Coddle Creek Tributary
(Indian Run) Stream Restoration
EEP Project # 94
DENR Contract # 5360

Monitoring Report Year 2 of 5
Cabarrus County, North Carolina

Prepared for:

North Carolina Department of Environmental and Natural Resources
Ecosystem Enhancement Program
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Construction Completed: March 27, 2011
Data Collected: December 2013
Report Submission: March 2014

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1.0 EXECUTIVE SUMMARY

The Coddle Creek Tributary (Indian Run) Stream Restoration Project, completed in March 2011, enhanced (level1) or restored a total of 2,270 linear feet of stream in the Upper Rocky River watershed including restoring 6.17 acres of riparian buffer. In addition, approximately 1,540 linear feet of stream was preserved within the 19.61 acre conservation easement. The project is located in the USGS Hydrologic Unit (HU) 03040105020010 of the Yadkin Pee-Dee River Basin. This HU is within the EEP's Upper Rocky River Local Watershed Plan and is also listed as a Targeted Local Watershed (TLW) in EEP's Lower Yadkin Pee-Dee River Basin Restoration Priorities Plan 2009. The project site, which is protected by a 19.61-acre permanent conservation easement held by the State of North Carolina, is situated in Cabarrus County in the Southern Outer Piedmont ecoregion of the Piedmont physiographic province. Coddle Creek, from 0.2 miles upstream of NC Highway 73 (NC-73) to Rocky River, is currently listed on the NC 303(d) List as impaired due to turbidity (NCDENR 2012). In addition to the current non-supporting use classification for the lower portions of Coddle Creek, anticipated high rates of development in the watershed pose critical challenges in managing the region's aquatic resources. The project goals and objectives are listed below.

Project Goals

- Improve local water quality by reestablishing stream stability and capacity to transport watershed flows and sediment load.
- Provide additional floodplain storage by increasing the capacity of the stream to mitigate flood flows.
- Restore aquatic and riparian habitat.
- Reducing non-point source sedimentation and nutrient inputs into the project reaches.

Project Objectives

- Restore/Enhance (level 1) 2,270 linear feet of stable stream channel morphology, supported by instream habitat and grade/bank stabilization structures.
- Preserve 852 linear feet of stream within the conservation easement.
- Eliminate accelerated bank erosion by creating a bankfull bench, floodplain, and laying back slopes.
- Reestablish a native riparian buffer.

Vegetation Assessment

The vegetative success of the restoration site is based on criteria established in the USACE Stream Mitigation Guidelines (2003). Vegetation monitoring will be considered successful if a minimum of 260 planted stems/acre are surviving at the end of five years. The interim measure of vegetative success for the site will be the survival of a minimum of 320 planted stems/acre in year three and 288 stems/acre at the end of year four. The Monitoring Year 2 (MY2) stem counts are located in Tables 7 and 9 in Appendix C. Currently, all 11 vegetation plots are meeting the interim measures of success. Vegetation throughout the reach appears to be growing at acceptable rates and the mortality rate appears to be fairly low.

A few areas were noted along the reach as having sparse vegetation as a result of deposition on the floodplain. These areas are located near Sta. 21+00 on the upper reach and Sta. 18+00 to 19+00 on the lower reach. Both areas are illustrated on the Current Condition Plan View (CCPV) in Appendix B. In addition to this location, there is an increasing number of cattails (*Typha latifolia*) growing within the

stream. These locations are noted on the CCPV and represent approximately 250 linear feet of the reach or 11 % of the total reach. The cattails are likely to continue to grow and take over additional stream footage without maintenance activities to control the growth. The cattails aren't currently creating issues to the current vegetation; however, they may start outcompeting other riparian herbaceous species and appear to be having some effects on channel morphology. No other invasive species were observed. No new easement encroachments were noted.

Stream Assessment

The upper and lower reaches of the restoration project were observed to be in stable condition. The channel's profile and cross-sections adjusted minimally from the baseline conditions. The channel accesses its floodplain and evidence of bankfull events were observed during Year 2 monitoring. This evidence included the presence of wrack lines, sediment deposits, and the crest gauge. The substrate continues to shows a gradual change to more coarse material in the upper reach although the lower reach still has finer sediment. This is expected as the lower reach is an offline channel restoration and the larger particles haven't yet migrated downstream.

One notable area of aggradation was observed on the upper reach at Sta. 25+00. This area has a small midchannel bar forming and could be the result of some of the cattail growth near that location. Two areas of bar formation were noted at Sta. 26+50 on the upper reach and Sta. 11+25 on the lower reach. These areas do not appear to be negatively impacting the channel morphology at this time. Two areas of bank erosion were noted near Sta. 22+50 and Sta. 23+50 on the upper reach. The terrace rill at approximately Sta. 18+00 on the left bank of the upper reach was noted in the Monitoring Year 1 report, but appears to have stabilized. This area will continue to be monitored for erosion. Two beaver dams were noted on the lower reach at Sta. 14+25 and 19+00 and removed from the site in November 2013.

Pebble count data for the upper reach cross sections indicate similar values compared to baseline. The exception would be the upper most riffle section where significantly larger material continues to dominate the bed compared to the baseline value. This indicates a good movement of material at least in the upstream parts of the upper reach. The lower reach riffle at cross section 8 still exhibits a small particle size making up the riffle section; however, the riffle at cross section 5 exhibits larger particle sizes. As the lower reach was constructed as an offline segment, these values are not unexpected. It will take longer for coarser material to progress to the lower reach from upstream areas. Also, effects from the beaver dam on the lower reach downstream of cross section 8 may play a role in the type of bed material. Since the cross section dimensions have remained relatively the same for the lower reach, the sections are stable despite the smaller bed material.

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

2.0 METHODOLOGY

The following methods were utilized during the Year 2 monitoring for data collection and post-processing:

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

3.0 REFERENCES

HDR Engineering, Inc. 2007. Final Stream Restoration Plan for Indian Run (Trib. to Coddle Creek).

HDR Engineering, Inc. 2009. Indian Run Stream Restoration Final Plans (90%).

HDR Engineering, Inc. 2011. Baseline Monitoring and As Built Baseline Report.

HDR Engineering, Inc. 2012. Monitoring Report Year 1 of 5.

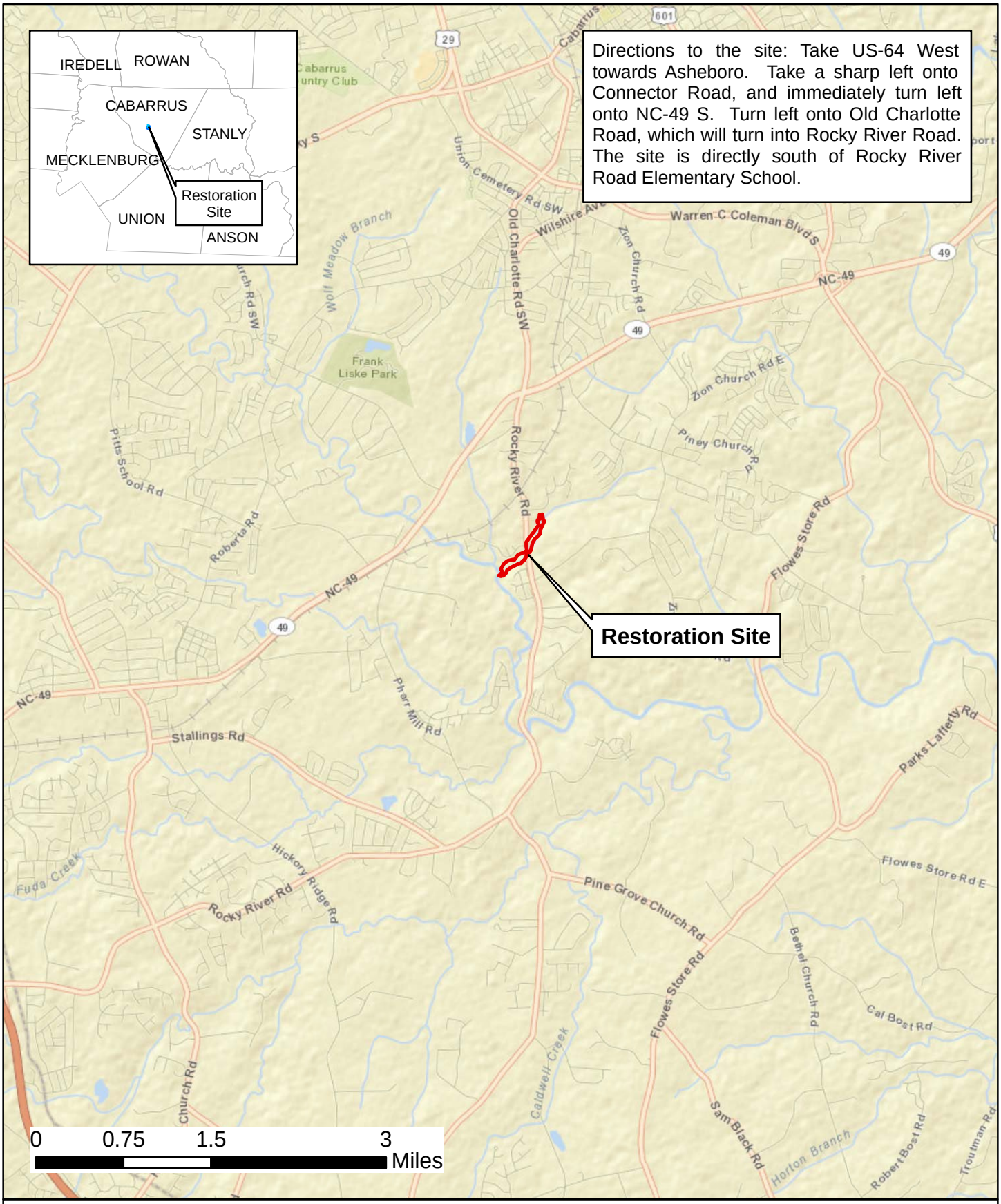
Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation. Version 4.0. (http://cvs.bio.unc.edu/methods.htm)

North Carolina Ecosystem Enhancement Program. 2011. Procedure Guidance and Content Requirements for EEP Monitoring Reports. Version 1.4
(http://www.nceep.net/business/EEP_Mon_Rep_Temp_1.3_01-15-10.pdf)

U.S. Army Corps of Engineers, Wilmington District. 2003. Stream Mitigation Guidelines. North Carolina Division of Water Quality (DWQ), U.S. Environmental Protection Agency, Region IV (EPA), Natural Resources Conservation Service (NRCS) and the North Carolina Wildlife Resources Commission (WRC).

Appendix A

Project Vicinity Map and Background Tables



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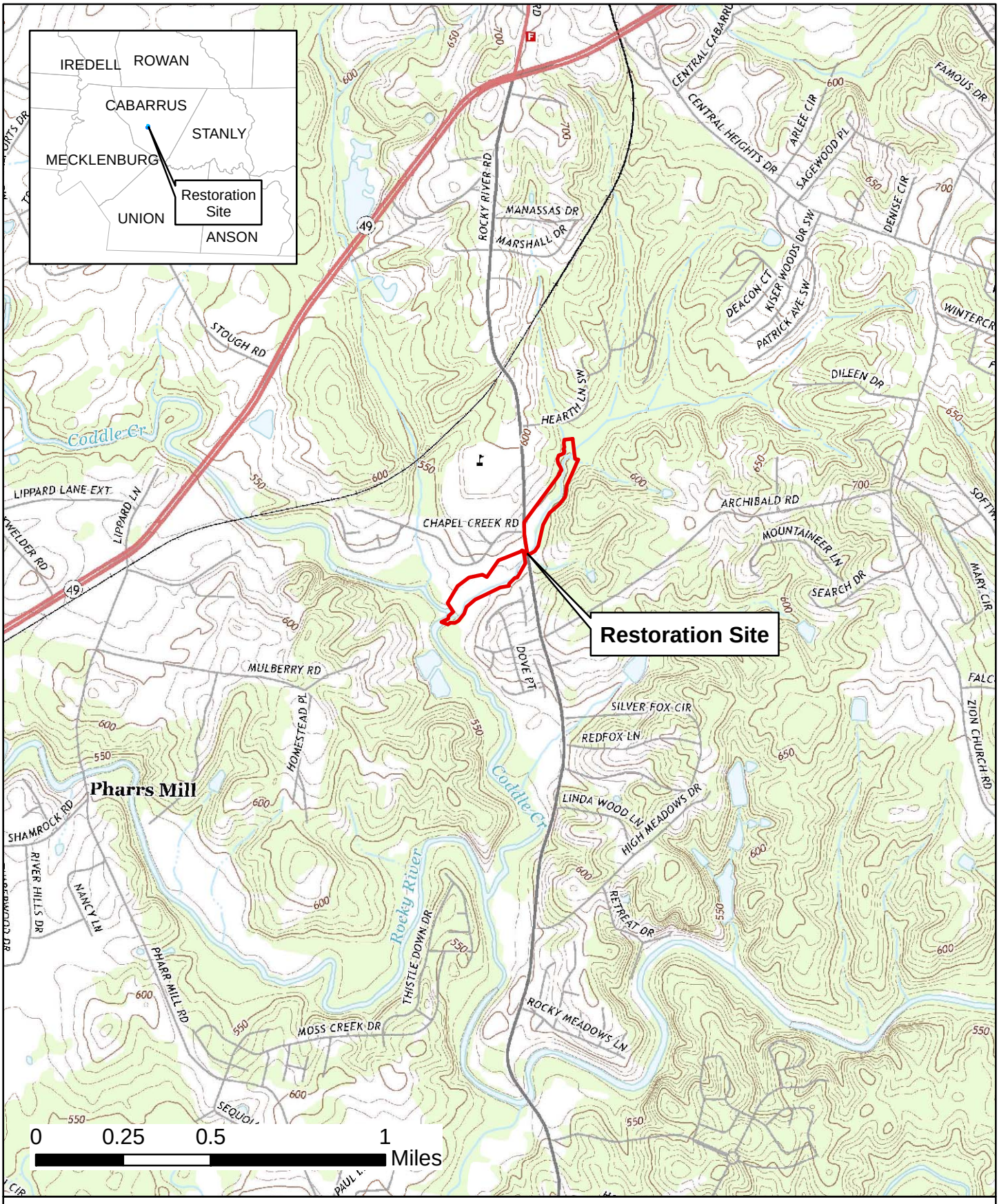
Restoration Site Vicinity

Coddle Creek Tributary (Indian Run)

Monitoring Year 2 Cabarrus County, NC

March 2014 Project # 94 Figure 1

N W E S



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USGS Concord SE Quadrangle

Coddle Creek Tributary (Indian Run)
Monitoring Year 2 Cabarrus County, NC
March 2014 Project # 94 Figure 2

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W E
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Table 1a. Project Components									
Coddle Creek Tributary (Indian Run) / 94									
Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Mitigation Ratio	Mitigation Units	BMP Elements	Comment
Reach 1 - Upper	1275 lf	E (Level 1)	P3	1275 lf	15+00-26+26 & 26+46-27+95	1.5:1	850		Restored bankfull dimension within the existing channel, utilized a partial floodplain bench to restore floodprone conditions, and enhanced existing pattern and profile.
Reach 1 - Upper	20 lf	E (Level 1)	P3	20 lf	26+26-26+46	3:1	7		Restored bankfull dimension within the existing channel, utilized a partial floodplain bench to restore floodprone conditions, and enhanced existing pattern and profile.
Reach 1 - Upper	415 lf	P		415 lf	07+52-09+10 & 09+34-11+72 & 14+45-14+64	10:1	42		Preserved channel in its existing condition within the conservation easement.
Reach 1 - Upper	327 lf	P		297 lf*	09+10-9+34 & 11+72-14+45	20:1	15		Preserved channel in its existing condition within the utility easement. *30 feet of sanitary sewer easement will not receive mitigation credits
Reach 2 - Lower	735 lf	R	P2	975 lf	10+00-19+75	1:1	975		Fully restored pattern, dimension and profile, excavated a new channel within an adjoining floodplain bench to restore floodplain conditions.
Reach 2 - Lower	434 lf	P		434 lf	21+72-23+58 & 24+45-26+93	20:1	22		Preserved channel in its existing condition within the utility easement.
Reach 2 - Lower	394 lf	P		394 lf	19+75-21+72 & 23+58-24+45 & 26+93-28+03	10:1	39		Preserved channel in its existing condition within the conservation easement.

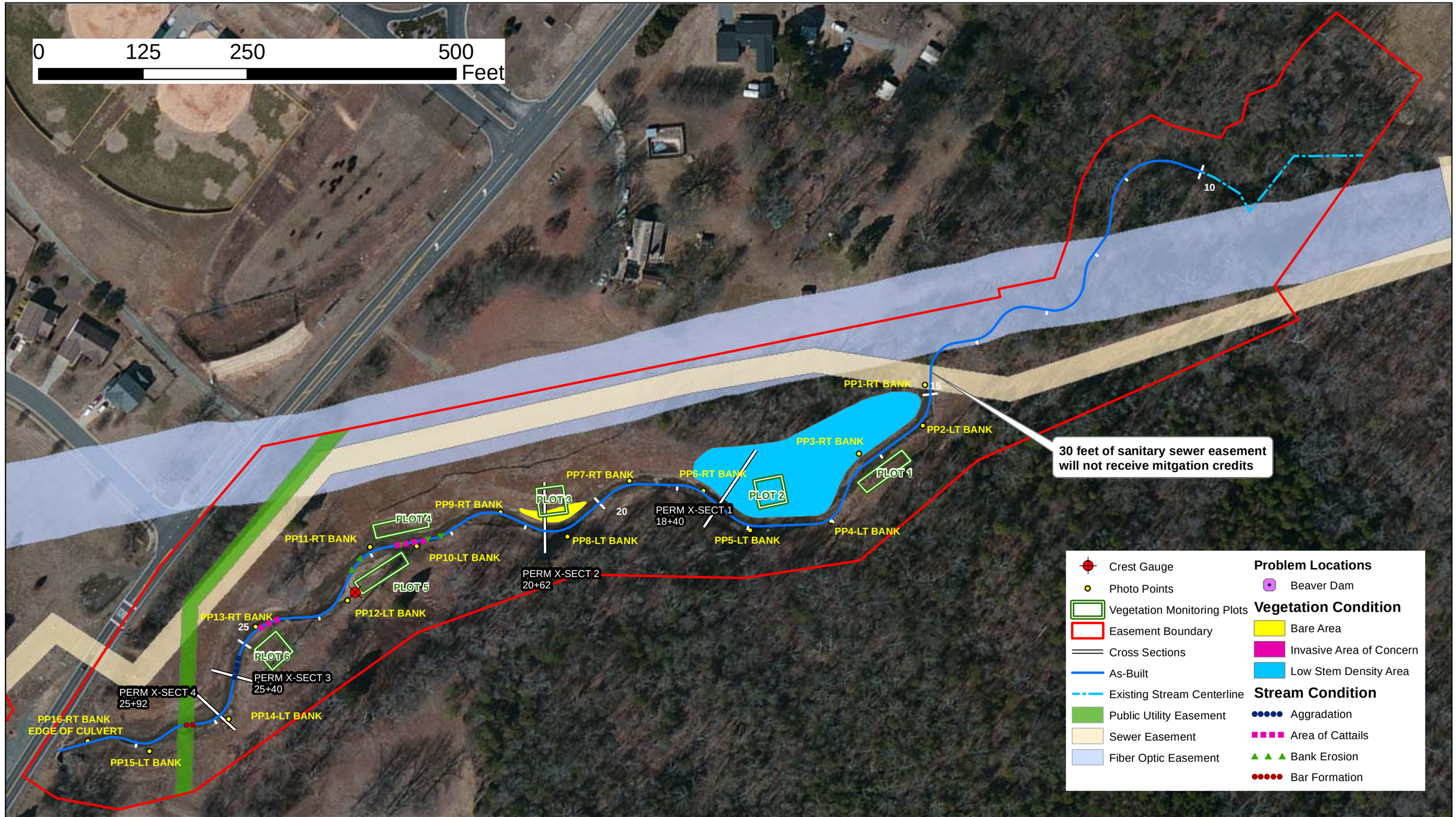
Table 1b. Component Summations Coddle Creek Tributary (Indian Run) / 94								
Restoration Level	Stream (lf)	Stream Mitigation Units (lf)	Riparian Wetland (Ac)		Planted Area (Ac)	Potential Buffer Area (Ac)	Total Conservation Area (Ac)	BMP
			Riverine	Non-Riverine				
Restoration (Lower)	975	975			4.21	2.58	10.11	
Enhancement (Upper)	1295	857			4.30	3.59	9.50	
Preservation	1540	118				1.89		
Totals (Feet/Acres)	3,810				8.51	8.06	19.61	
MU Totals		1,949						

Table 2. Project Activity and Reporting History Coddle Creek Tributary (Indian Run) / 94		
Elapsed Time Since Grading Complete: 2 yrs 8 months		
Elapsed Time Since Planting Complete: 2 yrs 8 Months		
Number of Reporting Years: 2		
	Data Collection	Completion or
Activity or Deliverable	Complete	Delivery
Restoration Plan	Jun-07	Aug-07
Final Design – Construction Plans	Jun-07	Jul-09
Construction/Grading	NA	Mar-11
Planting	NA	Mar-11
Final Inspection	NA	Mar-11
Monitoring – baseline)	May-11	Aug-11
Year 1 Monitoring	5/29/2012 - 5/30/2012	Sep-12
Year 2 Monitoring	Nov-13	Mar-14
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

Table 3. Project Contacts Table Coddle Creek Tributary (Indian Run) / 94	
Designer	HDR Engineering Inc. of the Carolinas
	3733 National Drive, Suite 207, Raleigh, NC 27612
Primary project design POC	Jonathan Henderson, PE (919) 785-1118
Construction Contractor	Land Mechanic Designs, Inc.
	126 Circle G Lane, Willow Spring, NC 27592
Construction contractor POC	Lloyd Glover, (919) 639-6132
Survey Contractor	Stewart Proctor Pllc
	319 Chapanoke Road #106, Raleigh, NC 27603
Survey contractor POC	Herb Proctor, (919) 799-1855
Planting Contractor	HARP, Inc.
	301 McCullough Drive, 4th Floor, Charlotte, NC 28262
Planting contractor POC	Alan Peoples, (704) 841-2841
Seeding Contractor	Land Mechanic Designs, Inc.
	126 Circle G Lane, Willow Spring, NC 27592
Contractor point of contact	Lloyd Glover, (919) 639-6132
Seed Mix Sources	Green Resource, Charlotte, NC
	Phone: (704) 927-3100
Nursery Stock Suppliers	Cure Nursery, Pittsboro, NC - (919) 542-6186
	ArborGen, Blenheim, SC - (843) 528-3203
	Foggy Mountain Nursery llc, Creston, NC - (336) 384-5323
	Habitat and Restoration Plants, Lexington, NC - (336) 362-6776
	NC Division of Forest Resources, Greensboro, NC - (919) 731-7988
Monitoring Performers - Baseline & Year 1	HDR Engineering Inc. of the Carolinas
	3733 National Drive, Suite 207, Raleigh, NC 27612
Monitoring Performers - Year 2	SEPI Engineering & Construction, Inc.
	1025 Wade Avenue, Raleigh, NC 27605
Stream Monitoring POC	Phil Beach, PWS (919) 787-9977
Vegetation Monitoring POC	Kim Hamlin, Project Scientist (919) 787-9977

Table 4. Project Attribute Table Coddle Creek Tributary (Indian Run) / 94		
Project County	Cabarrus	
Physiographic Region	Piedmont	
Ecoregion	Southern Outer Piedmont	
Project River Basin	Yadkin / Pee Dee	
USGS HUC for Project (14 digit)	3040105020010	
NCDWQ Sub-basin for Project	03 - 07 - 11	
Within extent of EEP Watershed Plan?	Upper Rocky River	
WRC Hab Class (Warm, Cool, Cold)	Warm	
% of project easement fenced or demarcated	100% marked with EEP easement signage	
Beaver activity observed during design phase?	No	
Restoration Component Attribute Table		
	UPPER	LOWER
Drainage area (ac)	1.5	
Stream order	2nd	
Restored length (feet)	1295	975
Perennial or Intermittent	Per	
Watershed type (Rural, Urban, Developing etc.)	Devel.	
Watershed LULC Distribution (e.g.)		
Medium Density Residential	11	
Low Density Residential / Open Fields/ Lawns	34	
Forested	52	
Watershed impervious cover (%)	3	
NCDWQ AU/Index number	-	
NCDWQ classification	C	
303d listed?	No	
Upstream of a 303d listed segment?	Yes	
Reasons for 303d listing or stressor	Bio. Integ.	Turbidity
Total acreage of easement	9.5	10.11
Total vegetated acreage within the easement	9.5	10.11
Total planted acreage as part of the restoration	4.3	4.21
Rosgen classification of pre-existing	Imp. C4	Ditch
Rosgen classification of As-built	C4	C4
Valley type	VIII	VIII
Valley slope	0.63%	0.61%
Valley side slope range (e.g. 2-3.%)	-	-
Valley toe slope range (e.g. 2-3.%)	-	-
Cowardin classification	NA	
Trout waters designation	No	
Species of concern, endangered etc.? (Y/N)	No	
Dominant soil series and characteristics		
Series	Chewacla	
Depth	U	U
Clay%	U	U
K	U	U
T	U	U

Appendix B
Visual Assessment Data



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Coddle Creek Tributary (Indian Run) Year 2 Monitoring

Current Conditions Plan View Upper Reach Cabarrus County, NC

March 2014 Project # 94 Figure 3A

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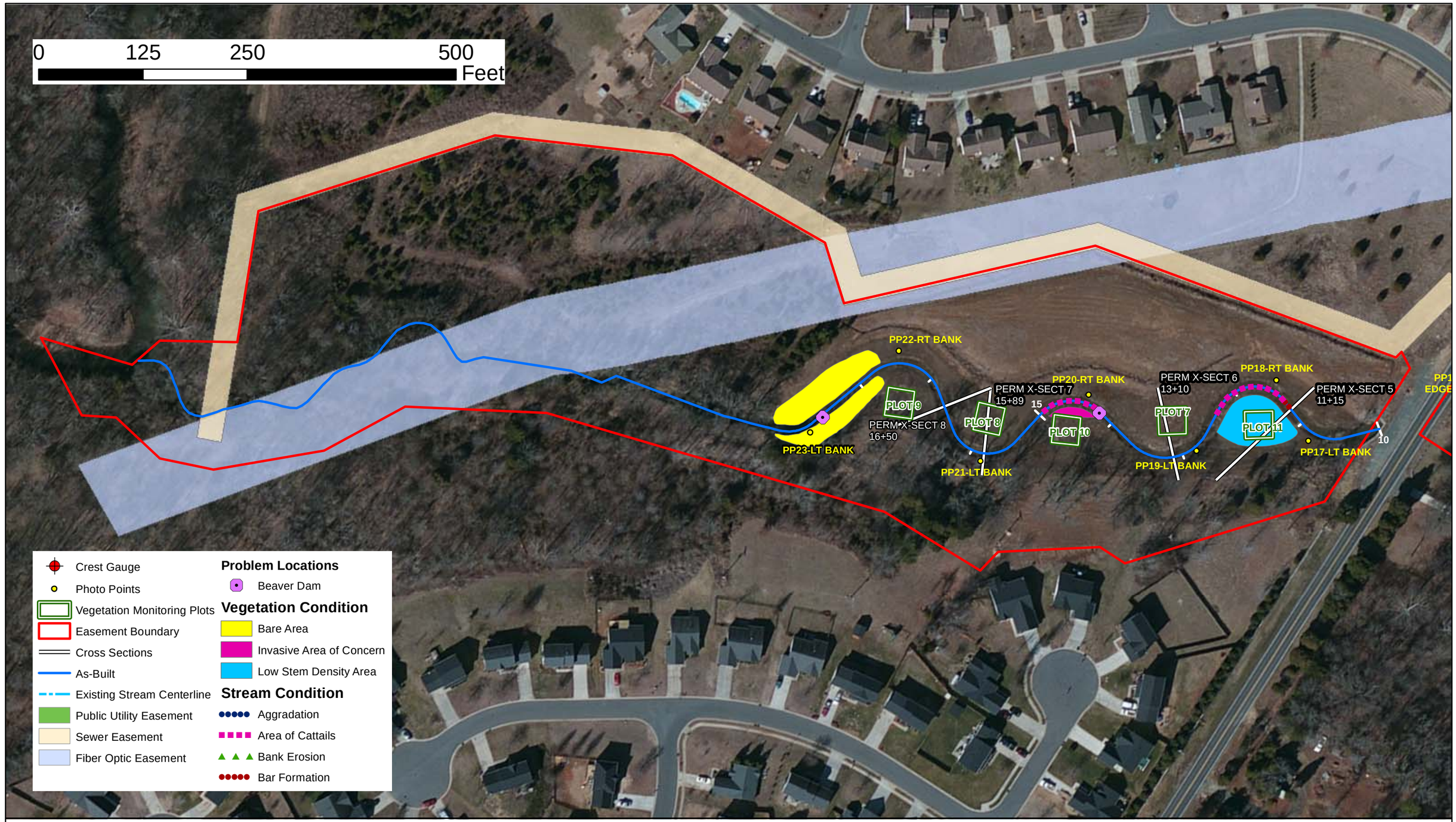

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Coddle Creek Tributary (Indian Run) Year 2 Monitoring

Current Conditions Plan View Lower Reach Cabarrus County, NC

March 2014 Project # 94 Figure 3B

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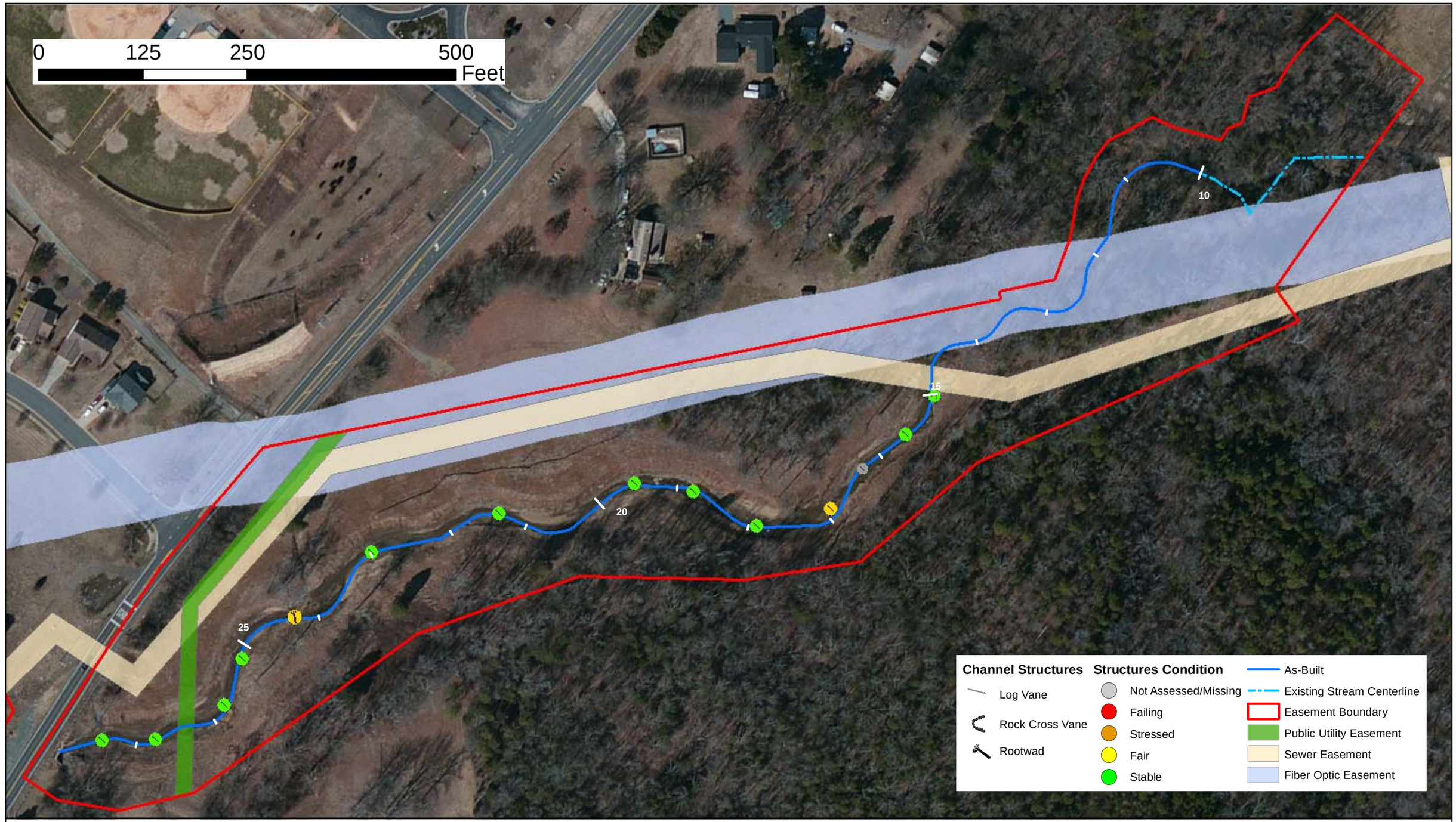

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Coddle Creek Tributary (Indian Run) Year 2 Monitoring

Structure Conditions Upper Reach Cabarrus County, NC

March 2014 Project # 94 Figure 3C

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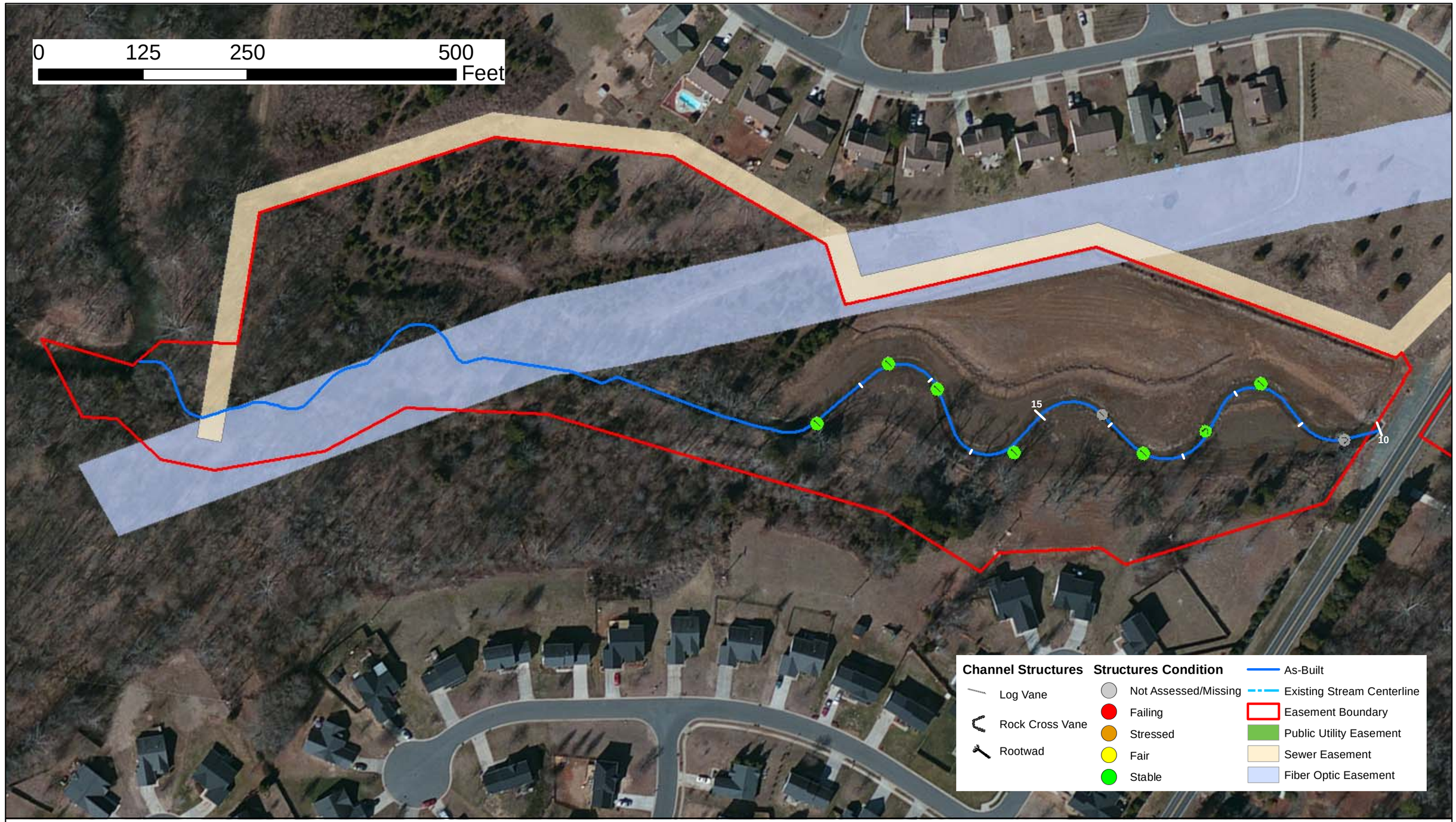

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Coddle Creek Tributary (Indian Run) Year 2 Monitoring

Structure Conditions Lower Reach Cabarrus County, NC

March 2014 Project # 94 Figure 3D

Prepared By

SEPI Engineering & Construction

Table 5a **Visual Stream Morphology Stability Assessment**
Reach ID **Upper Reach**
Assessed Length **1295**

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)			2	34	97%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	11	11			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	15	15			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	15	15			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	15	15			100%			
		2. Thalweg centering at downstream of meander (Glide)	15	15			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			2	83	97%	2	83	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	2	83	97%	2	83	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	14	14			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	14	14			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	13	13			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	13	13			100%			

Table 5b **Visual Stream Morphology Stability Assessment**
Reach ID **Lower Reach**
Assessed Length **975**

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)			1	11	99%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	6	6			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	6	7			86%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	7	7			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	7	7			100%			
		2. Thalweg centering at downstream of meander (Glide)	7	7			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does 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			1	10	99%	0	0	99%
				Totals	1	10	99%	0	0	99%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	9	9			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	9	9			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)	9	9			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	9			89%			

*Riffles were not supplied with coarse substrate in the as-built condition. Aside from minor aggradation, riffles remain stable.

Table 6 Vegetation Condition Assessment

Planted Acreage[1] **8.51**

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.	0.027	Pattern and Color	3	0.18	2.1%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0	Pattern and Color	2	0.55	6.5%
			Total	5	0.73	8.6%
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	Pattern and Color	0	0.00	0.0%
			Cumulative Total	5	0.73	8.6%

Easement Acreage[2] **19.61**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Areas or points (if too small to render as polygons at map scale).	0	Pattern and Color	1	0.01	0.1%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

1 = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.

2 = The acreage within the easement boundaries.

3 = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1,2 or 3) as well as a parallel tally in item 5.

4 = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern spcies are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by EEP such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of Microstegium in the herb layer will not likley trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly ealry in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolzing invasives polygons, particulalry for situations where the conditon for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.

Photo Station 1 Downstream (Year 2)

Photo Station 1 Upstream (Year 2)

Photo Station 2 Downstream (Year 2)

Photo Station 2 Upstream (Year 2)

Photo Station 3 Downstream (Year 2)

Photo Station 3 Upstream (Year 2)

Photo Station 4 Downstream (Year 2)

Photo Station 4 Upstream (Year 2)

Photo Station 5 Downstream (Year 2)

Photo Station 5 Upstream (Year 2)

Photo Station 6 Downstream (Year 2)

Photo Station 6 Upstream (Year 2)

Photo Station 7 Downstream (Year 2)

Photo Station 7 Upstream (Year 2)

Photo Station 8 Downstream (Year 2)

Photo Station 8 Upstream (Year 2)

Photo Station 9 Downstream (Year 2)

Photo Station 9 Upstream (Year 2)

Photo Station 10 Downstream (Year 2)

Photo Station 10 Upstream (Year 2)

Photo Station 11 Downstream (Year 2)

Photo Station 11 Upstream (Year 2)

Photo Station 12 Downstream (Year 2)

Photo Station 12 Upstream (Year 2)

Photo Station 13 Downstream (Year 2)

Photo Station 13 Upstream (Year 2)

Photo Station 14 Downstream (Year 2)

Photo Station 14 Upstream (Year 2)

Photo Station 15 Downstream (Year 2)

Photo Station 15 Upstream (Year 2)

Photo Station 16 Downstream (Year 2)

Photo Station 16 Upstream (Year 2)

Photo Station 17 Downstream (Year 2)

Photo Station 17 Upstream (Year 2)

Photo Station 18 Downstream (Year 2)

Photo Station 18 Upstream (Year 2)

Photo Station 19 Downstream (Year 2)

Photo Station 19 Upstream (Year 2)

Photo Station 20 Downstream (Year 2)

Photo Station 20 Upstream (Year 2)

Photo Station 21 Downstream (Year 2)

Photo Station 21 Upstream (Year 2)

Photo Station 22 Downstream (Year 2)

Photo Station 22 Upstream (Year 2)

Photo Station 23 Downstream (Year 2)

Photo Station 23 Upstream (Year 2)

Vegetation Plot 1 – 5m x 20m (11/06/2013 Year 2 of 5)

Vegetation Plot 2 – 10m x 10m (11/06/2013 Year 2 of 5)

Vegetation Plot 3 – 10m x 10m (11/06/2013 Year 2 of 5)

Vegetation Plot 4 – 5m x 20m (11/06/2013 Year 2 of 5)

Vegetation Plot 5 – 5m x 20m (11/06/2013 Year 2 of 5)

Vegetation Plot 6 – 10m x 10m (11/06/2013 Year 2 of 5)

Vegetation Plot 7 – 10m x 10m (11/05/2013 Year 2 of 5)

Vegetation Plot 8 – 10m x 10m (11/05/2013 Year 2 of 5)

Vegetation Plot 9 – 10m x 10m (11/05/2013 Year 2 of 5)

Vegetation Plot 10 – 10m x 10m (11/05/2013 Year 2 of 5)

Vegetation Plot 11 – 10m x 10m (11/05/2013 Year 2 of 5)

Appendix C
Vegetation Plot Data

Table 7. Vegetation Plot Mitigation Success Summary		
Coddle Creek Tributary (Indian Run) / 94		
Plot	Planted Stems/Ac	Meeting Criteria
1	971.2	Yes
2	485.6	Yes
3	688	Yes
4	768.9	Yes
5	768.9	Yes
6	849.8	Yes
7	364.2	Yes
8	323.7	Yes
9	445.2	Yes
10	647.5	Yes
11	485.6	Yes

Table 8. CVS Vegetation Plot Metadata Coddle Creek Tributary (Indian Run) - 94	
Report Prepared By	Kim Hamlin
Date Prepared	1/20/2014 13:52
database name	cvs-eep-entrytool-v2.2.7_2012_from_hdr_20131219.mdb
database location	G:\Environmental\NCEEP Coddle Creek SMS
computer name	W93
file size	39059456
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	94
project Name	Indian Run Tributary to Coddle Creek
Description	Stream Restoration
River Basin	Yadkin-Pee Dee
length(ft)	2270
stream-to-edge width (ft)	100
area (sq m)	42173.71
Required Plots (calculated)	11
Sampled Plots	0

Table 9. Planted and Total Stem Counts (Species by Plot with Annual Means
EEP Project Code 94. Project Name: Indian Run Tributary to Coddle Creel

			Current Plot Data (MY2013 2013)																													Annual Means					
			094-HDR-0001			094-HDR-0002			094-HDR-0003			094-HDR-0004			094-HDR-0005			094-HDR-0006			094-HDR-0007			094-HDR-0008			094-HDR-0009			094-HDR-0010			094-HDR-0011			MY2013 (2013)			MY2012 (2012)			MY2011 (2011)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree																		1																1			9					
Acer rubrum	red maple	Tree	8	8	8	3	3	3	2	2	2				5	5	5	4	4	5	1	1	1													23	23	24	28	28	30	30	30	38
Alnus serrulata	hazel alder	Shrub	5	5	5						5	2	2	6	5	5	5	2	2	3	5	5	5				1	1	1	1	1	1				21	21	31	21	21	21	19	19	19
Baccharis halimifolia	eastern baccharis	Shrub						1																													1							
Betula nigra	river birch	Tree			808			1			29			5	3	3	9	3	3	3							4	4	4	2	2	2	7	7	12	19	19	865	20	20	674	28	28	28
Callicarpa americana	American beautyber	Shrub										3	3	3	1	1	1	1	1	1															5	5	5	7	7	7	8	8	8
Calycanthus floridus	eastern sweetshrub	Shrub							1	1	1																								1	1	1	1	1	1	2	2	2
Celtis laevigata	sugarberry	Tree																									1	1	1							1	1	1	10	10	10	15	15	15
Cornus amomum	silky dogwood	Shrub	1	1	3	3	3	3				8	8	8				4	4	4	2	2	2	4	4	4	5	5	5	1	1	1	1	1	1	29	29	31	34	34	34	32	32	32
Diospyros virginiana	common persimmon	Tree							2	2	2							1	1	1										1	1	1				4	4	4	18	18	18	21	21	21
Fraxinus pennsylvanica	green ash	Tree	5	5	5	4	4	4	7	7	7	2	2	2	2	2	2			1																20	20	21	21	21	21	21	21	21
Juglans nigra	black walnut	Tree										1	1	1				1	1	1																2	2	2	5	5	5	6	6	6
Ligustrum sinense	Chinese privet	Exotic																		1																		1						
Liquidambar styraciflu	sweetgum	Tree															5			12																		17			9			
Morella cerifera	wax myrtle	Shrub												1																								1						
Nyssa sylvatica	blackgum	Tree	1	1	1				2	2	2																									3	3	3						
Pinus taeda	loblolly pine	Tree																														2						2					
Platanus occidentalis	American sycamore	Tree			48			34			31			488			80			14																		679			1530			
Populus deltoides	eastern cottonwood	Tree			35			4			2			11			4			3			48						41			17			9			174			662			655
Quercus lyrata	overcup oak	Tree						1																									1	1	1	1	1	2						
Quercus nigra	water oak	Tree							1	1	1				1	1	1	2	2	4										2	2	2				6	6	8	8	8	8	12	12	12
Quercus phellos	willow oak	Tree	4	4	4	2	2	2	2	2	2	3	3	3	1	1	1	1	1	1													3	3	3	16	16	16	21	21	21	21	21	21
Salix nigra	black willow	Tree			2											1	1		1	1	1	1	1	4	4	4				9	9	14			1	14	16	24	11	13	18	6	8	8
Sambucus canadensis	common Elderberry	Shrub																	1	2																1	1	7	2	2	2	2	2	2
Ulmus	elm	Tree															2																					2			33			
Ulmus rubra	slippery elm	Tree																		31																		31						
		Stem count	24	24	903	12	12	53	17	17	84	19	19	520	18	19	121	20	21	89	9	9	57	8	8	8	11	11	52	16	16	40	12	12	27	166	168	1954	207	209	3125	223	225	888
		size (ares)	1			1			1			1			1			1			1			1			1			1			1			11			11			11		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.27			0.27			0.27		
		Species count	6	6	10	4	4	9	7	7	11	6	6	10	7	8	13	10	11	18	4	4	5	2	2	2	4	4	5	6	6	8	4	4	6	16	16	26	14	14	19	14	14	15
		Stems per ACRE	971.2	971.2	36543	485.6	485.6	2145	688	688	3399	768.9	768.9	21044	728.4	768.9	4897	809.4	849.8	3602	364.2	364.2	2307	323.7	323.7	323.7	445.2	445.2	2104	647.5	647.5	1619	485.6	485.6	1093	610.7	618.1	7189	761.5	768.9	11497	828.4	827.8	3267

Appendix D
Stream Survey Data

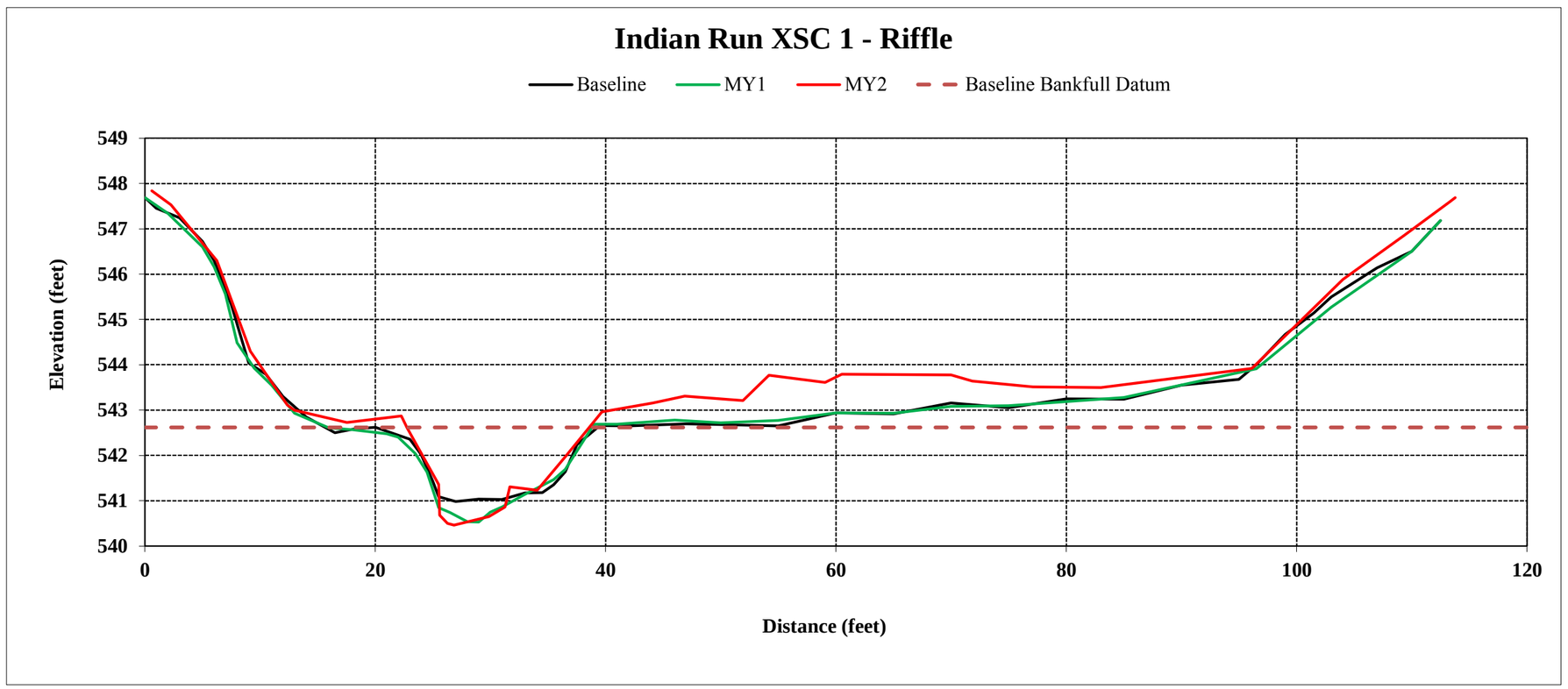
Station	Elevation
0	547.69
1	547.45
3	547.24
5	546.72
6	546.3
7.5	545.33
9	544.04
10.5	543.79
12	543.3
14	542.85
16.5	542.5
18	542.58
20	542.62
23	542.36
24	542.02
25	541.43
25.5	541.09
27	540.98
29	541.04
31	541.03
33	541.17
34.5	541.18
35.5	541.35
36.5	541.64
37.5	542.24
39.5	542.66
42	542.65
47	542.7
50	542.68
55	542.65
60	542.94
65	542.92
70	543.16
75	543.05
80	543.25
85	543.24
90	543.55
95	543.68
96.5	544
99	544.67
101.5	545.14
103	545.5
107	546.14
110	546.5
112.5	547.18

Reach	Indian Run, Upper Reach
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-1, Riffle, Upper Reach, 18+40
Drainage Area (Sq Mi)	1.5
Date	11/6/2013
Observers	H. Anthony, P. Beach, C. Flowers, K. Hamlin

SUMMARY DATA	
Baseline Bankfull Datum, ft	542.62
Bankfull Cross Sectional Area, ft^2	27.3
Bankfull Width, ft	16
Max Depth at Bankfull, ft	2.16
Mean Depth at Bankfull, ft	1.71
Width/Depth Ratio	9.38
Flood Prone Width, ft	91
Flood Prone Area Elevation	544.78
Entrenchment Ratio	5.69
Bank Height Ratio	1.16

Stream Type	C4

Sta. 18+40 Looking Downstream



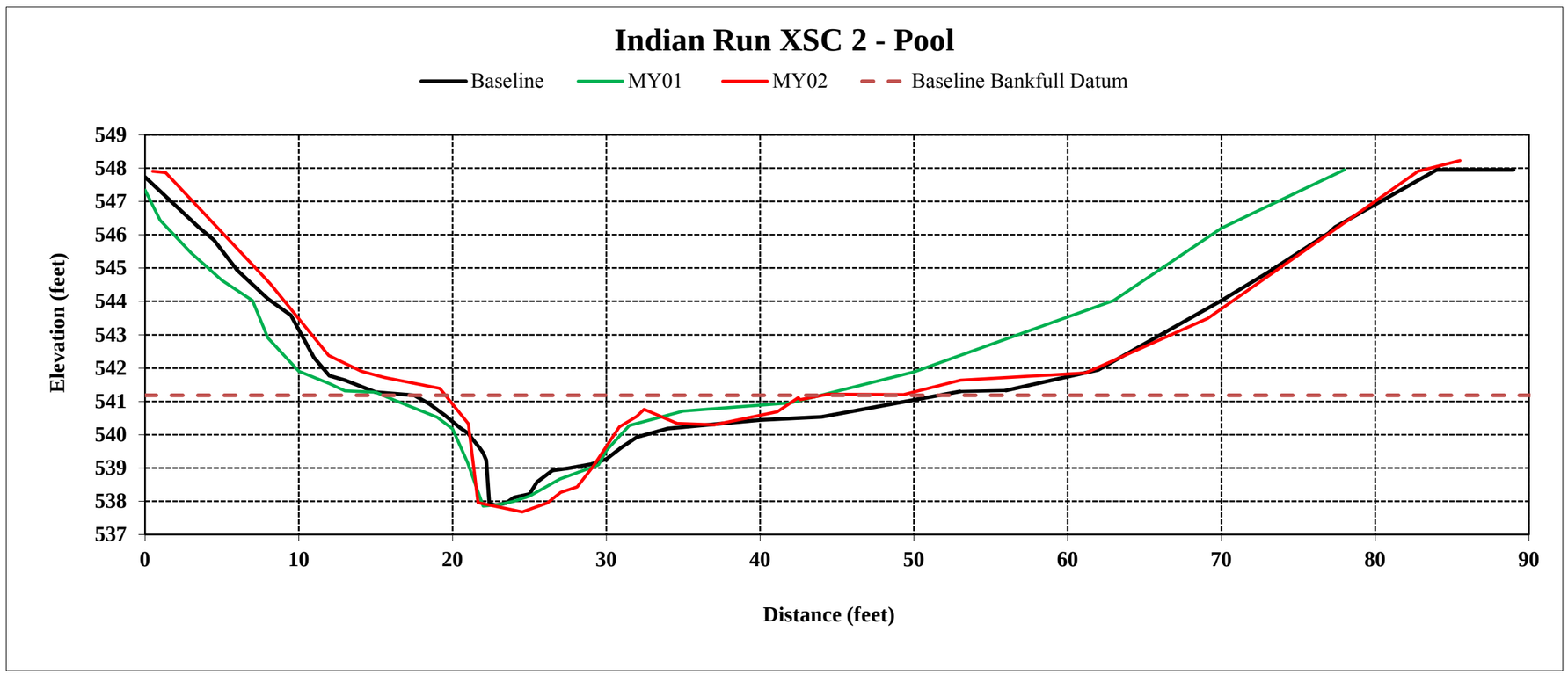
Station	Elevation
0.5	547.91
1.35	547.87
8.14	544.54
11.96	542.38
14.08	541.9
15.56	541.72
19.18	541.39
21.04	540.33
21.66	537.96
24.54	537.68
26.17	537.95
27.04	538.27
28.11	538.43
29.14	539.04
30.86	540.23
31.98	540.54
32.47	540.76
34.61	540.34
37.03	540.3
41.12	540.69
42.48	541.11
42.6	541.05
44.4	541.21
49.33	541.2
53.05	541.64
61.16	541.85
69.12	543.49
82.79	547.91
85.52	548.23

Reach	Indian Run, Upper Reach
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-2, Pool, Upper Reach, 20+62
Drainage Area (Sq Mi)	1.5
Date	11/6/2013
Observers	H. Anthony, P. Beach, C. Flowers, K. Hamlin

SUMMARY DATA	
Baseline Bankfull Datum, ft	541.18
Bankfull Cross Sectional Area, ft^2	41.97
Bankfull Width, ft	23
Max Depth at Bankfull, ft	3.5
Mean Depth at Bankfull, ft	1.82
Width/Depth Ratio	12.60
Flood Prone Width, ft	65
Flood Prone Area Elevation	544.68
Entrenchment Ratio	2.83
Bank Height Ratio	1

Stream Type	C4

Sta. 20+62 Looking Downstream



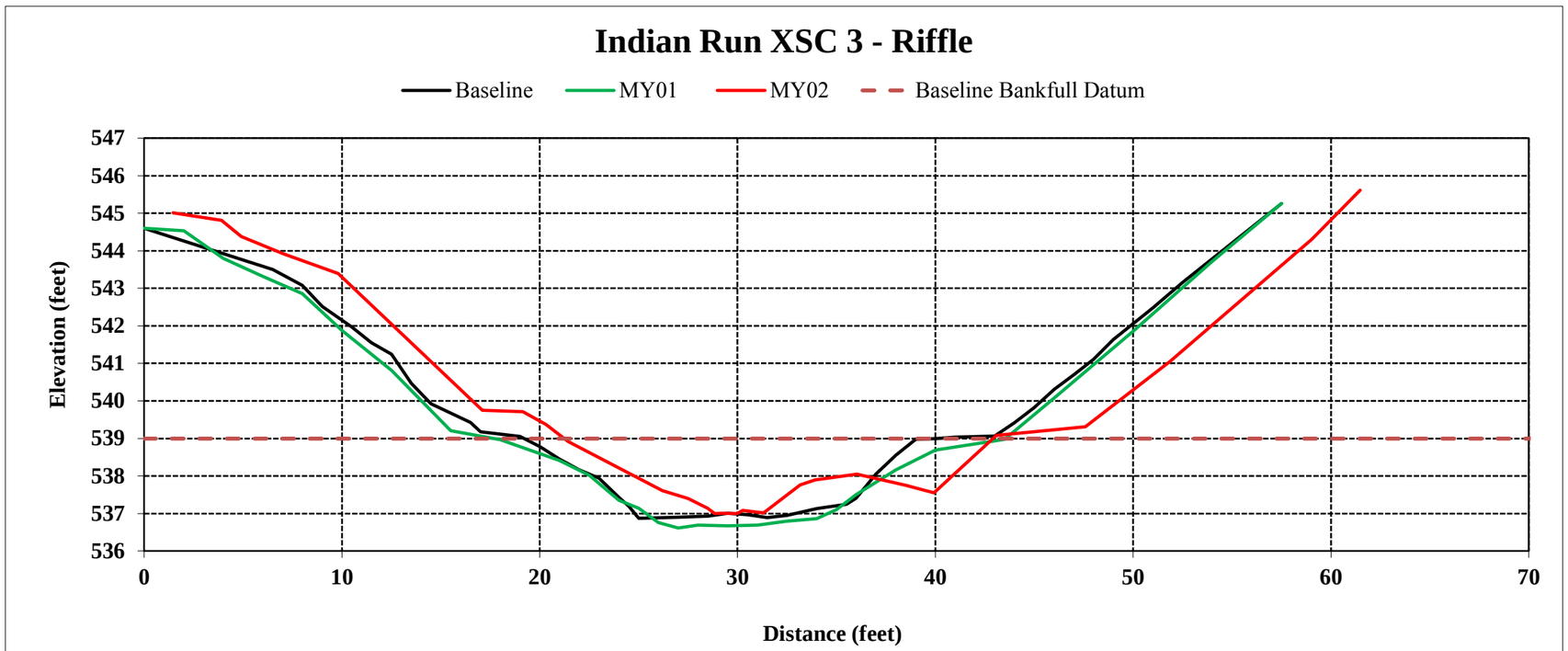
Station	Elevation
1.46	545.01
3.91	544.81
4.91	544.38
7.04	543.92
9.8	543.4
17.09	539.75
19.14	539.71
20.33	539.37
21.43	538.92
26.21	537.61
27.5	537.4
28.48	537.14
28.85	537
29.21	537.01
29.97	537
30.27	537.08
31.32	537.02
33.17	537.76
33.93	537.9
36.04	538.05
38.49	537.75
39.93	537.55
43.09	539.08
47.58	539.31
51.86	541.05
59.02	544.3
61.47	545.61

Reach	Indian Run, Upper Reach
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-3, Riffle, Upper Reach, 25+40
Drainage Area (Sq Mi)	1.5
Date	11/6/2013
Observers	H. Anthony, P. Beach, C. Flowers, K. Hamlin

SUMMARY DATA	
Baseline Bankfull Datum, ft	539.00
Bankfull Cross Sectional Area, ft^2	24.53
Bankfull Width, ft	21.66
Max Depth at Bankfull, ft	2
Mean Depth at Bankfull, ft	1.13
Width/Depth Ratio	19.13
Flood Prone Width, ft	36.9
Flood Prone Area Elevation	541
Entrenchment Ratio	1.70
Bank Height Ratio	1.04

Stream Type	C4

Sta. 25+40 Looking Downstream



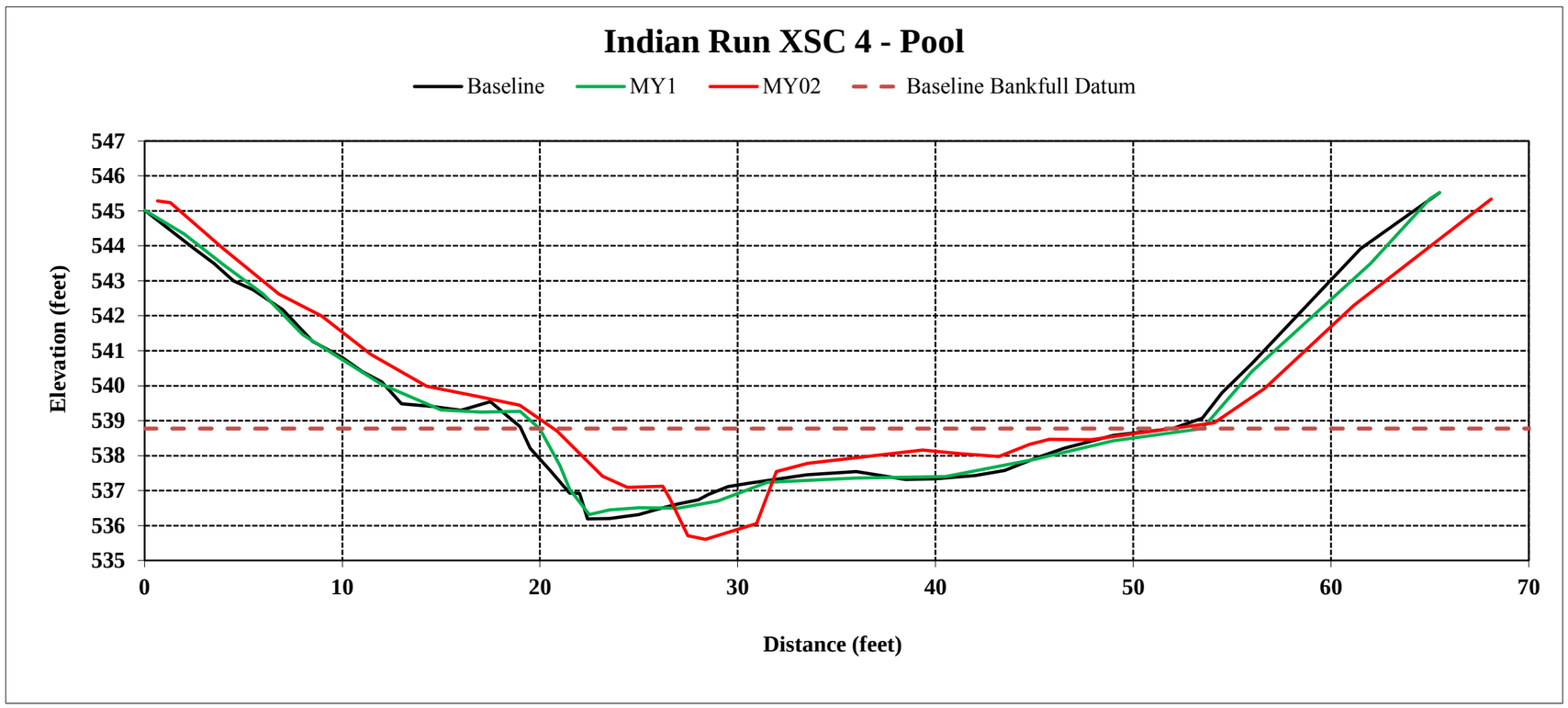
Station	Elevation
0.66	545.28
1.31	545.23
3.96	543.93
6.8	542.62
8.95	541.99
11.44	540.9
14.26	539.98
16.82	539.7
18.98	539.44
20.87	538.7
23.16	537.41
24.41	537.09
26.21	537.12
26.56	536.79
27.47	535.71
28.36	535.61
30.96	536.06
31.96	537.54
33.53	537.78
39.34	538.16
41.22	538.06
43.2	537.98
44.76	538.32
45.76	538.47
47.86	538.46
50.21	538.64
54.09	538.94
56.65	539.92
61.14	542.29
68.1	545.34

Reach	Indian Run, Upper Reach
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-4, Pool, Upper Reach, 25+92
Drainage Area (Sq Mi)	1.5
Date	11/6/2013
Observers	H. Anthony, P. Beach, C. Flowers, K. Hamlin

SUMMARY DATA	
Baseline Bankfull Datum, ft	538.77
Bankfull Cross Sectional Area, ft^2	30.99
Bankfull Width, ft	29.34
Max Depth at Bankfull, ft	3.16
Mean Depth at Bankfull, ft	1.06
Width/Depth Ratio	27.78
Flood Prone Width, ft	51.5
Flood Prone Area Elevation	541.93
Entrenchment Ratio	1.76
Bank Height Ratio	0.96

Stream Type	C4

Sta. 25+92 Looking Downstream



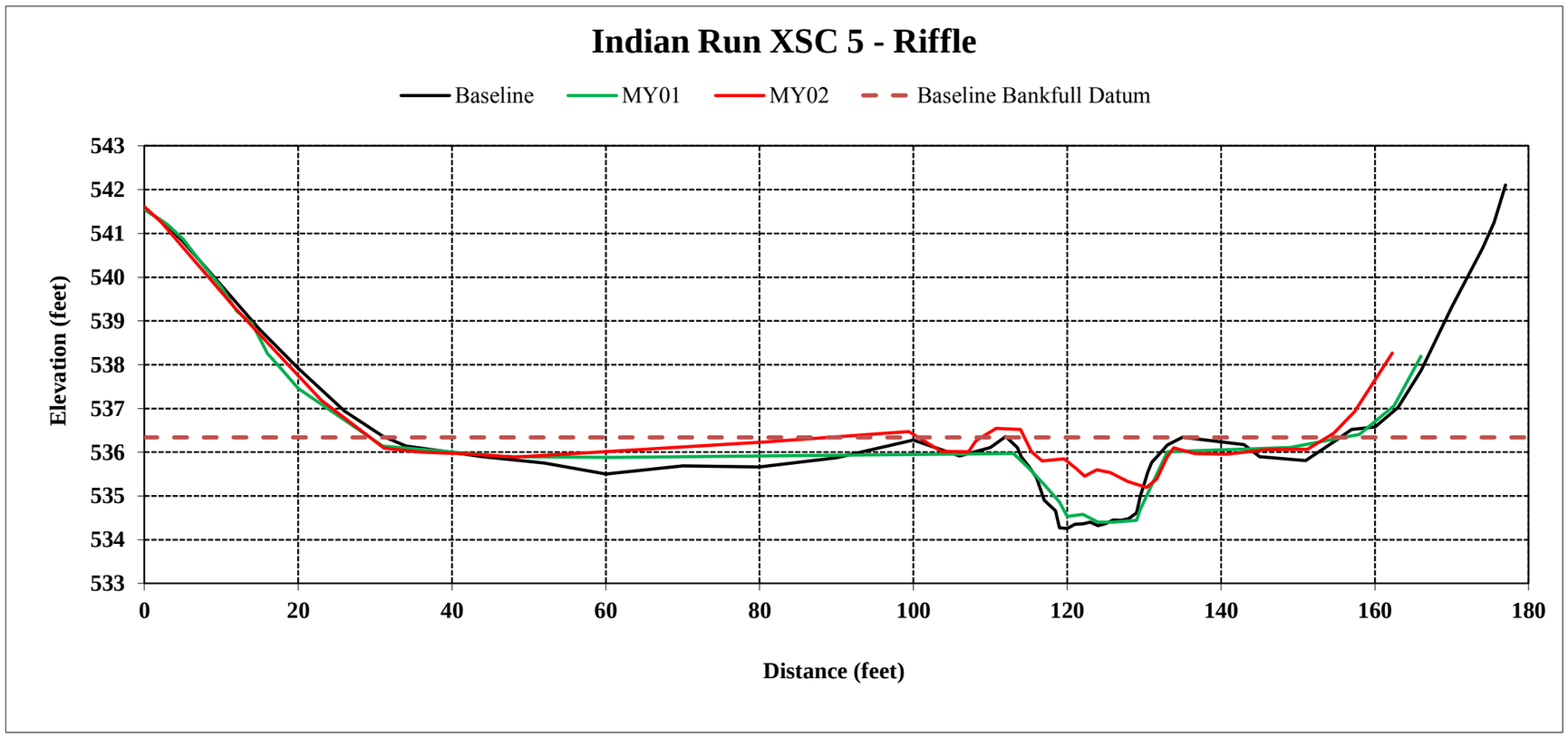
Station	Elevation
0	541.61
2.23	541.25
11.79	539.29
22.97	537.19
31.19	536.09
35.89	536
41.82	535.96
48.23	535.89
60.55	536.02
80.93	536.24
99.37	536.47
103.6	536.02
107.16	536.01
108.12	536.26
110.77	536.54
113.94	536.52
115.35	536.01
116.72	535.8
119.6	535.85
121.18	535.62
122.25	535.45
123.85	535.6
125.63	535.53
127.88	535.33
130.29	535.19
131.64	535.39
133.02	535.9
133.84	536.1
136.58	535.97
140.74	535.95
145.89	536.06
151.24	536.07
154.62	536.43
157.34	536.92
162.27	538.27

Reach	Indian Run, Lower Reach
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-5, Riffle, Lower Reach, 11+15
Drainage Area (Sq Mi)	1.5
Date	12/3/2013
Observers	P. Beach, K. Hamlin

SUMMARY DATA	
Baseline Bankfull Datum, ft	536.34
Bankfull Cross Sectional Area, ft^2	18
Bankfull Width, ft	18.49
Max Depth at Bankfull, ft	1.15
Mean Depth at Bankfull, ft	0.97
Width/Depth Ratio	18.99
Flood Prone Width, ft	138
Flood Prone Area Elevation	537.49
Entrenchment Ratio	7.46
Bank Height Ratio	0.79

Stream Type	C4

Sta. 11+15 Looking Downstream



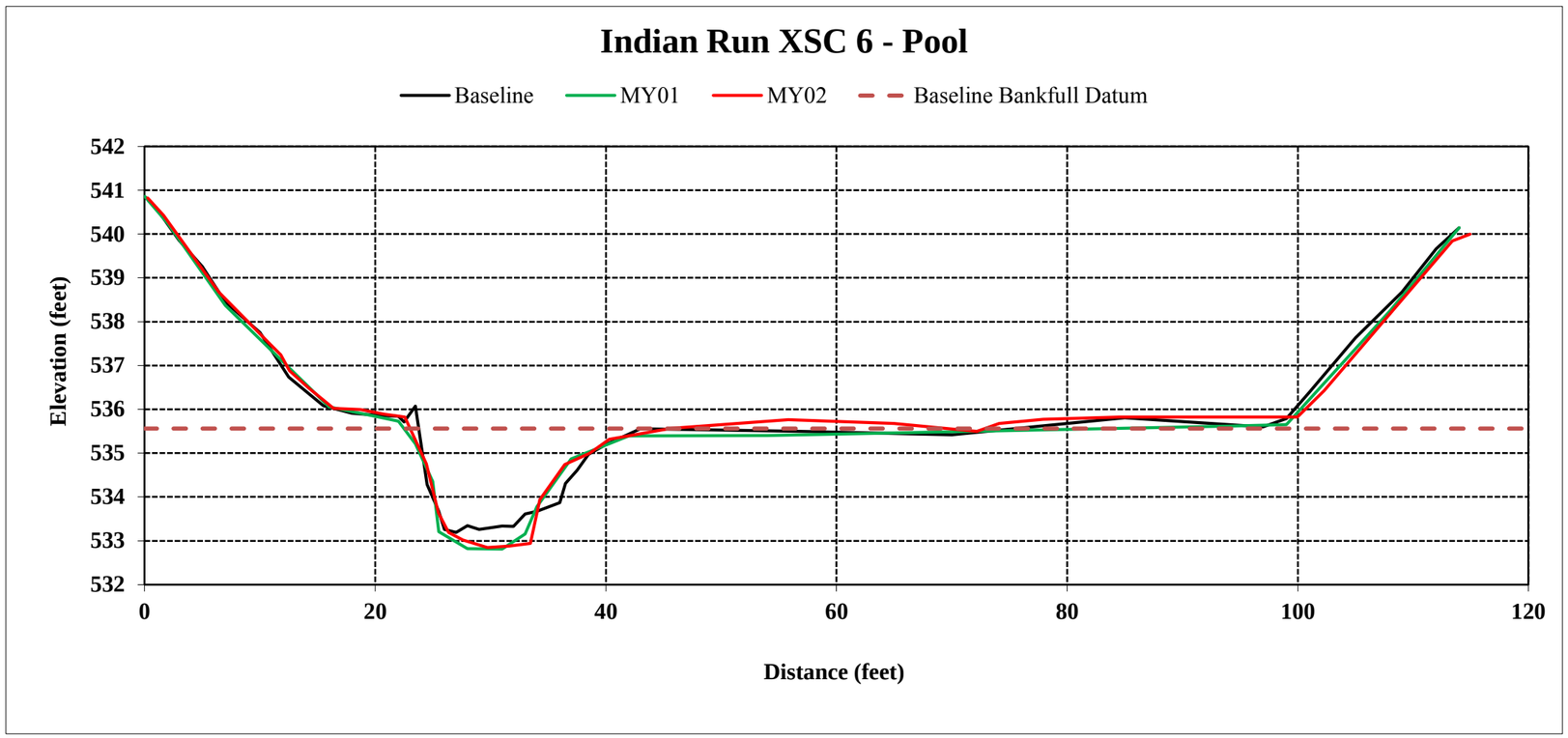
Station	Elevation
0.28	540.82
1.65	540.43
6.44	538.67
10.92	537.48
11.81	537.24
12.55	536.88
14.23	536.49
16.39	536.02
18.72	536
20.69	535.89
22.57	535.82
24.44	534.76
25.47	533.64
26.36	533.19
27.59	533.02
29.74	532.85
31.67	532.88
33.47	532.94
34.27	533.94
36.44	534.74
38.6	535
40.3	535.32
45.61	535.57
55.82	535.76
64.99	535.68
72.18	535.5
74.1	535.68
77.91	535.77
84.49	535.82
99.95	535.82
102.29	536.43
113.4	539.84
114.95	540

Reach	Indian Run, Lower Reach
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-6, Pool, Lower Reach, 13+10
Drainage Area (Sq Mi)	1.5
Date	12/3/2013
Observers	P. Beach, K. Hamlin

SUMMARY DATA	
Baseline Bankfull Datum, ft	535.56
Bankfull Cross Sectional Area, ft^2	34.9
Bankfull Width, ft	22.11
Max Depth at Bankfull, ft	2.71
Mean Depth at Bankfull, ft	1.58
Width/Depth Ratio	14.01
Flood Prone Width, ft	100.4
Flood Prone Area Elevation	538.27
Entrenchment Ratio	4.54
Bank Height Ratio	1

Stream Type	C4

Sta. 13+10 Looking Downstream



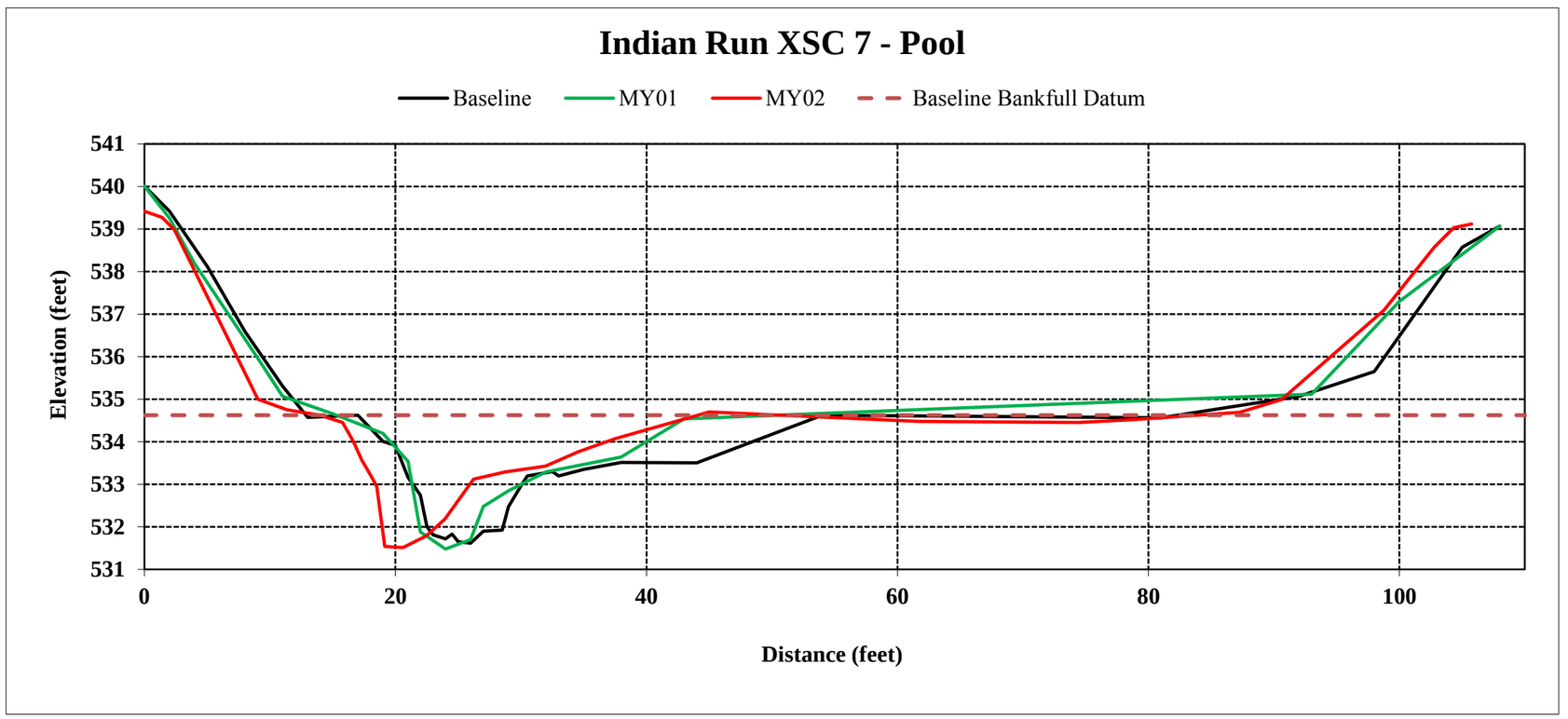
Station	Elevation
0	539.42
1.41	539.27
2.4	538.97
9.05	535
11.37	534.75
14	534.62
15.8	534.45
16.66	534
17.32	533.56
18.03	533.21
18.52	532.95
19.14	531.54
20.61	531.51
22.45	531.79
23.94	532.18
26.22	533.12
28.73	533.29
31.97	533.43
34.53	533.76
37.46	534.07
45.01	534.7
61.7	534.48
74.43	534.45
78.83	534.52
87.28	534.69
90.59	534.99
98.78	537.09
102.78	538.57
104.35	539.03
105.75	539.12

Reach	Indian Run, Lower Reach
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-7, Pool, Lower Reach, 15+89
Drainage Area (Sq Mi)	1.5
Date	12/3/2013
Observers	P. Beach, K. Hamlin

SUMMARY DATA	
Baseline Bankfull Datum, ft	534.62
Bankfull Cross Sectional Area, ft^2	37.17
Bankfull Width, ft	31.01
Max Depth at Bankfull, ft	3.11
Mean Depth at Bankfull, ft	1.20
Width/Depth Ratio	25.87
Flood Prone Width, ft	96
Flood Prone Area Elevation	537.73
Entrenchment Ratio	3.10
Bank Height Ratio	1.03

Stream Type	C4

Sta. 15+89 Looking Downstream



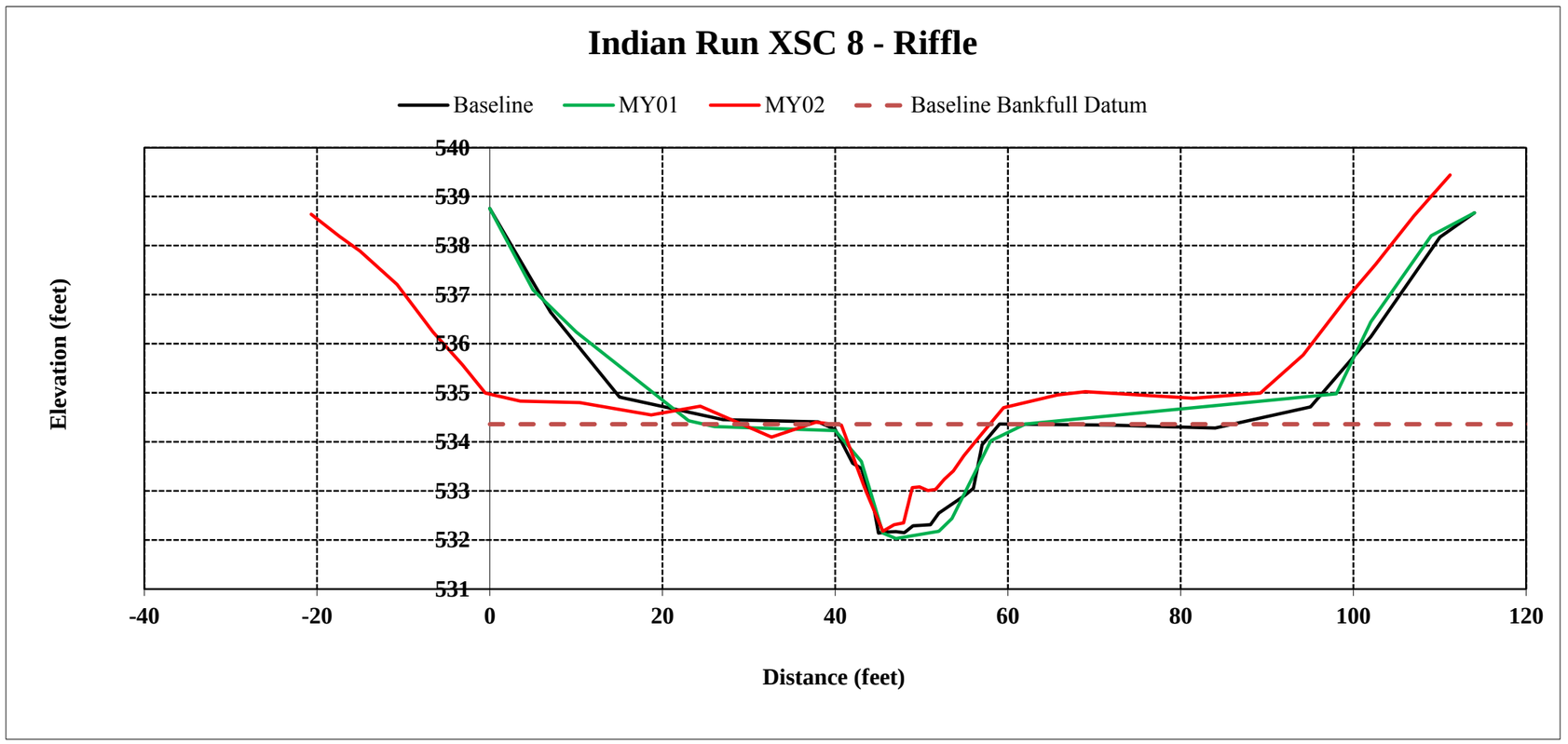
Station	Elevation
0.3	538.64
3.62	538.19
5.97	537.89
10.26	537.21
14.4	536.24
17.77	535.58
20.5	534.99
24.53	534.83
31.4	534.8
39.68	534.55
45.38	534.73
53.62	534.1
58.75	534.4
61.72	534.34
64.48	533.02
66.5	532.18
67.83	532.31
68.92	532.35
69.9	533.07
70.77	533.08
71.74	533.01
72.62	533.03
73.64	533.24
74.66	533.41
75.91	533.72
77.78	534.13
80.5	534.7
86.7	534.96
89.97	535.02
102.41	534.89
110.22	534.99
115.19	535.77
120.13	536.91
123.57	537.62
128.02	538.61
132.2	539.44

Reach	Indian Run, Lower Reach
River Basin	Yadkin/Pee Dee
Cross Section ID	XSC-8, Riffle, Lower Reach, 16+50
Drainage Area (Sq Mi)	1.5
Date	12/18/2013
Observers	H. Anthony, K. Hamlin

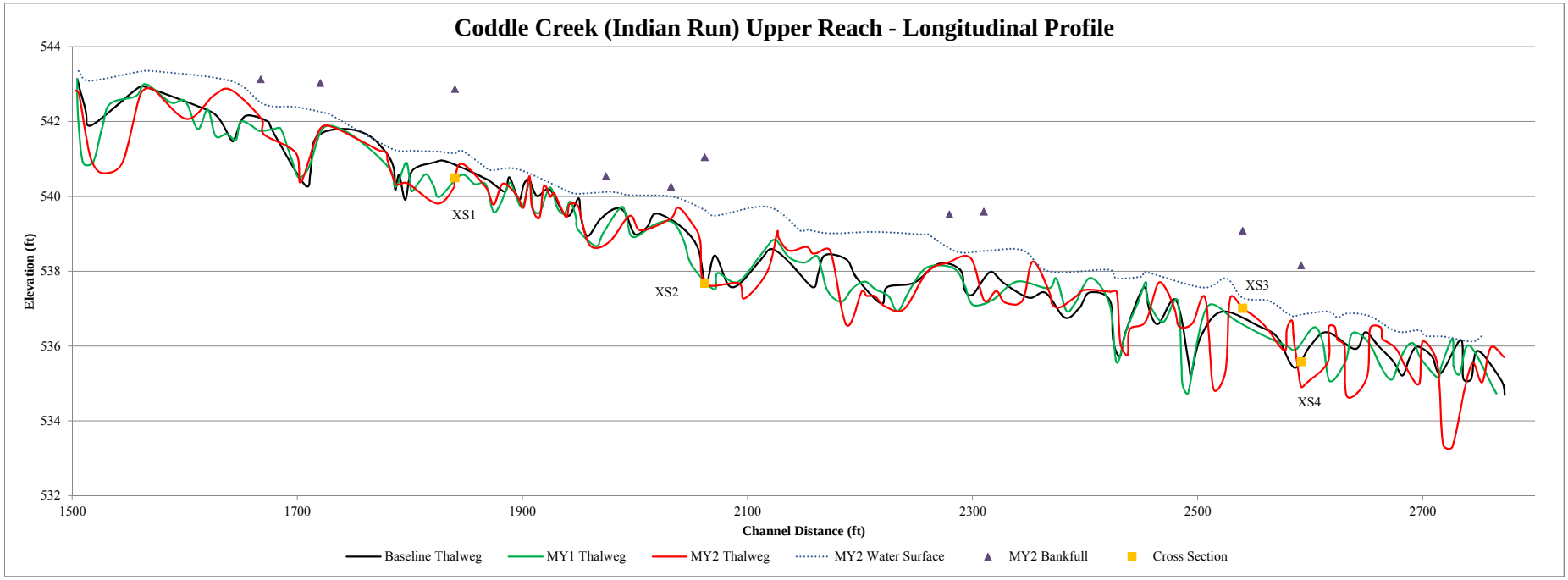
SUMMARY DATA	
Baseline Bankfull Datum, ft	534.36
Bankfull Cross Sectional Area, ft^2	19.72
Bankfull Width, ft	16.78
Max Depth at Bankfull, ft	2.18
Mean Depth at Bankfull, ft	1.18
Width/Depth Ratio	14.28
Flood Prone Width, ft	89.5
Flood Prone Area Elevation	536.54
Entrenchment Ratio	5.33
Bank Height Ratio	0.99

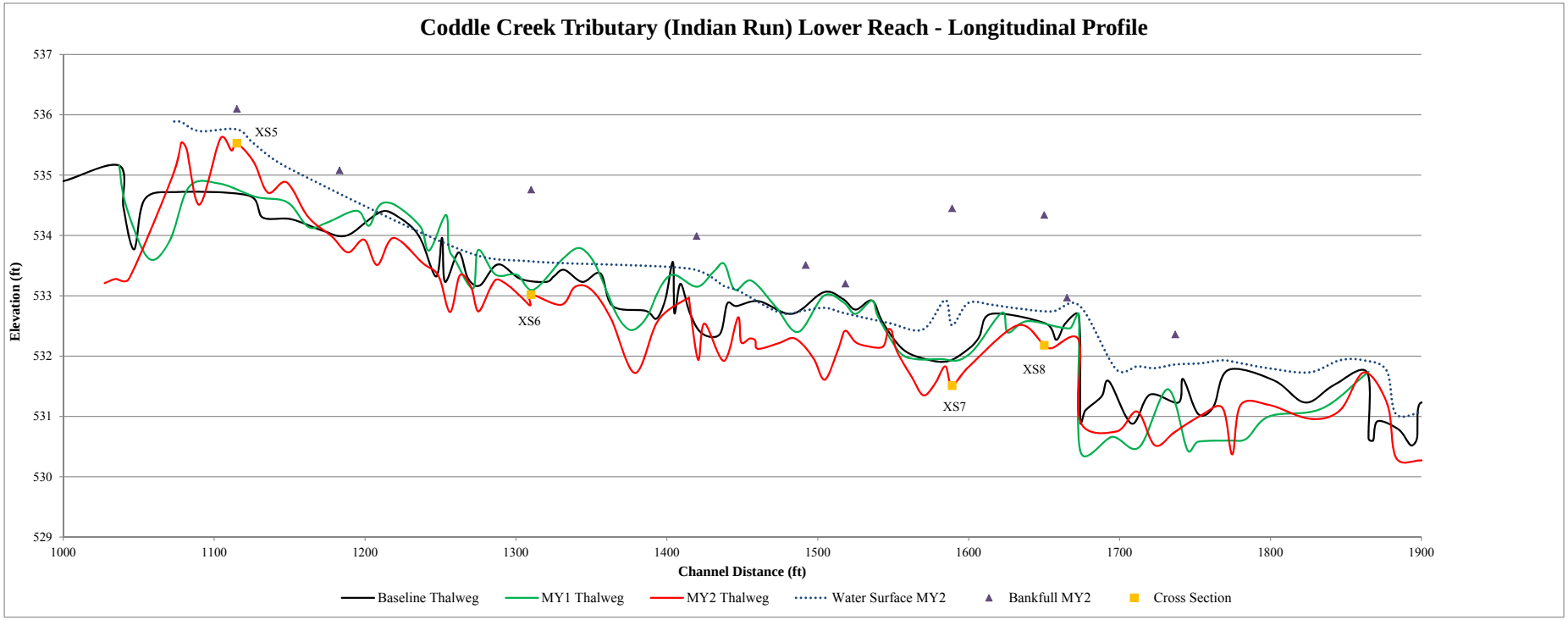
Stream Type	C4

Sta. 16+50 Looking Upstream



*The pins for XS8 were not located in the field. The location of the cross section for MY2 is approximate.


Coddle Creek (Indian Run) Upper Reach - Longitudinal Profile
544
542
540
538
536
534
532
Elevation (ft)
1500
1700
1900
2100
2300
2500
2700
Channel Distance (ft)
XS1
XS2
XS3
XS4
Baseline Thalweg
MY1 Thalweg
MY2 Thalweg
MY2 Water Surface
MY2 Bankfull
Cross Section

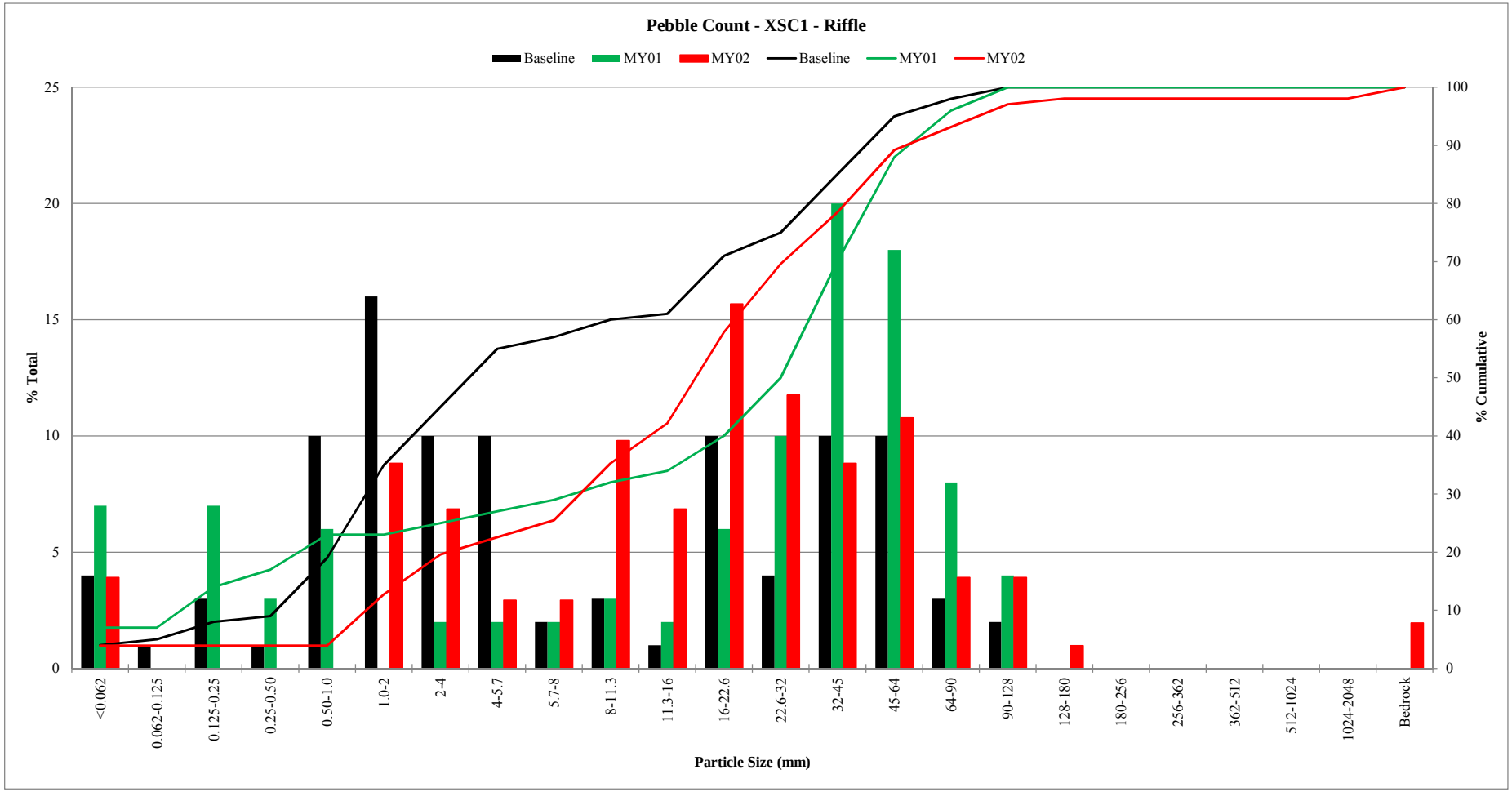

Coddle Creek Tributary (Indian Run) Lower Reach - Longitudinal Profile
Elevation (ft)
537
536
535
534
533
532
531
530
529
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
Channel Distance (ft)
XS5
XS6
XS7
XS8
Baseline Thalweg
MY1 Thalweg
MY2 Thalweg
Water Surface MY2
Bankfull MY2
Cross Section

Indian Run - UR - XS1 Riffle Pebble Count

Location: STA 18+40

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062	SAND	4	4	4
	Very Fine	0.062-0.125		0	0	4
	Fine	0.125-0.25		0	0	4
	Medium	0.25-0.50		0	0	4
	Coarse	0.50-1.0		0	0	4
0.04-0.08	Very Coarse	1.0-2		9	9	13
0.08-0.16	Very Fine	2-4	GRAVEL	7	7	20
0.16-0.22	Fine	4-5.7		3	3	23
0.22-0.31	Fine	5.7-8		3	3	25
0.31-0.44	Medium	8-11.3		10	10	35
0.44-0.63	Medium	11.3-16		7	7	42
0.63-0.89	Coarse	16-22.6		16	16	58
0.89-1.26	Coarse	22.6-32		12	12	70
1.26-1.77	Very Coarse	32-45		9	9	78
1.77-2.5	Very Coarse	45-64		11	11	89
2.5-3.5	Small	64-90	COBBLE	4	4	93
3.5-5.0	Small	90-128		4	4	97
5.0-7.1	Medium	128-180		1	1	98
7.1-10.1	Large	180-256		0	0	98
10.1-14.3	Small	256-362	BOULDER	0	0	98
14.3-20	Small	362-512		0	0	98
20-40	Medium	512-1024		0	0	98
40-80	Large	1024-2048		0	0	98
	Bedrock	Bedrock	Bedrock	2	2	100
			Total Counted	102		

Summary Data	
D50	19
D84	55
D95	100

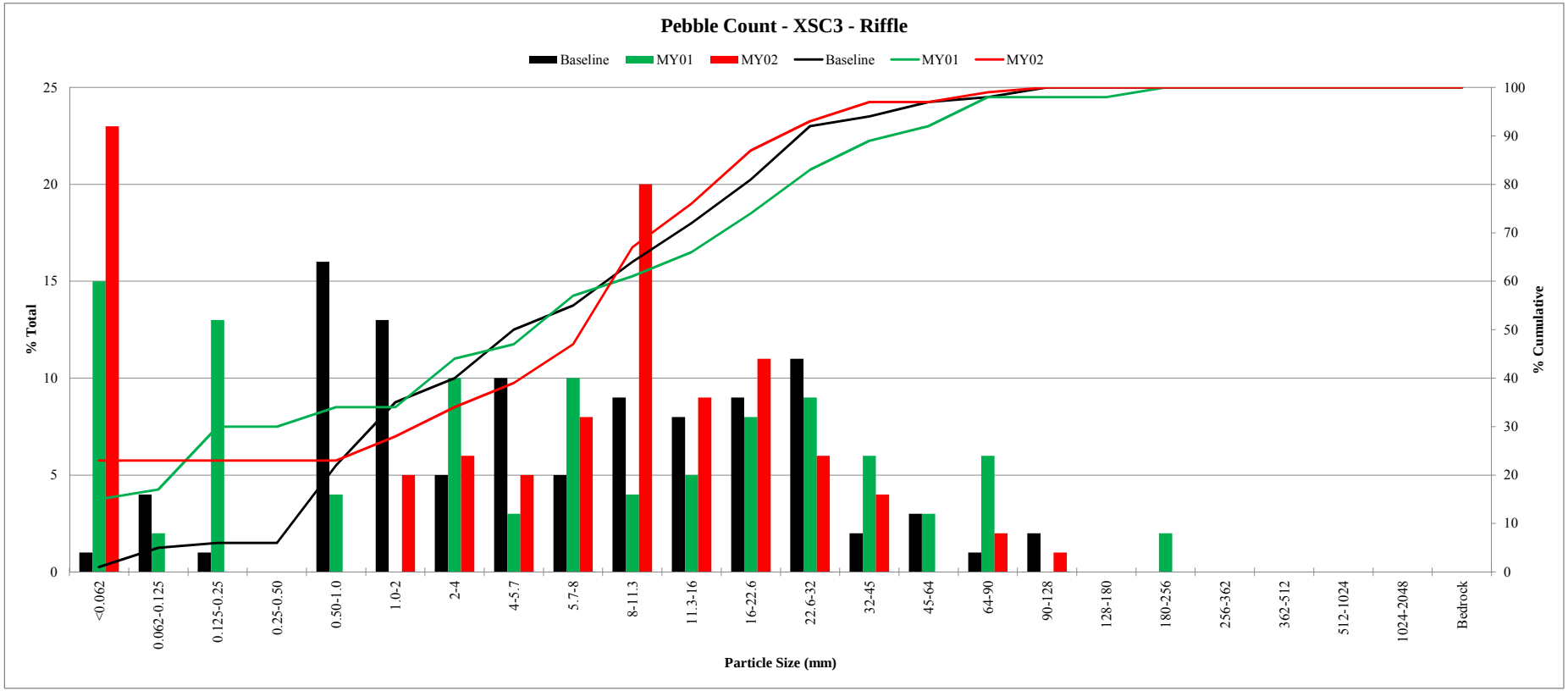

Pebble Count - XSC1 - Riffle
Baseline
MY01
MY02
Baseline
MY01
MY02
% Total
% Cumulative
Particle Size (mm)
<0.062
0.062-0.125
0.125-0.25
0.25-0.50
0.50-1.0
1.0-2
2-4
4-5.7
5.7-8
8-11.3
11.3-16
16-22.6
22.6-32
32-45
45-64
64-90
90-128
128-180
180-256
256-362
362-512
512-1024
1024-2048
Bedrock

Indian Run -UR - XS3 Riffle Pebble Count

Location: STA 25+40

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062		23	23	23
	Very Fine	0.062-0.125	S	0	0	23
	Fine	0.125-0.25	A	0	0	23
	Medium	0.25-0.50	N	0	0	23
	Coarse	0.50-1.0	D	0	0	23
0.04-0.08	Very Coarse	1.0-2		5	5	28
0.08-0.16	Very Fine	2-4		6	6	34
0.16-0.22	Fine	4-5.7		5	5	39
0.22-0.31	Fine	5.7-8	G	8	8	47
0.31-0.44	Medium	8-11.3	R	20	20	67
0.44-0.63	Medium	11.3-16	A	9	9	76
0.63-0.89	Coarse	16-22.6	V	11	11	87
0.89-1.26	Coarse	22.6-32	E	6	6	93
1.26-1.77	Very Coarse	32-45	L	4	4	97
1.77-2.5	Very Coarse	45-64		0	0	97
2.5-3.5	Small	64-90	C	2	2	99
3.5-5.0	Small	90-128	O	1	1	100
5.0-7.1	Medium	128-180	B	0	0	100
7.1-10.1	Large	180-256	B L E	0	0	100
10.1-14.3	Small	256-362	B	0	0	100
14.3-20	Small	362-512	O U L D E R	0	0	100
20-40	Medium	512-1024		0	0	100
40-80	Large	1024-2048		0	0	100
	Bedrock	Bedrock	Bedrock	0	0	100
			Total Counted	100		

Summary Data	
D50	8.5
D84	21
D95	36

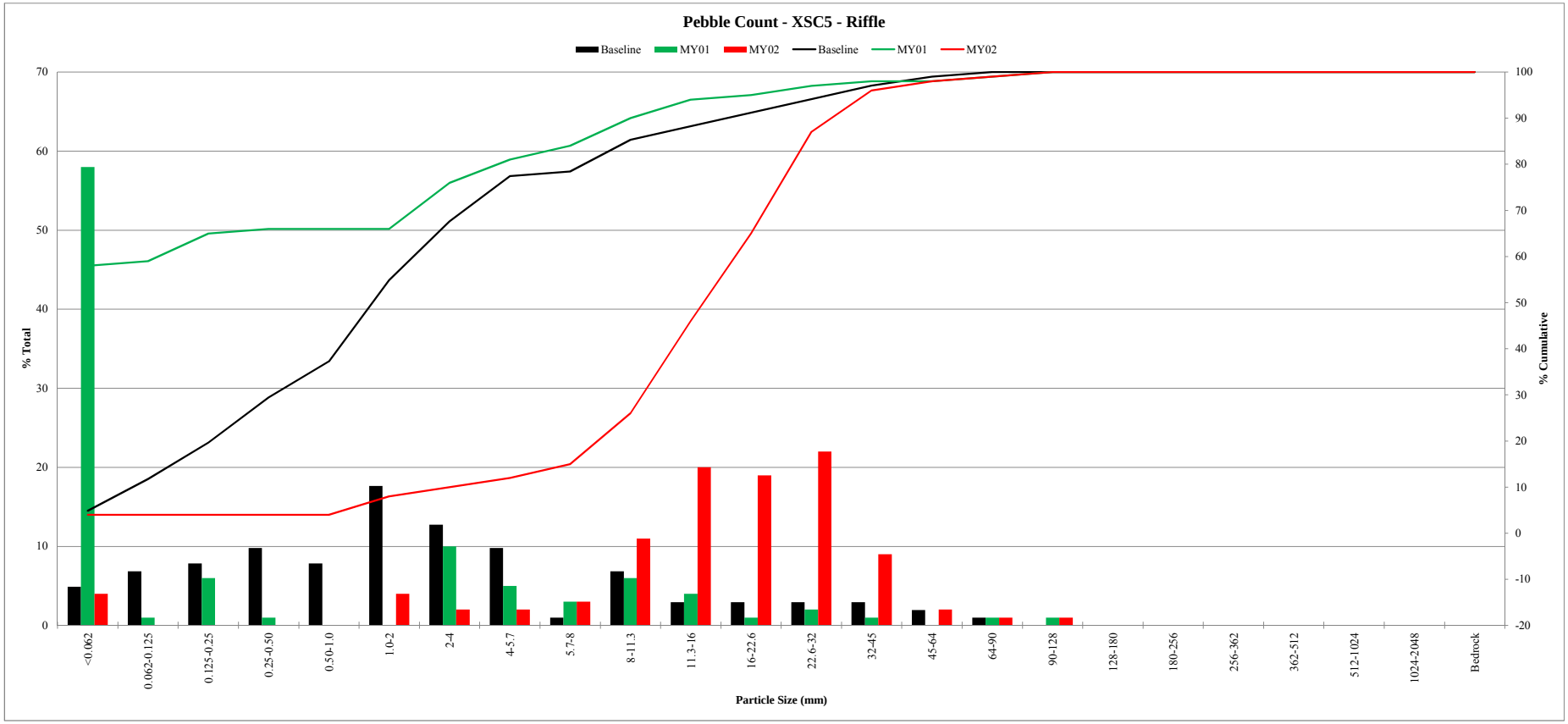

Pebble Count - XSC3 - Riffle
Baseline
MY01
MY02
Baseline
MY01
MY02
% Total
% Cumulative
Particle Size (mm)
<0.062
0.062-0.125
0.125-0.25
0.25-0.50
0.50-1.0
1.0-2
2-4
4-5.7
5.7-8
8-11.3
11.3-16
16-22.6
22.6-32
32-45
45-64
64-90
90-128
128-180
180-256
256-362
362-512
512-1024
1024-2048
Bedrock

Indian Run - LR - XS5 Riffle Pebble Count

Location: STA 11+15

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062	SAND	4	4	4
	Very Fine	0.062-0.125		0	0	4
	Fine	0.125-0.25		0	0	4
	Medium	0.25-0.50		0	0	4
	Coarse	0.50-1.0		0	0	4
0.04-0.08	Very Coarse	1.0-2		4	4	8
0.08-0.16	Very Fine	2-4	GRAVEL	2	2	10
0.16-0.22	Fine	4-5.7		2	2	12
0.22-0.31	Fine	5.7-8		3	3	15
0.31-0.44	Medium	8-11.3		11	11	26
0.44-0.63	Medium	11.3-16		20	20	46
0.63-0.89	Coarse	16-22.6		19	19	65
0.89-1.26	Coarse	22.6-32		22	22	87
1.26-1.77	Very Coarse	32-45		9	9	96
1.77-2.5	Very Coarse	45-64		2	2	98
2.5-3.5	Small	64-90	COBBLE	1	1	99
3.5-5.0	Small	90-128		1	1	100
5.0-7.1	Medium	128-180		0	0	100
7.1-10.1	Large	180-256		0	0	100
10.1-14.3	Small	256-362	BOULDER	0	0	100
14.3-20	Small	362-512		0	0	100
20-40	Medium	512-1024		0	0	100
40-80	Large	1024-2048		0	0	100
	Bedrock	Bedrock	Bedrock	0	0	100
			Total Counted	100		

Summary Data	
D50	17
D84	30
D95	42


Pebble Count - XSC5 - Riffle
Baseline
MY01
MY02
Baseline
MY01
MY02
% Total
% Cumulative
Particle Size (mm)
<0.062
0.062-0.125
0.125-0.25
0.25-0.50
0.50-1.0
1.0-2
2-4
4-5.7
5.7-8
8-11.3
11.3-16
16-22.6
22.6-32
32-45
45-64
64-90
90-128
128-180
180-256
256-362
362-512
512-1024
1024-2048
Bedrock

Indian Run - LR - XS8 Riffle Pebble Count

Location: STA 16+50

Inches	Particle	Millimeters		Count	% Total	% Cum.
	Silt/Clay	<0.062		68	68	68
	Very Fine	0.062-0.125	S	0	0	68
	Fine	0.125-0.25	A	27	27	95
	Medium	0.25-0.50	N	0	0	95
	Coarse	0.50-1.0	D	1	1	96
0.04-0.08	Very Coarse	1.0-2		0	0	96
0.08-0.16	Very Fine	2-4		0	0	96
0.16-0.22	Fine	4-5.7		0	0	96
0.22-0.31	Fine	5.7-8	G	1	1	97
0.31-0.44	Medium	8-11.3	R	1	1	98
0.44-0.63	Medium	11.3-16	A	2	2	100
0.63-0.89	Coarse	16-22.6	V	0	0	100
0.89-1.26	Coarse	22.6-32	E	0	0	100
1.26-1.77	Very Coarse	32-45	L	0	0	100
1.77-2.5	Very Coarse	45-64		0	0	100
2.5-3.5	Small	64-90		0	0	100
3.5-5.0	Small	90-128	C	0	0	100
5.0-7.1	Medium	128-180	O	0	0	100
7.1-10.1	Large	180-256	B	0	0	100
10.1-14.3	Small	256-362	B	0	0	100
14.3-20	Small	362-512	L	0	0	100
20-40	Medium	512-1024	E	0	0	100
40-80	Large	1024-2048		0	0	100
	Bedrock	Bedrock	Bedrock	0	0	100
			Total Counted	100		

Summary Data	
D50	0.062
D84	0.19
D95	0.25

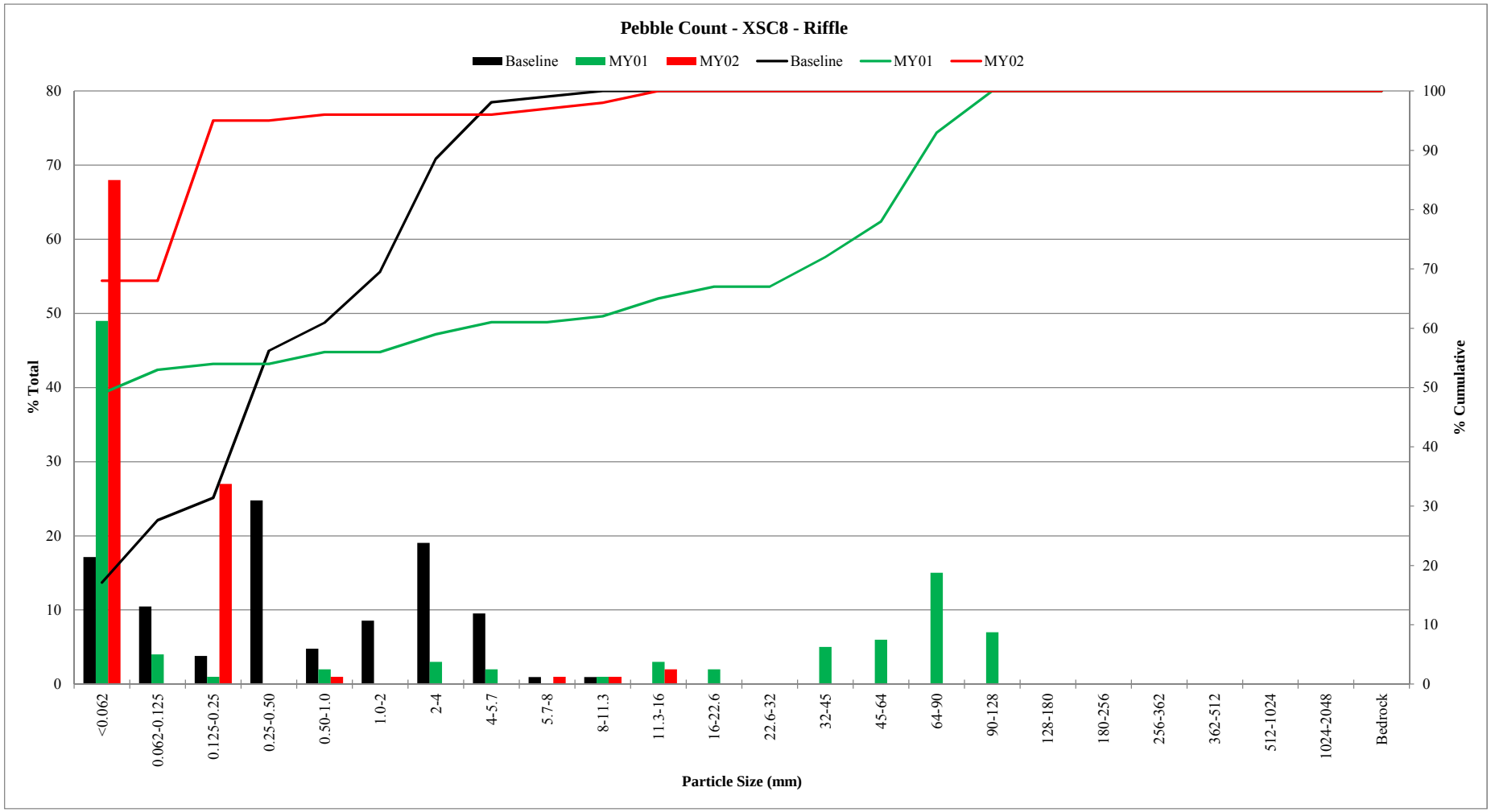

Pebble Count - XSC8 - Riffle
Baseline
MY01
MY02
Baseline
MY01
MY02
% Total
% Cumulative
0
10
20
30
40
50
60
70
80
0
10
20
30
40
50
60
70
80
90
100
<0.062
0.062-0.125
0.125-0.25
0.25-0.50
0.50-1.0
1.0-2
2-4
4-5.7
5.7-8
8-11.3
11.3-16
16-22.6
22.6-32
32-45
45-64
64-90
90-128
128-180
180-256
256-362
362-512
512-1024
1024-2048
Bedrock
Particle Size (mm)

Table 10a. Baseline Stream Data Summary
Coddle Creek Tributary (Indian Run) / 94 - Segment/Reach: Upper (1295 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)							20.0				8.0			9.2				20.0		19.3	20.1		20.8		2
Floodprone Width (ft)							53.7				20.0			92.0				35.0		35.4	62.1		88.7		2
Bankfull Mean Depth (ft)							3.1				1.2			1.5				1.6		1.0	1.2		1.4		2
[1]Bankfull Max Depth (ft)							4.6				1.3			1.9				1.8		1.6	1.9		2.1		2
Bankfull Cross Sectional Area (ft^2)							61.3				11.3			12.3				29.3		19.9	24.7		29.5		2
Width/Depth Ratio							6.5				5.3			7.5				12.0		14.7	16.8		18.8		2
Entrenchment Ratio							2.7				2.5			10.0				1.8		1.7	3.2		4.6		2
[1]Bank Height Ratio											1.6			1.7				1.0		1.0	1.0		1.0		2
Profile																									
Riffle Length (ft)							11.5													11.0	27.9	24.5	62.0	16.2	8
Riffle Slope (ft/ft)							0.027				0.017			0.033				0.0117		0.006	0.013	0.011	0.031	0.008	8
Pool Length (ft)							40				10.8			14.0						18.0	31.6	30.0	55.0	12.2	7
Pool Max depth (ft)							4.79				2.0			2.7				2.85		2.6	3.3	3.3	3.8	0.5	6
Pool Spacing (ft)							10				4.4			47.2			52.0		101.0	47.0	91.4	91.0	126.0	25.4	7
Pattern																									
Channel Beltwidth (ft)							130.0				20.0			69.0			50.0		173.0	50.0	55.6	54.0	67.0	6.7	5
Radius of Curvature (ft)							25.0				6.0			37.0			20.0		60.0	30.0	44.9	50.0	65.0	9.0	16
Rc:Bankfull width (ft/ft)							1.3				0.7			4.6			0.7		4.6	1.6	2.2		3.1		
Meander Wavelength (ft)							115.0				48.0			85.0			104.0		213.0	135.0	168.4	171.5	208.0	21.3	8
Meander Width Ratio							5.8				2.5			8.6			2.5		8.6	2.6	2.8		3.2		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2							0.53											0.47					0.42		
Max part size (mm) mobilized at bankfull							38.7											35.4					32.0		
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification							Impaired C4				C4						C4			C4					
Bankfull Velocity (fps)							5.4										3.49								
Bankfull Discharge (cfs)							328.4																		
Valley length (ft)							1638										1548			1122					
Channel Thalweg length (ft)							1900										1796			1295					
Sinuosity (ft)							1.16				1.3						1.16			1.15					
Water Surface Slope (Channel) (ft/ft)							0.0051				0.0061 - 0.0130						0.0047			0.0056					
BF slope (ft/ft)							0.0051										0.0047			0.0057					
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

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

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

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

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

Table 10b. Baseline Stream Data Summary
Coddle Creek Tributary (Indian Run) / 94 - Segment/Reach: Lower (975 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)							20.0				8.0			9.2				20.0		20.4	21.7		22.9		2
Floodprone Width (ft)							75.0				20.0			92.0				100.0		96.4	123.4		150.3		2
Bankfull Mean Depth (ft)							3.7				1.2			1.5				1.7		1.3	1.3		1.3		2
[1]Bankfull Max Depth (ft)							5.1				1.3			1.9				1.8		2.1	2.2		2.2		2
Bankfull Cross Sectional Area (ft^2)							74.5				11.3			12.3				29.3		27.1	28.0		28.8		2
Width/Depth Ratio							5.4				5.3			7.5				12.0		15.3	16.8		18.2		2
Entrenchment Ratio							3.8				2.5			10.0				5.0		4.7	5.7		6.6		2
[1]Bank Height Ratio											1.6			1.7				1.1		1.0	1.0		1.0		2
Profile																									
Riffle Length (ft)							6.0													18.0	32.0	31.0	48.0	12.3	5
Riffle Slope (ft/ft)							0.035				0.017			0.033				0.0114		0.0057	0.0090	0.0076	0.0150	0.0042	4
Pool Length (ft)							81.0				10.8			14.0						14.0	47.4	35.0	48.0	30.5	7
Pool Max depth (ft)							5.8				2.0			2.7				2.85		2.4	3.0	3.1	3.5	0.4	6
Pool Spacing (ft)							7.5				4.4			47.2			52		101	92.0	112.8	114.0	131.0	19.7	4
Pattern																									
Channel Beltwidth (ft)											20.0			69.0			50.0		173.0	67.0	77.2	75.0	89.0	9.1	5
Radius of Curvature (ft)											6.0			37.0			35.0		56.0	45.0	48.9	50.0	50.0	3.9	7
Rc:Bankfull width (ft/ft)											0.7			4.6			0.7		4.6	2.2	2.3		2.2		
Meander Wavelength (ft)											48.0			85.0			104.0		213.0	190.0	204.2	210.0	211.0	9.4	5
Meander Width Ratio											2.5			8.6			2.5		8.6	3.3	3.6		3.9		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2							0.53											0.36					0.34		
Max part size (mm) mobilized at bankfull							38.7											27.3					25.4		
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification							Modified Channel				C4						C4			C4					
Bankfull Velocity (fps)							5.9										3.49								
Bankfull Discharge (cfs)							442.9																		
Valley length (ft)							1550										1550			763					
Channel Thalweg length (ft)							1700										1922			975					
Sinuosity (ft)							1.1				1.3						1.24			1.28					
Water Surface Slope (Channel) (ft/ft)							0.0052				0.0061 - 0.0130						0.0035			0.0042					
BF slope (ft/ft)							0.0052										0.0035			0.0042					
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

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

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

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

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

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

Coddle Creek Tributary (Indian Run) / 94 Segment/Reach: Upper (1295', CS's 1-4) and Lower (975', CS's 5-8)

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Pool)													
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	542.62	542.62	542.62					541.18	541.18	541.18					539.00	539.00	539.00					538.77	538.77	538.77											
Bankfull Width (ft)	19.31	22.90	16					34.10	35.59	23					20.80	25.86	21.66					33.00	33.51	29.34											
Floodprone Width (ft)	88.70	92.50	91					56.20	60.70	65					35.40	37.80	36.9					45.70	47.90	51.5											
Bankfull Mean Depth (ft)	1.03	0.99	1.71					1.20	1.16	1.82					1.40	1.31	1.13					1.30	1.30	1.06											
Bankfull Max Depth (ft)	1.60	2.09	2.16					3.30	3.32	3.5					2.10	2.39	2					2.60	2.46	3.16											
Bankfull Cross Sectional Area (ft^2)	19.90	22.60	27.3					39.43	41.46	41.97					29.50	33.89	24.53					43.50	43.72	30.99											
Bankfull Width/Depth Ratio	18.80	23.20	7.41					29.50	30.55	12.6					14.70	19.73	19.13					25.00	25.68	27.78											
Bankfull Entrenchment Ratio	4.60	4.04	5.69					1.60	1.71	2.83					1.70	1.46	1.7					1.40	1.43	1.76											
Bankfull Bank Height Ratio	1.00	0.98	1.16					1.00	1.00	1					1.00	1.00	1.04					1.00	1.00	0.96											
Cross Sectional Area between end pins (ft^2)	421.80	411.70	429.37					457.50	471.20	455.94					248.40	262.10	264.04					358.10	361.90	349.78											
d50 (mm)	4.90	32.00	19					12.00	27.00						6.00	6.50	8.5					0.34	4.40												
	Cross Section 5 (Riffle)							**Cross Section 6 (Pool)**							**Cross Section 7 (Pool)**							**Cross Section 8 (Riffle)**													
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+							
Record elevation (datum) used	536.34	536.34	536.34					535.56	535.56	535.56					534.62	534.62	534.62					534.36	534.36	534.36											
Bankfull Width (ft)	22.90	19.98	18.49					19.30	19.03	22.11					69.30	34.53	31.01					20.40	22.02	16.78											
Floodprone Width (ft)	150.30	150.10	138					95.20	104.40	100.4					93.00	99.00	96					96.40	95.60	89.5											
Bankfull Mean Depth (ft)	1.30	1.40	0.97					1.50	1.40	1.58					0.70	1.07	1.20					1.30	1.30	1.18											
Bankfull Max Depth (ft)	2.10	1.94	1.15					2.40	2.75	2.71					3.00	3.14	3.11					2.20	2.33	2.18											
Bankfull Cross Sectional Area (ft^2)	28.80	27.92	18					28.20	26.71	34.9					48.90	37.08	37.17					27.10	28.64	19.78											
Bankfull Width/Depth Ratio	18.20	14.30	18.99					13.10	13.56	14.01					96.30	32.16	25.87					15.30	16.93	14.28											
Bankfull Entrenchment Ratio	6.60	7.51	7.46					5.00	5.49	4.54					1.30	2.87	3.1					4.70	4.34	5.33											
Bankfull Bank Height Ratio	1.00	0.83	0.79					1.00	0.94	1					1.00	1.00	1.03					1.00	0.94	0.99											
Cross Sectional Area between end pins (ft^2)	823.40	870.60	807.93					467.00	467.40	540.64					458.80	441.30	480.99					442.50	431.60	444.59											
d50 (mm)	1.60	0.062	17					0.30	0.29						0.82	0.15						0.42	0.074	0.062											

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

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Coddle Creek Tributary (Indian Run) / 94 - Segment/Reach: Upper (1295 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	19.3	20.1		20.8		2	22.9	24.4		25.9		2	16	18.8		21.6		2																		
Floodprone Width (ft)	35.4	62.1		88.7		2	37.8	65.2		92.5		2	36.9	63.9		91		2																		
Bankfull Mean Depth (ft)	1.0	1.2		1.4		2	1.0	1.2		1.3		2	1.71	1.42		1.13		2																		
[1]Bankfull Max Depth (ft)	1.6	1.9		2.1		2	1.7	2.1	2.1	2.4	0.2	10	2	2.1		2.16		2																		
Bankfull Cross Sectional Area (ft^2)	19.9	24.7		29.5		2	22.6	28.2		33.9		2	24.53	25.9		27.3		2																		
Width/Depth Ratio	14.7	16.8		18.8		2	19.7	21.5		23.2		2	7.41	13.27		19.13		2																		
Entrenchment Ratio	1.7	3.2		4.6		2	1.5	2.8		4.0		2	1.7	3.7		5.69		2																		
[1]Bank Height Ratio	1.0	1.0		1.0		2	1.0	1.0		1.0		2	1.04	1.1		1.16		2																		
Profile																																				
Riffle Length (ft)	11.0	27.9	24.5	62.0	16.2	8	4	13.1	12	23	6.6	11	12.1	25.2	26	39	19	5																		
Riffle Slope (ft/ft)	0.0060	0.0126	0.0107	0.0310	0.0078	8	0.0077	0.0234	0.0236	0.0425	0.0124	11	0.02	0.02	0.03	0.03	0.01	5																		
Pool Length (ft)	18.0	31.6	30.0	55.0	12.2	7	13	25.2	20	63	13.3	15	25	48.7	50.1	67.8	21.5	5																		
Pool Max depth (ft)	2.6	3.3	3.3	3.8	0.5	6	2.37	3.23	3.3	4.33	0.63	15	2.3	3.3	3.4	4.3	1	5																		
Pool Spacing (ft)	47.0	91.4	91.0	126.0	25.4	7	35	80.9	80	122.5	30.3	10	83.8	125.9	127	158.8	37.6	5																		
Pattern																																				
Channel Beltwidth (ft)	50.0	55.6	54.0	67.0	6.7	5																														
Radius of Curvature (ft)	30.0	44.9	50.0	65.0	9.0	16																														
Rc:Bankfull width (ft/ft)	1.6	2.2		3.1																																
Meander Wavelength (ft)	135.0	168.4	171.5	208.0	21.3	8																														
Meander Width Ratio	2.6	2.8		3.2																																

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

Additional Reach Parameters																																				
Rosgen Classification	C4						C4						C4																							
Channel Thalweg length (ft)	1295						1295						1295																							
Sinuosity (ft)	1.15						1.15						1.15																							
Water Surface Slope (Channel) (ft/ft)	0.0056						0.0058						0.0054																							
BF slope (ft/ft)	0.0057						0.0055						0.0054																							
[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							2.3						0																							
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

Exhibit Table 11c. Monitoring Data - Stream Reach Data Summary
Coddle Creek Tributary (Indian Run) / 94 - Segment/Reach: Lower (975 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	20.4	21.7		22.9		2	20.0	21.0		22.0		2	16.78	17.64		18.49		2																		
Floodprone Width (ft)	96.4	123.4		150.3		2	95.6	122.9		150.1		2	89.5	113.8		138		2																		
Bankfull Mean Depth (ft)	1.3	1.3		1.3		2	1.3	1.4		1.4		2	0.97	1.07		1.18		2																		
[1]Bankfull Max Depth (ft)	2.1	2.2		2.2		2	1.9	2.2	2.2	2.4	0.2	7	1.15	1.66		2.18		2																		
Bankfull Cross Sectional Area (ft^2)	27.1	28.0		28.8		2	27.9	28.3		28.6		2	18	18.89		19.78		2																		
Width/Depth Ratio	15.3	16.8		18.2		2	14.3	15.6		16.9		2	14.28	16.63		18.99		2																		
Entrenchment Ratio	4.7	5.7		6.6		2	4.3	5.9		7.5		2	5.33	6.39		7.46		2																		
[1]Bank Height Ratio	1.0	1.0		1.0		2	0.8	0.9		0.9		2	0.79	0.89		0.99		2																		
Profile																																				
Riffle Length (ft)	18.0	32.0	31.0	48.0	12.3	5	4.0	13.5	14.5	24.0	7.2	6	10.78	18.17	17.8	27.19	6.16	6																		
Riffle Slope (ft/ft)	0.0057	0.0090	0.0076	0.0150	0.0042	4	0.0088	0.0141	0.0152	0.0188	0.0036	6	0.004	0.012	0.012	0.021	0.007	6																		
Pool Length (ft)	14.0	47.4	35.0	48.0	30.5	7	26.0	45.6	48.0	71.0	17.6	7	16.41	41.3	45.6	66.8	18.7	5																		
Pool Max depth (ft)	2.4	3.0	3.1	3.5	0.4	6	2.4	3.0	2.8	3.9	0.5	7	14.79	18.1	18.4	20.7	2.17	5																		
Pool Spacing (ft)	92.0	112.8	114.0	131.0	19.7	4	45.0	93.1	107.0	141.0	38.0	6	67.6	122.2	123	176.1	44.7	4																		
Pattern																																				
Channel Beltwidth (ft)	67.0	77.2	75.0	89.0	9.1	5																														
Radius of Curvature (ft)	45.0	48.9	50.0	50.0	3.9	7																														
Rc:Bankfull width (ft/ft)	2.2	2.3		2.2																																
Meander Wavelength (ft)	190.0	204.2	210.0	211.0	9.4	5																														
Meander Width Ratio	3.3	3.6		3.9																																
Additional Reach Parameters																																				
Rosgen Classification	C4						C4						C4																							
Channel Thalweg length (ft)	975						975						975																							
Sinuosity (ft)	1.28						1.28						1.28																							
Water Surface Slope (Channel) (ft/ft)	0.0042						0.0042						0.0051																							
BF slope (ft/ft)	0.0042						0.0046						0.0054																							
[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							0						0																							
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 surveys and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

Appendix E
Hydrologic Data

Table 12. Verification of Bankfull Events			
Coddle Creek Tributary (Indian Run)/ 94 Segment/Reach: 2270 feet			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo**
5/30/2012	Between 5/11/2011 - 5/30/2012	Visual observation of wrack lines; stream gauge	Photo in MY1 Report
11/4/2013	Between 5/30/2012 - 11/04/2013	Visual observation of wrack lines; stream gauge	Photo below