Year 7 Monitoring Report
Hudson Property

Beaufort County, North Carolina
Tar-Pamlico River Basin (USGS 03020104)

DMS Project ID #: 95361
DMS Contract #: 004638
DWR Project #: 20140422
USACE Action ID# SAW-2012-01394

Submitted: December 2022

Submitted to/Prepared for:
NC Department of Environment and Natural Resources
Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652

Prepared by:
ALBEMARLE RESTORATIONS, LLC
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ecotone
ecological restoration

Ecotone, LLC.
410.420.2600 (P)
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December 22, 2022

Mr. Jeremiah Dow
North Carolina Department of Environmental Quality
217 West Jones Street
1601 Mail Service Center
Raleigh, NC 27699

RE: Draft Year 7 Monitoring Report for Hudson Property – (DMS#: 95361) (Ecotone #1269)

Mr. Dow,

Ecotone, LLC. has addressed the comments made on December 7th, 2022 by DMS for the above referenced project. The following is a point-by-point response addressing those comments.

1. *Please remove reference to "Project Closeout Report" in the title. Recommend simply titling the document "Year 7 Monitoring Report."*
   Ecotone Response: Title has been changed.

2. *Recommend replacing language describing Reach 5 as a "swamp run" with more industry standard language such as "multi-thread" and/or "D" type channel.*
   Ecotone Response: "Swamp run" has been changed to the standard language of "multi-thread".

3. *Section 9 indicates that XS10 was moved 1 foot downstream. A cross section in the original location should still be completed, and the data/graph provided as normal. Any new, additional cross sections should be included as a separate graph (not overlain with years 0 – 6) with an explanation of what information is intended to be conveyed with the new data.*
   Ecotone Response: Addressed in Section 9. Vegetation limited the ability to get laser level shots directly at the cross section.

4. *On the CCPV, please show flow stations that malfunctioned as a different color or graphic and add to the legend.*
   Ecotone Response: The wells are now color-coded to match their status.

5. *Please indicate on the photo log heading the date or dates all photos were taken.*
   Ecotone Response: The date the photos were taken has been added to the Photo Log.

6. *In Table 11a, please verify the morphology data, specifically for XS6. The XS graph shows aggradation, and the max depth has decreased from 0.86 at AB to 0.60 in MY7, yet the LTOB cross sectional area is shown to have increased since MY0. Please verify or correct.*

Ecotone Response: A revision was needed in the "omit bankful" checkbox of the survey overlay file. This slightly decreased LTOB Cross Sectional Area, though they are still higher than previous years. This is likely because aggradation has increased channel width. An arrow indicating the Year 7 LTOB has been added to the cross section 6 chart.

7. *Some flow gauges show hydrology that dipped below the thalweg and yet was counted toward consecutive days of flow (Figure 5 for example). Recommend recalculating consecutive days of flow for MY7, and all prior years if possible, and updating Table 13 accordingly. Please remove footnotes that say "Ground water line may drop below thalweg…"*
   Ecotone Response: Consecutive days meeting flow was recounted for monitoring year 7 and adjusted on the graphs, as well as in Table 13.
   Comment Revisited 1/6/2023: Consecutive days meeting flow was also recalculated for all 10 wells from monitoring years 1-6. All the changes listed above can be seen in the updated Table 13.

8. *Vegetation data is missing from submission. The summary table has been submitted but no data sheets/database or excel data tables were submitted. This project is subject to height requirement as well and no summary or data was submitted.*
   Ecotone Response: Field data sheet has been added with the summary table. Data was recorded on the summary table from MY5 (2020).

9. *The cross-section submission is missing graphs in many cases.*
   Ecotone Response: The cross section excel file has been updated to show the correct cross section for MY7.

10. *The Stream visual assessment table for reach 3 indicates 20 feet of scoured and eroded banks per the table, the submission was missing the required shapefile. This location needs to be indicated on the CCPV as well. If the area has been revegetated and/or repaired, or has not shown further signs of instability, please discuss briefly in Section 9.*
    Ecotone Response: The shapefile has been added to the CCPV as a yellow line, as per the CCPV depiction for eroding banks.

Thank you for your consideration of this application. We appreciate your assistance with our project thus far, and we look forward to working with you to complete the review process. Feel free to contact us at 410-420-2600.

Sincerely,

Wesley Rhoades

Environmental Technician

Ecotone LLC

cc. Ed Temple, Albemarle Restorations, LLC

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Tables and Figures

1.0 PROJECT SUMMARY

The Hudson Property stream restoration project is 13.49 acres located within a larger 106-acre property owned by Justin Hill. It is located in Beaufort County, NC and the Tar-Pamlico River Basin (USGS 03020104). Mitigation components include five stream reaches totalling 2,891 linear feet contained within a Conservation Easement. Construction was completed in 2015 and planting completed in 2016. The first of seven monitoring years was initiated in 2016. Year 7 monitoring was completed October 4-6, 2022.

2.0 PROJECT GOALS AND OBJECTIVES

The project goals of the Hudson Property stream restoration project per the approved mitigation plan are as follows:

- Improve and sustain hydrologic connectivity/interaction and storm flow/flood attenuation.
- Reduce nutrient and sediment stressors to the reach and receiving watershed.
- Provide uplift in water quality functions.
- Improve aquatic and terrestrial habitats (complexity, quality).
- Improve and maintain riparian buffer habitat.

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

- Implement a sustainable, reference-based, rehabilitation of the reach dimension, pattern, and profile to provide needed capacity and competency.
- Support the removal of barriers to anadromous fish movement and to help improve nursery and spawning habitats.
- Strategically install stream structures and plantings designed to maintain vertical and lateral stability and improve habitat diversity/complexity.
- Provide a sustainable and functional bankfull floodplain feature.
- Enhance and maintain hydrologic connection between stream and adjacent floodplain/riparian corridors.
- Utilize the additional width of the multi-thread channels to provide natural filters for sediment and nutrients and diffuse flow from upstream runoff.
- Install, augment, and maintain an appropriate riparian buffer with sufficient density and robustness to support native forest succession.
- Encourage water quality enhancement through riparian forest planting and woody material installation, and increased floodplain interaction/overbank flooding.
- Restore the existing ditched streams to single and multi-thread headwater systems with forested riparian buffers.
- Provide ecologically sound construction techniques that will require minimal grading and disturbance.

3.0 PROJECT SUCCESS CRITERIA

3.1 Stream Restoration Performance Standards

Single Thread Channels (Reaches 1 - 4) and Multi-Thread Channel (Reach 5):

Groundwater monitoring wells are installed in and near the thalweg of all five reaches. The wells are equipped with continuous–reading gauges capable of documenting sustained flow. Per the approved Mitigation Plan, each reach must exhibit water flow for at least 30 consecutive days during years with normal rainfall (demonstrating at least

intermittent stream status). All restored channels shall receive sufficient flow through the monitoring period to maintain an Ordinary High-Water Mark (OHWM). Field indicators of flow events include a natural line impressed on the bank; shelving; changes in soil characteristics; destruction of terrestrial vegetation; presence of litter and debris; wracking; vegetation matted down, bent, or absent; sediment sorting; leaf litter disturbed or washed away; scour; deposition; bed and bank formation; water staining; or change in plant community. In addition, two overbank flows shall be documented for each reach during the monitoring period using continuously monitored pressure transducers and crest gauges. All collected data and field indicators of water flow shall be documented in each monitoring report. Seven flow monitoring stations are located on Reaches 1 – 4, three are located on Reach 5.

3.2 Stream Channel Restoration Stability Performance Standards

Headwater System (Reach 5):

All stream areas shall remain stable with no areas of excessive erosion such as evidence of bank sloughing or actively eroding banks due to the exceedance in critical bank height and lack of deep-rooted stream bank vegetation.

Single Thread Channels (Reaches 1 - 4):

1. Bank Height Ratio (BHR) shall not exceed 1.2 within restored reaches of the stream channel.
2. Entrenchment Ratio (ER) shall be no less than 2.2 within restored reaches of the stream channel.
3. The stream project shall remain stable and all other performance standards shall be met through two separate bankfull events, occurring in separate years, during the 7-year post construction monitoring period.
4. Three bank pin arrays and 11 cross sections are located on Reaches 1 – 4.

3.3 Planted Vegetation Performance Standards

1. At least 320 three-year-old planted stems/acre must be present after year three. At year five, density must be no less than 260 five-year-old planted stems/acre. At year 7, density must be no less than 210 seven-year-old planted stems/acre.
2. If this performance standard is met by year 5 and stem density is trending toward success (i.e., no less than 260 five-year-old stems/acre) monitoring of vegetation on the site may be terminated provided written approval is provided by the USACE in consultation with the North Carolina Interagency Review Team (NCIRT).
3. Thirteen vegetation plot samples are located within the project area.

4.0 SITE CONDITIONS AND DESCRIPTION

Much of the site has been used for crop production, primarily corn, soybeans, and wheat. As a result of the lowering of local water tables, and in some cases the complete elimination of ground and surface water interaction, the degradation of water quality and downstream anadromous fish spawning/nursery habitat has occurred. Hydric soils are present on site, meaning that the pre-existing site conditions were appropriate for raising the water table and re-establishing normal base flow conditions (See Figure 1 -Vicinity Map).

5.0 MITIGATION COMPONENTS

Mitigation components are limited to five reaches: Reach 1: 833 lf; Reach 2: 532 lf; Reach 3: 445 lf; Reach 4: 437 lf; Reach 5: 644 lf, for a total restored stream footage of 2,891 lf (Table 1).

6.0 DESIGN APPROACH

A natural design approach was used to restore channel sinuosity and flow of headwater streams, which existed prior to channelization. Grading was designed to decrease sediment load and erosion rate while allowing for floodplain connectivity and storage for overland flow. Banks were graded down to distribute flow velocity and the banks and riparian buffers were planted to stabilize the channel and create habitat. A combination of Priority 1 and Priority II restoration types were used. Where the proposed channels tied into the existing, non-restored channels, Priority II restoration was used.

7.0 CONSTRUCTION AND PLANTING TIMELINE

Construction commenced in December 2014, with the installation of recommended erosion control practices, and was completed in May 2015. Planting was officially concluded in early January 2016. (Table 2 – Project History Table)

8.0 PLAN DEVIATIONS

There were no significant deviations between construction plans and the As-built conditions.

9.0 PROJECT PERFORMANCE

The Hudson stream restoration project is currently meeting functional goals and objectives. Annual monitoring took place in October and revealed the presence of bankfull events, floodplain connectivity, and lateral and vertical stability. In-stream structures were observed to be functioning as intended with minimal scouring of the bed or banks. Bankfull events were observed for Years 1 through Year 7. The site is meeting the bankfull standard for success. The entire length of the project is currently exhibiting fully vegetated banks with both herbaceous and woody plants. Overall, woody plantings within the riparian buffer are meeting project goals. Some dieback of planted stems occurred in previous years, but reintroduction of other woody vegetation has been noted in all monitoring plots. Tree heights range from 4-20 feet, with an approximate average of 12 feet (2022 data). Stream gauges indicated base flow and bankfull events at 5 out of 10 locations. Baseflow and bankfull events could not be confirmed at Wells 1,2,6,7 due to the loggers' battery being dead, leading to the data being unreadable. Well 10 could also not be evaluated because the well cap and logger were disturbed; the base station also malfunctioned during the monitoring effort, preventing download of the annual data. Although the loggers were not functioning, ordinary high-water marks were present at wells 1,2,6,7, and 10. Areas around Well 1 showed vegetation matted down and water staining (Current Condition Photo Log: Photo 14). The area at well 2 showed vegetation matted down and leaf litter disturbance (Photo 15). The area at well 6 showed matted vegetation and change in vegetation (Photo 23). The areas around well 7 showed vegetation matted down, water stains, and leaf litter disturbance (Photo 19). Well 10 was in standing water on the multi-thread reach 5, see "Appendix E–Well Data Logger Status" for the photograph. Base flow and bankfull events are assumed to have occurred based on conditions seen during monitoring and information from adjacent wells.

During MY 7, bank pins could not be located due to dense vegetative growth; erosion is therefore assumed to be minimal given the vegetative stability of the reaches. Bank pins also couldn't be found in MY 5. Aggradation was noted on Reaches 2 and 3 in MY 5, though slightly less than in MY 3; both reaches remain stable, and no changes were seen from MY 5 to MY 7. In MY 7 stream cross sections are meeting objectives in 11 out of 11 locations. Cross section 10 on reach one was pulled a foot downstream of previous years due to excessive vegetation at the original cross section, leading to inability to properly obtain laser readings. The cross section was able to be pulled a foot downstream of the original, hence explaining the change in the cross-sectional

profile on page 53, although still functioning properly. The original cross section location visually represented profiles from previous years.

Previous corrective measures included regrading Reach 5 to raise the stream invert to create a wider multi-thread channel. This was identified during a field meeting with NC Division of Mitigation Services and the USACE in June 2017 and completed in October 2017. A field meeting with NC Division of Mitigation Services and the USACE in April 2018, identified two monitoring wells that required repair; repair was completed. Year 1 Monitoring identified some areas where woody survivability was low; these areas were spot planted in December 2017. In Year 3, Vegetation Plot 6, and other small areas on Reach 1 and 2, appeared to have slightly low woody survivability. These areas were spot planted in October 2019, though the areas were smaller than 0.1 acres and were not included in the CCPV. Also, approximately 20 feet of minor bank scour was present on Reach 3, starting at cross-section 2 and moving downstream on the left bank. There are no signs of further instability. No additional corrective measures are necessary.

10.0 METHODS AND REFERENCES

Monitoring methodology did not differ from the approved Mitigation Plan. Cross-section dimensions were collected using standard survey methods. Vegetation assessment was done according to the Level 2 protocol specified by the Carolina Vegetation Survey. Hydrology monitoring wells were installed per ERDC TN-WRAP-00-02 "Installing Monitoring Wells/Piezometers in Wetlands" dated 2000. Groundwater levels were recorded using the U20-001-01 water level data loggers manufactured by Onset Computer. The loggers were installed in the wells per the manufacturer's instructions.

Vegetation plot data for 2022 was recorded in the field on the previous years "Veg Plot Count and Densities" table. If the counts differed from those on the previous years chart, the new count was penciled in. A scanned sheet is provided in Appendix X that shows MY5 counts, with the new counts from MY7 penciled in.

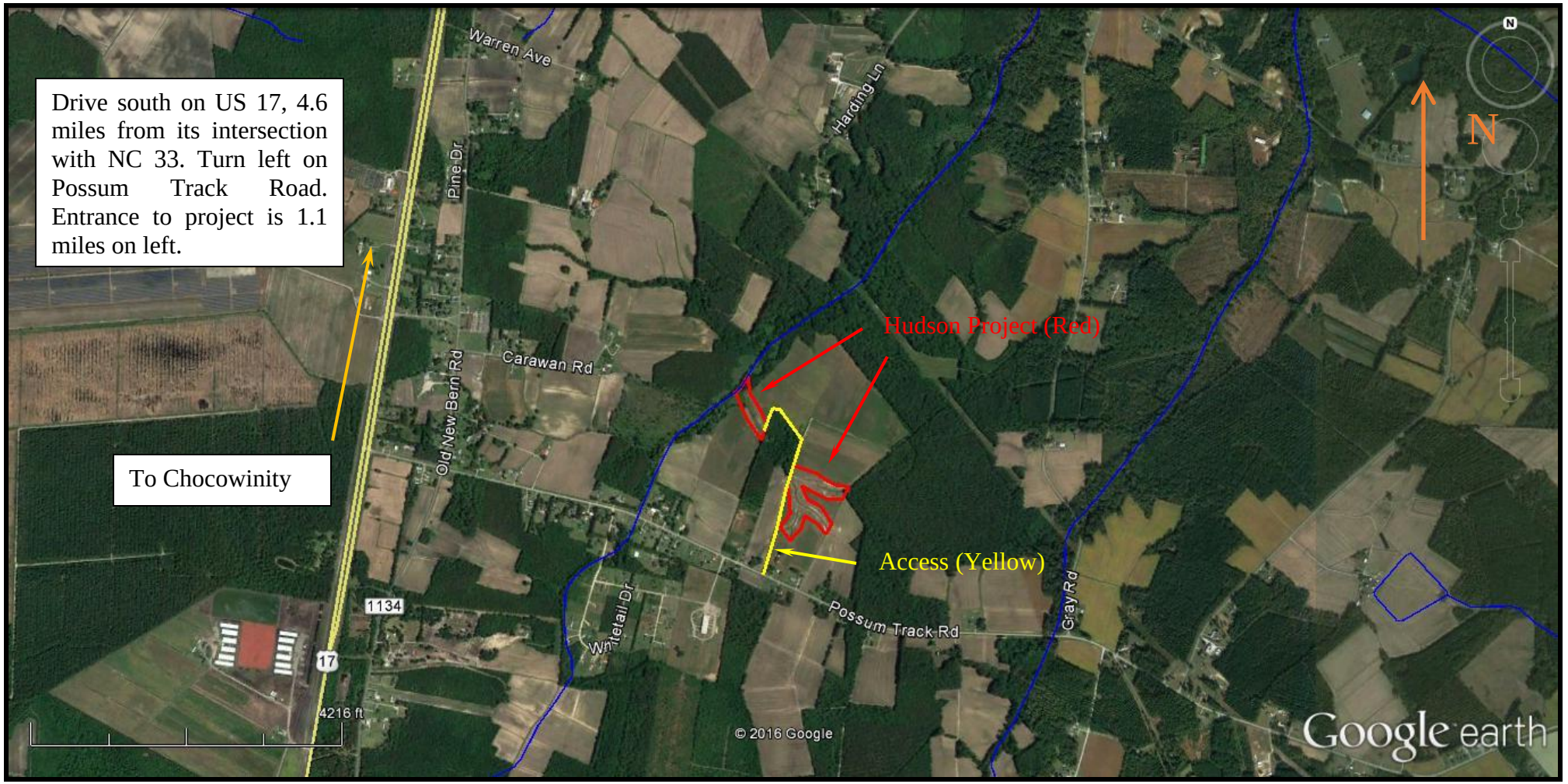


Figure 1: Vicinity Map

Hudson Stream Mitigation Project
DMS Project #95361
Beaufort County, NC

APPENDIX A: PROJECT BACKGROUND TABLES

Table 1. Project Components and Mitigation Credits

Table 2. Project Activity and Reporting History

Table 3. Project Contacts

Table 4. Project Information and Attributes

Figure 2: Topography Figure – USGS Topo Map

Figure 3: Soils

Table 1: Project Components and Mitigation Credits

Table 1: Project Components and Mitigation Credits
Hudson Property, Beaufort County
EEP Project Number: 95361

Mitigation Credits

	Stream		Riparian wetland		Non-riparian wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	2,891								

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
Reach 1		766 LF	PI		833 LF	1:1
Reach 2		516 LF	PI/PII		532 LF	1:1
Reach 3		611 LF	PI/PII		445 LF	1:1
Reach 4		503 LF	PI/PII		437 LF	1:1
Reach 5		689 LF	PI		644 LF	1:1
Total		3,085 LF			2,891 LF	

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-riverine			
Restoration	2,891 LF					
Enhancement						
Enhancement I						
Enhancement II						
Creation						
Preservation						

BMP Elements

Element	Location	Purpose/Function	Notes
FB	Adjacent to stream	Buffer	100 feet on either side of stream centerline

Table 2: Project Activity and Reporting History

Table 2: Project Activity and Reporting History Hudson Property- EEP Project Number 95361		
Activity, Deliverable, or Milestone	**Data Collection Complete**	**Actual Completion or Delivery**
Project Institution	N/A	June 2012
Mitigation Plan	July 2014	Oct 2014
Permits Issued	March 2013	May 2014
Final Design Construction	March 2013	May 2014
Construction	N/A	May 2015
Containerized, Bare Root, and B&B Planting	N/A	January 2016
Baseline Monitoring Document (Year 0 - Baseline)	January 2016	August 2016
Year 1 Monitoring	September 2016	Final: January 2017
Year 2 Monitoring	November 2017	Final: January 2018
Year 3 Monitoring	October 2018	Final: March 2019
Year 4 Monitoring	October 2019	Final: January 2020
Year 5 Monitoring	October 2020	Final: December 2020
Year 6 Monitoring	October 2021	Final: February 2022
Year 7 Monitoring	October 2022	Final: November 2022

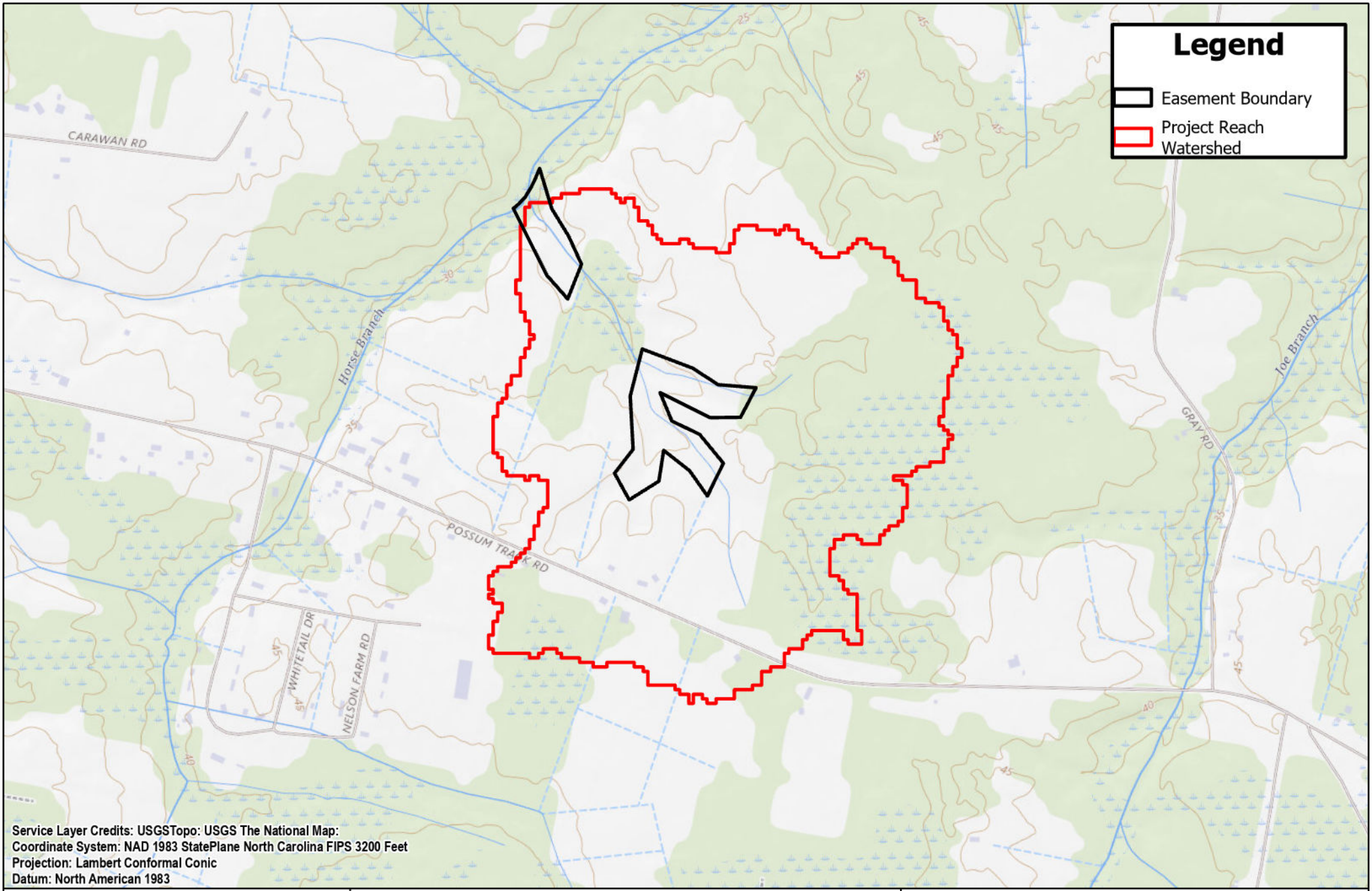
Table 3: Project Contacts

Table 3: Project Contacts Hudson Property- EEP Project Number: 95361	
Primary Project Design POC	Ecotone, LLC. Scott McGill (410) 420-2600 129 Industry Lane, Forest Hill, MD 21050
Construction Contractor POC	Riverside Excavation, Inc. Car Baynor (252) 943-8633
Survey Contractor POC	True Line Surveying Curk Lane (919) 359-0427
Planting and Seeding Contractor POC	Carolina Silvics, Inc. Mary Margaret McKinney (252) 482-8491 908 Indian Trail Road, Edenton, NC 27932
Seed Mix Sources	Ernst Conservation Seeds, LLP, Meadville, PA
Nursery Stock Suppliers	Carolina Silvics, Inc.
Monitoring Performers Stream and Vegetation POC	Ecotone, LLC. Scott McGill (410) 420-2600 129 Industry Lane, Forest Hill, MD 21050

Table 4: Project Information

Table 4: Project information **Hudson Property- EEP Project Number: 95361**					
Project name	HUDSON PROPERTY				
County	BEAUFORT				
Project Area (ac)	13.4 AC				
Project Coordinates (Lat and Long)	77˚ 06" 13.62' W / 35˚ 26" 53.20' N				
4.1 Project Watershed Summary Information					
Physiographic province	INNER COASTAL PLAIN				
River basin	TAR-PAMLICO RIVER BASIN				
USGS Hydrologic Unit 8-digit	03020104	USGS Hydrologic Unit 14-digit	03020104010010		
DWQ Sub-basin	CHOCOWINITY CREEK – HORSE BRANCH				
Project Drainage Area (acres)	190.86				
Project Drainage Area Percentage of Impervious Area	1.2 % (2.24 acres)				
CGIA Land Use Classification	2.01.01.07 Annual Row Crop Rotation				
4.2 Reach Summary Information					
Parameters	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5
Length of reach (linear feet)	766	516	611	503	689
Valley classification	VIII	VIII	VIII	VIII	VIII
Drainage area (acres)	40.51	74.63	35.21	150.35	190.86
NCDWR stream identification score	20.75	20.75	20.75	20.75	28
NCDWR Water Quality Classification	C;NSW	C;NSW	C;NSW	C;NSW	C;NSW
Morphological Description (stream type)	G5-G6	G5-G6	G5-G6	G5-G6	G5-G6
Evolutionary trend	Early (CEM)	Early (CEM)	Early (CEM)	Early (CEM)	Early (CEM)
Underlying mapped soils	GoA & CrB	CrB & Ly	CrB & Ly	CrB	CrB & Me
Drainage class	MW	MW & SP	MW & SP	MW	MW & P
Soil Hydric status	Non-Hydric	Non-Hydric	Non-Hydric	Non-Hydric	Hydric
Slope (ft/ft)	0.009	0.006	0.008	0.004	0.003
FEMA classification	N/A	N/A	N/A	N/A	AE/X
Native vegetation community	Pasture/Crop	Pasture/Crop	Pasture/Crop	Pasture/Crop	Pasture/Crop
Percent composition of exotic invasive vegetation	N/A	N/A	N/A	N/A	N/A
4.3 Regulatory Considerations					
Regulation	Applicable?	Resolved?	Supporting Documents		
Waters of the United States – Section 404	YES	YES	Supporting Documents		
Waters of the United States – Section 401	YES	YES	SAW-2012-01394		
Endangered Species Act	NO	YES	NA		
Historic Preservation Act	NO	YES	NA		
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	NO	YES	NA		
FEMA Floodplain Compliance	NO	YES	NA		
Essential Fisheries Habitat	NO	YES	NA		

Figure 2: Topography Figure - USGS Topo Map



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USGS TOPOGRAPHIC MAP
HUDSON STREAM RESTORATION PROJECT

Project Coordinates : 77° 06″ 13.62′ W / 35° 26″ 53.20′ N

SCALE: 1" = 10,000'

DMS PROJECT NO: 95361

DATE: 10/18/2022

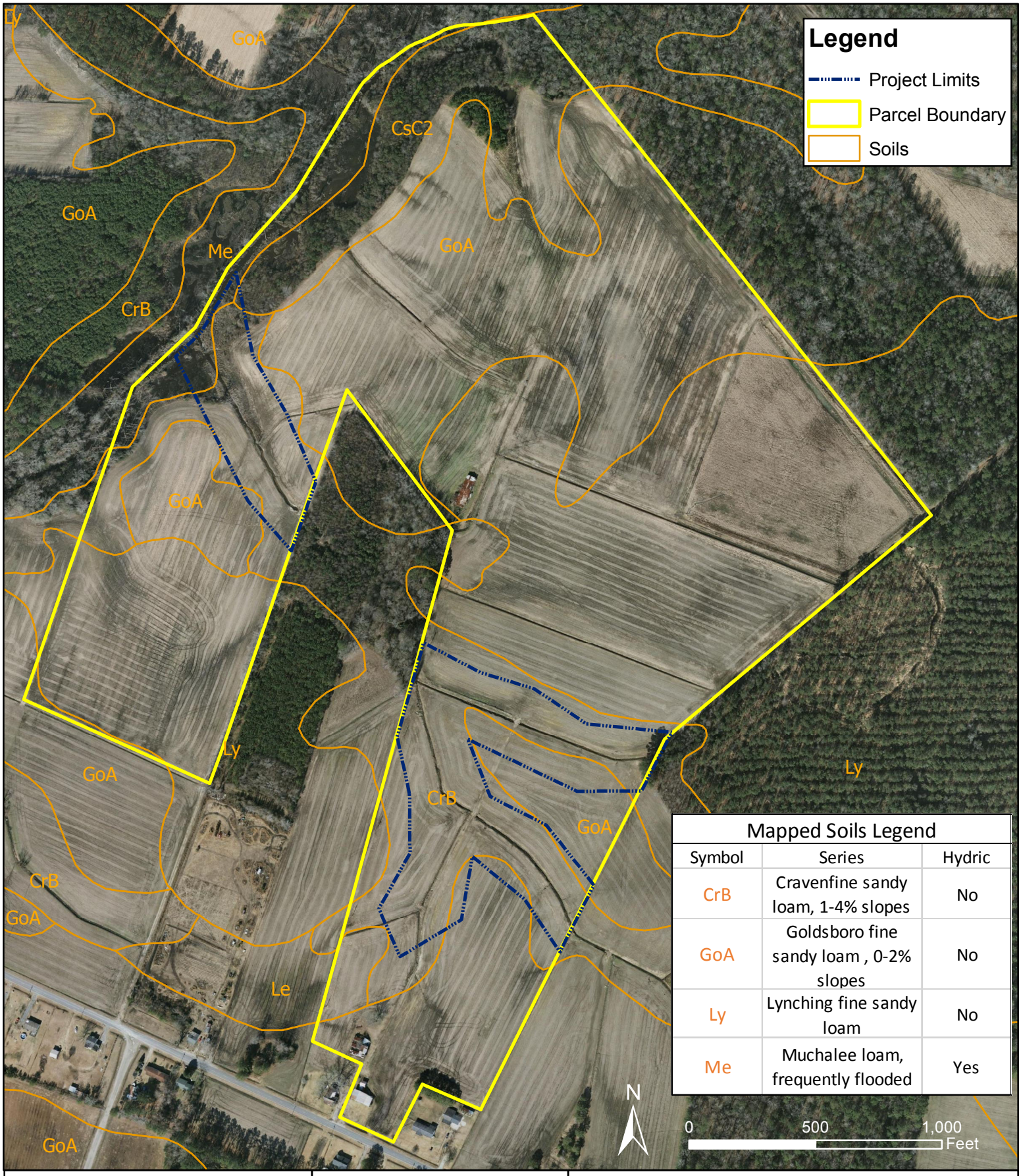
DRAWN BY: WCR

PROJECT MANAGER: ET

N

SHEET #1

Figure 3: Soils



Mapped Soils Legend

Symbol	Series	Hydric
CrB	Cravenfine sandy loam, 1-4% slopes	No
GoA	Goldsboro fine sandy loam , 0-2% slopes	No
Ly	Lynching fine sandy loam	No
Me	Muchalee loam, frequently flooded	Yes

ALBEMARLE RESTORATIONS, LLC

WETLAND RESTORATION,
STREAM RESTORATION,
& WILDLIFE HABITAT CREATION

P.O. BOX 176 FAIRFIELD, NC 27826
(252)333-0249 FAX (252)926-9983

EXHIBIT C

NRCS SOIL SURVEY

SCALE: 1 inch = 500 feet

HUDSON PROPERTY
EEP# 004638
TAR-PAMLICO RIVER BASIN
CHOCOWINITY CREEK TLW
(HUC: 03020104010010)

Ecosystem Enhancement PROGRAM

APPENDIX B: VISUAL ASSESSMENT DATA

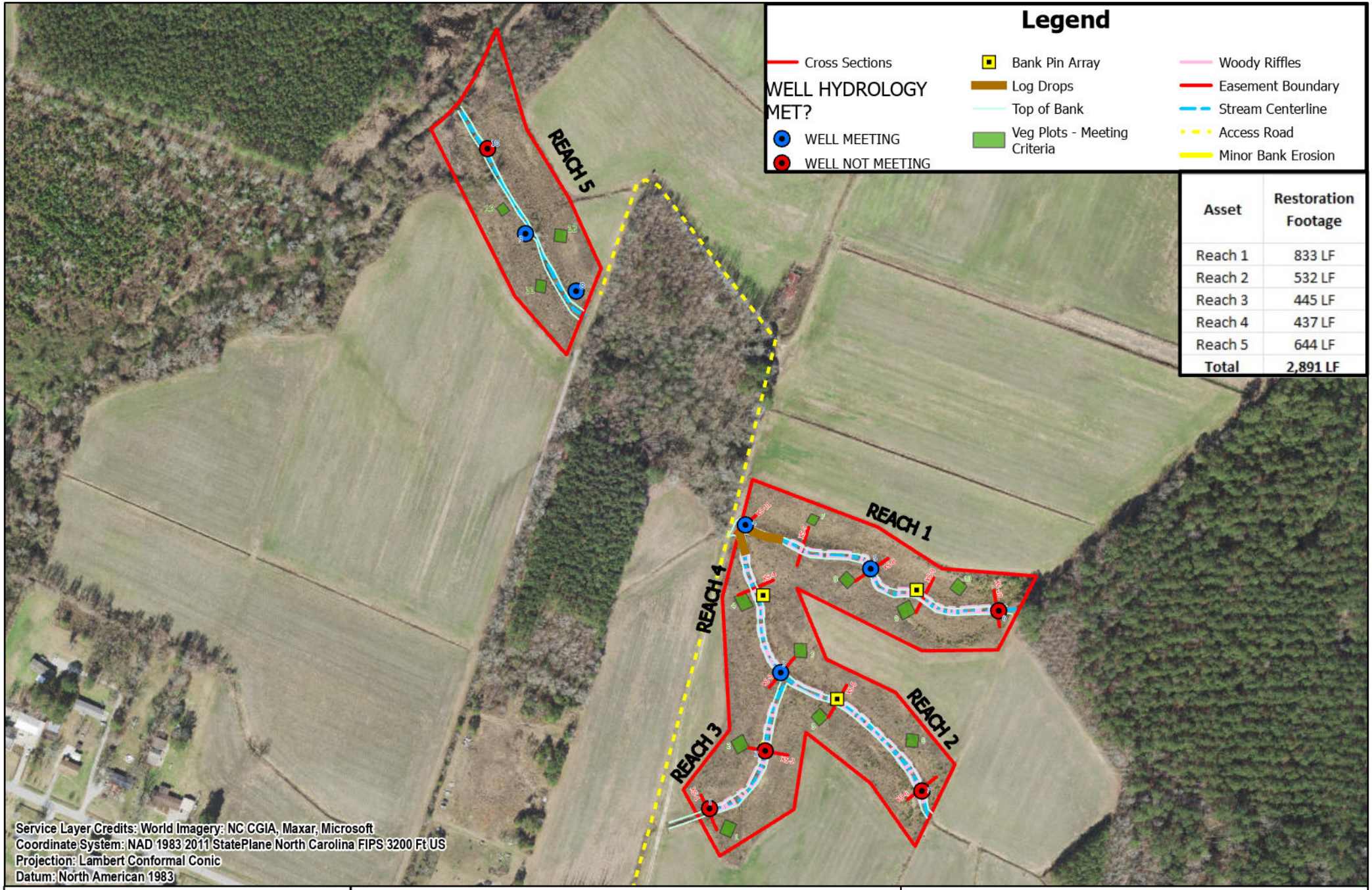
Current Condition Plan View

Table 5. Visual Stream Morphology Stability Assessment (Reach 1-4)

Table 6. Vegetation Condition Assessment Table

Pre-Construction Photo Log

Current Condition Photo Log



Asset	Restoration Footage
Reach 1	833 LF
Reach 2	532 LF
Reach 3	445 LF
Reach 4	437 LF
Reach 5	644 LF
Total	2,891 LF

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HUDSON STREAM RESTOATION PROJECT
CURRENT CONDITION PLAN VIEW
MONITORING YEAR 7

Project Coordinates : 77° 06" 13.62' W / 35° 26" 53.20' N

SCALE: 1" = 4,000'

DMS PROJECT NO: 95361

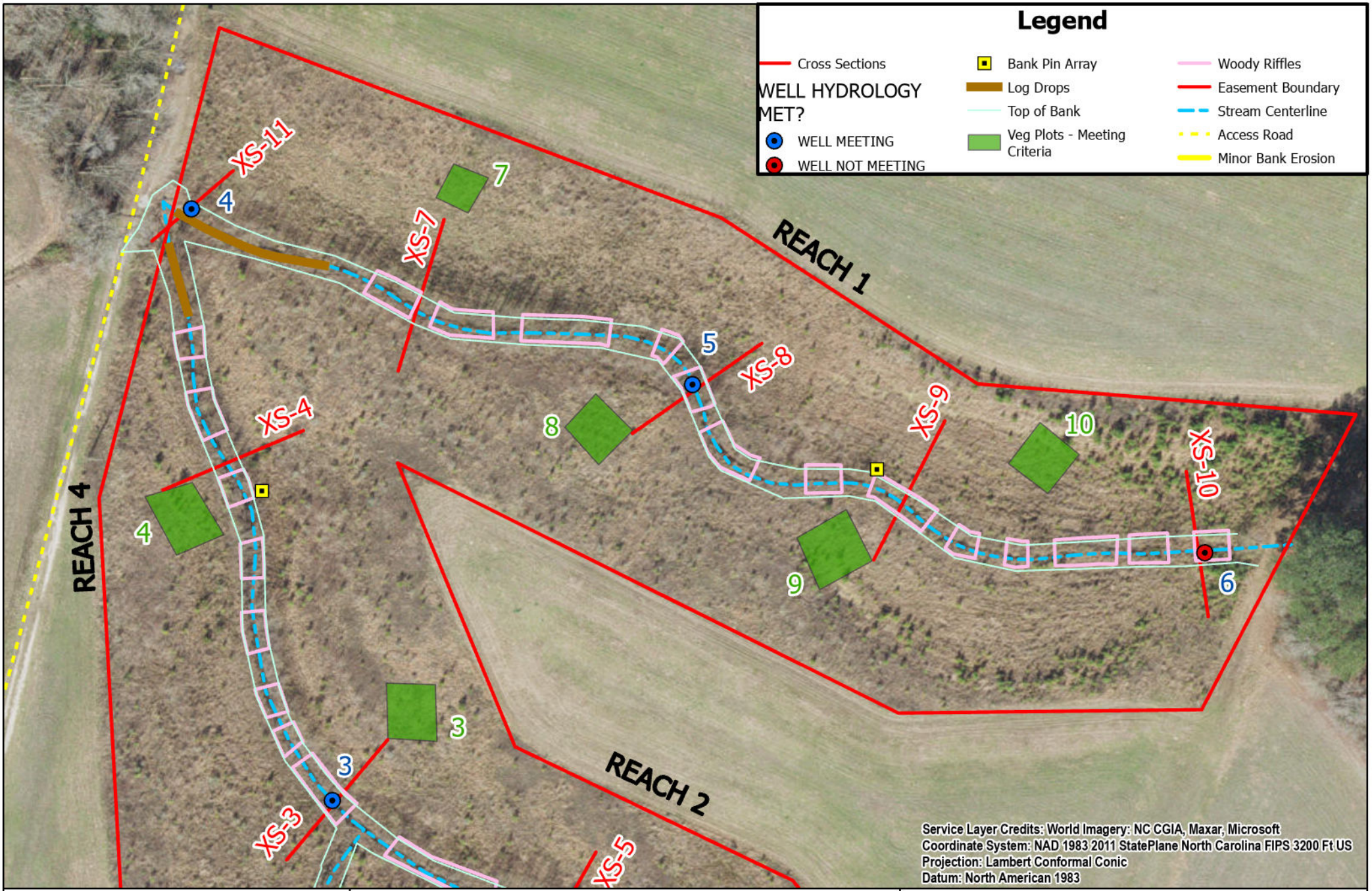
DATE: OCTOBER 18, 2022

DRAWN BY: WCR

PROJECT MANAGER: ET

N

SHEET #1



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HUDSON STREAM RESTORATION PROJECT
CURRENT CONDITION PLAN VIEW

MONITORING YEAR 7

Project Coordinates : 77° 06″ 13.62′ W / 35° 26″ 53.20′ N

SCALE: 1" = 1,000'

DMS PROJECT NO: 95361

DATE: OCTOBER 18, 2022

DRAWN BY: WCR

PROJECT MANAGER: ET

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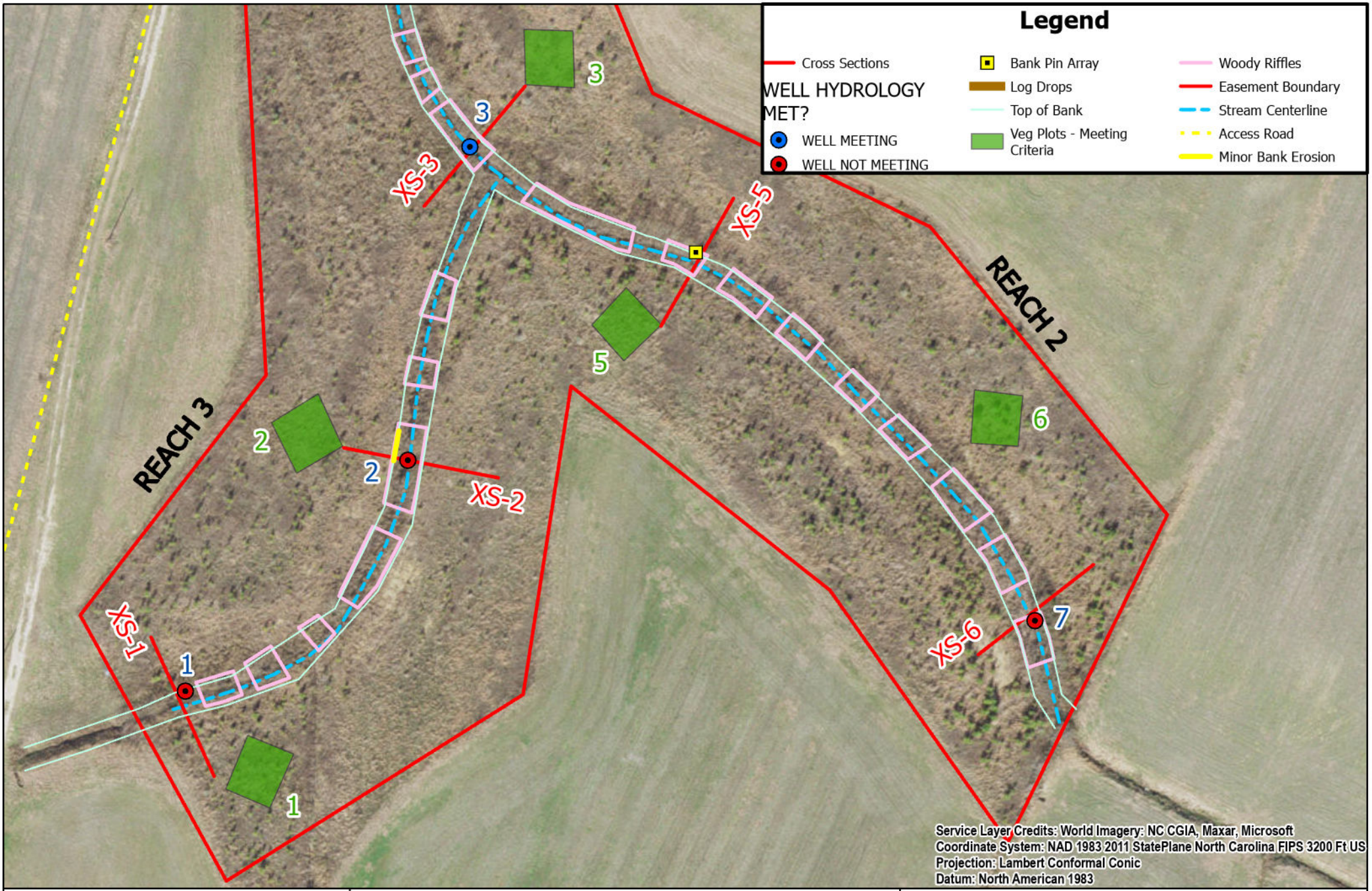
SHEET #2



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HUDSON STREAM RESTORATION PROJECT
CURRENT CONDITION PLAN VIEW

MONITORING YEAR 7

Project Coordinates : 77° 06" 13.62' W / 35° 26" 53.20' N

SCALE: 1" = 1,000'

DMS PROJECT NO: 95361

DATE: OCTOBER 18, 2022

DRAWN BY: WCR

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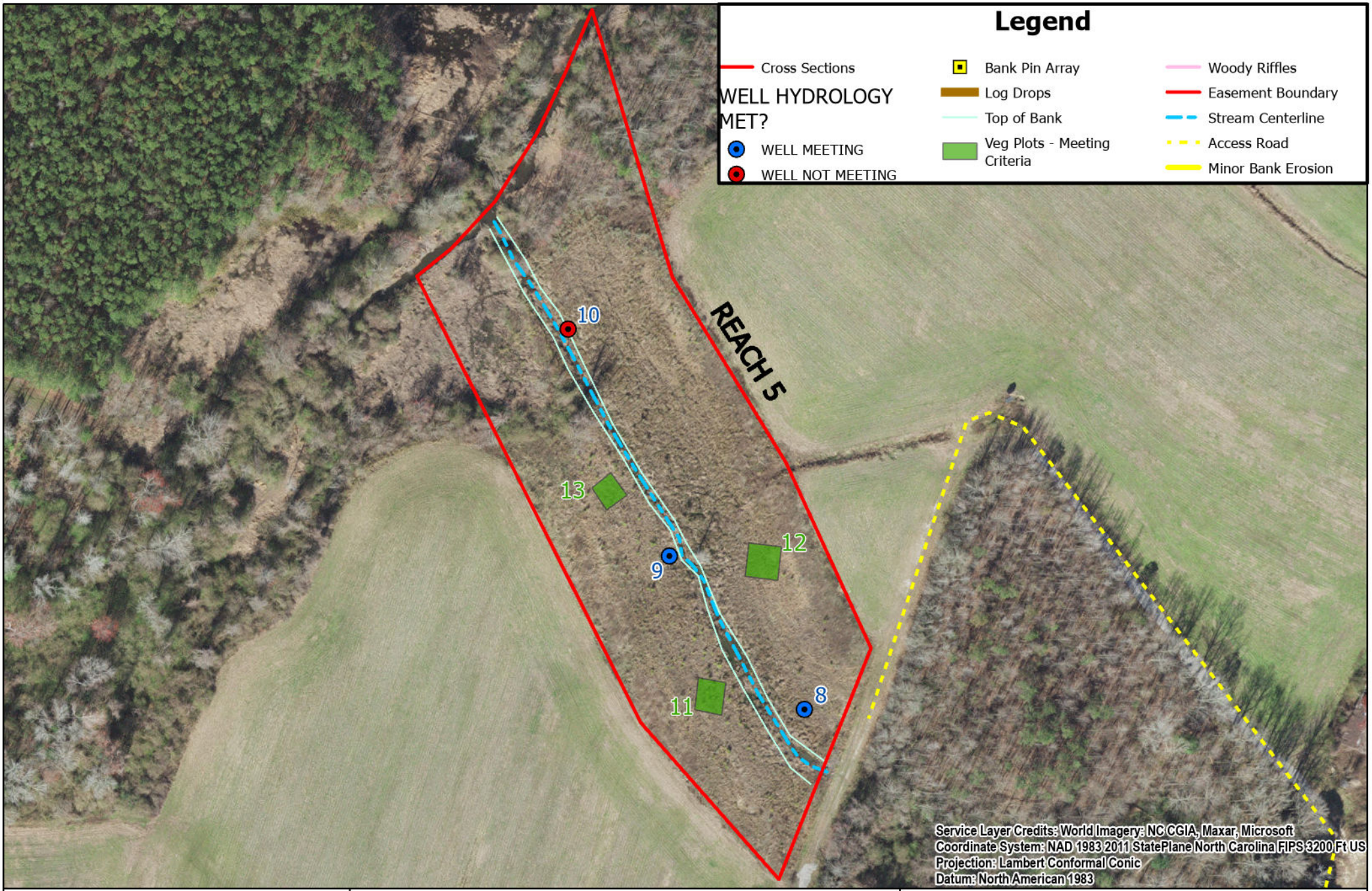
N

SHEET #3



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HUDSON STREAM RESTORATION PROJECT
CURRENT CONDITION PLAN VIEW
MONITORING YEAR 7

Project Coordinates : 77° 06" 13.62' W / 35° 26" 53.20' N

SCALE: 1" = 1,500'

DMS PROJECT NO: 95361

DATE: OCTOBER 18, 2022

DRAWN BY: WCR

PROJECT MANAGER: ET

N

SHEET #4

Table 5: Visual Stream Morphology Stability Assessment (Reaches 1-4)

Table 5		Visual Stream Morphology Stability Assessment								
Reach ID		Reach 1								
Assessed Length		766								
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	13	13			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	5	5			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	5	5			100%			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	NA*	NA*			NA*			
		2. Thalweg centering at downstream of meander (Glide)	NA*	NA*			NA*			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	8	8			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			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)	8	8			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	8	8			100%			

* Stream's narrow width, layout, and heavily vegetated banks make this attribute not applicable.

Table 5		Visual Stream Morphology Stability Assessment								
Reach ID		Reach 2								
Assessed Length		516								
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	9	9			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	3	3			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	3	3			100%			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	NA*	NA*			NA*			
		2. Thalweg centering at downstream of meander (Glide)	NA*	NA*			NA*			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	0	0			NA			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	0	0			NA			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	0	0			NA			
	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)	0	0			NA			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	0	0			NA			

* Stream's narrow width, layout, and heavily vegetated banks make this attribute not applicable.

Table 5		**Visual Stream Morphology Stability Assessment**								
Reach ID		**Reach 3**								
Assessed Length		**611**								
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	7	7			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	3	3			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	3	3			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	NA*	NA*			NA*			
		2. Thalweg centering at downstream of meander (Glide)	NA*	NA*			NA*			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	20	98%	0	0	98%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	20	98%	0	0	98%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	0	0			NA			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	0	0			NA			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	0	0			NA			
	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)	0	0			NA			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	0	0			NA			

* Stream's narrow width, layout, and heavily vegetated banks make this attribute not applicable.

Table 5		Visual Stream Morphology Stability Assessment								
Reach ID		Reach 4								
Assessed Length		503								
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	8	8			NA			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	3	3			NA			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	3	3			NA			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	NA*	NA*			NA			
		2. Thalweg centering at downstream of meander (Glide)	NA*	NA*			NA			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	3	3			NA			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			NA			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			NA			
	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)	3	3			NA			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	3	3			NA			

* Stream's narrow width, layout, and heavily vegetated banks make this attribute not applicable.

Table 6: Vegetation Condition Assessment

Table 6	Vegetation Condition Assessment					
Planted Acreage	**12.42**					
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	0	0	0.0%
2. Low Stem Density Areas*	Woody stem densities clearly below target levels based on MY 3, 4 or 5 stem count criteria	0.1 acres	Pattern and Color	0	0	0.0%
			Total:	**0**	**0**	**0.0%**
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	0.0%
			Cumulative Total:	**0**	**0**	**0.0%**
Easement Acreage	**13.5**					
Vegetation Category	**Definitions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Planted Acreage**
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale	1000 sf	Pattern and Color	0	0	0.0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale	none	Pattern and Color	0	0	0.0%
No areas of concern are noted .						
***Some small areas spot planted in 2019; these areas are smaller than 0.1 acres and not included in CCPV**						

Pre-Construction Site Conditions

(Photos from 2011)

Photo 1: High flow drift lines after storm on proposed Reach 3.

Photo 2: Facing upstream confined flow path causing erosion from existing crop field.

Photo 3: Reach 1.

Photo 4: Culvert at the end of reach 4.

Photo 5: Facing upstream at the end of proposed Reach 1 and 4 confluence.

Photo 6: Facing upstream towards existing forest stand at proposed Reach 1.

Photo 7: Facing downstream showing stream bank soil profile.

Photo 8: Horse Branch floodplain downstream of Reach 5.

Photo 9: Facing upstream at upstream limits of proposed Reach 1.

Hudson Current Condition (MY 7) Photo Log
Photos Taken on October 5th, 2022

Photo 1: Culvert at the top of reach 1.

Photo 2: Clear Cutting at the top of reach 1, outside of project boundary.

Photo 3: Veg plot #1.

Photo 4: Veg plot #3.

Photo 5: Veg plot #4.

Photo 6: Veg plot #5.

Photo 7: Veg plot #6.

Photo 8: Veg plot #8.

Photo 9: Veg plot #9.

Photo 10: Veg plot #10.

Photo 11: Veg plot #11.

Photo 12: Veg plot #12.

Photo 13: Veg plot #13.

Photo 14: Cross section #1.

Photo 15: Cross section #2.

Photo 16: Cross section #3.

Photo 17: Cross section #4

Photo 18: Cross section #5.

Photo 19: Cross section #6.

Photo 20: Cross section #7.

Photo 21: Cross section #8.

Photo 22: Cross section #9.

Photo 23: Cross section #10.

Photo 24: Cross section #11.

Photo 25: End of reach 5 (multi-thread channel) looking upstream.

APPENDIX C: MY 7 VEGETATION PLOT DATA (2022)

Table 7: Vegetation Plot Counts and Densities

Scanned Field Data Sheet

Table 7: Vegetation Plot Counts and Densities (MY 7 2022) (Plots 1-9)

EEP Project Code 0004638. Project Name: Hudson

			Current Plot Data (MY7 2022) (Collected 10/05/2022)																										
			0004638-01-0001			0004638-01-0002			0004638-01-0003			0004638-01-0004			0004638-01-0005			0004638-01-0006			0004638-01-0007			0004638-01-0008			0004638-01-0009		
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
Acer rubrum	red maple	Tree																											
Baccharis halimifolia	eastern baccharis	Shrub			2									5			1			1			3			4			1
Betula nigra	river birch	Tree																											
Juniperus virginiana	eastern redcedar	Tree																											
Ligustrum vulgare	European privet	Exotic																											
Liquidambar styraciflua	sweetgum	Tree			4			1			3			1			2			4			12			2			
Liriodendron tulipifera	tuliptree	Tree	1	1	1																								
Morella cerifera	wax myrtle	shrub			1			1			1			1						2									
Pinus echinata	shortleaf pine	Tree																					2						1
Pinus taeda	loblolly pine	Tree			21			5			11			10			10			24			4			14			22
Platanus occidentalis	American sycamore	Tree	3	3	4	4	4	4	4	4	5	3	3	3	2	2	3	2	2	2	6	6	6	5	5	5	5	5	5
Quercus alba	white oak	Tree	1	1	1	2	2	2				2	2	2															
Quercus bicolor	swamp white oak	Tree	4	4	9	1	1	1							1	1	1				2	2	2						
Quercus michauxii	swamp chestnut oa	Tree																											
Quercus nigra	water oak	Tree													2	2	2										3	3	3
Quercus phellos	willow oak	Tree	2	2	2	1	1	3	3	3	3	5	5	5	4	4	4	4	4	4	3	3	4	6	6	6	2	2	2
Taxodium distichum	bald cypress	Tree													1	1	1	1	1	4									
Ulmus americana	American elm	Tree																											
		Stem count	11	11	45	8	8	17	7	7	23	10	10	27	10	10	24	7	7	41	11	11	33	11	11	31	10	10	34
		size (ares)	1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.0247105			0.0247105			0.0247105			0.0247105			0.0247105			0.0247105			0.0247105			0.0247105			0.0247105		
		Species count	5	5	9	4	4	7	2	2	5	3	3	7	5	5	8	3	3	7	3	3	7	2	2	5	3	3	6
		Stems per ACRE	445	445	1821	324	324	688	283	283	931	405	405	1093	405	405	971	283	283	1659	445	445	1335	445	445	1255	405	405	1376

MY 7 Stems/Acre Requirement = 210	
Color for Density	Stems/Acre
Exceeds requirements by 10%	>231
Exceeds requirements, but by less than 10%	210-230
Fails to meet requirements, by less than 10%	188-209
Fails to meet requirements by more than 10%	<187

Vegetation Plot Counts and Densities Continued (MY 7 2022) (Plots 10-13 & Annual Means)

EEP Project Code 0004638. Project Name: Hudson

															Annual Means																	
			0004638-01-0010			0004638-01-0011			0004638-01-0012			0004638-01-0013			MY7 (2022)			MY5 (2020)			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)		
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
Acer rubrum	red maple	Tree			2			4			20			4			30			2						9						
Baccharis halimifolia	eastern baccharis	Shrub						4			0			5			26			18			1								
Betula nigra	river birch	Tree						1	1	1	1				1	1	2	1	1	1												
Juniperus virginiana	eastern redcedar	Tree	1	1	2									1	1	1	3	1	1	1												
Ligustrum vulgare	European privet	Exotic																								1						
Liquidambar styraciflua	sweetgum	Tree			3			10			15			3			60			32			10			6						
Liriodendron tulipifera	tuliptree	Tree	2	2	0				1	1	1				4	4	2	4	4	5	14	14	15	15	15	18	12	12	12	31	31	31
Morella cerifera	wax myrtle	shrub									1						7			3			4			2						
Pinus echinata	shortleaf pine	Tree															3			1			1									
Pinus taeda	loblolly pine	Tree			24			12			3			1			161			83			84			53						
Platanus occidentalis	American sycamore	Tree			1	10	10	10	1	1	1	4	4	4	49	49	53	49	49	54	49	49	50	46	46	50	44	44	47	54	54	54
Quercus alba	white oak	Tree							1	1	1	5	5	7	11	11	13	11	11	11	11	11	15	12	12	16	12	12	12	16	16	16
Quercus bicolor	swamp white oak	Tree				2	2	2	1	1	1				11	11	16	11	11	11	16	16	16	17	17	17	19	19	19	19	19	19
Quercus michauxii	swamp chestnut oa	Tree	1	1	0	1	1	1	3	3	3	1	1	1	6	6	5	6	6	6	8	8	8	11	11	12	8	8	8	13	13	13
Quercus nigra	water oak	Tree				3	3	3							8	8	8	8	8	8	13	13	13	14	14	15	11	11	11	18	18	18
Quercus phellos	willow oak	Tree	2	2	3			2							32	32	38	32	32	39	29	29	31	29	29	35	24	24	25	33	33	33
Taxodium distichum	bald cypress	Tree						7			5			9	2	2	26	2	2	7			6									
Ulmus americana	American elm	Tree	1	1	1										1	1	1	1	1	1												
		Stem count	7	7	36	16	16	56	8	8	52	10	10	35	126	126	454	126	126	283	140	140	254	144	144	234	130	130	134	184	184	184
		size (ares)	1			1			1			1			13			13			13			13			13			13		
		size (ACRES)	0.0247105			0.0247105			0.0247105			0.0247105			0.3212370			0.3212370			0.3212370			0.3212370			0.3212370			0.3212370		
		Species count	5	5	9	4	4	11	6	6	12	3	3	9	11	11	17	11	11	17	7	7	13	7	7	12	7	7	7	7	7	7
		Stems per ACRE	283	283	1457	647	647	2266	324	324	2104	405	405	1416	392	392	1413	392	392	881	436	436	791	448	448	728	405	405	417	573	573	573

MY 7 Stems/Acre Requirement = 210	
Color for Density	Stems/Acre
Exceeds requirements by 10%	>231
Exceeds requirements, but by less than 10%	210-230
Fails to meet requirements, by less than 10%	188-209
Fails to meet requirements by more than 10%	<187

APPENDIX D: MY 7 STREAM MEASUREMENT AND GEOMORPHOLOGY

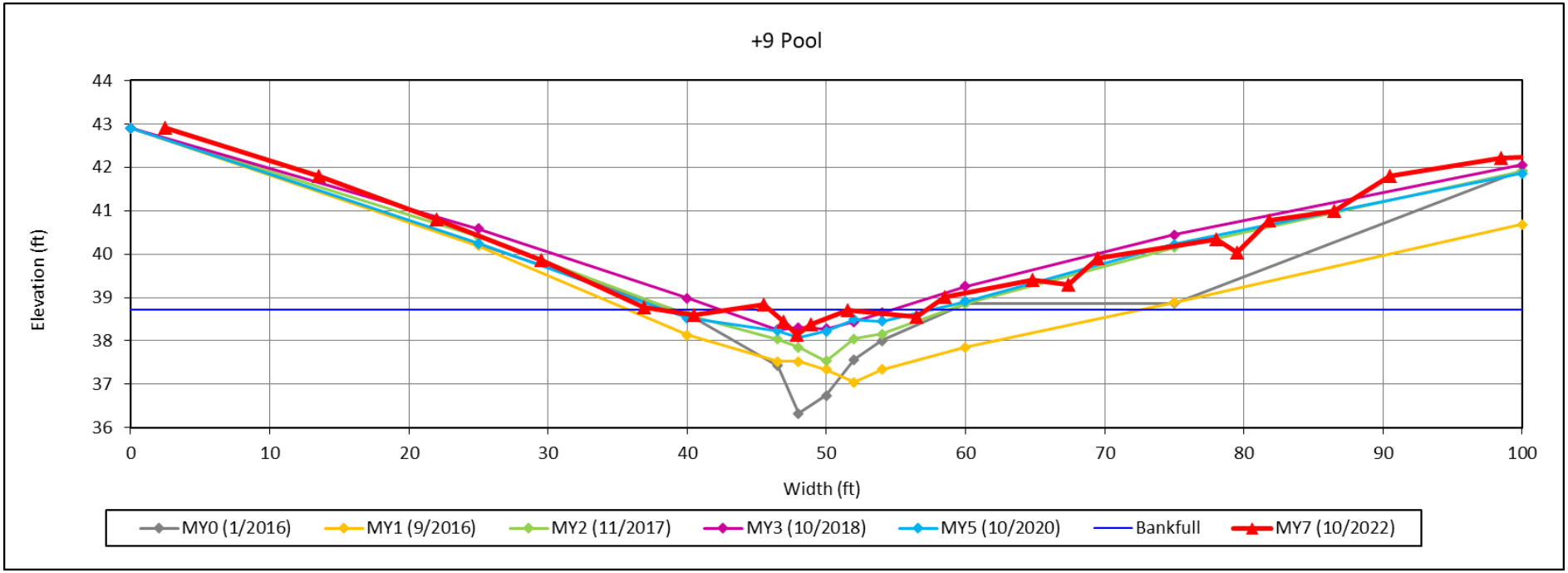
Cross Sections with Annual Overlays (XS 1-11)

Table 8: Bank Pin Data

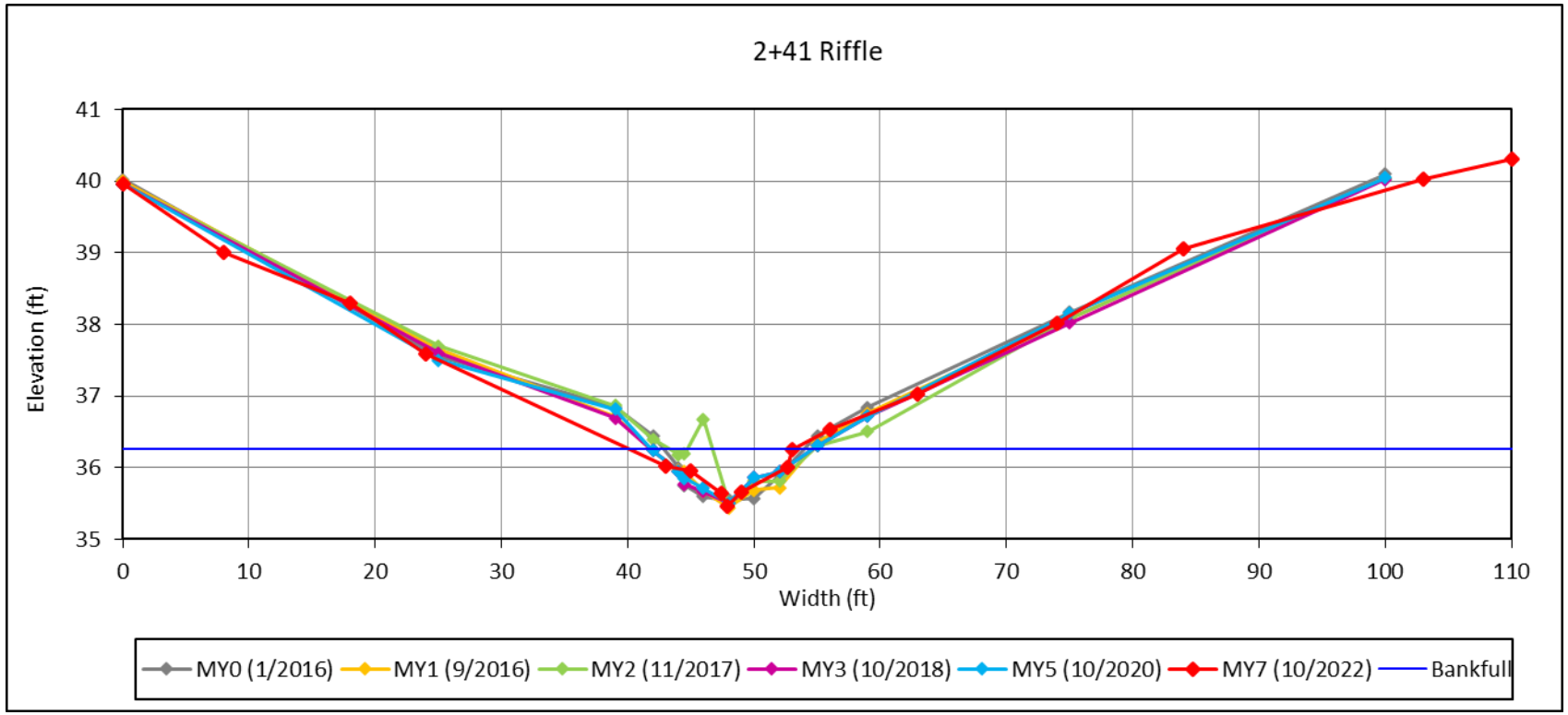
Table 10a. Baseline Stream Data Summary (Reach 1-4)

Table 11a. Monitoring Data – Dimensional Morphology Summary

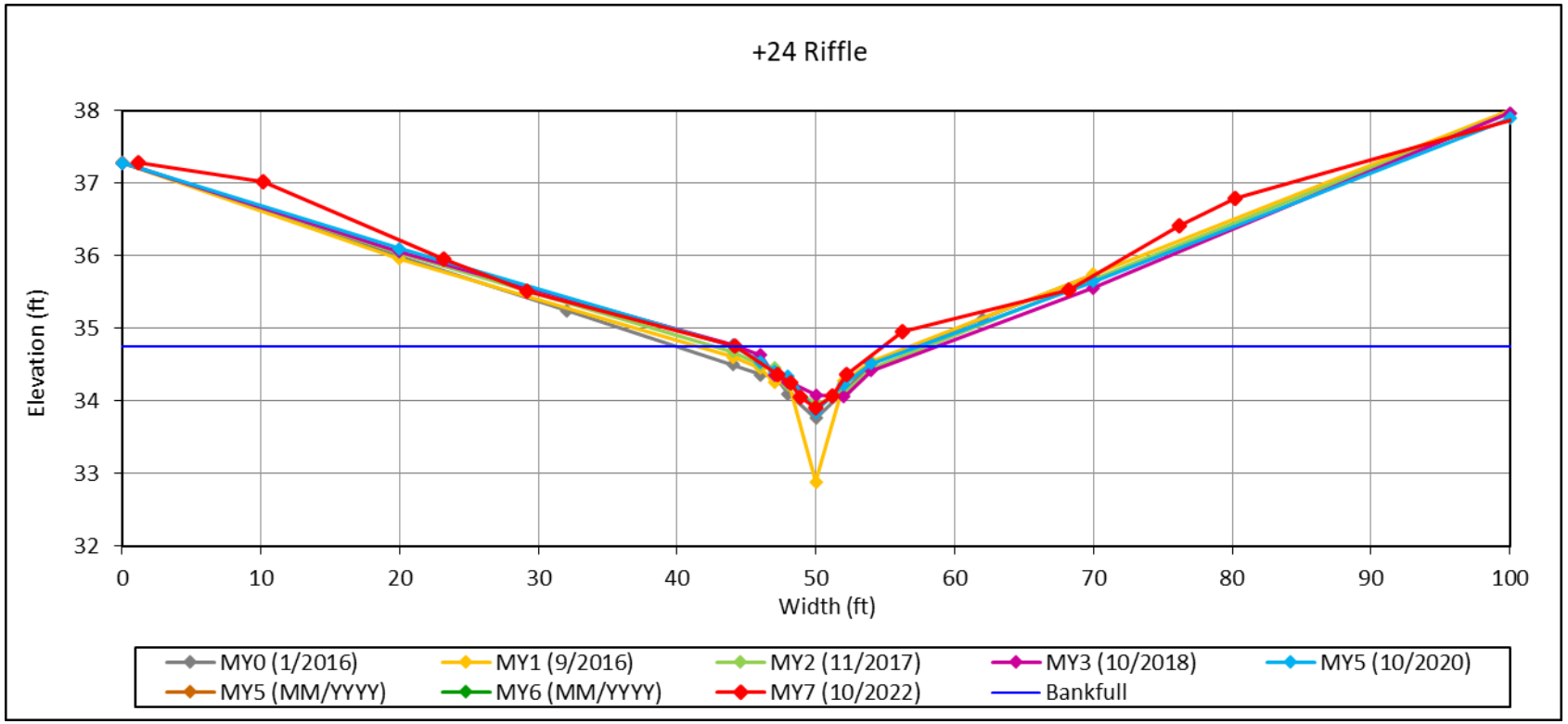
Table 11b. Monitoring Data – Stream Reach Data Summary (Reach 1-4)



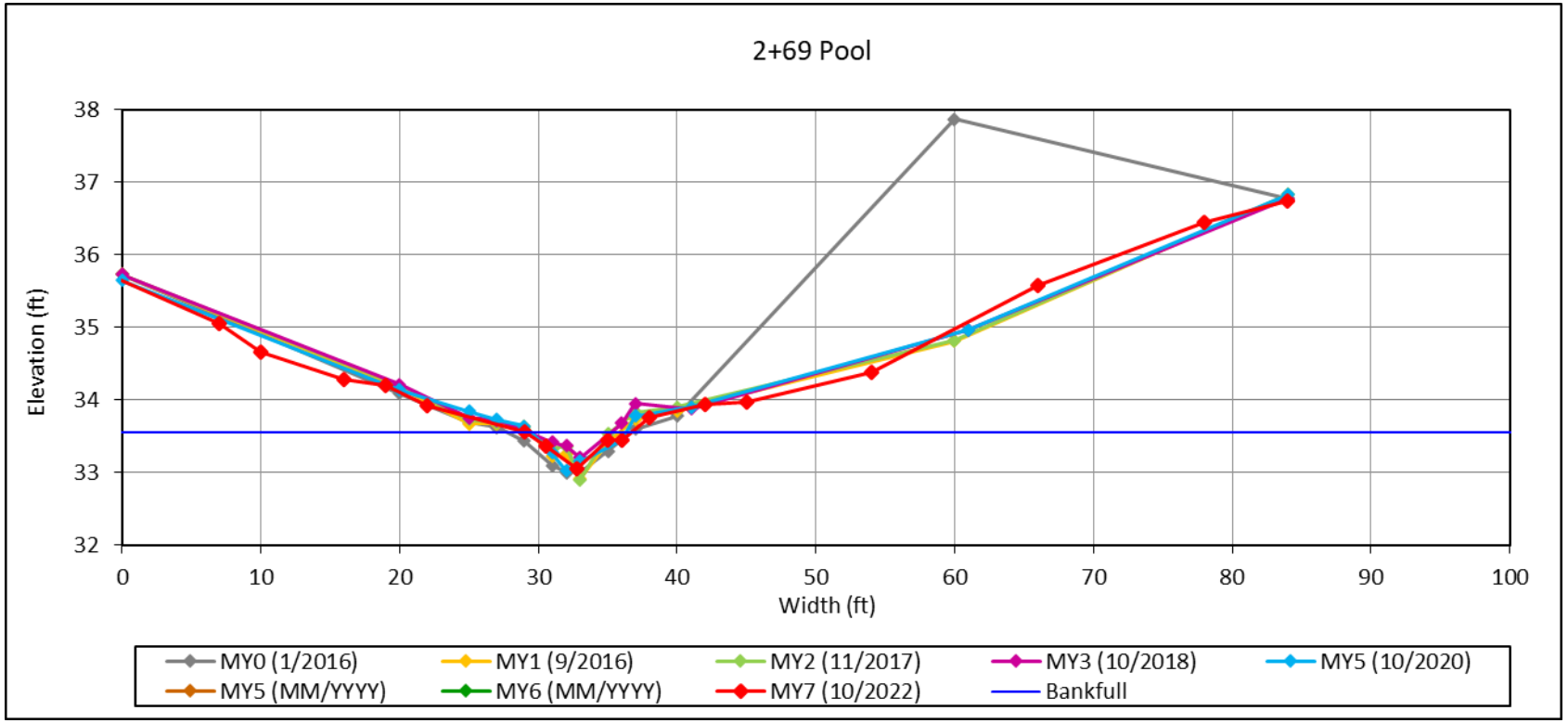
Cross Section 1 – Reach 3 (2022 Data)



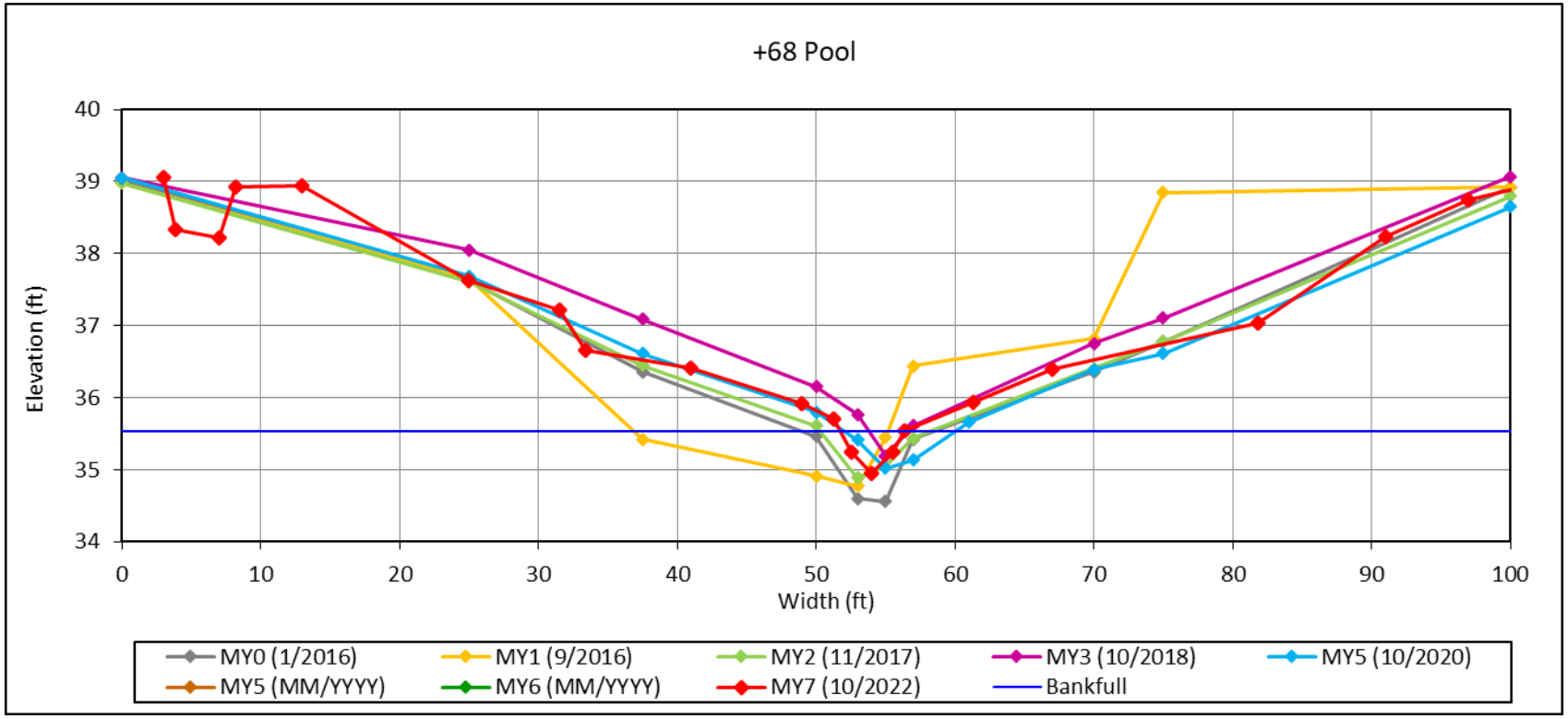
Cross Section 2 – Reach 3 (2022 Data)



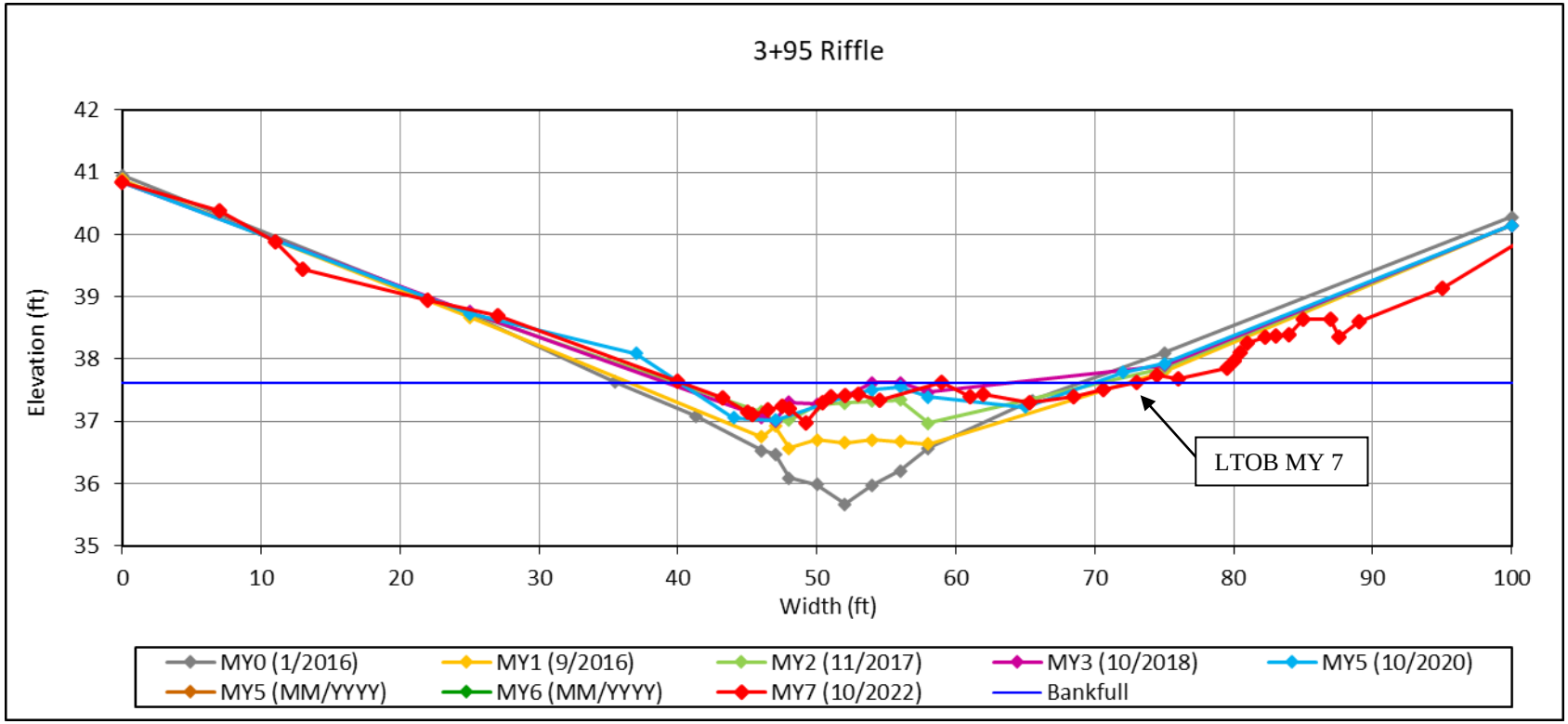
Cross Section 3 – Reach 4 (2022 Data)



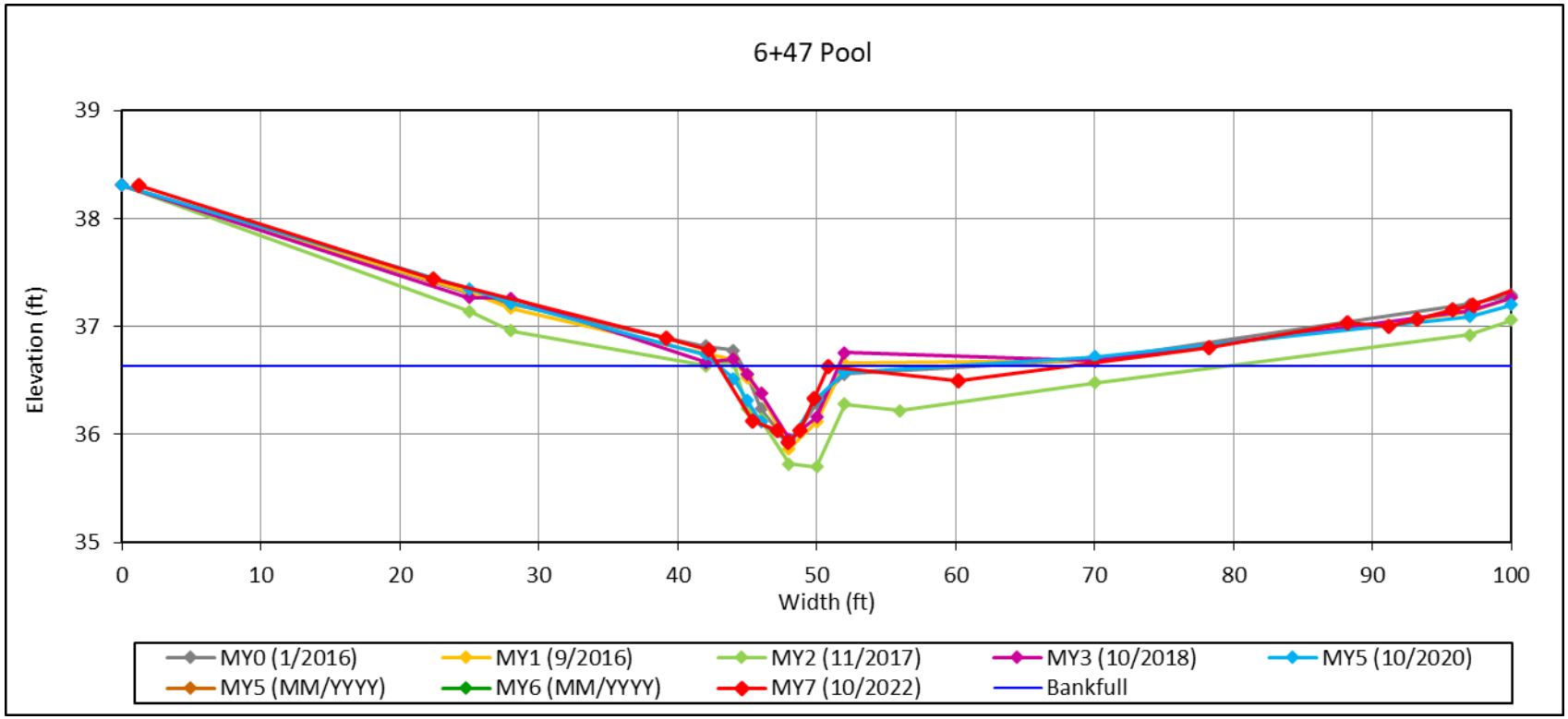
Cross Section 4 – Reach 4 (2022 Data)



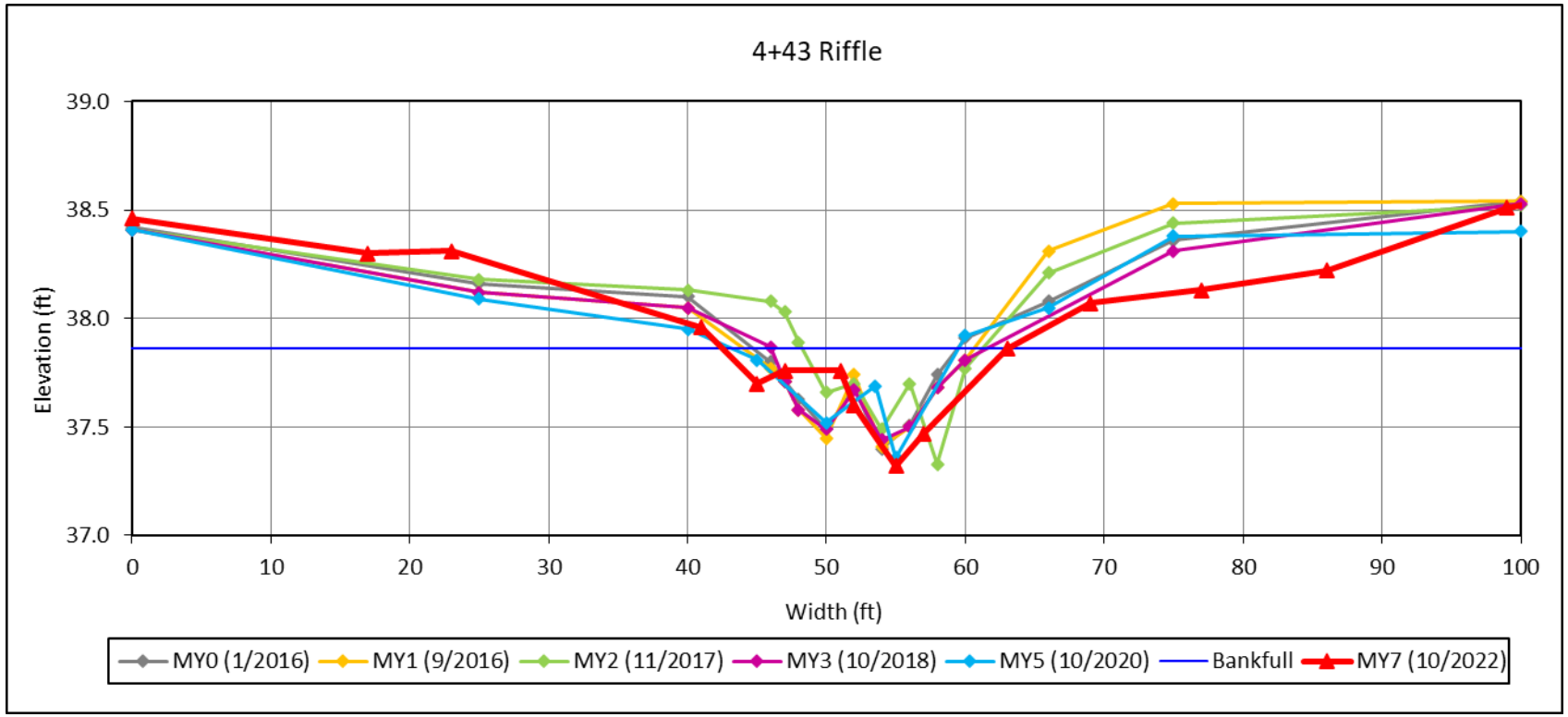
Cross Section 5 – Reach 2 (2022 Data)



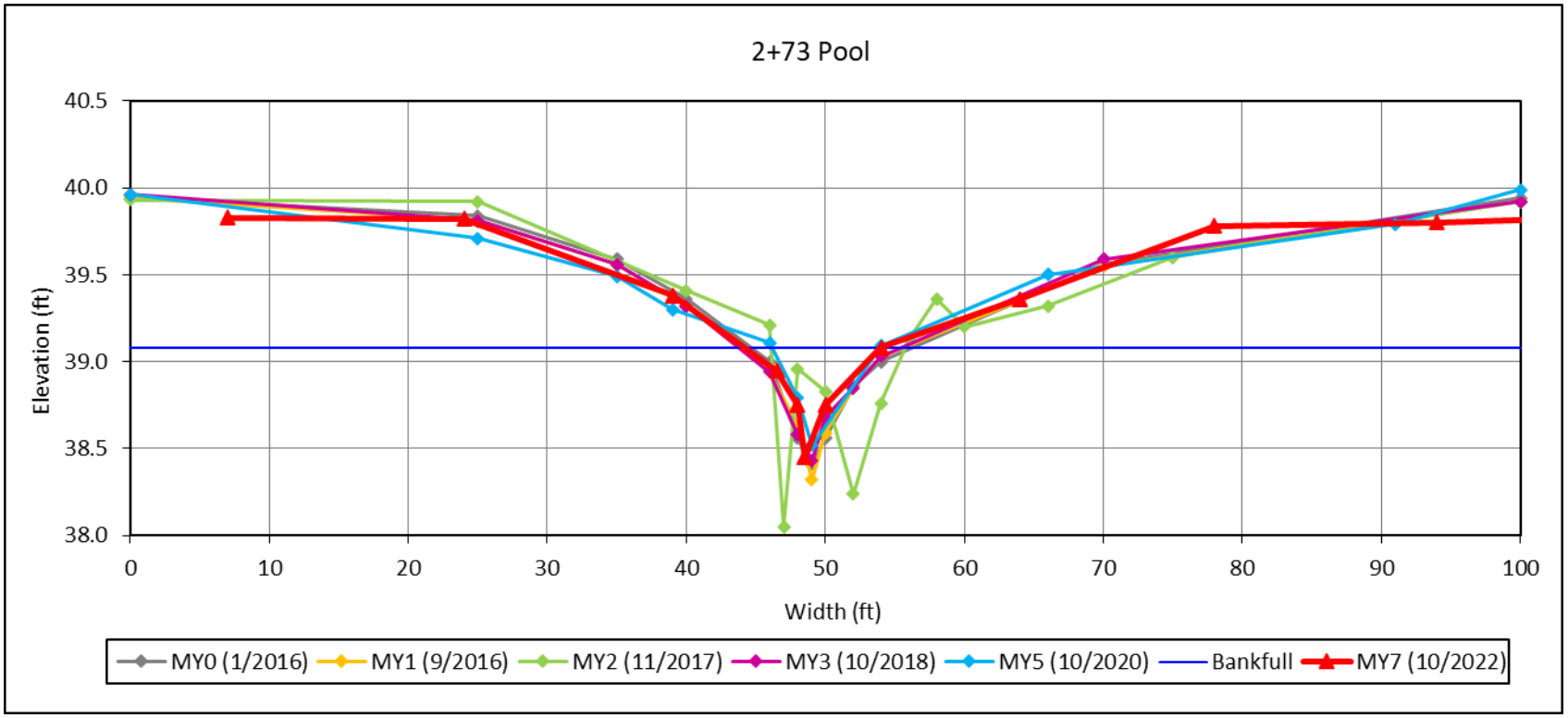
Cross Section 6 – Reach 2 (2022 Data)



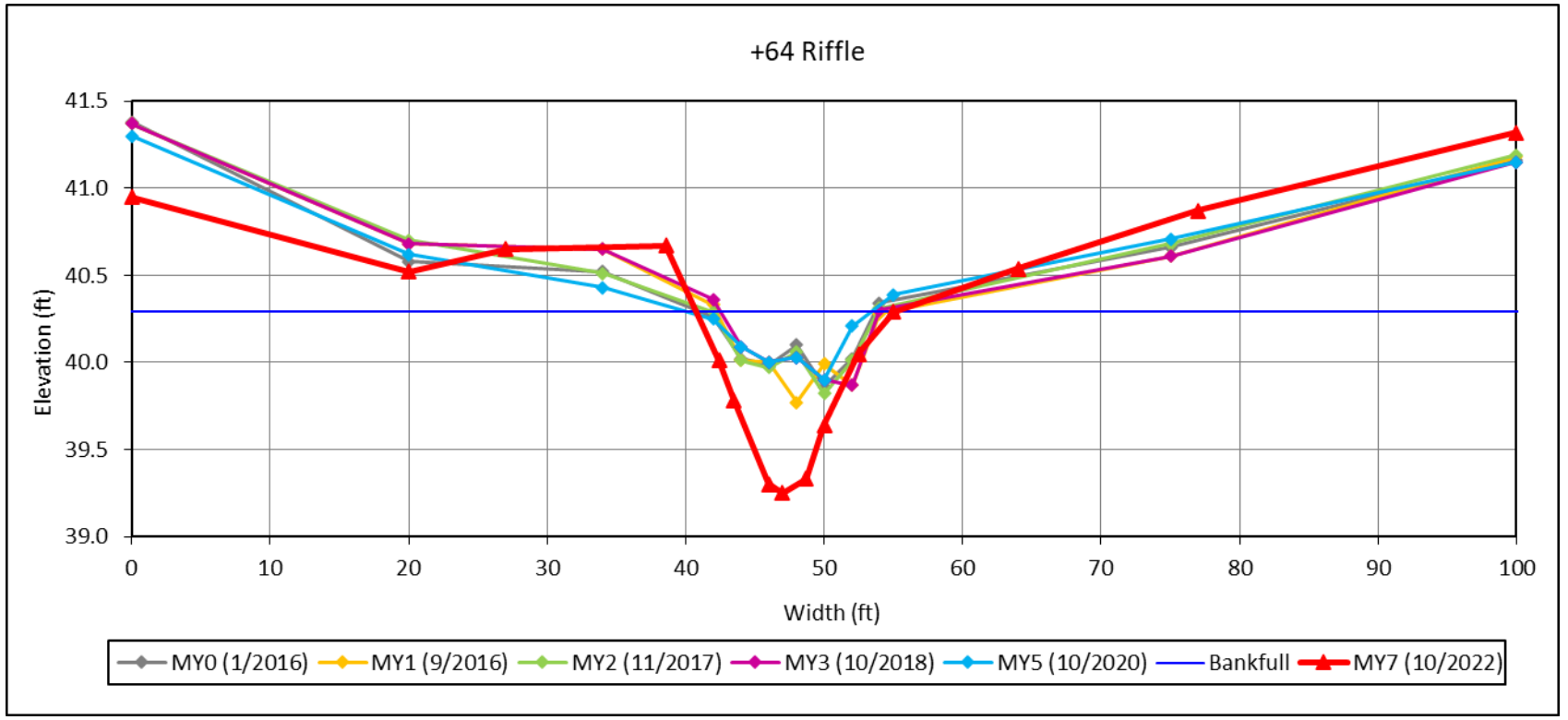
Cross Section 7 – Reach 1 (2022 Data)



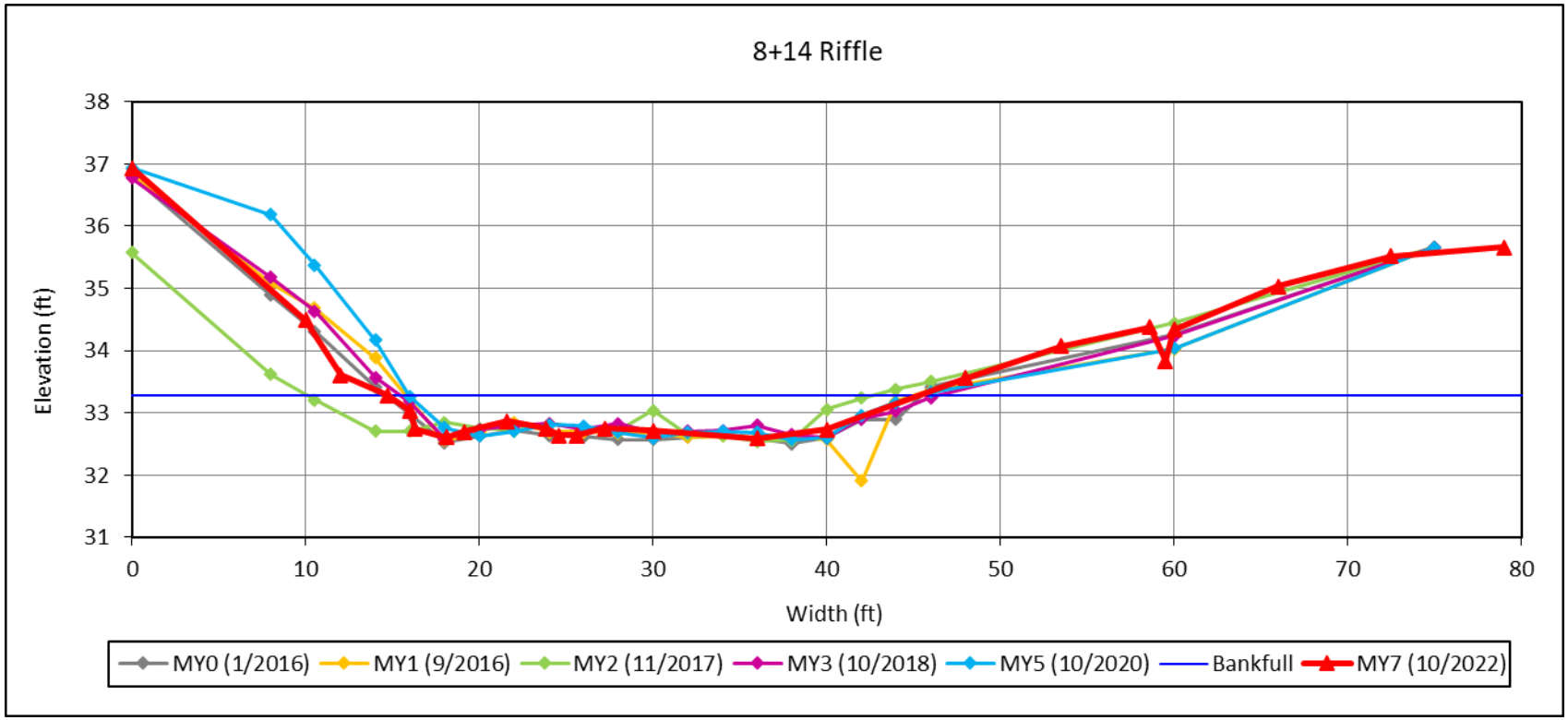
Cross Section 8 – Reach 1 (2022 Data)



Cross Section 9 – Reach 1 (2022 Data)



Cross Section 10 – Reach 1 (2022 Data)



Cross Section 11 – Reach 1 & 4 Confluence (2022 Data)

Table 8: Monitoring Year 7 - Bank Pin Data

Pins arrays consist of three pins located in the middle of stream banks along meander bends.

Bank Pin Array #1 @ XS 5 - Reach 2 – Station 2+69	
Pin	**Exposure**
Upstream Pin	Could not find- minor aggradation & dense vegetation
Middle Pin	Could not find- minor aggradation & dense vegetation
Downstream Pin	Could not find- minor aggradation & dense vegetation

Bank Pin Array #2 @ XS 4 - Reach 2 – Station 3+95	
Pin	**Exposure**
Upstream Pin	Could not find- minor aggradation & dense vegetation
Middle Pin	Could not find- minor aggradation & dense vegetation
Downstream Pin	Could not find- minor aggradation & dense vegetation

Bank Pin Array #3 @ XS 9 - Reach 1 – Station 2+73	
Pin	**Exposure**
Upstream Pin	Could not find- minor aggradation & dense vegetation
Middle Pin	Could not find- minor aggradation & dense vegetation
Downstream Pin	Could not find- minor aggradation & dense vegetation

Table 10: Baseline Stream Data Summary (Reaches 1-4)

Table 10a. Baseline Stream Data Summary
Project Name/Number (Hudson/ DMS:95361) - Segment/Reach: Reach 1

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)					3.36		3.83	6.02			19.74		21.97	24.2				9.02		11.5			16.2		2
Floodprone Width (ft)					6.47		6.91	10.5			44		64.5	85			18.06	26.74	34.89	57			83.33		2
Bankfull Mean Depth (ft)					0.45		0.52	0.6			0.7		0.75	0.82				0.42		0.22			0.26		2
[1]Bankfull Max Depth (ft)					0.56		0.87	1.07			0.85		1.02	1.18			0.44	0.53	0.61	0.4			0.51		2
Bankfull Cross Sectional Area (ft^2)					1.99		2	2.68			16.09		16.49	16.89				3.8		2.58			4.26		2
Width/Depth Ratio					5.64		7.37	13.52			24.22		29.27	34.67				21.4		52.27			62.31		2
Entrenchment Ratio					1.74		1.8	1.93			2		2.94	3.87			2	2.94	3.87	4.96			5.14		2
[1]Bank Height Ratio																				1			1		2
Profile																									
Riffle Length (ft)						N/A*					12		46.5	81			4.93	19.09	33.25						
Riffle Slope (ft/ft)						N/A*					0.004		0.011	0.017			0.006	0.016	0.025						
Pool Length (ft)						N/A*					21		30.5	40			4.72	8.41	14.98						
Pool Max depth (ft)						N/A*					1.4		1.65	1.9			0.72	0.93	1.15						
Pool Spacing (ft)						N/A*					40		59	78			16.42	26.95	35.63						
Pattern																									
Channel Beltwidth (ft)						N/A*					27		49	76			11.08	20.11	31.19						
Radius of Curvature (ft)						N/A*					90		92	95			36.94	37.76	38.99						
Rc:Bankfull width (ft/ft)						N/A*											4.10	4.19	4.32						
Meander Wavelength (ft)						N/A*					12.43		15.07	18.25			112.1	135.9	164.6						
Meander Width Ratio						N/A*											1.23	2.23	3.46						
Transport parameters																									
Reach Shear Stress (competency) lb/f^2							0.26											0.18							
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2							0.56											0.14							
Additional Reach Parameters																									
Rosgen Classification							G5-G6						C5-C6					C5-C6				C5/6			
Bankfull Velocity (fps)																									
Bankfull Discharge (cfs)							5.6																		
Valley length (ft)							840						264												
Channel Thalweg length (ft)							846						264					833				850			
Sinuosity (ft)							1.01						1					1.04				1.04			
Water Surface Slope (Channel) (ft/ft)							0.007						0.004					0.007							
BF slope (ft/ft)																						0.006			
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Table 10a. Baseline Stream Data Summary

Project Name/Number (Hudson/ DMS:95361) - Segment/Reach: Reach 2

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)					5.97		6.87	7.2			19.74		21.97	24.2				14.83				11.78			1
Floodprone Width (ft)					10.03		12.03	13.47			44		64.5	85			29.71	43.55	57.39			28.2			1
Bankfull Mean Depth (ft)					0.91		0.92	0.94			0.7		0.75	0.82				0.67				0.45			1
[1]Bankfull Max Depth (ft)					1.38		1.42	1.54			0.85		1.02	1.18			0.7	0.84	0.98			0.86			1
Bankfull Cross Sectional Area (ft^2)					5.59		6.32	6.58			16.09		16.49	16.89				10				5.28			1
Width/Depth Ratio					6.38		7.47	7.88			24.22		29.27	34.67				22				26.18			1
Entrenchment Ratio					1.67		1.68	1.96			2		2.94	3.87				2.94				2.39			1
[1]Bank Height Ratio																						1			1
Profile																									
Riffle Length (ft)						N/A*					12		46.5	81			8.1	31.39	54.68						
Riffle Slope (ft/ft)						N/A*					0.004		0.011	0.017			0.003	0.008	0.012						
Pool Length (ft)						N/A*					21		30.5	40			14.18	20.59	27						
Pool Max depth (ft)						N/A*					1.4		1.65	1.9			1.16	1.48	1.84						
Pool Spacing (ft)						N/A*					40		59	78			27	44.33	58.61						
Pattern																									
Channel Beltwidth (ft)						N/A*					27		49	76			18.23	33.08	51.31						
Radius of Curvature (ft)						N/A*					90		92	95			60.76	62.11	64.14						
Rc:Bankfull width (ft/ft)						N/A*											4.10	4.19	4.32						
Meander Wavelength (ft)						N/A*					12.43		15.07	18.25			184.3	223.5	270.7						
Meander Width Ratio						N/A*											1.23	2.23	3.46						
Transport parameters																									
Reach Shear Stress (competency) lb/f^2							0.42											0.11							
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2							1.25											0.18							
Additional Reach Parameters																									
Rosgen Classification							G5-G6						C5-C6					C5-C6				C 5/6			
Bankfull Velocity (fps)																									
Bankfull Discharge (cfs)							17.2																		
Valley length (ft)							486						264												
Channel Thalweg length (ft)							516						264					532				541			
Sinuosity (ft)							1.06						1					1.05				1.05			
Water Surface Slope (Channel) (ft/ft)							0.003						0.004					0.003							
BF slope (ft/ft)																						0.0035			
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Table 10a. Baseline Stream Data Summary Project Name/Number (Hudson/ DMS:95361) - Segment/Reach: Reach 3																										
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)					3.55		4.03	5.05			19.74		21.97	24.2				10				12.5			1
Floodprone Width (ft)					5.97		6.44	9.13			44		64.5	85			20.03	29.36	38.69			32.9			1
Bankfull Mean Depth (ft)					0.55		0.79	0.84			0.7		0.75	0.82				0.5				0.57			1
[1]Bankfull Max Depth (ft)					0.88		1.15	1.44			0.85		1.02	1.18			0.52	0.63	0.72			0.85			1
Bankfull Cross Sectional Area (ft^2)					1.94		3.17	4.26			16.09		16.49	16.89				5				7.07			1
Width/Depth Ratio					5.12		5.99	6.5			24.22		29.27	34.67				20				21.95			1
Entrenchment Ratio					1.6		1.68	1.8			2		2.94	3.87			2	2.94	3.87			2.63			1
[1]Bank Height Ratio																						1			1
Profile																									
Riffle Length (ft)						N/A*					12		46.5	81			5.46	21.17	36.87						
Riffle Slope (ft/ft)						N/A*					0.004		0.011	0.017			0.005	0.014	0.021						
Pool Length (ft)						N/A*					21		30.5	40			9.56	13.88	18.21						
Pool Max depth (ft)						N/A*					1.4		1.65	1.9			0.86	1.1	1.36						
Pool Spacing (ft)						N/A*					40		59	78			18.21	29.89	39.51						
Pattern																									
Channel Beltwidth (ft)						N/A*					27		49	76			12.29	22.3	24.59						
Radius of Curvature (ft)						N/A*					90		92	95			40.96	41.88	43.24						
Rc:Bankfull width (ft/ft)						N/A*											4.10	4.19	4.32						
Meander Wavelength (ft)						N/A*					12.43		15.07	18.25			124.3	150.7	182.5						
Meander Width Ratio						N/A*											1.23	2.23	3.46						
Transport parameters																									
Reach Shear Stress (competency) lb/f^2							0.37											0.14							
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2							1.02											0.18							
Additional Reach Parameters																									
Rosgen Classification							G5-G6						C5-C6					C5-C6				C 5/6			
Bankfull Velocity (fps)																									
Bankfull Discharge (cfs)							8																		
Valley length (ft)							442						264												
Channel Thalweg length (ft)							460						264					445				446			
Sinuosity (ft)							1.04						1					1.01				1.08			
Water Surface Slope (Channel) (ft/ft)							0.007						0.004					0.007							
BF slope (ft/ft)																						0.005			
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Table 10a. Baseline Stream Data Summary

Project Name/Number (Hudson/ DMS:95361) - Segment/Reach: Reach 4

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)					7.34		7.48	8.84			19.74		21.97	24.2				21.82				9.9			1
Floodprone Width (ft)					12.21		13.83	16.28			44		64.5	85			43.69	64.05	84.41			31.36			1
Bankfull Mean Depth (ft)					0.97		1	1.05			0.7		0.75	0.82				0.78				0.32			1
[1]Bankfull Max Depth (ft)					1.47		1.51	1.82			0.85		1.02	1.18			0.81	0.98	1.13			0.74			1
Bankfull Cross Sectional Area (ft^2)					7.49		7.69	8.58			16.09		16.49	16.89				17				3.17			1
Width/Depth Ratio					7.01		7.47	9.11			24.22		29.27	34.67				28				30.9			1
Entrenchment Ratio					1.63		1.84	1.88			2		2.94	3.87			2	2.94	3.87			3.17			1
[1]Bank Height Ratio																						1			1
Profile																									
Riffle Length (ft)							N/A*				12		46.5	81			11.92	46.18	80.44						
Riffle Slope (ft/ft)							N/A*				0.004		0.011	0.017			0.006	0.016	0.025						
Pool Length (ft)							N/A*				21		30.5	40			20.85	30.29	39.72						
Pool Max depth (ft)							N/A*				1.4		1.65	1.9			1.34	1.71	2.12						
Pool Spacing (ft)							N/A*				40		59	78			39.72	65.21	86.21						
Pattern																									
Channel Beltwidth (ft)							N/A*				27		49	76			26.8	48.66	75.47						
Radius of Curvature (ft)							N/A*				90		92	95			89.37	91.36	94.34						
Rc:Bankfull width (ft/ft)							N/A*										4.096	4.188	4.324						
Meander Wavelength (ft)							N/A*				12.43		15.07	18.25			271.1	328.7	398.2						
Meander Width Ratio							N/A*										1.23	2.23	3.46						
Transport parameters																									
Reach Shear Stress (competency) lb/f^2							0.48											0.16							
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2							1.01											0.22							
Additional Reach Parameters																									
Rosgen Classification							G5-G6						C5-C6					C5-C6				C 5/6			
Bankfull Velocity (fps)																									
Bankfull Discharge (cfs)							26.2																		
Valley length (ft)							434						264												
Channel Thalweg length (ft)							503						264					437				447			
Sinuosity (ft)							1.16						1					1.01				1.01			
Water Surface Slope (Channel) (ft/ft)							0.003						0.004					0.003							
BF slope (ft/ft)																						0.0035			
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

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

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

Project Name/Number (Hudson/ DMS:95361) Segment/Reach: Reach 1-4 (2200 feet)

	Cross Section 1 (Pool - Reach 3)							Cross Section 2 (Riffle - Reach 3)							Cross Section 3 (Riffle - Reach 4)							Cross Section 4 (Pool - Reach 4)							Cross Section 5 (Pool - Reach 2)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area								36.40	36.36	36.55	36.42	36.43	36.26		34.50	34.34	34.60	34.62	34.63	34.75															
Bank Height Ratio_Based on AB Bankfull[1] Area								1.00	1.00	0.77	0.88	0.79	0.63		1.00	1.14	0.77	0.65	0.90	1.00															
Thalweg Elevation	36.33	37.05	37.54	38.28	38.08	38.15		35.55	35.44	35.52	35.51	35.51	35.46		33.76	32.88	33.96	34.06	33.85	33.91		33.00	32.92	32.90	33.20	33.02	33.05		34.56	34.77	34.89	35.19	35.02	34.95	
LTOB[2] Elevation	37.57	37.53	38.05	38.65	38.49	38.71		36.40	36.36	36.31	36.31	36.24	35.96		34.50	34.55	34.45	34.42	34.52	34.75		33.60	33.64	33.60	33.75	33.73	33.45		35.46	35.42	35.44	36.15	35.41	35.54	
LTOB[2] Max Depth (ft)	1.24	0.48	0.51	0.37	0.50	0.60		0.85	0.92	0.79	0.80	0.70	0.80		0.74	1.67	0.49	0.36	0.70	0.80		0.60	0.72	0.70	0.55	0.60	0.50		0.90	0.65	0.55	0.96	0.60	0.08	
LTOB[2] Cross Sectional Area (ft^2)	3.90	1.50	1.40	1.80	1.80	2.10		7.07	7.07	2.90	5.60	4.60	4.70		3.17	4.40	2.00	1.70	2.30	4.20		3.19	2.30	1.80	2.50	2.50	1.80		3.70	4.90	2.00	3.40	3.40	2.50	
	Cross Section 6 (Riffle - Reach 2)							**Cross Section 7 (Pool - Reach 1)**							**Cross Section 8 (Riffle - Reach 1)**							**Cross Section 9 (Pool - Reach 1)**							**Cross Section 10 (Riffle - Reach 1)**						
	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	36.53	37.13	37.75	37.84	37.52	37.62									37.91	37.90	37.97	37.93	37.91	37.86									40.26	40.22	40.27	40.28	40.29	40.29	
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	0.63	0.47	0.74	1.50	1.00									1.00	1.30	1.09	0.88	0.80	0.80									1.00	1.13	1.04	1.00	0.90	1.00	
Thalweg Elevation	35.67	36.57	36.97	37.01	37.02	36.98		35.91	35.87	35.70	35.96	35.93	35.93		37.40	37.41	37.33	37.44	37.36	37.32		38.41	38.32	38.05	38.43	38.52	38.45		39.86	39.77	39.82	39.87	39.90	39.25	
LTOB[2] Elevation	36.53	36.92	37.34	37.62	37.78	37.62		36.56	36.66	36.25	36.70	36.58	36.63		37.91	38.05	38.03	37.87	37.81	37.76		39.00	39.03	39.21	39.05	39.09	38.95		40.26	40.28	40.29	40.28	40.25	40.29	
LTOB[2] Max Depth (ft)	0.86	0.35	0.37	0.61	0.80	0.64		0.65	0.79	0.55	0.74	0.70	0.70		0.51	0.64	0.70	0.43	0.50	0.50		0.59	0.71	1.16	0.62	0.60	0.60		0.40	0.51	0.47	0.41	0.40	1.00	
LTOB[2] Cross Sectional Area (ft^2)	5.25	2.82	1.60	2.66	12.09	7.30		2.30	3.10	2.30	3.20	3.20	4.30		4.28	7.20	5.01	3.80	2.77	4.34		2.20	2.40	5.20	2.40	2.40	2.10		2.40	3.30	2.90	2.40	2.00	7.70	

	Cross Section 11 (Confluence - Reach 1)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	33.42	33.44	33.49	33.52	33.53	33.29	
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	0.84	0.73	0.71	0.79	0.64	
Thalweg Elevation	32.51	31.91	32.56	32.58	32.60	32.59	
LTOB[2] Elevation	33.42	33.19	33.24	33.25	33.33	33.04	
LTOB[2] Max Depth (ft)	0.91	1.28	0.68	0.67	0.50	0.70	
LTOB[2] Cross Sectional Area (ft^2)	22.54	14.68	14.13	13.85	16.54	15.82	

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - **Bank Height Ratio (BHR)** takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.

2 - **LTOB Area and Max depth** - These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

Table 11b: Monitoring Data - Stream Reach Data Summary (Reach 1-4)

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Hudson/ DMS:95361) Segment/Reach: Reach 1

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 5						MY- 7					
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)	11.50			16.20		2	11.46			20.00		2	11.19			16.10		2	11.24			17.33		2	11.20			14.90		2	20.50			14.20		2
Floodprone Width (ft)	57.00			83.30		2	58.28			86.26		2	53.80			97.70		2	57.38			74.01		2	54.00			>100		2	87.70			>100		2
Bankfull Mean Depth (ft)	0.22			0.26		2	0.24			0.28		2	0.23			0.26		2	0.25			0.26		2	0.20			0.60		2	0.20			0.50		2
[1]Bankfull Max Depth (ft)	0.40			0.51		2	0.49			0.50		2	0.42			0.57		2	0.40			0.45		2	0.40			0.60		2	0.50			1.00		2
Bankfull Cross Sectional Area (ft^2)	2.58			4.26		2	3.25			4.77		2	2.58			4.26		2	2.58			4.26		2	2.58			4.26		2	4.34			7.70		2
Width/Depth Ratio	52.27			62.31		2	40.49			83.95		2	48.60			60.83		2	38.10			38.50		2	52.20			52.80		2	96.50			26.20		2
Entrenchment Ratio	4.96			5.14		2	4.31			5.08		2	5.21			5.36		2	4.27			5.10		2	4.80			---		2	4.30			---		2
[1]Bank Height Ratio	1.00			1.00		2	1.00			1.00		2	1.12			0.88		2	0.91			1.10		2	0.80			0.90		2	0.80			1.00		2
Profile																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification	C 5/6						C 5/6						C 5/6						C 5/6						C 5/7						C 5/8					
Channel Thalweg length (ft)	850						850						850						850						850						850					
Sinuosity (ft)	1.04						1.04						1.04						1.04						1.04						1.04					
Water Surface Slope (Channel) (ft/ft)																																				
BF slope (ft/ft)	0.006						0.006						0.006						0.006						0.006						0.006					
[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																																				

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

2 = Bankfull for XS 6 recalculated

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 measurements 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

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Hudson/ DMS:95361) Segment/Reach: Reach 2

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 5						MY- 7					
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)			11.8			1			12.5			1			12.5			1			26.2			1			24.4			1			32.5			
Floodprone Width (ft)			28.2			1			25			1			42.3			1			48.3			1			36.3			1			48.6			
Bankfull Mean Depth (ft)			0.45			1			0.11			1			0.42			1			0.22			1			0.2			1			0.2			
[1]Bankfull Max Depth (ft)			0.86			1			0.21			1			0.54			1			0.64			1			0.5			1			0.6			
Bankfull Cross Sectional Area (ft^2)			5.28			1			1.39			1			5.28			1			5.28			1			5.28			1			7.7			
Width/Depth Ratio			26.2			1			112			1			29.6			1			40.9			1			113			1			137			
Entrenchment Ratio			2.39			1			2			1			2			1			1.8			1			1.5			1			1.5			
[1]Bank Height Ratio			1			1			1			1			1			1			1			1			1			1			1			
Profile																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
Pattern									71																											
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification	C 5/5						C 5/5						C 5/5						C 5/5						C 5/6						C 5/7					
Channel Thalweg length (ft)	541						541						541						541						541						541					
Sinuosity (ft)	1.05						1.05						1.05						1.05						1.05						1.05					
Water Surface Slope (Channel) (ft/ft)																																				
BF slope (ft/ft)	0.0035						0.0035						0.0035						0.0035						0.0035						0.0035					
2 = Bankfull for XS 6 recalculated																																				
[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																																				

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

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 measurements 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

Entrenchment ratio is low for Reach 2 due to water spreading into the floodplain, similar to that of Reach 5. Not expected to be an issue in the future. With the addition of the channel getting wider and shallower, it is functioning as intended and creating additional wetlands along the floodplain.

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Hudson/ DMS:95361) Segment/Reach: Reach 3

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 5						MY- 7					
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)			12.50			1			14.44			1			16.33			1			14.80			1			13.00			1			12.90			
Floodprone Width (ft)			32.90			1			36.68			1			42.80			1			36.01			1			38.20			1			33.10			
Bankfull Mean Depth (ft)			0.57			1			0.48			1			0.43			1			0.47			1			0.50			1			0.40			
[1]Bankfull Max Depth (ft)			0.85			1			0.96			1			1.04			1			0.88			1			0.90			1			0.80			
Bankfull Cross Sectional Area (ft^2)			7.07			1			16.24			1			7.07			1			7.07			1			7.05			1			4.70			
Width/Depth Ratio			21.95			1			69.34			1			37.73			1			16.80			1			24.00			1			35.30			
Entrenchment Ratio			2.63			1			2.53			1			2.25			1			2.42			1			2.90			1			2.57			
[1]Bank Height Ratio			1.00			1			1.00			1			1.00			1			0.45			1			1.00			1			0.63			
Profile																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification	C 5/6						C 5/6						C 5/6						C 5/6						C 5/7						C 5/7					
Channel Thalweg length (ft)	446						446						446						446						446						446					
Sinuosity (ft)	1.08						1.08						1.08						1.08						1.08						1.08					
Water Surface Slope (Channel) (ft/ft)																																				
BF slope (ft/ft)	0.005						0.005						0.005						0.005						0.005						0.005					
[2]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																																				

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

2 = Bankfull for XS 6 recalculated

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 measurements 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

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Hudson/ DMS:95361) Segment/Reach: Reach 4

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 5						MY- 7					
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)			9.90			1			8.27			1			10.59			1			10.00			1			8.00			1			10.60			
Floodprone Width (ft)			31.36			1			57.96			1			29.01			1			25.46			1			34.20			1			40.60			
Bankfull Mean Depth (ft)			0.32			1			0.52			1			0.30			1			0.30			1			0.40			1			0.40			
[1]Bankfull Max Depth (ft)			0.74			1			1.62			1			0.62			1			0.52			1			0.80			1			0.80			
Bankfull Cross Sectional Area (ft^2)			3.17			1			4.31			1			3.17			1			3.17			1			3.17			1			4.20			
Width/Depth Ratio			30.90			1			15.86			1			35.39			1			19.23			1			20.20			1			26.50			
Entrenchment Ratio			3.17			1			7.01			1			5.47			1			2.55			1			4.30			1			3.80			
[1]Bank Height Ratio			1.00			1			1.00			1			1.00			1			0.70			1			1.00			1			1.00			
Profile																																				
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification			C 5/6						C 5/6						C 5/6																						
Channel Thalweg length (ft)			447						447						447																						
Sinuosity (ft)			1.01						1.01						1.01																						
Water Surface Slope (Channel) (ft/ft)																																				
BF slope (ft/ft)			0.0035						0.0035						0.0035																						
2 = Bankfull for XS 6 recalculated																																				
[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																																				

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

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 measurements 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

APPENDIX E: YEAR 7 HYDROLOGIC DATA

Table 9: Verification of Bankfull Events

Table 12: Verification of Baseflow

Figure 4: Monthly Rainfall Data with Percentiles

Table 13: Cumulative Days Table

Well Data Logger Status

Figures 5-9: Stream Surface Water Hydrology (Well 1-9)

Table 9: Verification of Bankfull Events

Date of Observation	Dates of Occurrence	Method	Greater than Qbkf Stage?
Reach 1 (Well 5, 6)			
10/4/2022	Well 5 Only: 1/3-1/6/2022, 1/9-1/23/2022, 1/26-2/19/2022, 2/21-3/2/2022, 3/9-3/19/2022, 3/24-3/27/2022, 4/5-4/8/2022, 6/12/2022, 7/9/2022,	Data logger	Y
10/28/2021	10/27-10/28/20, 11/1-11/8/20, 11/12-11/30/20, 12/1-12/6/20, 12/8/20-1/13/21, 1/17-1/21/21, 1/23-1/31/21, 2/4-3/3/21, 3/5-4/5/21, 4/10/21, 6/4/21, 6/7 & 8/21, 6/10 & 11/21, 6/22-6/29/21	Data logger	Y
10/28/2020	Various, including: 11/11-12/22/19, 1/4-4/26/20 ,5/20-6/24, 9/15-9/21	Data logger	Y
10/23/19	Various, including: 11/11/18-4/6/19, 6/7-6/15/19	Data logger	Y
10/5/18	Various, including: 12/8-4/6/18, 5/05-5/10, 5/30-6/6, 6/14, 7/24-8/8, 8/22-8/26, 9/13-9/20	Data logger	Y
11/17/17	Various, including: 9/29/2016-10/17/2016, 10/21-10/24, 7/16-7/17, 8/11, 8/13-8/14, 9/6- 9/8/2017	Data logger	Y
9/29/16	2/7-2/13/16, 3/7-3/9/16	Data logger	Y
Reach 2 (Well 7)			
10/4/2022	NA (Data Unreadable)	Data logger	NA
10/28/2021	10/27/20-5/9/21, 5/12-5/15/21, 5/29-7/17/21, 7/19-7/23/21, 7/27-8/30/21, 9/3/21, 10/23-10/25/21	Data logger	Y
10/28/20	Various, including: 11/24/19-6/23/20, 9/18-10/28	Data logger	Y
10/23/19	Various, including: 10/5/18-5/5/19, 6/7-7/2, 7/12-7/25, 8/16-8/24, 9/6-9/14, 10/22	Data logger	Y
10/5/18	1/7-1/16/18, 1/25-2/23, 2/27, 3/24-3/27, 3/21, 4/9-4/15, 8/2-8/5, 9/13-9/20	Data logger	Y
11/17/17	9/29/2016-10/16/2016, 10/25, 12/18-12/28, 12/30-1/3, 1/5-1/19, 1/30-1/31, 2/1-2/6, 2/20-2/21, 3/3-3/6, 3/19-3/27, 3/29-3/30, 4/1-4/3, 4/13, 4/18-4/20, 4/28-4/30, 5/30/2017	Data logger	Y
9/29/16	1/29-2/1/16, 2/2-2/8/16	Data logger	Y
Reach 3 (Well 1, 2)			
10/4/2022	NA (Data Unreadable)	Data logger	NA
10/25/21	Various, including: 10/27-12/6/20, 12/8/20-1/14/21, 1/17-1/31/21, 2/3-4/10/21, 4/13-4/14/21, 4/19-4/24/21, 4/26-4/28/21, 5/1/21, 5/12-5/13/21, 5/29-6/11/21, 6/18/21, 6/20/21, 6/22-7/1/21, 7/5-7/16/21, 7/19/21, 7/22-7/23/21, 7/27/-7/29/21, 8/2-8/19/21, 8/24-8/29/21	Data logger	Y
10/28/20	Various, including between 12/14/19-3/10/20	Data logger	Y
10/23/19	Various, including: 11/4/18, 11/11-11/15, 12/24-12/28, 12/30-12/31, 1/7/19, 1/15-1/23, 1/31-2/02. 3/13, 3/19-21, 3/27-3/28	Data logger	Y
10/5/18	12/27/2017, 1/1/18, 1/6, 1/16, 1/25-2/5, 3/27, 9/13-9/18	Data logger	Y
11/17/17	9/29/2016-11/3/2017	Data logger	Y
9/29/16	2/5-6/16, 2/18/16, 5/29/16, 6/7/16	Data logger	Y
Reach 4 (Well 3)			
10/4/2022	1/3-1/5/2022, 1/9-1/10/2022, 1/12-1/13/2022, 1/16/2022, 2/7/2022, 2/17/2022, 3/9/2022, 3/12/2022, 4/7/2022, 5/23-5/24/2022, 6/3/2022, 6/8/2022, 6/12/2022, 7/9/2022, 7/31/2022, 8/22-8/24/2022, 8/27-9/15/2022, 9/17-10/4/2022	Data logger	Y

10/25/21	10/31-11/2/2020, 11/4-11/9/2020, 11/12-11/15/2020, 11/18-11/21/2020, 11/24-11/26/2020, 12/3/2021, 12/13-12/16/2020, 12/18-12/20/2020, 12/22-12/24/2020, 12/27/2020-1/3/2021, 1/10-1/12/2021, 1/24/2021, 1/26/2021, 1/28/2021, 1/28-1/31/2021, 2/8-2/22/2021, 2/25-2/28/2021, 3/2/2021, 3/7-3/12/2021, 3/16 &17/2021, 3/19-3/22/2021, 3/30-4/4/2021, 4/10/2021, 5/29/2021, 6/2-6/4/2021, 6/7/021, 6/10/2021, 6/25-6/27/2021, 6/29/2021, 08/1/2021, 8/3, 4, 6 & 7/2021, 8/15 & 18/2021	Data logger	Y
10/28/20	Various, including between 12/7-12/22/19, 1/8-1/22/20, 2/6-2/24	Data logger	Y
10/23/19	Various, including: 10/17-10/26/18, 11/4, 11/9, 11/11-11/23, 12/5-12/16, 12/25-1/2/19, 1/21-2/4, 2/8-2/11, 2-16-3/14, 3-19-3/21, 3/25-3/31, 4/1-4/7, 9/6/18	Data logger	Y
10/5/18	11/9, 11/17-11/22/17, 3/24-4/24/18, 5/22-6/10, 9/11-9/19	Data logger	Y
11/17/17	9/29/2016-10/2, 10/6-10/12, 10/14-10/16, 10/25-10/29, 11/1-11/2, 11/5-11/8, 11/12, 12/4-12/5, 12/9-12/28, 12/30-1/3, 1/6-1/17, 2/2-2/6, 2/10-2/11, 2/21, 3/2-3/31, 4/2-4/3, 4/9-4/20, 4/24-4/26, 4/29-4/30, 5/5, 5/25, 5/30, 6/21, 6/24-6/25, 7/5, 7/18, 8/13-8/14, 9/9-9/11/2017	Data logger	Y
9/29/16	2/4/16, 2/18/16, 5/3/16, 6/7/16	Data logger	Y
Reach 1&4 Confluence (Well 4)			
10/4/2022	12/30/2021-1/3/2022, 4/8/2022, 5/17-5/18/2022, 5/23-5/31/2022, 6/4-6/6/2022, 6/8-6/17/2022, 7/9-7/17/2022, 7/31-8/2/2022, 8/12-8/14/2022, 8/22-8/24/2022, 9/11-9/13/2022, 9/30-10/3/2022	Data logger	Y
10/25/21	10/31-11/9/20, 11/12-11/29/20, 12/2-12/4/20, 12/10-12/20/20, 12/22/20-1/4/21, 1/6-1/7/21, 1/9-1/13-21, 1/18-1/20/21, 1/23-1/31/21, 2/4/21, 2/6-2/28/21, 3/2-3/3-21, 3/6-3/23/21, 3/25/2021, 3/29-4/4/21, 4/10/21, 6/3-6/4/21, 6/7-6/10/2021, 6/12/21, 6/25-6/29/21, 7/11/21, 8/3-8/4/2021, 8/7-8/8/21, 8/15/21, 8/18/21	Data logger	Y
10/28/20	Various, including between 12/19-12/22/19, 1/8-1/23/20, 2/14-2/24, 3/7-3/23	Data logger	Y
10/23/19	Various, including: 10/18/18, 11/3, 11/8, 11/11-11/18, 11/21-11/23, 12/5-12/15, 12/24-12/31, 1/31/19-2/2, 2/18-2/27, 3/6-3/14, 4/1-4/5, 6/10, 7/12, 9/5	Data logger	Y
10/5/18	11/13, 11/17, 12/12, 12/26, 12/31/17, 1/10/18, 2/13-2/15, 3/24-3/26, 4/22, 5/31, 6/1, 7/24, 7/29, 8/8, 9/12, 9/16	Data logger	Y
11/17/17	10/7-10/9/16, 12/19-12/20/16, 1/2/16, 1/7-1/10/17, 1/13-1/14/17, 3/5/17, 3/23-3/24/17, 4/24-4/25/17, 5/5/17, 5/23/17, 5/25/17, 6/24/17, 9/6/17	Data logger	Y
9/29/16	2/4/16, 2/18/16, 5/3/16, 6/7/16	Data logger	Y

Table 12: Verification of Baseflow

Table 12: Verification of Baseflow			
Well (Reach)	**Dates of Occurrence**	**30 Consecutive Days Minimum Flow Requirement Met?**	**Notes**
1 (Reach 3)	NA	NA	Data Unreadable
2 (Reach 3)	NA	NA	Data Unreadable
3 (Reach 4)	Various	Y	On-site data logger
4 (Confluence Reach 1 & Reach 4)	Various	Y	On-site data logger
5 (Reach 1)	Various	Y	On-site data logger
6 (Reach 1)	NA	NA	Data Unreadable
7 (Reach 2)	NA	NA	Data Unreadable
8 (Reach 5)	Various	Y	On-site data logger
9 (Reach 5)	Various	Y	On-site data logger
10 (Reach 5)	NA	NA	Data Unreadable

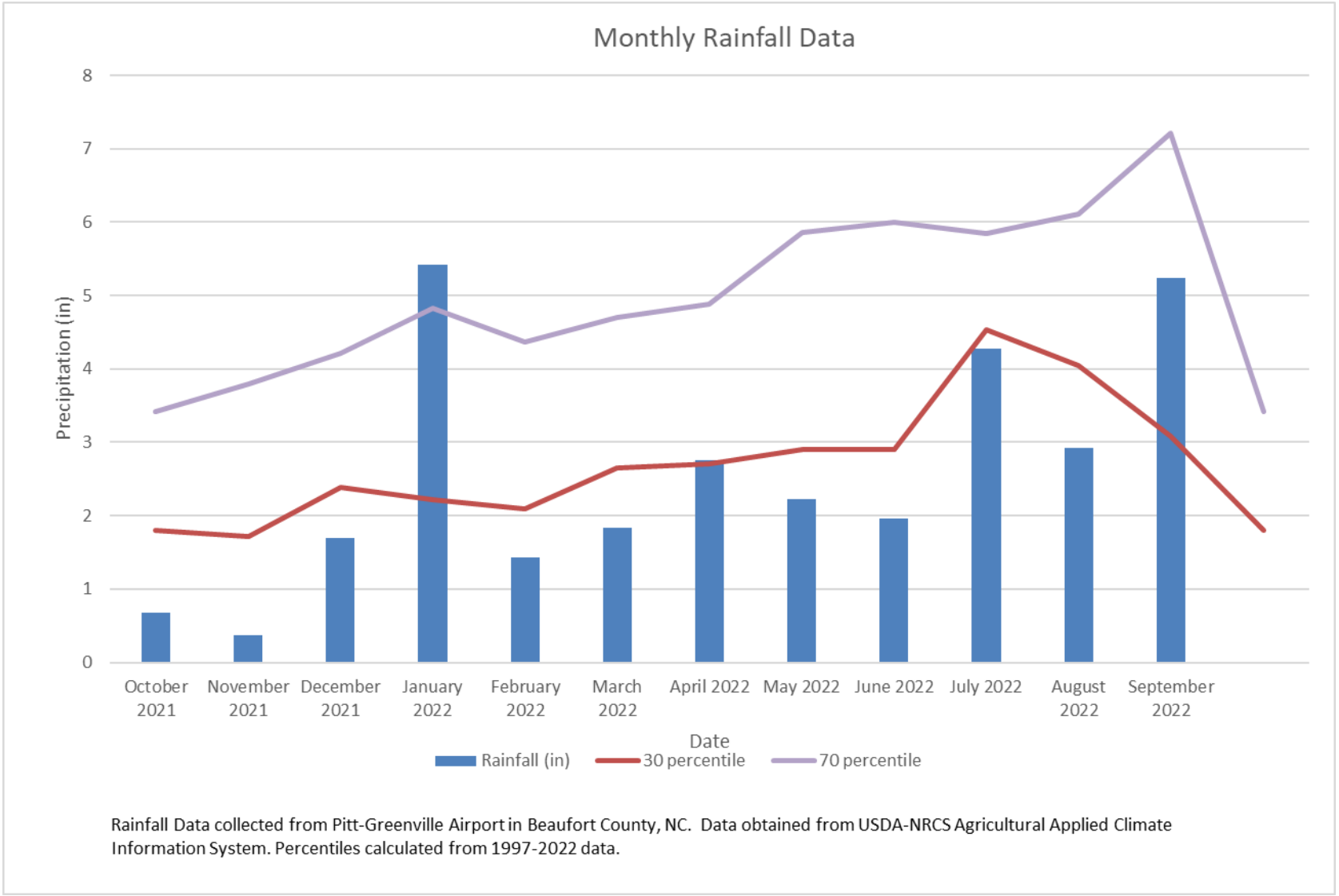


Figure 4: Hudson Stream Restoration Project – Year 7: Monthly Rainfall Data with Percentiles

Well Data Logger Status

Monitoring Well 1 – Reach 3

- HOBO Logger could not read out data.

Monitoring Well 2 – Reach 3

- HOBO Logger could not read out data.

Monitoring Well 6 – Reach 1

- HOBO Logger could not read out data.

Monitoring Well 7 – Reach 2

- HOBO Logger could not read out data.

Monitoring Well 10 – Reach 5

- HOBO Logger could not read out data. When the logger was retrieved, the cap of the well was dislodged, and the logger string was not fully extended. Logger cap could have been dislodged by animal activity, or from high water flow. The well was situated in standing water and would have met hydrology requirements. See photo to the right.

Photo 1: Logger dislodged at monitoring well 10, on the multi-thread channel Reach 5.

Table 13: Hudson Stream Restoration Project – Year 7: Days Meeting Minimum Flow Requirements

	Most Consequtive Days Meeting Criteria						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
	12/30/15 - 8/12/16	9/30/16 - 11/3/17	11/30/17 - 10/4/18	10/5/18 - 10/23/19	10/23/19 - 10/27/20	01/27/20 - 10/24/21	10/25/21 - 10/4/22
Well 1	65	301	61	140	87	98	NA
Well 2	91	142	193	125	67	163	NA
Well 3	227	400	93	89	53	43	35
Well 4	120	256	167	196	146	175	78
Well 5	81	96	147	85	NA	117	84
Well 6	11	285	241	123	61	129	NA
Well 7	15	21	37	215	229	201	NA
Well 8	169	297	98	14	11	12	80
Well 9	227	400	194	204	181	183	117
Well 10	227	400	240	218	184	NA	NA

	Culmulative Days Meeting Criteria						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
	12/30/15 - 8/12/16	9/30/16 - 11/3/17	11/30/17 - 10/4/18	10/5/18 - 10/23/19	10/23/19 - 10/27/20	01/27/20 - 10/24/21	10/25/21 - 10/4/22
Well 1	219	392	316	283	317	292	NA
Well 2	194	346	296	255	282	259	NA
Well 3	227	400	329	243	272	1231	205
Well 4	210	332	283	228	258	235	202
Well 5	181	209	204	170	NA	190	104
Well 6	158	351	315	187	238	200	NA
Well 7	143	190	197	277	304	298	NA
Well 8	225	396	253	170	128	187	153
Well 9	227	400	276	358	295	266	180
Well 10	227	400	302	273	306	NA	NA

*Yellow highlighted cells indicate that the logger data could not be retrieved from the device due to the devices having dead batteries.

Figure 5: Monitoring Well 3 – Reach 4

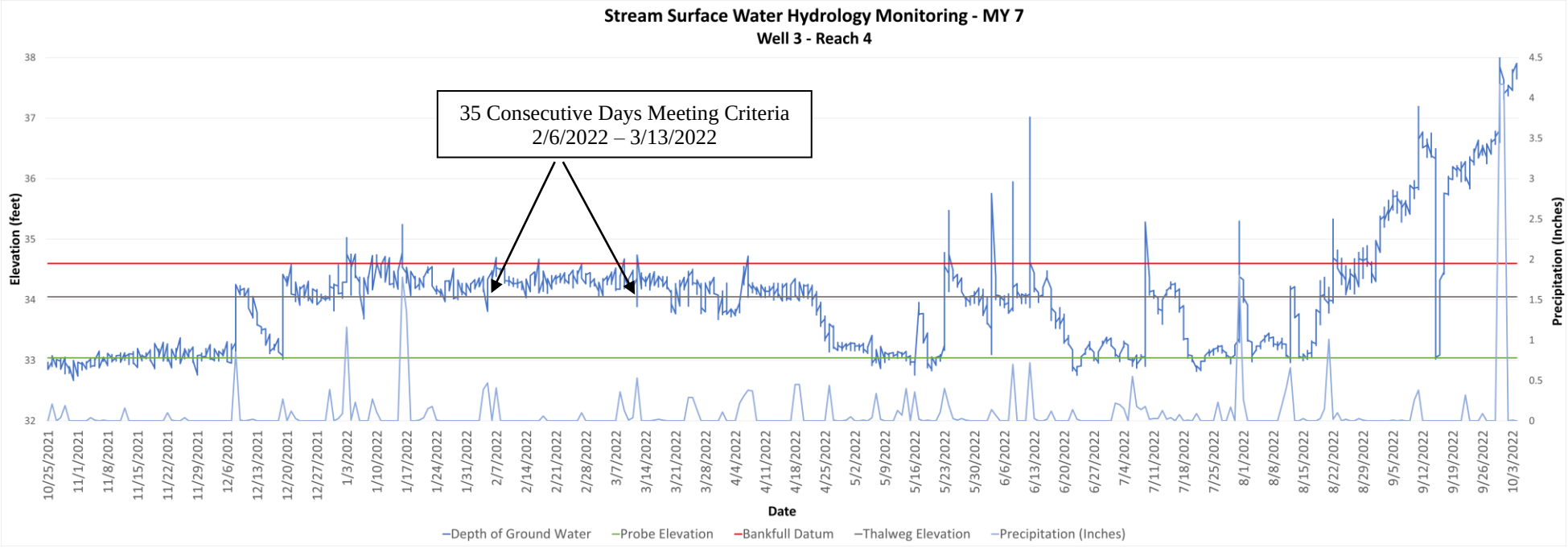


Figure 6: Monitoring Well 4 – Confluence Reaches 1 & 4

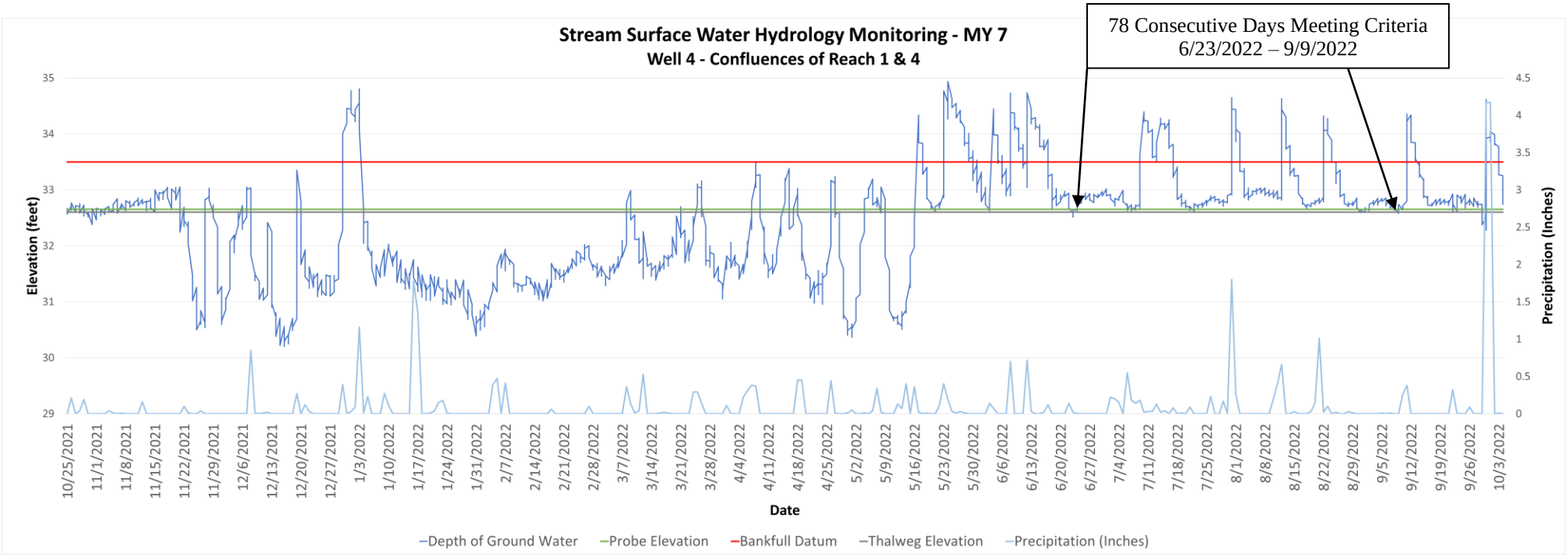


Figure 7: Monitoring Well 5 – Reach 1

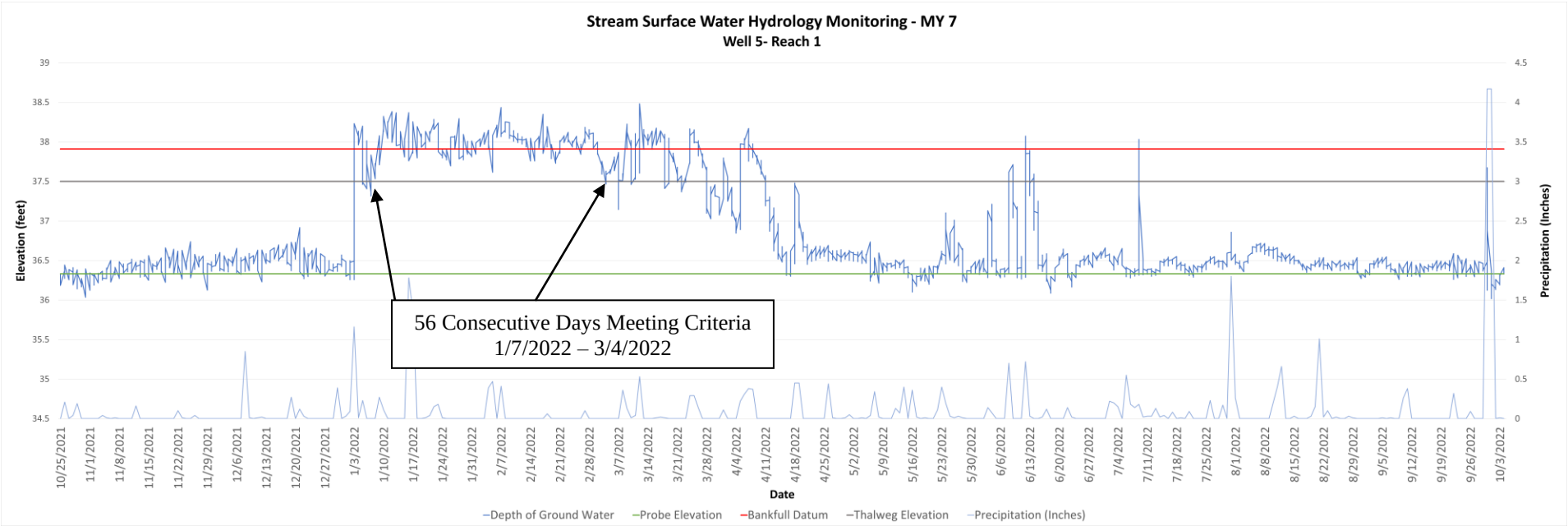


Figure 8: Monitoring Well 8 – Reach 5

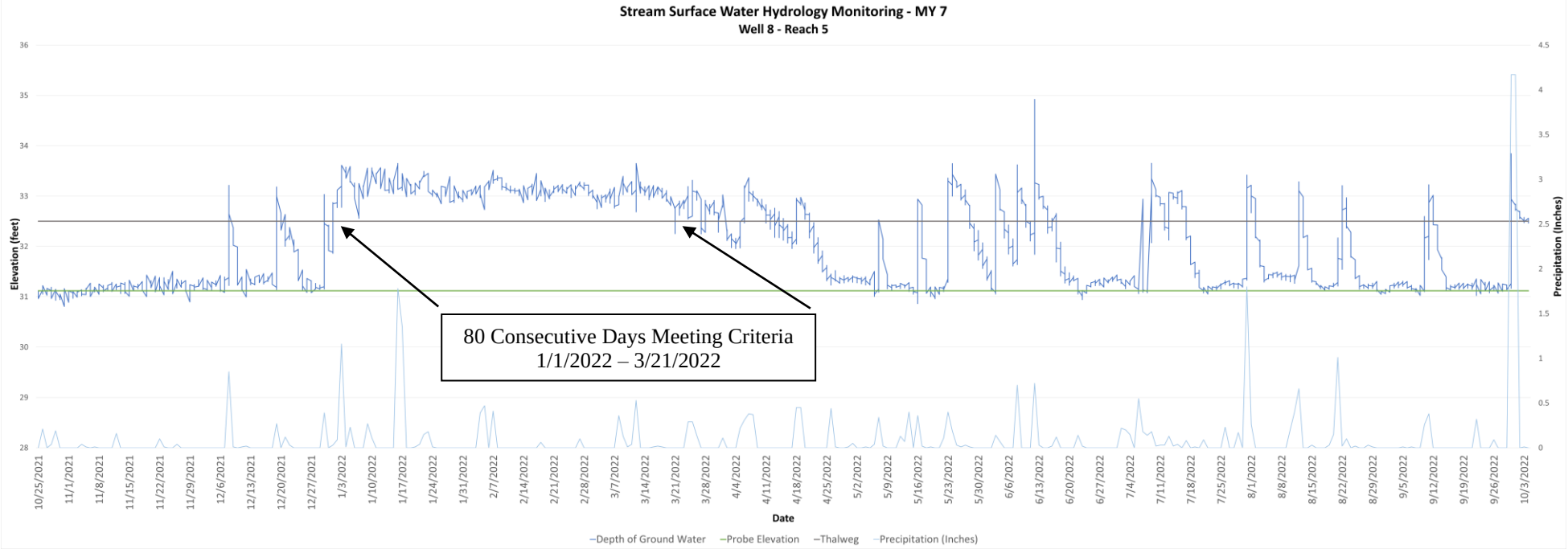
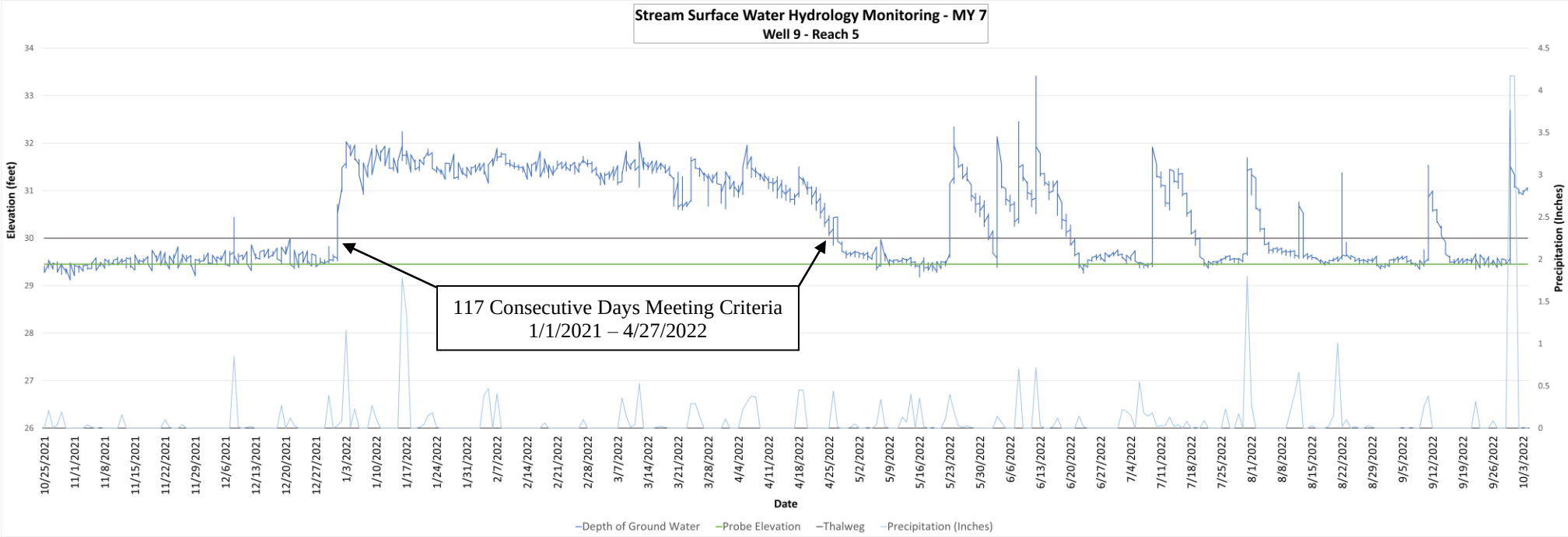


Figure 9: Monitoring Well 9 – Reach 5



APPENDIX F: WATERSHED PLANNING SUMMARY – PRODUCED BY EEP

APPENDIX G: LAND OWNERSHIP AND PROTECTION – PRODUCED BY EEP

APPENDIX H: JURISDICTIONAL DETERMINATIONS 404/01 PERMITS AND OTHER RELATED CORRESPONDENCE

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID: **SAW-2012-01394** County: **Beaufort** USGS Quad: **NC-Hackney**

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

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

Authorized Agent: **Albemarle Restorations, LLC Attn: Ed Temple**
Address: **PO Box 176**
Fairfield, NC 27826

Size and location of property (waterbody, road name/number, town, etc.): **The project (Hudson Property Mitigation Site) is located north of Possum Track Road, east of US 17, in Beaufort County, NC.**

Site Coordinates: **35.4511 °N -77.1028 °W** Waterway: **Chocowinity Creek** River Basin: **Chowan**

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

Applicable Law: ☒ Section 404 (Clean Water Act, 33 USC 1344)
☐ Section 10 (Rivers and Harbors Act, 33 USC 403)
Authorization: Nationwide or Regional General Permit Number(s): **27**

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

Your work is authorized by the above referenced permit provided it is accomplished in strict accordance with the attached conditions and your submitted application and attached information dated August 22, 2014. Any violation of the attached conditions or deviation from your submitted plans may subject the permittee to a stop work order, a restoration order and/or appropriate legal action.

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

Corps Regulatory Official: Todd J Tugwell TUGWELL.TODD.JASON.1048429293 2014.10.08 08:21:51 -04'00' Date: **October 8, 2014**

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

Summary of Authorized Impacts and Required Mitigation

NWP / GP #	Open Water (ac)		Wetland (ac)		Unimportant Steam (lf)		Important Stream (lf)	
	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent
27	0	0	0.97	0	0	0	3085	0
Impact Totals	0	0	0.97	0	0	0	3085	0

Total Loss of Waters of the U.S. (ac)	0	Total Loss of Waters of the U.S. (lf)	0
Required Wetland Mitigation (ac)	0	Required Stream Mitigation (lf)	0

Additional Remarks and/or Special Permit Conditions:
This verification is the second NWP 27 issued for this project, and was issued for work necessary to repair degraded portions of the project. The following special conditions apply:

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

Copy Furnished:

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

Determination of Jurisdiction

A. ☐ Based on preliminary information, there appear to be waters of the US including wetlands within the above described project area. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).

B. ☐ There are Navigable Waters of the United States within the above described project area subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

C. ☐ There are waters of the US and/or wetlands within the above described project area subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

D. ☒ The jurisdictional areas within the above described project area have been identified under a previous action. Please reference the jurisdictional determination issued on **October 28, 2013** (Action ID: **SAW-2013-02102**).

Basis of Jurisdictional Determination: See AID SAW-2013-02102

E. Attention USDA Program Participants: This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B and C above): This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

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

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

Corps Regulatory Official: _____ TUGWELL.TODD.JASON.1048429293 2014.10.08 08:22:53 -04'00'

Date: **October 8, 2014**

Expiration Date of Jurisdictional Determination: **October 28, 2018**

APPENDIX I: PROJECT DEBIT LEDGER – PRODUCED BY EEP