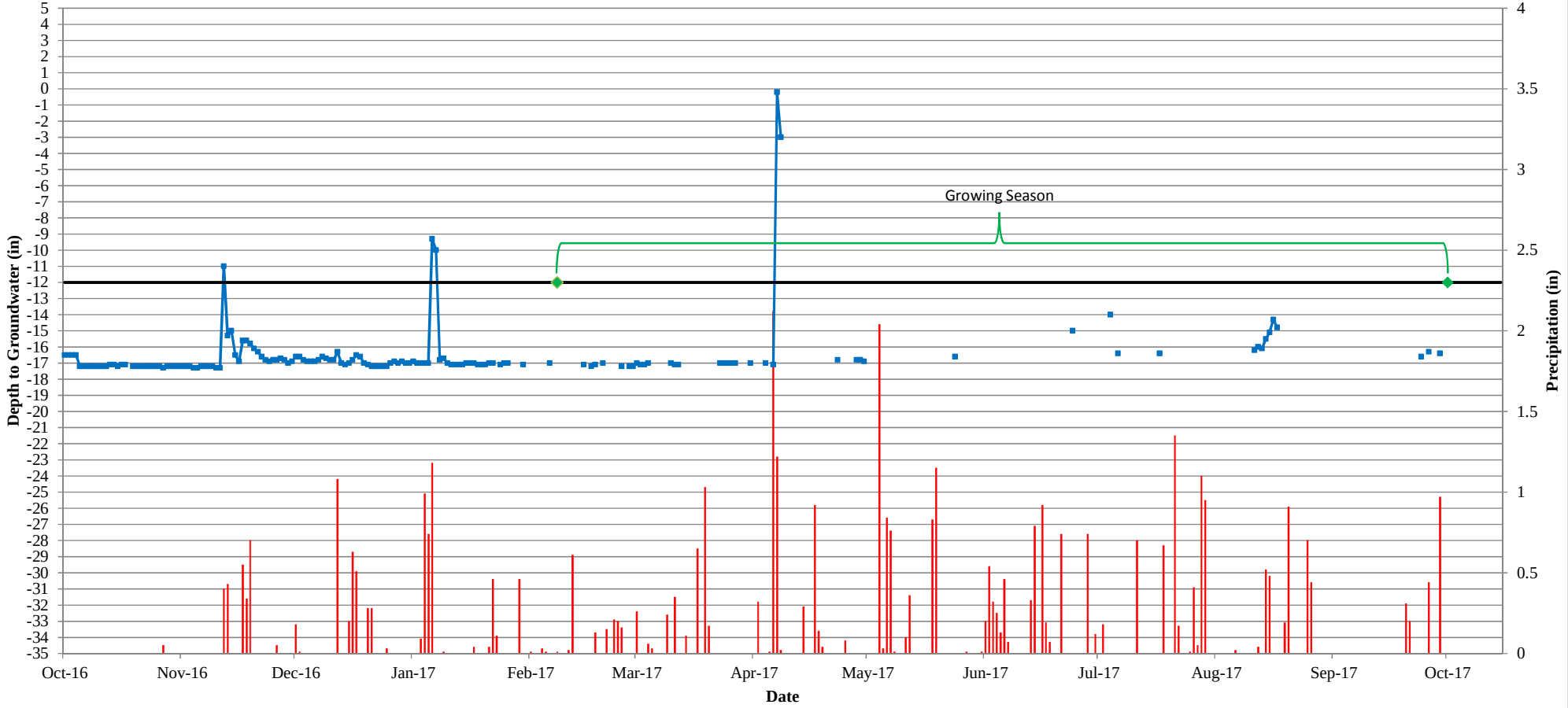


Figure 13
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 9 - 2017
WM000009DE4B47

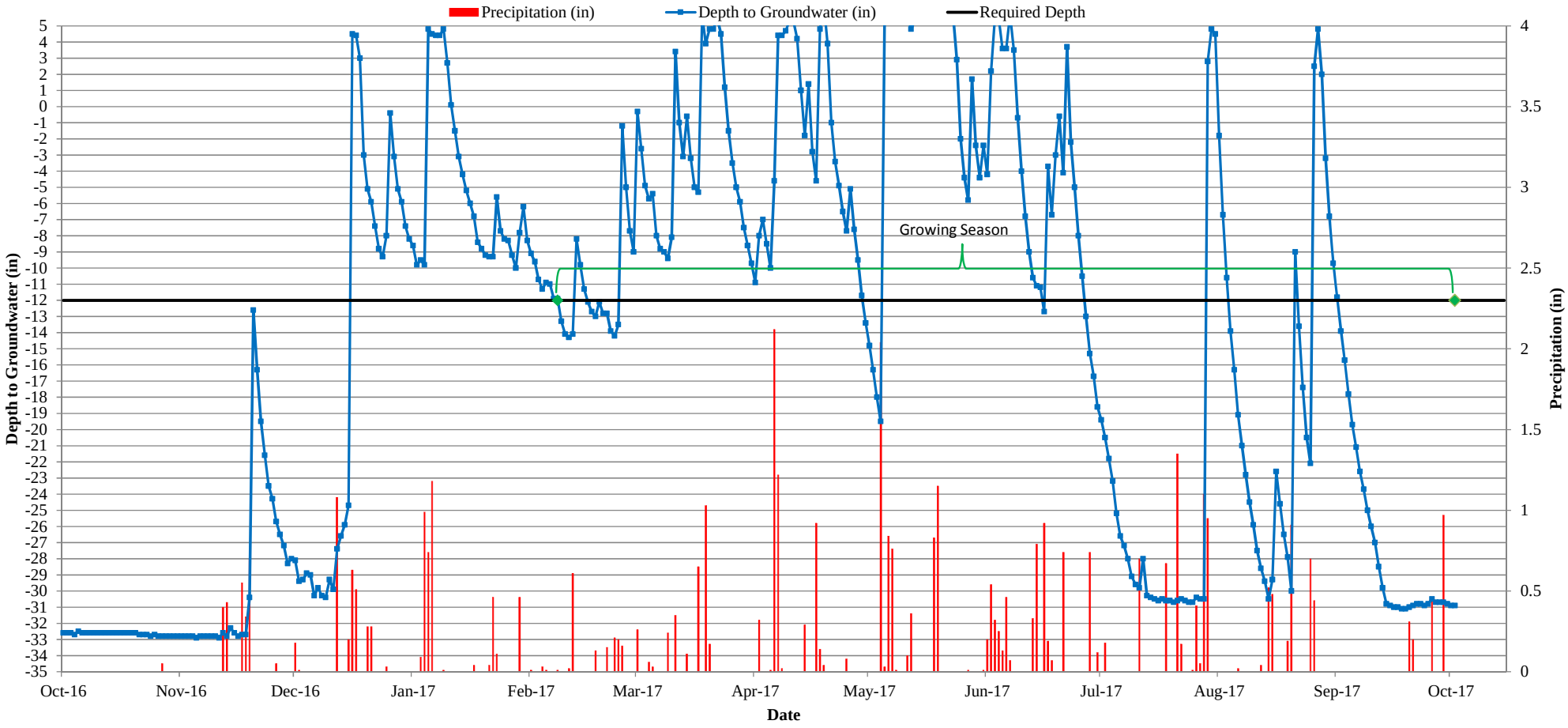


Figure 14
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 10 - 2017
WM 000000EBD27A5

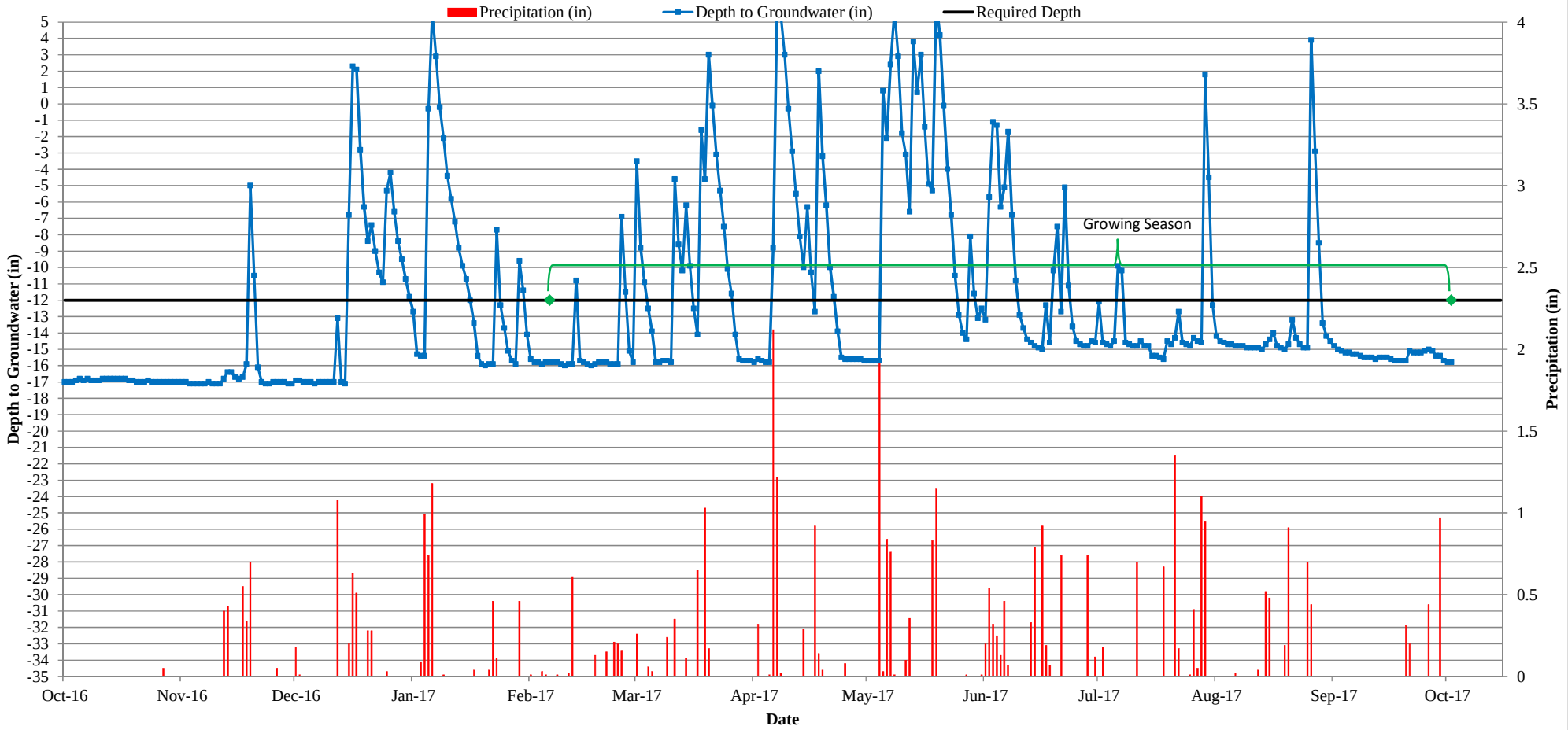


Figure 15
UT to Clarke Creek Hydrology Monitoring
Groundwater Gauge 11 - 2017
WM00001315322D