YEAR 4 MONITORING REPORT

ROSES CREEK STREAM MITIGATION SITE
Burke County, North Carolina
NC DMS Project # 96309

Prepared for:

NCDEQ Division of Mitigation Services (DMS)
217 West Jones St., Suite 3000A
Raleigh, North Carolina 27603

Construction Completed: May 2016
Visual Assessment Data Collected: Jan 2019, May 2019, Aug 2019, Sept 2019, Nov 2019
Submitted: February, 2020

Mitigation Project Name	**Roses Creek Stream Restoration Site**	**County**	**Burke**	**USACE Action ID**	**2014-00517**
DMS ID	**96309**	**Date Project Instituted**	**2/14/2014**	**NCDWR Permit No**	**2014-0194**
River Basin	**Catawba**	**Date Prepared**	**7/15/2019**		
Cataloging Unit	**03050101**				

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)				**5,009.600**										
Potential Credits (As-Built Survey)				**5,009.600**										
1 (Site Establishment)	**N/A**				N/A	N/A	**N/A**				**N/A**		N/A	N/A
2 (Year 0 / As-Built)	**30%**			1,502.880	2016	9/22/2016	**N/A**				**N/A**		N/A	N/A
3 (Year 1 Monitoring)	**10%**			500.960	2017	4/3/2017	**N/A**				**N/A**		N/A	N/A
4 (Year 2 Monitoring)	**10%**			500.960	2018	4/25/2018	**N/A**				**N/A**		N/A	N/A
5 (Year 3 Monitoring)	**10%**			500.960	2019	4/26/2019	**N/A**				**N/A**		N/A	N/A
6 (Year 4 Monitoring)	**5%**				2020		**N/A**				**N/A**		N/A	N/A
7 (Year 5 Monitoring)	**10%**				2021		**N/A**				**N/A**		N/A	N/A
8 (Year 6 Monitoring)	**5%**				2022		**N/A**				**N/A**		N/A	N/A
9 (Year 7 Monitoring)	**10%**				2023		**N/A**				**N/A**		N/A	N/A
Stream Bankfull Standard	**10%**			500.960	2019	4/26/2019								
Total Credits Released to Date				**3,506.720**										

NOTES:

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) Reciept of necessary DA permit authorization or written DA approval for porjects where DA permit issuance is not required

3 - A 15% reserve of credits is to be held back until the bankfull event performance standard has been met

Mitigation Project Name	**Roses Creek Stream Restoration Site**	**County**	**Burke**	**USACE Action ID**	**2014-00517**
DMS ID	**96309**	**Date Project Instituted**	**2/14/2014**	**NCDWR Permit No**	**2014-0194**
River Basin	**Catawba**	**Date Prepared**	**7/15/2019**		
Cataloging Unit	**03050101**				

DEBITS (released credits only)

			Ratios	1	2	2.5	5	1	3	2	5	1	3	2	5	1	3	2	5
				Stream Restoration	Stream Enhancment I	Stream Enhancement II	Stream Preservation	Riparian Restoration	Riparian Creation	Riparian Enhancement	Riparian Preservation	Nonriparian Restoration	Nonriparian Creation	Nonriparian Enhancement	Nonriparian Preservation	Coastal Marsh Restoration	Coastal Marsh Creation	Coastal Marsh Enhancement	Coastal Marsh Preservation
As-Built Amounts (feet and acres)				**4,738.000**		**679.000**													
As-Built Amounts (mitigation credits)				**4,738.000**		**271.600**													
Percentage Released				**70%**		**70%**													
Released Amounts (feet / acres)				**3,316.600**		**475.300**													
Released Amounts (credits)				**3,316.600**		**190.120**													
NCDWR Permit	USACE Action ID	Project Name																	
	2013-00803	SR 1560 - Bridge 118 - Division 13		41.000															
	2013-00806	SR 1560 - Bridge 123 - Division 13		34.000															
	2013-01764	NCDOT TIP B-5138		151.000															
	2013-01675	SR 1438 - Bridge 291 - Division 13		21.000															
	2014-00641	SR 1150 - Bridge 10 - Division 11		68.000															
	2014-00119	SR 1365 Improvements - Division 11		255.000															
	2015-00240	SR 1515 Improvements - Division 11		130.000															
	2016-00373	SR 1560 - Bridge 580125 - Division 13		100.000															
	2015-02250	SR 1369 Improvements - Division 11		41.400		203.700													
2008-0915	2008-02753	Linville Dam ESSI Project		580.000															
	2015-02250	SR 1369 Improvements - Division 11		324.120															
	2017-00893	SR 1241 - Bridge 110320 - Division 13		82.000															
	2017-00910	SR 1410 - Bridge 580284 - Division 13		67.680		35.800													
	2017-00930	SR 1258 - Bridge 110131 - Division 13				32.100													
	2017-00930	SR 1258 - Bridge 110131 - Division 13		23.160															
	2017-00928	SR 1560 - Bridge 580126 - Division 13		38.000															
	2017-00901	NCDOT TIP B-4447		99.000															
	2017-00896	SR 1798 - Bridge 580011 - Division 13		38.000															
	2015-02250	SR 1369 Improvements Additional - Division 11		30.000															
Remaining Amounts (feet / acres)				**1,193.240**		**203.700**													
Remaining Amounts (credits)				**1,193.240**		**81.480**													

February 7, 2020

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

RE: NCDEQ – Division of Mitigation Services
Roses Creek MY 4 Monitoring Report
DMS Project Number: 96309
Response to DMS Review Comments on Draft Year 4 Monitoring Report for Roses Creek

Mr. Tsomides:

As per your letter dated January 24, 2020, we have reviewed and addressed DMS review comments as follows:

1. Please include the 8/27/2019 IRT meeting minutes and USACE and DWR comments, as an Appendix, and reference in the report.

   Response: IRT meeting minutes have been included as Appendix D.

2. There were concerns noted at the 08/2019 IRT meeting about tributary discharge and maintenance of single thread channel as opposed to wetland complex. HDR states that single channel flow was obvious during winter months, in UT1 and UT3. On what basis was this assessment made? Please provide more detail (e.g., dates of observation, correlation with rain events, photos, video or hydrologic data), if available, supporting single channel flow.

   Response: Aerial photos were taken with a drone on January 29, 2020 and have been included as Figures 3.11 – 3.16.

3. Similarly, it is stated that single channel flow is evident throughout UT2 except for the upper 100 LF or so (just below the pond and farm road, to XS-9), and that the stream is functioning as intended. During the 08/2019 site visit, thick herbaceous vegetation had established and appeared to be trapping sediments along several sections of this reach. Since apparent lack of single channel flow has been noted as a concern, any additional data would be helpful that might support single channel flow.

Response: See aerial photos on Figures 3.13 and 3.14. Based on aerial evidence of single channel flow throughout UT 2 in January 2020, HDR revised the report narrative as follows:

"UT 1 and UT 3 have remained stable over the past monitoring year. Thick herbaceous vegetation along the stream banks makes it difficult to see the channels during the growing season in some areas but single channel flow is obvious during winter months (see Figures 3.11 – 3.16). During a site visit in August 2019 it was noted that sediment from the soil farm road had deposited in the bed of UT 2 just downstream of the culvert and partially diverted base flow through the floodplain over the upstream most 100 feet of UT 2. Diverted flow re-entered the channel just downstream of the constructed berm near cross section 9. Single channel flow was evident throughout UT 2 downstream of cross section 9 and the stream was functioning as intended through this reach. Based on aerial photos taken in January 2020 (Figures 3.13 and 3.14), single channel flow was evident throughout the entirety of UT 2."

4. Fig 5.3 x-axis label has distance rather than time as a label.

   Response: The x-axis label has been corrected and Figure numbers for the Figure 5 series were changed to Figure 4 series to match figure numbering in the MY4 report.

5. Vegetation Visual Assessment –Invasives treatment is mentioned as occurring in 2019. Please provide date(s) of treatment here (at least month-year), and in Table 2 (Project Activity and Reporting History).

   Response: Dates of treatments (January and September 2019) were added to the report narrative and Table 2.

6. Surface Water Level Meter Data – If available, rain data should be shown concurrently, with the most consecutive days/dates during which criteria were met.

   Response: Rain data has been added to Surface Water Level figures.

If you have any questions or need additional information, please do not hesitate to give me a call (919.232.6637)

Sincerely,
HDR | ICA

Vickie Miller

555 Fayetteville Street, Suite 900, Raleigh, NC 27601-3034
T 919.232.6600

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1.0 PROJECT SUMMARY

The following report summarizes the vegetation establishment and stream stability for Year 4 monitoring for the Roses Creek Site (hereafter referred to as the "Site") in Burke County, North Carolina.

1.1 Goals and Objectives

Primary goals for the Site, as detailed in the Roses Creek Stream Mitigation Site Mitigation Plan (ICA Engineering 2015) include:

1. Reducing water quality stressors and providing/enhancing flood attenuation.
2. Restoring and enhancing aquatic, semi-aquatic and riparian habitat.
3. Restoring and enhancing habitat connectivity with adjacent natural habitats.

The following objectives accomplish the goals listed above:

1. Reducing water quality stressors and providing/enhancing flood attenuation through:
    a. Restoring the existing degraded, straightened and incised/entrenched streams as primarily a Priority 1 restoration where bankfull and larger flows can access the floodplain allowing nutrients, sedimentation, trash and debris from upstream runoff to settle from floodwaters to the extent practical. Restoring a stable dimension, pattern, and profile will ensure the channel will transport and attenuate watershed flows and sediment loads without aggrading or degrading.
    b. Restore channel banks by relocating the channel, excavating bankfull benches, placing in-stream structures to reduce shearing forces on outside meander bends, and planting native vegetative species to provide soil stability, thus reducing stream bank stressors.
    c. Reducing point source (i.e. cattle and equipment crossings) and non-point source (i.e. stormwater runoff through pastures) pollution associated with on-site agricultural operations (hay production and cattle) by exclusionary fencing from the stream and riparian buffer and by eliminating all stream crossings from the easement.
    d. Plant a vegetative buffer on stream banks and adjacent floodplains to treat nutrient enriched surface runoff from adjacent pastureland associated with on-site agricultural operations.
    e. Restoring riparian buffers adjacent to the streams that are currently maintained for hay production that will attenuate floodwaters, in turn reducing stressors from upstream impacts.
2. Restoring and enhancing aquatic, semi-aquatic and riparian habitat through:
    a. Restoration of a sinuous gravel bed channel that promotes a stable bed form and accommodates benthic macroinvertebrate and fish propagation. Additionally, woody materials such as log structures, overhanging planted vegetation and toe wood/brush toe in submerged water will provide a diversity of shading, bed form and foraging opportunities for aquatic organisms.
    b. Restoring native vegetation to the stream channel banks and the adjacent riparian corridor, that is currently grass dominated, will diversify flora and create a protected habitat corridor, which will provide an abundance of available foraging and cover habitat for a multitude of amphibians, reptiles, mammals and birds.
3. Restoring and enhancing habitat connectivity with adjacent natural habitats through:

a. Planting the riparian buffer with native vegetation.
b. Protection of the restored community will ensure a protected wildlife corridor between the Site and the upstream and downstream mature riparian buffers and upland habitats.
c. Converting approximately 15 acres from existing agricultural land to riparian buffer protected by permanent conservation easement.

1.2 Success Criteria

Monitoring of restoration efforts will be performed until success criteria are fulfilled. Monitoring includes stream channel/hydraulics and vegetation. In general, the restoration success criteria, and required remediation actions, are based on the Stream Mitigation Guidelines (USACE et al. 2003) and the Ecosystem Enhancement Program Monitoring Requirements and Performance Standards for stream and/or Wetland Mitigation (NCEEP 2011). Project success criteria are further detailed in the Baseline Monitoring Document & As-Built Baseline Report (HDR|ICA 2016).

1.3 Background Summary

The North Carolina Department of Environmental Quality Division of Mitigation Services (DMS) contracted HDR|ICA to restore 4,746 linear feet of Roses Creek and three of its unnamed tributaries within the Site to assist in fulfilling stream mitigation needs in the watershed. The Site is located approximately 12 miles northwest of downtown Morganton in Burke County, NC. The Site contains Roses Creek and three unnamed headwater tributaries of Roses Creek (UT 1, UT 2 and UT 3). The Site is located within the 03050101060030 14-digit Hydrologic Unit, which is also a DMS Targeted Hydrologic Unit for Cataloging Unit 03050101 of the Catawba River Basin. Roses Creek is classified as a Water Supply Watershed (WS-III), as it is part of the headwaters that feed Lake Rhodhiss. The Site is comprised of one property owned by Robert B. Sisk and Martha M. Sisk (PIN # 1767479652) (known as the Sisk Farm). Additional information concerning project history is presented in Table 2.

1.4 Visual Vegetation Assessment

Visual assessment of on-site vegetation suggests that planted stems are becoming well established and volunteer stems are becoming more evident. The herbaceous vegetation is also becoming better established as previously noted bare areas are showing a dense community of annual and perennial species. Overall, visual observations indicate that the Site is performing well enough to meet the vegetative performance standard of 260 stems per acre in Year 5.

Chinese privet and multiflora rose were observed and treated downstream of STA 14+75 along UT 1. Invasive stems were mechanically removed, and the stumps were treated with herbicide twice in 2019 (January and September, 2019). In addition, privet was observed downstream of STA 37+00 in the left floodplain of Roses Creek. HDR plans to conduct additional treatments in 2020 to control the spread of invasive species on-site. HDR will continue to monitor these areas closely.

1.5 Visual Stream Assessment

Roses Creek remains stable and functioning as designed. Bank erosion areas repaired in 2018 continue to benefit from the establishment of vegetation along the channel toes and bank. During Year 4, eight small areas of minor to moderate erosion were noted on Roses Creek as depicted in the Current Conditions Plan View (CCPV). Maturing vegetation along the stream banks should

stabilize these areas over time. HDR will monitor areas of erosion closely over the next year. A beaver dam was discovered near STA 41+80 in August 2019, and backwater effects extended to approximately STA 38+00. The dam was removed in September 2019 and the stream is currently stable at this location. Photos of the dam before and after removal are presented in figures 3.1-3.6. The beavers were removed from the Site to discourage construction of future dams; however, an additional beaver dam was observed near STA 31+50 in December 2019. HDR will coordinate with APHIS to trap beaver and remove the dam at this location in 2020.

UT 1 and UT 3 have remained stable over the past monitoring year. Thick herbaceous vegetation along the stream banks makes it difficult to see the channels during the growing season in some areas but single channel flow is obvious during winter months (see Figures 3.11 – 3.16). During a site visit in August 2019 it was noted that sediment from the soil farm road had deposited in the bed of UT 2 just downstream of the culvert and partially diverted base flow through the floodplain over the upstream most 100 feet of UT 2. Diverted flow re-entered the channel just downstream of the constructed berm near cross section 9. Single channel flow was evident throughout UT 2 downstream of cross section 9 and the stream was functioning as intended through this reach. Based on aerial photos taken in January 2020 (Figures 3.13 and 3.14), single channel flow was evident throughout the entirety of UT 2. Based on water level data obtained using the Hobo U20 pressure transducers installed in the bottom of each tributary, all three tributaries have indicated constant flow for a span of 30+ consecutive days at least once this past year. Water level data is provided in Appendix C.

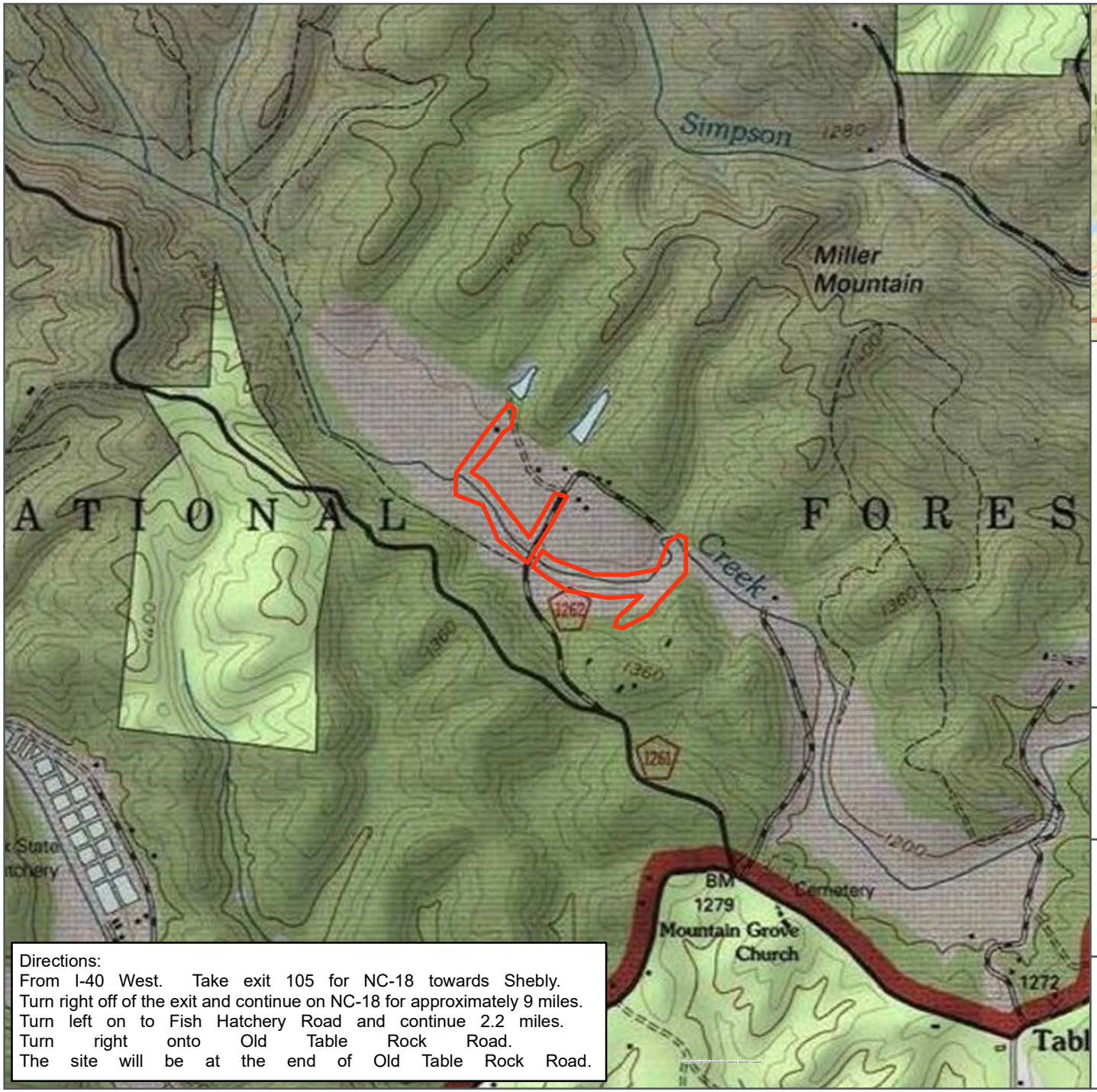
2.0 REFERENCES

Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation, Version 4.0 (http://cvs.bio.unc.edu/methods.htm).

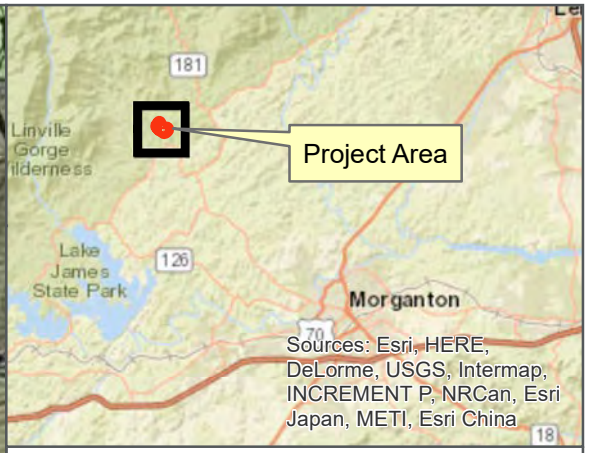
Weakley, Alan S. 2011. Flora of the Southern and Mid-Atlantic States (online). Available: http://www.herbarium.unc.edu/FloraArchives/WeakleyFlora_2011-May-nav.pdf [May 15, 2011]. University of North Carolina Herbarium, North Carolina Botanical Garden, University of North Carolina, Chapel Hill, North Carolina.

APPENDICES

Appendix A. Project Vicinity Map and Background Tables



Directions:
From I-40 West. Take exit 105 for NC-18 towards Shebly.
Turn right off of the exit and continue on NC-18 for approximately 9 miles.
Turn left on to Fish Hatchery Road and continue 2.2 miles.
Turn right onto Old Table Rock Road.
The site will be at the end of Old Table Rock Road.



Legend

Project Easement

The subject project site is an environmental restoration site of the NCDEQ Divison of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, monitoring, and stewardship of the restoration site is permitted within the terms and timeframes of their defined, pre-approved roles. Any intended site visitation or activity by any person outside of these previously sanctioned activities/roles requires prior coordination with DMS.

ROSES CREEK STREAM MITIGATION SITE

VICINITY MAP
BURKE COUNTY, NC

N

0 1,000 2,000 4,000 Feet

FIGURE 1

PATH: Z:\ROSES_CREEK\5.0_PROJECT_DEVELOPMENT\5.2_WORK_IN_PROGRESS\DOCS\MONITORING\YEAR 1\APPENDIX A_VICINITY MAP AND BACKGROUND TABLES\VICINITY MAP.MXD - USER: ADIGERON - DATE: 11/13/2017

Map Produced 12/2/2016

Table 1. Project Components and Mitigation Credits

Roses Creek, Burke County DMS Project No. 96309									
Credit Summary									
	Stream SMU		Riparian Wetland WMU		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	5,009.6								
Project Components									
Project Component or Reach ID	Stationing/ Location		Existing Footage/ Acreage	Approach (PI, PII, etc.)	Restoration or Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio	SMU	
Roses Creek	10+00-41+81		3,643	PI	Restoration	3,181	1:1	3,121*	
Roses Creek	41+81-42+19		38	-	EII	38	2.5:1	15	
UT 1	10+00-12+54; 16+11-16+46		267	PI	Restoration	289	1:1	289	
UT 1	12+54-16+11; 16+46-19+30		641	-	EII	641	2.5:1	256	
UT 2	10+00-17+07		610	PI	Restoration	707	1:1	707	
UT 3	10+00-16+21		558	PI	Restoration	621	1:1	621	
Total	NA		5,757	PI	Restoration/ EII	5,477	1-2.5:1	5,009.6	

* Stream Mitigation Units decreased by 60 to account for break in easement at the stream crossing on Sisk Farm Road

Component Summation						
Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	4,798					
Enhancement II	679					

Table 2. Project Activity and Reporting History

Activity or Report	Data Collection Complete	Completion or Delivery
Mitigation Plan	September 2015	September 2015
Final Design – Construction Plans	September 2015	March 2016
Construction	February 25, 2016	May 18, 2016
Temporary S&E Mix Applied to Entire Project Area	--	May 18, 2016
Permanent Seed Mix Applied to Entire Project Area	--	May 18, 2016
Bare Root, Containerized, and B&B plantings for Entire Project Area	--	May 27, 2016
Mitigation Plan/As-built (Year 0 Monitoring-Baseline)	May 2016	July 2016
Year 1 Monitoring	November 2016	January 2017
Stream Morphology	November 2016	--
Vegetation	August 2016	--
Supplemental Planting	--	February 2017
Year 2 Monitoring	August 2017	November 2017
Stream Morphology	June 2017	--
Vegetation	August 2017	--
Supplemental Planting	--	February 2018
Year 3 Monitoring	August 2018	November 2018
Stream Morphology	March 2018	--
Vegetation	August 2018	--
Structural Repairs	--	October 2018
Year 4 Monitoring	November 2019	December 2019
Stream Morphology	--	--
Vegetation	--	--
Dam Removal	--	September 2019
Invasive Treatment		Jan. and Sept. 2019
Year 5 Monitoring		
Stream Morphology		
Vegetation		
Year 6 Monitoring		
Stream Morphology		
Vegetation		
Year 7 Monitoring		
Stream Morphology		
Vegetation		

Table 3. Project Contacts Table

Designer Primary project design POC	ICA Engineering 555 Fayetteville Street, Suite 900 Raleigh, North Carolina 27601 Vickie Miller (919) 232-6600
Construction Contractor Construction Contractor POC	Land Mechanic Designs, Inc. 126 Circle G Lane Willow Spring, NC 27592 Lloyd Glover (919) 639-6132
Structural Repair Contractor Structural Repair Contractor POC	Land Mechanic Designs, Inc. 126 Circle G Lane Willow Spring, NC 27592 Lloyd Glover (919) 639-6132
Planting Contractor Planting Contractor POC	Land Mechanic Designs, Inc. 126 Circle G Lane Willow Spring, NC 27592 Lloyd Glover (919) 639-6132
Supplemental Planting Contractor Supplemental Planting Contractor POC	River Works, Inc. 114 W Main Street, Suite 106 Clayton, NC 27520 Bill Wright (919) 590-5193
Seeding Contractor Seeding Contractor POC	Land Mechanic Designs, Inc. 126 Circle G Lane Willow Spring, NC 27607 Lloyd Glover (919) 639-6132
Seed Mix Sources	Green Resources – Triangle Office
Nursery Stock Suppliers	1) Dykes and Son Nursery, McMinnville, TN 2) Foggy Mountain Nursery (live stakes)
Monitoring Performers	HDR|ICA 555 Fayetteville Street, Suite 900 Raleigh, North Carolina 27601 Alex DiGeronimo (LMG) (843) 830-1536
Stream Monitoring POC	HDR|ICA 555 Fayetteville Street, Suite 900 Raleigh, North Carolina 27601 Alex DiGeronimo (LMG) (843) 830-1536
Vegetation Monitoring POC	HDR|ICA 555 Fayetteville Street, Suite 900 Raleigh, North Carolina 27601 Alex DiGeronimo (LMG) (843) 830-1536

Table 4. Project Information

Project Information				
Project Name		Roses Creek Stream Mitigation Site		
County		Burke		
Project Area (acres)		17.3		
Project Coordinates (latitude and longitude)		35.850953, -81.819541		
Project Watershed Summary Information				
Physiographic Province		Piedmont / Mountain		
River Basin		Catawba		
USGS Hydrologic Unit 8-digit	03050101	USGS Hydrologic Unit 14-digit	03050101060030	
NCDWQ Sub-basin		03-08-31		
Project Drainage Area (acres)		Roses: 3,309, UT 1: 35, UT 2: 47, UT 3: 10		
Project Drainage Area Percentage of Impervious Area		<1%		
CGIA Land Use Classification		Agricultural/Pasture		
Ecoregion		Northern Inner Piedmont		
Geological Unit		Zabg: Alligator Back Formation; Gneiss		
Reach Summary Information				
Parameters	**Roses Creek**	**UT 1**	**UT 2**	**UT 3**
Length of reach (linear feet)	3,681 existing	900 existing	610 existing	558 existing
Valley Classification	VIII	VIII	VIII	VIII
Drainage Area (acres)	3,309	35	47	13
NCDWQ Stream Identification Score	56	30	33.5	34
NCDWQ Water Quality Classification	WS-III; Tr	WS-III; Tr	WS-III; Tr	WS-III; Tr
Morphological Description (stream type)	E4, B4, and F4	B5, F5	B5	B5, G5
Evolutionary Trend	Simon's Stages: Premodified » Constructed » Degradation and Widening	Could maintain a B type channel in majority of reach Or F » B	G » B/E	G » B

Regulatory Considerations (cont.)			
Coastal Zone Management (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	CLOMR/LOMR
Essential Fisheries Habitat	No	N/A	N/A

Appendix B. Visual Assessment Data

DMS PROJECT #: 96309

CONTRACT: ROSES CREEK

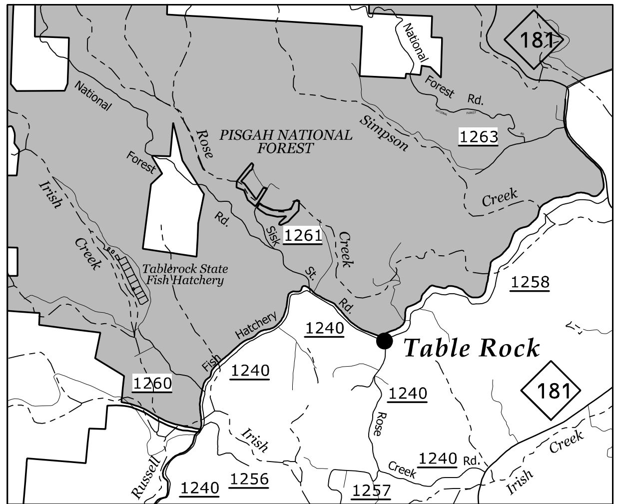
STATE		SHEET NO.
N.C.	ROSES CREEK	1

CURRENT CONDITIONS PLAN VIEW (CCPV)
ROSES CREEK

LOCATION: BURKE COUNTY, NORTH CAROLINA

LAT: 35°51' 01" N   LONG: -81°49' 11" W

TYPE OF WORK: CCPV PLANS - YEAR 4



VICINITY MAP

YEAR 4 CONDITIONS

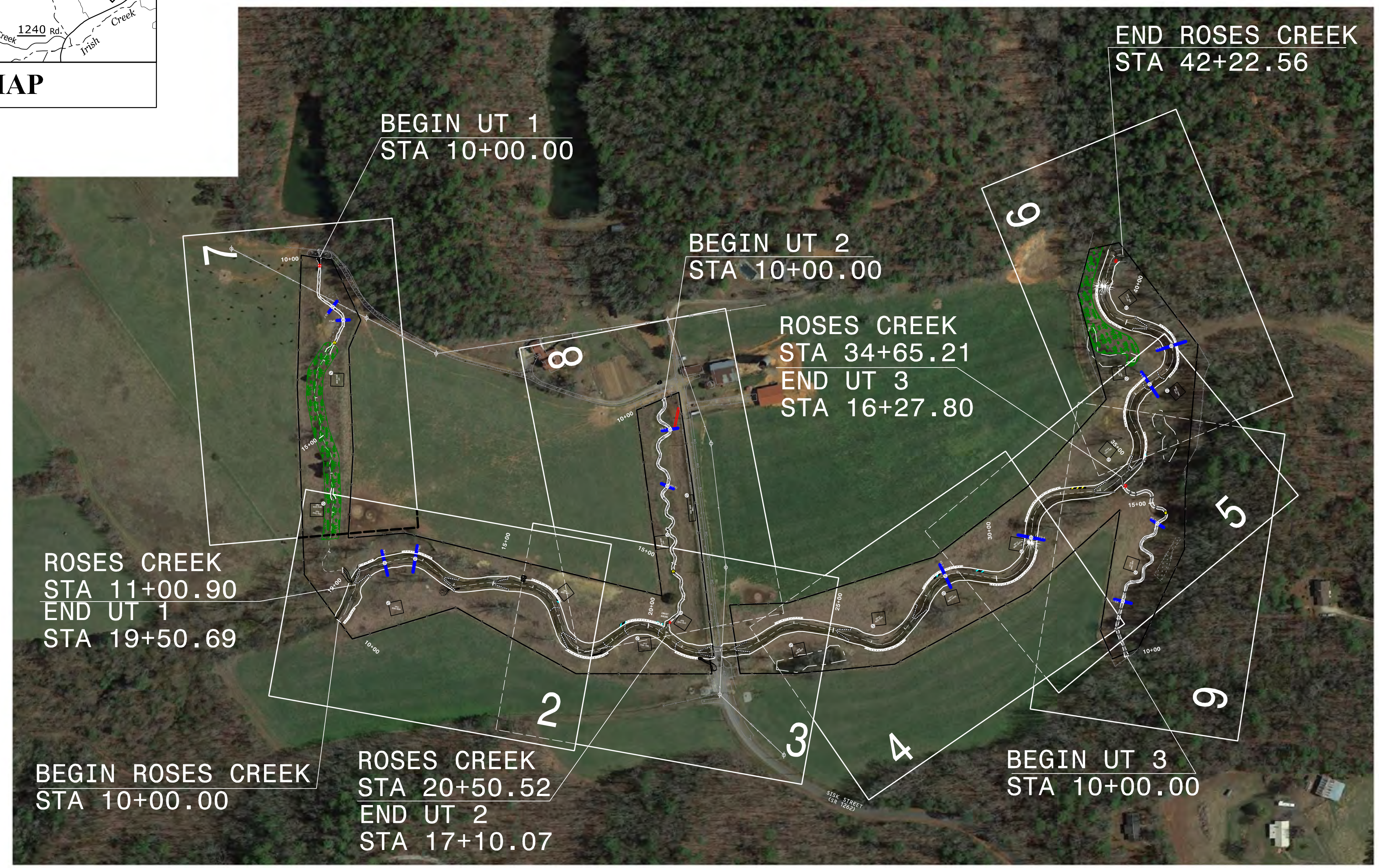
- FALLEN TREE
- CONSTRUCTED BERM

BANK/BED CONDITION

- MODERATE EROSION
- MINOR EROSION
- DEPOSITION (SILT)
- BEAVERDAM

VEGETATION PROBLEM AREAS

- INVASIVE POPULATION



LEGEND

- ASBUILT ALIGNMENTS & STATIONING (15+00)
- THALWEG
- BANKFULL
- EPHEMERAL POOL
- CONSERVATION EASEMENT
- POWERLINE
- FENCE
- CROSS-SECTION LOCATION (XS-1)
- FLOW METER (FM)
- CREST GAUGE
- PHOTO POINT & DIRECTION
- EXISTING WETLANDS (WLB)
- 10 x 10 VEG PLOT
- 5 x 20 VEG PLOT
- BRUSH TOE
- ROCK L-VANE
- ROCK CROSS VANE
- ROCK STEP STRUCTURE w/ BOULDERS
- ROCK STEP STRUCTURE w/ CLASS B RIP RAP
- ROCK / LOG CROSS VANE
- FLOODPLAIN INTERCEPTOR

GRAPHIC SCALES

50 25 0 50 100
PLANS

10 5 0 10 20
PROFILE (HORIZONTAL)

20 10 0 20 40
PROFILE (VERTICAL)

DESIGN DATA

ROSES CREEK		UT 1		UT 2		UT 3	
DESIGN STREAM TYPE	= C4	DESIGN STREAM TYPE	= C5	DESIGN STREAM TYPE	= C5	DESIGN STREAM TYPE	= C5
BANKFULL AREA (FT^2) CROSS-SECTIONED	= 66.4	BANKFULL AREA (FT^2) CROSS-SECTIONED	= 2.1	BANKFULL AREA (FT^2) CROSS-SECTIONED	= 2.1	BANKFULL AREA (FT^2) CROSS-SECTIONED	= 2.6
BANKFULL WIDTH (FT)	= 30.5	BANKFULL WIDTH (FT)	= 5.0	BANKFULL WIDTH (FT)	= 5.0	BANKFULL WIDTH (FT)	= 5.5
MAX DEPTH (FT)	= 2.72	MAX DEPTH (FT)	= 0.58	MAX DEPTH (FT)	= 0.58	MAX DEPTH (FT)	= 0.63
WIDTH / DEPTH RATIO	= 14.0	WIDTH / DEPTH RATIO	= 13.0	WIDTH / DEPTH RATIO	= 13.0	WIDTH / DEPTH RATIO	= 13.1
DRAINAGE AREA (MI^2)	= 5.17	DRAINAGE AREA (MI^2)	= 0.06	DRAINAGE AREA (MI^2)	= 0.07	DRAINAGE AREA (MI^2)	= 0.02
BANKFULL SLOPE(FT/FT)	= 0.0062	BANKFULL SLOPE(FT/FT)	= 0.0021	BANKFULL SLOPE(FT/FT)	= 0.0021	BANKFULL SLOPE(FT/FT)	= 0.0021

PROJECT LENGTH

		PROPOSED DESIGN STREAM LENGTH	ASBUILT STREAM LENGTH
ROSES CREEK	=	3,219.20 FT	3,222.56 FT
UT 1	=	930.38 FT	950.69 FT
UT 2	=	707.59 FT	710.07 FT
UT 3	=	621.03 FT	627.80 FT

CHRISTOPHER L. SMITH
PROJECT MANAGER

Prepared in the Office of:

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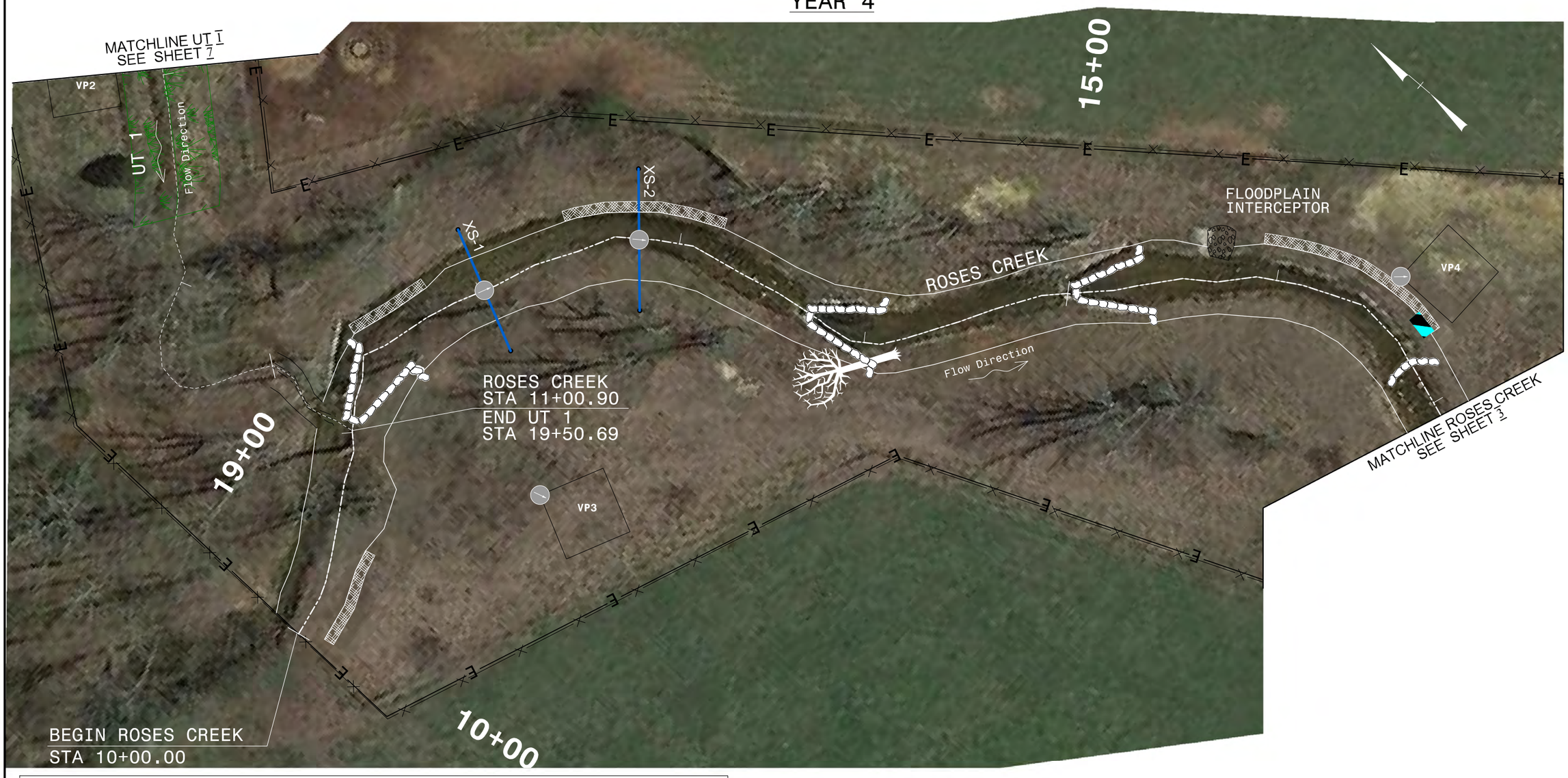
NC License No: F-0258

$$$$SYSTIME$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$
$$$$USERNAME$$$$

CURRENT CONDITIONS PLAN VIEW (CCPV)
YEAR 4



LEGEND

15+00	ASBUILT ALIGNMENTS & STATIONING	●	PHOTO POINT & DIRECTION		CREST GAUGE
	THALWEG		CROSS-SECTION LOCATION		ROCK L-VANE
	BANKFULL	□	10 x 10 VEG PLOT		ROCK CROSS VANE
	EPHEMERAL POOL	▭	5 x 20 VEG PLOT		ROCK STEP STRUCTURE w/ BOULDERS
—E—	CONSERVATION EASEMENT	▨	BRUSH TOE		ROCK STEP STRUCTURE w/ CLASS B RIP RAP
—×—	FENCE				FLOODPLAIN INTERCEPTOR

YEAR 4 CONDITIONS

FALLEN TREE

BANK/BED CONDITION

MINOR EROSION

VEGETATION PROBLEM AREAS

INVASIVE POPULATION

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ROSES CREEK
STREAM RESTORATION PROJECT
BURKE COUNTY, NORTH CAROLINA

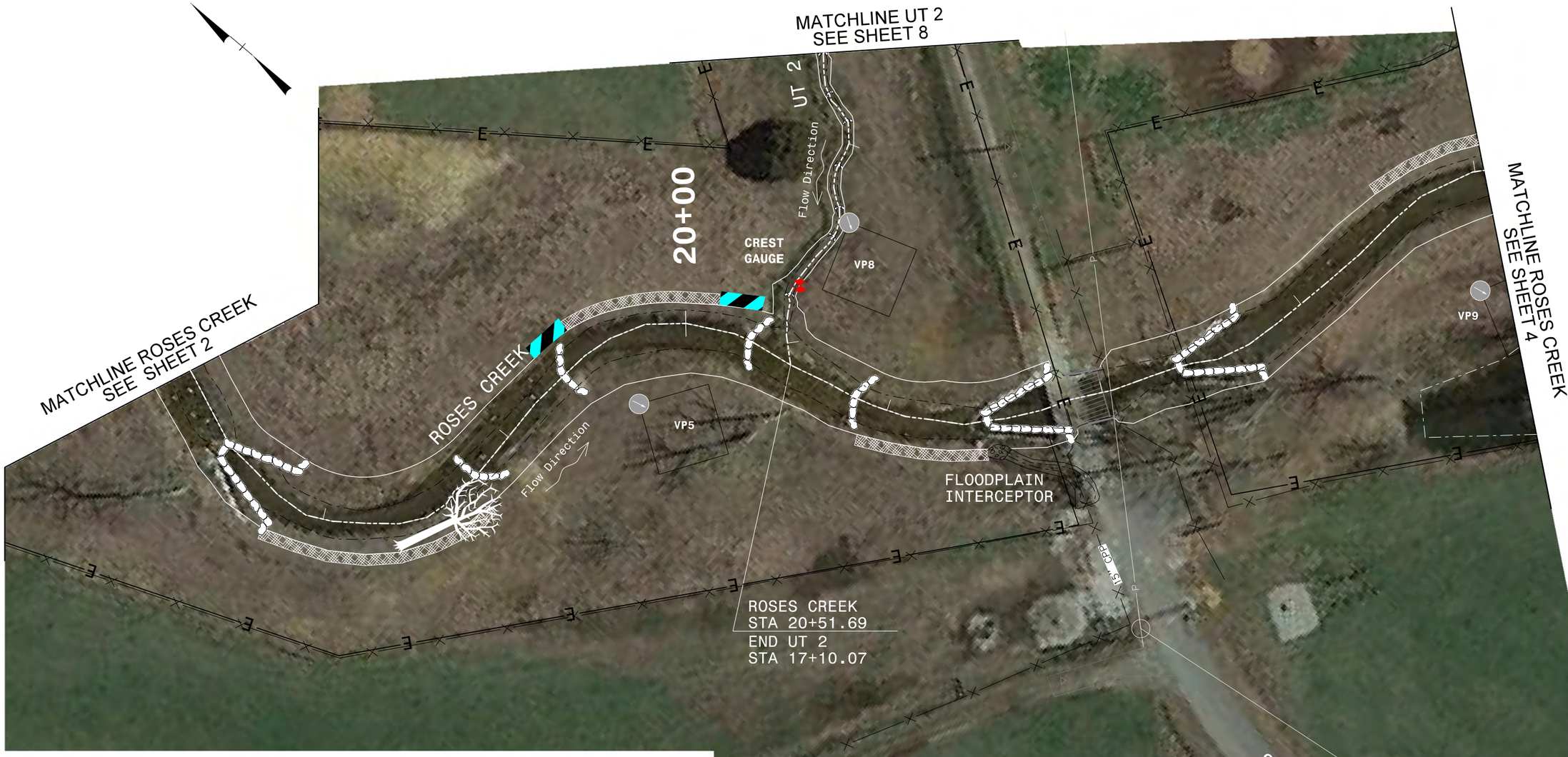
GRAPHIC SCALE
25 0 25 50
PLANS

DATE: 12-11-19

CCPV
YEAR 4

SHEET
2

EEP# 96309



CURRENT CONDITIONS PLAN VIEW (CCPV)
YEAR 4

LEGEND

- 15+00 — ASBUILT ALIGNMENTS & STATIONING
- THALWEG
- BANKFULL
- EPHEMERAL POOL
- —E— CONSERVATION EASEMENT
- —×— FENCE
- ● PHOTO POINT & DIRECTION
- XS-1 — CROSS-SECTION LOCATION
- ☐ 10 x 10 VEG PLOT
- ▭ 5 x 20 VEG PLOT
- ▨ BRUSH TOE
- —P— POWER LINE
- CREST GAUGE
- ROCK L-VANE
- ROCK CROSS VANE
- ROCK STEP STRUCTURE w/ BOULDERS
- ROCK STEP STRUCTURE w/ CLASS B RIP RAP
- FLOODPLAIN INTERCEPTOR

YEAR 4 CONDITIONS

- FALLEN TREE

BANK/BED CONDITION

- ▨ MINOR EROSION

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ROSES CREEK
STREAM RESTORATION PROJECT
BURKE COUNTY, NORTH CAROLINA

GRAPHIC SCALE
50
25
0
25
PLANS

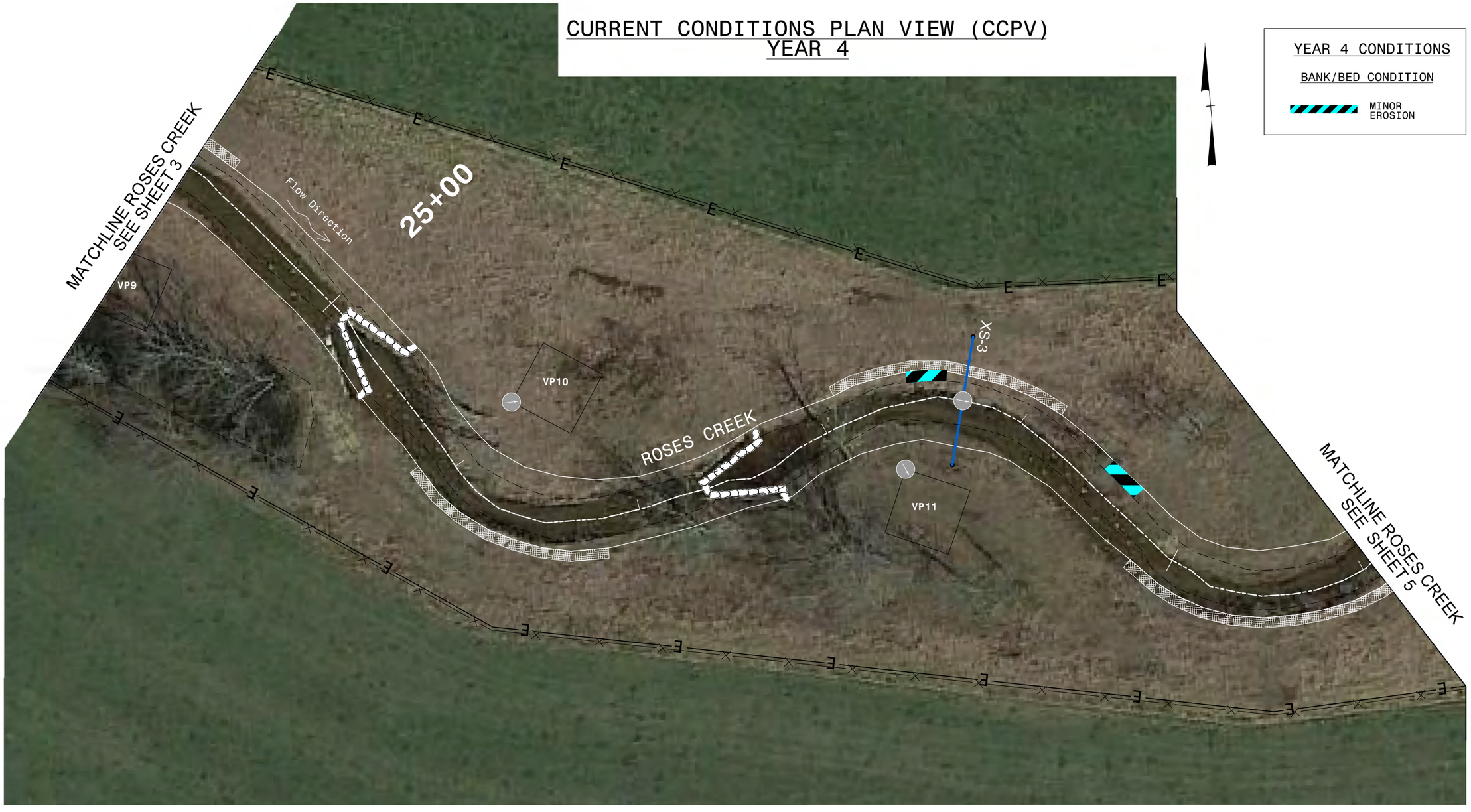
DATE: 12-11-19

CCPV
YEAR 4

SHEET
3

EEP# 96309

CURRENT CONDITIONS PLAN VIEW (CCPV)
YEAR 4



YEAR 4 CONDITIONS

BANK/BED CONDITION

MINOR EROSION

LEGEND

15+00 — ASBUILT ALIGNMENTS & STATIONING

THALWEG

BANKFULL

EPHEMERAL POOL

E — CONSERVATION EASEMENT

FENCE

PHOTO POINT & DIRECTION

XS-1 — CROSS-SECTION LOCATION

10 x 10 VEG PLOT

5 x 20 VEG PLOT

BRUSH TOE

CREST GAUGE

ROCK L-VANE

ROCK CROSS VANE

ROCK STEP STRUCTURE w/ BOULDERS

ROCK STEP STRUCTURE w/ CLASS B RIP RAP

FLOODPLAIN INTERCEPTOR

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ROSES CREEK RESTORATION PROJECT
STREAM
BURKE COUNTY, NORTH CAROLINA

GRAPHIC SCALE 50 25 0 25 — PLANS

DATE: 12-11-19

CCPV YEAR 4

SHEET 4

EEP# 96309

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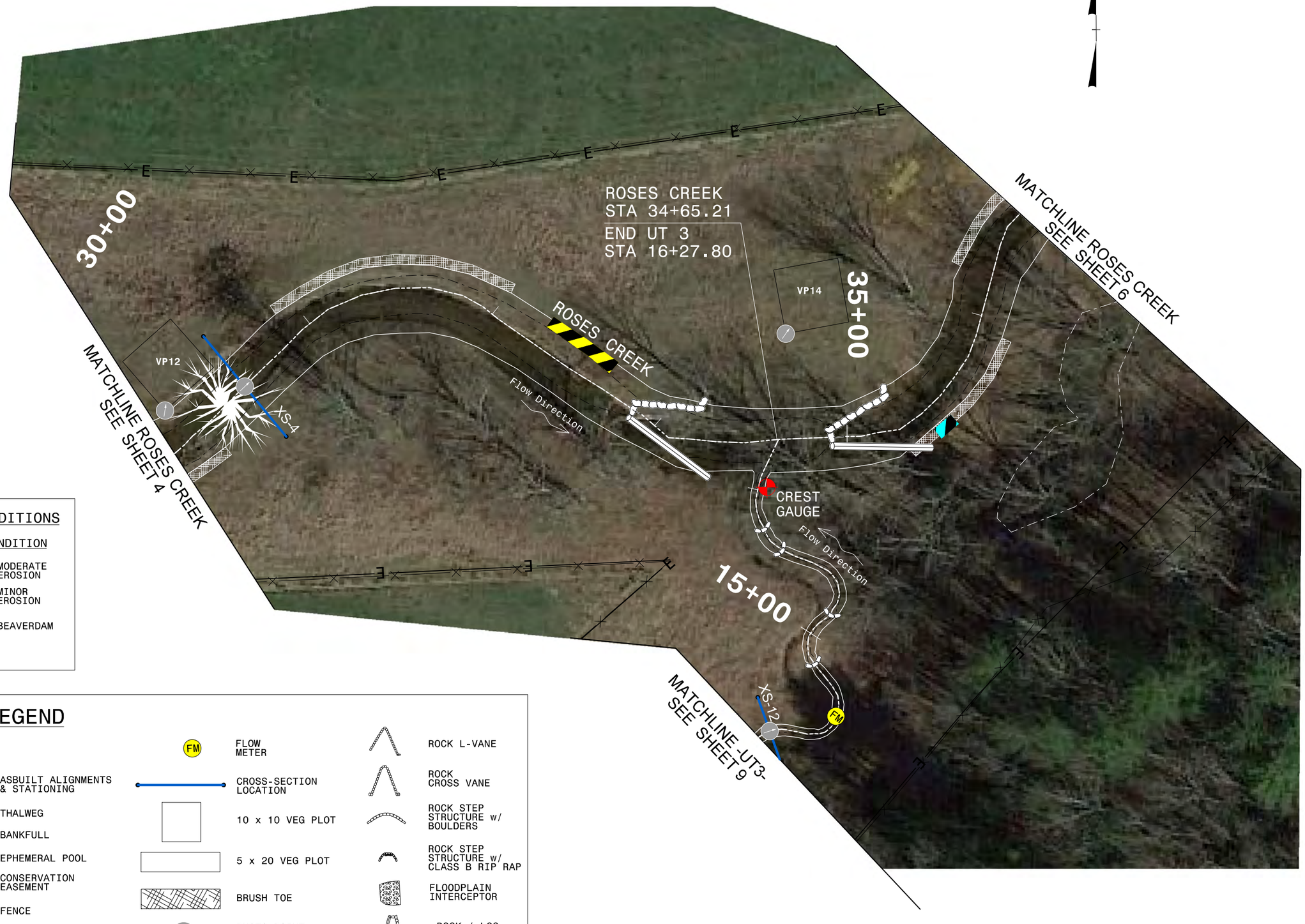
CURRENT CONDITIONS PLAN VIEW (CCPV)
YEAR 4



YEAR 4 CONDITIONS

BANK/BED CONDITION

- MODERATE EROSION
- MINOR EROSION
- BEAVERDAM

LEGEND

- 15+00 — ASBUILT ALIGNMENTS & STATIONING
- THALWEG
- BANKFULL
- EPHEMERAL POOL
- E — CONSERVATION EASEMENT
- FENCE
- CREST GAUGE
- FM — FLOW METER
- CROSS-SECTION LOCATION
- 10 x 10 VEG PLOT
- 5 x 20 VEG PLOT
- BRUSH TOE
- PHOTO POINT & DIRECTION
- ROCK L-VANE
- ROCK CROSS VANE
- ROCK STEP STRUCTURE w/ BOULDERS
- ROCK STEP STRUCTURE w/ CLASS B RIP RAP
- FLOODPLAIN INTERCEPTOR
- ROCK / LOG CROSS VANE

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ROSES CREEK
STREAM RESTORATION PROJECT
BURKE COUNTY, NORTH CAROLINA

GRAPHIC SCALE
50 25 0 25
PLANS

DATE: 12-11-19

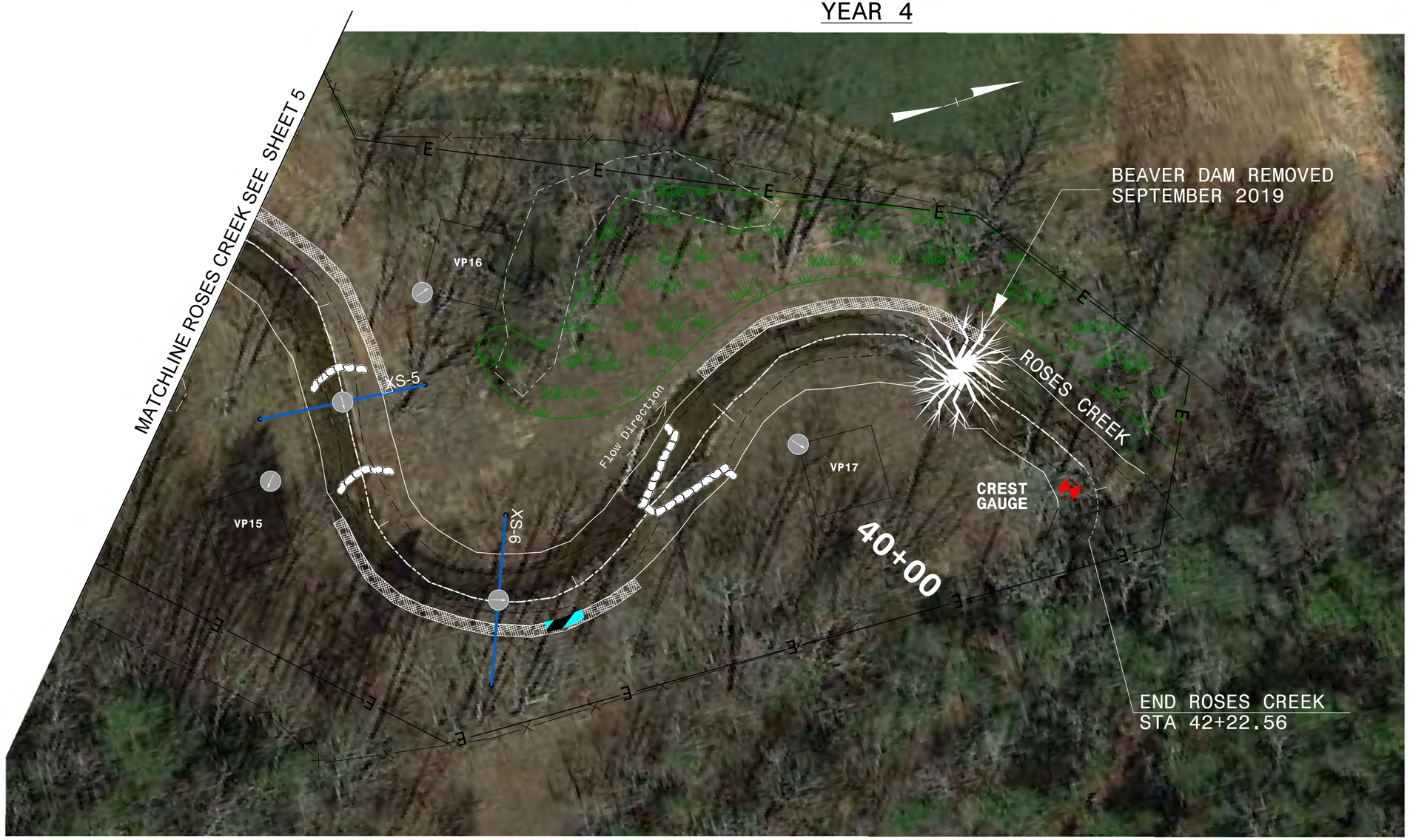
CCPV
YEAR 4

SHEET
5

EEP# 96309

$$$$$$$$SYSTIME$$$$$$$$
$$$$$$$$LOGIN$$$$$$$$
$$$$$$$$DWG$$$$$$$$

CURRENT CONDITIONS PLAN VIEW (CCPV)
YEAR 4



LEGEND

15+00 — ASBUILT ALIGNMENTS & STATIONING

THALWEG

BANKFULL

EPHEMERAL POOL

E — CONSERVATION EASEMENT

FENCE

CROSS-SECTION LOCATION

10 x 10 VEG PLOT

5 x 20 VEG PLOT

BRUSH TOE

PHOTO POINT & DIRECTION

CREST GAUGE

ROCK L-VANE

ROCK CROSS VANE

ROCK STEP STRUCTURE w/ BOULDERS

ROCK STEP STRUCTURE w/ CLASS B RIP RAP

FLOODPLAIN INTERCEPTOR

YEAR 4 CONDITIONS

BANK/BED CONDITION

MINOR EROSION

BEAVERDAM

VEGETATION PROBLEM AREAS

INVASIVE POPULATION

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ROSES CREEK
STREAM RESTORATION PROJECT
BURKE COUNTY, NORTH CAROLINA

GRAPHIC SCALE 50 25 0 25 PLANS

DATE: 12-11-19

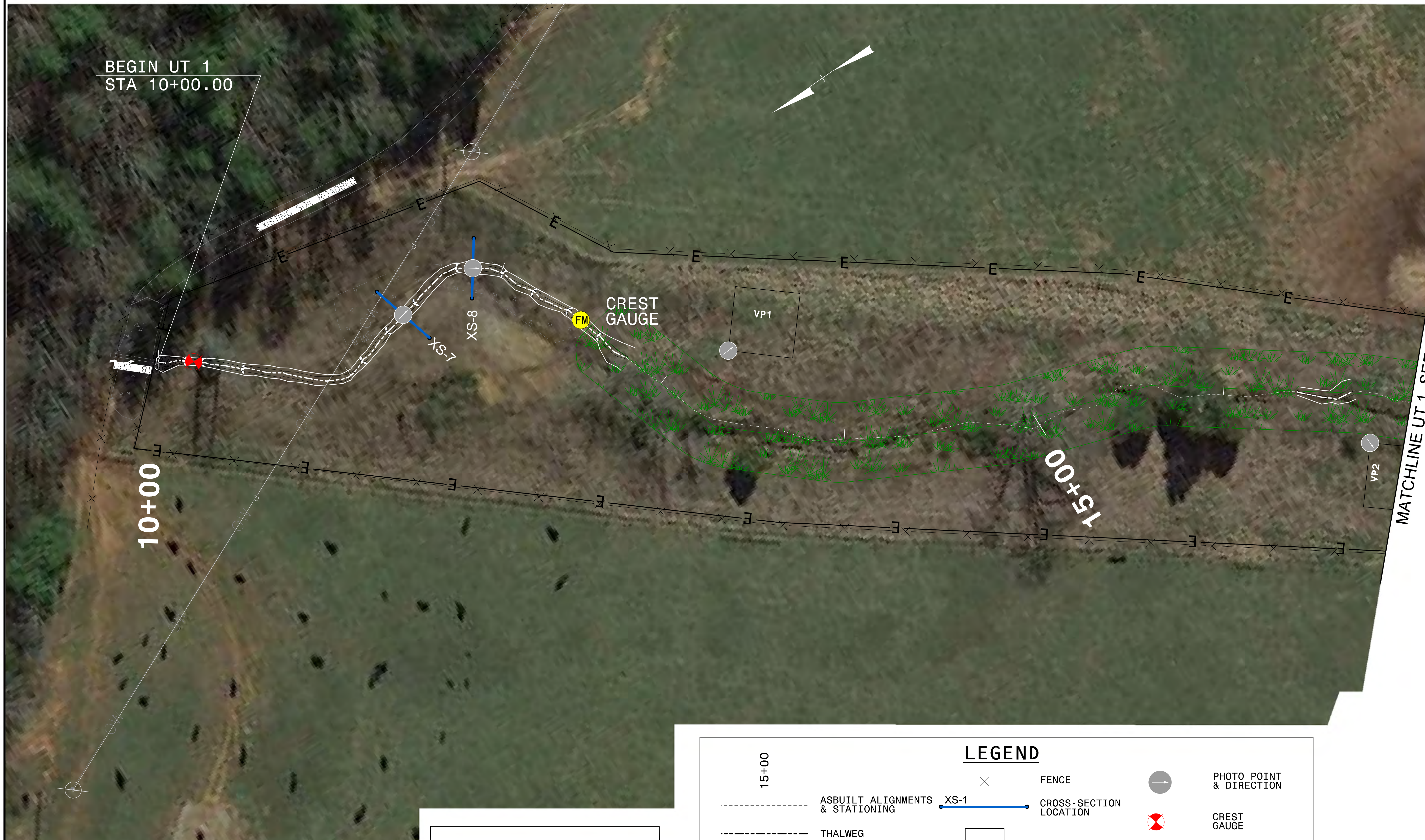
CCPV YEAR 4

SHEET 6

EEP# 96309

$$$$$$SYSTIME$$$$$
$$$$$$USERNAME$$$$$
$$$$$$SCENAME$$$$$

CURRENT CONDITIONS PLAN VIEW (CCPV)
YEAR 4



YEAR 4 CONDITIONS

VEGETATION PROBLEM AREAS

INVASIVE POPULATION

LEGEND

15+00 ASBUILT ALIGNMENTS & STATIONING

THALWEG

BANKFULL

EPHEMERAL POOL

CONSERVATION EASEMENT

FENCE

XS-1 CROSS-SECTION LOCATION

10 x 10 VEG PLOT

FLOW METER

POWER LINE

PHOTO POINT & DIRECTION

CREST GAUGE

ROCK STEP STRUCTURE w/ CLASS B RIP RAP

FLOODPLAIN INTERCEPTOR

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HDR

ROSES CREEK STREAM RESTORATION PROJECT
BURKE COUNTY, NORTH CAROLINA

GRAPHIC SCALE
25 0 25 50
PLANS

DATE: 12-11-19

CCPV YEAR 4

SHEET 7

EEP# 96309

CURRENT CONDITIONS PLAN VIEW (CCPV)
YEAR 4

LEGEND

- 15+00 — ASBUILT ALIGNMENTS & STATIONING
- THALWEG
- BANKFULL
- EPHEMERAL POOL
- E — CONSERVATION EASEMENT
- FENCE
- XS-1 — CROSS-SECTION LOCATION
- 10 x 10 VEG PLOT
- 5 x 20 VEG PLOT
- FM — FLOW METER
- PHOTO POINT & DIRECTION
- CREST GAUGE
- BRUSH TOE
- ROCK STEP STRUCTURE w/ CLASS B RIP RAP
- FLOODPLAIN INTERCEPTOR
- P — POWER LINE

YEAR 4 CONDITIONS

- 🟥 CONSTRUCTED BERM

BANK/BED CONDITION

- ▨ DEPOSITION (SILT)

GRAPHIC SCALE
25 0 25 50
PLANS

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ROSES CREEK
STREAM RESTORATION PROJECT
BURKE COUNTY, NORTH CAROLINA

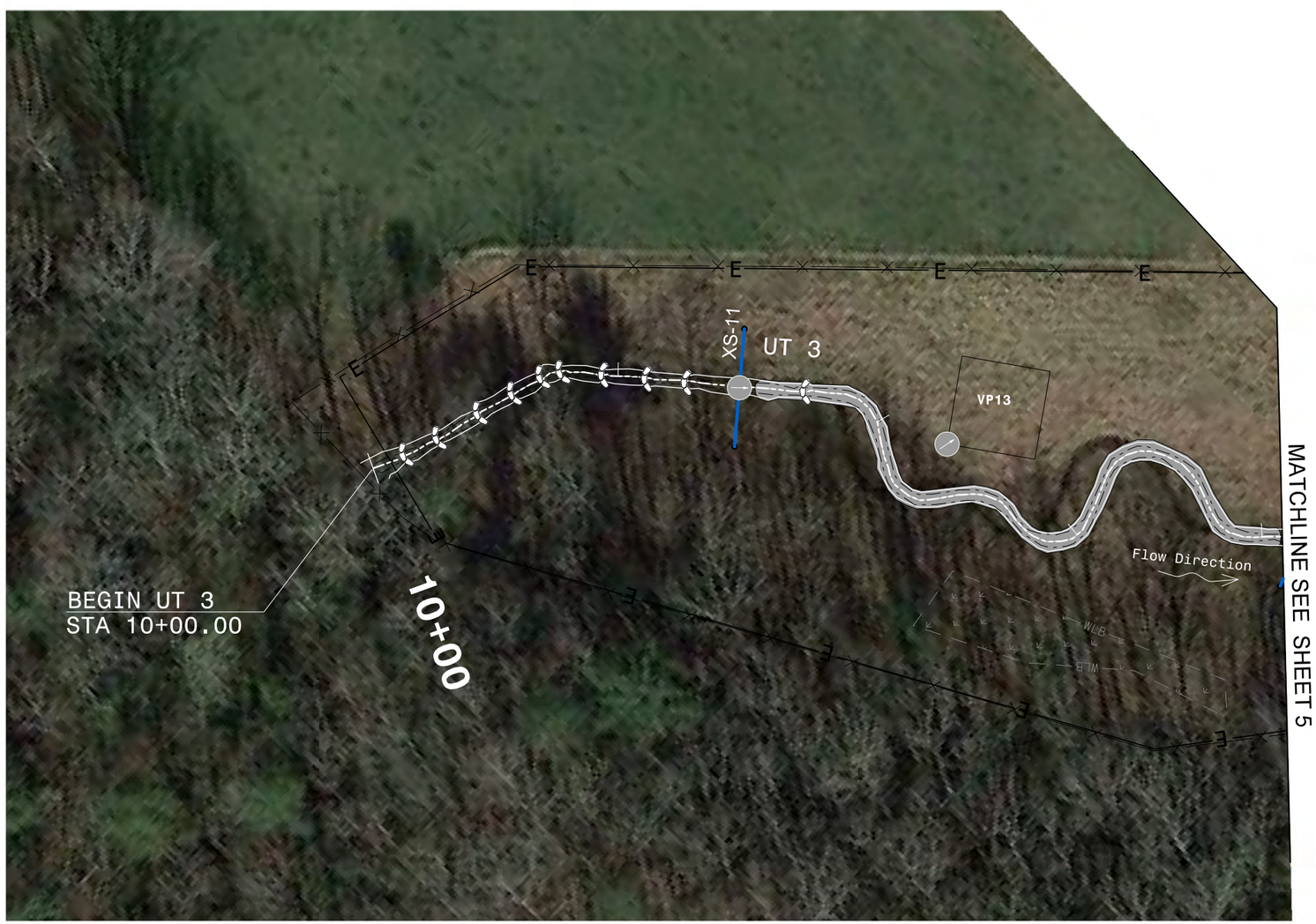
DATE: 12-11-19

CCPV
YEAR 4

SHEET
8

EEP# 96309

CURRENT CONDITIONS PLAN VIEW (CCPV)
YEAR 4



YEAR 4 CONDITIONS

BANK/BED CONDITION

▨ DEPOSITION (SILT)

LEGEND

15+00	ASBUILT ALIGNMENTS & STATIONING
	THALWEG
	BANKFULL
	EPHEMERAL POOL
E	CONSERVATION EASEMENT
×	FENCE
●	PHOTO POINT & DIRECTION
XS-1	CROSS-SECTION LOCATION
☐	10 x 10 VEG PLOT
WLB	EXISTING WETLANDS
	ROCK STEP STRUCTURE w/ CLASS B RIP RAP
	FLOODPLAIN INTERCEPTOR

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ROSES CREEK
STREAM RESTORATION PROJECT
BURKE COUNTY, NORTH CAROLINA

GRAPHIC SCALE
25 0 25 50
PLANS

DATE: 12-11-19

CCPV
YEAR 4

SHEET
9

EEP# 96309

Table 5: Visual Stream Morphology Stability Assessment

Reach ID: Roses Creek

Assessed Length: 3,121 FT

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
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	17	17			100%
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	18	18			100%
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	18	18			100%
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	17	17			100%
		2. Thalweg centering at downstream of meander (Glide)	17	17			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			8	160	97.0%
	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%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
				Totals	0	0	100.0%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	19	19			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	19	19			100%
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	19	19			100%
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	19	19			100%
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	19	19			100%

Table 5a: Visual Stream Morphology Stability Assessment
Reach ID: UT1
Assessed Length: 234 LF

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
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	0	0			100%
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	2	2			100%
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	2	2			100%
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	3	3			100%
		2. Thalweg centering at downstream of meander (Glide)	3	3			100%
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%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
				Totals	0	0	100.0%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	12	12			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	12	12			100%
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	12	12			100%
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	12	12			100%
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	12	12			100%

Table 5b: Visual Stream Morphology Stability Assessment
Reach ID: UT2
Assessed Length: 707 LF

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
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)			1	333	53%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	22	22			100%
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	21	21			100%
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	21	21			100%
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	22	22			100%
		2. Thalweg centering at downstream of meander (Glide)	22	22			100%
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%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
				Totals	0	0	100.0%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	21	21			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	21	21			100%
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	21	21			100%
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	21	21			100%
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	21	21			100%

Table 5c: Visual Stream Morphology Stability Assessment
Reach ID: UT3
Assessed Length: 620 LF

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
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)			1	255	59%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	13	13			100%
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	12	12			100%
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem 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 (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%
	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%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
				Totals	0	0	100.0%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	14	14			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	14	14			100%
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	14	14			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)	14	14			100%
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	14	14			100%

Table 6. Vegetation Condition Assessment

Planted Acreage **15.81**

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.	0.05 Acres	Pink polygons filled with green x's	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 Acres	Blue cross hatch pattern	0	0.0	0.0%
			Total			
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.1 Acres	Pattern and color.	0	0	0%
			Cumulative Total			

Easement Acreage **17.33**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF	Green grass pattern.	2	0.8	5%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	None	N/A	N/A	N/A	N/A

Figure 3.1 – 3.16 Problem Areas and Aerial Photos

3.1 Minor erosion at 19+50

3.2 Minor erosion at 20+10

3.3 Beaver dam near STA 41+25

3.4 Backwater effects from dam STA 38+00

3.5 Beaver dam removal near STA 41+25

3.6 UT 2 dense bank vegetation STA 10+75

3.7 Beaver dam at 31+50

3.8 Recent sediment deposits at head of UT 2

3.9 Privet downstream of 37+00

3.10 Privet downstream of 37+00

3.11 UT 1 aerial evidence of single channel flow

3.12 UT 1 aerial evidence of single channel flow

3.13 UT 2 aerial evidence of single channel flow

3.14 UT 2 aerial evidence of single channel flow

3.15 UT 3 aerial evidence of single channel flow

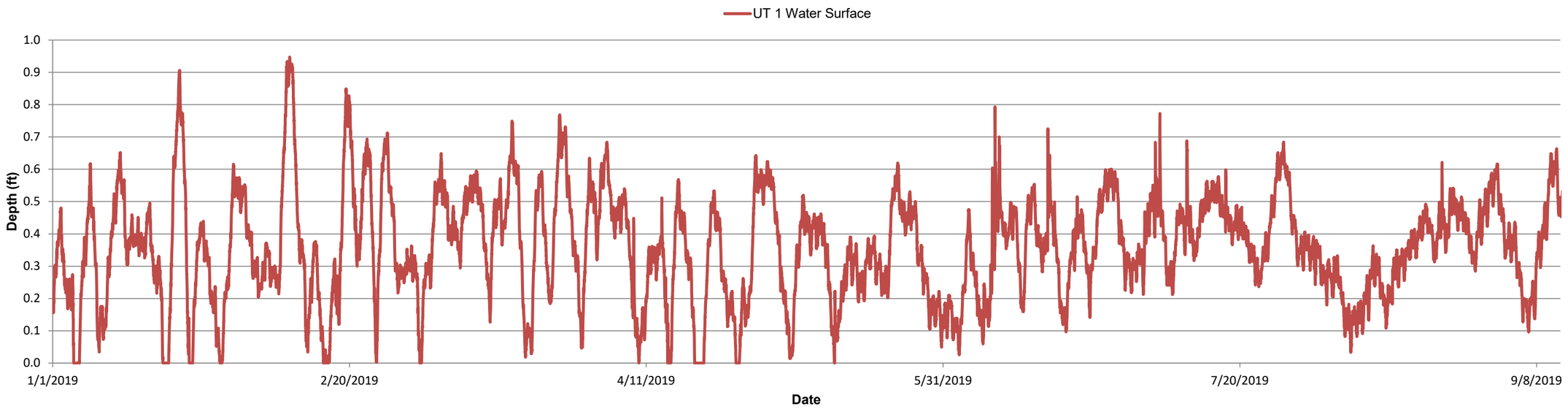
3.16 UT 3 aerial evidence of single channel flow

Appendix C. Hydrologic Data

Table 7. Verification of Bankfull Events

Date	Crest Gauge Info		Gauge Reading (ft)	Gauge Elevation (ft)	Crest Elevation (ft)	Bankfull Elevation (ft)	Height above Bankfull (ft)
	Site	Sta.					
10/5/2016	1	Roses Creek Lower	0.00	1212.11	N/A	1213.93	N/A
10/5/2016	2	UT 1	0.00	1267.45	N/A	1267.95	N/A
10/5/2016	3	UT 2	0.35	1227.81	1228.16	1228.19	N/A
10/5/2016	4	UT 3	0.25	1216.94	1217.19	1217.36	N/A
11/22/2016	1	Roses Creek Lower	0.00	1212.11	N/A	1213.93	N/A
11/22/2016	2	UT 1	0.00	1267.45	N/A	1267.95	N/A
11/22/2016	3	UT 2	0.00	1227.81	N/A	1228.19	N/A
11/22/2016	4	UT 3	0.35	1216.94	1217.29	1217.36	N/A
6/2/2017	1	Roses Creek Lower	1.89	1212.11	1214.00	1213.93	0.07
6/2/2017	2	UT 1	0.80	1267.45	1268.25	1267.95	0.30
6/2/2017	3	UT 2	1.50	1227.81	1229.31	1228.19	1.12
6/2/2017	4	UT 3	1.80	1216.94	1218.74	1217.36	1.38
8/15/2017	1	Roses Creek Lower	0.50	1212.11	1212.61	1213.93	N/A
8/15/2017	2	UT 1	0.38	1267.45	1267.83	1267.95	N/A
8/15/2017	3	UT 2	0.85	1227.81	1228.66	1228.19	0.47
8/15/2017	4	UT 3	1.64	1216.94	1218.58	1217.36	1.22
3/28/2018	1	Roses Creek Lower	2.83	1212.11	1214.94	1213.93	1.01
3/28/2018	2	UT 1	0.38	1267.45	1267.83	1267.95	N/A
3/28/2018	3	UT 2	2.50	1227.81	1230.31	1228.19	2.12
3/28/2018	4	UT 3	1.38	1216.94	1218.32	1217.36	0.96
8/6/2018	1	Roses Creek Lower	3.75	1212.11	1215.86	1213.93	1.93
8/6/2018	2	UT 1	1.13	1267.45	1268.58	1267.95	0.63
8/6/2018	3	UT 2	2.54	1227.81	1230.35	1228.19	2.16
8/6/2018	4	UT 3	2.92	1216.94	1219.86	1217.36	2.50
1/29/2019	1	Roses Creek Lower	2.68	1212.11	1214.79	1213.93	0.86
1/29/2019	2	UT 1	0.67	1267.45	1268.12	1267.95	0.17
1/29/2019	3	UT 2	1.29	1227.81	1229.10	1228.19	0.91
1/29/2019	4	UT 3	1.29	1216.94	1218.23	1217.36	0.87

Figure 4.1 UT 1 Water Level



Daily Precipitation

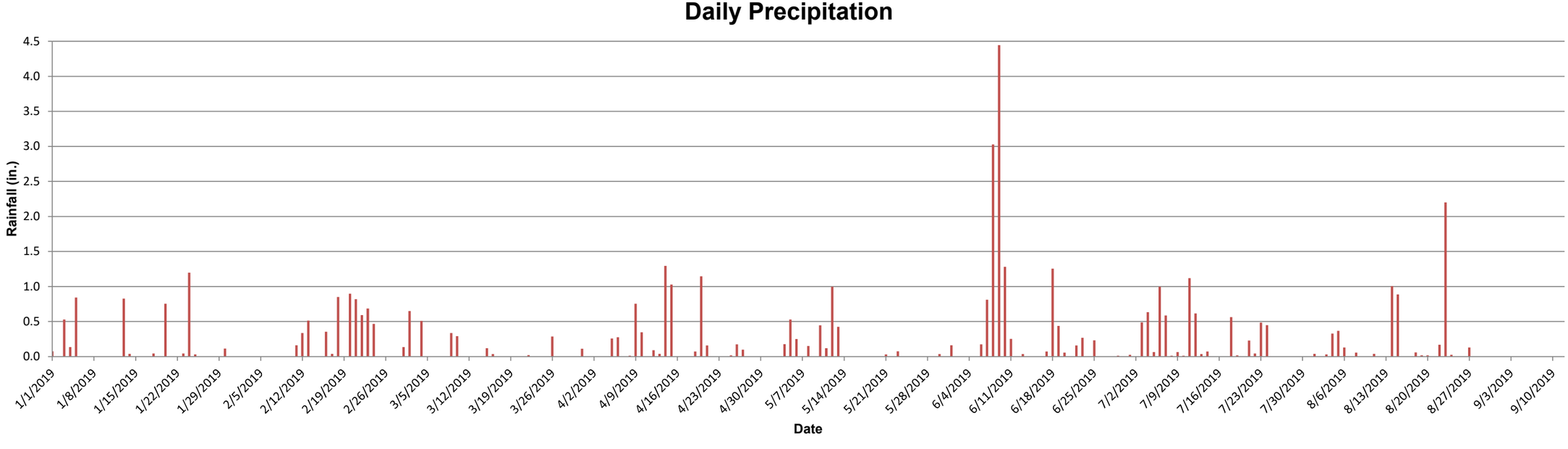
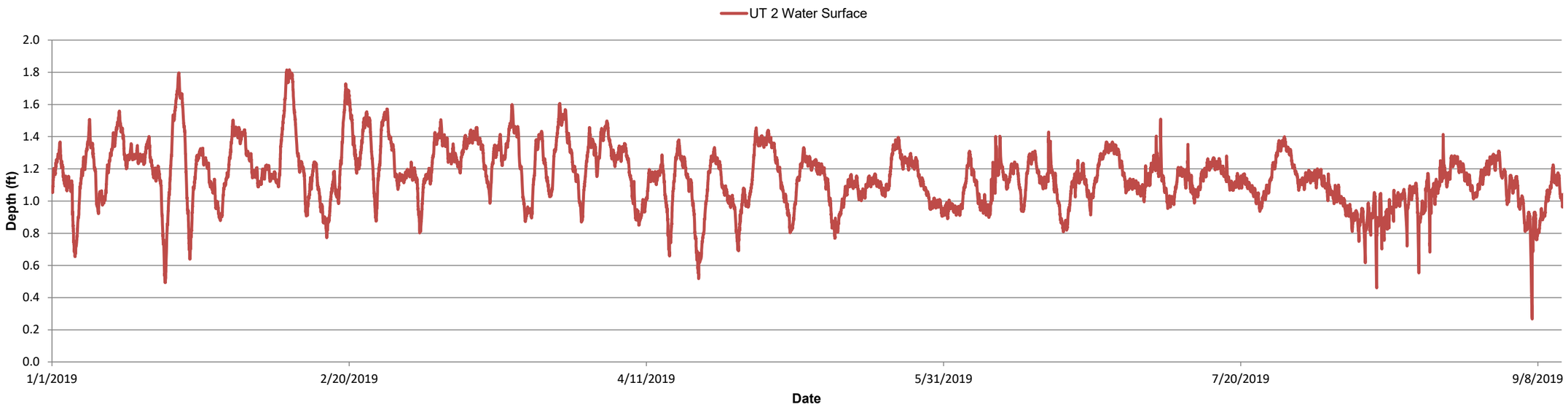


Figure 4.2 UT 2 Water Level



Daily Precipitation

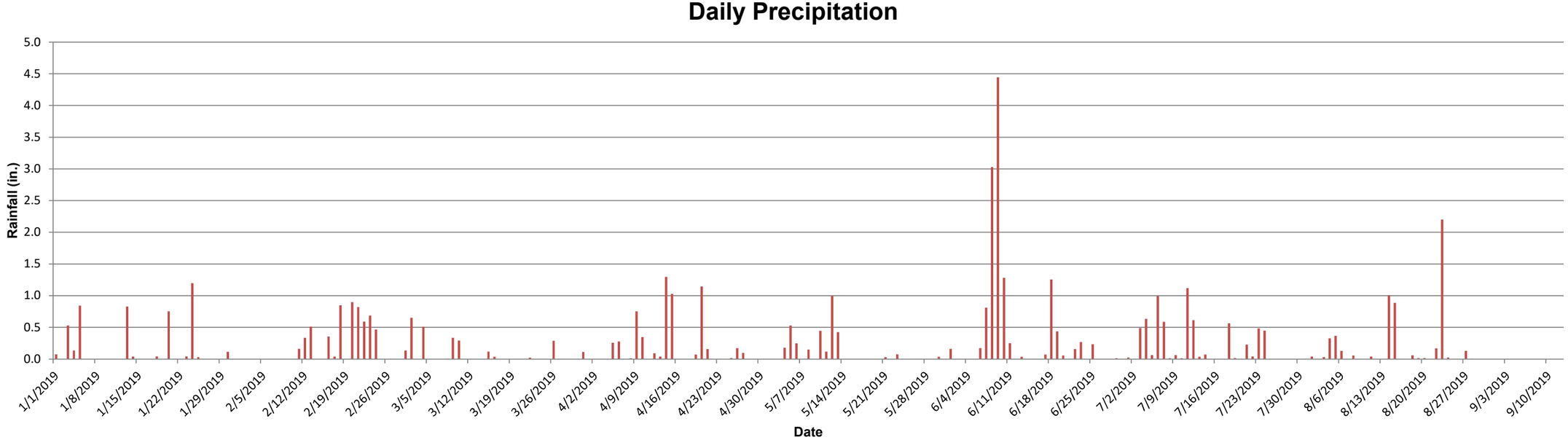
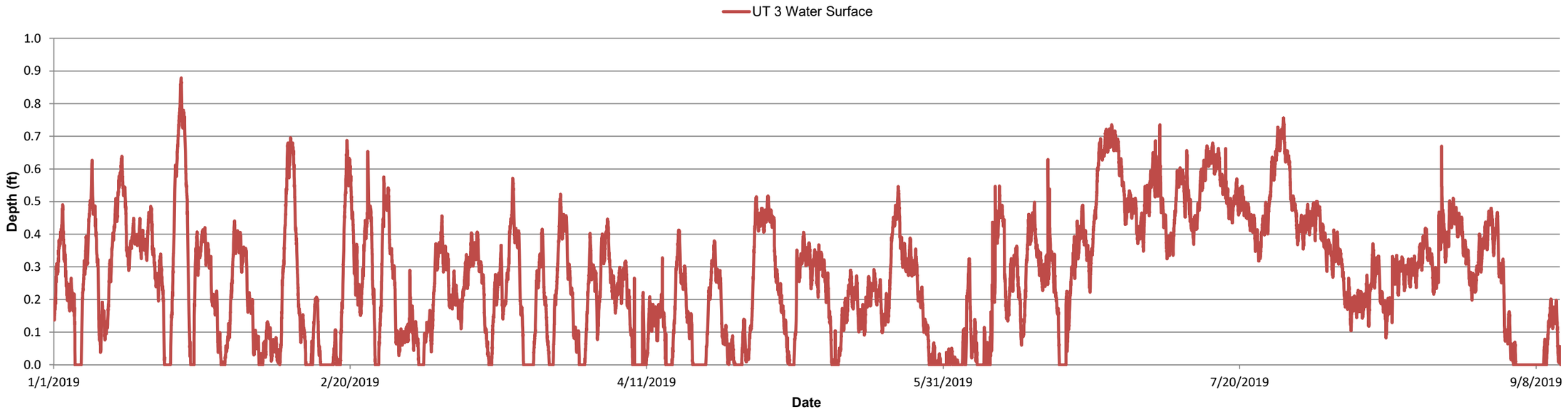
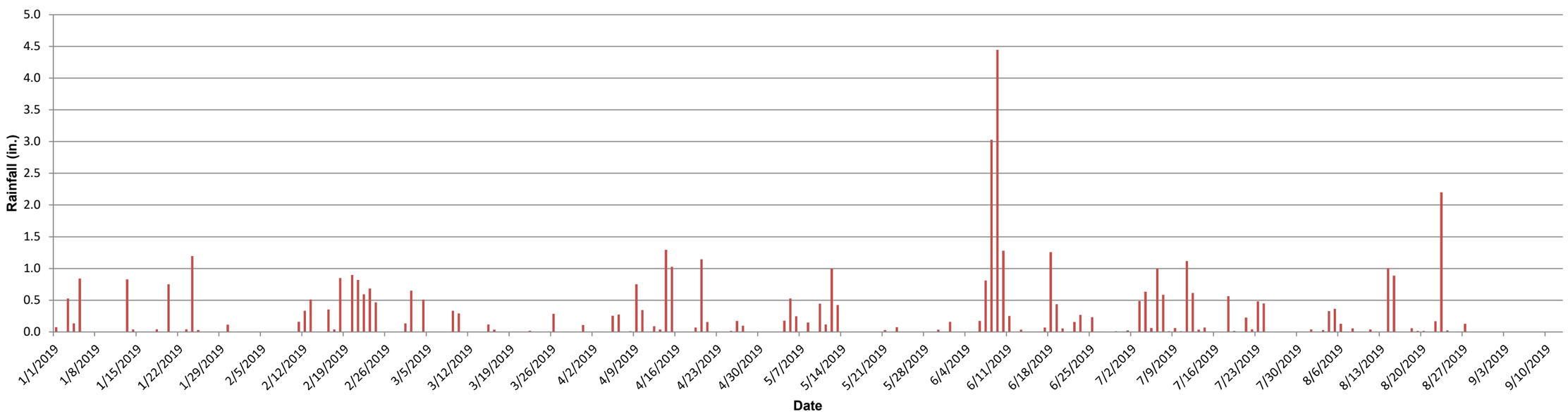


Figure 4.3 UT 3 Water Level



Daily Precipitation



Appendix D. IRT Meeting Minutes (08/27/2019)

Meeting Minutes

Project:	Roses Creek Stream Mitigation Site (DMS # 96309)	
Subject:	IRT Credit Release Meeting	
Date:	Tuesday, August 27, 2019	
Location:	Burke County	
Attendees:	Todd Tugwell (USACE)	Kim Browning (USACE)
	Mac Haupt (DWR)	Erin Davis (DWR)
	Paul Wiesner (DMS)	Harry Tsomides (DMS)
	Tim Baumgartner (DMS)	Melonie Allen (DMS)
	Joe Famularo (DMS)	Ryan Smith (HDR)
	Chris Smith (HDR)	

The IRT Credit Release Meeting for the Roses Creek Stream Mitigation Site was held at 9:00 AM on Tuesday, August 27, 2019 at the project site in Burke County. The following represents highlights of discussions that occurred during the site visit:

1. Chris Smith provided a synopsis of the project site to begin the meeting.
2. The IRT expressed concern over the following items at this stage in monitoring (year 4):
    a. Vegetation.
        i. 2 vegetation plots along UT 1 are not currently meeting success criteria
            1. Supplemental planting occurred during 2018.
        ii. Invasive Plants: Privet has been treated along UT 1 multiple times this year but no measures were taken prior to 2019.
    b. Repair areas along Roses Creek.
    c. Tributary discharge and maintenance of single thread channel as opposed to wetland complex.

Site Walk

1. Discussion regarding the current condition of the tributaries. UT 2 and UT 3 are the tributaries of concern:
    a. HDR observed that the monitoring cross sections for the tributaries do not show aggradation or significant alteration in cross sectional dimension.

b. HDR observed that the flow gauge data indicates all the tributaries meet performance standard requirements.
c. There is flow through the restored channels, however, there is also water flowing in the floodplains of UT 2 and UT 3.
d. Dense, low growing vegetation (juncus/carex/salix/polygonum) is prevalent along several reaches of UT 2 and UT 3's channel side slopes and floodplain. The IRT expressed concern that vegetation is constricting channel flow and could in the future cause enough aggradation within the channels to the point that they function as a linear wetland rather than the channel functioning as a stream. HDR reiterated that monitoring cross-sectional data confirms that the channel is maintaining its dimension even though the vegetation is admittedly dense which restricts the ability to visually identify sections of existing bed and bank within some restored channel reaches.
e. Some sediment entered the upstream extent of UT 2 due to a soil access road that had not been stabilized immediately following construction completion. The road is now stabilized, however there is still sediment that is slowly being mobilized downstream.
f. The IRT indicated that stream reaches proposed for stream mitigation credit should function as streams and be considered jurisdictional streams by the regulatory agencies at project closeout. The IRT noted that stream channels that are determined to be non-jurisdictional will not be eligible to receive stream mitigation credit. The IRT suggested documenting stream conditions with photos and videos during winter when plants are dormant in an effort to more clearly identify the channel bed and bank. The IRT noted that there has been allowances for providers to maintain vegetation on channel banks through the first two monitoring years. They did not recommend this for this site during the visit, but noted it as a potential tool for future sites.
g. There was discussion during the site walk on if flow gauges should be moved further upstream compared with their current locations. At the end of the walk it was determined that the tributaries appear to display sufficient flow and that it may not be necessary to relocate flow gauges.

2. Continued treatment of invasives including but not limited to privet and multi-flora rose is necessary though project closeout.
3. Vegetation on UT 1 was a concern prior to the site walk due to low survival rates within monitoring plots as noted in the monitoring report. However, during the site walk woody vegetation was noted to be dense along UT 1, displaying healthy vigor and survivability. HDR will review monitoring plots to determine if monitored vegetation within the plots is accurate and/or if vegetation with the plots is representative of survivability along UT 1 and will detail the information in the MY4 (2019) report.
4. Beaver have entered the site near the downstream terminus of restoration on Roses Creek (have built one dam and began a second). The IRT noted that beaver management should begin and removal of the dam is necessary. Beaver inspection, management and dam removal should be completed until project closeout.
    a. *NOTE: As of September 11, 2019 the beaver dams have been removed and an eradication program has begun through a contract with the USDA APHIS.*
5. The IRT noted that overall the site is functioning well (both streams, repairs from storm events and vegetation). The IRT noted issues on both UT 2 and UT 3 that have potential credit

implications. The IRT was willing to release stream credits for MY3 (2018) as long as the remaining amount of unreleased credits exceeded the potential stream credits associated with both UT2 and UT3. The IRT indicated that they would review the MY4 report and any supplemental data provided and discuss the project and additional project credit release at the 2020 IRT credit release meeting.

6. The IRT noted that HDR should document any adaptive management measures and discuss measures during the credit release meeting in April 2020. Any significant adaptive management must be pre-approved by the IRT before implementation.

-----Original Message-----
From: Tugwell, Todd J CIV USARMY CESAW (US) [mailto:Todd.J.Tugwell@usace.army.mil]
Sent: Monday, September 23, 2019 10:07 AM
To: Wiesner, Paul <paul.wiesner@ncdenr.gov>
Cc: Davis, Erin B <erin.davis@ncdenr.gov>
Subject: [External] FW: Roses Creek_DMS# 96309: IRT Credit Release Site Visit (8-27-19) Meeting Minutes

Paul, see below.
Thanks,
Todd

-----Original Message-----
From: Tugwell, Todd J CIV USARMY CESAW (US)
Sent: Friday, September 20, 2019 1:07 PM
To: 'Davis, Erin B' <erin.davis@ncdenr.gov>; Haupt, Mac <mac.haupt@ncdenr.gov>; Browning, Kimberly D CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Subject: RE: Roses Creek_DMS# 96309: IRT Credit Release Site Visit (8-27-19) Meeting Minutes

Paul, just a couple comments:
1. under the site walk, 1.f., I would stress that we do not want vegetation manipulation along the channel on this project, not that is just not recommended.
2. I believe we noted some evidence of livestock within the buffer that should be noted in the minutes.
Thanks,
Todd

-----Original Message-----
From: Davis, Erin B [mailto:erin.davis@ncdenr.gov]
Sent: Thursday, September 19, 2019 8:59 AM
To: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>; Haupt, Mac <mac.haupt@ncdenr.gov>; Browning, Kimberly D CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Subject: [Non-DoD Source] RE: Roses Creek_DMS# 96309: IRT Credit Release Site Visit (8-27-19) Meeting Minutes

These meeting minutes generally reflect my field notes with the noticeable omission of the evidence of cattle present along UT1. Also, I had noted that sections of the adjacent fencing connected to the easement area could use reinforcement (areas that were down and allowed us to cross) and it's recommended HDR notify the landowner.

Erin B. Davis, PWS

Stream & Wetland Mitigation Specialist

401 & Buffer Permitting Branch

Division of Water Resources

Department of Environmental Quality

919-707-3684 office

erin.davis@ncdenr.gov <mailto:erin.davis@ncdenr.gov>

From: Wiesner, Paul
Sent: Friday, September 13, 2019 10:48 AM
To: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>; Haupt, Mac <mac.haupt@ncdenr.gov>; Davis, Erin B <erin.davis@ncdenr.gov>; Kim Browning <Kimberly.D.Browning@usace.army.mil>
Cc: Smith, Ryan <Ryan.V.Smith@hdrinc.com>; Smith, Christopher <Christopher.L.Smith@hdrinc.com>; Allen, Melonie <melonie.allen@ncdenr.gov>; Famularo, Joseph T <Joseph.Famularo@ncdenr.gov>; Baumgartner, Tim <tim.baumgartner@ncdenr.gov>; Tsomides, Harry <harry.tsomides@ncdenr.gov>
Subject: Roses Creek_DMS# 96309: IRT Credit Release Site Visit (8-27-19) Meeting Minutes

All:

The meeting minutes from the August 27, 2019 Roses Creek IRT credit release site visit are attached for your review.

Please let us know if you have any additional comments, questions or concerns.

Chris and Ryan,

Please include the final meeting minutes (including any additional IRT comments) in the MY4 report as an Appendix.

Thanks

Paul Wiesner

Western Regional Supervisor

North Carolina Department of Environmental Quality

Division of Mitigation Services

828-273-1673 Mobile

paul.wiesner@ncdenr.gov <mailto:paul.wiesner@ncdenr.gov>

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