

Baseline Monitoring Document and As-built Baseline Report

Cat Creek Stream and Wetland Restoration Macon County, NC

**SCO Project Number 050657901
EEP Project Number 71**



Prepared for:



**NCDENR Ecosystem Enhancement Program
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**Cat Creek Stream and Wetland Restoration
Macon County, NC**

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EEP Project Number 71**

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EXECUTIVE SUMMARY

The Cat Creek stream and wetland restoration site in Macon County, North Carolina was identified by the North Carolina Department of Transportation (NCDOT) as a potential stream, riparian buffer, and wetland restoration site. The site consists of reaches on four separate tracts of land referred to as: Swartwout, Waldroop, Parker, and Preserve. The Swartwout, Parker, and Preserve tracts have been purchased by the NCDOT, while the Waldroop tract is in private ownership. Following initial studies of the site by NCDOT beginning in 2002, the site was turned over to the Ecosystem Enhancement Program (EEP) in 2005 for final design, construction, and monitoring.

The proposed restoration area entails about 7,128 linear feet of Cat Creek, and 948 linear feet of four small tributaries in a rural area of Macon County. Cat Creek and the tributaries have been impacted by past land use including use as pastureland and a golf course.

Both stream restoration and enhancement was proposed for the various reaches of Cat Creek dependent upon the existing stream conditions and other constraints. Stream activities consisted of Restoration, Enhancement Level 1, and Enhancement Level 2. Restoration consisted of modifying the streams dimension, pattern and profile to achieve a stable stream channel. Reaches proposed for Enhancement Level 1 activities had their dimension and profile modified, but pattern remained the same. Enhancement Level 2 activities consisted of fencing out livestock, spot stabilization, and planting a riparian buffer. The type of restoration by tract is presented in the table below. A permanent Conservation Easement was obtained for the Waldroop tract. The Conservation Easement was recorded in 2008.

Wetland restoration and enhancement also occurred on the Swartwout, Parker, and Preserve tracts. Restoration activities were performed to restore predisturbance hydrology to the site by removing fill and drain tiles. Following fill removal these areas were planted with native hardwoods. Areas proposed for enhancement are areas that still retained hydrology to qualify as jurisdictional wetlands. These areas, at a minimum, were planted with hardwoods. In some of the enhancement areas, hydrologic enhancement will also occur with the removal of drain tiles. Livestock were removed from the Swartwout Tract.

The following table presents the restoration/enhancement activity by tract and by reach. **Figure 2** in **Appendix A** shows the location of each activity.

Table 1. Project Restoration Structure and Objectives

Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Comment
Cat Creek - Upper Swartwout	900 feet	E2		900 feet	10+00 - 19+00	Livestock exclusion, buffer plantings, bank stabilization in 3 locations

Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Comment
Cat Creek - Lower Swartwout	770 feet	R	P1	926 feet	19+00 - 28+26	
UT 1	363 feet	R	P1	457 feet	10+00 - 14+57	
Swartwout wetlands		R		1.11 acres		
		E		0.51 acres		Livestock exclusion, removal of drain pipe, plantings
UT 1	100 feet	E2		100 feet	NA	Livestock exclusion, buffer plantings
Cat Creek - Upper Waldroop	1463 feet	E2		1463 feet	NA	Livestock exclusion, buffer plantings
Cat Creek - Lower Waldroop	480 feet	E1		480 feet	30+00 - 34+80	Livestock exclusion, buffer plantings, and structures to provide enhanced profile
Cat Creek - Parker	1750 feet	R	P1	1820 feet	34+80 - 53+00	
UT 2	210 feet	R	P1	374 feet	10+00 - 13+74	
UT 3	165 feet	R	P1	287 feet	10+00 - 12+87	
Parker wetlands		R		4.73 acres		
		E		0.25 acres		
Cat Creek Preserve	1765 feet	E1		1852 feet	60+00 - 78+52	Grade control, turbulent riffles to add habitat, buffer plantings, and invasive species management
UT 4	110 feet	R	P1	230 feet	10+00 - 12+30	
Preserve wetlands		R		0.71 acres		
		E		0.66 acres		

This project has the following goals:

- Provide a stable stream channel for the main channel and the unnamed tributaries to Cat Creek that neither aggrades nor degrades while maintaining their dimension, pattern, and profile with the capacity to transport their watershed's water and sediment load.
- Improve water quality to the receiving watershed through stream bank stabilization measures, the installation of a woody riparian buffer, and the exclusion of livestock.
- Improve aquatic habitat of the main channel and tributaries with the use of natural material stabilization structures such as root wads, rock and log vanes, constructed riffles with river stone, and a riparian buffer.

- Provide aesthetic value, wildlife habitat, and bank stability through the creation or enhancement of a riparian zone.
- Create a contiguous wildlife corridor and provide diverse amphibian habitat with added topographic and wetland features.
- Provide shading and biomass input to the stream and mast for wildlife when vegetation is mature.
- Enhance wetland biochemical-and geo-chemical processes over an extended area.

1.0. PROJECT GOALS, BACKGROUND, AND ATTRIBUTES

The North Carolina Department of Transportation (NCDOT) initially identified a portion of Cat Creek in Macon County, North Carolina for potential stream, riparian buffer, and wetland restoration and/or enhancement (**Figure 1**). Following studies by NCDOT beginning in 2002, the project was turned over to the North Carolina Ecosystem Enhancement Program (EEP) in 2005 for design, construction and monitoring. The reaches of Cat Creek identified are located on four separate tracts of land: Swartwout, Waldroop, Parker, and Preserve. Three of the tracts, Swartwout, Parker, and Preserve have been purchased by NCDOT.

1.1 Location and Setting

The project site is located east of the town of Franklin in Macon County. Cat Creek Road (SR 1513) is located off of US 23/441 between Business 441 and US 64. If proceeding south on US 23 turn left onto Cat Creek Road. Proceed along Cat Creek Road for approximately 1.5 miles and turn left onto Ferguson Road to access the Preserve and the Parker tracts. Cat Creek crosses Ferguson Road about 1,900 feet from the turnoff from Cat Creek. Parking is available on either tract near the creek crossing.

To access the Waldroop Tract continue on Cat Creek Road past Ferguson about 0.5 mile. Bethel Church Road comes in from the right and just before the road there is a driveway on the left with a farmhouse and large barn beyond the farmhouse.

To access the Swartwout Tract continue on Cat Creek Road past Ferguson Road about 0.8 miles. Cat Creek Road takes an abrupt left turn (if you go straight you will be on Jack Cabe Road). Turn left (staying on Cat Creek Road). The Swartwout Tract is immediately on the right. A gate provides access to the field.

Cat Creek is located in the Little Tennessee River Basin in USGS Cataloging Unit 06010202. The NCDWQ Sub-basin is 04-04-01. The watershed to the end of the project site is approximately 3.6 square miles.

1.2 Project Goals and Objectives

Project Goals:

- Provide a stable stream channel for the main channel and the unnamed tributaries to Cat Creek that neither aggrades nor degrades while maintaining their dimension, pattern, and profile with the capacity to transport their watershed's water and sediment load.
- Improve water quality to the receiving watershed through stream bank stabilization measures, the installation of a woody riparian buffer, and the exclusion of livestock.
- Improve aquatic habitat of the main channel and tributaries with the use of natural material stabilization structures such as root wads, rock and log vanes, constructed riffles with river stone, and a riparian buffer.

- Provide aesthetic value, wildlife habitat, and bank stability through the creation or enhancement of a riparian zone.
- Create a contiguous wildlife corridor and provide diverse amphibian habitat with added topographic and wetland features.
- Provide shading and biomass input to the stream and mast for wildlife when vegetation is mature.
- Enhance wetland biochemical-and geo-chemical processes over an extended area.

Project Objectives:

- Restore or enhance over 8,200 feet of Cat Creek and its tributaries..
- Restore a natural riparian buffer.
- Restore 5 acres of swamp forest bog complex wetlands.
- Plant native trees and shrubs throughout the site.

1.3 Project Structure, Restoration Type and Approach

The project restored 4,094 linear feet of Cat Creek and four tributaries, and enhanced 4,795 linear feet of Cat Creek. Additionally, 6.55 acres of wetlands were restored and 1.42 acres of wetlands were enhanced.

Cat Creek on the upper reach of the Swartwout Tract was enhanced by the removal of livestock, planting of the riparian buffer and stabilization of the bank in three locations. Wetlands on the upper portion of the tract were restored by the removal of drain tile and planting with hardwoods. The lower reach of Cat Creek on the Swartwout Tract underwent a Priority 1 restoration and was reconnected to its floodplain. Unnamed Tributary 1 on the Swartwout Tract also underwent a Priority 1 restoration. Wetlands on the lower portion of the tract underwent restoration by the removal of fill, removal of drain tile, and reconnection of Cat Creek and Tributary 1 to their abandoned floodplains. Existing wetlands were enhanced by increasing hydrology, planting of hardwoods, and removal of livestock.

Cat Creek on the upper portion of the Waldroop Tract underwent enhancement by fencing out livestock and planting the riparian buffer. Additional activities on the lower portion of Cat Creek included the addition of vanes and sills to create pools and riffles.

Cat Creek on the Parker Tract underwent full restoration by reconnecting the stream to its floodplain, and restoring pattern, dimension, and profile. Unnamed Tributary 2 and 3 were also restored in the same manner. Wetlands on the Parker Tract were restored by removing fill placed in the wetlands when it was developed as a golf course, removal of drain tiles, and reconnecting Cat Creek to its abandoned floodplain to provide periodic flooding. The wetlands and riparian areas were planted in hardwoods.

Cat Creek on the Preserve Tract underwent enhancement. A riparian buffer was established and mowing of the buffer no longer occurs. The profile of the channel was enhanced by the addition of sills and vanes. Boulders were added to two long runs to create “turbulent riffles” that

enhanced structure within the channel and improved aquatic habitat. Unnamed Tributary 4 was restored by restoring dimension, pattern, and profile. Wetlands on the Preserve Tract were restored by removing fill placed in the wetlands when it was developed as a golf course. Existing wetlands on the Preserve were enhanced by prohibiting mowing. The wetlands and riparian areas were planted in hardwoods.

1.4 Project History, Contacts and Attribute Data

The site was first identified by NCDOT in 2002, at which time Feasibility Studies were performed on several separate tracts of land. Following the Feasibility Studies, NCDOT purchased the Swartwout Tract, Parker Tract, and Preserve Tract. Following the formation of the EEP, NCDOT turned the site over to EEP in 2005 for final design, construction, and monitoring. A permanent Conservation Easement on the Waldroop property was recorded in 2008. Design was completed in 2008 and construction began in August 2009. Planting was performed in January 2010. Construction on the project was not completed until invasive species control was performed in June and July, 2010.

2.0 SUCCESS CRITERIA

The following section outlines the success criteria for the three restoration elements: stream, hydrology and vegetation.

2.1 Morphometric Parameters and Channel Stability

Considering the typical 5-year timeframe for mitigation monitoring, the determination of success for stream projects is often based primarily on the degree of morphological stability. The absence of any change over these timeframes will certainly be interpreted as stability, but is not a prerequisite. To the contrary, it is typical for streams to demonstrate variation over a 5-year monitoring period in the form of sustainable rates of change or stable patterns of variation (dynamic stability). Considering the young state of woody buffers and the fact that design parameters are estimates and therefore never a perfect match for the watershed regimes, restored streams typically adjust or shift to some extent after their exposure to varying flows in the years that immediately follow construction. However, these changes should be moderate and exhibit little discernable trends. Annual variation is to be expected, but over time and with buffer development should generally demonstrate a reduction in amplitude and demonstrate dynamic maintenance around some central tendency that represents acceptable distributions for design parameters and/or stable stream types. Key among these are parameters those that indicate lateral and vertical stability and intended levels of floodplain connection. If some trends or patterns become evident, they should be modest or indicate migration toward another stable form. Lastly, all of this must be evaluated in the context of hydrologic events to which the system is exposed over the monitoring period.

2.2 Dimension

Dimensional stability will be based on comparisons of overlays of annual cross-section plots and their calculated parameters to the as-built conditions, design distributions, and distributions for stable stream types. Parameters such as cross-sectional area and the channel's width to depth ratio should demonstrate modest overall change and patterns of variation that are in keeping with above description of dynamic stability. The stream dimension should not demonstrate trends of enlargement either through downcutting or widening, however, modest year-to-year variation or oscillation in channel elevation or width demonstrating maintenance around baseline or design distributions is acceptable. Changes from depositional processes resulting in the development of constructive features on the banks and floodplain, such as an inner berm, channel narrowing, natural levees, and general floodplain deposition will be acceptable forms of change and indicative of stability.

The entire project will also be visually cataloged for areas of bank instability and represented as proportions of overall bank footage. The overall proportion, severity, spatial distribution, and temporal trends in this parameter will be assessed to serve as an additional indicator of dimensional stability. In general, stability proportions (stable bank/total bank) below 85% would be of concern. Considering temporal trends, a higher percentage in a given year may also be of concern if it represents a data point in a trend of decreasing stability. Instability dominated by surface scour versus mass wasting would be an example of differing severity and the latter would be more concerning than the former. Erosion in meanders versus riffle reaches would generate differing levels of concern because erosion in the former is more likely given greater bank shear stress, whereas instability concentrated in riffle/run reaches might be more indicative of an overall design flaw.

2.3 Pattern and Profile

Reach profiles should not exhibit any consistent trends in thalweg degradation over any significant continuous portion of its length. Some aggradation will be acceptable and will not be actionable unless it is apparently causal for widening/bank erosion. Over the monitoring period, the profile should also demonstrate the maintenance or development of bedform (facets) more in keeping with reference level diversity and distributions for the stream type in question. It should also provide a meaningful contrast in terms of bedform diversity against the pre-existing condition. Bedform distributions, riffle/pool lengths and slopes will vary, but should do so with maintenance around design/as-built size distributions. This requires that the majority of pools are maintained at greater depths with lower water surface slopes and riffles are shallower with greater water surface slopes.

2.4 Substrate

Pebble count data should indicate the progression towards or the maintenance of the known size distributions from the design phase. The absence of any significant trends in bed aggradation or deposition should represent stable conditions in terms of sediment input and transport

functionality. While stream projects are designed to transport bedload in equilibrium and carry overall sediment loads at bankfull, fines can be transported even at low discharges and upstream instability beyond design projections can also lead to deposition as storm events recede in areas of energy dissipation such as restoration reaches. This can have the effect of obscuring bedform and fining of riffles especially in the first few years after the implementation of a stream project. In many cases subsequent narrowing and reduction of width/depth ratios as a project develops/stabilizes can then increase transport efficiency and return bedform to intended distributions, but some fining can persist due to upstream disturbance.

2.5 Sediment Transport

Maintenance of sediment transport will be evident by the monitored cross-sections and profile. From these two indicators, there should be no evidence of any significant trend in aggradation or degradation throughout the channel.

2.6 Vegetation

Vegetation success is based on the criteria established in the USACE Stream Mitigation Guidelines (2003). This document states that vegetation monitoring results indicate the following planted stem density minimums in the corresponding monitoring years: 320 stems/acre through year three, 288 stems/acre in year four, and 260 stems/acre in year five. If monitoring indicates that the specified survival rate is not being met, appropriate corrective actions will be developed to include invasive species control, the removal of dead/dying plants, and replanting.

2.7 Hydrology

Separate hydrologic goals have been established for the stream and for the wetlands. For the stream a minimum of two bankfull events, occurring in separate years, must be documented within the monitoring period.

In the wetland restoration areas the hydrologic goal is for the soil to be saturated within 12 inches of the surface for at least 8 percent of the growing season under average climatic conditions.

3.0 MONITORING PLAN

3.1 Dimension

Nineteen permanent monitoring cross-sections have been established on the site, 11 on the main stem of Cat Creek and two on each of the four tributaries. On the Swartwout tract three cross-sections (2 riffle and 1 pool) were established on Cat Creek and a pool and riffle cross-section were established on Tributary 1. On the Parker Tract 8 cross-sections (4 riffle and 4 pool) were established on Cat Creek and two cross-sections (1 riffle and 1 pool) were established on Tributary 2 and Tributary 3. On the Preserve Tract one riffle and 1 pool cross-section were

established on Tributary 4. Permanent monuments of rebar have been established at each end of these cross-sections. While cross-section have been established on all tributaries only the mainstem of Cat Creek and Tributary 1 will be surveyed each year, with measurements occurring at bankfull, top of bank, edge of water, and other significant breaks in slope.

3.2 Profile

The entire profile of the mainstem of Cat Creek (Swartwout Tract and Preserve Tract) and Tributary 1 will be surveyed each monitoring year. The profile will be surveyed in detail, documenting the elevations of the thalweg, water surface, and bankfull. Pool and riffle features will be called out to calculate feature slopes and lengths.

3.3 Pattern

Pattern measurements have been taken for the as-built condition and are documented in this report. Future pattern measurements will not be taken unless there is evidence that significant geomorphological adjustments have occurred.

3.4 Substrate

Pebble counts will be conducted at all of the permanent cross-sections. These pebble counts will occur each year of the monitoring period and be used to calculate the sediment distribution at the cross-sections and the D50 and D84 at each location.

3.5 Visual Assessment

A visual assessment of the stream to include an assessment of the bank (lateral stability), bed (vertical stability), the easement boundary, and site vegetation will be completed each year to document the necessary parameters required for the EEP monitoring report.

3.6 Vegetation

Fourteen vegetation plots were set up and assessed for the baseline vegetation monitoring. Vegetation data collection must follow the CVS-EEP Protocol for Recording Vegetation (Lee et al. 2006, <http://cvs.bio.unc.edu/methods.htm>). The baseline vegetation monitoring was conducted as a Level 1: Inventory of Planted Stems, as will the first year monitoring. Beginning in year two and continuing throughout the rest of the monitoring period, the site will be monitored using the Level 2 protocol. Note that due to data loss not all vegetation plot photos are presented in Appendix C.

3.7 Digital Photos

Ten permanent photo stations have been established as part of the baseline monitoring. Starting in the first monitoring year, these photos will be taken in late October / early November, so that vegetative conditions are similar at the site between monitoring years. The photos will be used to make a qualitative assessment of channel aggradation or degradation, bank erosion, success of

riparian vegetation, effectiveness of erosion control measures, and the presence or absence of developing in-stream bars. Any significant changes from the as-built conditions will be discussed and highlighted in the report. Additional photo points should be established if problem areas arise.

3.8 Hydrology

Eighteen monitoring gauges were installed in wetland enhancement/restoration areas to monitor site hydrology. Monitoring gauges were installed in accordance with USACE guidelines (USACE 1993b). Wetland hydrology will be monitored for five years.

4.0 BASELINE CONDITIONS

The project was built as designed with the following changes and additions based upon conditions encountered during construction:

- Swartwout Tract
 - 16+30 to 16+60 channel relocated about 5 feet to the (left) south. Right bank built up and brush mattress added to address a vertical and eroding right bank in this location
 - Bedload (river stone) with a D50 of 90 mm was added to all riffles in the relocated portion of Cat Creek.
- Waldroop Tract
 - Combo Vane at 31+05 eliminated
 - Combo Vane at 31+77 installed left bank (moved upstream from 32+59)
 - Combo Vane at 32+59 eliminated Sill installed at 32+89
 - Combo Vane at 33+73 eliminated Sill installed at 34+58
 - Combo Vane at 35+00 eliminated
- Parker Tract
 - Tributary 3 log vane at 12+65 replaced with sill
- Preserve Tract
 - Combo Vane at 70+88 replaced with sill.
 - Combo vane at 72+50 moved upstream approx. 20 feet.
 - Removal of pipe from road to old pond
 - Wood sills added at down slope end of the two pocket wetlands

A large bankfull storm event occurred on September 20 and 21, 2009. This event caused some bed degradation and bed scouring on the portion of the Parker Tract that had been completed. Based on the observations it was determined that the channel cross-sectional area was larger than necessary and a smaller channel was redesigned for the implementation on Cat Creek main stem and Tributary 1 on the Swartwout Tract. Repairs to the Cat Creek on the Parker Tract were performed in December 2010. This included the construction of turbulent riffles with river stone. All riffles were made into “turbulent riffles” as shown on design plans. Two rock spurs were added at approximately 38+10 and 38+40.

A detailed baseline survey was conducted post-construction by AECOM in June 2010. The baseline survey of the longitudinal profile and the cross-sections shows that the as-built Cat Creek channel closely reflects the design conditions.

5.0 MAINTENANCE AND CONTINGENCY PLANS

Problem areas at the Cat Creek Stream and Wetland Restoration Site will be dealt with accordingly based on the severity of the problem and at the discretion of the EEP. Site maintenance may include reinstallation of coir matting, removal of debris from the channel, stabilization of bank erosion with protective structures, or adjustments to in-stream structures. All maintenance activities will be documented in the yearly monitoring reports.

The Cat Creek site will be subject to control of invasive plant species identified as a high concern in version 1.3 of the EEP Monitoring template.

6.0 REFERENCES

Lee, M.T., R.K. Peet, S.D. Roberts, T.R. Wentworth. 2006. *CVS-EEP Protocol for Recording Vegetation Version 4.0.*

APPENDIX A

General Tables and Figures

Vicinity Maps and General Site Maps

Project Component/Asset Maps

Tables 1-4

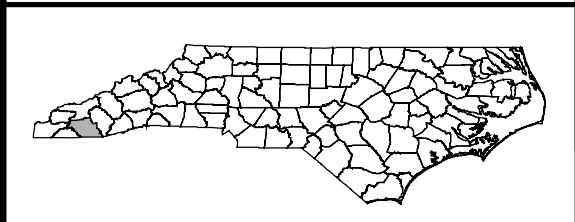
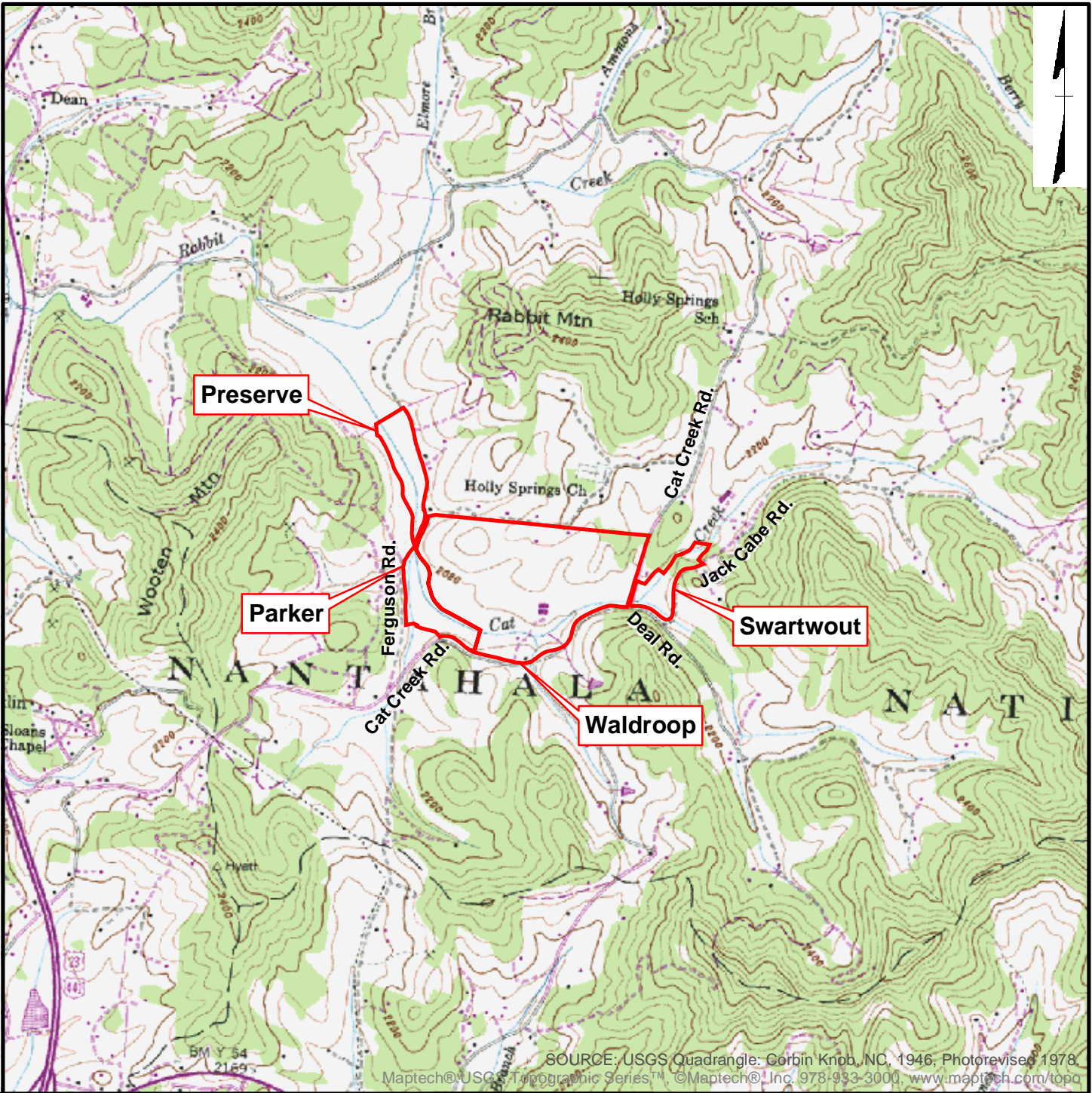
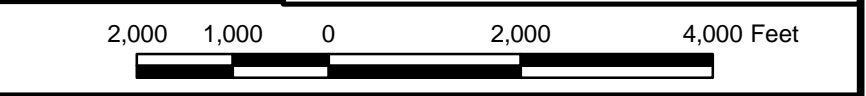


FIGURE 1
VICINITY MAP
 Baseline Monitoring Report
 Cat Creek Stream and Wetland
 Restoration Site (EEP # 71)
 Macon County, North Carolina





- Legend**
- Property Line
 - Conservation Easement
 - Environmentally Sensitive Area
 - Wetland Mitigation
 - Wetland Enhancement
 - Wetland Restoration
 - Stream Mitigation
 - Restoration
 - Enhancement 1
 - Enhancement 2

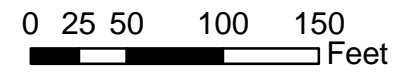
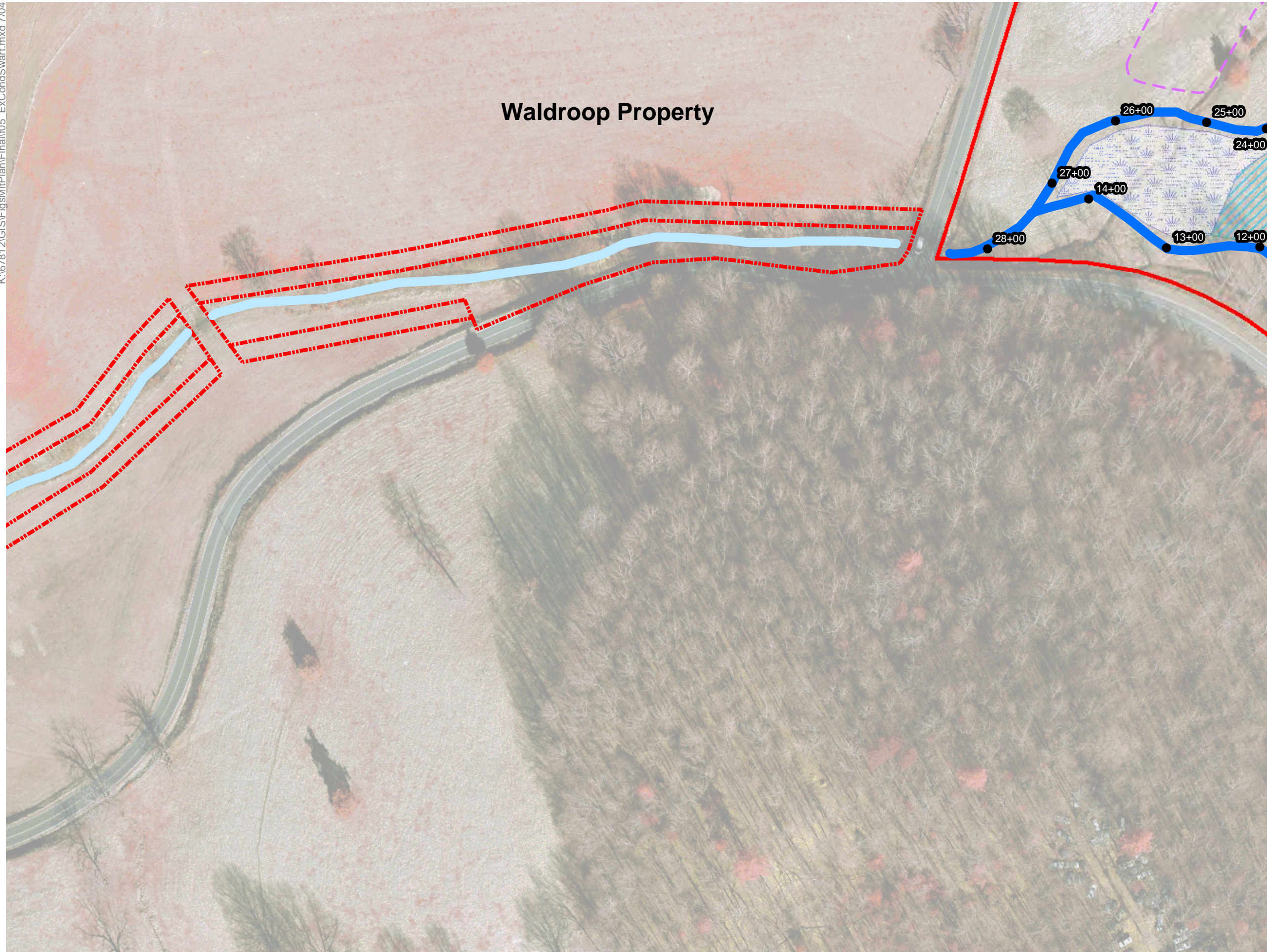


Figure 2
CAT CREEK ASSETS

Baseline Monitoring Report
Cat Creek Stream and Wetland
Restoration Site (EEP #71)
Macon County, North Carolina



Waldroop Property

- Legend**
- Property Line
 - Conservation Easement
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 - Wetland Mitigation
 - Wetland Enhancement
 - Wetland Restoration
 - Stream Mitigation
 - Restoration
 - Enhancement 1
 - Enhancement 2

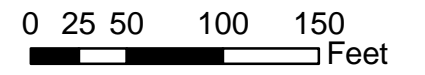
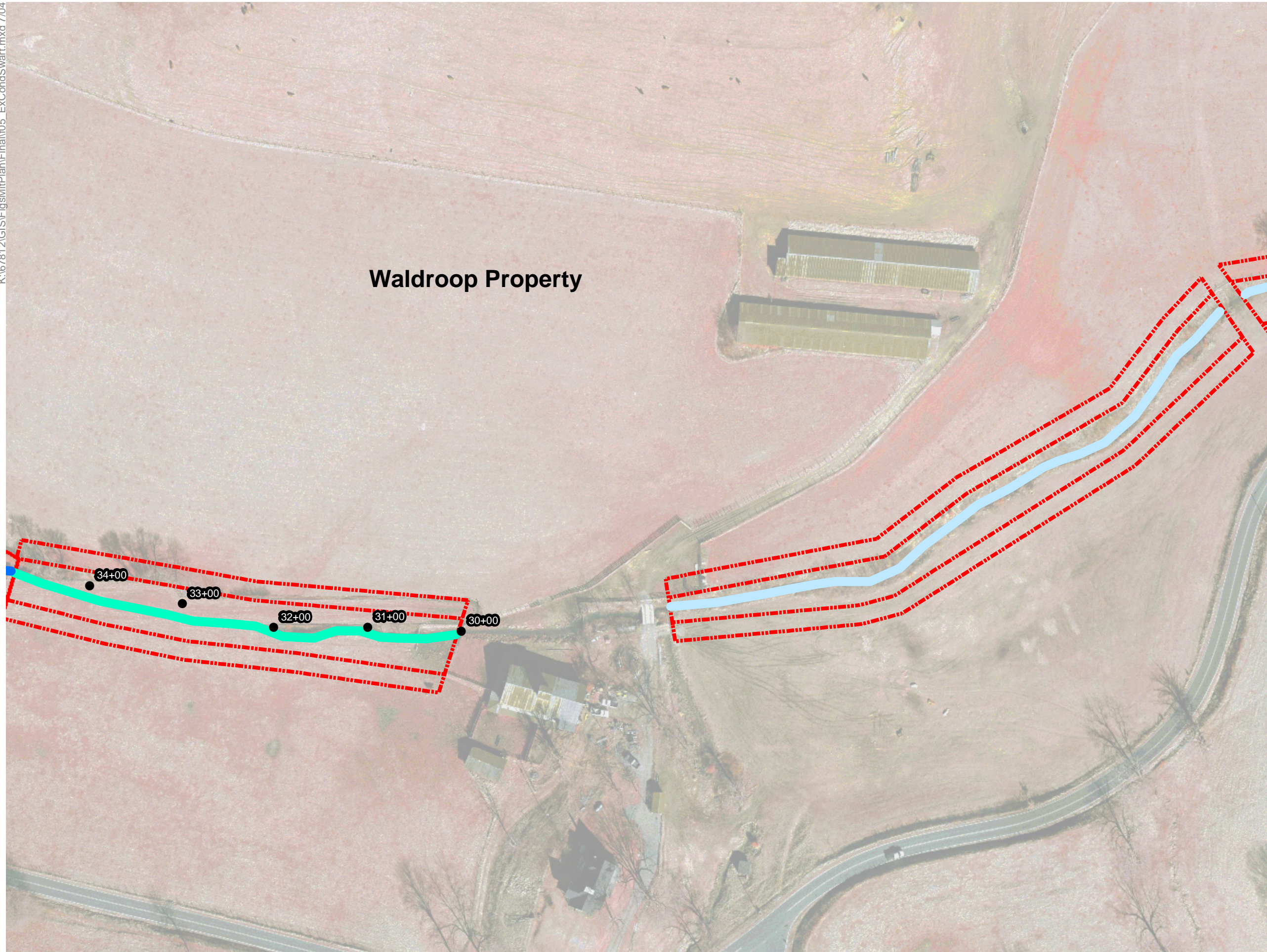


Figure 2
CAT CREEK ASSETS

Baseline Monitoring Report
Cat Creek Stream and Wetland
Restoration Site (EEP #71)
Macon County, North Carolina



Waldroop Property

Legend

- Property Line
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 - Restoration
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 - Enhancement 2

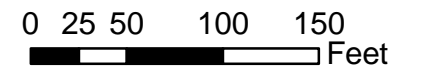
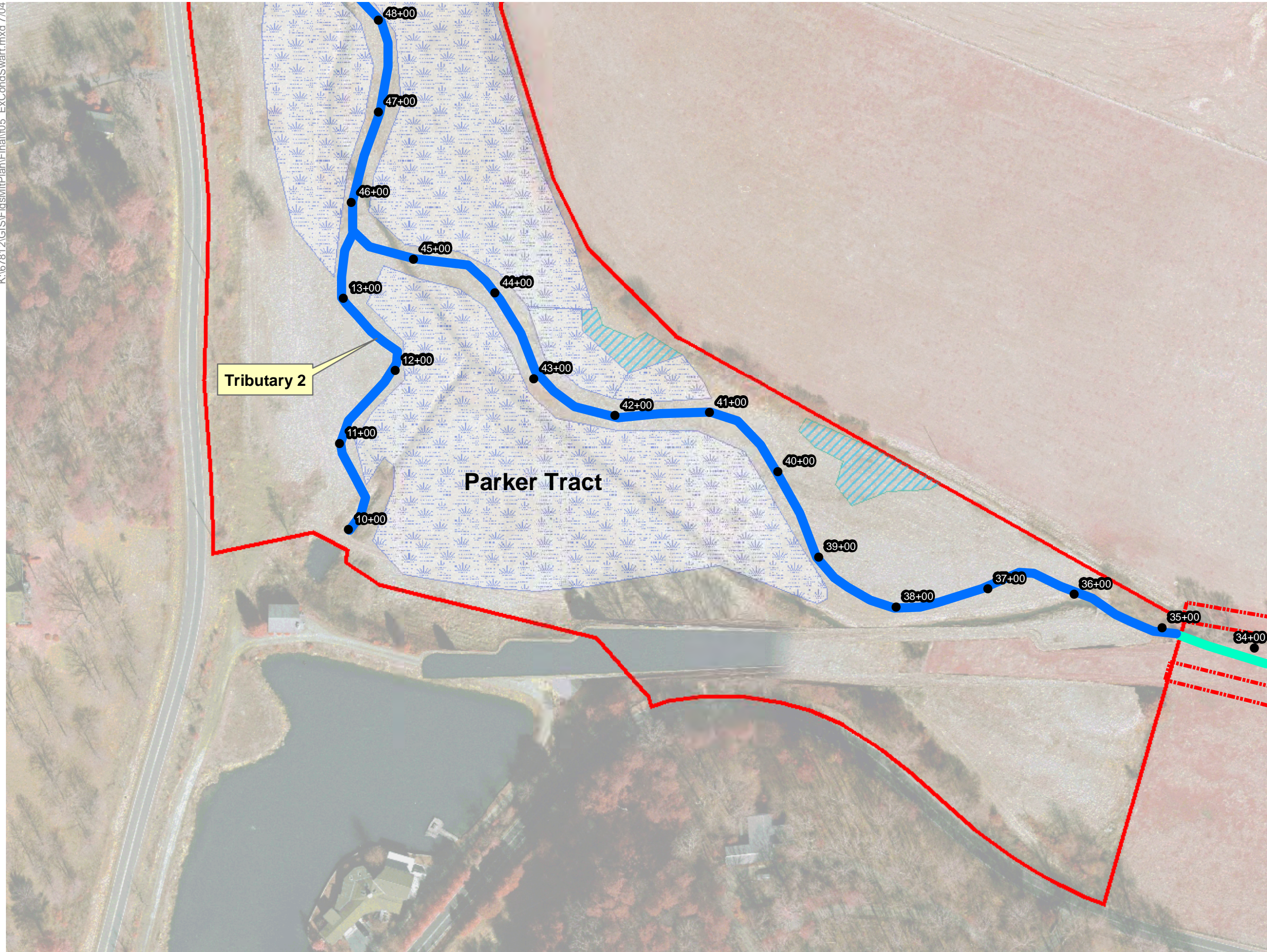


Figure 2
CAT CREEK ASSETS

Baseline Monitoring Report
Cat Creek Stream and Wetland
Restoration Site (EEP #71)
Macon County, North Carolina



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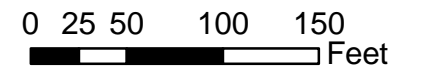
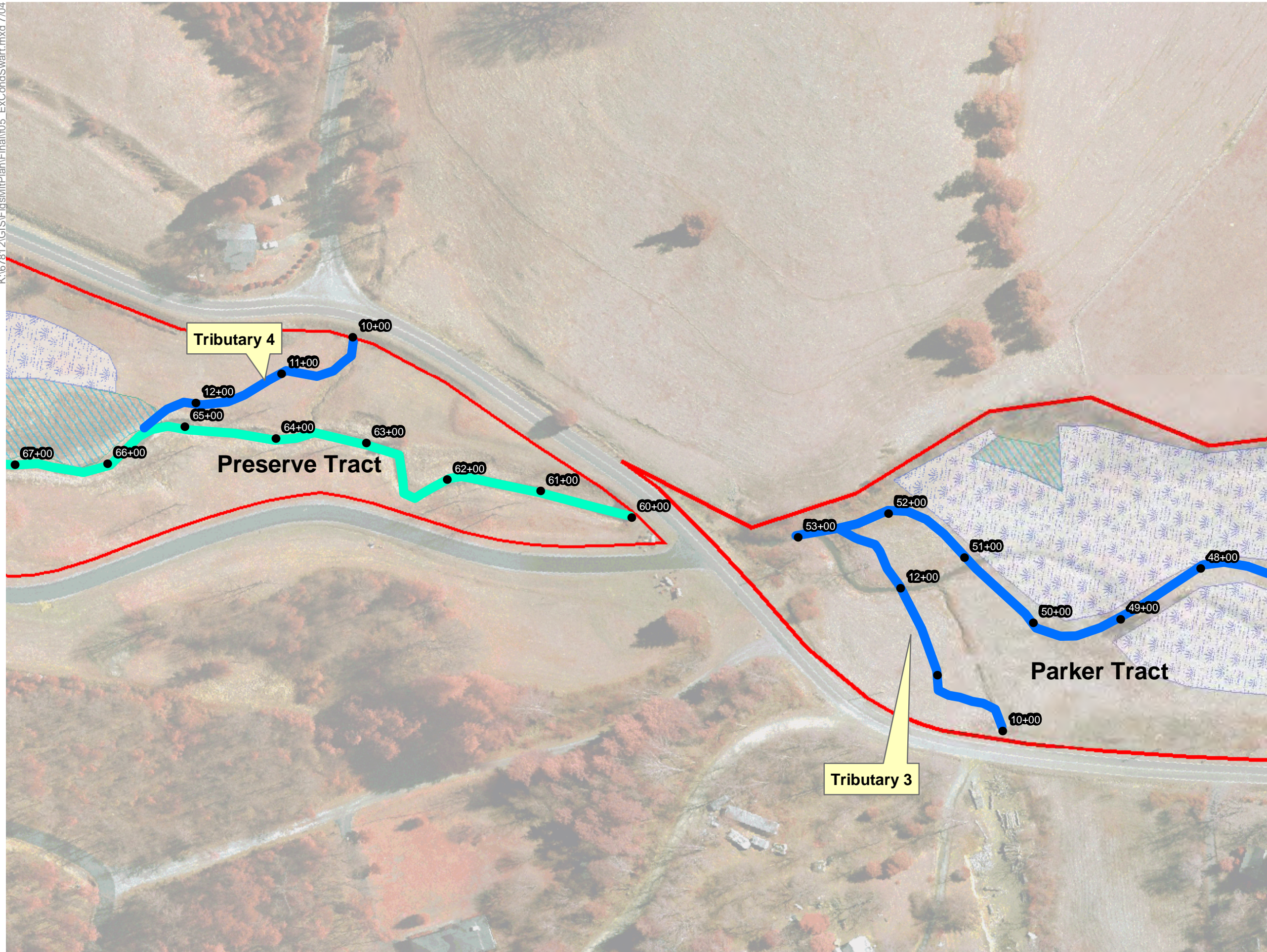


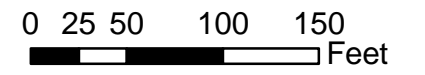
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CAT CREEK ASSETS

Baseline Monitoring Report
Cat Creek Stream and Wetland
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Macon County, North Carolina



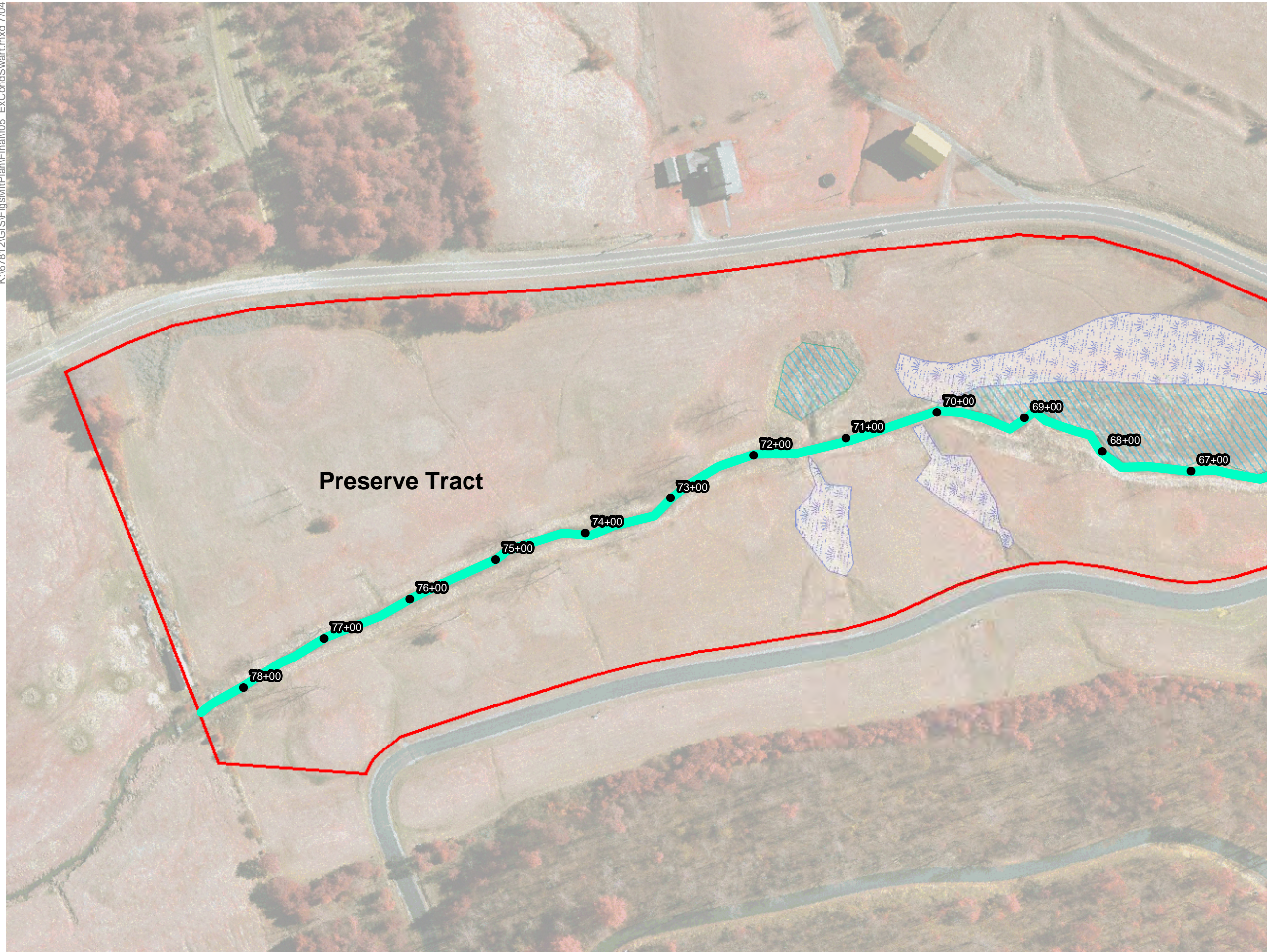
Legend

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 - Enhancement 2



**Figure 2
CAT CREEK ASSETS**

Baseline Monitoring Report
Cat Creek Stream and Wetland
Restoration Site (EEP #71)
Macon County, North Carolina



Legend

- Property Line
- Conservation Easement
- Environmentally Sensitive Area
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 - Wetland Enhancement
 - Wetland Restoration
- Stream Mitigation
 - Restoration
 - Enhancement 1
 - Enhancement 2

0 25 50 100 150 Feet



Figure 2
CAT CREEK ASSETS

Baseline Monitoring Report
Cat Creek Stream and Wetland
Restoration Site (EEP #71)
Macon County, North Carolina

Table 1a. Project Components
Cat Creek Stream and Wetland Restoration - EEP # 71 SCO # 050657901

Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Buffer Acres	BMP Elements	Comment
Cat Creek - Upper Swartwout	900 feet	E2		900 feet	10+00 - 19+00	10.6		Livestock exclusion, buffer plantings, bank stabilization in 3 locations
Cat Creek - Lower Swartwout	770 feet	R	P1	926 feet	19+00 - 28+26			
UT 1	363 feet	R	P1	457 feet	10+00 - 14+57			
Swartwout wetlands		R		1.11 acres				
		E		0.51 acres				Livestock exclusion, removal of drain pipe, plantings
UT 1	100 feet	E2		100 feet	NA			Livestock exclusion, buffer plantings
Cat Creek - Upper Waldroup	1463 feet	E2		1463 feet	NA	2.07	Equipment crossing and watering stations	Livestock exclusion, buffer plantings
Cat Creek - Lower Waldroup	480 feet	E1		480 feet	30+00 - 34+80		Cattle crossing and watering stations	Livestock exclusion, buffer plantings, and structures to provide enhanced profile
Cat Creek - Parker	1750 feet	R	P1	1820 feet	34+80 - 53+00	13		
UT 2	210 feet	R	P1	374 feet	10+00 - 13+74			
UT 3	165 feet	R	P1	287 feet	10+00 - 12+87			
Parker wetlands		R		4.73 acres				
		E		0.25 acres				
Cat Creek Preserve	1765 feet	E1		1852 feet	60+00 - 78+52	13.9		Grade control, turbulent riffles to add habitat, buffer plantings, and invasive species management
UT 4	110 feet	R	P1	230 feet	10+00 - 12+30			
Preserve wetlands		R		0.71 acres				
		E		0.66 acres				

**Table 1b. Component Summations
Cat Creek Stream and Wetland Restoration - EEP # 71 (SCO # 050657901)**

Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	4,094	6.55					
Enhancement		1.42			31		
Enhancement I	2,332						
Enhancement II	2,463						
Creation							
Preservation							
HQ Preservation							
		7.97	0				
Totals	8889	7.97		0	31	0	Count

 Non-Applicable

**Table 2. Project Activity and Reporting History
Cat Creek Stream and Wetland Restoration - EEP # 71 (SCO # 050657901)**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Mitigation Plan	Sep-07	Jul-07
Final Design – Construction Plans	Jul-08	Jul-08
Construction	NA	May-10
Temporary S&E mix applied to entire project area	NA	Jan-10
Permanent seed mix applied to entire project area	NA	Jan-10
Containerized and B&B plantings for entire project	NA	Mar-10
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	Jun-10	Mar-11
Year 1 Monitoring	Dec-10	-
Year 2 Monitoring	Dec-11	-
Year 3 Monitoring	Dec-12	-
Year 4 Monitoring	Dec-13	-
Year 5 Monitoring	Dec-14	-

**Table 3. Project Contacts Table
Cat Creek Stream and Wetland Restoration - EEP # 71 (SCO # 050657901)**

Designer	AECOM 701 Corporate Center Drive, Suite 475 Raleigh, NC 27607 Phone: (919) 854-6200	
Construction Contractor	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611	
Survey Contractor	Turner Land Surveying 3201 Glenridge Drive Raleigh, NC 27604	
Planting Contractor	Bruton Natural Systems, Inc. Charlie Bruton PO Box 1197 Fremont, NC 27830 (919) 242-6555 Office	
Seeding Contractor	Fluvial Solutions	
Seed Mix Sources	Mellow Marsh Farm, Inc. 1312 Woody Store Rd. Siler City, NC 27344 Phone: (919) 742-1200	
Nursery Stock Suppliers	Various	
Monitoring Performers Year 1 only	AECOM 701 Corporate Center Drive, Suite 475 Raleigh, NC 27607	
Stream Monitoring	AECOM	Phone: (919) 854-6200
Vegetation Monitoring	AECOM	Phone: (919) 854-6200

**Table 4. Project Attribute Table
Cat Creek Stream and Wetland Restoration - EEP # 71 (SCO # 050657901)**

Project County	Macon County				
Physiographic Region	Mountains				
Ecoregion	Blue Ridge Mountains - Broad Basins				
Project River Basin	Little Tennessee River				
USGS HUC for Project (14 digit)	6010202040010				
NCDWQ Sub-basin for Project	04-04-01				
Within extent of EEP Watershed Plan?	Yes -Franklin to Fontana Local Watershed Plan				
WRC Hab Class (Warm, Cool, Cold)	Cool				
% of project easement fenced or demarcated	100%				
Beaver activity observed during design phase?	Yes				
Restoration Component Attribute Table					
	Cat Creek	Trib 1	Trib 2	Trib 3	Trib 4
Drainage area (square miles)	3.6	0.9	0.5	0.2	0.2
Stream order	3rd	2nd	2nd	1st	1st
Restored length (feet)	7,741	475	374	287	230
Perennial or Intermittent	Perennial	Perennial	Perennial	Perennial	Perennial
Watershed type (Rural, Urban, Developing etc.)	Rural	Rural	Rural	Rural	Rural
Watershed LULC Distribution (e.g.)					
Urban	0%	0%	0%	0%	0%
Ag-Pasture	30%	30%	50%	10%	80%
Forested	70%	70%	50%	90%	20%
Watershed impervious cover (%)	1%	1%	1%	1%	1%
NCDWQ AU/Index number					
NCDWQ classification	C	C	C	C	C
303d listed?	No	No	No	No	No
Upstream of a 303d listed segment?	No	No	No	No	No
Reasons for 303d listing or stressor	N/A	N/A	N/A	N/A	N/A
Total acreage of easement	39.6	Included in Cat Creek acreage			
Total vegetated acreage within the easement	39.6	Included in Cat Creek acreage			
Total planted acreage as part of the restoration	20	Included in Cat Creek acreage			
Rosgen classification of pre-existing	G4	Cb4	N/A	N/A	N/A
Rosgen classification of As-built	C4	C4	C	C	Cb
Valley type	VII	VII	VII	VII	VII
Valley slope	0.0062 - 0.015	0.023	0.013	0.013	0.048
Valley side slope range (e.g. 2-3.%)	15 - 30%	15 - 30%	15 - 30%	15 - 30%	15 - 30%
Valley toe slope range (e.g. 2-3.%)	2 - 3 %	2 - 3 %	2 - 3 %	2 - 3 %	2 - 3 %
Cowardin classification					
Trout waters designation	N/A	N/A	N/A	N/A	N/A
Species of concern, endangered etc.? (Y/N)	No	No	No	No	No
Dominant soil series and characteristics					
Series	Nikwasi	Reddies	Nikwasi	Nikwasi	Udorthents
Depth	> 60 inches	> 60 inches	> 60 inches	> 60 inches	> 60 inches
Clay%	5 - 18%	1 - 18%	5 - 18%	5 - 18%	N/A
K	.05 - .20	.05 - .20	.05 - .20	.05 - .20	N/A
T	3	3	3	3	N/A

APPENDIX B

Morphological Summary Data and Plots

Tables 5 - 6
Longitudinal Plots
XS-Plots
Pebble Count Plots

**Exhibit Table 5. Baseline Stream Data Summary
Cat Creek Stream and Wetland Restoration - EEP # 71 (SCO # 050657901)**

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition			Reference Reach			Design Cat Creek (Swartwout)			Design Tributary 1			Design Cat Creek (Parker)			Design (Trib 2)			Design (Trib 3)			Design (Trib 4)		
		LL	UL	Eq.	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Dimension and Substrate - Riffle																												
Bankfull Width (ft)	NA				17.5	22.9	19.7			26			16.2			15			21.5			13			10			9.1
Floodprone Width (ft)																												
Bankfull Mean Depth (ft)	NA				0.8	2.2	1.4			2.5			1.4			1.3			1.8			0.98			0.75			0.69
¹ Bankfull Max Depth (ft)	NA				2	3.8	2.8			NA			2			1.8			2.6			1.5			1.2			1.1
Bankfull Cross Sectional Area (ft ²)	NA				16.7	40.3	28.3			65			22.4			18.9			39			12.75			7.4			6.3
Width/Depth Ratio	NA				8.4	23.7	15.9			10.4			11.8			11.9			11.9			13.25			13.24			13.1
Entrenchment Ratio	NA				1.6	6.9	4.3			5			>2.2			>2.2			>2.2			>2.2			>2.2			>2.2
¹ Bank Height Ratio	NA				1.3	1.5	1.4	NA	NA	NA			1			1			1			1			1			1
Profile																												
Riffle Length (ft)					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Riffle Slope (ft/ft)					0.006	0.03	0.016	0.009	0.01	0.01	0.011	0.02	0.017	0.011	0.021	0.018	0.005	0.009	0.007	0.007	0.014	0.012	0.01	0.019	0.016	0.01	0.019	0.016
Pool Length (ft)					5.68	46.69	23.7	53.9	158.1	90.5	29.7	50.2	43.3	27.45	46.5	40.05	39.4	66.7	57.4	23.8	40.3	34.7	18.1	30.7	26.4	16.7	28.2	24.3
Pool Max depth (ft)					NA	NA	NA	NA	NA	NA			3.1			2.8			4			2			2			1.7
Pool Spacing (ft)					25.4	108.9	59.5	NA	NA	158.12	110	134	126	102	124	117	147	178	167	89	108	101	67	82	77	62	75	71
Pattern																												
Channel Beltwidth (ft)					NA	NA	NA	71	118	91.3	30	78	51	28	72	47	40	104	68	24	63	41	18	48	31	17	44	29
Radius of Curvature (ft)					NA	NA	NA	23.6	73	48.3	24	58	34	22.8	54.3	135.2	32.7	77.8	45.6	20	47	26	15	36	21	14	33	19
Rc/Bankfull width (ft/ft)					NA	NA	NA			1.86			2.10			9.01			2.12			2.00			2.10			2.09
Meander Wavelength (ft)					NA	NA	NA	82	484	205	107	205	145	99	190	131	143	273	194	86	165	117	66	126	89	61	115	82
Meander Width Ratio					NA	NA	NA	2.73	4.54	3.51	1.86	4.83	3.15	1.86	4.83	3.15	6.65	12.69	9.01	1.86	4.83	3.15	1.86	4.83	3.15	1.86	4.83	3.15
Transport parameters																												
Reach Shear Stress (competency) lb/ft ²						NA																						
Max part size (mm) mobilized at bankfull						NA																						
Stream Power (transport capacity) W/m ²						NA																						
Additional Reach Parameters																												
Rosgen Classification						C4 - G4		C4		C4		Cb4		C4		C4		C4		C4		C4		C4		Cb4		
Bankfull Velocity (fps)						NA																						
Bankfull Discharge (cfs)						NA																						
Valley length (ft)						NA		142		690		490		1480		311		318		217								
Channel Thalweg length (ft)						NA		271		832		581		1809		374		342		244								
Sinuosity (ft)						1.01 - 1.06		1.9		1.2		1.2		1.2		1.2		1.1		1.1								
Water Surface Slope (Channel) (ft/ft)						0.0058 - 0.015		0.0097		0.0116		0.0125		0.0052		0.008		0.0114		0.0251								
BF slope (ft/ft)						NA		NA		NA		NA		NA		NA		NA		NA								
³ Bankfull Floodplain Area (acres)						NA		NA		NA		NA		NA		NA		NA		NA								
⁴ Proportion over wide (%)						NA		NA		NA		NA		NA		NA		NA		NA								
Channel Stability or Habitat Metric						NA		NA		NA		NA		NA		NA		NA		NA								
Biological or Other						NA		NA		NA		NA		NA		NA		NA		NA								

**Exhibit Table 5b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Cat Creek Stream and Wetland Restoration - EEP # 71 (SCO # 050657901)**

Parameter	Pre-Existing Condition						UT to Meadow Fork Creek											
¹ Ri% / Ru% / P% / G% / S%							40		60									
¹ SC% / Sa% / G% / C% / B% / Be%							8	12	67	13	0	0						
¹ d16 / d35 / d50 / d84 / d95 / di ^p / di ^{sp} (mm)							0.7	13.83	21.4	58.82	84.8							
² Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10										2-4.9								
³ Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0							<1.2											
BEHI VL% / L% / M% / H% / VH% / E%								100										
Parameter	Design						As-built/Baseline											
¹ Ri% / Ru% / P% / G% / S%																		
¹ SC% / Sa% / G% / C% / B% / Be%																		
¹ d16 / d35 / d50 / d84 / d95 / di ^p / di ^{sp} (mm)																		
² Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																		
³ Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																		
BEHI VL% / L% / M% / H% / VH% / E%																		

**NOT APPLICABLE
DUE TO CHANNELIZATION**

Exhibit Table 6. Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

Cat Creek/EEP # 71 (SCO # 050657901) Segment/Reach: Swartwout and Parker (2,746 feet)

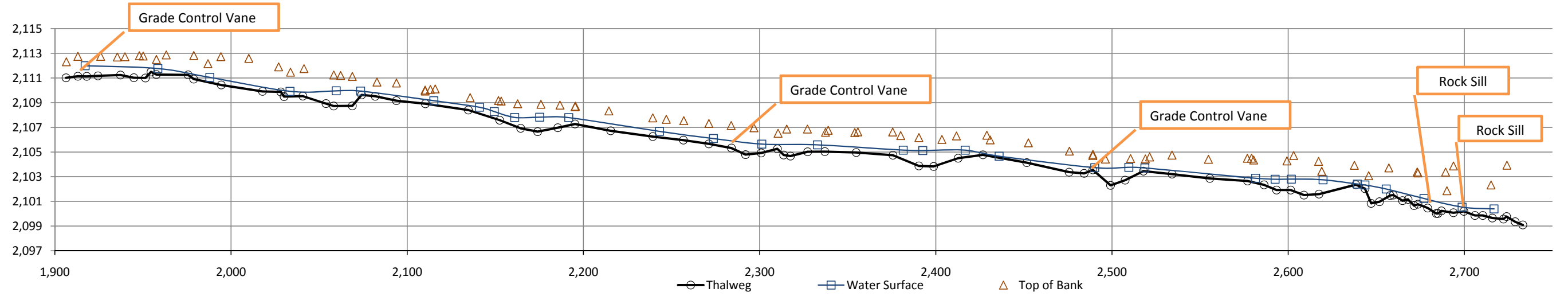
	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Pool)							Cross Section 5 (Riffle)						
Based on fixed baseline bankfull elevation¹	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	10.76							18.31							12.61							24.92							24.39						
Floodprone Width (ft)	45							60							45							80							180						
Bankfull Mean Depth (ft)	0.73							0.93							0.94							1.16							1.16						
Bankfull Max Depth (ft)	1.17							2.16							1.41							2.49							1.88						
Bankfull Cross Sectional Area (ft ²)	7.88							16.96							11.84							28.91							28.2						
Bankfull Width/Depth Ratio	14.74							19.69							13.41							21.48							21.3						
Bankfull Entrenchment Ratio	4.18							3.28							3.57							3.21							7.38						
Bankfull Bank Height Ratio																																			
Based on current/developing bankfull feature²																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft ²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft ²)																																			
d50 (mm)	0.5							0.21							0.3							0.36							0.46						
	Cross Section 6 (Pool)							Cross Section 7 (Riffle)							Cross Section 8 (Riffle)							Cross Section 9 (Pool)							Cross Section 10 (Riffle)						
Based on fixed baseline bankfull elevation¹	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+
Bankfull Width (ft)	28.41							22.45							18							15.71							20.58						
Floodprone Width (ft)	160							240							170							260							140						
Bankfull Mean Depth (ft)	1.69							1.47							1.24							1.63							1.48						
Bankfull Max Depth (ft)	3.25							2.57							1.99							2.92							2.35						
Bankfull Cross Sectional Area (ft ²)	47.93							33.04							22.25							25.65							30.4						
Bankfull Width/Depth Ratio	16.81							15.27							14.52							9.65							13.91						
Bankfull Entrenchment Ratio	5.63							10.69							9.44							16.55							6.80						
Bankfull Bank Height Ratio																																			
Based on current/developing bankfull feature²																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft ²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft ²)																																			
d50 (mm)	0.29							1.8							1.33							0.34							0.45						

Exhibit Table 6. Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

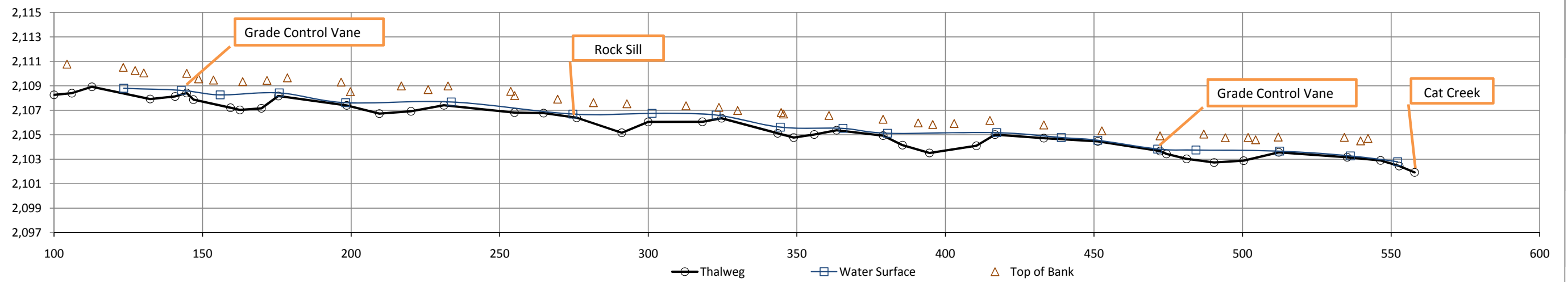
Cat Creek/EEP # 71 (SCO # 050657901) Segment/Reach: Parker and Preserve

	Cross Section 11 (Pool)							Trib 1 Cross Section 1 (Riffle)							Trib 1 Cross Section 2 (Pool)							Trib 2 Cross Section 1 (Pool)							Trib 2 Cross Section 2 (Riffle)						
Based on fixed baseline bankfull elevation¹	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+
Bankfull Width (ft)	23.59							16.58							16.58							23.51							12.41						
Floodprone Width (ft)	140							85							200							200							85						
Bankfull Mean Depth (ft)	1.4							0.79							0.077							0.9							0.89						
Bankfull Max Depth (ft)	2.75							1.56							2.24							2.22							1.51						
Bankfull Cross Sectional Area (ft ²)	32.97							13.07							12.09							21.06							10.98						
Bankfull Width/Depth Ratio	2.75							20.99							21.81							26.12							13.94						
Bankfull Entrenchment Ratio	5.93							5.13							12.06							8.51							6.85						
Bankfull Bank Height Ratio																																			
Based on current/developing bankfull feature²																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft ²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft ²)																																			
d50 (mm)	0.18							0.19							0.11							0.16							0.04						
	Trib 3 Cross Section 1 (Riffle)							Trib 3 Cross Section 2 (Pool)							Trib 4 Cross Section 1 (Pool)							Trib 4 Cross Section 2 (Riffle)													
Based on fixed baseline bankfull elevation¹	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+
Bankfull Width (ft)	11.43							13.76							11.33							8.73													
Floodprone Width (ft)	60							240							35							30													
Bankfull Mean Depth (ft)	0.86							0.86							1.31							0.83													
Bankfull Max Depth (ft)	1.36							1.53							3.04							1.61													
Bankfull Cross Sectional Area (ft ²)	9.8							11.83							14.82							7.24													
Bankfull Width/Depth Ratio	13.29							16							8.65							10.52													
Bankfull Entrenchment Ratio	5.25							17.44							3.09							3.44													
Bankfull Bank Height Ratio																																			
Based on current/developing bankfull feature²																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft ²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft ²)																																			
d50 (mm)	0.18							0.25							0.05							0.35													

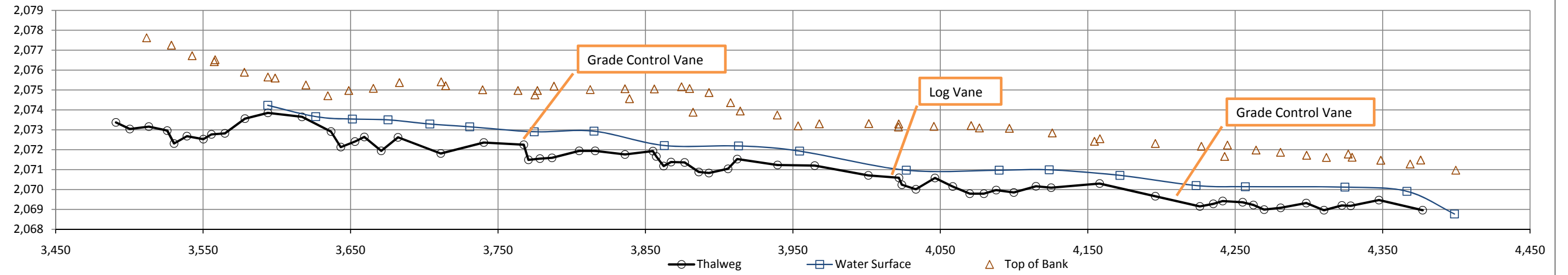
Cat Creek Longitudinal Profile - Swartwout Tract



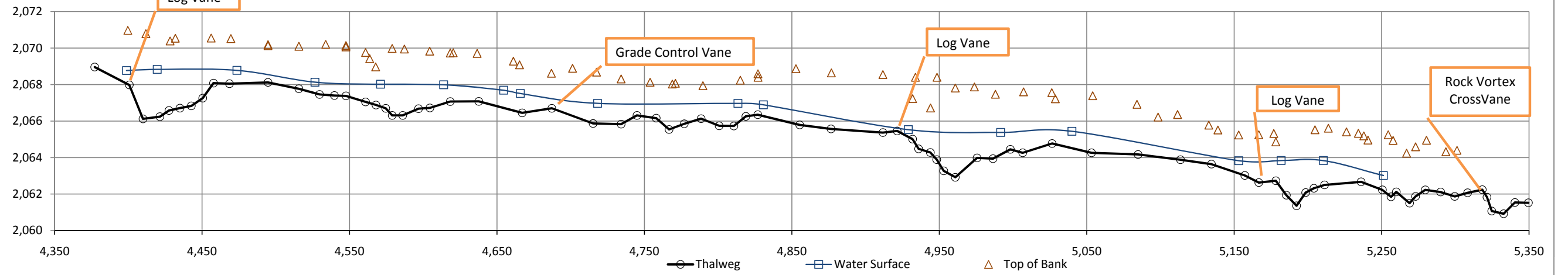
Trib 1 Longitudinal Profile - Swartwout Tract



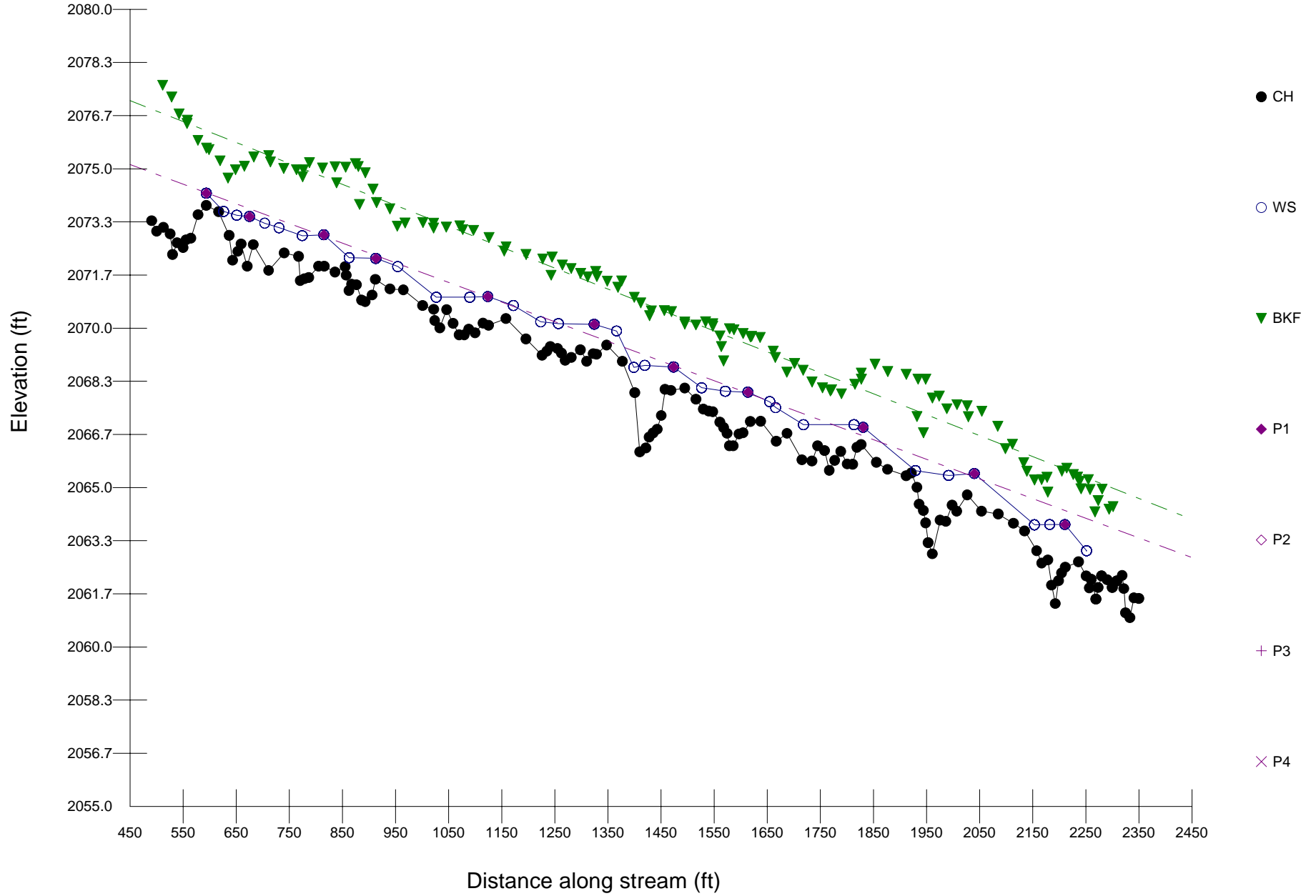
Cat Creek Longitudinal Profile - Parker Tract



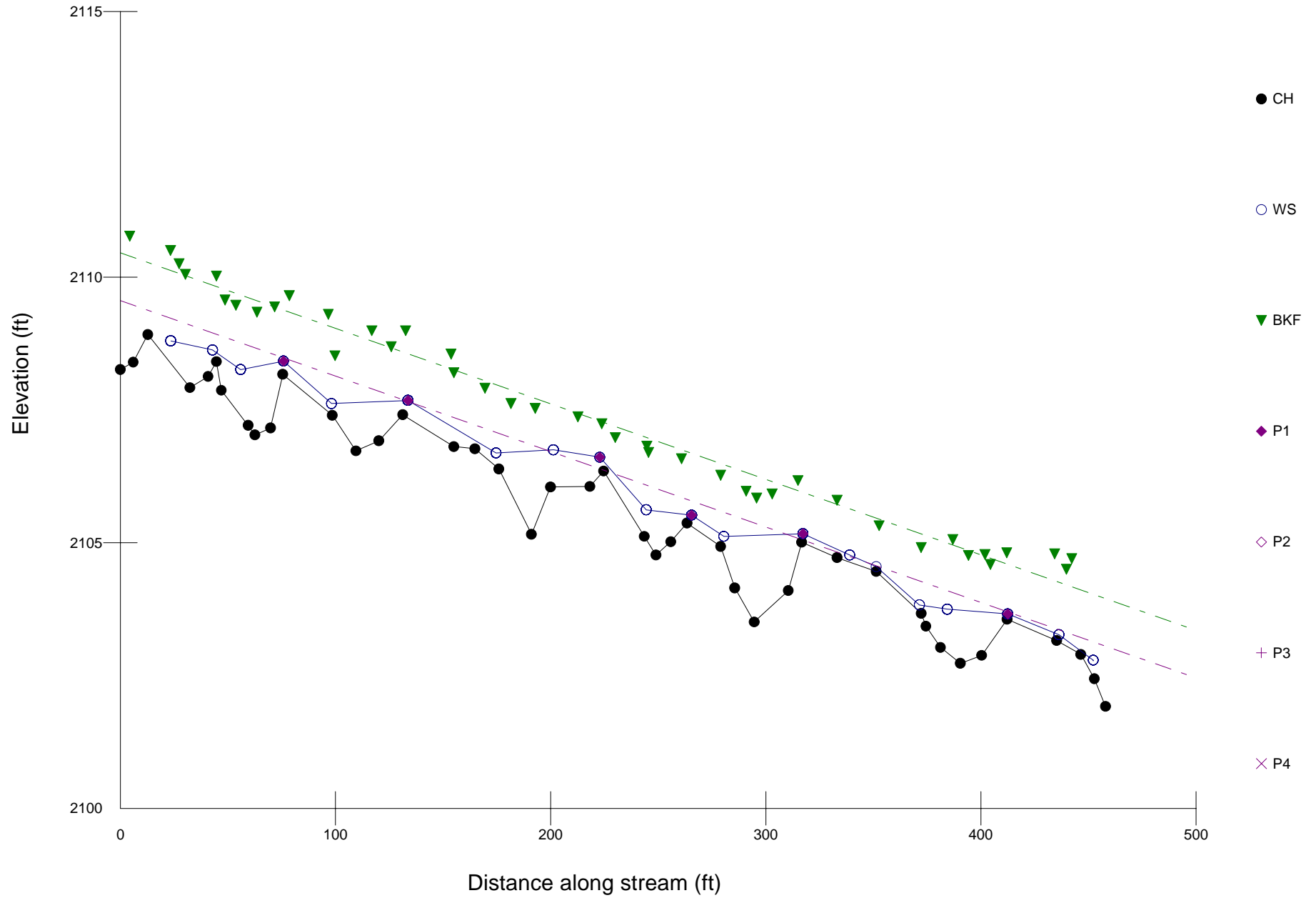
Cat Creek Longitudinal Profile - Parker Tract



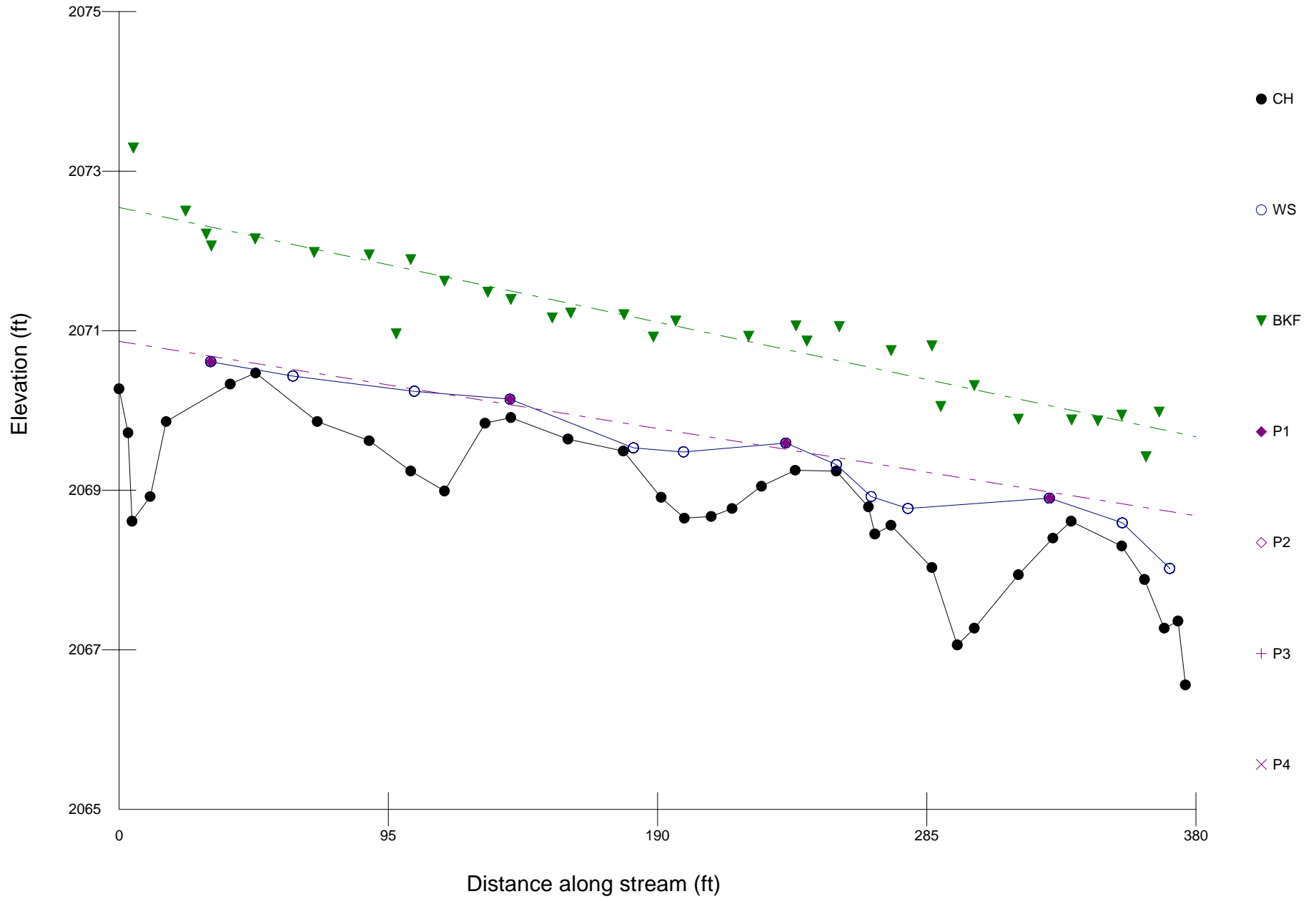
Parker Tract As-built



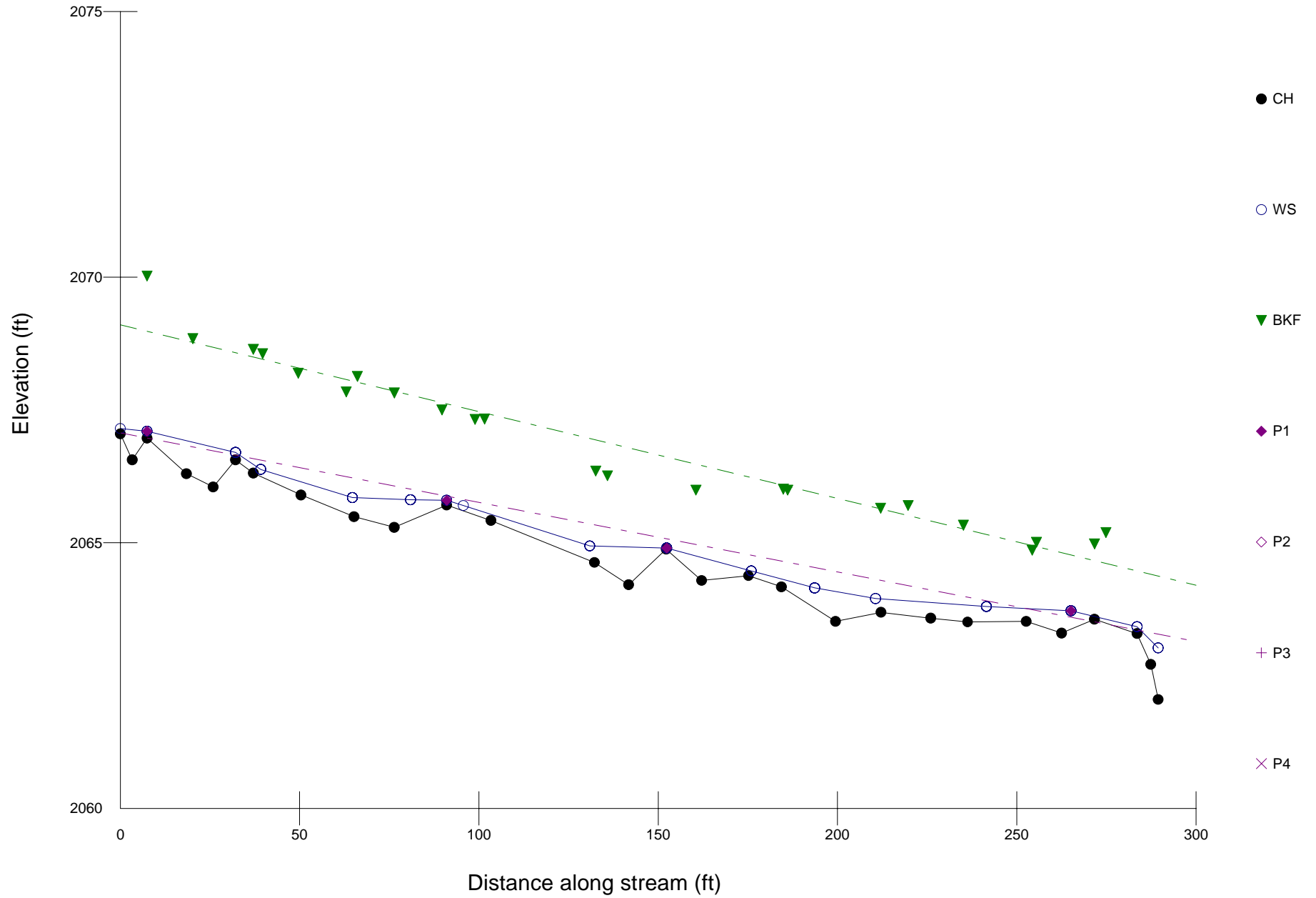
Trib 1 As-built



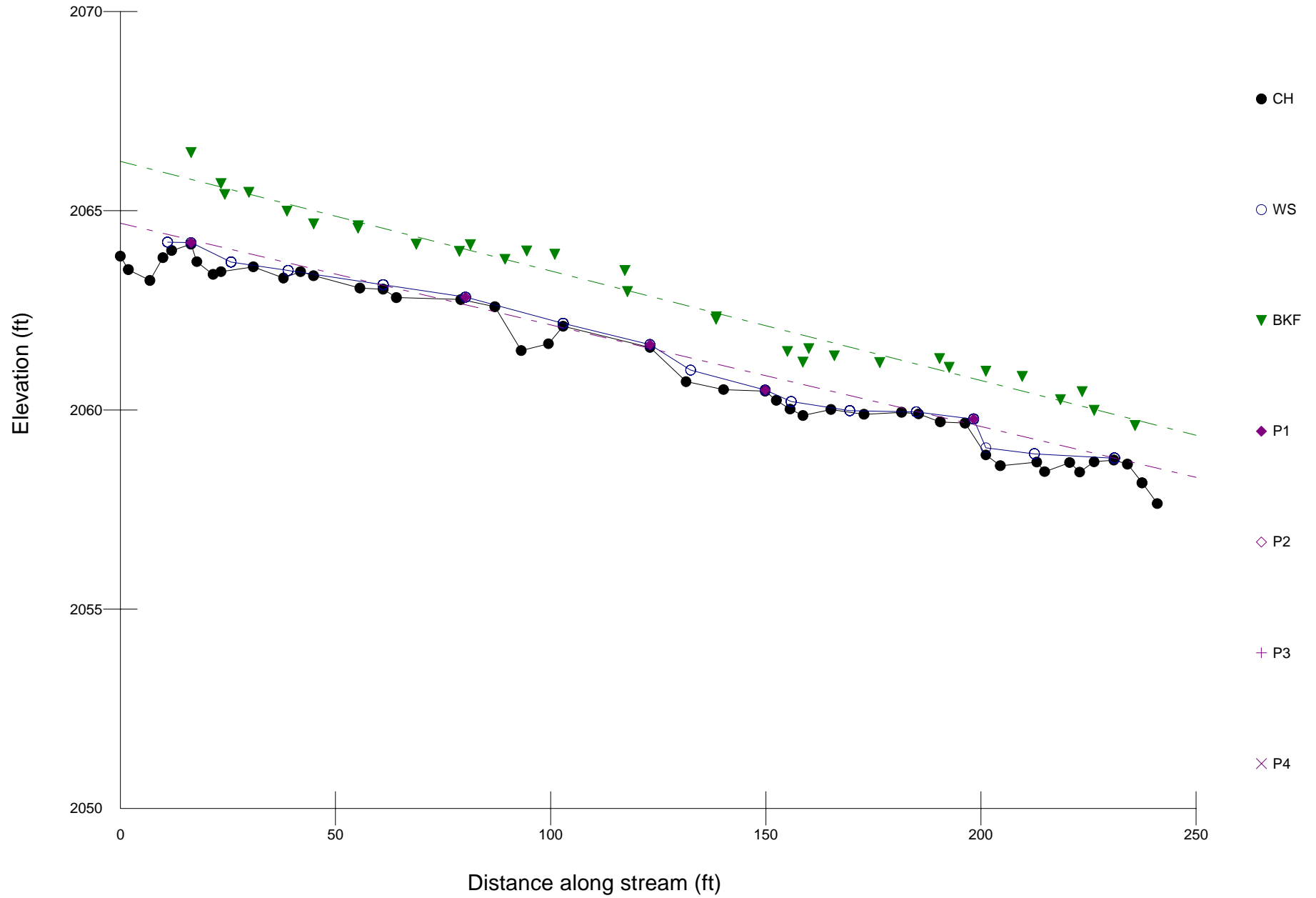
Trib 2 As-Built



Trib 3 As-built



Trib 4 As-built



X-Sec 1 Riffle

○ Ground Points

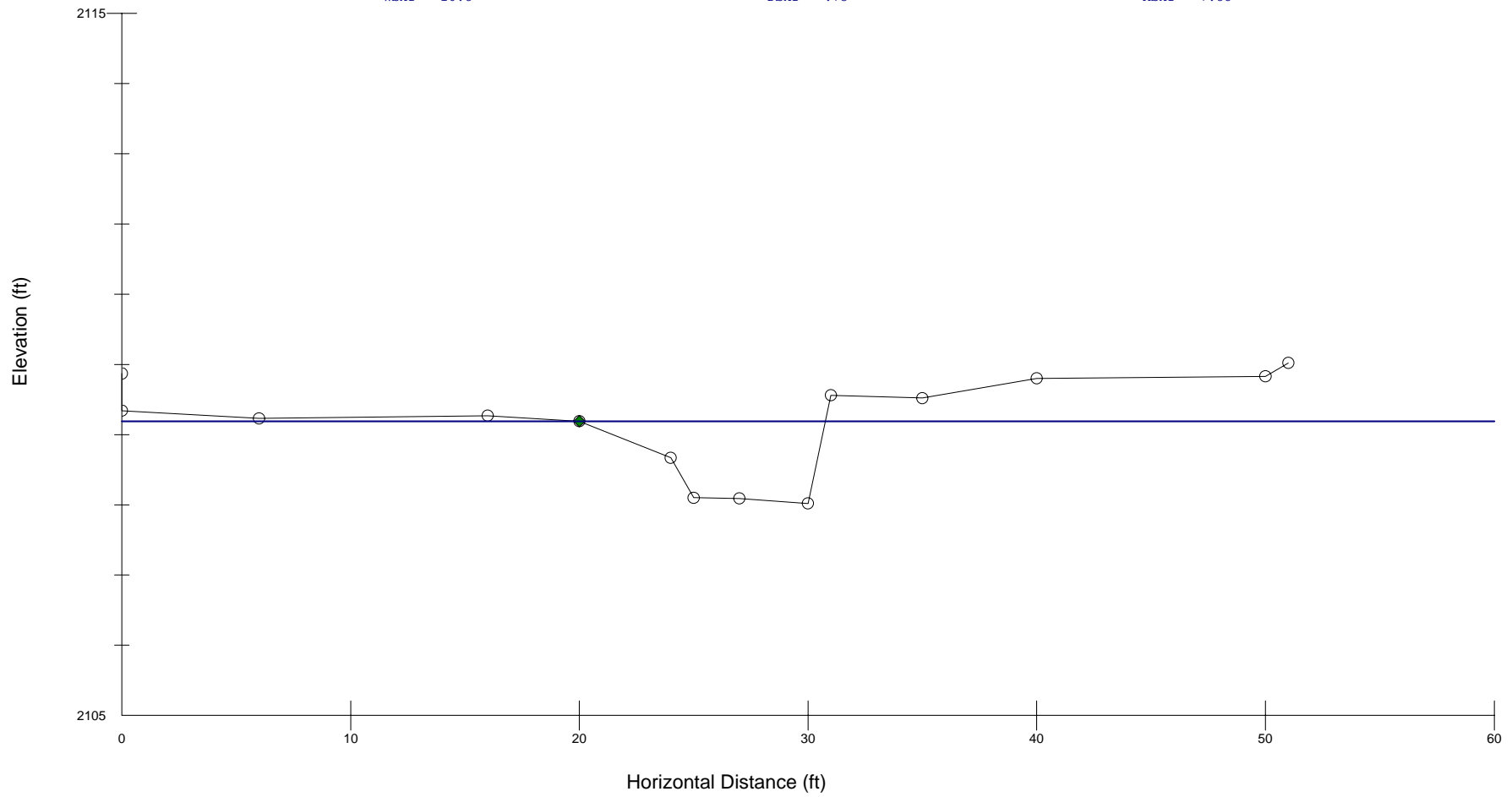
wbkf = 10.8

◆ Bankfull Indicators

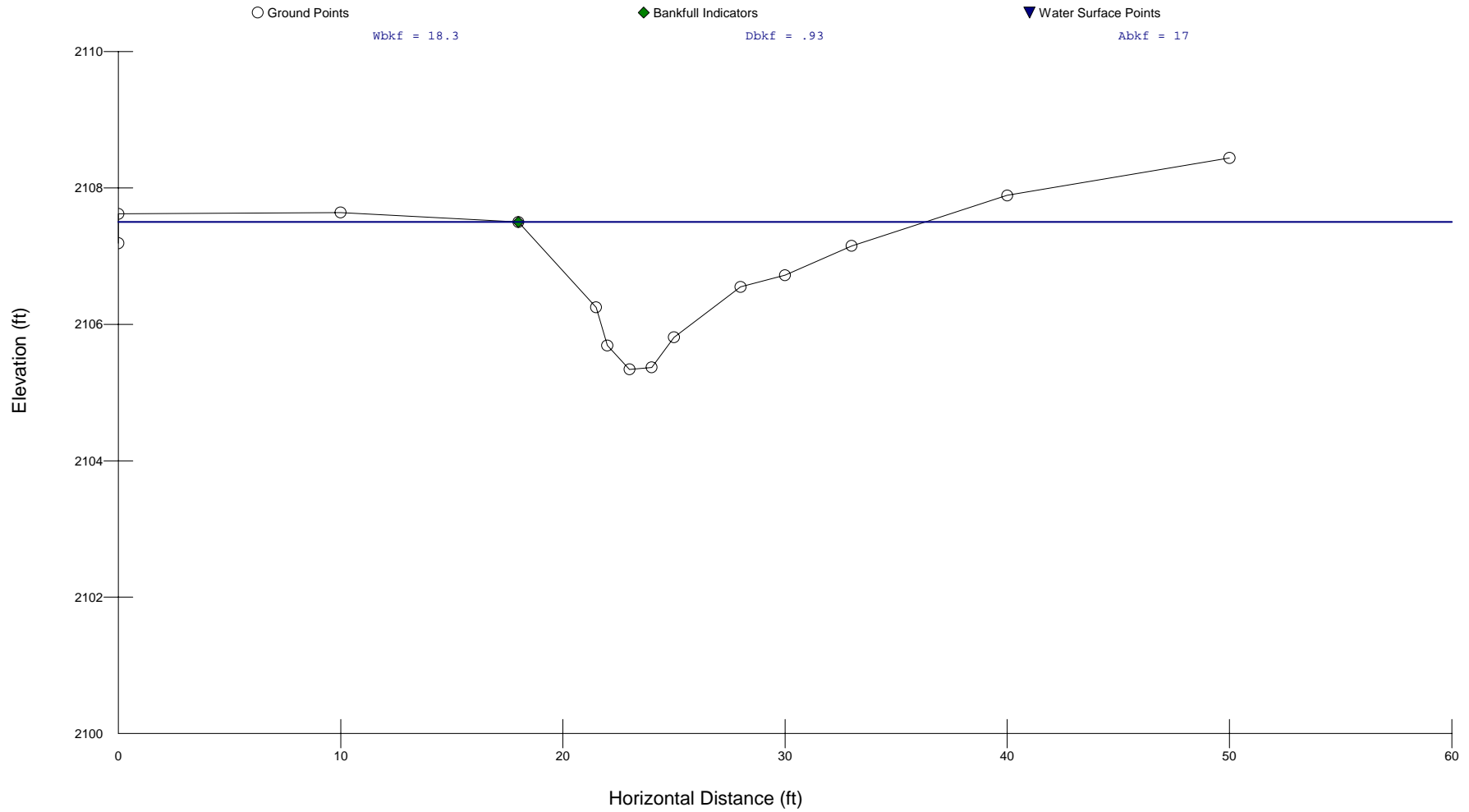
Dbkf = .73

▼ Water Surface Points

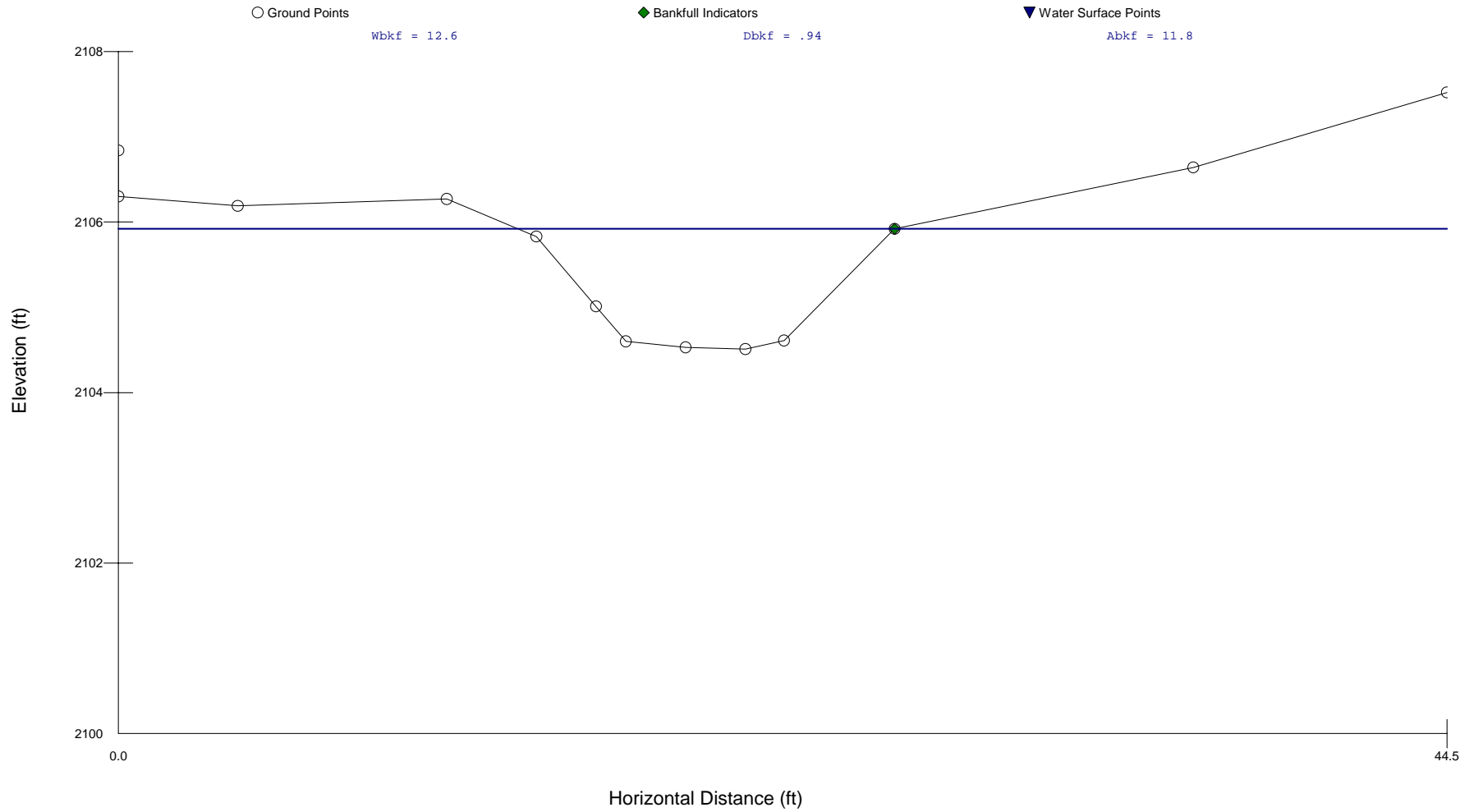
Abkf = 7.88



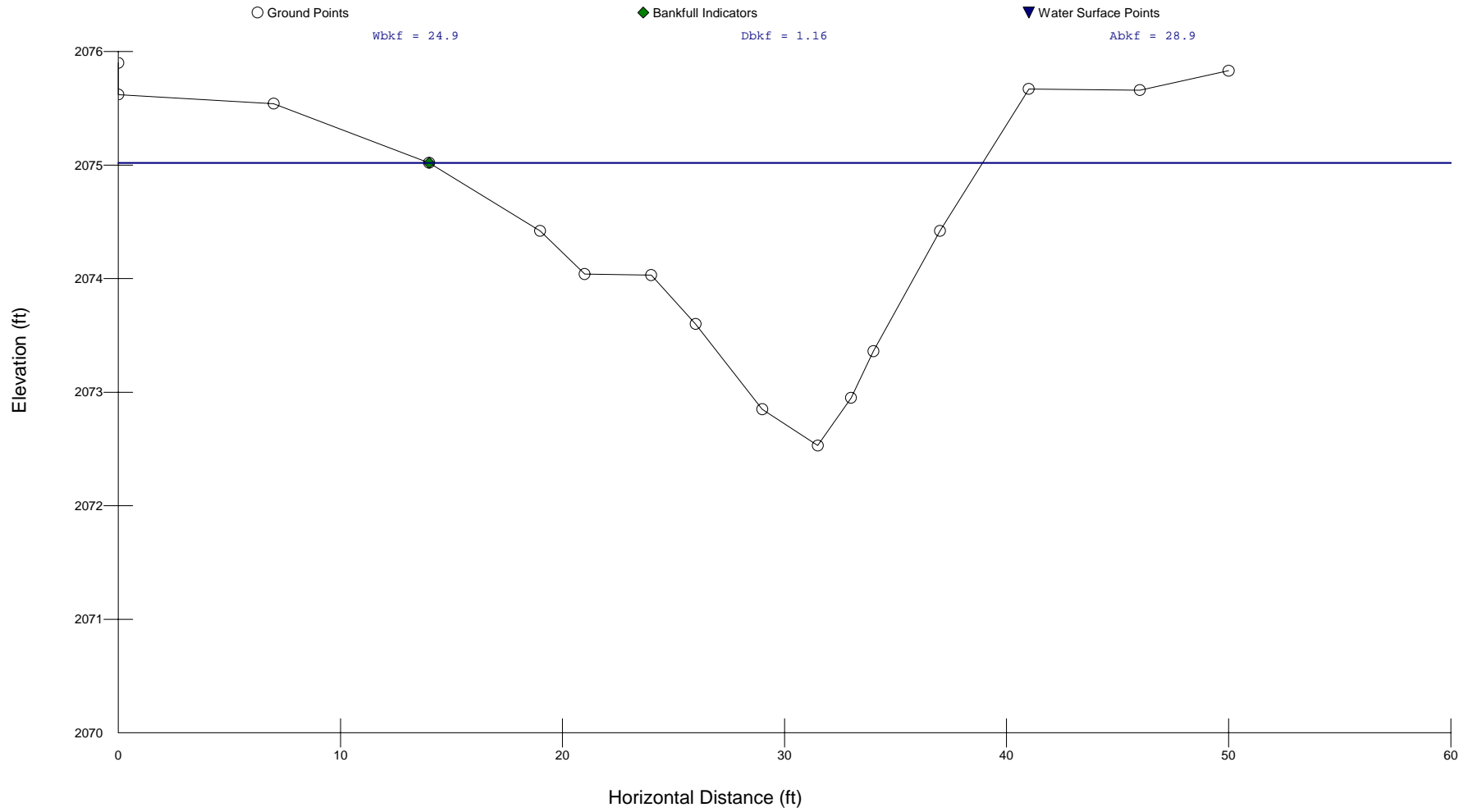
X-Sec 2 Pool



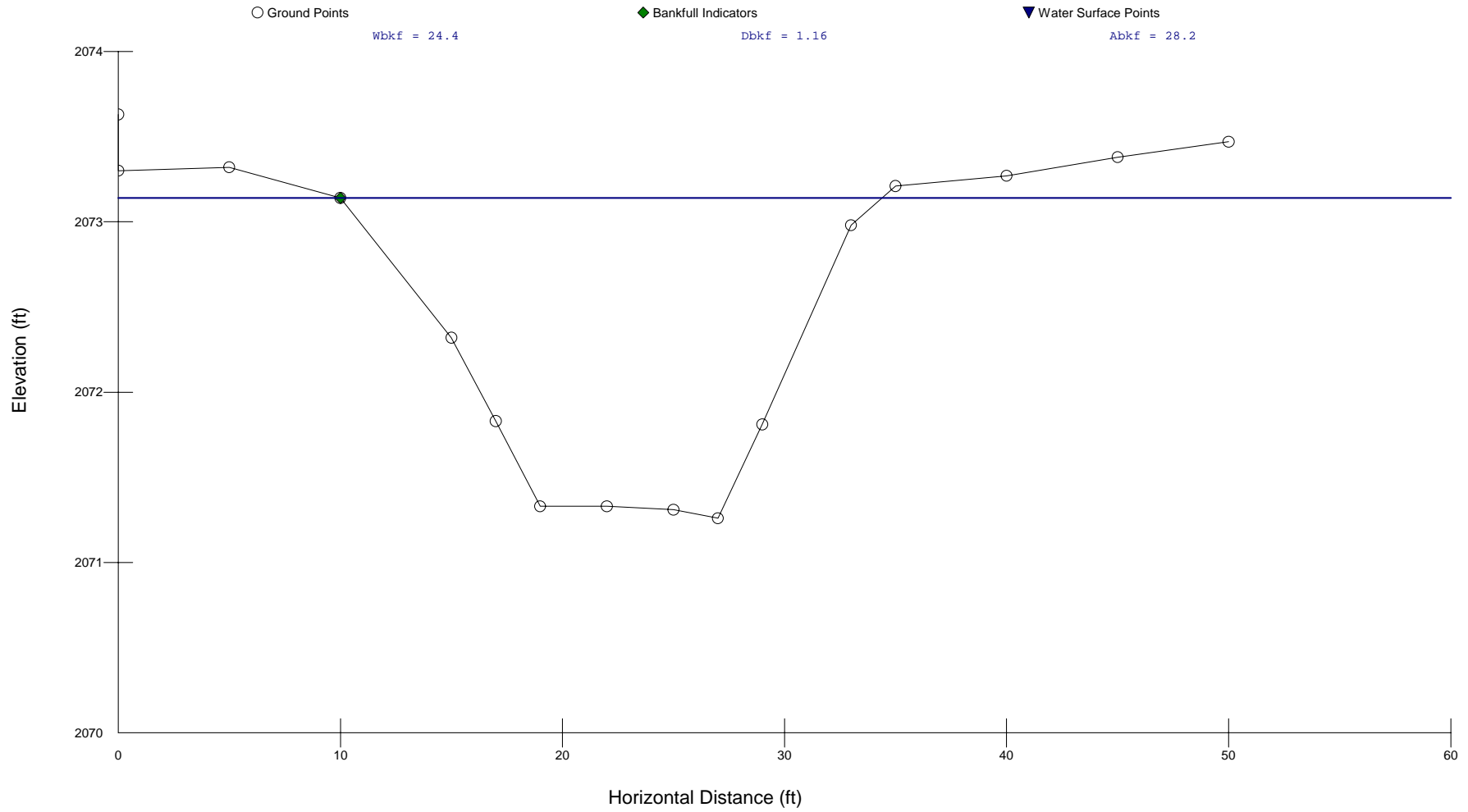
X-Sec 3 Riffle



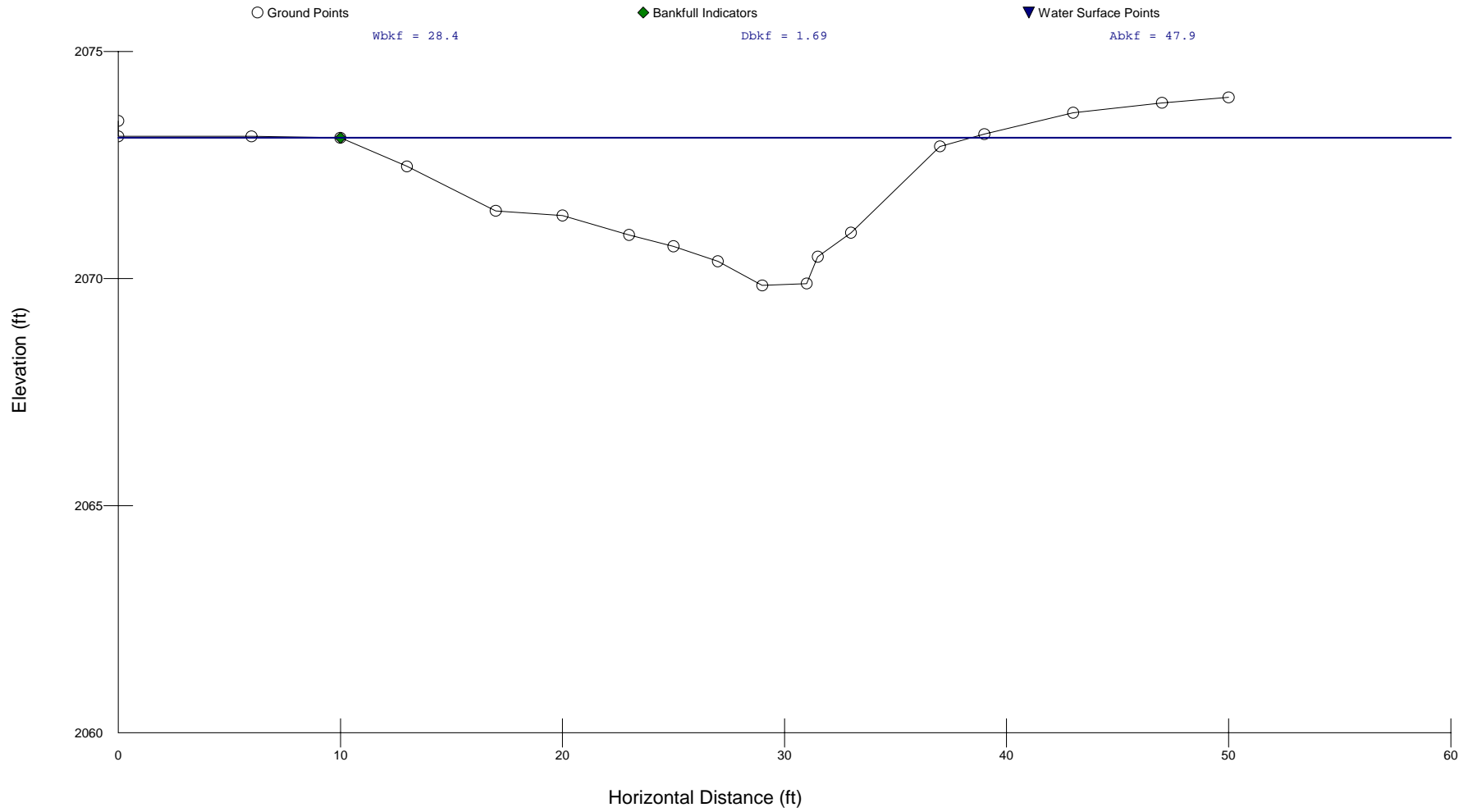
X-Sec 4 Pool



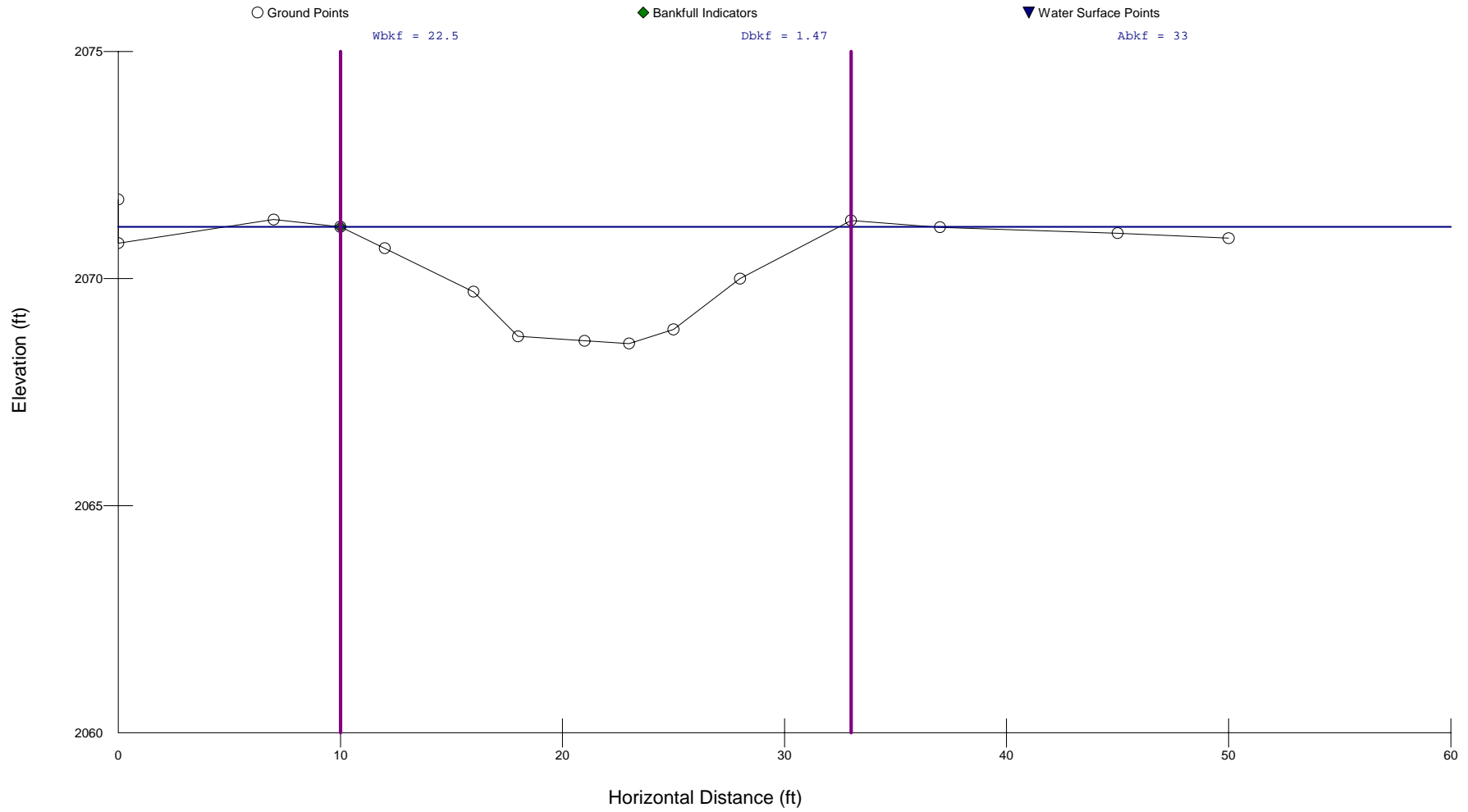
X-Sec 5 Riffle



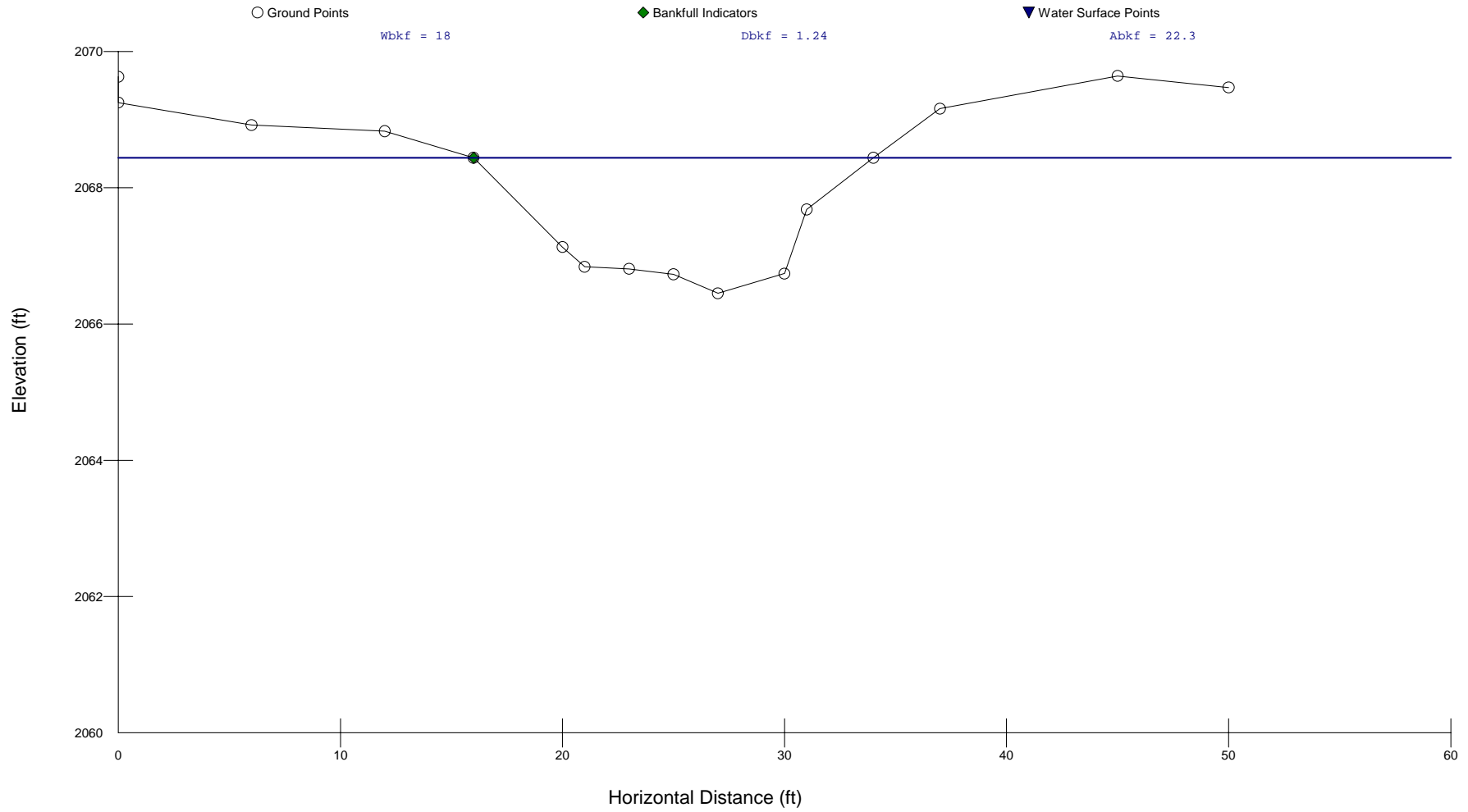
X-Sec 6 Pool



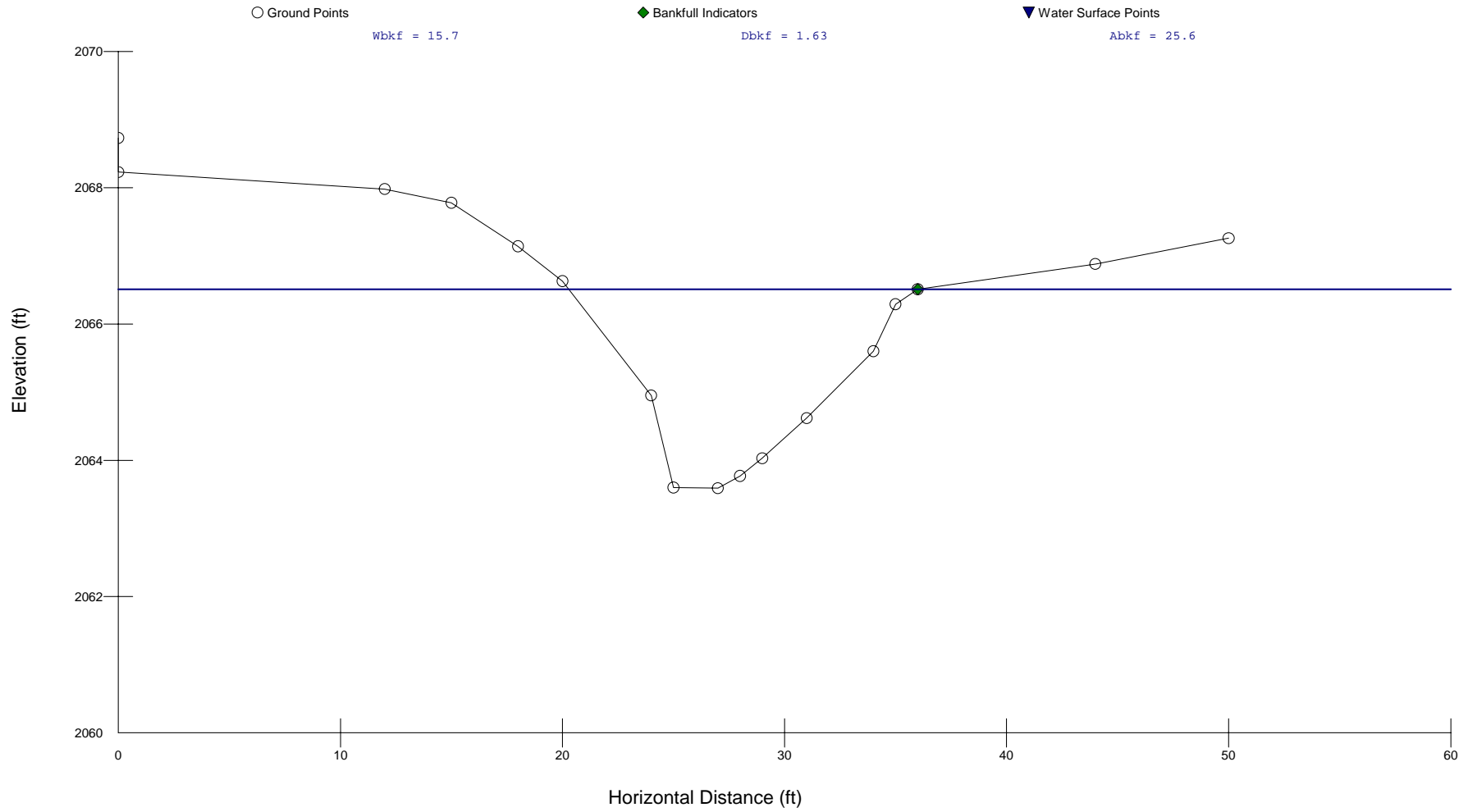
X-Sec 7 Riffle



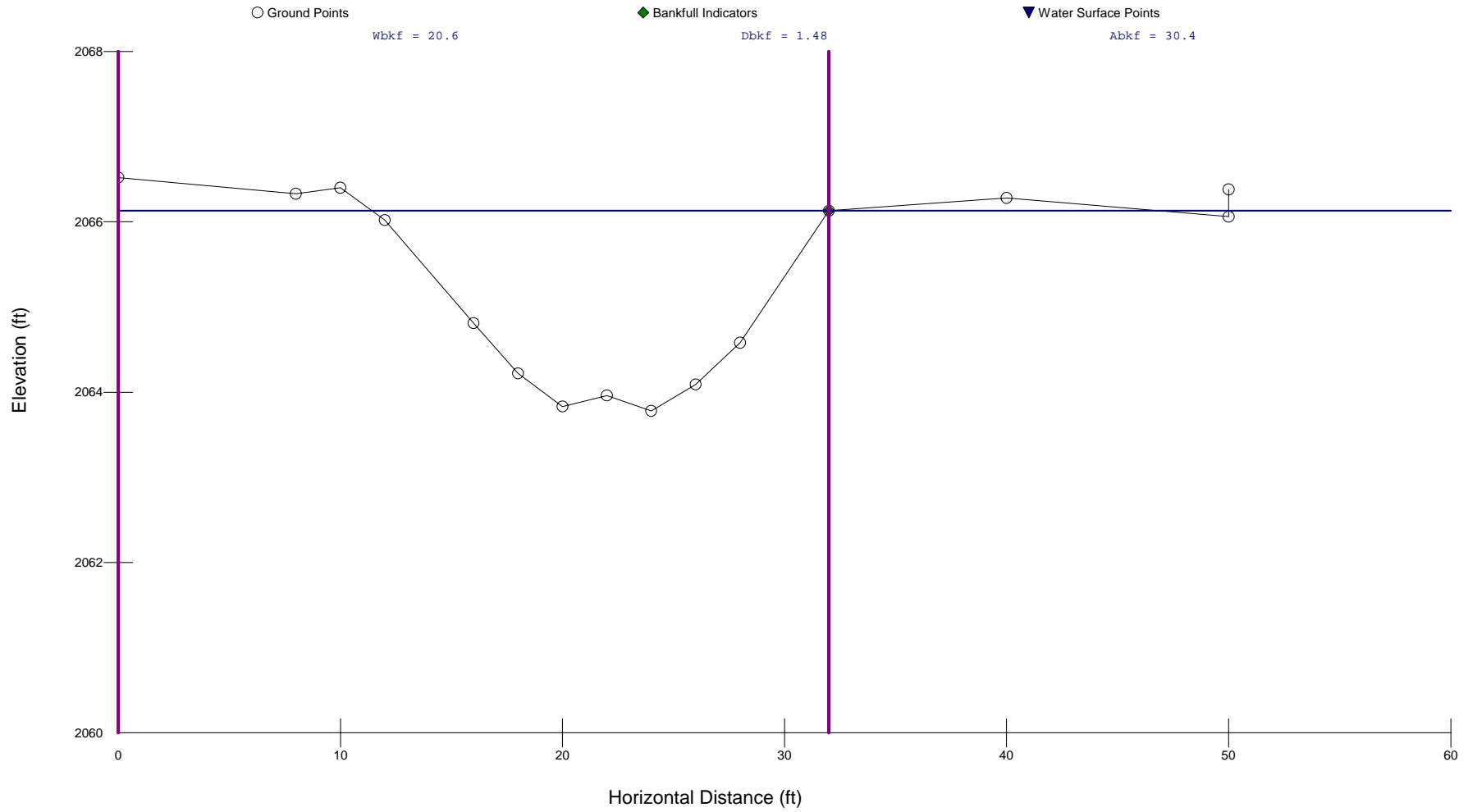
X-Sec 8 Riffle



X-Sec 9 Pool



X-Sec 10 Riffle



X-Sec 11 Pool

○ Ground Points

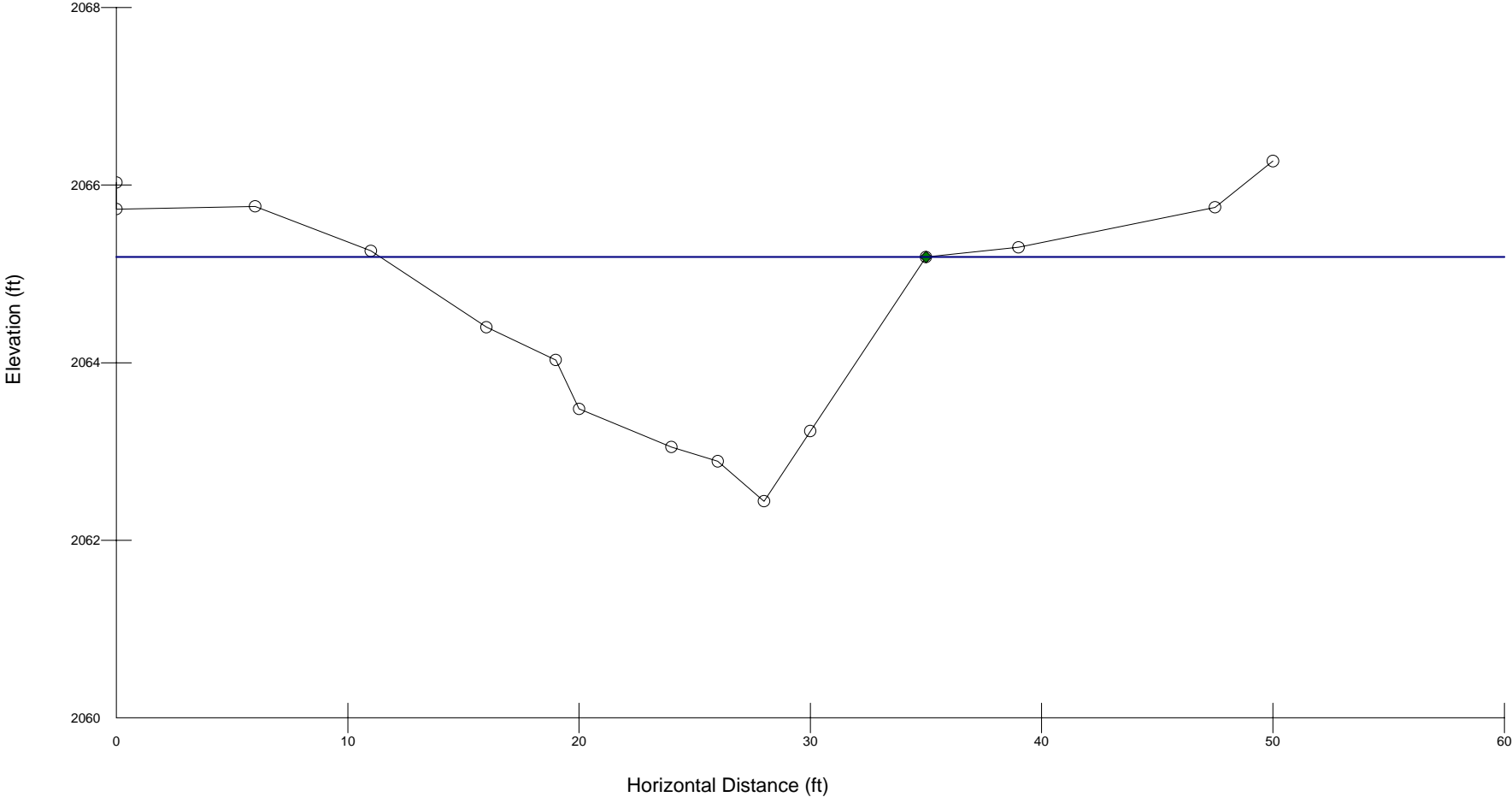
◆ Bankfull Indicators

▼ Water Surface Points

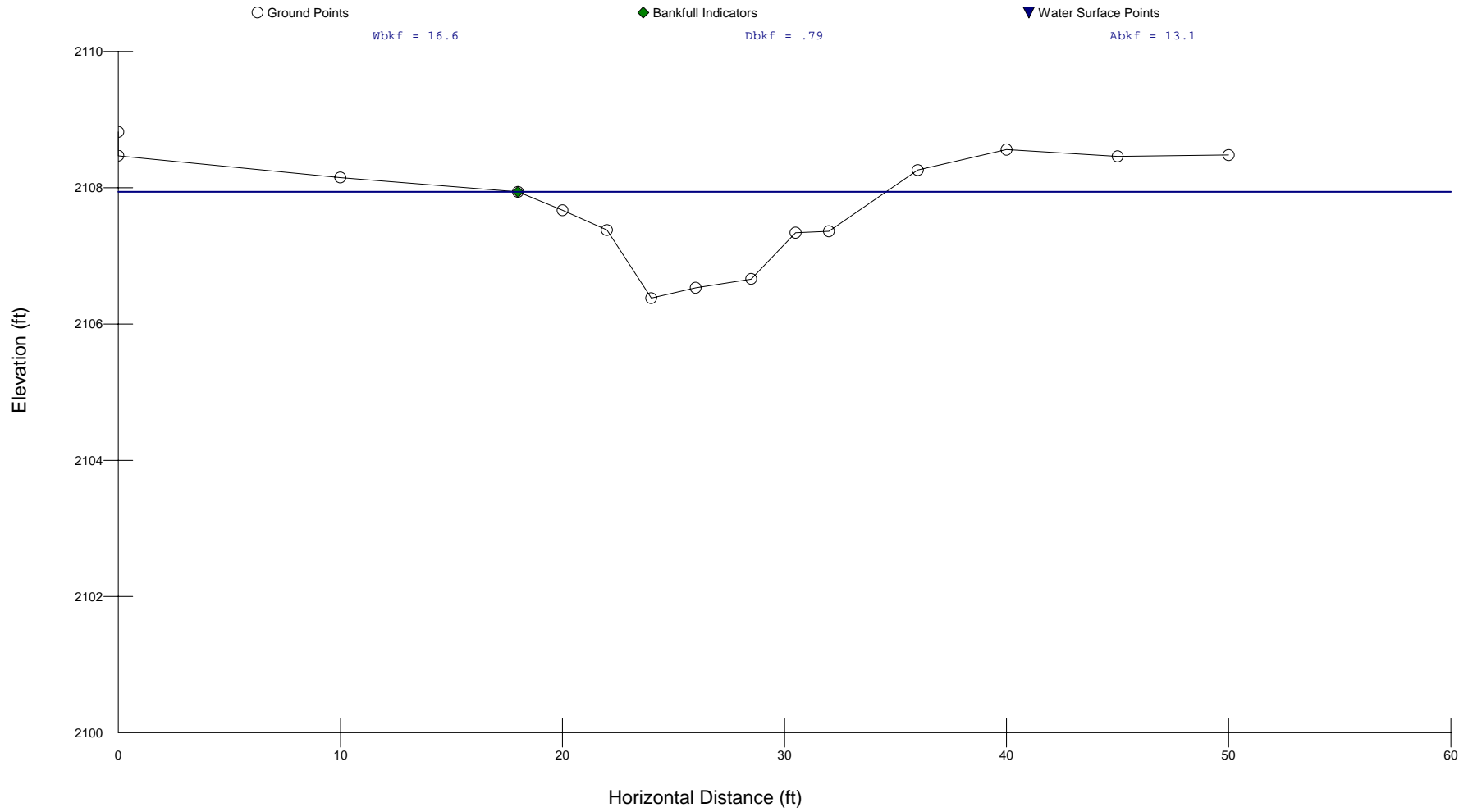
Wbkf = 23.6

Dbkf = 1.4

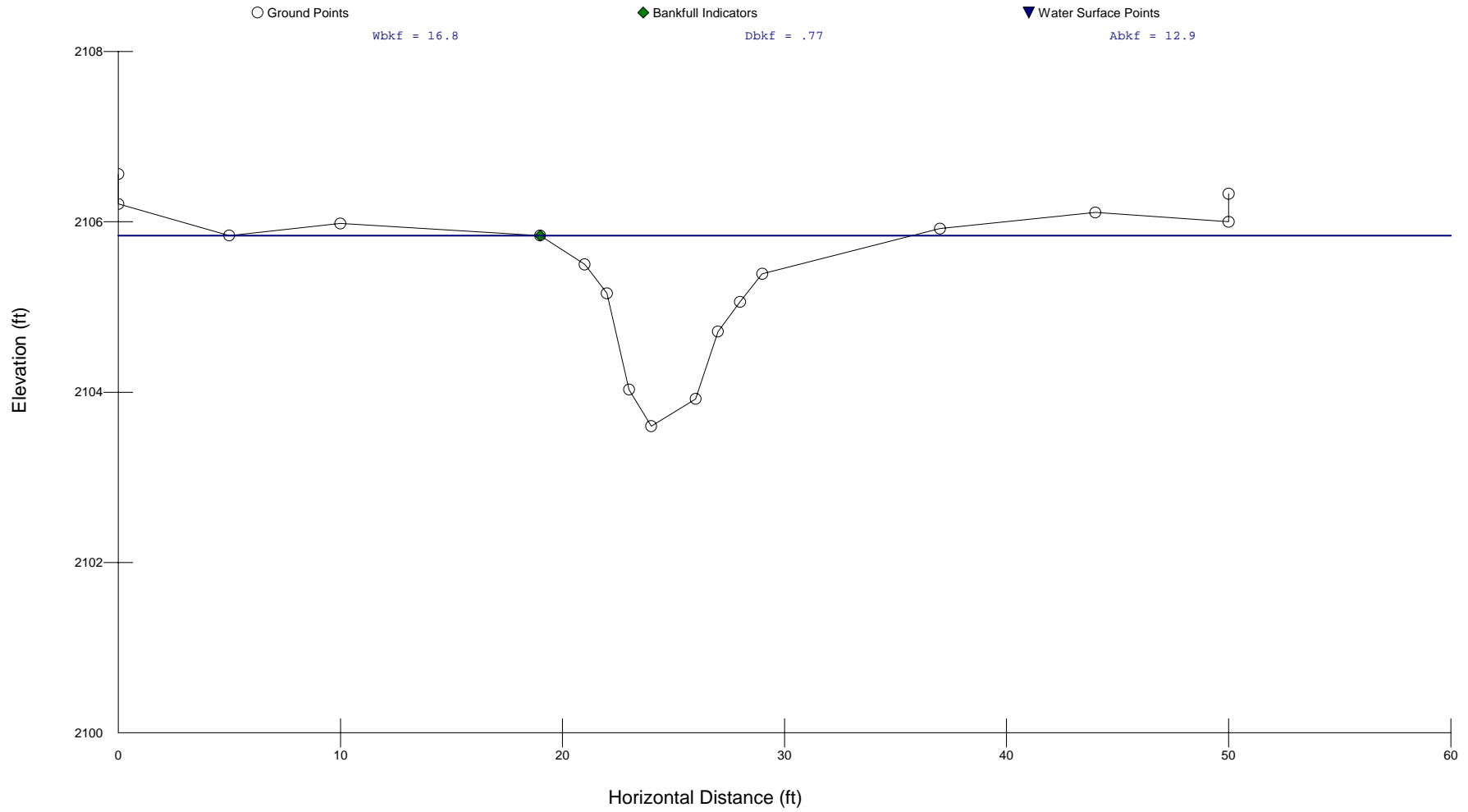
Abkf = 33



Trib 1 X-Sec 1 Riffle



X-Sec 2 Pool



Trib 2 X-Sec 1 Pool

○ Ground Points

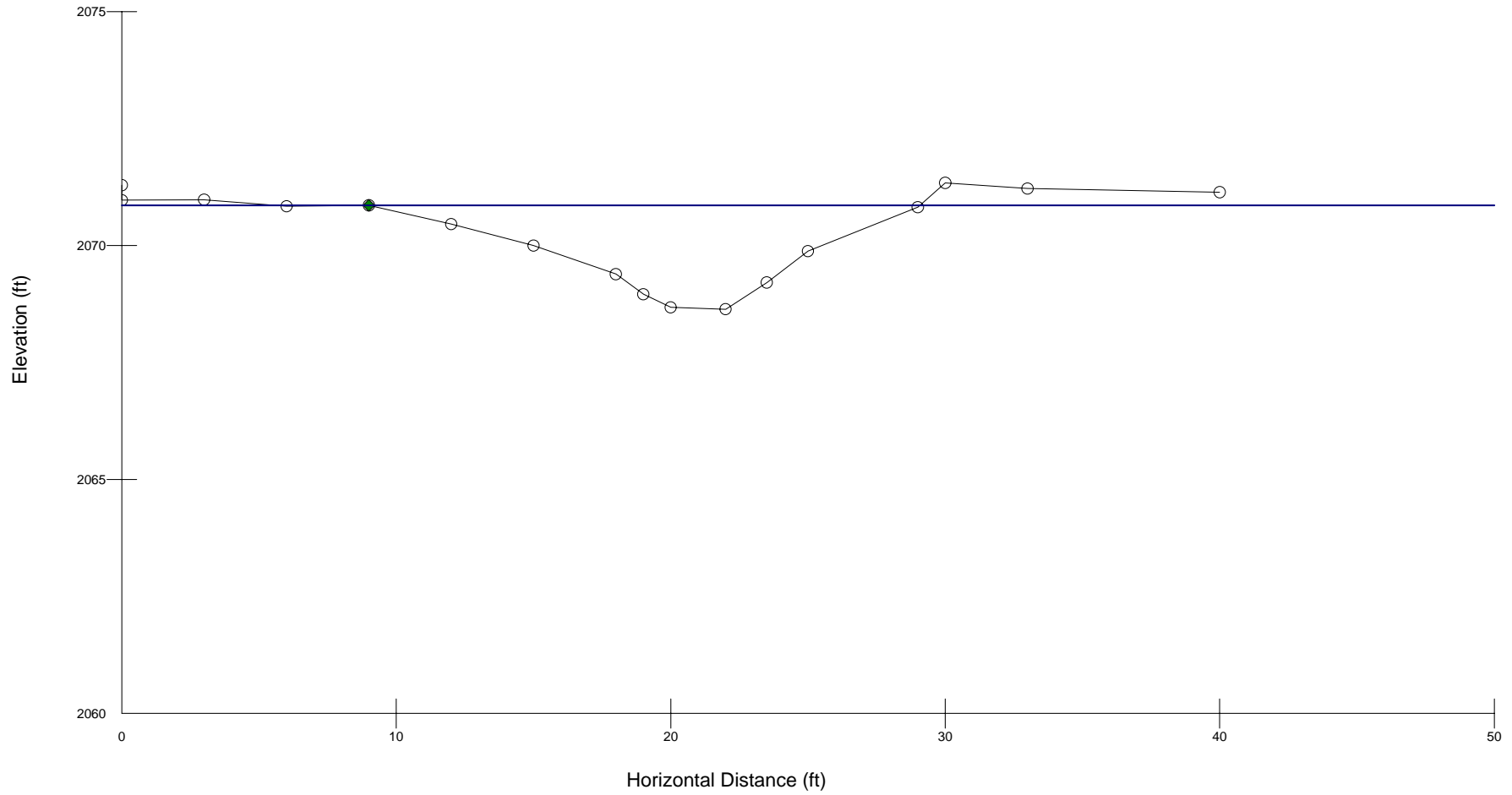
◆ Bankfull Indicators

▼ Water Surface Points

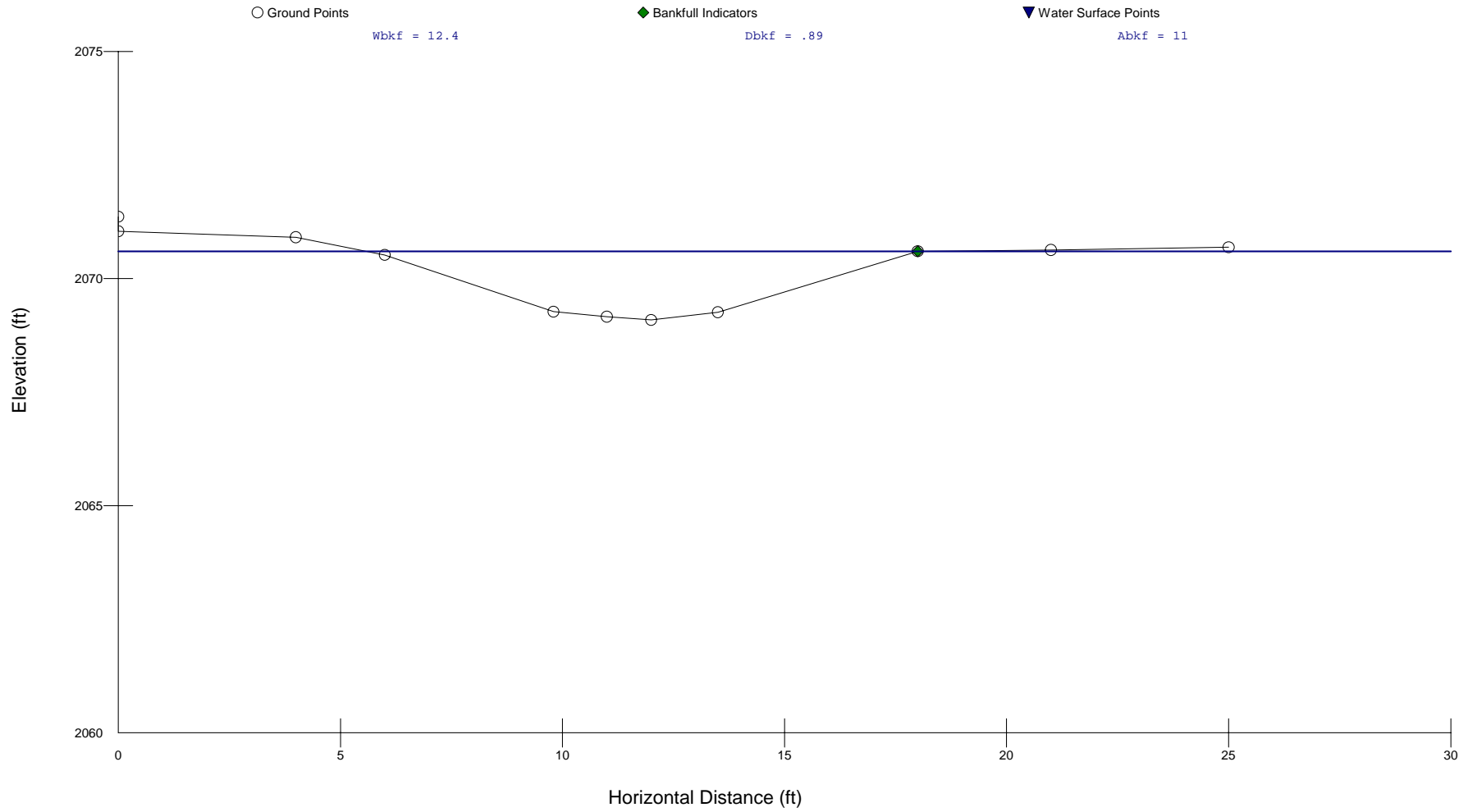
Wbkf = 23.5

Dbkf = .9

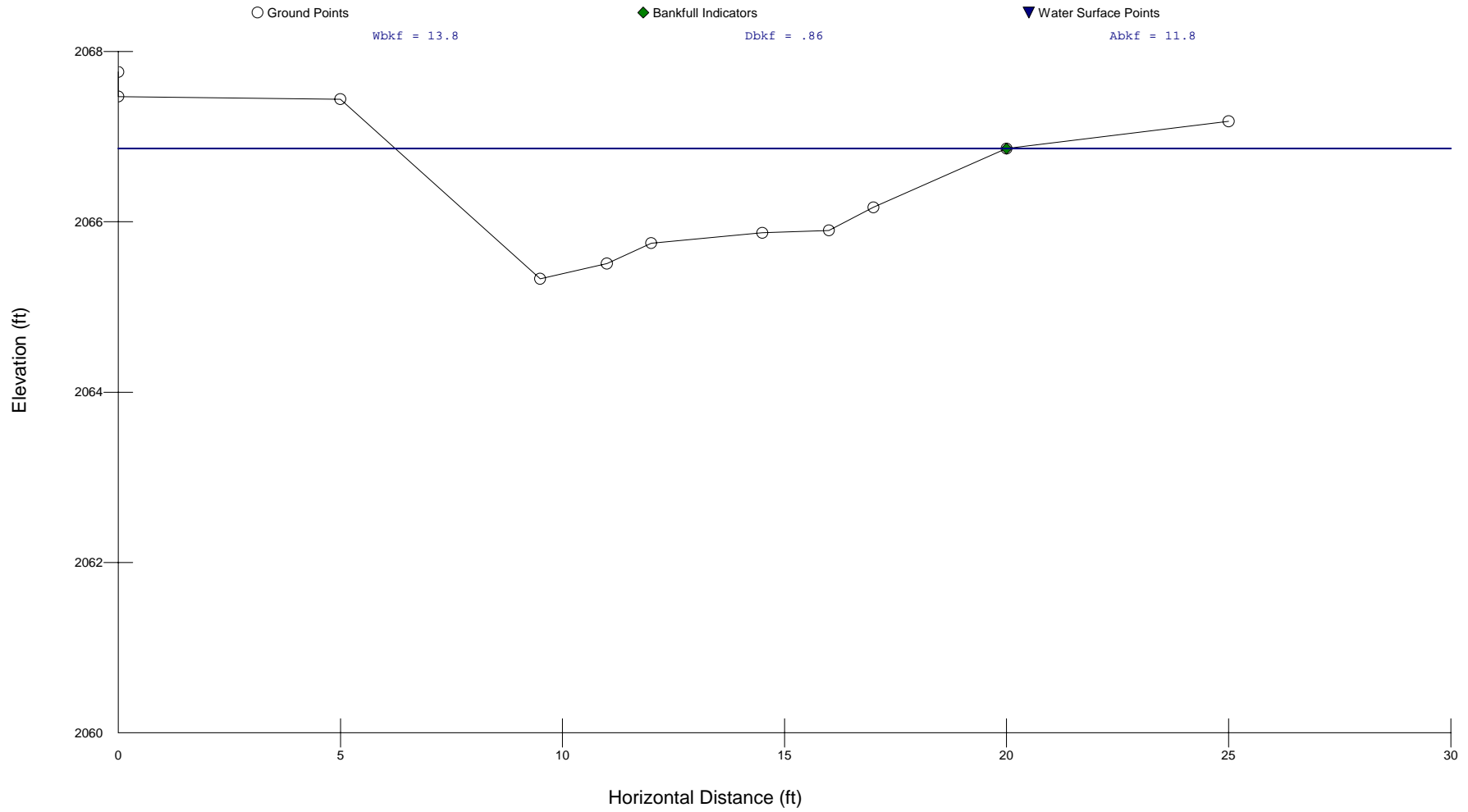
Abkf = 21.1



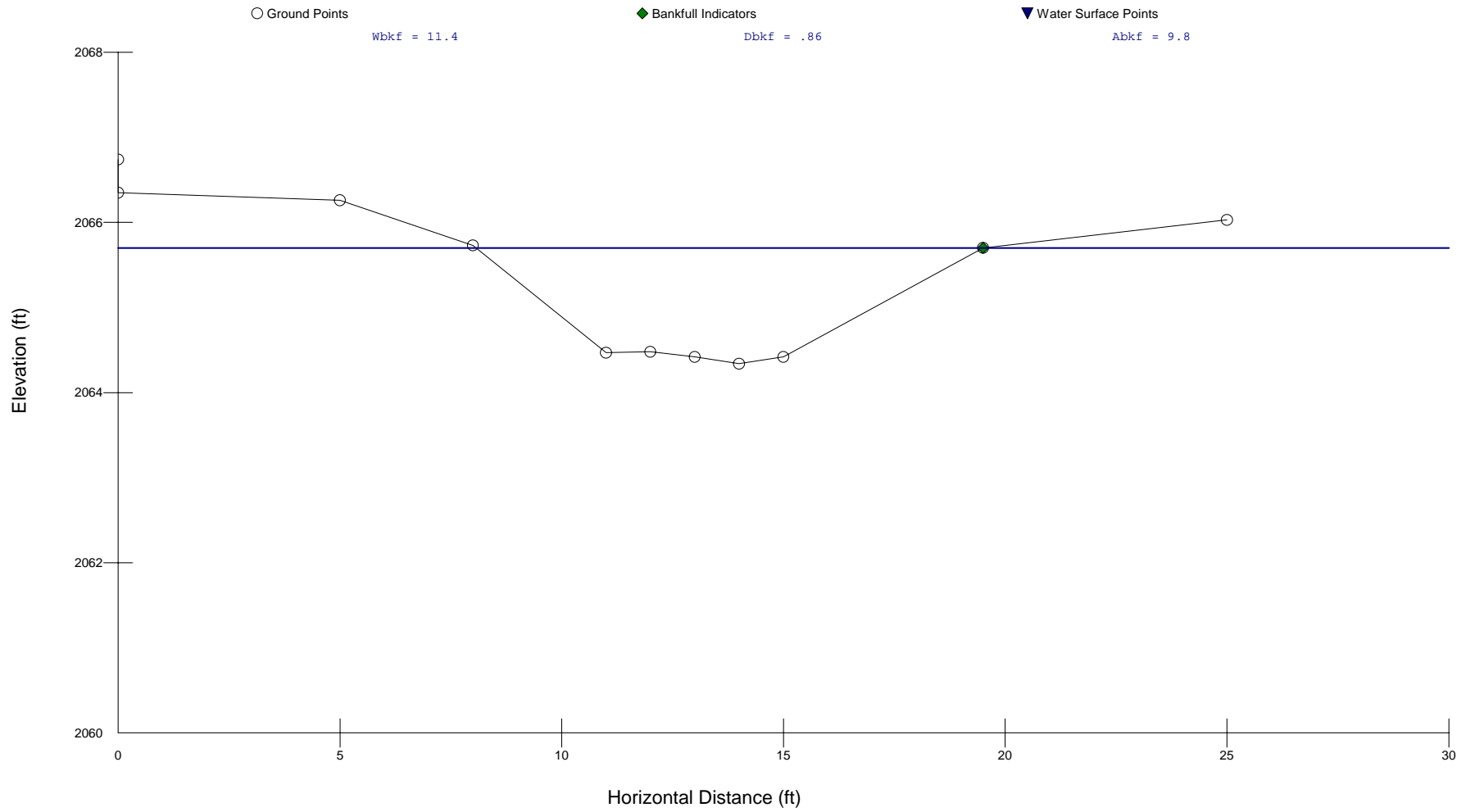
Trib 2 X-Sec 2 Riffle



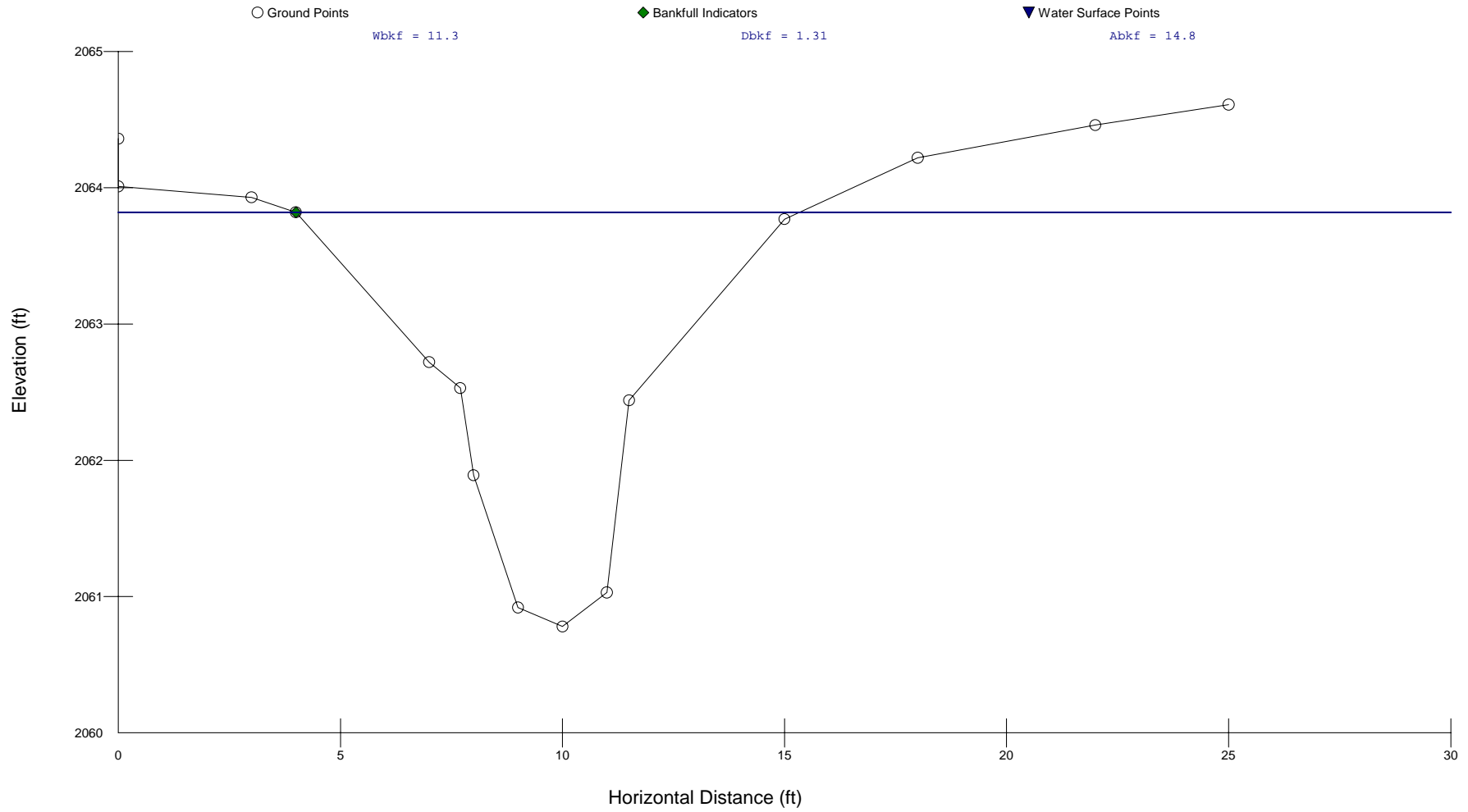
Trib 3 X-Sec 1 Pool



Trib 3 X-Sec 2 Riffle



Trib 4 X-Sec 1 Pool



Trib 4 X-Sec 2 Riffle

○ Ground Points

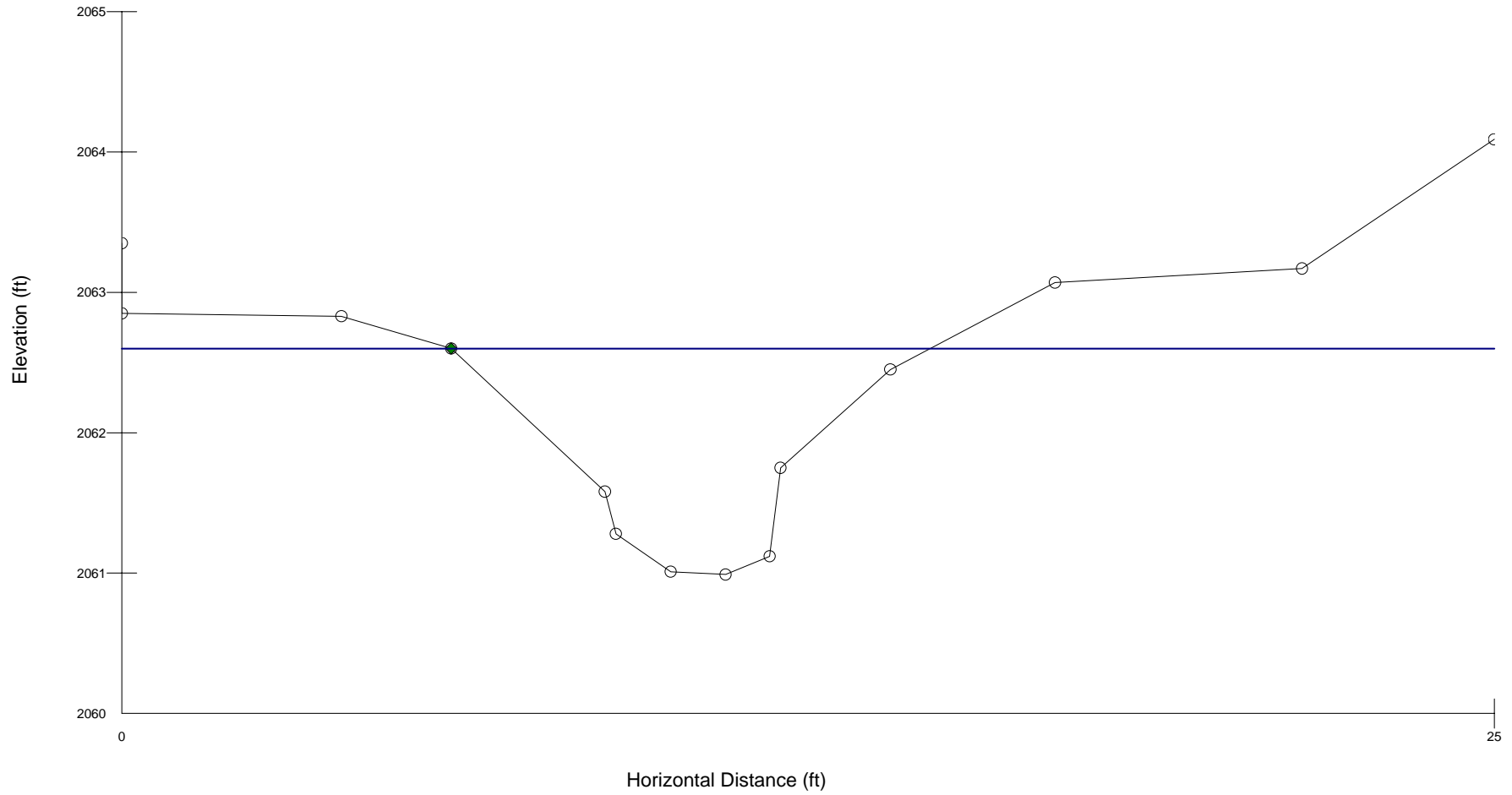
$wbkf = 8.73$

◆ Bankfull Indicators

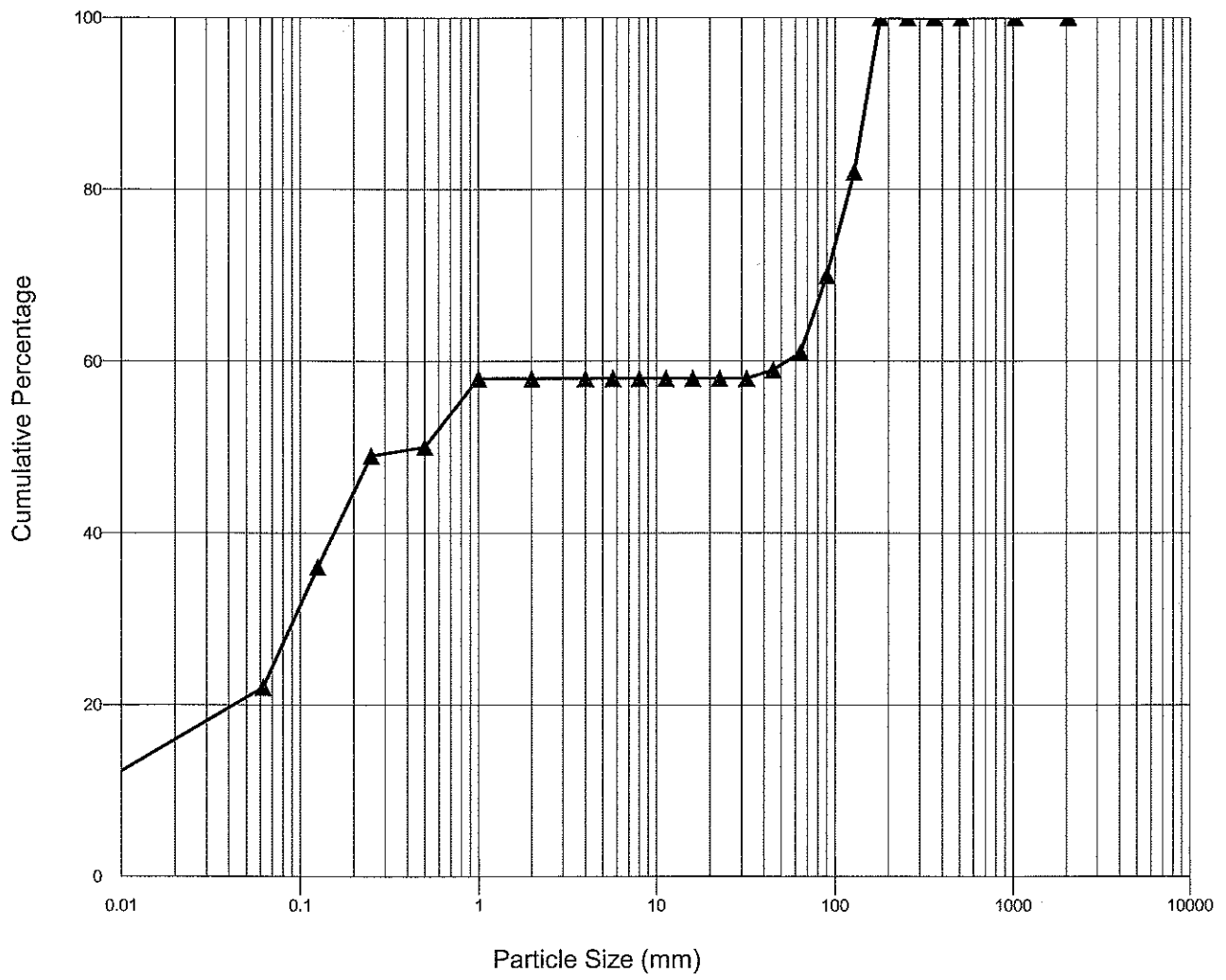
$Dbkf = .83$

▼ Water Surface Points

$Abkf = 7.24$



X-Sec 1 Riffle



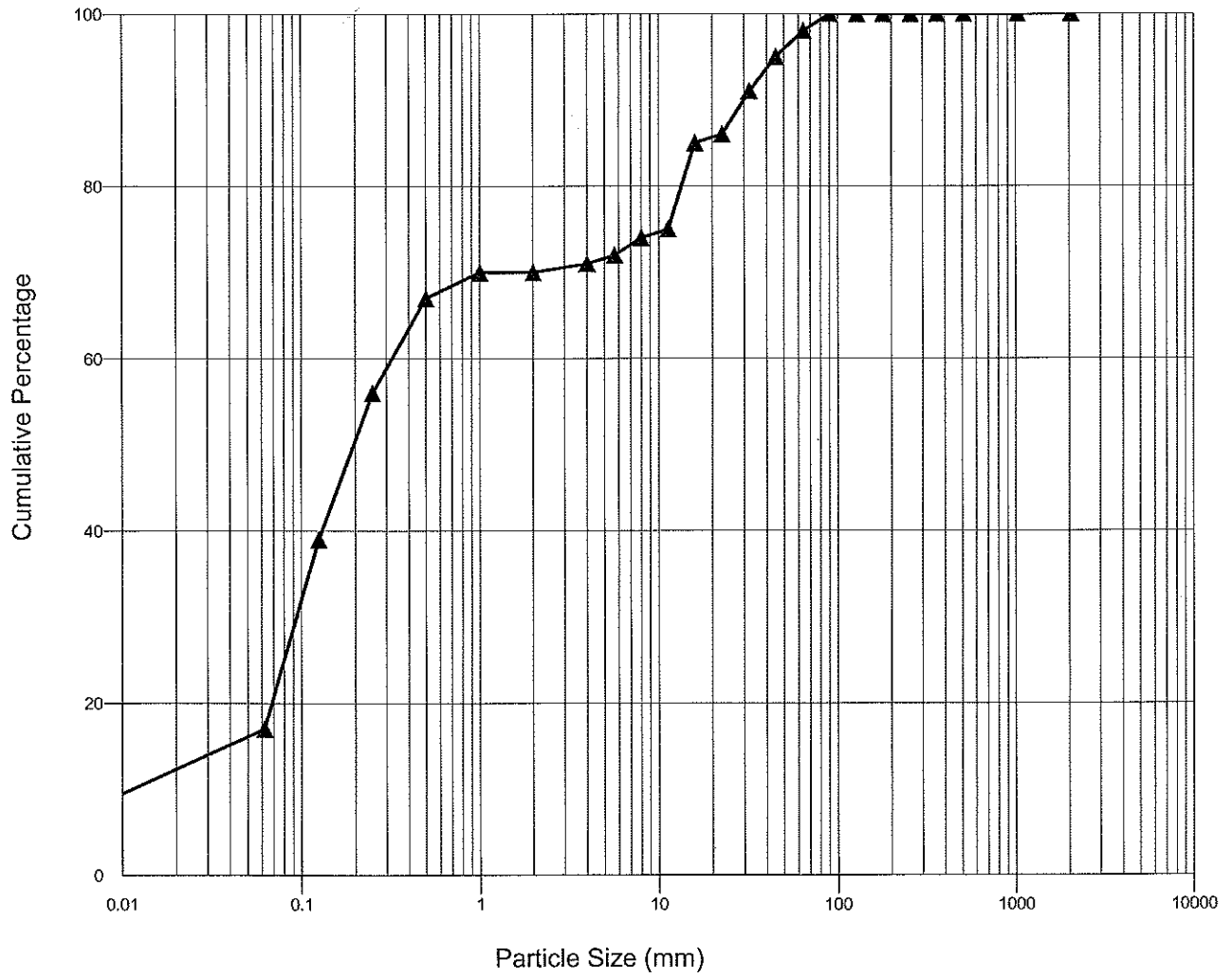
RIVERMORPH PARTICLE SUMMARY

 River Name: Cat Creek Restored
 Reach Name: Swartwout
 Sample Name: X-Sec 1 Riffle
 Survey Date: 06/09/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	22	22.00	22.00
0.062 - 0.125	14	14.00	36.00
0.125 - 0.25	13	13.00	49.00
0.25 - 0.50	1	1.00	50.00
0.50 - 1.0	8	8.00	58.00
1.0 - 2.0	0	0.00	58.00
2.0 - 4.0	0	0.00	58.00
4.0 - 5.7	0	0.00	58.00
5.7 - 8.0	0	0.00	58.00
8.0 - 11.3	0	0.00	58.00
11.3 - 16.0	0	0.00	58.00
16.0 - 22.6	0	0.00	58.00
22.6 - 32.0	0	0.00	58.00
32 - 45	1	1.00	59.00
45 - 64	2	2.00	61.00
64 - 90	9	9.00	70.00
90 - 128	12	12.00	82.00
128 - 180	18	18.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.05		
D35 (mm)	0.12		
D50 (mm)	0.5		
D84 (mm)	133.78		
D95 (mm)	165.56		
D100 (mm)	180		
silt/clay (%)	22		
sand (%)	36		
Gravel (%)	3		
Cobble (%)	39		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

X-Sec 2 Pool



RIVERMORPH PARTICLE SUMMARY

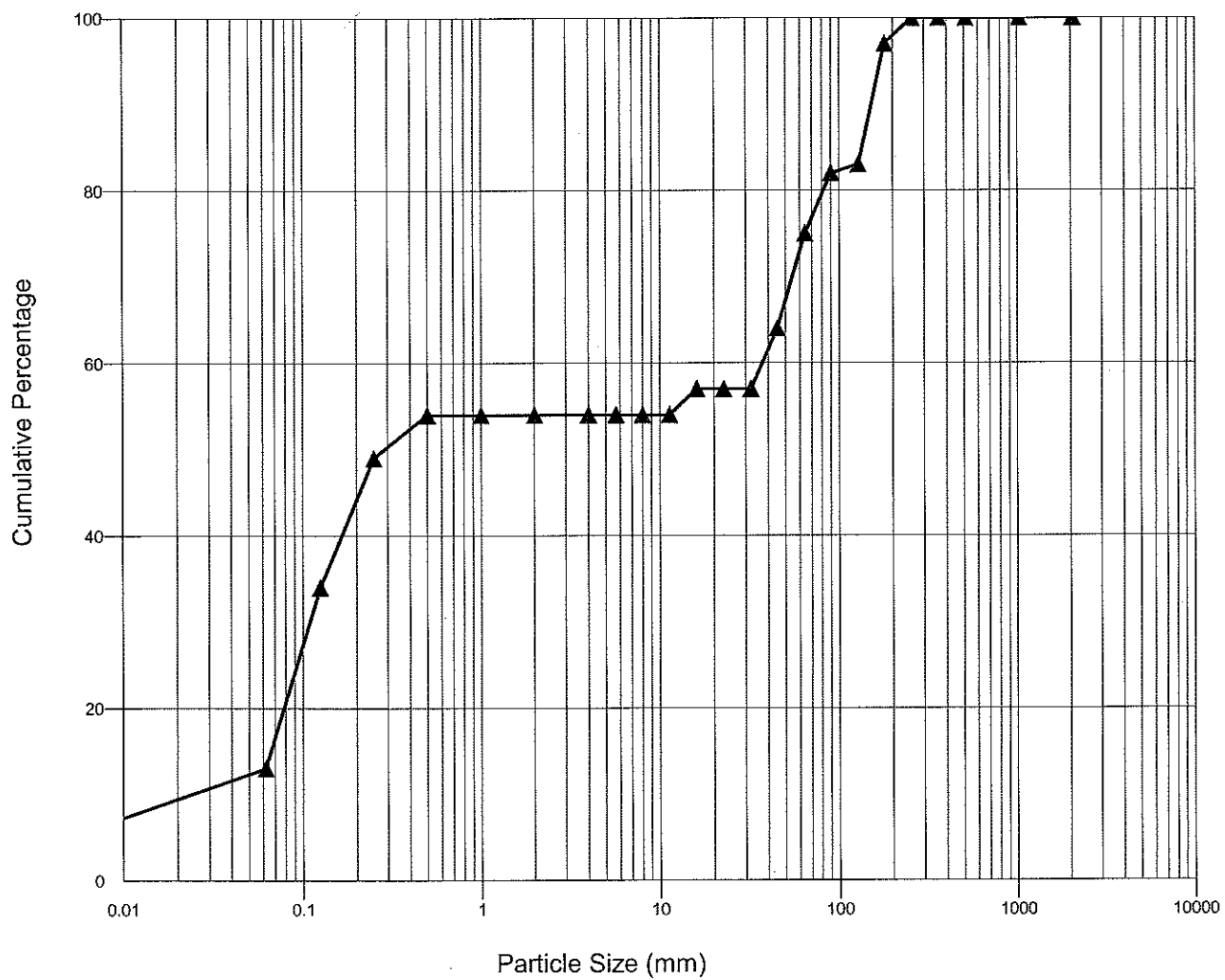
 River Name: Cat Creek Restored
 Reach Name: Swartwout
 Sample Name: X-Sec 2 Pool
 Survey Date: 06/09/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	17	17.00	17.00
0.062 - 0.125	22	22.00	39.00
0.125 - 0.25	17	17.00	56.00
0.25 - 0.50	11	11.00	67.00
0.50 - 1.0	3	3.00	70.00
1.0 - 2.0	0	0.00	70.00
2.0 - 4.0	1	1.00	71.00
4.0 - 5.7	1	1.00	72.00
5.7 - 8.0	2	2.00	74.00
8.0 - 11.3	1	1.00	75.00
11.3 - 16.0	10	10.00	85.00
16.0 - 22.6	1	1.00	86.00
22.6 - 32.0	5	5.00	91.00
32 - 45	4	4.00	95.00
45 - 64	3	3.00	98.00
64 - 90	2	2.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	0.06
D35 (mm)	0.11
D50 (mm)	0.21
D84 (mm)	15.53
D95 (mm)	45
D100 (mm)	90
Silt/Clay (%)	17
Sand (%)	53
Gravel (%)	28
Cobble (%)	2
Boulder (%)	0
Bedrock (%)	0

Total Particles = 100.

X-Sec 3 Riffle



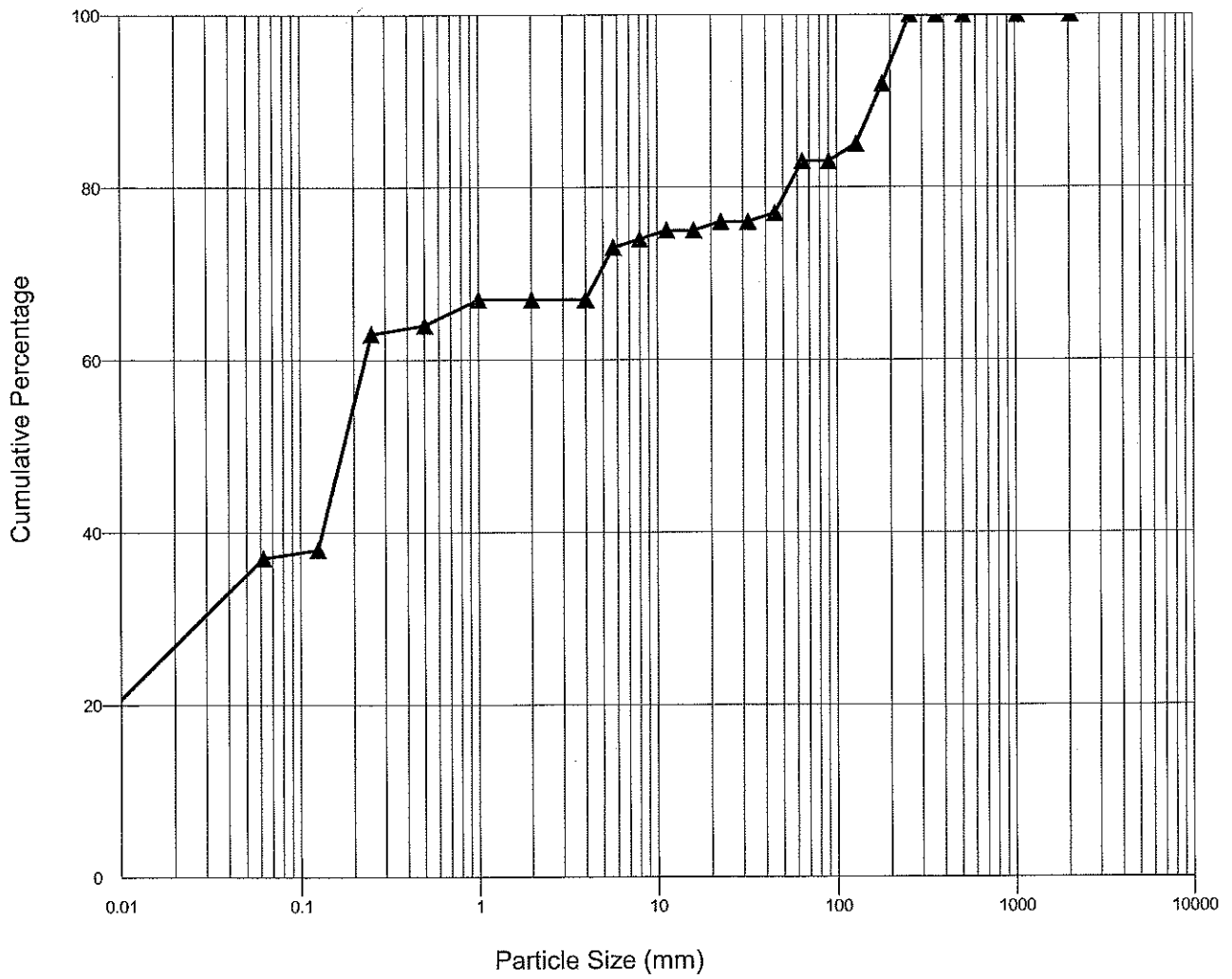
RIVERMORPH PARTICLE SUMMARY

 River Name: Cat Creek Restored
 Reach Name: Swartwout
 Sample Name: X-Sec 3 Riffle
 Survey Date: 06/09/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	13	13.00	13.00
0.062 - 0.125	21	21.00	34.00
0.125 - 0.25	15	15.00	49.00
0.25 - 0.50	5	5.00	54.00
0.50 - 1.0	0	0.00	54.00
1.0 - 2.0	0	0.00	54.00
2.0 - 4.0	0	0.00	54.00
4.0 - 5.7	0	0.00	54.00
5.7 - 8.0	0	0.00	54.00
8.0 - 11.3	0	0.00	54.00
11.3 - 16.0	3	3.00	57.00
16.0 - 22.6	0	0.00	57.00
22.6 - 32.0	0	0.00	57.00
32 - 45	7	7.00	64.00
45 - 64	11	11.00	75.00
64 - 90	7	7.00	82.00
90 - 128	1	1.00	83.00
128 - 180	14	14.00	97.00
180 - 256	3	3.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.07		
D35 (mm)	0.13		
D50 (mm)	0.3		
D84 (mm)	131.71		
D95 (mm)	172.57		
D100 (mm)	256		
Silt/Clay (%)	13		
Sand (%)	41		
Gravel (%)	21		
Cobble (%)	25		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

Trib 1 X-Sec 1 Riffle



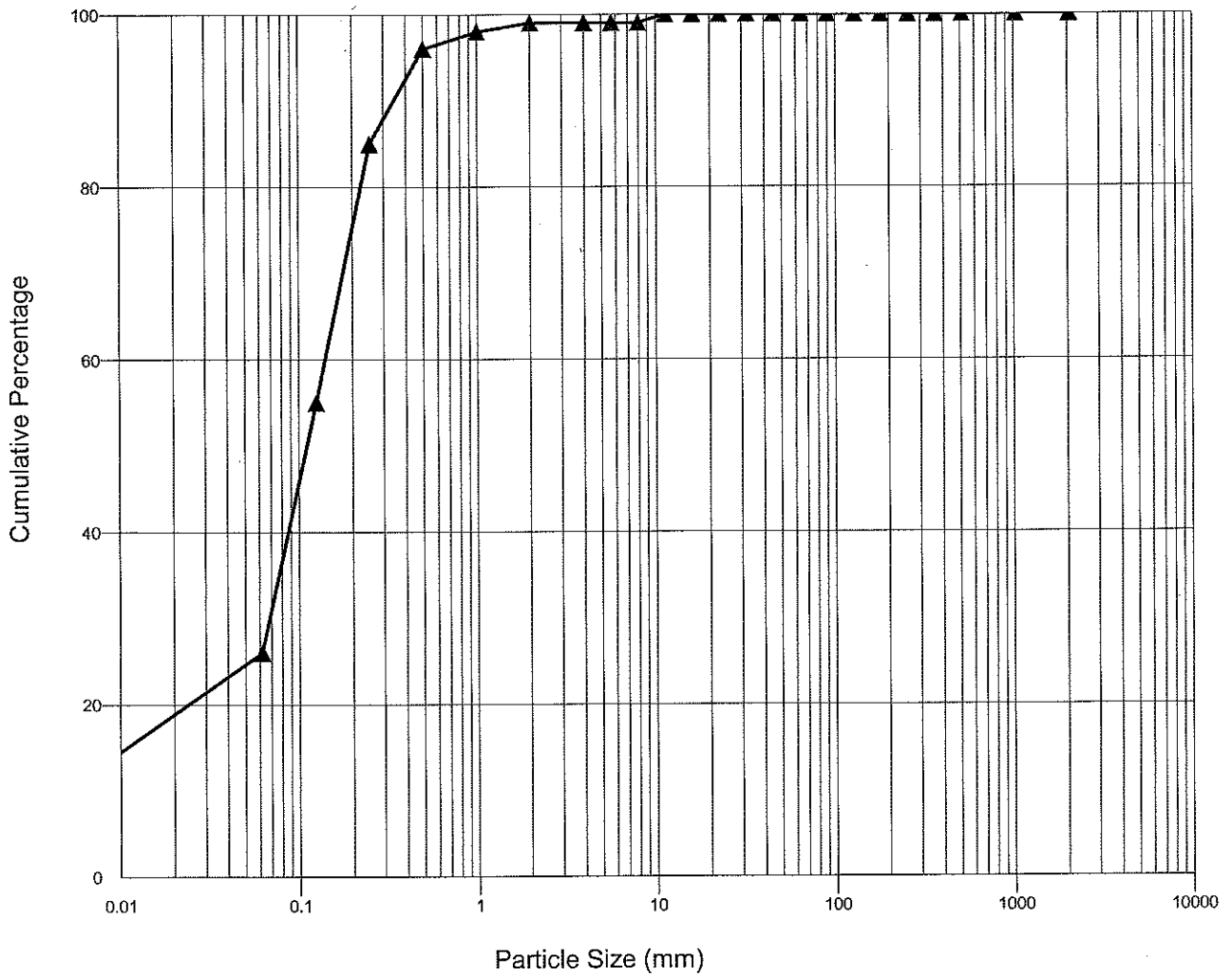
RIVERMORPH PARTICLE SUMMARY

 River Name: Cat Creek Restored
 Reach Name: Trib 1
 Sample Name: Trib 1 X-Sec 1 Riffle
 Survey Date: 06/09/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	37	37.00	37.00
0.062 - 0.125	1	1.00	38.00
0.125 - 0.25	25	25.00	63.00
0.25 - 0.50	1	1.00	64.00
0.50 - 1.0	3	3.00	67.00
1.0 - 2.0	0	0.00	67.00
2.0 - 4.0	0	0.00	67.00
4.0 - 5.7	6	6.00	73.00
5.7 - 8.0	1	1.00	74.00
8.0 - 11.3	1	1.00	75.00
11.3 - 16.0	0	0.00	75.00
16.0 - 22.6	1	1.00	76.00
22.6 - 32.0	0	0.00	76.00
32 - 45	1	1.00	77.00
45 - 64	6	6.00	83.00
64 - 90	0	0.00	83.00
90 - 128	2	2.00	85.00
128 - 180	7	7.00	92.00
180 - 256	8	8.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.03		
D35 (mm)	0.06		
D50 (mm)	0.19		
D84 (mm)	109		
D95 (mm)	208.5		
D100 (mm)	256		
Silt/Clay (%)	37		
Sand (%)	30		
Gravel (%)	16		
Cobble (%)	17		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

Trib 1 X-Sec 2 Pool



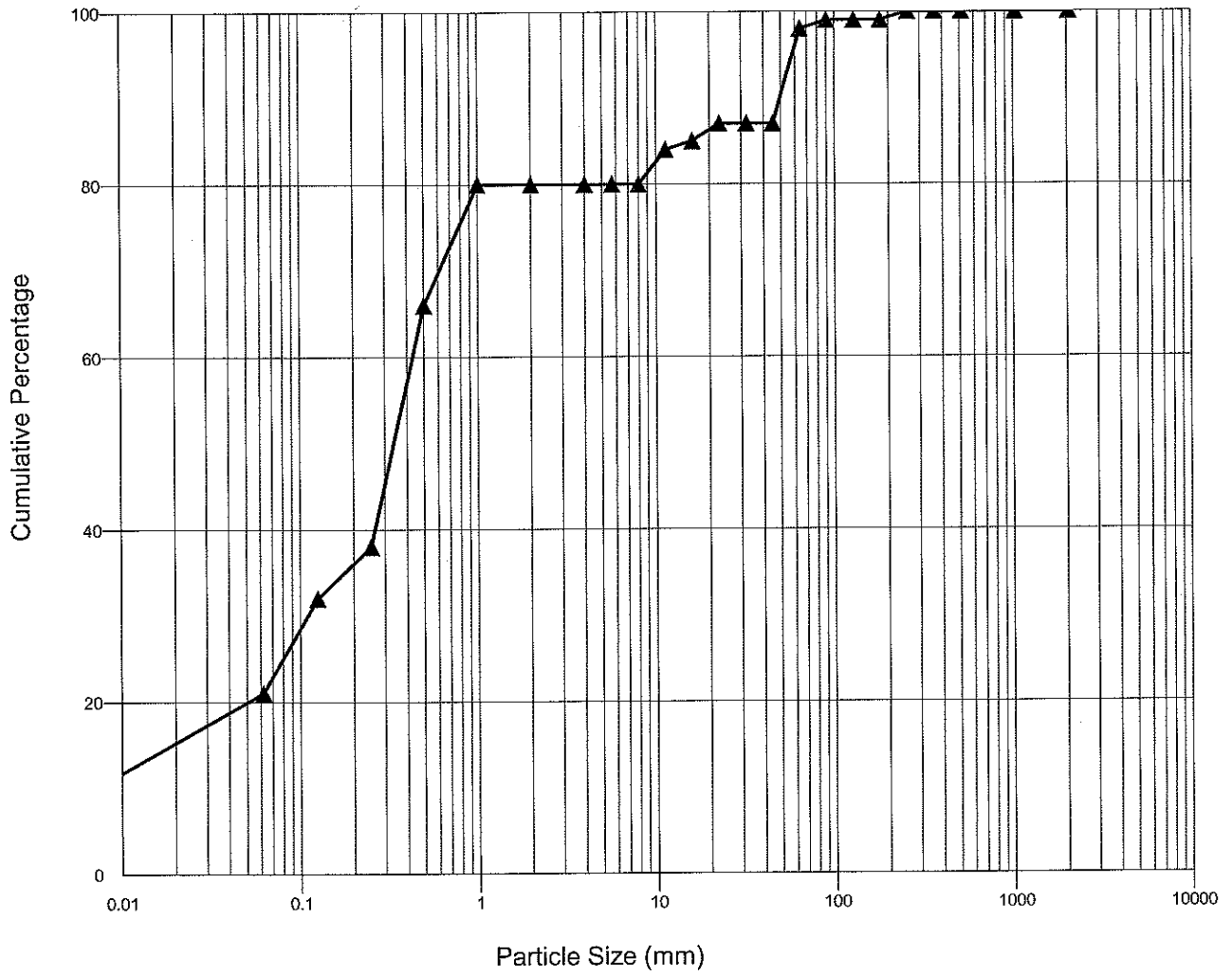
RIVERMORPH PARTICLE SUMMARY

River Name: Cat Creek Restored
 Reach Name: Trib 1
 Sample Name: Trib 1 X-Sec 2 Pool
 Survey Date: 06/09/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	26	26.00	26.00
0.062 - 0.125	29	29.00	55.00
0.125 - 0.25	30	30.00	85.00
0.25 - 0.50	11	11.00	96.00
0.50 - 1.0	2	2.00	98.00
1.0 - 2.0	1	1.00	99.00
2.0 - 4.0	0	0.00	99.00
4.0 - 5.7	0	0.00	99.00
5.7 - 8.0	0	0.00	99.00
8.0 - 11.3	1	1.00	100.00
11.3 - 16.0	0	0.00	100.00
16.0 - 22.6	0	0.00	100.00
22.6 - 32.0	0	0.00	100.00
32 - 45	0	0.00	100.00
45 - 64	0	0.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.04		
D35 (mm)	0.08		
D50 (mm)	0.11		
D84 (mm)	0.25		
D95 (mm)	0.48		
D100 (mm)	11.3		
Silt/Clay (%)	26		
Sand (%)	73		
Gravel (%)	1		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

X-Sec 4 Pool



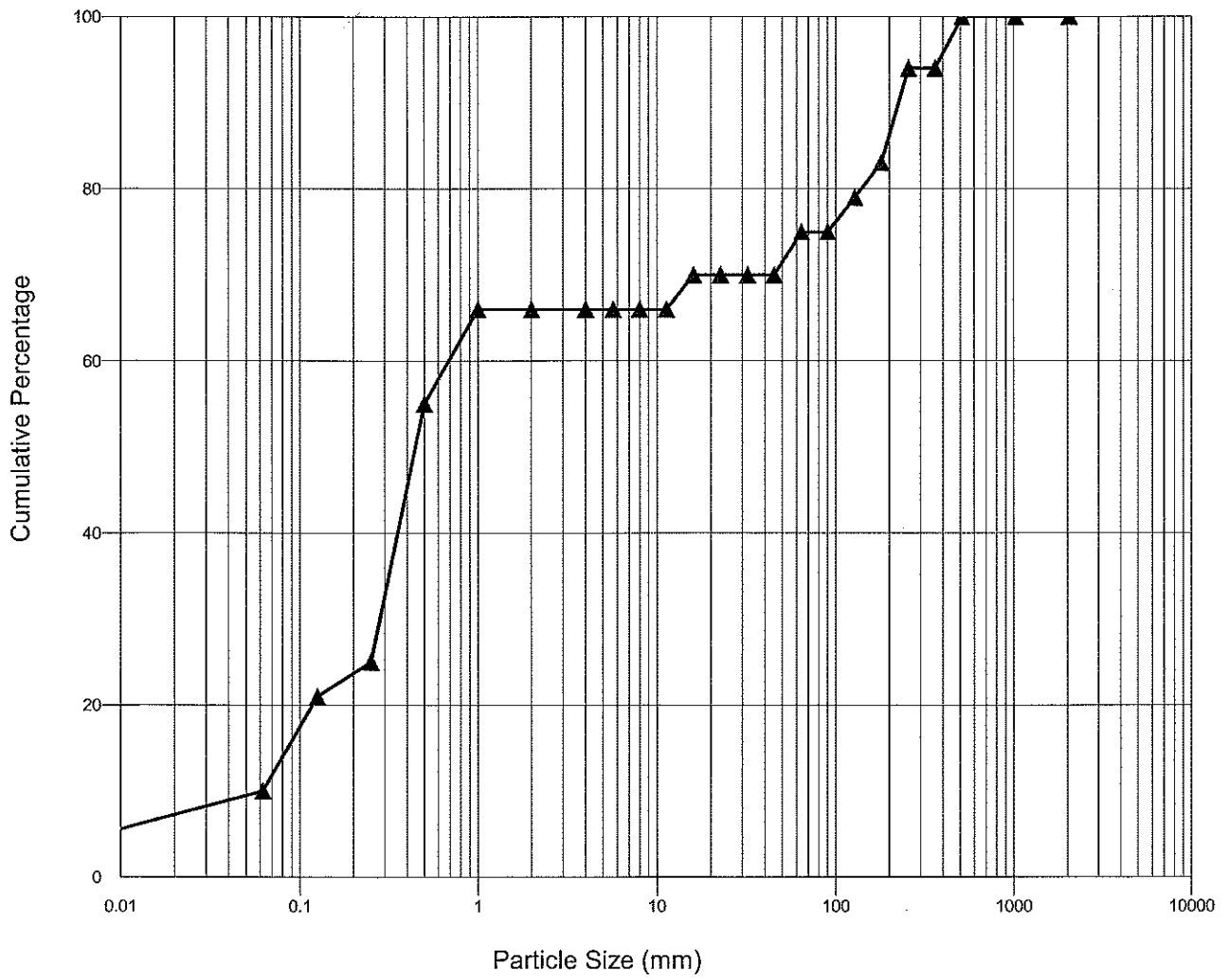
RIVERMORPH PARTICLE SUMMARY

 River Name: Cat Creek Restored
 Reach Name: Parker
 Sample Name: X-Sec 4 Pool
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	21	21.00	21.00
0.062 - 0.125	11	11.00	32.00
0.125 - 0.25	6	6.00	38.00
0.25 - 0.50	28	28.00	66.00
0.50 - 1.0	14	14.00	80.00
1.0 - 2.0	0	0.00	80.00
2.0 - 4.0	0	0.00	80.00
4.0 - 5.7	0	0.00	80.00
5.7 - 8.0	0	0.00	80.00
8.0 - 11.3	4	4.00	84.00
11.3 - 16.0	1	1.00	85.00
16.0 - 22.6	2	2.00	87.00
22.6 - 32.0	0	0.00	87.00
32 - 45	0	0.00	87.00
45 - 64	11	11.00	98.00
64 - 90	1	1.00	99.00
90 - 128	0	0.00	99.00
128 - 180	0	0.00	99.00
180 - 256	1	1.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.05		
D35 (mm)	0.19		
D50 (mm)	0.36		
D84 (mm)	11.3		
D95 (mm)	58.82		
D100 (mm)	255.99		
Silt/Clay (%)	21		
Sand (%)	59		
Gravel (%)	18		
Cobble (%)	2		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

X-Sec 5 Riffle



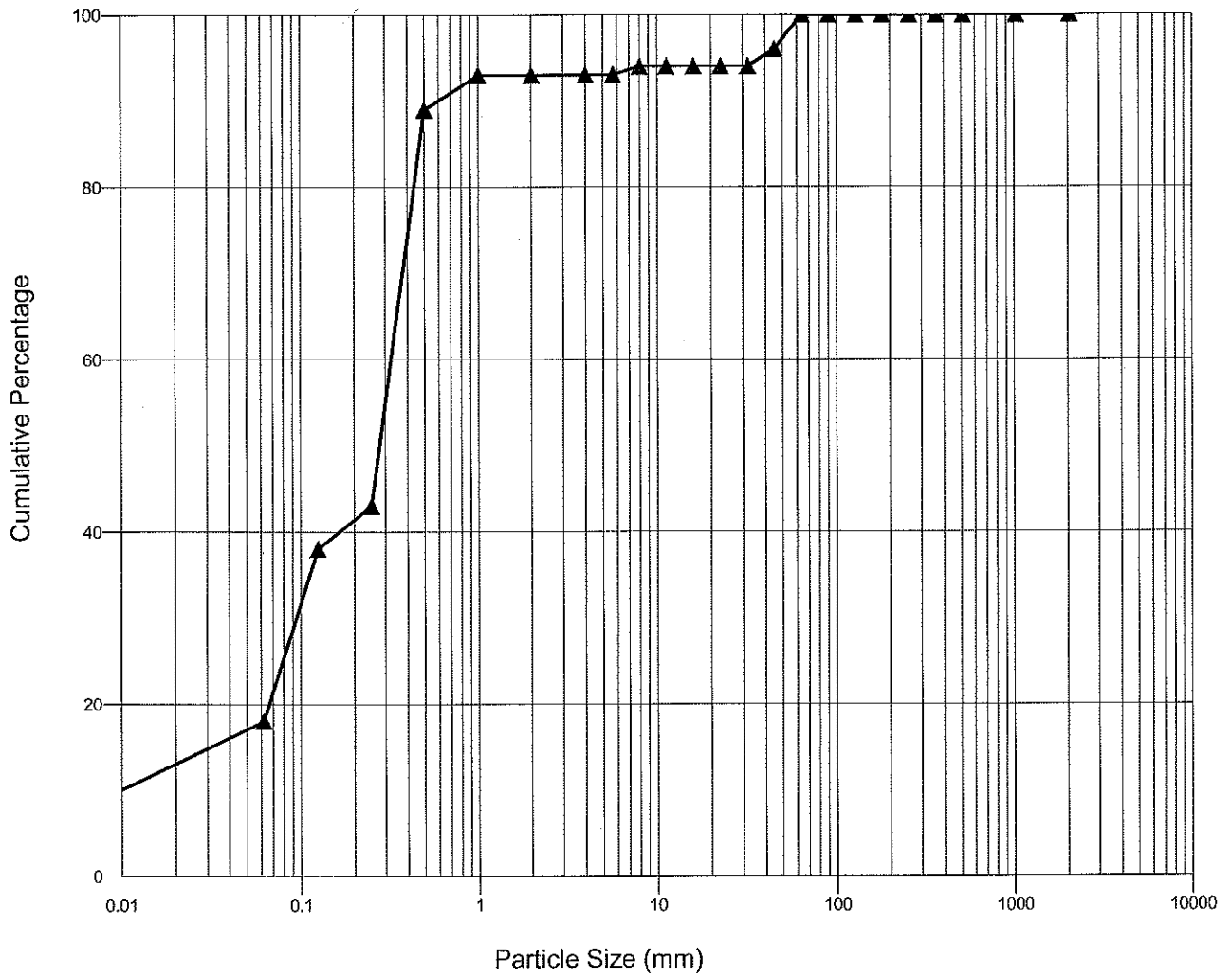
RIVERMORPH PARTICLE SUMMARY

River Name: Cat Creek Restored
 Reach Name: Parker
 Sample Name: X-Sec 5 Riffle
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	10	10.00	10.00
0.062 - 0.125	11	11.00	21.00
0.125 - 0.25	4	4.00	25.00
0.25 - 0.50	30	30.00	55.00
0.50 - 1.0	11	11.00	66.00
1.0 - 2.0	0	0.00	66.00
2.0 - 4.0	0	0.00	66.00
4.0 - 5.7	0	0.00	66.00
5.7 - 8.0	0	0.00	66.00
8.0 - 11.3	0	0.00	66.00
11.3 - 16.0	4	4.00	70.00
16.0 - 22.6	0	0.00	70.00
22.6 - 32.0	0	0.00	70.00
32 - 45	0	0.00	70.00
45 - 64	5	5.00	75.00
64 - 90	0	0.00	75.00
90 - 128	4	4.00	79.00
128 - 180	4	4.00	83.00
180 - 256	11	11.00	94.00
256 - 362	0	0.00	94.00
362 - 512	6	6.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.1		
D35 (mm)	0.33		
D50 (mm)	0.46		
D84 (mm)	186.91		
D95 (mm)	387		
D100 (mm)	512		
silt/clay (%)	10		
sand (%)	56		
Gravel (%)	9		
Cobble (%)	19		
Boulder (%)	6		
Bedrock (%)	0		

Total Particles = 100.

X-Sec 6 Pool



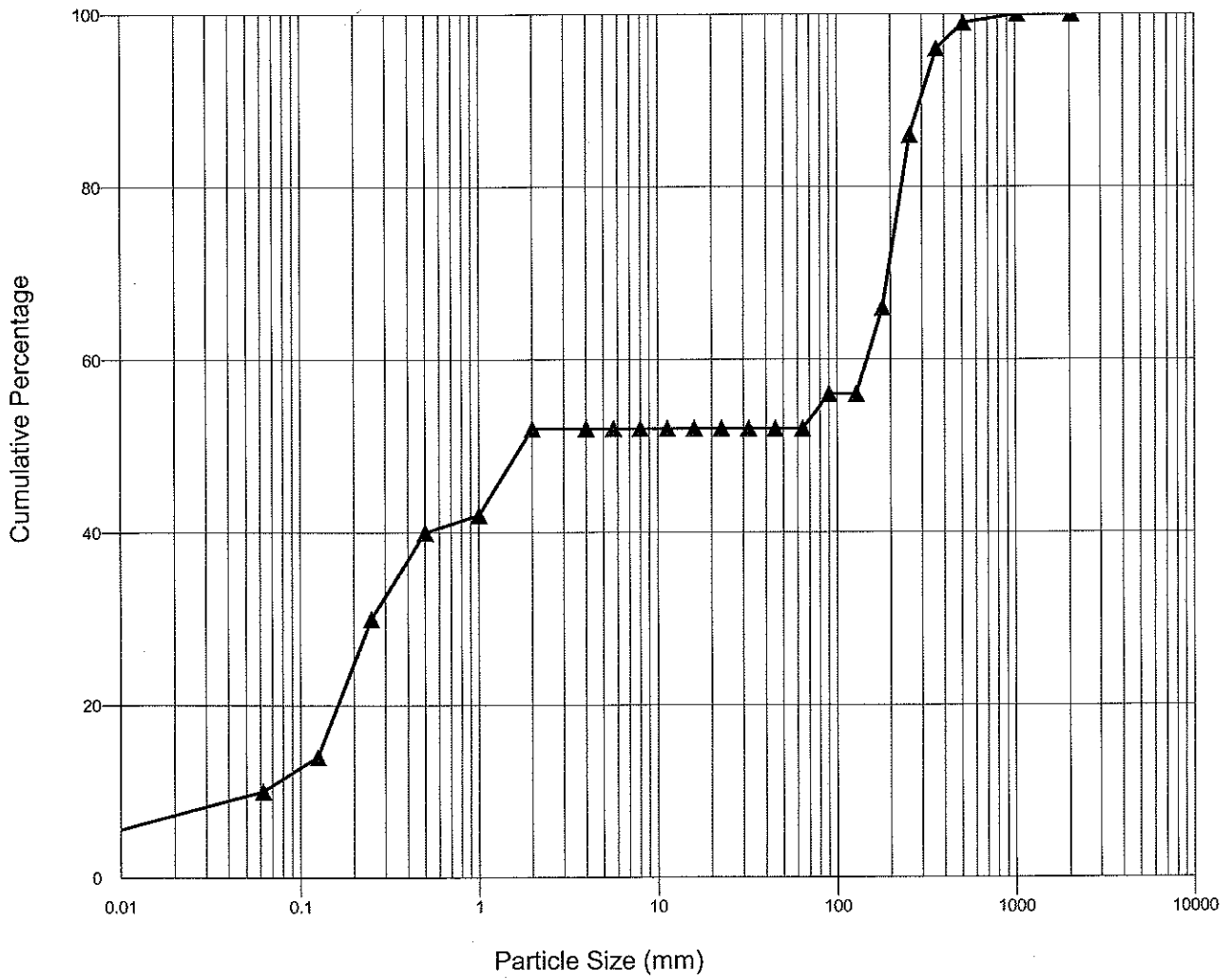
RIVERMORPH PARTICLE SUMMARY

River Name: Cat Creek Restored
 Reach Name: Parker
 Sample Name: X-Sec 6 Pool
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	18	18.00	18.00
0.062 - 0.125	20	20.00	38.00
0.125 - 0.25	5	5.00	43.00
0.25 - 0.50	46	46.00	89.00
0.50 - 1.0	4	4.00	93.00
1.0 - 2.0	0	0.00	93.00
2.0 - 4.0	0	0.00	93.00
4.0 - 5.7	0	0.00	93.00
5.7 - 8.0	1	1.00	94.00
8.0 - 11.3	0	0.00	94.00
11.3 - 16.0	0	0.00	94.00
16.0 - 22.6	0	0.00	94.00
22.6 - 32.0	0	0.00	94.00
32 - 45	2	2.00	96.00
45 - 64	4	4.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.06		
D35 (mm)	0.12		
D50 (mm)	0.29		
D84 (mm)	0.47		
D95 (mm)	38.5		
D100 (mm)	64		
Silt/Clay (%)	18		
Sand (%)	75		
Gravel (%)	7		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

X-Sec 7 Riffle



RIVERMORPH PARTICLE SUMMARY

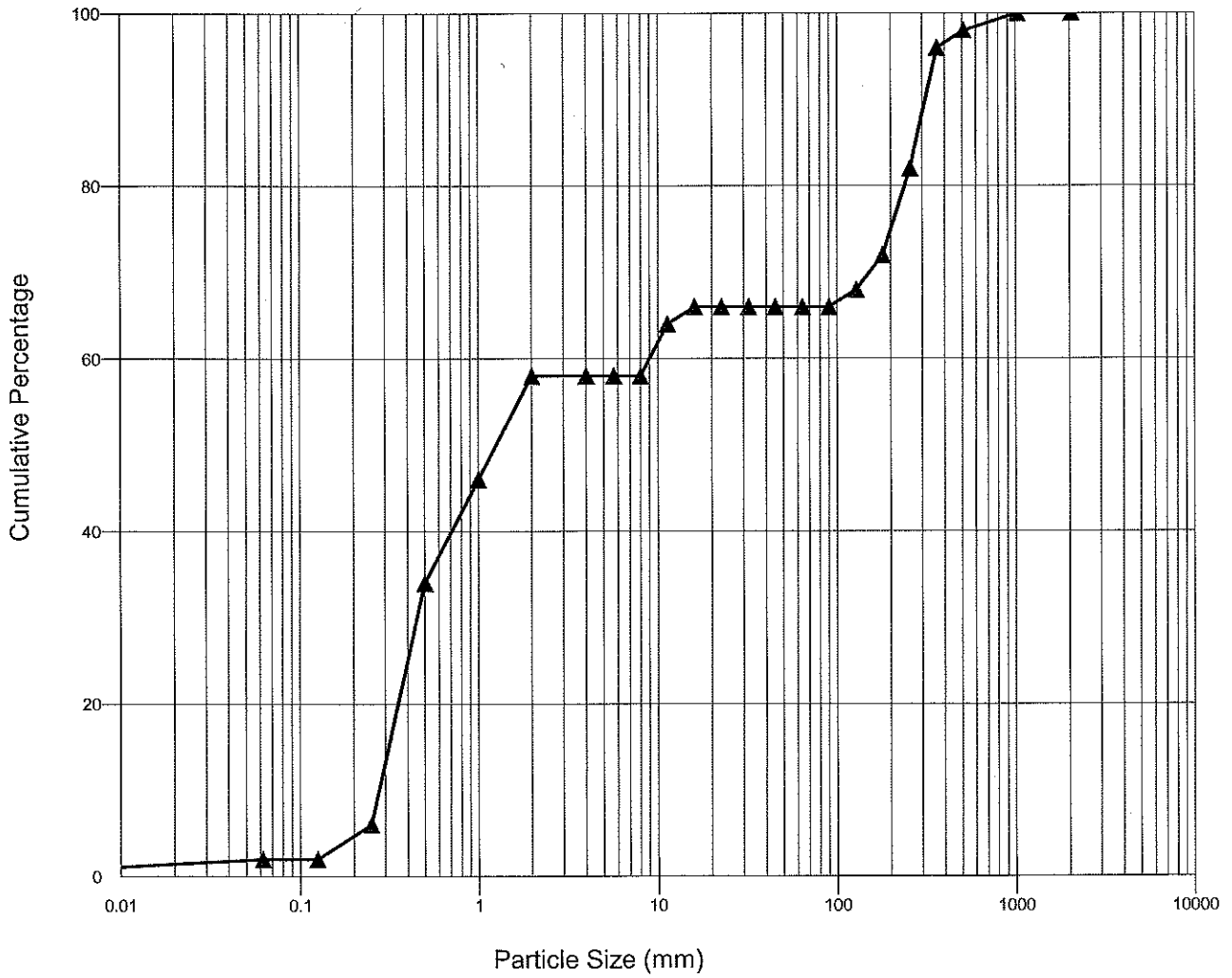
 River Name: Cat Creek Restored
 Reach Name: Parker
 Sample Name: X-Sec 7 Riffle
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	10	10.00	10.00
0.062 - 0.125	4	4.00	14.00
0.125 - 0.25	16	16.00	30.00
0.25 - 0.50	10	10.00	40.00
0.50 - 1.0	2	2.00	42.00
1.0 - 2.0	10	10.00	52.00
2.0 - 4.0	0	0.00	52.00
4.0 - 5.7	0	0.00	52.00
5.7 - 8.0	0	0.00	52.00
8.0 - 11.3	0	0.00	52.00
11.3 - 16.0	0	0.00	52.00
16.0 - 22.6	0	0.00	52.00
22.6 - 32.0	0	0.00	52.00
32 - 45	0	0.00	52.00
45 - 64	0	0.00	52.00
64 - 90	4	4.00	56.00
90 - 128	0	0.00	56.00
128 - 180	10	10.00	66.00
180 - 256	20	20.00	86.00
256 - 362	10	10.00	96.00
362 - 512	3	3.00	99.00
512 - 1024	1	1.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	0.14
D35 (mm)	0.38
D50 (mm)	1.8
D84 (mm)	248.4
D95 (mm)	351.4
D100 (mm)	1023.95
Silt/Clay (%)	10
Sand (%)	42
Gravel (%)	0
Cobble (%)	34
Boulder (%)	14
Bedrock (%)	0

Total Particles = 100.

X-Sec 8 Riffle



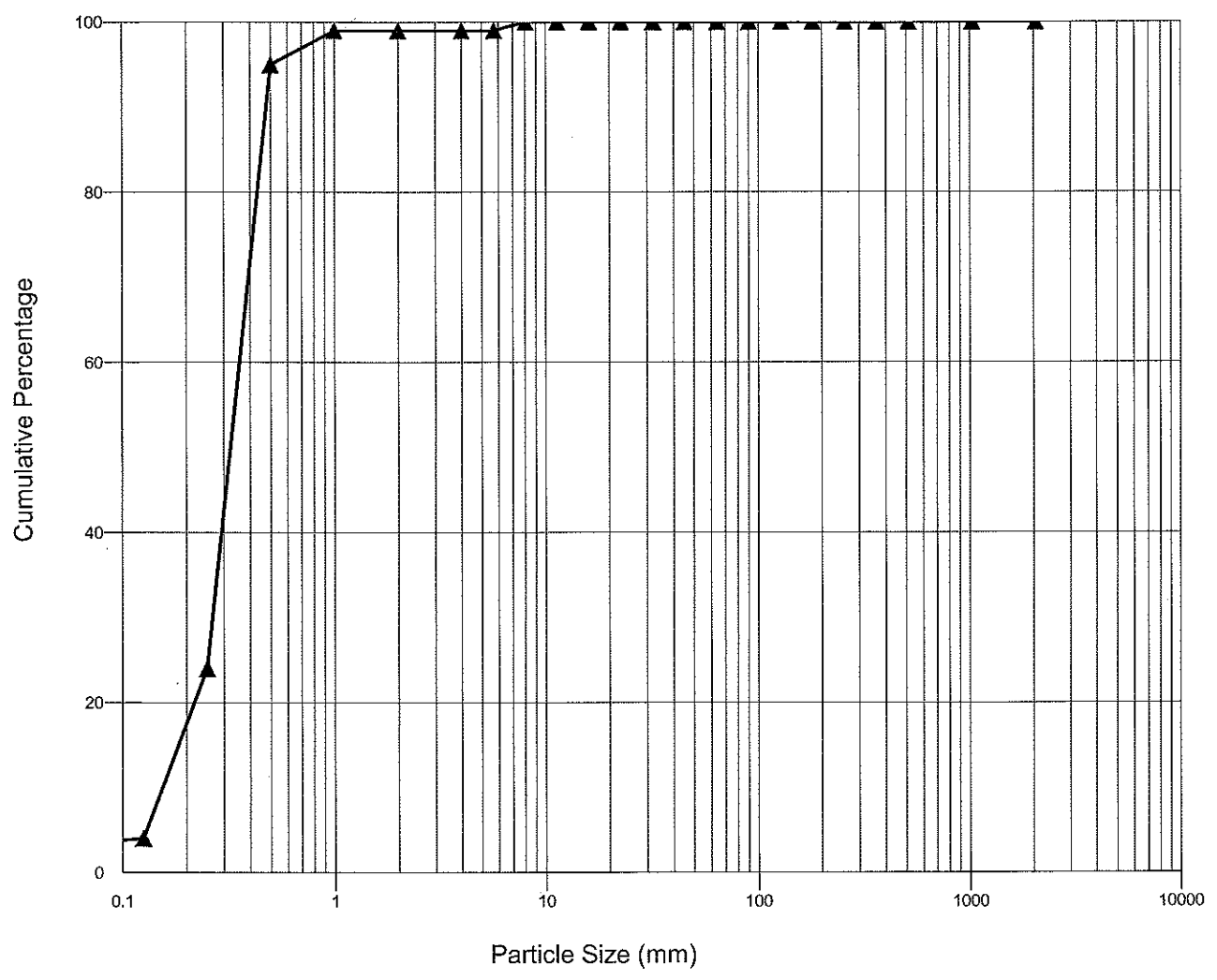
RIVERMORPH PARTICLE SUMMARY

 River Name: Cat Creek Restored
 Reach Name: Parker
 Sample Name: X-Sec 8 Riffle
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	2	2.00	2.00
0.062 - 0.125	0	0.00	2.00
0.125 - 0.25	4	4.00	6.00
0.25 - 0.50	28	28.00	34.00
0.50 - 1.0	12	12.00	46.00
1.0 - 2.0	12	12.00	58.00
2.0 - 4.0	0	0.00	58.00
4.0 - 5.7	0	0.00	58.00
5.7 - 8.0	0	0.00	58.00
8.0 - 11.3	6	6.00	64.00
11.3 - 16.0	2	2.00	66.00
16.0 - 22.6	0	0.00	66.00
22.6 - 32.0	0	0.00	66.00
32 - 45	0	0.00	66.00
45 - 64	0	0.00	66.00
64 - 90	0	0.00	66.00
90 - 128	2	2.00	68.00
128 - 180	4	4.00	72.00
180 - 256	10	10.00	82.00
256 - 362	14	14.00	96.00
362 - 512	2	2.00	98.00
512 - 1024	2	2.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.34		
D35 (mm)	0.54		
D50 (mm)	1.33		
D84 (mm)	271.14		
D95 (mm)	354.43		
D100 (mm)	1023.97		
Silt/Clay (%)	2		
Sand (%)	56		
Gravel (%)	8		
Cobble (%)	16		
Boulder (%)	18		
Bedrock (%)	0		

Total Particles = 100.

X-Sec 9 Pool



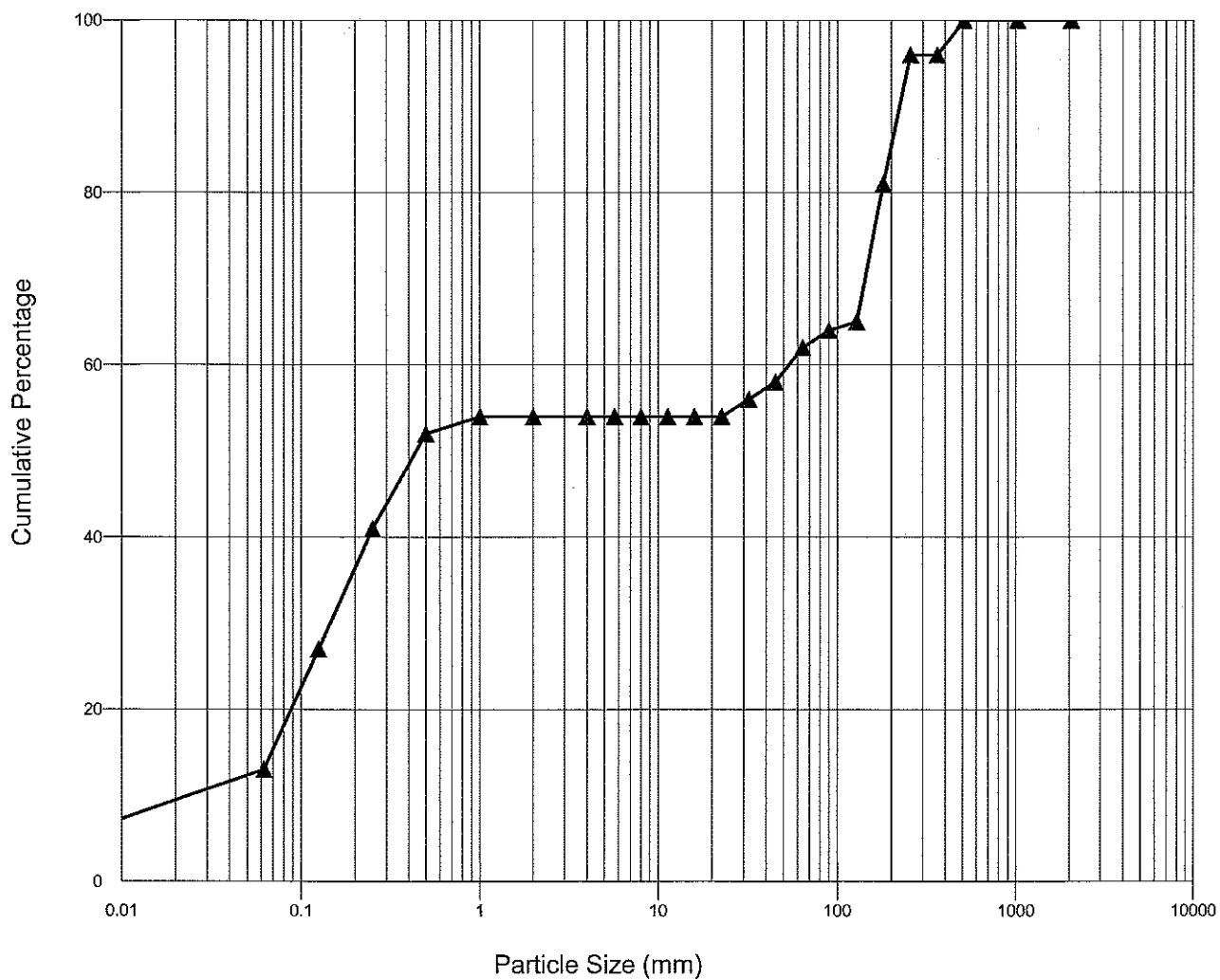
RIVERMORPH PARTICLE SUMMARY

River Name: Cat Creek Restored
 Reach Name: Parker
 Sample Name: X-Sec 9 Pool
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	4	4.00	4.00
0.125 - 0.25	20	20.00	24.00
0.25 - 0.50	71	71.00	95.00
0.50 - 1.0	4	4.00	99.00
1.0 - 2.0	0	0.00	99.00
2.0 - 4.0	0	0.00	99.00
4.0 - 5.7	0	0.00	99.00
5.7 - 8.0	1	1.00	100.00
8.0 - 11.3	0	0.00	100.00
11.3 - 16.0	0	0.00	100.00
16.0 - 22.6	0	0.00	100.00
22.6 - 32.0	0	0.00	100.00
32 - 45	0	0.00	100.00
45 - 64	0	0.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.2		
D35 (mm)	0.29		
D50 (mm)	0.34		
D84 (mm)	0.46		
D95 (mm)	0.5		
D100 (mm)	8		
Silt/Clay (%)	0		
Sand (%)	99		
Gravel (%)	1		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

X-Sec 10 Riffle



RIVERMORPH PARTICLE SUMMARY

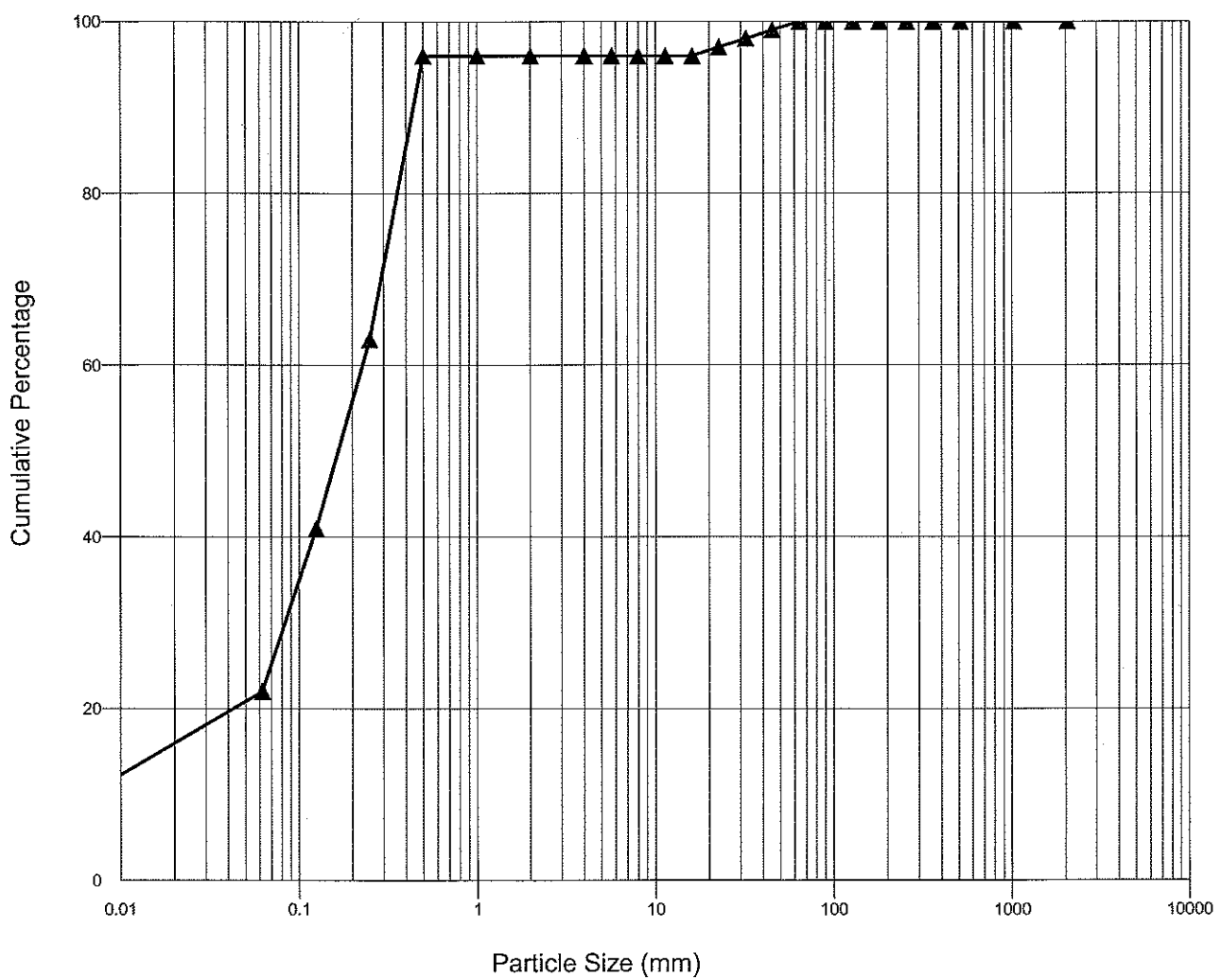
River Name: Cat Creek Restored
 Reach Name: Parker
 Sample Name: X-Sec 10 Riffle
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	13	13.00	13.00
0.062 - 0.125	14	14.00	27.00
0.125 - 0.25	14	14.00	41.00
0.25 - 0.50	11	11.00	52.00
0.50 - 1.0	2	2.00	54.00
1.0 - 2.0	0	0.00	54.00
2.0 - 4.0	0	0.00	54.00
4.0 - 5.7	0	0.00	54.00
5.7 - 8.0	0	0.00	54.00
8.0 - 11.3	0	0.00	54.00
11.3 - 16.0	0	0.00	54.00
16.0 - 22.6	0	0.00	54.00
22.6 - 32.0	2	2.00	56.00
32 - 45	2	2.00	58.00
45 - 64	4	4.00	62.00
64 - 90	2	2.00	64.00
90 - 128	1	1.00	65.00
128 - 180	16	16.00	81.00
180 - 256	15	15.00	96.00
256 - 362	0	0.00	96.00
362 - 512	4	4.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	0.08
D35 (mm)	0.2
D50 (mm)	0.45
D84 (mm)	195.2
D95 (mm)	250.93
D100 (mm)	512
Silt/Clay (%)	13
Sand (%)	41
Gravel (%)	8
Cobble (%)	34
Boulder (%)	4
Bedrock (%)	0

Total Particles = 100.

X-Sec 11 Pool



RIVERMORPH PARTICLE SUMMARY

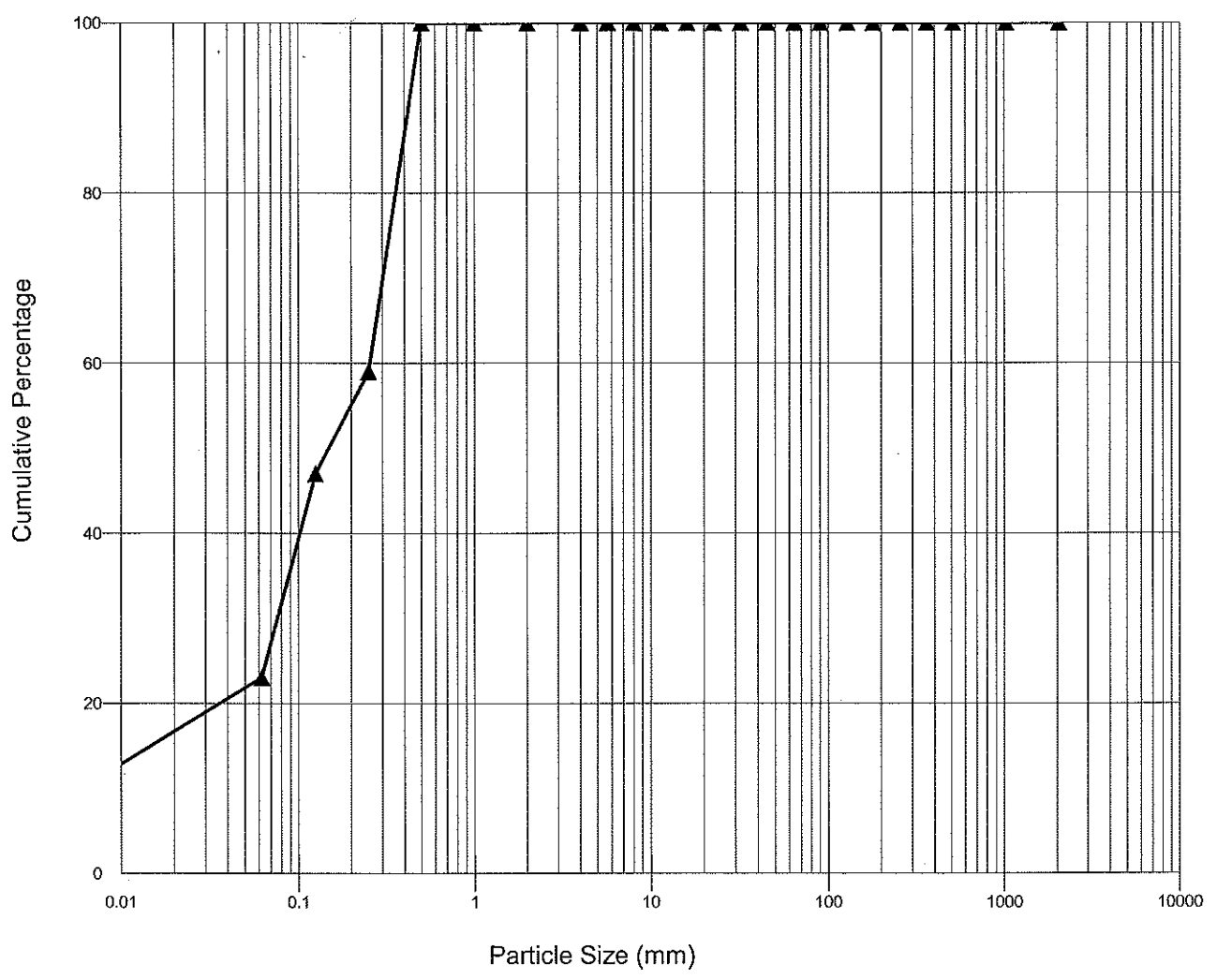
 River Name: Cat Creek Restored
 Reach Name: Parker
 Sample Name: X-Sec 11 Pool
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	22	22.00	22.00
0.062 - 0.125	19	19.00	41.00
0.125 - 0.25	22	22.00	63.00
0.25 - 0.50	33	33.00	96.00
0.50 - 1.0	0	0.00	96.00
1.0 - 2.0	0	0.00	96.00
2.0 - 4.0	0	0.00	96.00
4.0 - 5.7	0	0.00	96.00
5.7 - 8.0	0	0.00	96.00
8.0 - 11.3	0	0.00	96.00
11.3 - 16.0	0	0.00	96.00
16.0 - 22.6	1	1.00	97.00
22.6 - 32.0	1	1.00	98.00
32 - 45	1	1.00	99.00
45 - 64	1	1.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	0.05
D35 (mm)	0.11
D50 (mm)	0.18
D84 (mm)	0.41
D95 (mm)	0.49
D100 (mm)	64
Silt/Clay (%)	22
Sand (%)	74
Gravel (%)	4
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total Particles = 100.

Trib 2 X-Sec 1 Pool



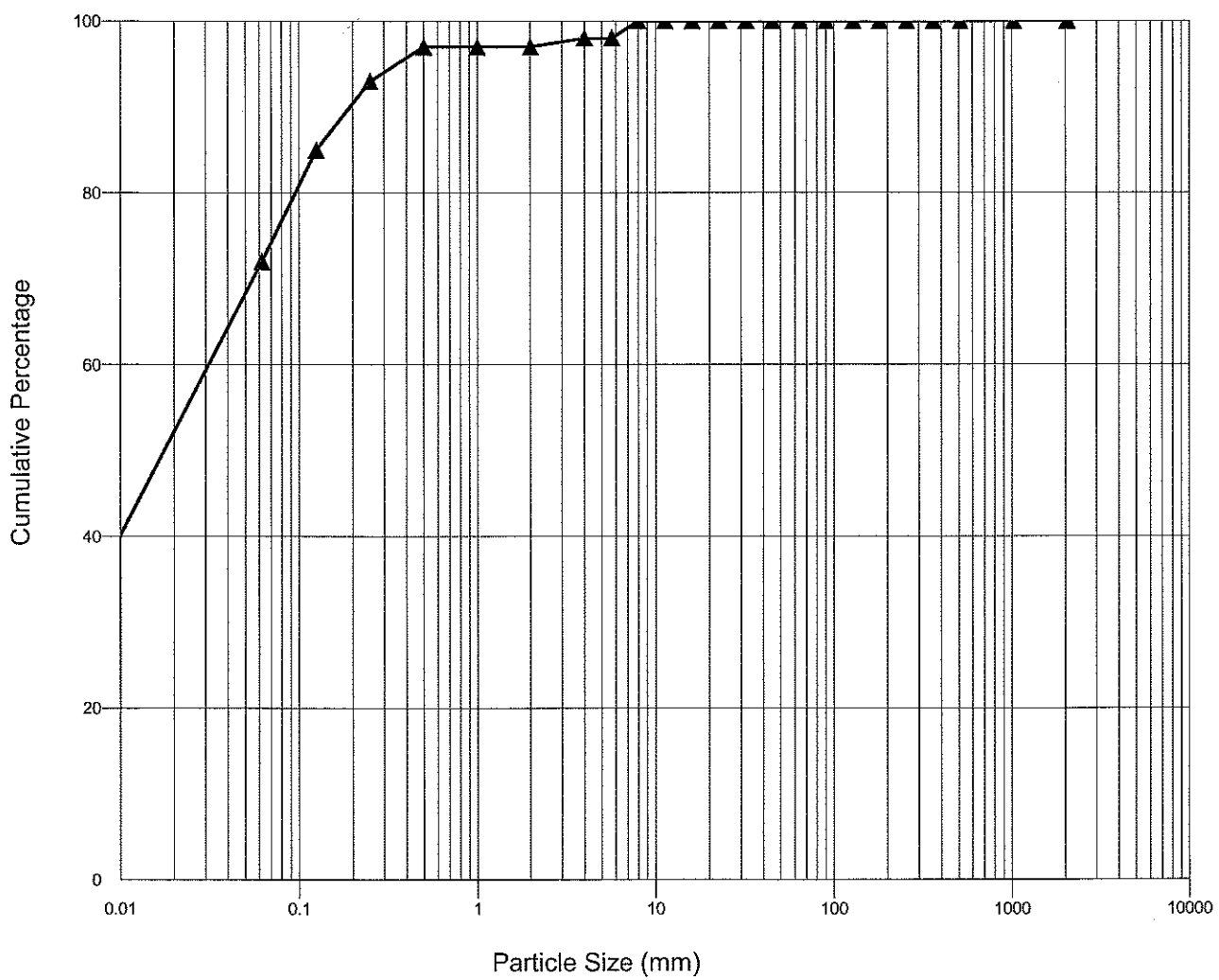
RIVERMORPH PARTICLE SUMMARY

River Name: Cat Creek Restored
 Reach Name: Trib 2
 Sample Name: Trib 2 X-Sec 1 Pool
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	23	23.00	23.00
0.062 - 0.125	24	24.00	47.00
0.125 - 0.25	12	12.00	59.00
0.25 - 0.50	41	41.00	100.00
0.50 - 1.0	0	0.00	100.00
1.0 - 2.0	0	0.00	100.00
2.0 - 4.0	0	0.00	100.00
4.0 - 5.7	0	0.00	100.00
5.7 - 8.0	0	0.00	100.00
8.0 - 11.3	0	0.00	100.00
11.3 - 16.0	0	0.00	100.00
16.0 - 22.6	0	0.00	100.00
22.6 - 32.0	0	0.00	100.00
32 - 45	0	0.00	100.00
45 - 64	0	0.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.04		
D35 (mm)	0.09		
D50 (mm)	0.16		
D84 (mm)	0.4		
D95 (mm)	0.47		
D100 (mm)	0.5		
Silt/Clay (%)	23		
Sand (%)	77		
Gravel (%)	0		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

Trib 2 X-Sec 2 Riffle



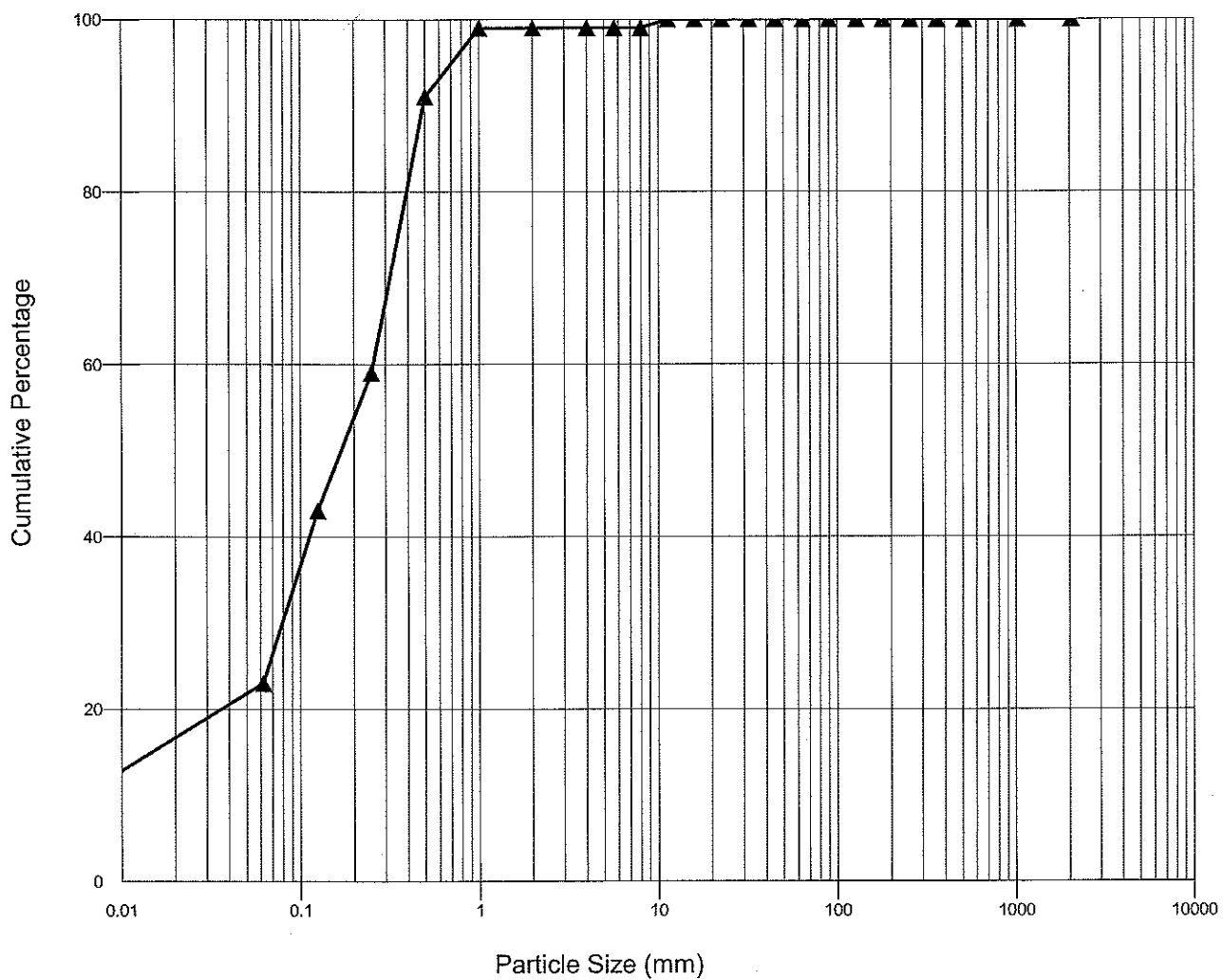
RIVERMORPH PARTICLE SUMMARY

 River Name: Cat Creek Restored
 Reach Name: Trib 2
 Sample Name: Trib 2 X-Sec 2 Riffle
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	72	72.00	72.00
0.062 - 0.125	13	13.00	85.00
0.125 - 0.25	8	8.00	93.00
0.25 - 0.50	4	4.00	97.00
0.50 - 1.0	0	0.00	97.00
1.0 - 2.0	0	0.00	97.00
2.0 - 4.0	1	1.00	98.00
4.0 - 5.7	0	0.00	98.00
5.7 - 8.0	2	2.00	100.00
8.0 - 11.3	0	0.00	100.00
11.3 - 16.0	0	0.00	100.00
16.0 - 22.6	0	0.00	100.00
22.6 - 32.0	0	0.00	100.00
32 - 45	0	0.00	100.00
45 - 64	0	0.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.01		
D35 (mm)	0.03		
D50 (mm)	0.04		
D84 (mm)	0.12		
D95 (mm)	0.38		
D100 (mm)	8		
Silt/Clay (%)	72		
Sand (%)	25		
Gravel (%)	3		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

Trib 3 X-Sec 1 Pool



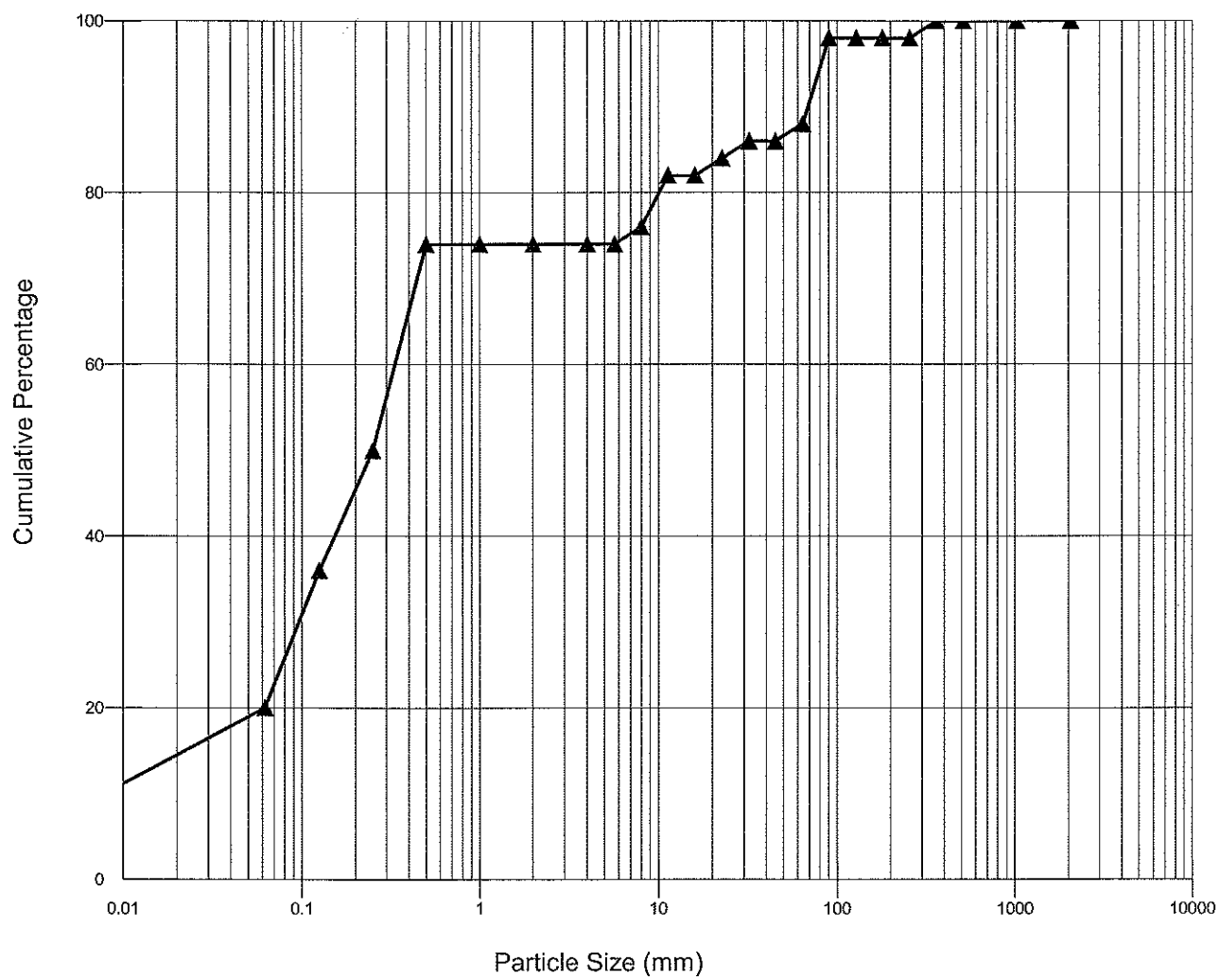
RIVERMORPH PARTICLE SUMMARY

 River Name: Cat Creek Restored
 Reach Name: Trib 3
 Sample Name: Trib 3 X-Sec 1 Pool
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	23	23.00	23.00
0.062 - 0.125	20	20.00	43.00
0.125 - 0.25	16	16.00	59.00
0.25 - 0.50	32	32.00	91.00
0.50 - 1.0	8	8.00	99.00
1.0 - 2.0	0	0.00	99.00
2.0 - 4.0	0	0.00	99.00
4.0 - 5.7	0	0.00	99.00
5.7 - 8.0	0	0.00	99.00
8.0 - 11.3	1	1.00	100.00
11.3 - 16.0	0	0.00	100.00
16.0 - 22.6	0	0.00	100.00
22.6 - 32.0	0	0.00	100.00
32 - 45	0	0.00	100.00
45 - 64	0	0.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.04		
D35 (mm)	0.1		
D50 (mm)	0.18		
D84 (mm)	0.45		
D95 (mm)	0.75		
D100 (mm)	11.3		
Silt/Clay (%)	23		
Sand (%)	76		
Gravel (%)	1		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

Trib 3 X-Sec 2 Riffle



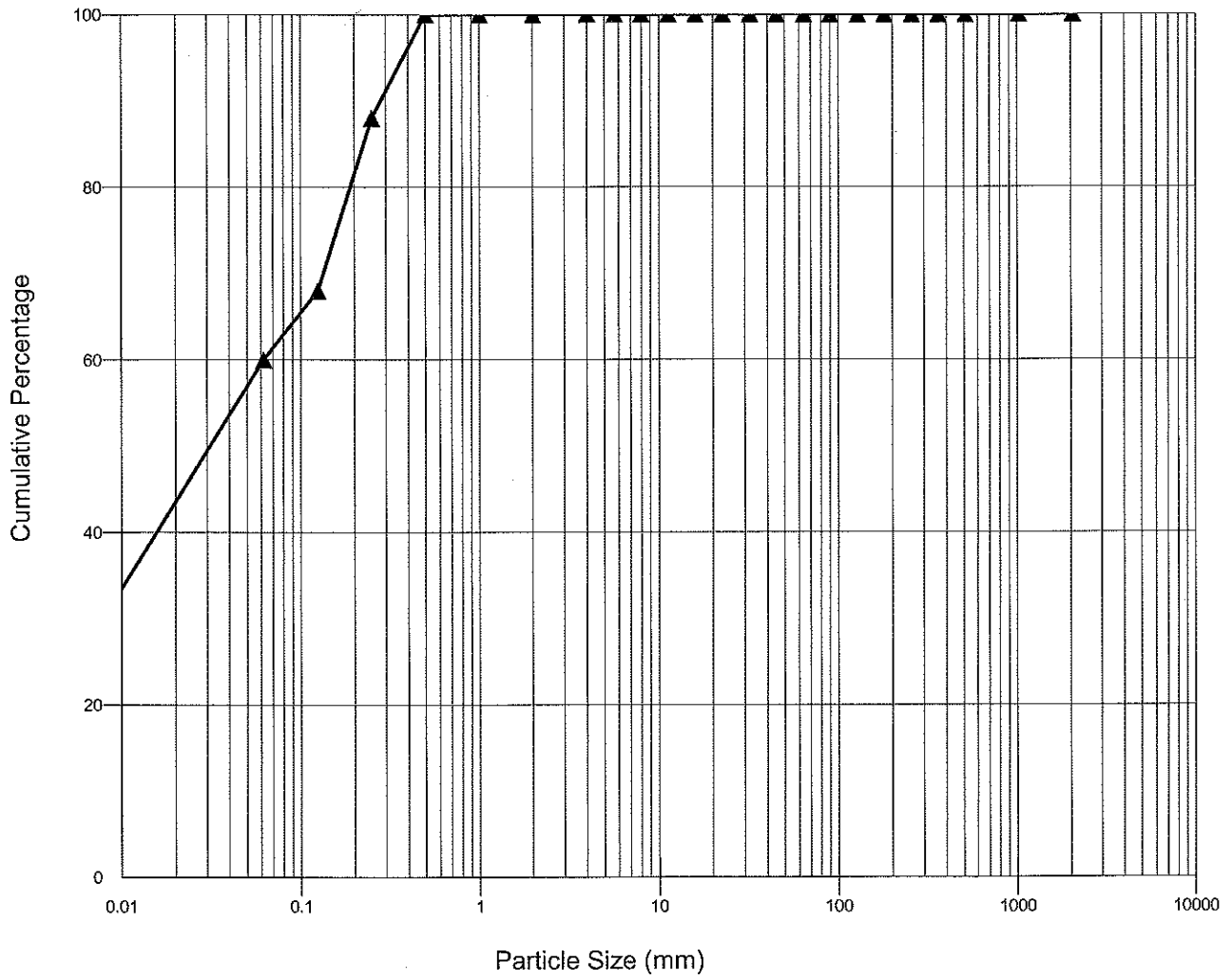
RIVERMORPH PARTICLE SUMMARY

River Name: Cat Creek Restored
 Reach Name: Trib 3
 Sample Name: Trib 3 X-Sec 2 Riffle
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	20	20.00	20.00
0.062 - 0.125	16	16.00	36.00
0.125 - 0.25	14	14.00	50.00
0.25 - 0.50	24	24.00	74.00
0.50 - 1.0	0	0.00	74.00
1.0 - 2.0	0	0.00	74.00
2.0 - 4.0	0	0.00	74.00
4.0 - 5.7	0	0.00	74.00
5.7 - 8.0	2	2.00	76.00
8.0 - 11.3	6	6.00	82.00
11.3 - 16.0	0	0.00	82.00
16.0 - 22.6	2	2.00	84.00
22.6 - 32.0	2	2.00	86.00
32 - 45	0	0.00	86.00
45 - 64	2	2.00	88.00
64 - 90	10	10.00	98.00
90 - 128	0	0.00	98.00
128 - 180	0	0.00	98.00
180 - 256	0	0.00	98.00
256 - 362	2	2.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.05		
D35 (mm)	0.12		
D50 (mm)	0.25		
D84 (mm)	22.6		
D95 (mm)	82.2		
D100 (mm)	361.99		
Silt/Clay (%)	20		
Sand (%)	54		
Gravel (%)	14		
Cobble (%)	10		
Boulder (%)	2		
Bedrock (%)	0		

Total Particles = 100.

Trib 4 X-Sec 1 Pool



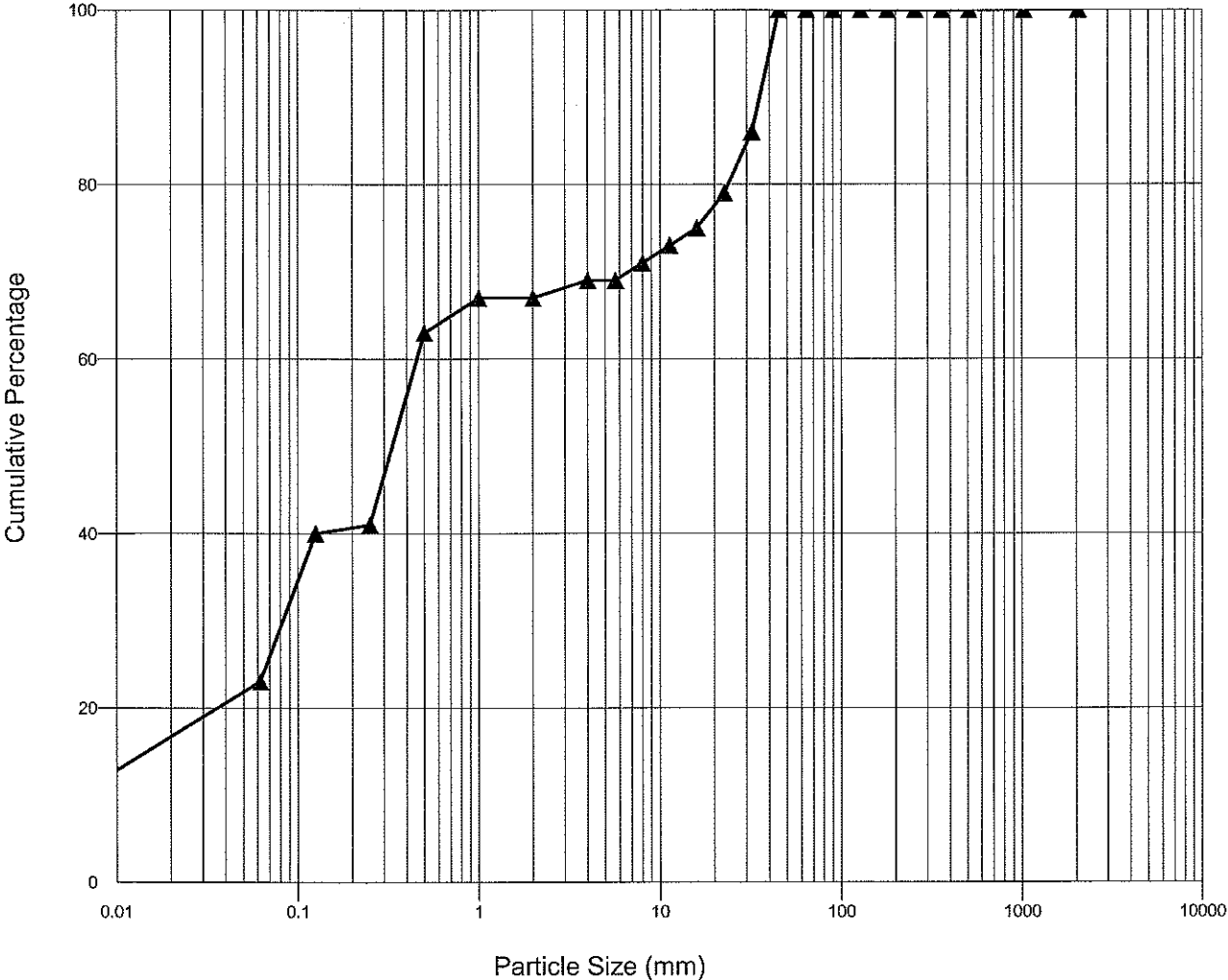
RIVERMORPH PARTICLE SUMMARY

 River Name: Cat Creek Restored
 Reach Name: Trib 4
 Sample Name: Trib 4 X-Sec 1 Pool
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	60	60.00	60.00
0.062 - 0.125	8	8.00	68.00
0.125 - 0.25	20	20.00	88.00
0.25 - 0.50	12	12.00	100.00
0.50 - 1.0	0	0.00	100.00
1.0 - 2.0	0	0.00	100.00
2.0 - 4.0	0	0.00	100.00
4.0 - 5.7	0	0.00	100.00
5.7 - 8.0	0	0.00	100.00
8.0 - 11.3	0	0.00	100.00
11.3 - 16.0	0	0.00	100.00
16.0 - 22.6	0	0.00	100.00
22.6 - 32.0	0	0.00	100.00
32 - 45	0	0.00	100.00
45 - 64	0	0.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.02		
D35 (mm)	0.04		
D50 (mm)	0.05		
D84 (mm)	0.23		
D95 (mm)	0.4		
D100 (mm)	0.5		
Silt/Clay (%)	60		
Sand (%)	40		
Gravel (%)	0		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

Trib 4 X-Sec 2 Riffle



RIVERMORPH PARTICLE SUMMARY

River Name: Cat Creek Restored
 Reach Name: Trib 4
 Sample Name: Trib 4 X-Sec 2 Riffle
 Survey Date: 06/10/2010

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	23	23.00	23.00
0.062 - 0.125	17	17.00	40.00
0.125 - 0.25	1	1.00	41.00
0.25 - 0.50	22	22.00	63.00
0.50 - 1.0	4	4.00	67.00
1.0 - 2.0	0	0.00	67.00
2.0 - 4.0	2	2.00	69.00
4.0 - 5.7	0	0.00	69.00
5.7 - 8.0	2	2.00	71.00
8.0 - 11.3	2	2.00	73.00
11.3 - 16.0	2	2.00	75.00
16.0 - 22.6	4	4.00	79.00
22.6 - 32.0	7	7.00	86.00
32 - 45	14	14.00	100.00
45 - 64	0	0.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	0.04
D35 (mm)	0.11
D50 (mm)	0.35
D84 (mm)	29.31
D95 (mm)	40.36
D100 (mm)	45
Silt/Clay (%)	23
Sand (%)	44
Gravel (%)	33
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total Particles = 100.

APPENDIX C

Vegetation Data

Table 7 – Vegetation Plot Data

Table 8 – Vegetation Plot Attribute Tables

Table 9 – Planted Vegetation

CVS Output Tables

Vegetation Plot Photos

**Table 7. Vegetation Plot Attribute Data
Cat Creek Stream and Wetland Restoration - EEP # 71 (SCO # 050657901)**

Plot ID	Community Type	Planting Zone ID	Reach ID	Associated Gauge(s)	Method¹	CVS Level
1	Swamp Forest Bog Complex	Wetlands	1	MW 1, MW 2	CVS	2
2	Swamp Forest Bog Complex	Wetlands	1	MW 4	CVS	2
3	Low Mountain Alluvial Forest	Well Drained Riparian Floodplain	1	NA	CVS	2
4	Swamp Forest Bog Complex	Wetlands	1	MW 5	CVS	2
5	Mesic Mixed Hardwood Forest	Well Drained Riparian Floodplain	1	MW 6	CVS	2
6	Swamp Forest Bog Complex	Wetlands	1	MW 8	CVS	2
7	Swamp Forest Bog Complex	Wetlands	1	MW 11	CVS	2
8	Swamp Forest Bog Complex	Wetlands	1	MW 10	CVS	2
9	Swamp Forest Bog Complex	Wetlands	1	NA	CVS	2
10	Swamp Forest Bog Complex	Wetlands	1	NA	CVS	2
11	Swamp Forest Bog Complex	Wetlands	1	MW 13	CVS	2
12	Swamp Forest Bog Complex	Wetlands	1	MW 14	CVS	2
13	Swamp Forest Bog Complex	Wetlands	1	MW 17	CVS	2
14	Swamp Forest Bog Complex	Wetlands	1	NA	CVS	2

Table 8. Stem Counts for Each Species by Plot Cat Creek/EEP Project # 71 (SCO # 050657901)

Species		Plots*														Initial Totals
Scientific Name	Common Name	01	02	03	04	05	06	07	08	09	10	11	12	13	14	
Shrubs																
<i>Alnus serrulata</i>	Hazel alder		2	5		1	5	1	3	2	2	5	1		2	29
<i>Sambucus canadensis</i>	Common Elderberry							3			1				2	6
<i>Cephalanthus occidentalis</i>	Common buttonbush					1				1						2
Total Shrubs			2	5	0	2	5	4	3	3	3	5	1	0	4	37
Trees																
<i>Aronia arbutifolia</i>	Red Chokeberry						2	1		1					3	7
<i>Betula nigra</i>	River birch		2		3		2		4	1		3		2		17
<i>Carpinus caroliniana</i>	American hornbeam	3		3	2	1			5	1	1		3		1	20
<i>Cornus florida</i>	Flowering dogwood													1		1
<i>Fagus grandifolia</i>	American beech						1							1	3	5
<i>Fraxinus pennsylvanica</i>	Green ash			1	1	3	1		2			2		4	1	15
<i>Juglans nigra</i>	black walnut	1														1
<i>Liriodendron tulipifera</i>	Tuliptree			3		2	1					1				7
<i>Nyssa sylvatica</i>	Blackgum	3														3
<i>Platanus occidentalis</i>	American sycamore	3					1								1	5
<i>Quercus phellos</i>	Willow oak		1		2	1	5	4	3	4		2	2			24
<i>Quercus rubra</i>	Northern red oak	1														1
<i>Ulmus americana</i>	American elm									3			1			4
<i>Unknown</i>					2						1					3
Total Trees		11	3	7	10	7	13	5	14	10	2	8	6	8	9	113
TABLE SUMMARY																
	<i>Total Stems of planted woody vegetation</i>	11	5	12	10	9	18	9	17	13	5	13	7	8	13	150
Current Density																
	Shrubs per acre	0	81	202	0	81	202	162	121	121	121	202	40	0	162	166
	Shrubs per hectare	0	200	500	0	200	500	400	300	300	300	500	100	0	400	411
	Trees per acre	445	121	283	405	283	526	202	567	405	81	324	243	324	364	508
	Trees per hectare	1100	300	700	1000	700	1300	500	1400	1000	200	800	600	800	900	1256
	Total stems per acre	445	202	486	405	364	728	364	688	526	202	526	283	324	526	674
	Total stems per hectare	1100	500	1200	1000	900	1800	900	1700	1300	500	1300	700	800	1300	1667

Table 8. Quantities of Stems Planted Cat Creek/EEP # 71 (SCO # 050657901)

Species		Quantity
Scientific Name	Common Name	
Shrubs		
<i>Alnus serrulata</i>	Hazel alder	1000
<i>Sambucus canadensis</i>	Common Elderberry	500
<i>Cephalanthus occidentalis</i>	Common buttonbush	500
<i>Asimina triloba</i>	Paw paw	400
Trees		
<i>Aronia arbutifolia</i>	Red Chokeberry	400
<i>Betula nigra</i>	River birch	1000
<i>Carpinus caroliniana</i>	American hornbeam	1200
<i>Cornus florida</i>	Flowering dogwood	700
<i>Fagus grandifolia</i>	American beech	1500
<i>Fraxinus pennsylvanica</i>	Green ash	600
<i>Juglans nigra</i>	Black walnut	200
<i>Liriodendron tulipifera</i>	Tuliptree	400
<i>Nyssa sylvatica</i>	Blackgum	600
<i>Platanus occidentalis</i>	American sycamore	1000
<i>Quercus phellos</i>	Willow oak	1700
<i>Quercus rubra</i>	Northern red oak	200
<i>Ulmus americana</i>	American elm	200
<i>Celtis laevigata</i>	Sugarberry	1200
<i>Carya tomentosa</i>	Mockernut hickory	200
	<i>Total Stems of planted woody vegetation</i>	13500

Report Prepared By Ron Johnson
Date Prepared 12/1/2010 9:07

database name cvs-eep-entrytool-v2.2.7.mdb
database location Q:\92531\Monitoring\Vegetation
computer name USRAL3LT014
file size 35991552

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.

PROJECT SUMMARY-----

Project Code		1
project Name	Cat Creek	
Description		
River Basin	Little Tennessee	
length(ft)		5500
stream-to-edge width (ft)		50
area (sq m)		51091.5
Required Plots (calculated)		13
Sampled Plots		14

Living planted stems, excluding live stakes, per acre: Negative (red) numbers indicate the project failed to reach requirements in a particular year

Project Code	Project Name	River Basin	Year 0 (baseline)
01	Cat Creek	Little Tennessee	

Total stems, including planted stems of all kinds (including live stakes) and natural/volunteer stems:

Project Code	Project Name	River Basin	Year 0 (baseline)
01	Cat Creek	Little Tennessee	

plot	Plot Level	Year	Latitude/Northing	Longitude/Easting	Zone	Datum	Date Sampled	Planted Living Stems	Planted Living Stems EXCLUDING Live Stakes	Dead/Missing Stems	Natural (Volunteer) Stems	Total Living Stems	Total Living Stems EXCLUDING Live Stakes	Planted Living Stems per ACRE	Planted Living Stems EXCLUDING Live Stakes PER ACRE	Natural (Volunteer) Stems PER ACRE	Total Living Stems PER ACRE	Total Living Stems EXCLUDING Live Stakes PER ACRE	# species	
001-01-0001	1	0						11	0	0	0	11	0							5
001-01-0010	1	0						5	0	1	0	5	0							4
001-01-0011	1	0						13	0	0	0	13	0							5
001-01-0012	1	0						7	0	1	0	7	0							4
001-01-0013	1	0						8	0	0	0	8	0							4
001-01-0014	1	0						13	0	0	0	13	0							7
001-01-0002	1	0						5	0	0	0	5	0							3
001-01-0003	1	0						12	0	0	0	12	0							4
001-01-0004	1	0						10	0	0	0	10	0							5
001-01-0005	1	0						9	0	0	0	9	0							6
001-01-0006	1	0						18	0	0	0	18	0							8
001-01-0007	1	0						9	0	0	0	9	0							4
001-01-0008	1	0						17	0	0	0	17	0							5
001-01-0009	1	0	555224.1527	707324.0255		NAD83/WGS84		13	0	0	0	13	0							7

vigor	Count	Percent
0	2	1.3
1	1	0.7
2	8	5.3
3	23	15.1
4	118	77.6

	Species	CommonName	4	3	2	1	0	Missing	Unknown
	Alnus serrulata	hazel alder	26	3					
	Aronia arbutifolia	Red Chokeberry	7						
	Betula nigra	river birch	12	3	2				
	Cephalanthus occidentalis	common buttonbush	1			1			
	Cornus florida	flowering dogwood	1						
	Fraxinus pennsylvanica	green ash	14	1					
	Juglans nigra	black walnut	1						
	Nyssa sylvatica	blackgum	3						
	Quercus phellos	willow oak	21	3			2		
	Sambucus canadensis	Common Elderberry	3	1	2				
	Carpinus caroliniana	American hornbeam	13	5	2				
	Fagus grandifolia	American beech	2	3					
	Quercus rubra	northern red oak	1						
	Liriodendron tulipifera	tuliptree	6		1				
	Platanus occidentalis	American sycamore	4	1					
	Ulmus americana	American elm	1	2	1				
	Unknown		2	1					
TOT:	17	16	118	23	8	1	2		

Damage	Count	Percent Of Stems
(no damage)	151	99.3
(other damage)	1	0.7

	Species	CommonName	Count of Damage Categories		
			(no damage)	(other damage)	
	Alnus serrulata	hazel alder	0	29	
	Aronia arbutifolia	Red Chokeberry	0	7	
	Betula nigra	river birch	0	17	
	Carpinus caroliniana	American hornbeam	0	20	
	Cephalanthus occidentalis	common buttonbush	0	2	
	Cornus florida	flowering dogwood	0	1	
	Fagus grandifolia	American beech	0	5	
	Fraxinus pennsylvanica	green ash	0	15	
	Juglans nigra	black walnut	0	1	
	Liriodendron tulipifera	tuliptree	0	7	
	Nyssa sylvatica	blackgum	0	3	
	Platanus occidentalis	American sycamore	0	5	
	Quercus phellos	willow oak	1	25	1
	Quercus rubra	northern red oak	0	1	
	Sambucus canadensis	Common Elderberry	0	6	
	Ulmus americana	American elm	0	4	
	Unknown		0	3	
TOT:	17	16	1	151	1

	<i>plot</i>	<i>Count of Damage Categories</i>		
		<i>(no damage)</i>	<i>(other damage)</i>	
	001-01-0001	0	11	
	001-01-0002	0	5	
	001-01-0003	0	12	
	001-01-0004	0	10	
	001-01-0005	1	8	1
	001-01-0006	0	18	
	001-01-0007	0	9	
	001-01-0008	0	17	
	001-01-0009	0	13	
	001-01-0010	0	6	
	001-01-0011	0	13	
	001-01-0012	0	8	
	001-01-0013	0	8	
	001-01-0014	0	13	
TOT:	14	1	151	1

	Comment	Species	CommonName	Total Planted Stems			plot 001-01-0001													
				# plots	avg# stems															
		Alnus serrulata	hazel alder	29	11	2.64		2	5		1	5	1	3	2	2	5	1		2
		Aronia arbutifolia	Red Chokeberry	7	4	1.75					2	1		1						3
		Betula nigra	river birch	17	7	2.43		2		3		2		4	1		3		2	
		Carpinus caroliniana	American hornbeam	20	9	2.22	3		3	2	1			5	1	1		3		1
		Cephalanthus occidentalis	common buttonbush	2	2	1					1				1					
		Cornus florida	flowering dogwood	1	1	1													1	
		Fagus grandifolia	American beech	5	3	1.67						1							1	3
		Fraxinus pennsylvanica	green ash	15	8	1.88			1	1	3	1		2			2		4	1
		Juglans nigra	black walnut	1	1	1	1													
		Liriodendron tulipifera	tuliptree	7	4	1.75			3		2	1					1			
		Nyssa sylvatica	blackgum	3	1	3	3													
		Platanus occidentalis	American sycamore	5	3	1.67	3					1								1
		Quercus phellos	willow oak	24	9	2.67		1		2	1	5	4	3	4		2	2		
		Quercus rubra	northern red oak	1	1	1	1													
		Sambucus canadensis	Common Elderberry	6	3	2							3			1				2
		Ulmus americana	American elm	4	2	2									3			1		
		Unknown		3	2	1.5				2						1				
TOT:	0	17	16	150	17		11	5	12	10	9	18	9	17	13	5	13	7	8	13



Vegetation Plot 3 – 6/10/2010 - Baseline Monitoring



Vegetation Plot 4 – 6/10/2010 - Baseline Monitoring



Vegetation Plot 8 – 6/10/2010 - Baseline Monitoring



Vegetation Plot 11 – 6/10/2010 - Baseline Monitoring



Vegetation Plot 13 – 6/10/2010 - Baseline Monitoring



Vegetation Plot 14 – 6/10/2010 - Baseline Monitoring

APPENDIX D

Baseline Monitoring Photos



Photo Point 1 – 6/10/2010 – Swartwout Tract Sta. 16+40 - Baseline Monitoring



Photo Point 2 – 6/10/2010 – Swartwout Tract Sta. 21+75 facing upstream - Baseline Monitoring



Photo Point 3 – 6/10/2010 – Trib 1 Sta 11+60 facing upstream - Baseline Monitoring



Photo Point 4 – 6/10/2010 – Sta 27+50 Confluence Trib 1 and Cat Creek - Baseline Monitoring



Photo Point 5 – 6/10/2010 – Parker Tract Sta. 36+30 facing upstream - Baseline Monitoring



Photo Point 6 – 2/17/2010 – Parker Tract Sta. 45+20 - Baseline Monitoring



Photo Point 7 – 2/17/2010 – Trib 3 Sta 10+20 - Baseline Monitoring



Photo Point 8 – 6/10/2010 – Parker Tract Sta. 48+00 - Baseline Monitoring



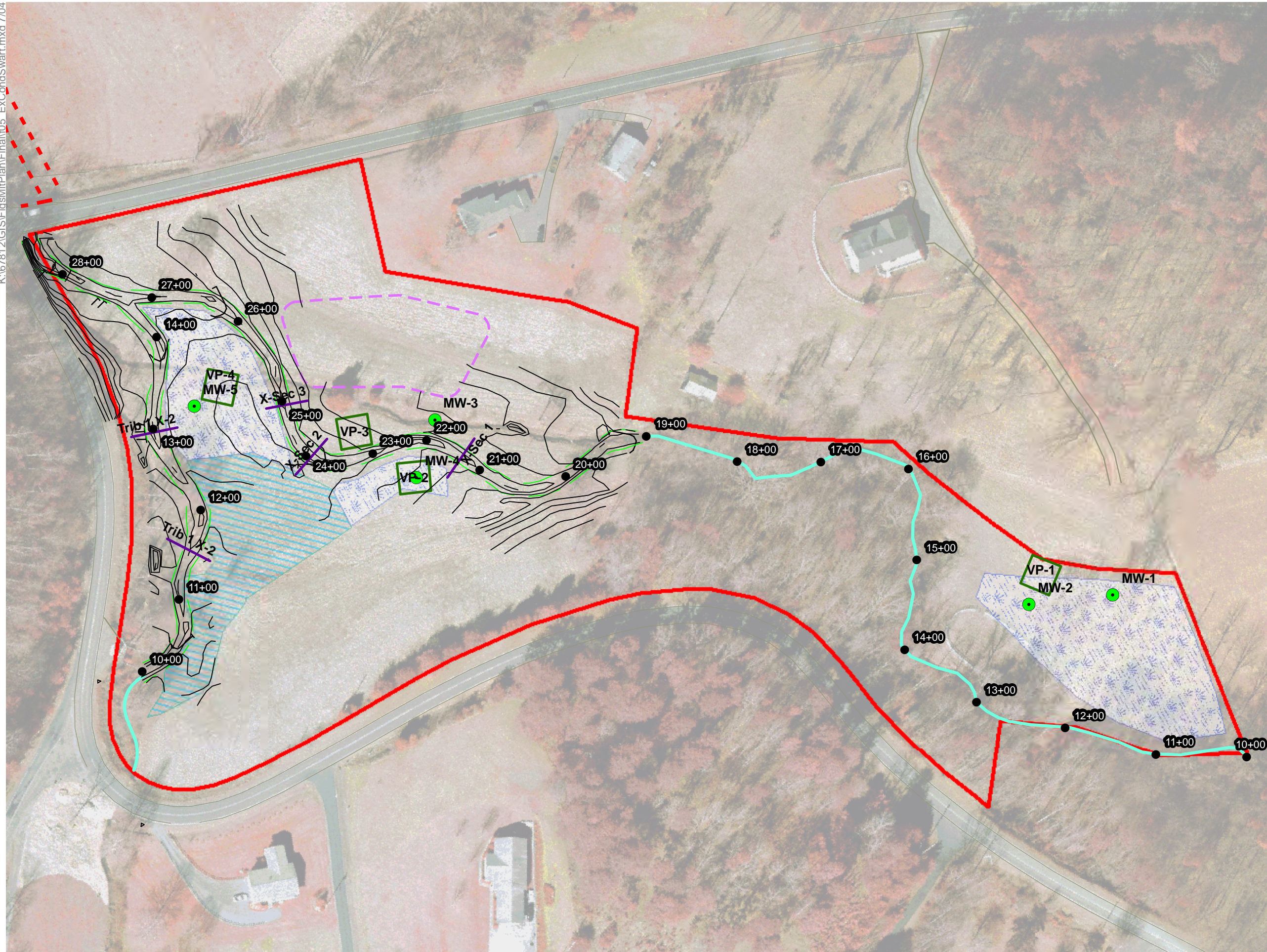
Photo Point 9 – 2/17/2010 – Preserve Sta. 62+10 facing downstream - Baseline Monitoring



Photo Point 10 – 2/17/2010 – Trib 4 Confluence facing upstream - Baseline Monitoring

APPENDIX E

As-Built Plan Sheets



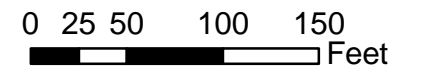
Legend

Property Line
 Conservation Easement

Environmentally Sensitive Area
 Cross Section

Vegetation Plots
 Monitor Well

Wetland Mitigation
 Wetland Enhancement
 Wetland Restoration



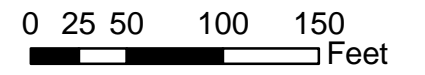
MONITORING PLAN

Baseline Monitoring Report
 Cat Creek Stream and Wetland
 Restoration Site (EEP #71)
 Macon County, North Carolina



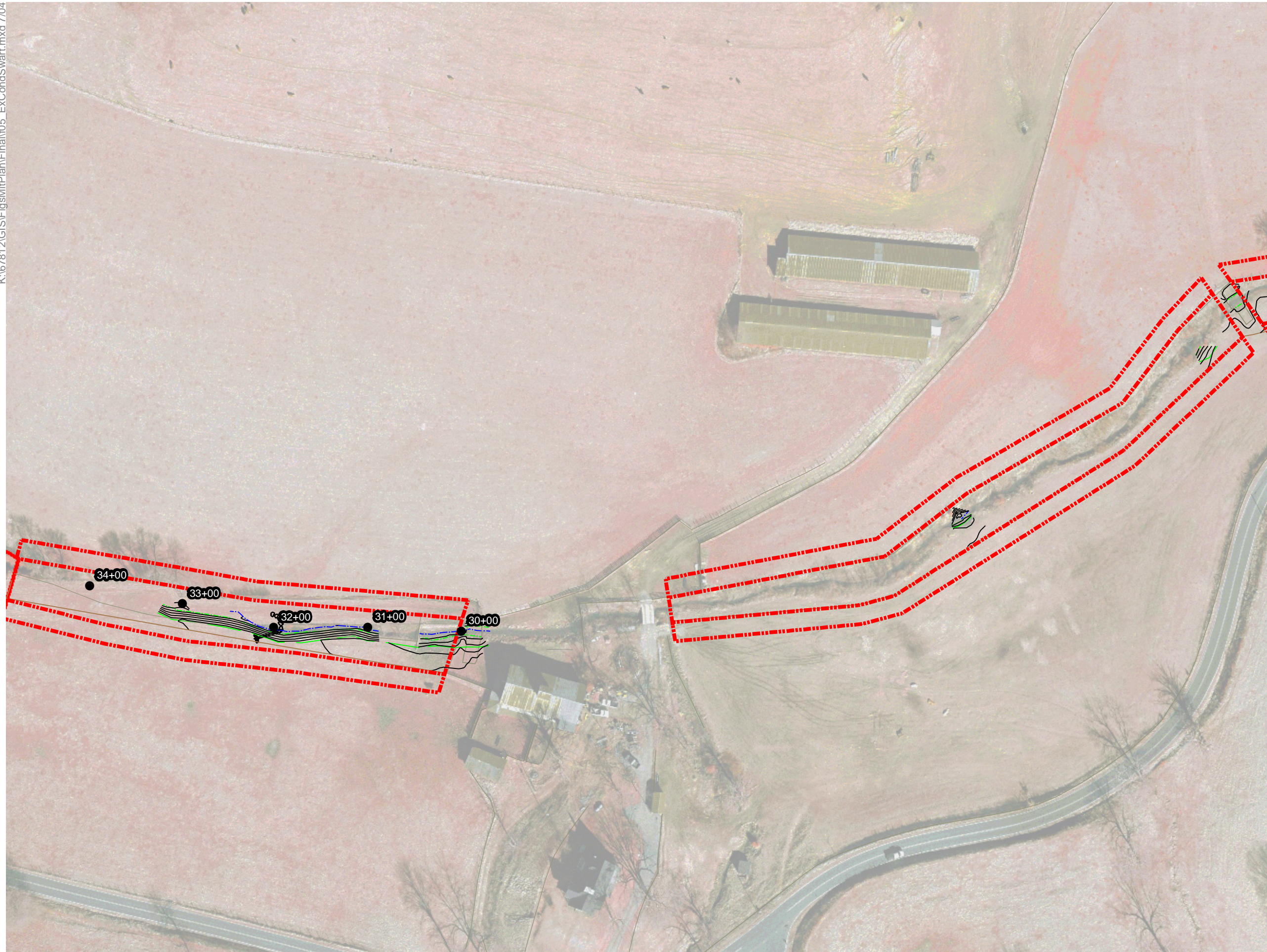
Legend

- Property Line
- Conservation Easement
- Environmentally Sensitive Area
- Cross Section
- Vegetation Plots
- Monitor Well
- Wetland Mitigation
 - Wetland Enhancement
 - Wetland Restoration



MONITORING PLAN

Baseline Monitoring Report
Cat Creek Stream and Wetland
Restoration Site (EEP #71)
Macon County, North Carolina



Legend

Property Line

Conservation Easement

Environmentally Sensitive Area

Cross Section

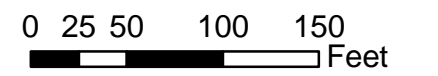
Vegetation Plots

Monitor Well

Wetland Mitigation

Wetland Enhancement

Wetland Restoration



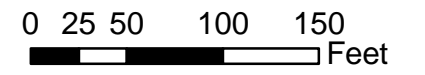
MONITORING PLAN

Baseline Monitoring Report
Cat Creek Stream and Wetland
Restoration Site (EEP #71)
Macon County, North Carolina



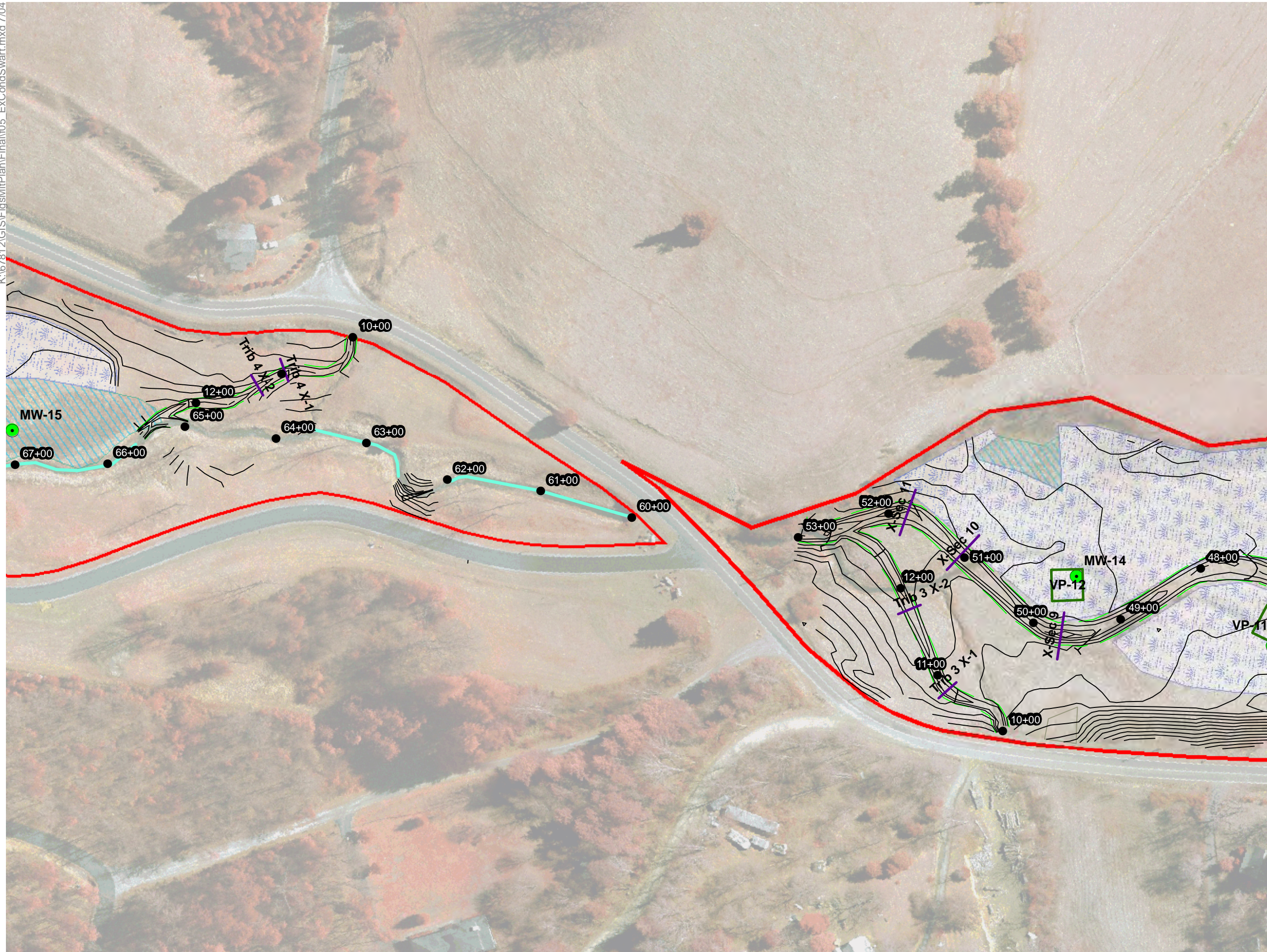
Legend

- Property Line**
— (Red solid line)
- Conservation Easement**
- - - (Red dashed line)
- Environmentally Sensitive Area**
- - - (Purple dashed line)
- Cross Section**
— (Purple solid line)
- Vegetation Plots**
□ (Green outline)
- Monitor Well**
● (Green circle)
- Wetland Mitigation**
 - ▨ (Light blue hatched) Wetland Enhancement
 - ▨ (Blue hatched) Wetland Restoration



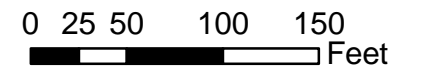
MONITORING PLAN

Baseline Monitoring Report
Cat Creek Stream and Wetland
Restoration Site (EEP #71)
Macon County, North Carolina



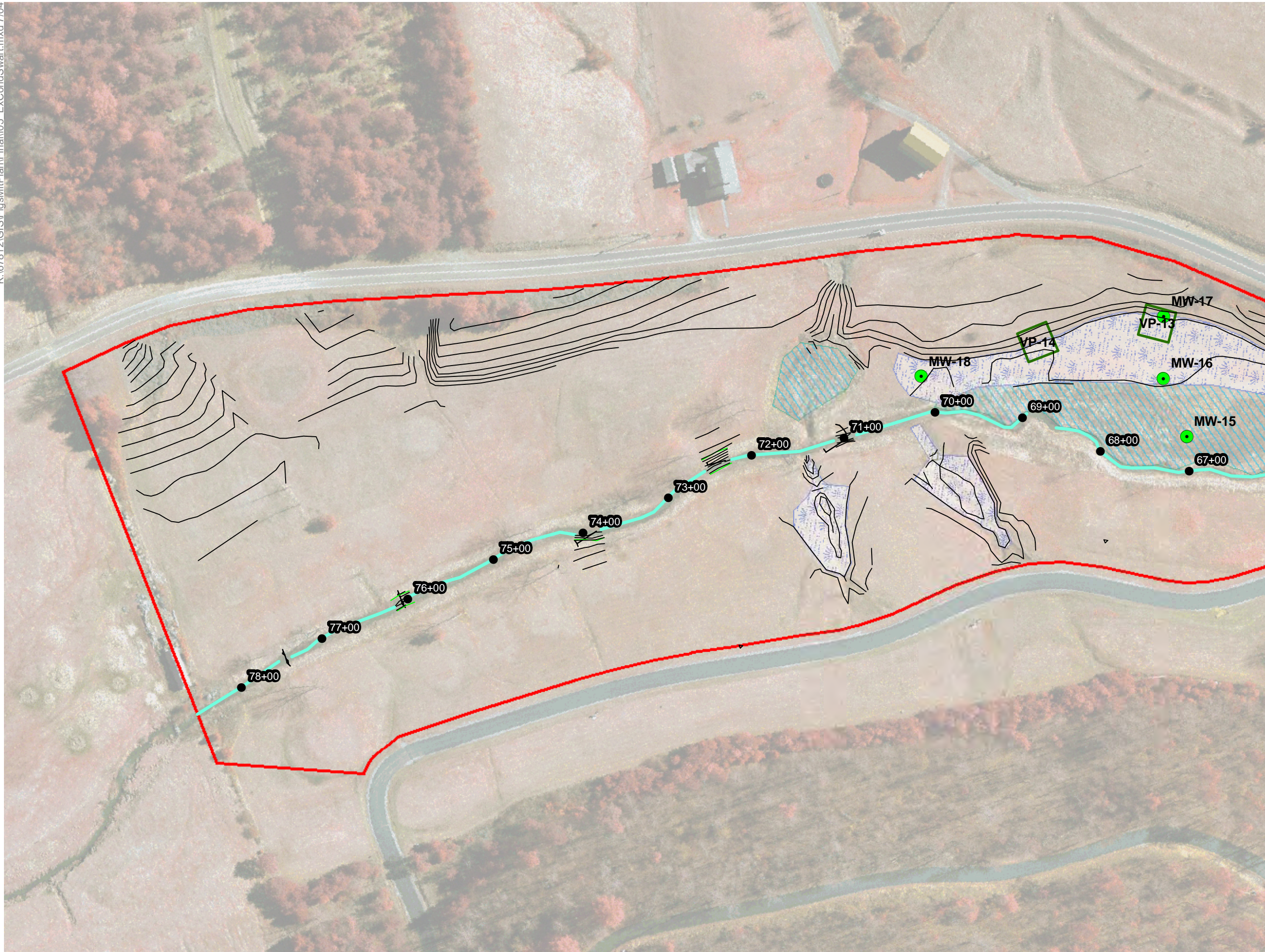
Legend

- Property Line**
- Conservation Easement**
- Environmentally Sensitive Area**
- Cross Section**
- Vegetation Plots**
- Monitor Well**
- Wetland Mitigation**
 - Wetland Enhancement
 - Wetland Restoration



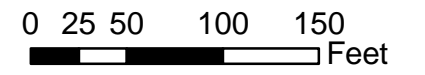
MONITORING PLAN

Baseline Monitoring Report
Cat Creek Stream and Wetland
Restoration Site (EEP #71)
Macon County, North Carolina



Legend

- Property Line
- Conservation Easement
- Environmentally Sensitive Area
- Cross Section
- Vegetation Plots
- Monitor Well
- Wetland Mitigation
 - Wetland Enhancement
 - Wetland Restoration



MONITORING PLAN

Baseline Monitoring Report
Cat Creek Stream and Wetland
Restoration Site (EEP #71)
Macon County, North Carolina

RECORD DRAWING

AS-BUILT SURVEY OF CAT CREEK STREAM & WETLAND RESTORATION

SCO# 050657901

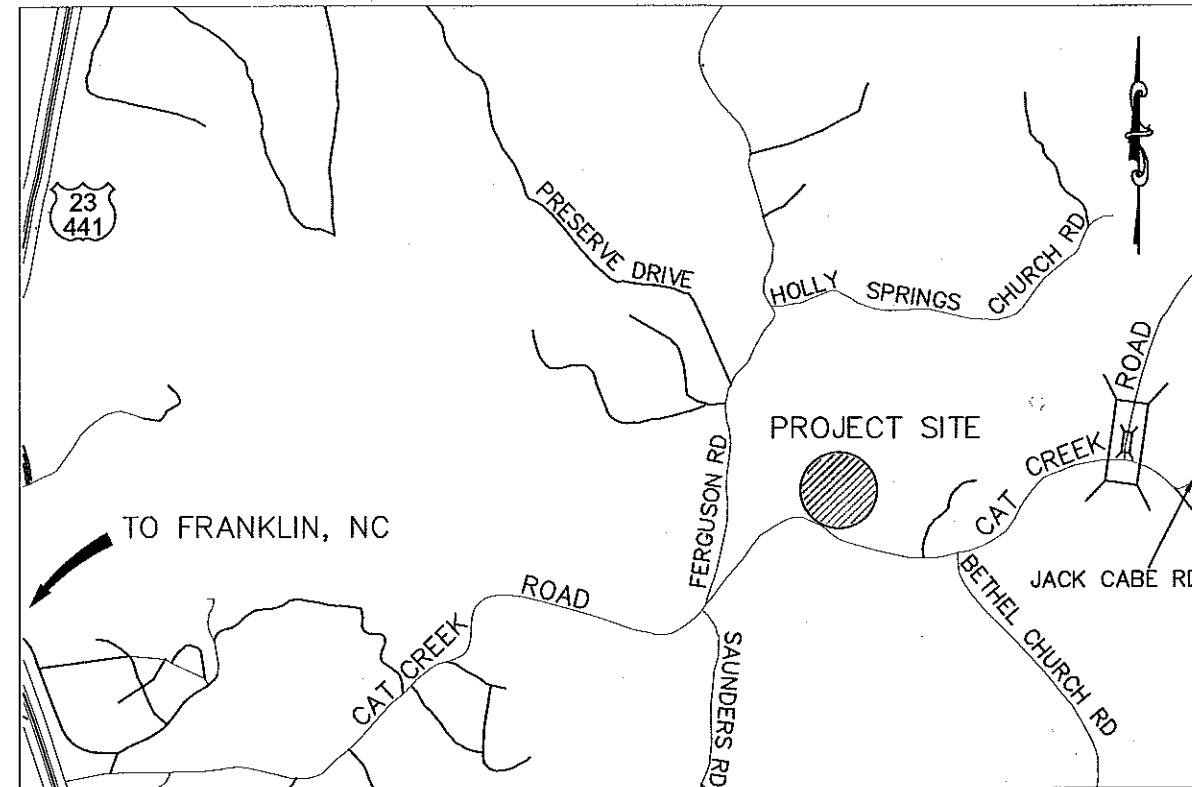
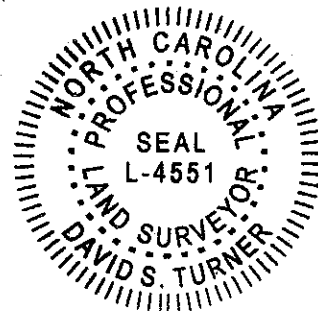
I, DAVID S. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HERON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 30th DAY OF June, 2010.

David S. Turner
DAVID S. TURNER, P.L.S. #L-4551



I, DAVID S. TURNER, CERTIFY THAT THESE PLANS WERE DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION AND THAT THE RATIO OF PRECISION AS CALCULATED IS 1: 10,000 +. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 30th DAY OF June, 2010.

David S. Turner
DAVID S. TURNER, P.L.S. #L-4551



VICINITY MAP
NOT TO SCALE

SHEET INDEX

- SHEET 1 - TITLE
- SHEET 2 - SWARTOUT TRACT
- SHEET 3 - LONGITUDINAL PROFILES 1 & 2
- SHEET 4 - WALDROOP TRACT
- SHEET 5 - PARKER TRACT
- SHEET 6 - PARKER TRACT
- SHEET 7 - LONGITUDINAL PROFILE 3
- SHEET 8 - LONGITUDINAL PROFILES 4 & 5
- SHEET 9 - EXISTING PRESERVE TRACT
- SHEET 10 - EXISTING PRESERVE TRACT

GENERAL NOTES

1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
2. THE VERTICAL DATUM IS NGVD 29.
3. THE BASIS OF BEARINGS IS NCGS STATE PLANE GRID COORDINATES NAD83 DATUM.
4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYENCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
5. SEE SHEETS 3, 7, 8, AND 9 FOR LONGITUDINAL PROFILE DATA.
6. REPRESENTATIVE CROSS-SECTIONS ARE PRESENTED ON THE SHEET WHERE THE CROSS-SECTION WAS TAKEN. ALL CROSS-SECTIONS ARE SHOWN FROM LEFT BANK TO RIGHT BANK.

REFERENCES:

OWNER:
NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM
1652 MAIL SERVICE CENTER
RALEIGH, NC 27099-1652
(919)715-0476
EEP PROJ. MGR.: PAUL WIESNER
REVIEW COORDINATOR: SALAM MURTADA

CONTRACTOR:
FLUVIAL SOLUTIONS, INC
RALEIGH, NC
(919)821-4300

DESIGNER:
EARTH TECH
RALEIGH, NC
(919)854-6210
EXISTING CONDITIONS & BOUNDARY DATA PROVIDED BY EARTH TECH

LEGEND:

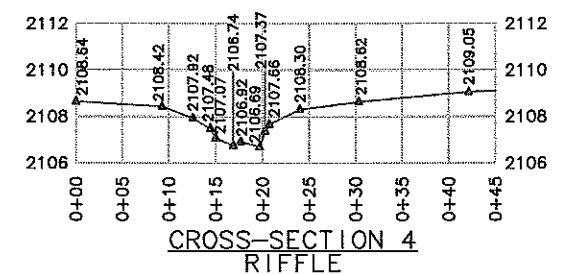
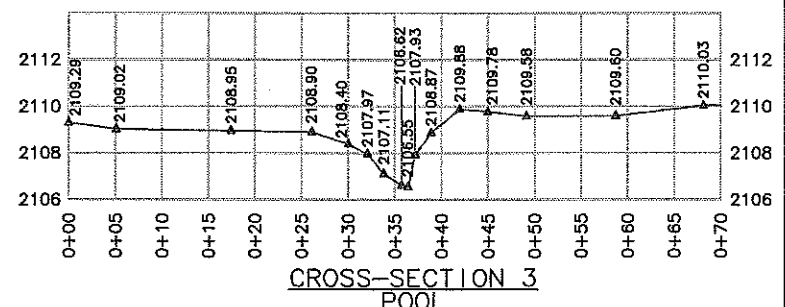
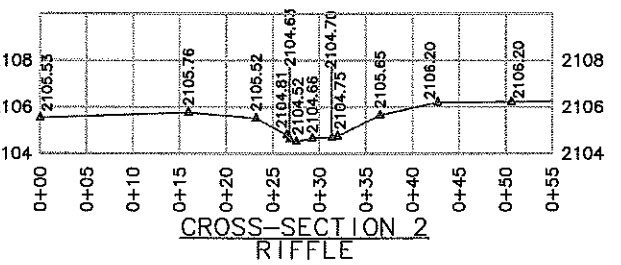
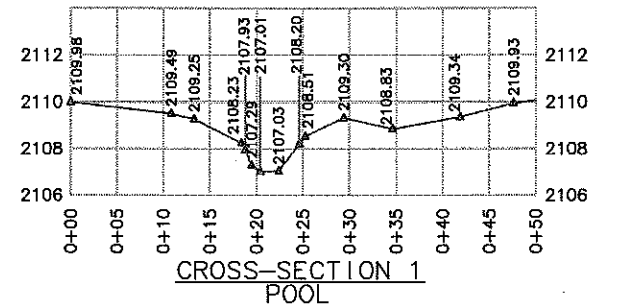
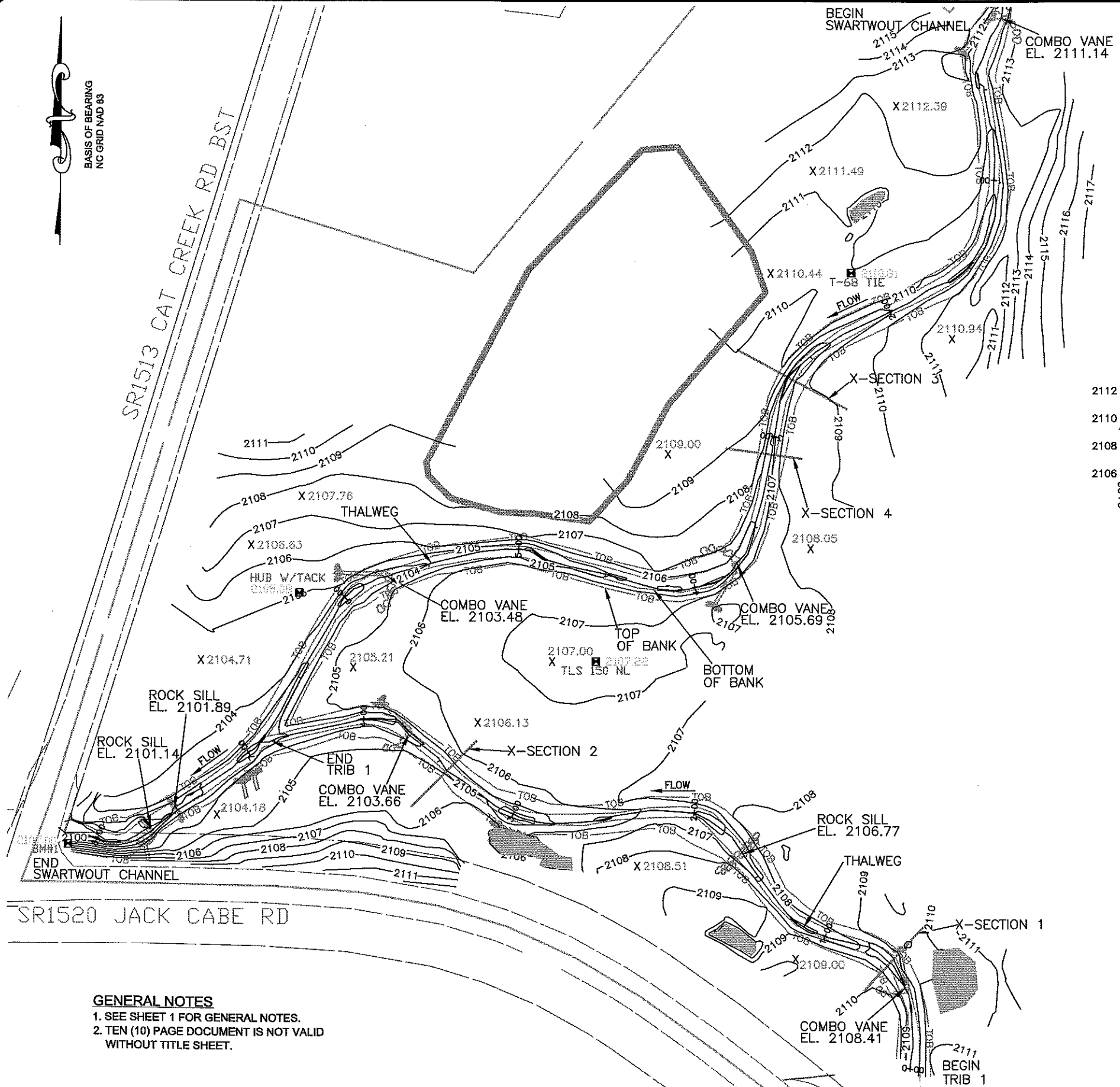
- THALWEG
- TOP OF BANK
- BOTTOM OF BANK
- CENTERLINE FLOW
- OPEN WATER AREA*
- EDGE OF WATER
- BENCH MARK/CONTROL

(* AT TIME OF SURVEY)

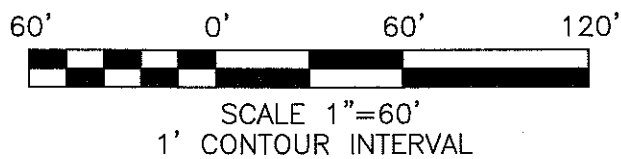
REVISIONS, DATE AND INITIAL		NORTH CAROLINA
	TURNER LAND SURVEYING, PLLC <small>3201 Glenridge Drive, Raleigh, NC 27604 -- (919)875-1378 Lturner@tlr.com -- Dturner15@ncr.com www.TURNERLANDSURVEYING.com</small>	FRANKLIN
	TITLE AS-BUILT SURVEY OF CAT CREEK STREAM & WETLAND RESTORATION SCO# 050657901	MAGON COUNTY
	DATE: 06/01/2010	
	SURVEYED BY: DST/EGT	
	DRAWN BY: DST/EGT	
	REVIEWED BY: DST/EGT	
	PROJECT: TLS-09-003	
	FILE: RICHLAND CREEK FINAL AS-BUILT 060110.DWG	
	SCALE: NOT TO SCALE	
	SHEET: 1 of 10	



SRI513 CAT CREEK RD BST



- LEGEND:
- THALWEG
 - TOP OF BANK
 - BOTTOM OF BANK
 - CENTERLINE FLOW
 - OPEN WATER AREA
 - EDGE OF WATER
 - 2080.57 X -SPOT ELEVATION
 - BENCH MARK/CONTROL



GENERAL NOTES
 1. SEE SHEET 1 FOR GENERAL NOTES.
 2. TEN (10) PAGE DOCUMENT IS NOT VALID WITHOUT TITLE SHEET.

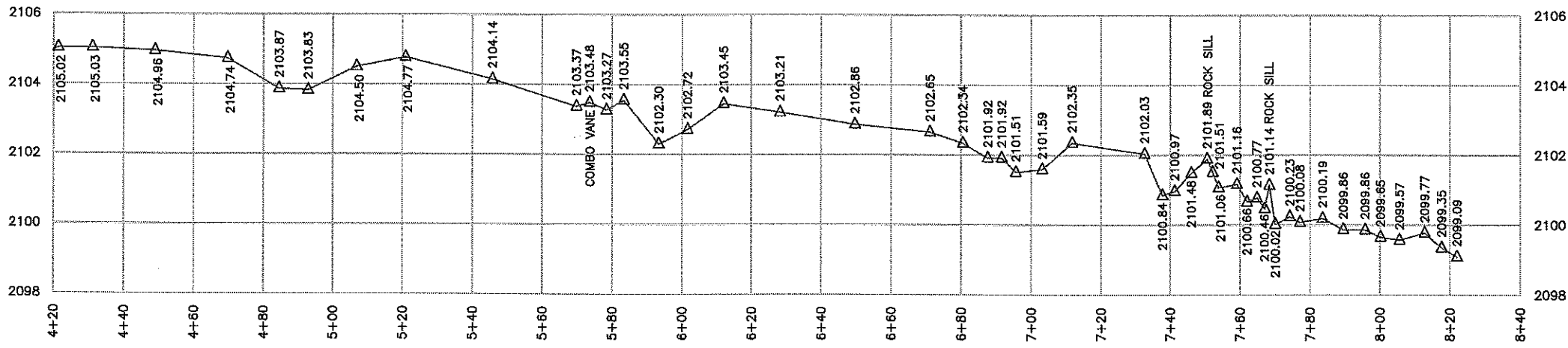
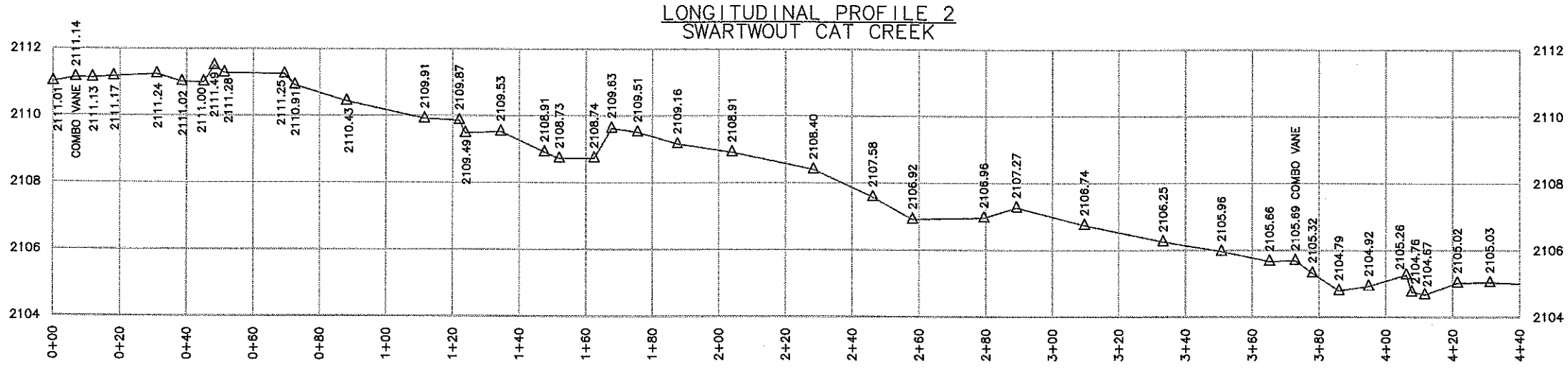
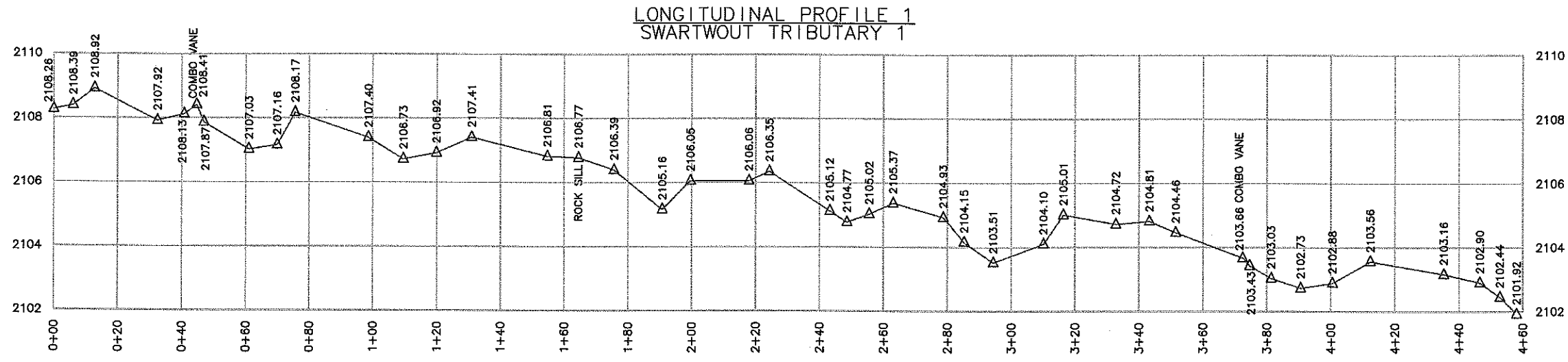
REVISIONS, DATE AND INITIAL:

TURNER LAND SURVEYING, PLLC
 3201 Glenridge Drive, Raleigh, NC 27604 - (919) 751-1378
 Lturner21@nc.rr.com - Dturner119@nc.rr.com
 www.TURNERLANDSURVEYING.com

NORTH CAROLINA
 MACON COUNTY
 FRANKLIN

SWARTWOUT TRACT
 AS-BUILT SURVEY OF
 CAT CREEK STREAM & WETLAND RESTORATION
 SCO# 050657901

DATE: 06/01/2010
 SURVEYED BY: DST/EGT
 DRAWN BY: EGT
 REVIEWED BY: DST/EGT
 PROJECT: TLS-09-003
 FILE: CAT CREEK AS-BUILT FINAL 060410.DWG
 SCALE: 1" = 60'
 SHEET: 2 of 10



REVISIONS, DATE AND INITIAL:

TURNER LAND SURVEYING, PLLC
 3201 Glenridge Drive, Raleigh, NC 27604 - (919) 875-1378
 Lturner92@nc.rr.com - Dturner119@nc.rr.com
 www.TURNERLANDSURVEYING.com

LONGITUDINAL PROFILES 1 & 2

**AS-BUILT SURVEY OF
CAT CREEK STREAM & WETLAND RESTORATION**

SCO# 050657901

NORTH CAROLINA

FRANKLIN

MACON COUNTY

DATE: 06/01/2010

SURVEYED BY: DST/EGT

DRAWN BY: DST/EGT

REVIEWED BY: DST/EGT

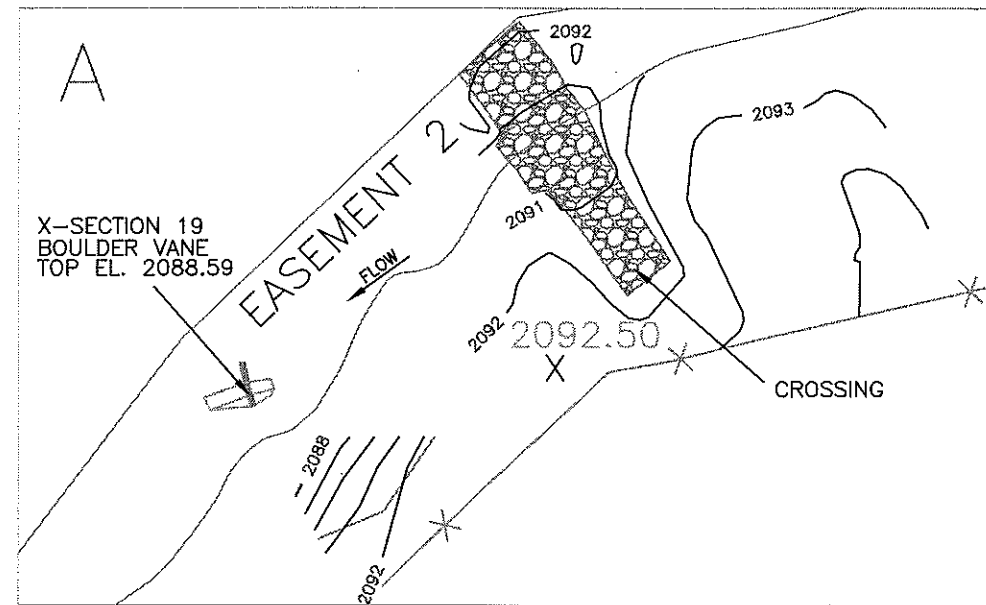
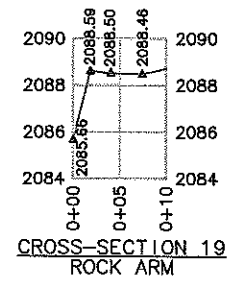
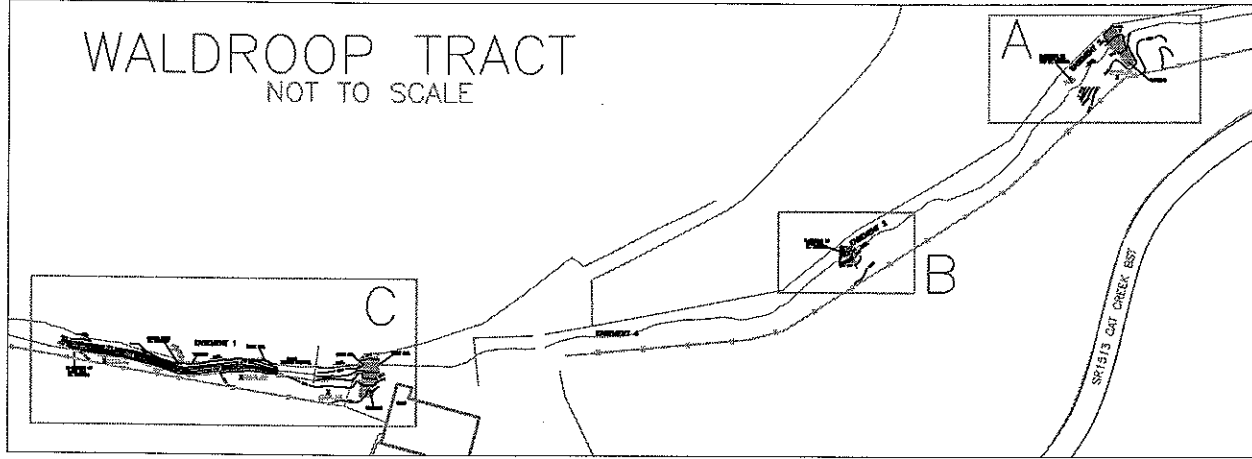
PROJECT: TLS-09-003

FILE: CAT CREEK AS-BUILT FINAL 060410.DWG

SCALE: N/A

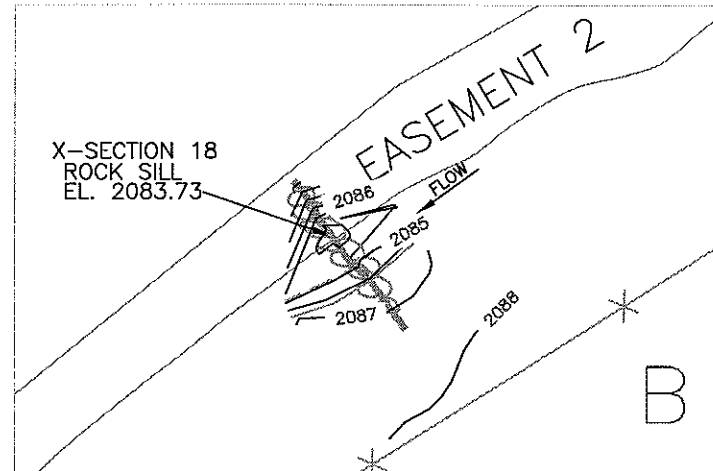
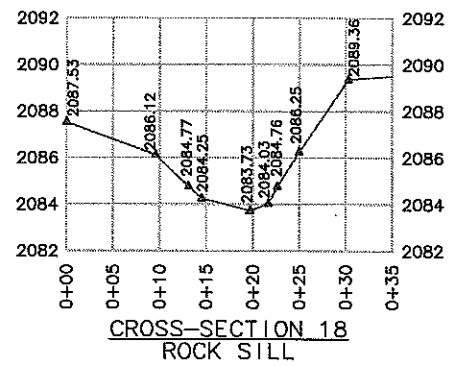
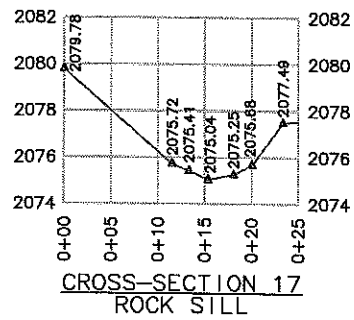
SHEET:
3 of 10

WALDROOP TRACT
NOT TO SCALE



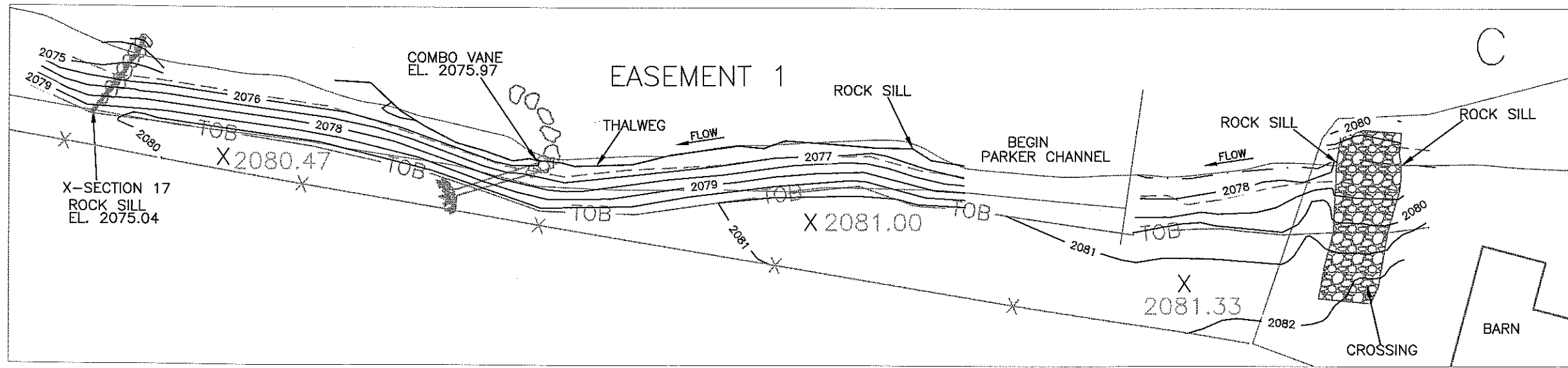
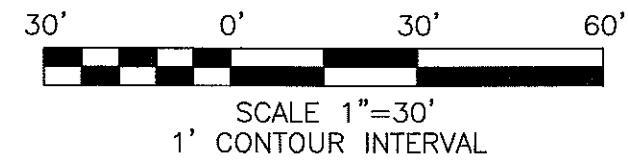
GENERAL NOTES

1. SEE SHEET 1 FOR GENERAL NOTES.
2. TEN (10) PAGE DOCUMENT IS NOT VALID WITHOUT TITLE SHEET.



LEGEND:

- THALWEG
- TOP OF BANK
- BOTTOM OF BANK
- CENTERLINE FLOW
- OPEN WATER AREA
- EDGE OF WATER
- SPOT ELEVATION



BASIS OF BEARING
NC GRID NAD 83

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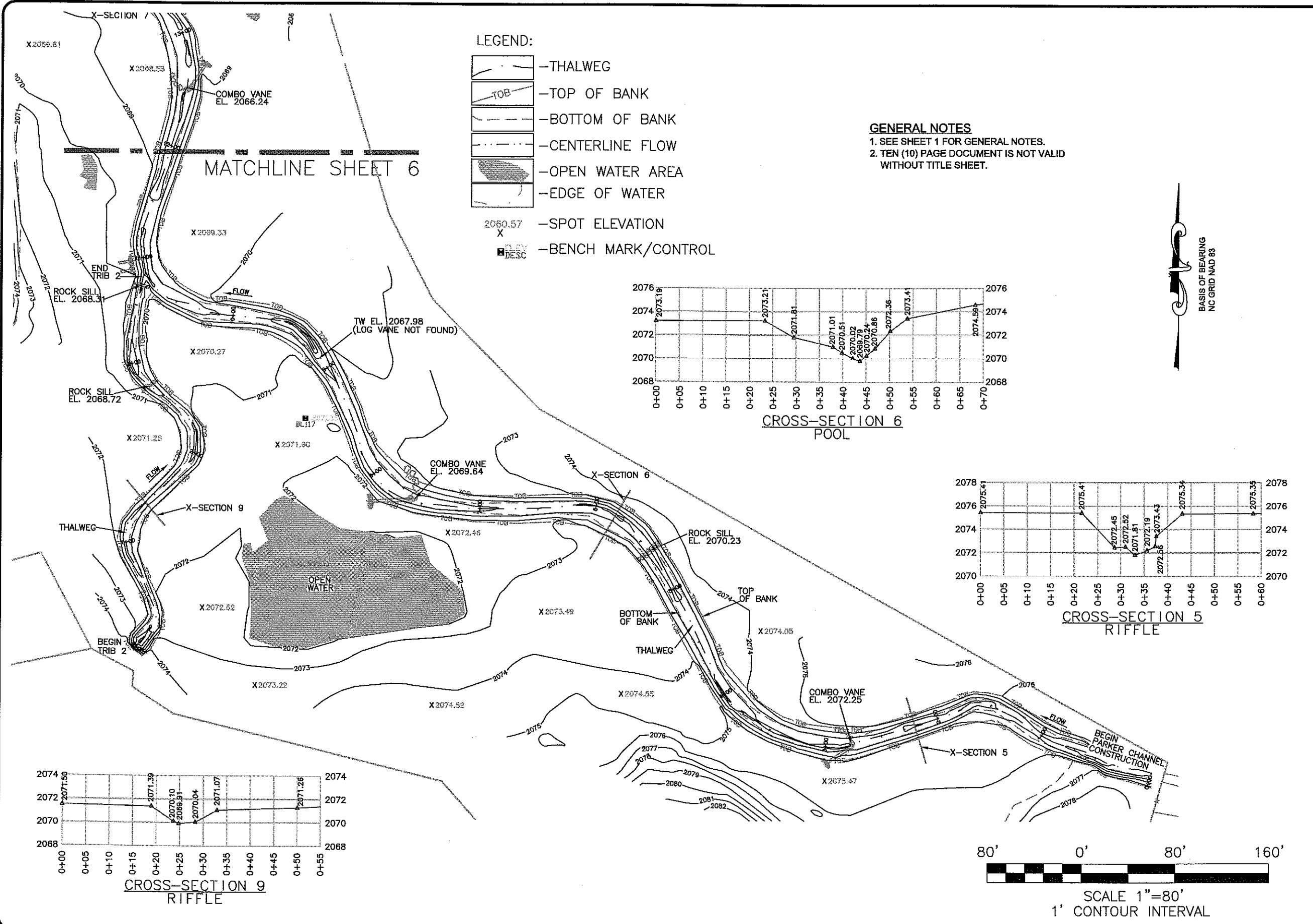
WALDROOP TRACT

**AS-BUILT SURVEY OF
CAT CREEK STREAM & WETLAND RESTORATION**

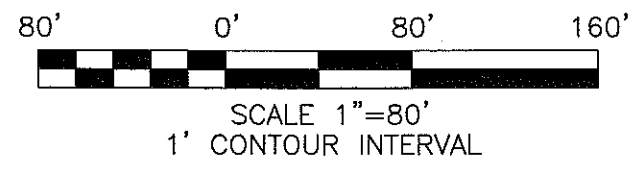
SCO# 050657901

NORTH CAROLINA
FRANKLIN
MACON COUNTY

DATE:	06/01/2010
SURVEYED BY:	DST/EGT
DRAWN BY:	DST/EGT
REVIEWED BY:	DST/EGT
PROJECT:	TLS-09-003
FILE:	CAT CREEK AS-BUILT FINAL 060410.DWG
SCALE:	1" = 30'
SHEET:	4 of 10



GENERAL NOTES
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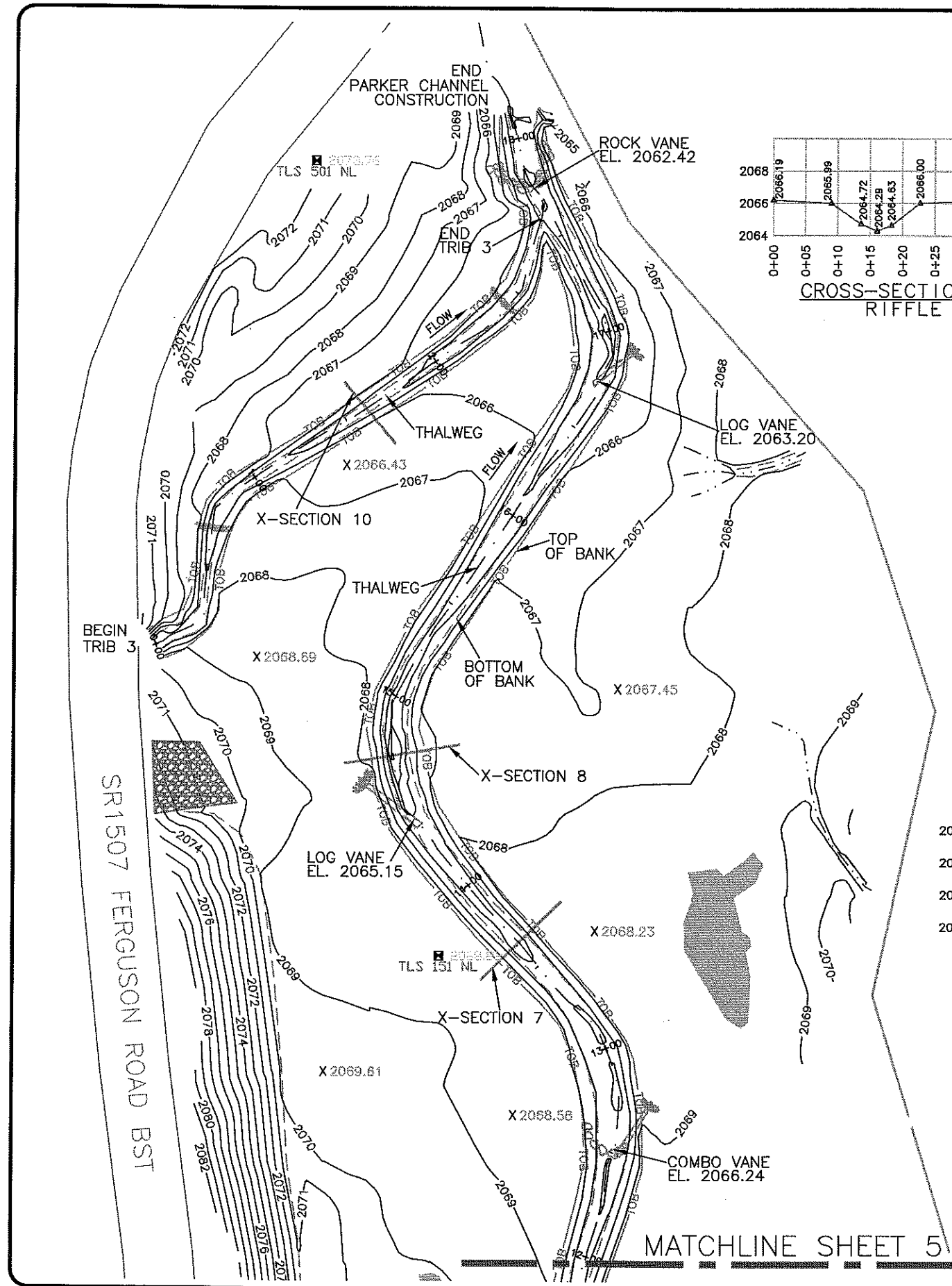
NORTH CAROLINA

FRANKLIN

PARKER TRACT
 AS-BUILT SURVEY OF
 CAT CREEK STREAM & WETLAND RESTORATION
 SCO# 050657901

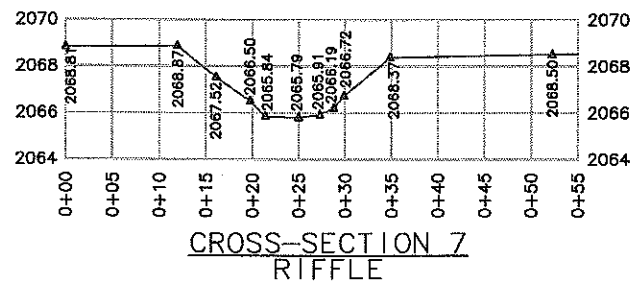
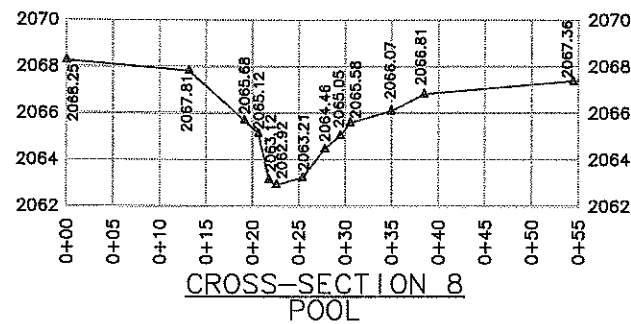
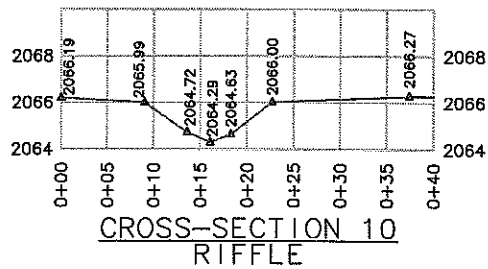
DATE: 06/01/2010
 SURVEYED BY: DST/EGT
 DRAWN BY: DST/EGT
 REVIEWED BY: DST/EGT
 PROJECT: TLS-09-003
 FILE: CAT CREEK AS-BUILT FINAL 060410.DWG
 SCALE: 1" = 80'

SHEET:
5 of 10



GENERAL NOTES

1. SEE SHEET 1 FOR GENERAL NOTES.
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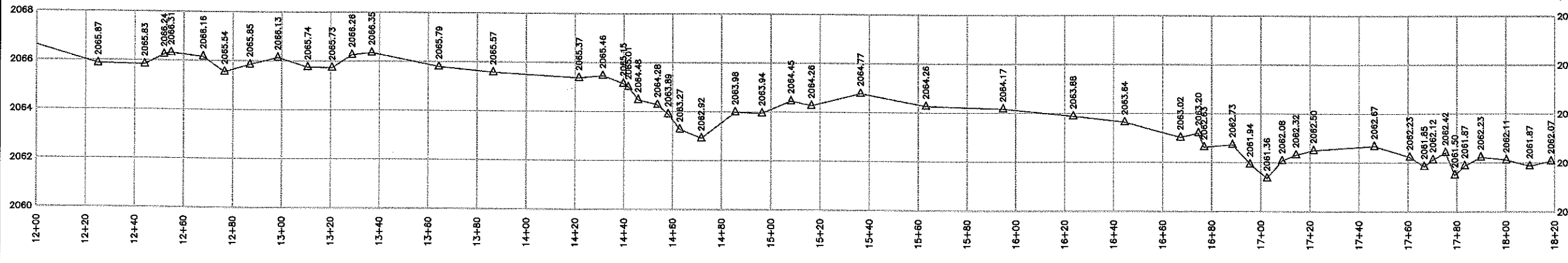
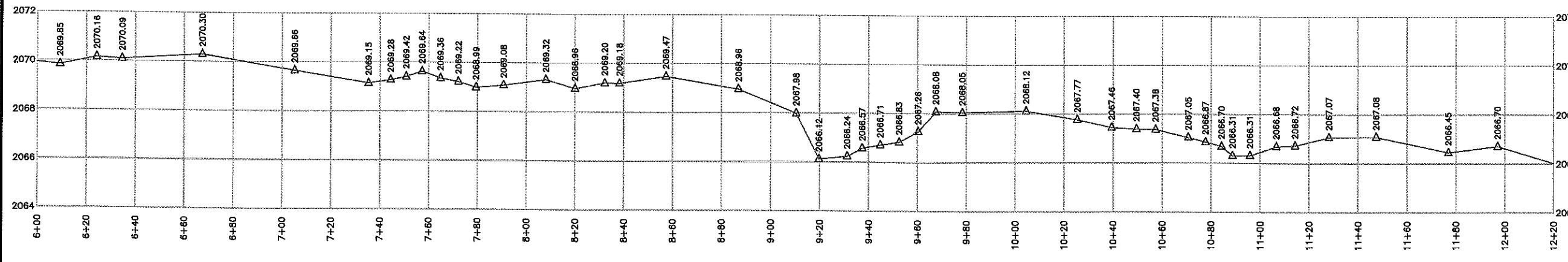
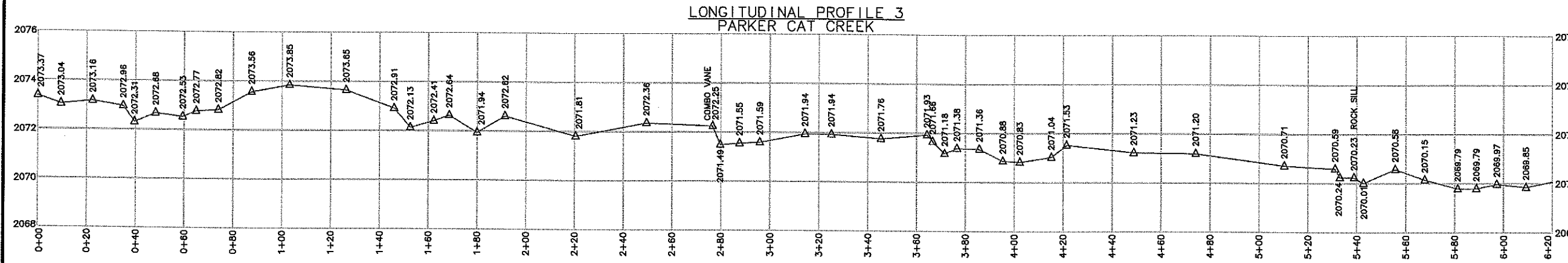
LEGEND:

- THALWEG
- TOP OF BANK
- BOTTOM OF BANK
- CENTERLINE FLOW
- OPEN WATER AREA
- EDGE OF WATER
- SPOT ELEVATION
- BENCH MARK/CONTROL



SCALE 1"=60'
1' CONTOUR INTERVAL

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<p>PARKER TRACT AS-BUILT SURVEY OF CAT CREEK STREAM & WETLAND RESTORATION SCO# 050657901</p>	
<p>FRANKLIN MACON COUNTY NORTH CAROLINA</p>	
<p>DATE: 08/01/2010</p> <p>SURVEYED BY: DST/EGT</p> <p>DRAWN BY: DST/EGT</p> <p>REVIEWED BY: DST/EGT</p> <p>PROJECT: TLS-09-003</p> <p>FILE: CAT CREEK AS-BUILT FINAL 080410.DWG</p> <p>SCALE: 1" = 60'</p> <p>SHEET: 6 of 10</p>	



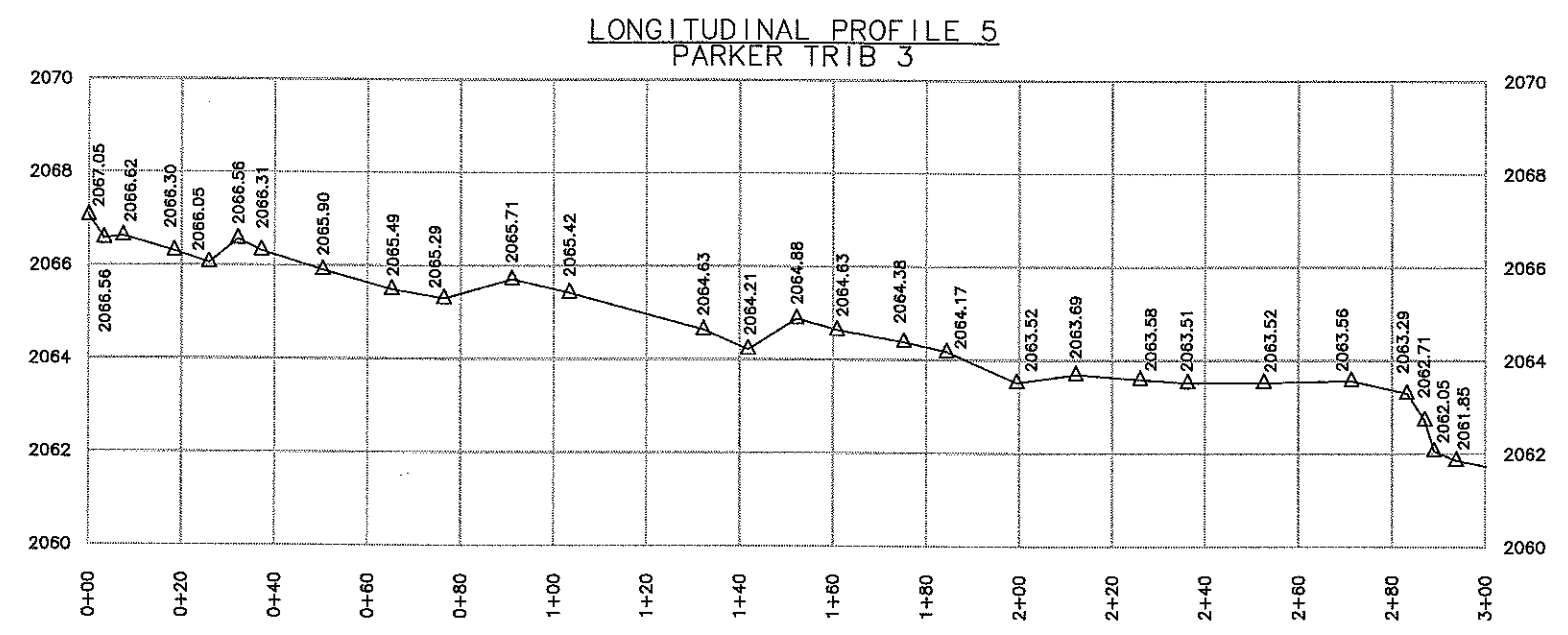
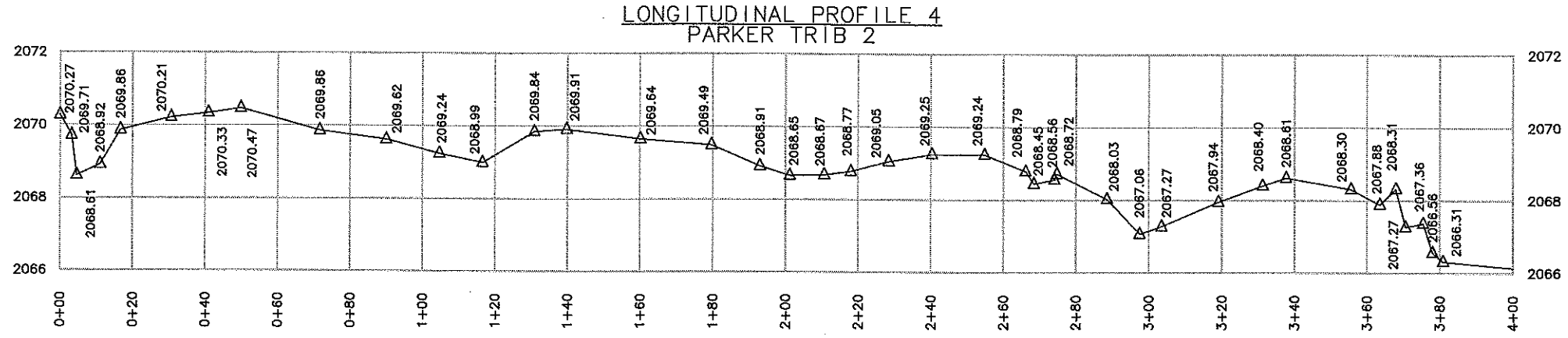
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**LONGITUDINAL PROFILE 3
AS-BUILT SURVEY OF
CAT CREEK STREAM & WETLAND RESTORATION**
 SCO# 050657901

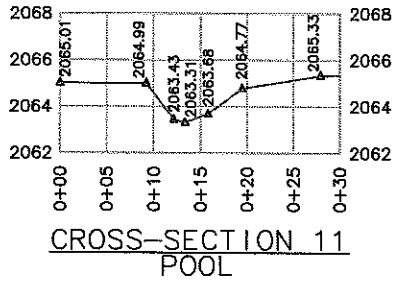
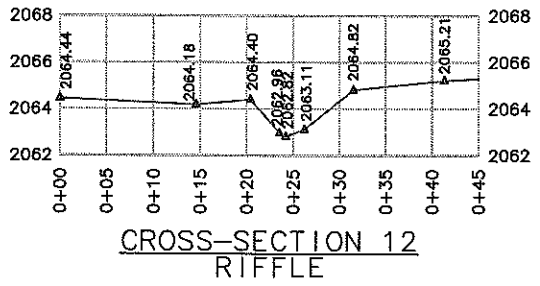
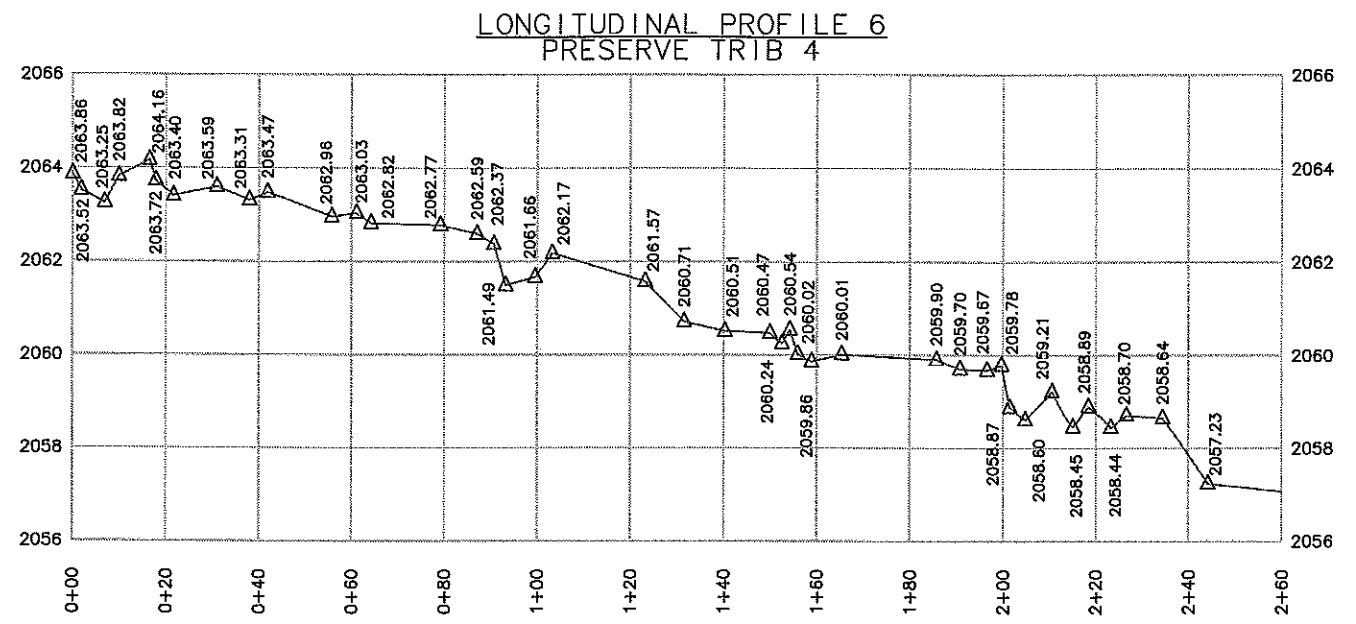
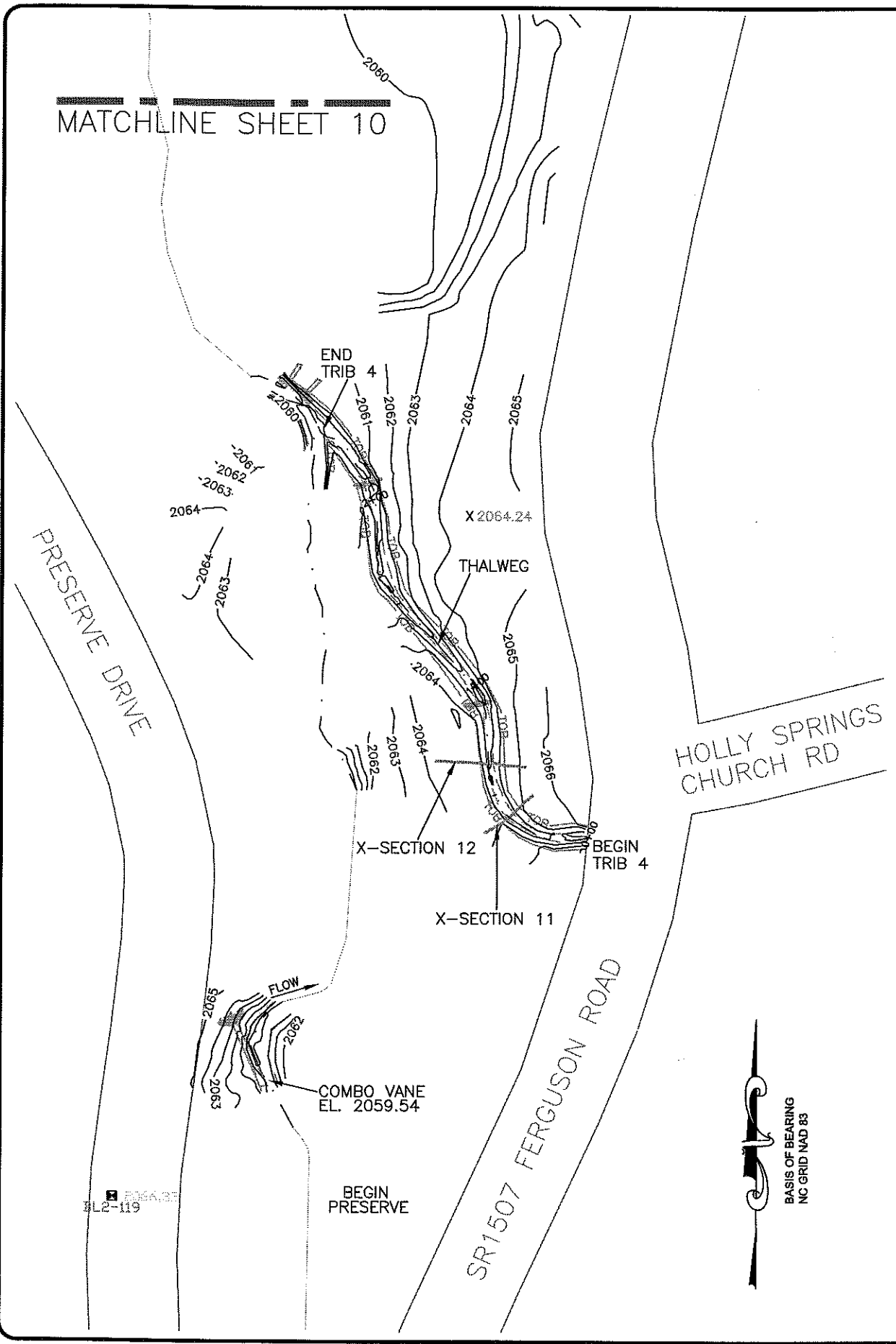
FRANKLIN
 MACON COUNTY
 NORTH CAROLINA

DATE:	06/01/2010
SURVEYED BY:	DST/EGT
DRAWN BY:	DST/EGT
REVIEWED BY:	DST/EGT
PROJECT:	TLS-08-003
FILE:	CAT CREEK AS-BUILT FINAL 060410.DWG
SCALE:	N/A
SHEET:	7 of 10

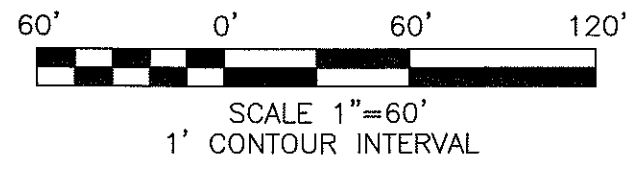


<p>LONGITUDINAL PROFILE 4 & 5</p> <p>AS-BUILT SURVEY OF CAT CREEK STREAM & WETLAND RESTORATION</p> <p>SCO# 050657901</p> <p style="text-align: right;">FRANKLIN MACON COUNTY NORTH CAROLINA</p>	<p>REVISIONS, DATE AND INITIAL:</p> <hr/> <div style="text-align: center;"> </div> <p style="text-align: center;">TURNER LAND SURVEYING, PLLC</p> <p style="text-align: center; font-size: small;">3201 Glenridge Drive, Raleigh, NC 27604 - (919)975-1378 Lturner921@ncrr.com - Dturner119@ncrr.com www.TURNERLANDSURVEYING.com</p>
<p>DATE: 08/01/2010</p> <p>SURVEYED BY: DST/EGT</p> <p>DRAWN BY: DST/EGT</p> <p>REVIEWED BY: DST/EGT</p> <p>PROJECT: TLS-09-003</p> <p>FILE: CAT CREEK AS-BUILT FINAL 080410.DWG</p> <p>SCALE: N/A</p> <p>SHEET: 6 of 10</p>	

MATCHLINE SHEET 10



- LEGEND:**
- THALWEG
 - TOP OF BANK
 - BOTTOM OF BANK
 - CENTERLINE FLOW
 - OPEN WATER AREA
 - EDGE OF WATER
 - SPOT ELEVATION
 - BENCH MARK/CONTROL



GENERAL NOTES
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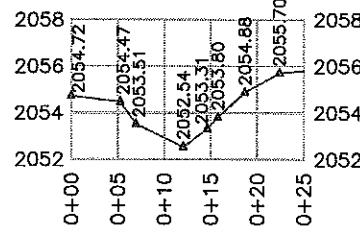
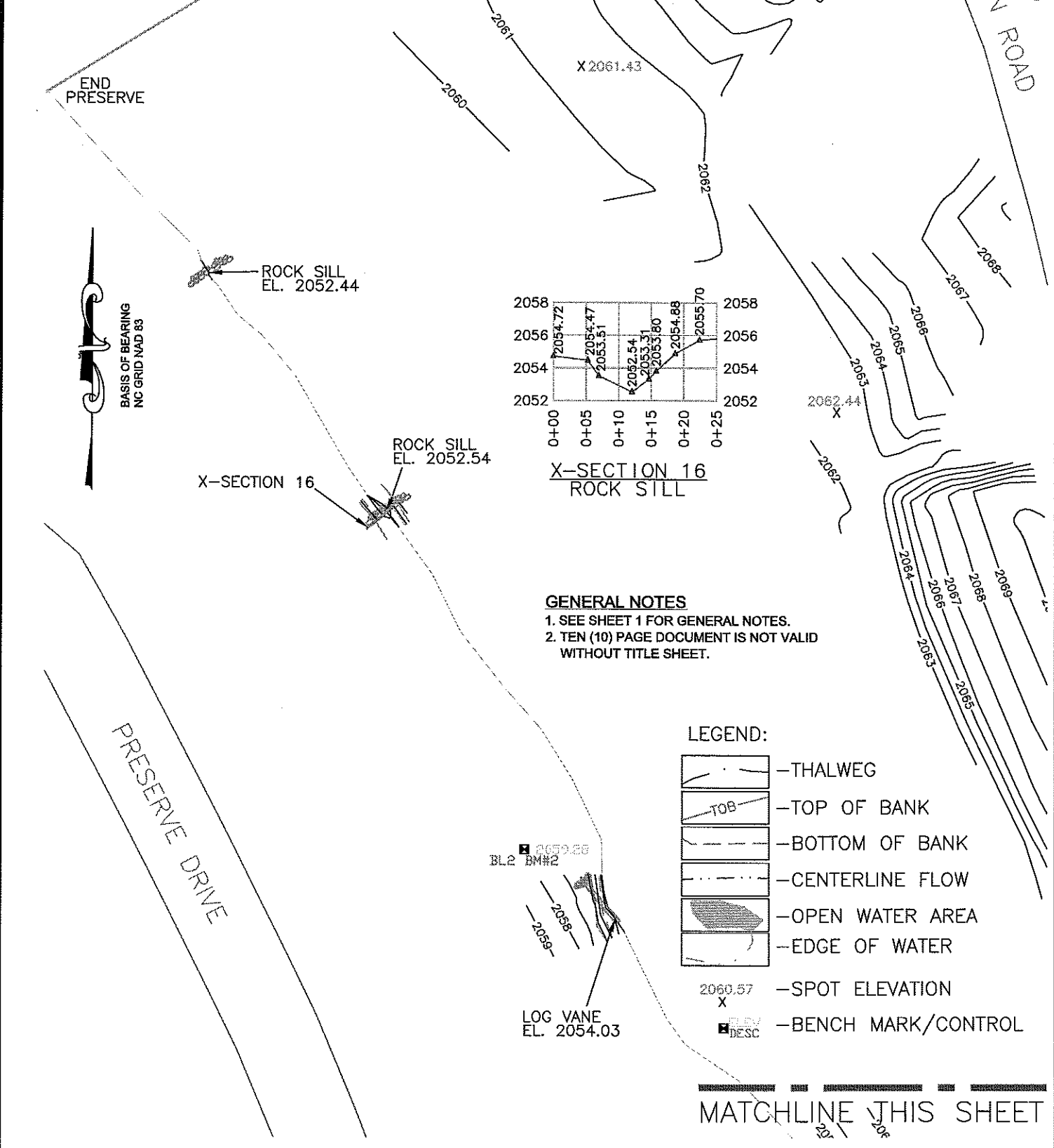
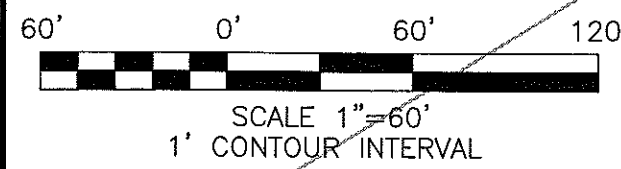
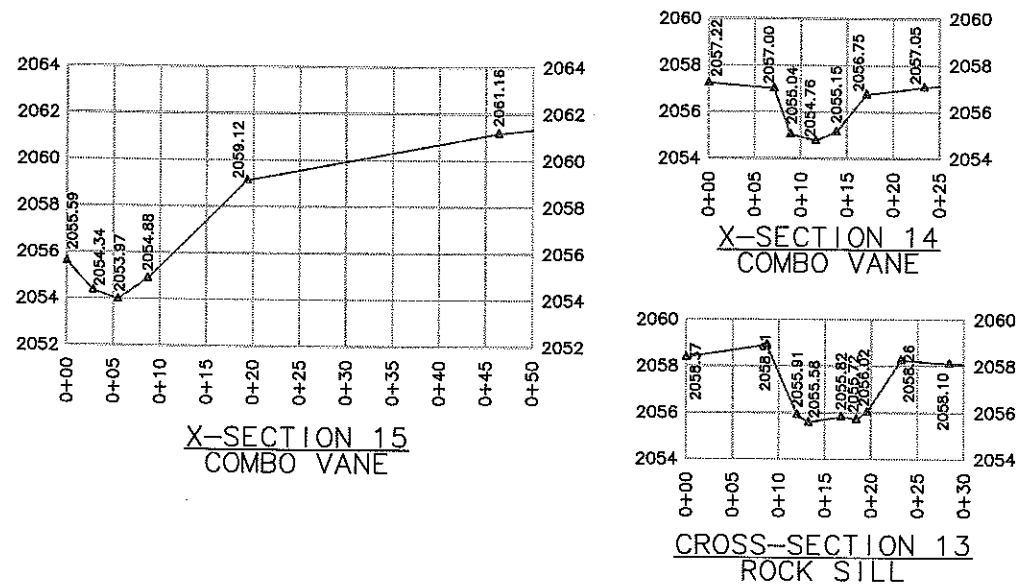
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EXISTING PRESERVE
AS-BUILT SURVEY OF
CAT CREEK STREAM & WETLAND RESTORATION
 SCO# 050657901

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FRANKLIN NORTH CAROLINA MACON COUNTY

DATE: 06/01/2010
 SURVEYED BY: DST/EGT
 DRAWN BY: DST/EGT
 REVIEWED BY: DST/EGT
 PROJECT: TLS-09-003
 FILE: CAT CREEK AS-BUILT FINAL 060410.DWG
 SCALE: 1" = 60'
 SHEET: 9 of 10



GENERAL NOTES

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- LEGEND:**
- THALWEG
 - TOP OF BANK
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EXISTING PRESERVE
AS-BUILT SURVEY OF
CAT CREEK STREAM & WETLAND RESTORATION
SCO# 050657901

NORTH CAROLINA
FRANKLIN
MACON COUNTY

DATE: 06/01/2010
SURVEYED BY: DST/EGT
DRAWN BY: DST/EGT
REVIEWED BY: DST/EGT
PROJECT: TLS-09-003
FILE: CAT CREEK AS-BUILT FINAL 060410.DWG
SCALE: 1" = 60'
SHEET: 10 of 10

MATCHLINE THIS SHEET