

North Muddy Creek Stream & Wetland Restoration

Year 2 Final Monitoring Report

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1.0 SUMMARY

This Annual Report details the monitoring activities during the 2010 (Year 2) growing season on the North Muddy Creek Mitigation Site. Construction of the site, including planting of trees, was completed in December 2008. The 2010 data represents results from the second year of hydrology and vegetation monitoring for both streams and wetlands.

The stream design for the North Muddy Site involved restoration, enhancement, and preservation associated with five independent stream reaches. Wetland components included riparian and non-riparian wetland restoration, enhancement, and preservation. After construction, it was determined that the project generated 3,974 linear feet of stream restoration, 673 linear feet of stream enhancement, and 3,313 linear feet of stream preservation. Wetlands included 11.4 acres of riparian restoration, 3.7 acres of riparian enhancement, 2.5 acres of riparian preservation, and 2.6 acres of non-riparian restoration.

This Annual Report presents the data from 9 cross sections, 3,128 linear feet of longitudinal profile, 3 crest gauges, 8 automated groundwater monitoring stations, 3 automated rain gauges, 11 vegetation monitoring plots, and photographic reference locations; as specified in the approved Mitigation Plan (EBX, 2009).

The Year 2 stream channel data indicates that the restored stream is generally stable and is providing the intended habitat and hydrologic functions. With the exception of some isolated areas of stream bed aggradation and degradation, stream bank erosion, grade control degradation, and thalweg migration; the longitudinal profiles, cross sections, and visual assessments indicate little adjustment in stream dimension since the As-built conditions. Stream hydrology monitoring during Year 2 recorded a significant bankfull event for each stream restoration reach.

Data from the groundwater monitoring stations resulted in all but one station exceeding saturation of the upper soil surfaces for seven percent of the growing season. Burke County weather station data in conjunction with on-site rain gauges documented precipitation and was used to validate groundwater monitoring station data. Overall, on-site rainfall was below normal during the majority of the growing season.

Vegetation plot (VP) monitoring during Year 2 indicates survival rates between 121 and 1,255 planted stems per acre with an average of 659 planted stems per acre for the entire restoration site. Overall, planted stems are surviving at the project site. Only one plot is not on track to meet the interim success criterion (VP4 at UT6), but planted stems were also low for VP3 at UT1. However, when planted and natural stems are combined, the average total stem density for the entire restoration site is over 1,400 stems per acre, which is well above the interim success criterion of 320 planted stems per acre at the end of the Year 3 monitoring period. With respect to each restoration area, UT1 has an average of 1,386 total (planted and natural) stems per acre, UT5 has 3,500, and UT 6 has 583.

2.0 INTRODUCTION

2.1 Project Description

The North Muddy Creek Stream and Wetland Mitigation Site was identified and developed through the North Carolina Ecosystem Enhancement Program (NC EEP) full delivery process. The site is located along the McDowell/Burke County line approximately nine miles east of Marion, North Carolina (**Figure 1**). The project streams lie within the Catawba River Basin (Hydrologic Unit Code 03050101040020) and the North Carolina Division of Water Quality (NCDWQ) sub-basin 03-08-30.

The mitigation site consists of five distinct stream systems totaling 7,960 linear feet and three adjacent wetland areas encompassing 20.2 acres. The five distinct unnamed tributaries (UT) are identified as UT1, UT2, UT4, UT5, and UT6. Unnamed Tributary 1 (UT1) is located just north of Interstate 40 on the McDowell/Burke County line, whereas UT2, UT4, UT5, and UT6 are located south of Interstate 40 on the McDowell/Burke County line. The USGS Marion East and Glen Alpine topographic quadrangles (**Figure 2**) shows UT1 drains to Muddy Creek, UT2 drains to North Muddy, and the subsequent streams drain to South Muddy Creek. All five reaches drain watersheds consisting of predominately forest and agricultural land. On-site topography, soils, and existing wetlands demonstrated that the site historically supported wetlands. The site is defined by conservation easements surrounding the streams and adjacent riparian buffers that total approximately 34.8 acres.

Channel restoration (improved pattern, dimension, and longitudinal profile) was completed on UT1, UT6, and the lower portion of UT5. Stream enhancement activities (improved dimension and longitudinal profile) were limited to the middle reach of UT5. The headwater reaches of UT2, UT4, and UT5 were protected under preservation criteria.

Prior to restoration UT1 and adjacent wetlands were highly disturbed due to the presence of livestock, channelization, and ditching. The lower reach of UT5 had been channelized and portions of the riparian wetland had been impaired due to historical agricultural practices. Channelization, ditching, and riparian disturbances associated with historical agricultural practices had severely degraded UT6 and the associated wetlands.

The 2010 monitoring season represents Year 2 of the monitoring period. Monitoring during 2010 included stream, wetland, and vegetation monitoring stations (**Figure 3**) as approved in the Mitigation Plan (EBX, 2009).

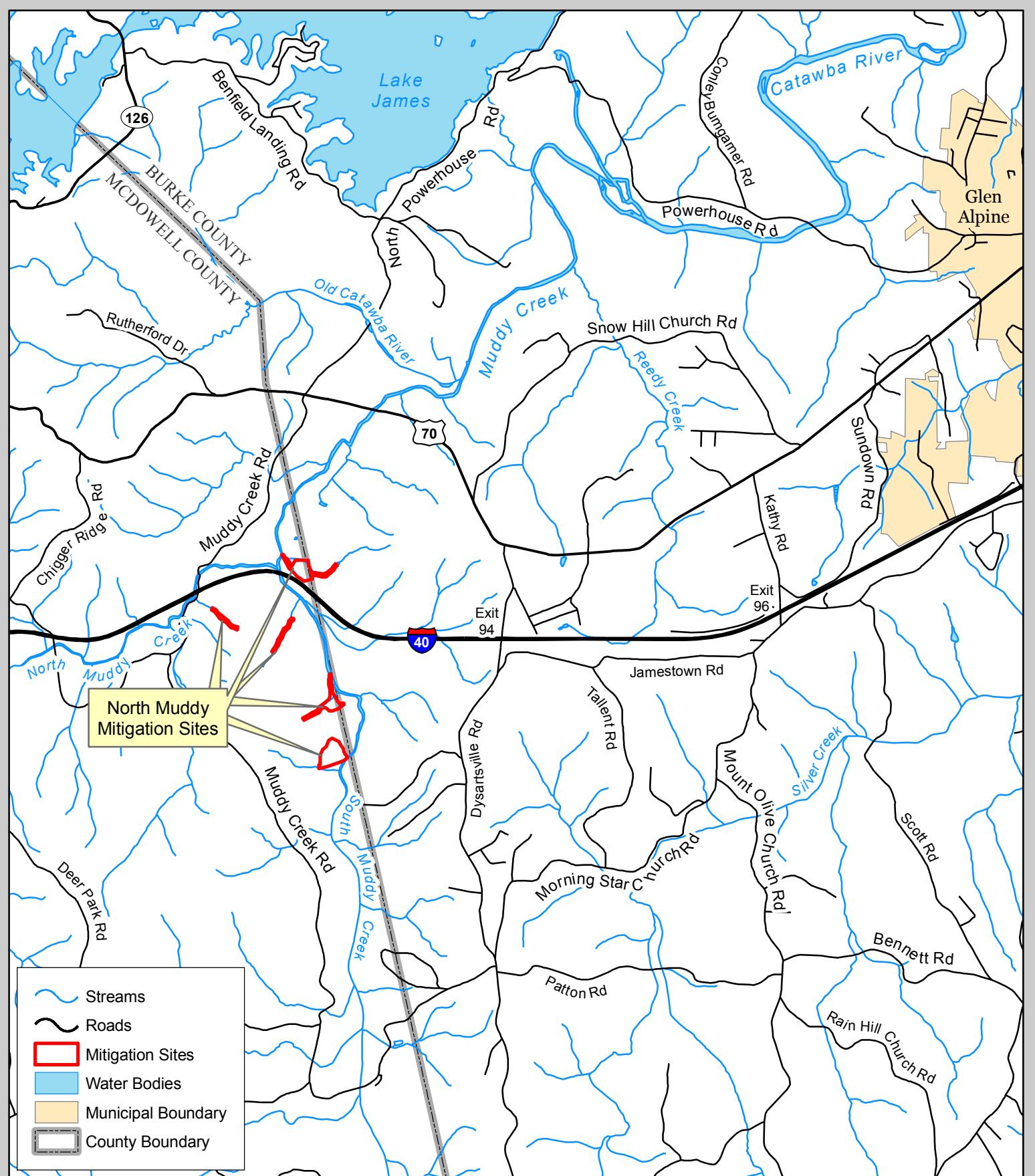
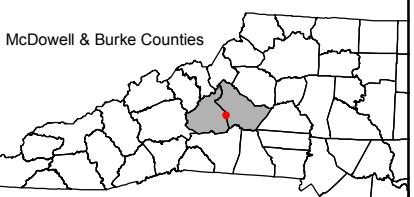
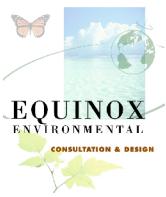


Figure 1
North Muddy Mitigation Site
Project Vicinity Map

0 0.5 1 2 Miles



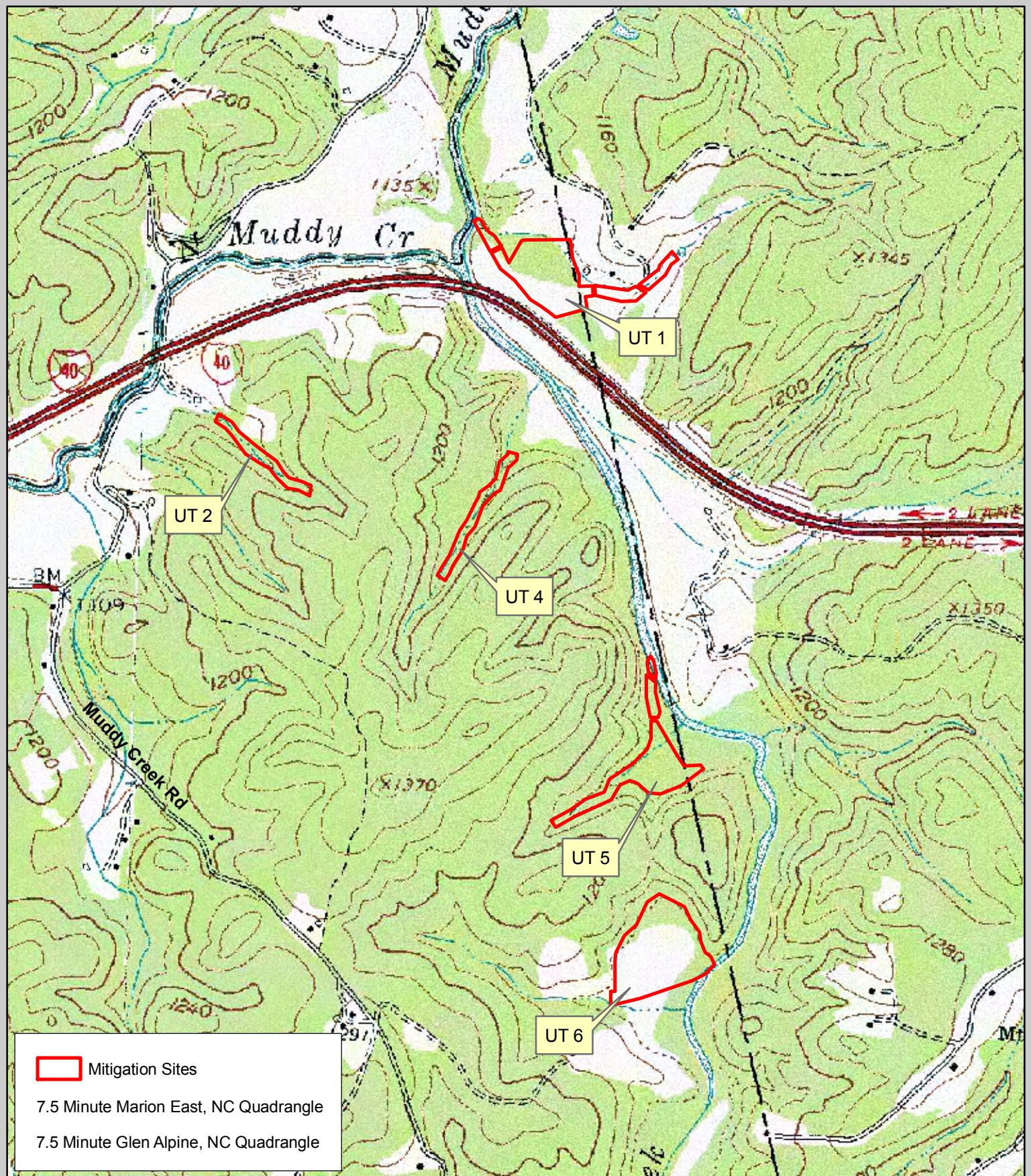
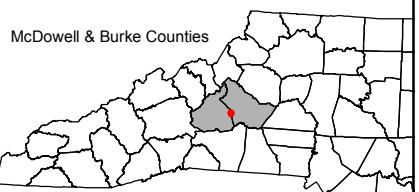
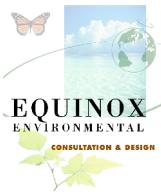
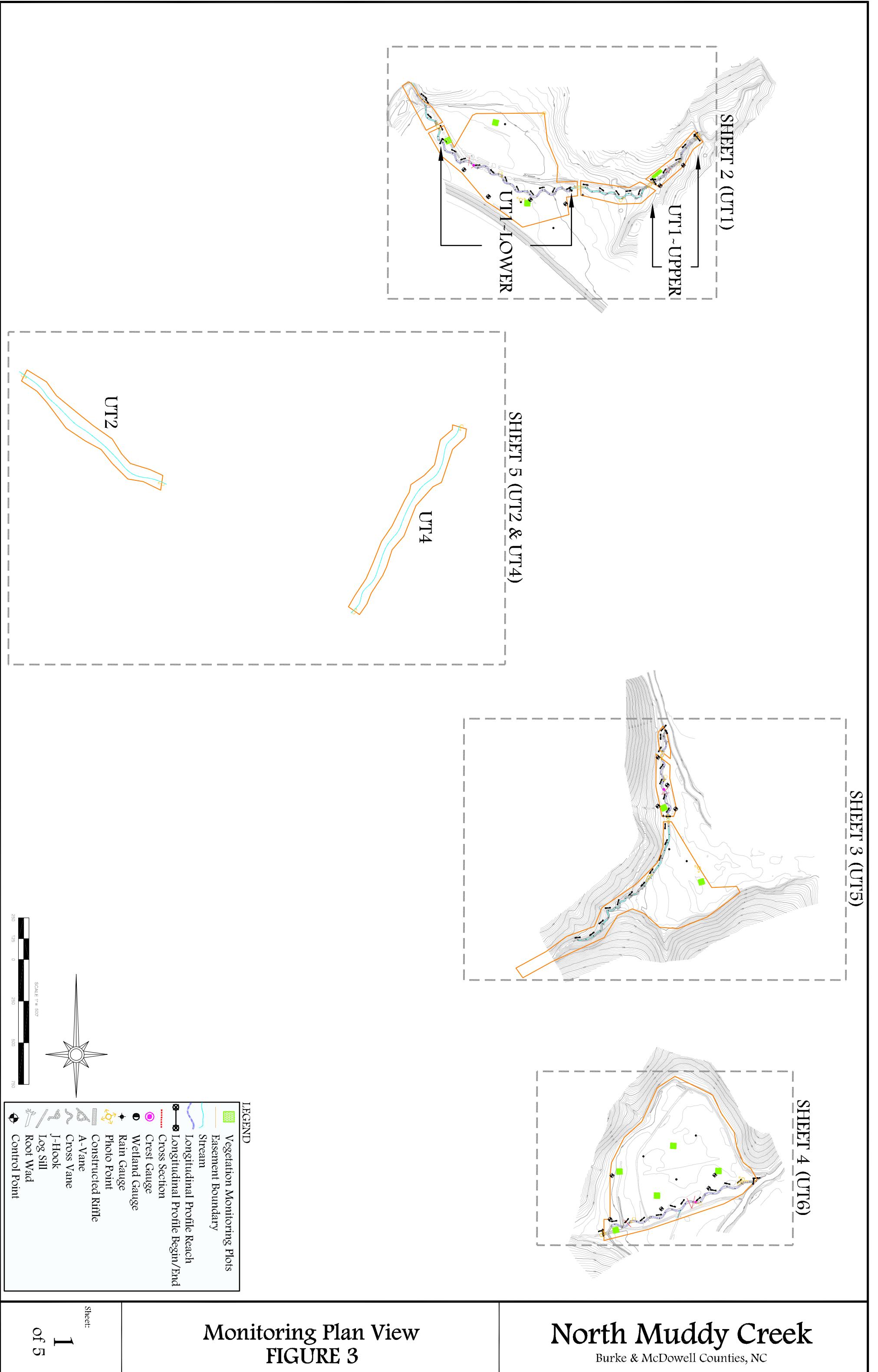
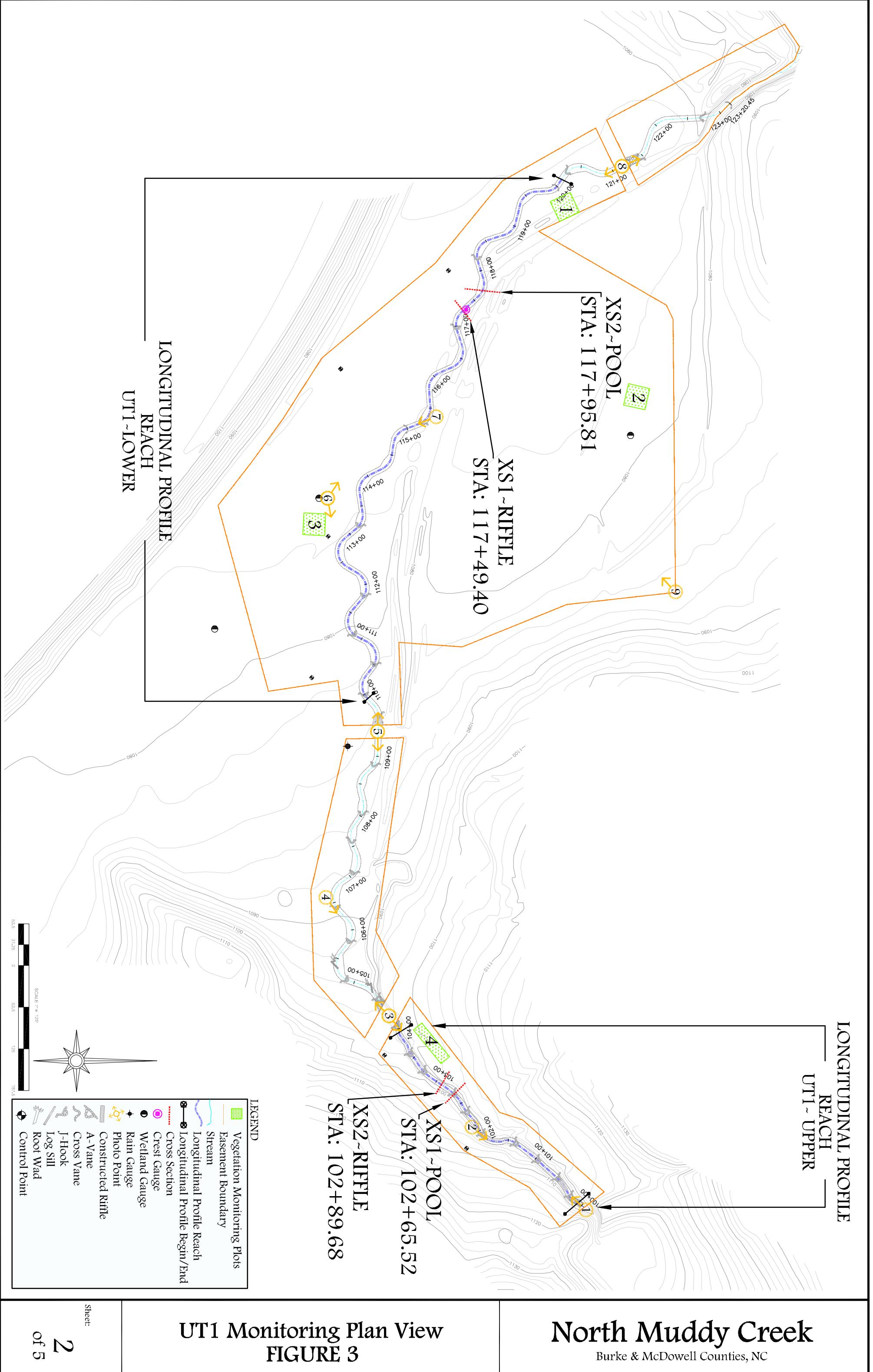


Figure 2
North Muddy Mitigation Site
USGS Map

0 750 1,500 3,000
Feet



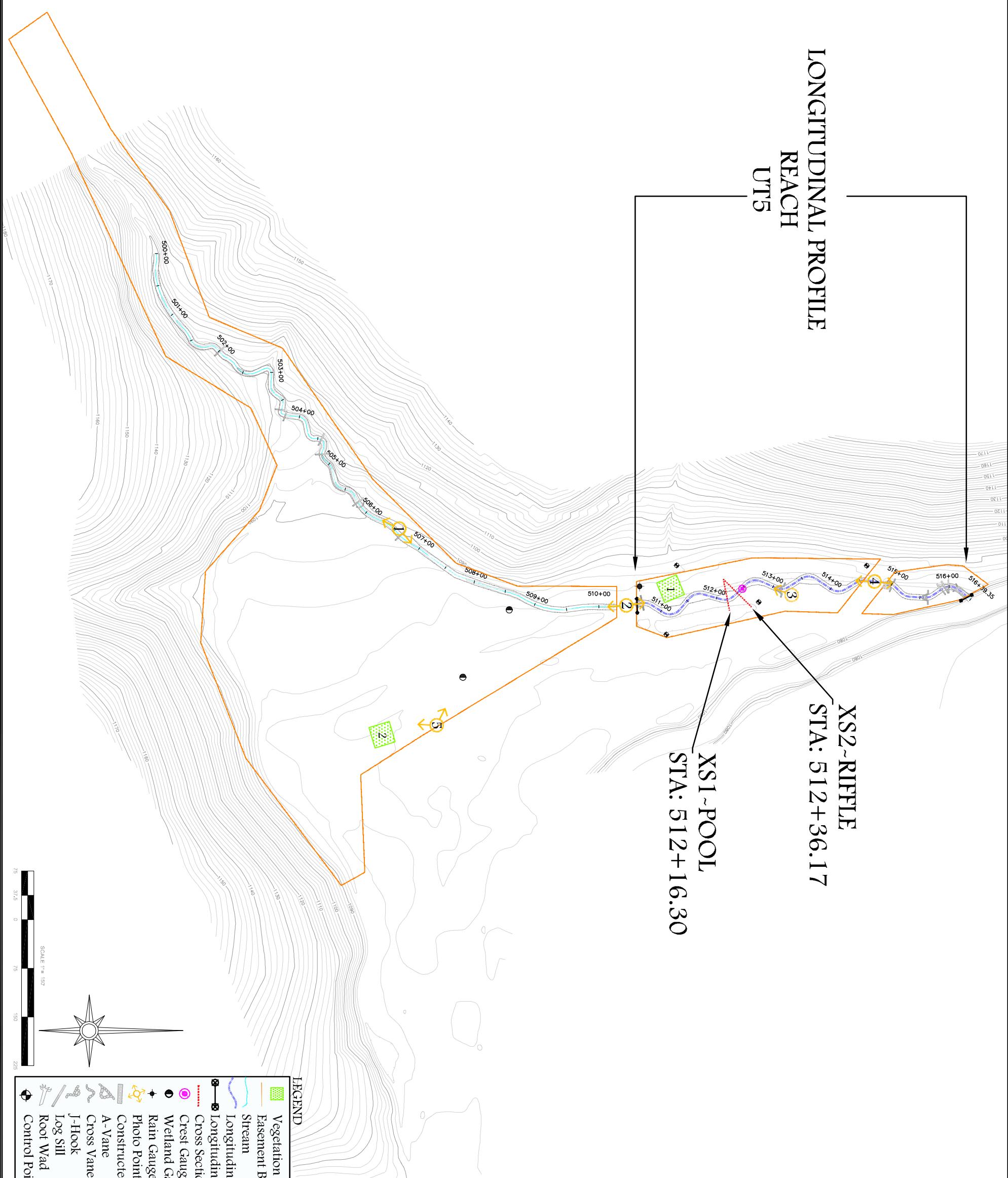




**LONGITUDINAL PROFILE
REACH
UT5**

X S2 ~ RIFFLE
STA: 512+36.17

X S1 ~ POOL
STA: 512+16.30



UT5 Monitoring Plan View
FIGURE 3

North Muddy Creek
Burke & McDowell Counties, NC

LONGITUDINAL PROFILE REACH

UT6

4

X_{S3}-RIFLE
STA: 606+56.85

X_{S2}-POOL
STA: 606+25.85

X_{S1}-RIFLE
STA: 601+87.17

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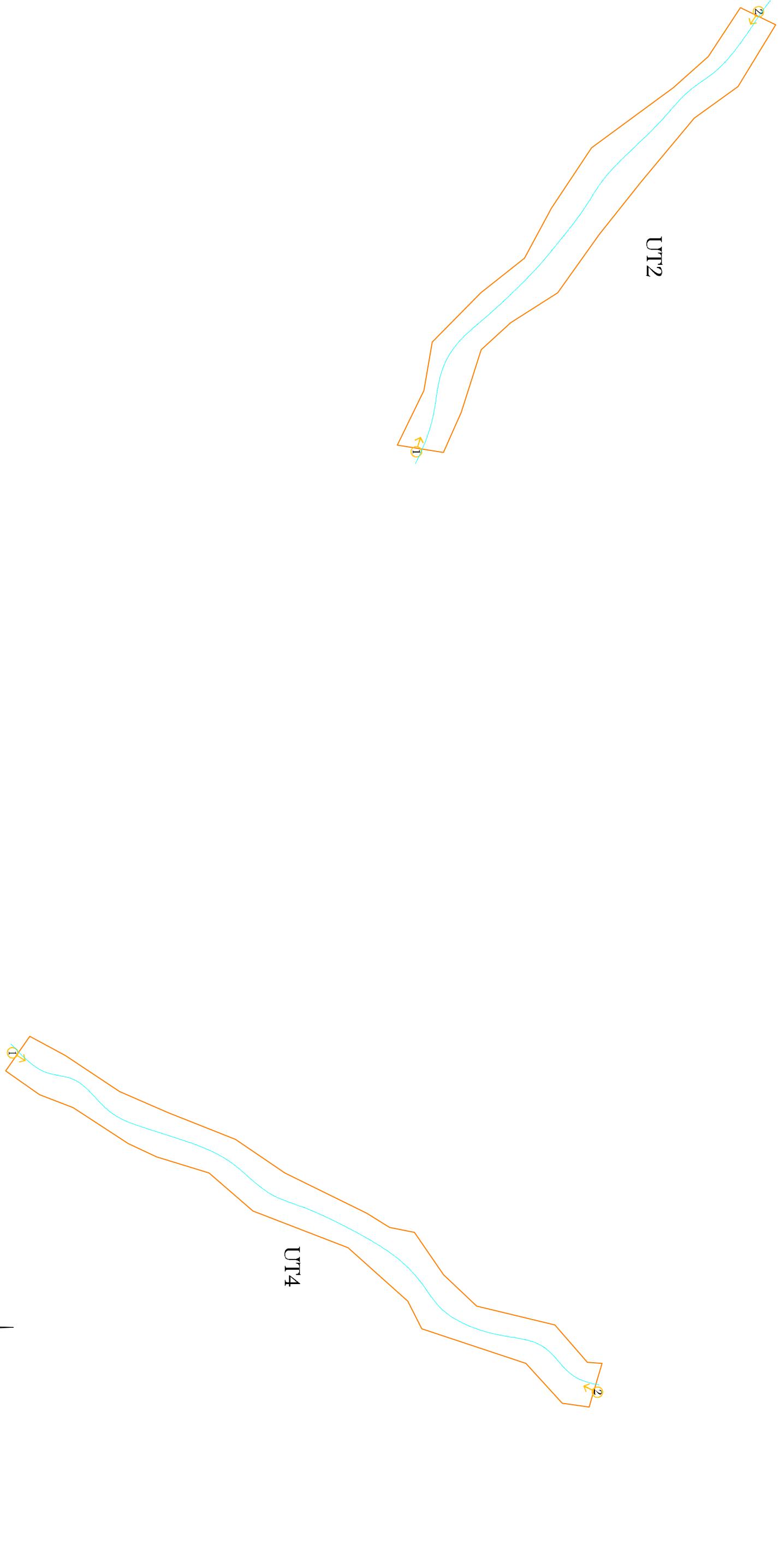
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UT2 & UT4 Monitoring Plan
View
FIGURE 3

North Muddy Creek
Burke & McDowell Counties, NC

2.2 Project Purpose

The objective of the project was to provide 5,014 stream mitigation units (SMU's), 12.0 acres of riparian wetland mitigation units (WMU's), and 2.4 acres of non-riparian WMU's for the NC EEP full delivery process in the Catawba 03-08-30 Basin. In conjunction with providing mitigation credits; riparian habitat, aquatic habitat, and water quality improvements are expected as a result of the ecological restoration and enhancement practices.

The North Muddy Creek Mitigation Report (EBX, 2009) documented 3,974 linear feet of stream restoration, 337 linear feet of stream enhancement Level I, 336 linear feet of stream enhancement Level II, and 3,313 linear feet of stream preservation resulting in 4,996 SMU's (**Table 1**). Wetland mitigation components stated within the Mitigation Report documented 11.4 riparian restoration acres, 3.7 riparian enhancement acres, 2.5 riparian preservation acres, and 2.6 non-riparian restoration acres resulting in 16.4 WMU's (**Table 1**).

Table 1. Project Mitigation Structure and Objectives

Reach Name	As-Built Length (feet)	Riparian Wetland (acres)	Non-Riparian Wetland (acres)	Total Wetland (acres)	Restoration Approach
UT1	2,257				Restoration
UT2	1,172				Preservation
UT4	1,421				Preservation
UT5	550				Restoration
UT5	337				Enhancement I
UT5	336				Enhancement II
UT5	720				Preservation
UT6	1,167				Restoration
UT1 - Wetland		3.3			Restoration
UT1 – Wetland		3.0		6.6	Enhancement
UT1 – Wetland		0.3			Preservation
UT5 – Wetland		0.7			Enhancement
UT5 – Wetland		2.2		2.9	Preservation
UT6 - Wetland		8.1	2.6		Restoration
Total Site	7,960	17.6	2.6	20.2	
Total Mitigation Units	4,996	13.8	2.6		

Annual monitoring of the site is required to demonstrate successful mitigation based on criteria established in the Restoration Plan (EBX, 2007) and through a comparison to As-built and reference conditions. The success criteria components adhere to guidance provided by the United States Army Corps of Engineers (USACE) – Wilmington District (USACE, 2003) and recommendations from the NC EEP. Stream, hydrology, and vegetation monitoring are conducted annually for five years or until success criteria have been met. This Annual Monitoring Report details the results of the monitoring efforts for Year 2 at the North Muddy

Creek Stream and Wetland Mitigation Site. Results from the Year 2 monitoring efforts are included within the following sections and **Appendix A**.

2.3 Project History and Schedule

The project was constructed in the summer and fall of 2008 and the five year monitoring is expected to be completed in the winter of 2013 (**Table 2**). **Table 3** lists the project contacts.

Table 2. Project Activity and Reporting History

Month / Year	Activity
September 2007	Restoration Plan
September 2008	Construction Completed
December 2008	Planting Completed
March 2009	Supplemental Planting
April 2009	Mitigation Plan / As-Built Report
December 2009	Year 1 Annual Monitoring Report
December 2010	Year 2 Annual Monitoring Report
December 2011	Year 3 Annual Monitoring Report (Scheduled)
December 2012	Year 4 Annual Monitoring Report (Scheduled)
December 2013	Year 5 Annual Monitoring Report (Scheduled)

Table 3. Project Contacts

Contact	Provider Information
Full Delivery Service Contractor Norton Webster	Environmental Banc & Exchange 909 Capability Drive Suite 3100 Raleigh, North Carolina 27606 (919) 829-9909
Designer William Wilhelm	Kimley-Horn and Associates, Inc. 4651 Charlotte Park Drive, Suite 300 Charlotte, North Carolina 28217 (704) 333-5131
Construction/Seeding Contractor Robert Grady	RFG Construction Inc. 1907 Cambridge Drive Kinston, North Carolina 28504 (252) 523-2405
Planting Contractor Robert Cato	Superior Wildlife Services 2105 Sparre Drive Kinston, North Carolina 28504 (252) 939-0465
Monitoring Contractor Steve Melton	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801 (828) 253-6856

3.0 STREAM MONITORING

3.1 Stream Success Criteria

As stated in the Mitigation Plan, the stream geometry will be considered successful if the cross-section geometry, profile, and sinuosity are stable or reach a dynamic equilibrium. While the channels may not adhere to the design or reference ratios of stream geometry, the streams will be considered stable if the following key indicators are present:

- *Stream Type*: Maintenance of the design stream type or progression toward or conversion to a stable stream type such as B, C, or E will indicate stability.
- *Bank Height Ratio*: Bank height ratio between 1.0 and 1.2 will indicate that flood flows have access to the active floodplain and that higher flows do not apply excessive stresses to stream banks.

A minimum of two bankfull events is required during the 5-year monitoring period. If two bankfull events do not occur the monitoring period may be extended at the discretion of the UACOE.

3.2 Stream Morphology Monitoring Plan

The stream monitoring program will document annual system development and progress towards achieving the success criteria. Monitoring will occur annually for 5-years or until the final success criteria are achieved, whichever is longer. The locations of the individual stream monitoring components are shown in **Figure 3**.

3.2.1 Cross-Sections

A total of nine cross-sections were installed during the As-built monitoring efforts. Cross-sections for UT1 include one riffle and one pool for each of the two monitored reaches. The UT5 restoration reach includes one riffle and one pool cross-section and UT6 includes two riffles and one pool cross-section. Each cross-section was marked on both banks with permanent iron pins to establish known elevations and stationing for comparisons between annual data collection efforts. Annual cross-sectional survey points include all present breaks in slope; including top of bank, bankfull, inner berm, and thalweg. Cross-sectional photos are collected annually to visually document left and right bank conditions.

3.2.2 Longitudinal Profile

Four permanent longitudinal profile reaches were established during the As-built monitoring efforts. UT1 includes an upper (UT1-Upper) and lower reach (UT1-Lower), whereas UT5 and UT6 include the entire lengths of the restoration reaches. The beginning and end of each longitudinal profile reach was marked on both banks with permanent iron pins to establish benchmarks for annual data comparison and analysis. Longitudinal profile measurements include thalweg, water surface, bankfull, and top of low bank. Annual thalweg and water surface measurements are collected at the head and tail of each bedform type.

3.2.3 Substrate

Bed substrate assessment sites were established at each permanent cross-section. Annual pebble counts are collected utilizing methods adapted from Harrelson et al. (1994). A minimum of 100 particles are selected and measured from each channel feature type sampled. Sampled materials are placed into size classes using the traditional Wentworth scale classes subdivided based on phi scale. These classes are grouped into broader sediment size categories (e.g. sand, gravel or cobble) and are utilized to compare substrate progression from As-built conditions.

3.2.4 Hydrology

Crest gauges installed on each restoration reach tributary are utilized to document bankfull events during the monitoring period. Crest gauges are checked during each site visit to document the highest flow between visits. Gauge height readings are recorded and digital images of floodplain debris lines and sediment deposition are collected to document annual bankfull events.

3.2.5 Photo Reference Stations

A total of 23 representative photo stations were established throughout the site to subjectively evaluate overall trends in project progression and general site conditions over the duration of the monitoring effort. Additionally, the entire site is visually assessed annually to document any identified areas of concern. Representative photos are collected to document areas of concern identified during the visual site assessment.

3.3 Stream Morphology Monitoring Results

The Year 2 annual stream morphology data were collected between February and November 2010. Reference station photos were collected in February 2010 prior to leaf out to document the general conditions of the site. The Year 2 cross-section, longitudinal profile, and substrate data collection efforts occurred in March, April, and June 2010. Visual assessments and bankfull documentation was noted during each site visit during the annual monitoring effort. A final quantitative site assessment and data collection effort occurred in November 2010.

3.3.1 Cross-Sections

Cross-sectional data collected during the Year 2 monitoring effort have been compared with the As-built and Year 1 data (**Appendices B & C**). Compared to the previous data sets, the Year 2 channel cross-sectional data shows minimal differences between years indicating that the overall stream dimensions have remained stable.

3.3.2 Longitudinal Profile

Longitudinal profile surveys were conducted along four separate reaches of the restoration project, totaling approximately 3,111 linear feet. The surveys conducted included reach UT1-Upper from STA 100+09 to STA 103+96 (387 linear feet), reach UT1-Lower from STA 109+92

to STA 120+56 (1,064 linear feet), reach UT5 from STA 510+59 to STA 516+39 (580 linear feet), and reach UT6 from STA 600+05 to STA 610+85 (1,080 linear feet). The longitudinal profiles documented bed elevations, stream features, and in-stream grade control structures as compared to the As-built profiles (**Appendices B & C**). With the exception of some isolated areas of stream bed aggradation and degradation, stream bank erosion, grade control degradation, and thalweg migration; stream profiles between monitoring years indicate little adjustment.

3.3.3 Substrate

Pebble count data collected during Year 2 indicates little change in substrate size composition between years. Substrate composition within the stream channels is primarily silt/clay and fine sand particles within both the riffle and pool habitat types. The Year 2 pebble count data summary plots are included in **Appendix B**.

3.3.4 Hydrology

During the Year 2 monitoring bankfull events were documented with crest gauges located on the UT1, UT5, and UT6 restoration reaches (**Table 4**). A significant bankfull event occurred at all three reaches during January 2010 resulting in crest gauges located at UT1 and UT6 being completely inundated.

Table 4. Crest Gauge Data

Month Recorded	UT1 (ft)	UT5 (ft)	UT6 (ft)
January	>4.00	3.50	>4.00
February	0.00	0.00	0.00
March	0.00	0.00	0.00
April	0.00	0.00	0.00
May	0.00	0.00	0.00
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.00	0.00	0.00
September	0.00	0.00	0.00
October	0.00	0.00	0.00
November	0.00	0.00	0.00
December	0.00	0.00	0.00

3.3.5 Photo Reference Stations

The Year 2 reference station photos are included in **Appendix D**. Stream areas of concern (SPA) identified through the morphological monitoring and visual assessments include isolated areas of stream bed aggradation and degradation, stream bank erosion, and grade control degradation (**Table 5**). Representative photos of these areas taken during the Year 2 monitoring effort are included in **Appendix D**.

Table 5. Stream Areas Requiring Observation

SPA	Feature	Reach	STA	Description	Recommendation
1	Riffle	UT1	105+00	Riffle down cutting	Continue to monitor
2	Pool	UT1	105+25	Reduced pool depth due to aggradation	Continue to monitor
3	Riffle	UT1	105+70	Riffle down cutting	Continue to monitor
4	Riffle	UT1	107+90	Riffle down cutting	Continue to monitor
5	Riffle	UT1	110+40	Riffle down cutting	Continue to monitor
6	Pool	UT5	510+75	Reduced pool depth due to aggradation	Continue to monitor
7	Stream Bank	UT5	515+50	Bank scour	Continue to monitor
8	Rock Vane	UT5	515+80	Grade control structure piping	Continue to monitor
9	Pool	UT6	601+00	Reduced pool depth due to aggradation	Continue to monitor
10	Riffle	UT6	601+30	Riffle down cutting	Continue to monitor
11	Pool	UT6	601+60	Reduced pool depth due to aggradation	Continue to monitor
12	Pool	UT6	602+25	Reduced pool depth due to aggradation	Continue to monitor
13	Riffle	UT6	603+75	Riffle down cutting	Continue to monitor

3.4 Stream Conclusions

The Year 2 morphological monitoring and visual assessments primarily indicate a stable system when compared to the As-built conditions. While the majority of pools and riffles were of appropriate depth, stream areas of concern identified during Year 2 were primarily associated with pool aggradation and pool degradation. These areas will continue to be monitored during subsequent monitoring years and recommendations will be made if these areas become problematic to project success. **Table 6** summarizes the riffle morphologic parameters between monitoring years; details of the morphologic parameters are provided in **Appendices B & C**.

Table 6. Summary of Morphologic Monitoring Parameters

Unnamed Tributary 1 – Upper Reach			
Parameter	As-Built	Year 1	Year 2
Bankfull Cross-Section Area Abkf (sq ft)	4.2	4.2	3.9
Bankfull Width Wbkf (ft)	6.0	5.8	5.8
Bankfull Width / Depth Ratio	8.6	8.0	8.5
Bankfull Mean Depth Dbkf (ft)	0.7	0.7	0.7
Bankfull Max Depth Dmax (ft)	1.2	1.2	1.2

Unnamed Tributary 1 – Lower Reach			
Parameter	As-Built	Year 1	Year 2
Bankfull Cross-Section Area Abkf (sq ft)	3.1	3.1	3.1
Bankfull Width Wbkf (ft)	5.5	6.2	6.4
Bankfull Width / Depth Ratio	9.9	12.2	12.9
Bankfull Mean Depth Dbkf (ft)	0.6	0.5	0.5
Bankfull Max Depth Dmax (ft)	1.0	1.0	0.9

Unnamed Tributary 5			
Parameter	As-Built	Year 1	Year 2
Bankfull Cross-Section Area Abkf (sq ft)	5.4	5.0	5.0
Bankfull Width Wbkf (ft)	7.2	7.2	7.6
Bankfull Width / Depth Ratio	9.7	10.3	11.6
Bankfull Mean Depth Dbkf (ft)	0.7	0.7	0.7
Bankfull Max Depth Dmax (ft)	1.2	1.2	1.2

Table 6 Continued. Summary of Morphologic Monitoring Parameters

Unnamed Tributary 6			
Parameter	As-Built	Year 1	Year 2
Average Bankfull Cross-Section Area Abkf (sq ft)	6.1	7.7	7.7
Average Bankfull Width Wbkf (ft)	10.5	10.5	10.8
Average Bankfull Width / Depth Ratio	14.5	14.7	15.2
Average Bankfull Mean Depth Dbkf (ft)	0.7	0.7	0.7
Average Bankfull Max Depth Dmax (ft)	1.3	1.4	1.6

4.0 HYDROLOGY

4.1 Hydrologic Success Criteria

As stated in the Restoration Plan, the hydrology success criteria for the site is based on improvements to the frequency and duration of saturated soils as compared to the reference wetlands. The groundwater hydrology of the reference sites serve as the target for groundwater conditions since these areas met wetland criteria prior to construction. They also are in similar landscape positions and should have hydrological responses similar to the restored wetlands. The minimum requirement for the restoration of wetland hydrology will also be based on the USACE guidelines (USACE, 1987) including saturation of the upper surface soils (12 inches) for 7 percent of the growing season. The growing season for McDowell County extends from March 28 to November 4 (222 days). The growing season is based on the fifty percent probability of a 28°F or greater minimum temperature between these dates (NRCS, October 2009).

4.2 Description of Hydrology Monitoring Efforts

Prior to the 2009 growing season, eight Infinities automated groundwater gauges were installed within the wetland project areas (**Figure 3**). The UT1 wetland project includes two gauges within the restoration sites and one reference gauge within a fully functional wetland immediately adjacent to the project site. The UT5 wetland project contains one gauge within the enhancement wetland and one within the preservation wetland. Finally, three gauges were installed within the UT6 wetland restoration area. Additionally, prior to the growing season an Ecotone automated rain gauge was installed at each project area. The monitoring protocol for the site specified that automated monitoring stations be downloaded and checked for malfunctions on a bi-monthly basis. During the 2010 growing season, the UT5-01 groundwater gauge malfunctioned during the initial portion of the growing season. Additionally, rain gauge malfunctions at UT1 and UT5 resulted in data gaps for rainfall events occurring during the growing season.

Automated Gauges

Groundwater gauges were installed to a minimum depth of 23 inches below the ground surface. Automated gauges compensate for changes in atmospheric pressure and were set to record water elevation above the bottom of the sensor twice daily at 08:00 and 20:00 hours. Automated rain gauges were installed within open areas to prevent overhead interference with daily rain recordings. Gauges automatically record rainfall with a tipping bucket calculated to record to 0.01 of an inch.

Data Interpretation

Unless erroneous readings were observed between the two daily groundwater readings, the 08:00 daily reading was utilized for the daily hydrology level. For days in which a significant difference between the 08:00 and 12:00 reading was observed ($N = 14$), the data were compared to prior and post ground water levels to eliminate erroneous readings. Rainfall readings were summed to obtain the monthly totals.

During monitoring years in which below normal precipitation results in groundwater gauges not meeting hydrologic requirements, the groundwater hydrology from the reference gauges will be utilized to compare the restoration and enhancement gauges for determination of a positive correlation.

4.3 Results of Hydrology Monitoring

The following Year 2 hydroperiod statistics were calculated for each monitoring station following the second growing season: 1) most consecutive days and percent of the growing season that the water table was within 12 inches of the soil surface; 2) cumulative number of days and percent of growing season that the water table was within 12 inches of the soil surface; and 3) number of times the water table rose to within 12 inches of the soil surface (**Table 7**). Individual groundwater graphs and raw hydrograph data collected from the monitoring gauges are provided in **Appendix E**.

During Year 2, all but one groundwater gauge (UT1 – 3) met the success criteria as stated in the Restoration Plan. Gauge data results for the UT1 wetland project ranged from approximately 6 to 19 percent hydroperiod attainment during the growing season with the reference gauge (UT1 – 1) meeting criteria for 18.9 percent of the season. Comparisons between the Year 1 and Year 2 gauge data for the reference gauge (UT1 – 1) and the gauge that did not meet criteria (UT1 – 3) in Year 2 indicate a similar downward trend in groundwater hydrology (**Table 7**). Gauge data for the UT5 wetland project, including the reference gauge (UT5 – 1), resulted in a consecutive hydroperiod range between 33 and 37 percent during the growing season. The UT6 wetland project gauges met criteria for 100 percent of the growing season.

Table 7. Hydrologic Monitoring Results

Gauge ID	2010 Max Hydroperiod (Growing Season March 28 – November 4, 222 Days)									
	Year 2		Year 1		Year 2		Year 1		Year 2	Year 1
	Consecutive		Consecutive		Cumulative		Cumulative			
Days	Percent of Growing Season	Days	Percent of Growing Season	Days	Percent of Growing Season	Days	Percent of Growing Season	Occurrences		
UT1 - 1	42	18.9	51	23.0	129	58.1	150	67.6	11	8
UT1 - 2	41	18.5	88	39.6	95	42.8	155	69.8	11	5
UT1 - 3	14	6.3	22	9.9	34	15.3	86	38.7	6	17
UT5 - 1	74	33.3	96	43.2	182	82.0	178	80.2	3	3
UT5 - 2	82	36.9	89	40.1	129	58.1	136	61.3	7	5
UT6 - 1	222	100.0	112	50.5	222	100.0	192	86.5	1	2
UT6 - 2	222	100.0	115	51.8	222	100.0	197	88.7	1	3
UT6 - 3	222	100.0	111	50.0	222	100.0	191	86.0	1	2

4.3.1 Site Data

Groundwater depths and daily precipitation for individual monitoring gauges are graphed in (**Appendix E**). This hydrography demonstrates the reaction of groundwater levels to specific rainfall events at each monitoring location.

4.3.2 Climate Data

On-site monthly rainfall for 2010 was compared to historical and observed precipitation recorded for Burke County (**Table 8 and Figure 4**). Historical and observed precipitation data reported herein is from the Burke County Bridgewater hydro station (NC CRONOS, November, 2010). The Bridgewater station recorded rainfall amounts during 2010 that exceeded the historical averages in January and August, whereas rainfall amounts during March, April, June, September, and October were below average. On-site gauges recorded similar results, with the exception that above average rainfall was also recorded in May.

Table 8. Comparison of Normal Rainfall to Observed Rainfall

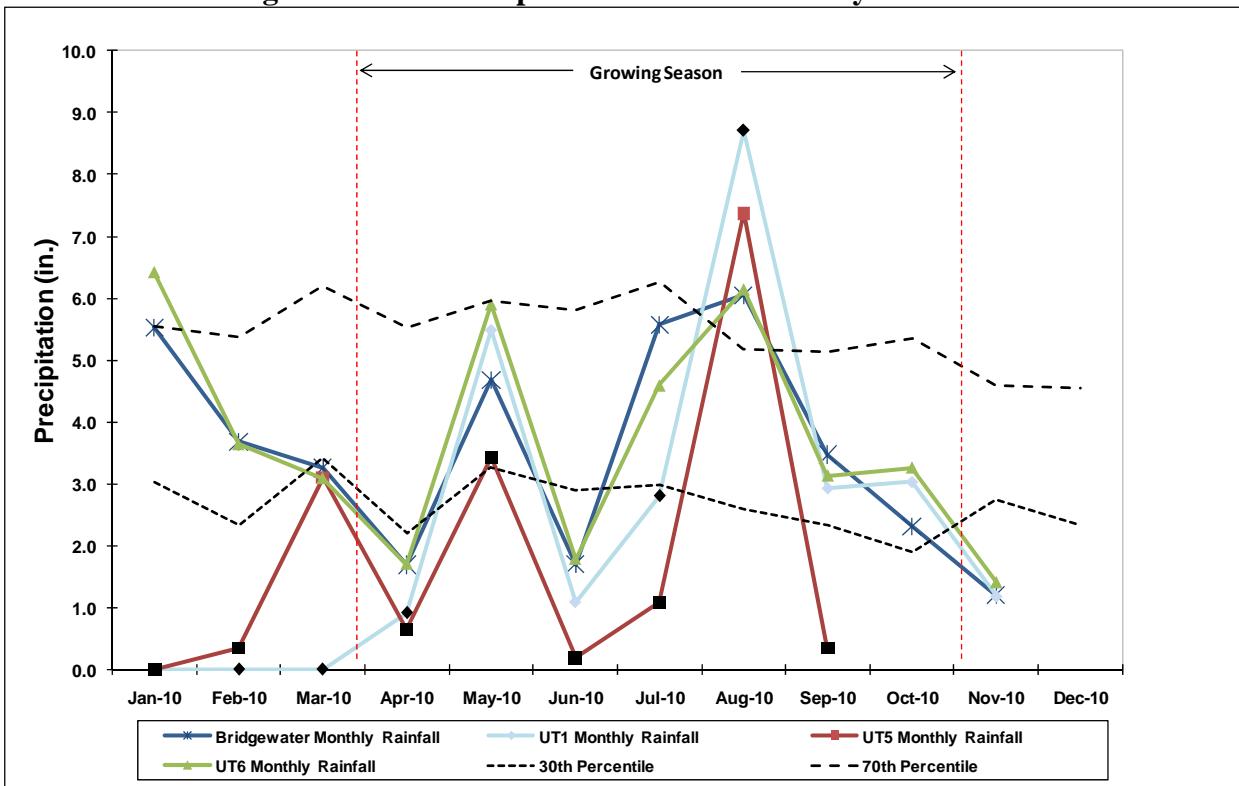
Month	Average (inches)	Normal Limits (inches)		Burke Precipitation (inches)	UT1 Precipitation (inches)	UT5 Precipitation (inches)	UT6 Precipitation (inches)
		30 Percent	70 Percent				
January	4.22	3.03	5.54	5.53	*	*	6.43
February	3.95	2.32	5.37	3.68	*	0.35**	3.64
March	4.96	3.41	6.20	3.25	*	3.10	3.09
April	4.08	2.20	5.52	1.69	0.91**	0.64**	1.70
May	4.86	3.26	5.96	4.68	5.49	3.42**	5.91
June	4.52	2.90	5.80	1.70	1.09	0.18**	1.78
July	4.82	2.99	6.27	5.57	2.80**	1.08**	4.59
August	4.17	2.60	5.17	6.05	8.71**	7.37	6.15
September	4.24	2.34	5.13	3.47	2.93	0.35**	3.13
October	3.88	1.90	5.34	2.31	3.03	*	3.26
November	3.85	2.74	4.59	1.20***	1.18***	*	1.40
December	3.67	2.33	4.55	---	---	---	---
Annual	---	45.23	56.10	---	---	---	---
Total	51.23	---	---	39.13	26.14	16.49	41.08

*Gauge malfunction no data collected.

**Gauge malfunction for portion of the month.

***Data from November 1st to November 17th.

Figure 4. 2010 Precipitation for North Muddy Creek Site



Data points with black fill indicate gauge malfunctions resulting in monthly rainfall data gaps.

4.4 Hydrologic Conclusions

Data collected from the groundwater monitoring gauges in 2010 indicate that all but one of the hydrologic monitoring stations recorded saturation of the upper surface soils (12 inches) for at least 7 percent of the growing season. Saturation of the upper surface soils ranged from 14 (6.3%) to 42 (18.9%) consecutive days during the growing season for the UT1 wetland project. The cumulative number of days groundwater levels were recorded within or above 12 inches of the soil surface ranged from 34 to 129 at UT1. Upper surface soil saturation for UT5 ranged from 74 (33.3%) to 82 (36.9%) consecutive days during the growing season with the cumulative days ranging from 129 to 182. Wetland hydrology attainment was greatest for the UT6 project with soil saturation occurring for 100% of the growing season.

The Bridgewater weather station and on-site rainfall data indicated that the 2010 growing season rainfall amounts were overall below normal for most of the growing season.

5.0 VEGETATION

5.1 Vegetation Success Criteria

Successful establishment of vegetation for the North Muddy Creek Stream and Wetland Restoration Project should be the survival of 320 planted stems per acre by the end of Year 3 such that the site will achieve the final requirement of 260 planted stems per acre by Year 5.

5.2 Description of Species and Vegetation Monitoring

Eleven plots, or approximately 1% of all three restoration areas combined, were established within the project easement area: ten standard (10m x 10m) plots and one non-standard (5m x 20m) plot (**Figure 3**). Four plots were established at UT1, two at UT5, and five at UT6. Vegetation monitoring plots at UT1 comprise 1% of the restoration area for this tributary, 2.5% for UT5, and 1% for UT6, respectively. These plots were established in accordance with the CVS-EEP Level II monitoring protocol (Lee et al. 2008) within the planted restoration areas. Approximately 0.025-acre in size, vegetation plots were monitored to determine the success of planted vegetation and the overall trajectory of woody plant restoration and regeneration at the project site. Plots were placed within the applicable planting zones to capture the heterogeneity of the designed vegetative communities. However, given that several planting zones were too narrow to accommodate the standard or non-standard plots, all vegetation plots were placed within riparian, wetland, and upland planting zones. A total of 10 tree species were planted on the site (**Table 9**).

Table 9. Planted Tree Species

Common Name	Scientific Name	FAC Status
Willow Oak	<i>Quercus phellos</i>	FACW-
Water Oak	<i>Quercus nigra</i>	FAC
Swamp Chestnut Oak	<i>Quercus michauxii</i>	FACW-
Cherrybark Oak	<i>Quercus pagoda</i>	FAC+
Shagbark Hickory	<i>Carya ovata</i>	FACU
River Birch	<i>Betula nigra</i>	FACW
Common Pawpaw	<i>Asimina triloba</i>	FAC
American Sycamore	<i>Platanus occidentalis var. occidentalis</i>	FACW-
Green Ash	<i>Fraxinus pennsylvanica</i>	FACW
Buttonbush	<i>Cephalanthus occidentalis</i>	OBL

5.3 Results of Vegetation Monitoring

Planted stem counts for each of the 11 vegetation monitoring plots were recorded by species (**Table 10**). Year 2 monitoring documented survivability ranging from 121 to 1,255 planted stems per acre across all vegetation plots. The average stem density for the entire restoration site is 659 stems per acre. With respect to each restoration reach, UT1 had an average of 678 planted stems per acre, UT5 had 1,052 stems per acre, and UT6 had 486 planted stems per acre (**Table**

11). The Year 2 monitoring results at UT6 indicated the stem density at VP4 and VP5 decreased by 50% and 29%, respectively when compared to the Year 1 densities. On average, planted stem density only declined 4.0% between Year 1 and Year 2 for the entire restoration area. The overall minimal decline was the result of several stems that were classified as missing in Year 1 were relocated or had re-sprouted, and actually increased the number of stems per acre in Year 2 for VP4 at UT1, VP2 at UT5, and VP3 at UT6.

Table 10. Results of 2010 Vegetation Monitoring by Plot

Species	UT1				UT5		UT6				
	Plot ID				Plot ID		Plot ID				
	VP1	VP2	VP3	VP4	VP1	VP2	VP1	VP2	VP3	VP4	VP5
<i>Asimina triloba</i>					5		1		2		3
<i>Betula nigra</i>	3						2		2		2
<i>Carya ovata</i>									4		
<i>Cephalanthus occidentalis</i>	6	11	1	7	8	3		9		1	7
<i>Fraxinus pennsylvanica</i>			2				8			1	
<i>Platanus occidentalis</i> var. <i>occidentalis</i>	2	5				2	1		1	1	
<i>Quercus michauxii</i>	4	4			5	3		1	4		
<i>Quercus nigra</i>	1		5	2					2		
<i>Quercus pagoda</i>	1					4					
<i>Quercus phellos</i>	5		2	6	3	19	2	2	4		

Table 11. Summary of Vegetation Monitoring Results

Reach ID	Plot ID	Stems Planted	2010 Stems	Percent Survival	Stems per Acre						
					Stems Planted		2009	2010	2011	2012	2013
							Year 1	Year 2	Year 3	Year 4	Year 5
UT1	VP1	26	22	85%	1,053		890	890			
	VP2	20	20	100%	810		809	809			
	VP3	15	10	67%	607		405	405			
	VP4	16	15	94%	648		567	607			
UT5	VP1	26	21	81%	1,053		891	850			
	VP2	35	31	89%	1,417		1,215	1,255			
UT6	VP1	16	14	88%	648		567	567			
	VP2	14	12	86%	567		567	486			
	VP3	23	19	83%	931		729	769			
	VP4	17	3	18%	688		243	121			
	VP5	30	12	40%	1,215		688	486			

Average stems per acre: 659

Range of stems per acre: 121-1,255

A visual estimate of herbaceous vegetation cover within the monitoring plots is provided to assess the overall stability of the restoration site (**Table 12**). On average, herbaceous vegetation coverage is 89% within the plots. Observations of herbaceous cover throughout the project area

were noted during the visual assessment and are documented in **Appendix A**; representative photos are included in **Appendix D**. Herbaceous cover in bare areas is expected to increase as a result of natural recruitment from adjacent wooded areas and no remedial action is recommended at this time. Herbaceous cover typically consists of annual ragweed (*Ambrosia artemisiifolia*), orchard grass (*Dactylis glomerata*), dogfennel (*Eupatorium capillifolium*), daisy fleabane (*Erigeron annuus*), Queen Anne's lace (*Daucus carota*), hollow-stem Joe-pyeweed (*Eutrochium fistulosum*), narrow-leaved sunflower (*Helianthus angustifolius*), and goldenrod (*Solidago sp.*).

Table 12. Estimated Herbaceous Total Percent Cover

Reach ID	Plot ID	Estimated Herbaceous Cover (%)
UT1	VP1	100%
	VP2	100%
	VP3	100%
	VP4	90%
UT5	VP1	75%
	VP2	90%
UT6	VP1	40%
	VP2	95%
	VP3	95%
	VP4	100%
	VP5	95%

Commonly encountered woody volunteer species are also documented throughout the five-year monitoring period (**Table 13**). Volunteer plant recruitment was highest at UT 5 with an average of 2,448 stems per acre followed by UT1 with an average of 708 stems per acre. Some of the most common recruits include American sycamore, green ash, tulip poplar, and tag alder. Woody volunteers were lowest at UT6 with approximately 97 natural stems per acre. Three of the five vegetation plots had no volunteers. Nevertheless, recruits were on average higher at UT6 than those reported during Year 1.

Table 13. Volunteer Tree Species

Reach ID	Common Name	Scientific Name	FAC Status
UT1	Eastern Box Elder	<i>Acer negundo var. negundo</i>	FACW
	Green Ash	<i>Fraxinus pennsylvanica</i>	FACW
	American Sycamore	<i>Platanus occidentalis var. occidentalis</i>	FACW-
	Yellow Poplar	<i>Liriodendron tulipifera var. tulipifera</i>	FACU
	Buttonbush	<i>Cephalanthus occidentalis</i>	OBL
	Black Cherry	<i>Prunus serotina var. serotina</i>	FACU
UT5	Sweet Gum	<i>Liquidambar styraciflua</i>	FAC+
	American Sycamore	<i>Platanus occidentalis var. occidentalis</i>	FACW-
	Yellow Poplar	<i>Liriodendron tulipifera var. tulipifera</i>	FACU
	Tag Alder	<i>Alnus serrulata</i>	FACW
	Black Cherry	<i>Prunus serotina var. serotina</i>	FACU
	Eastern Red Maple	<i>Acer rubrum var. rubrum</i>	FAC
	Green Ash	<i>Fraxinus pennsylvanica</i>	FACW
	American Persimmon	<i>Diospyros virginiana</i>	FAC
	River Birch	<i>Betula nigra</i>	FACW
UT6	American Sycamore	<i>Platanus occidentalis var. occidentalis</i>	FACW-
	Silky Dogwood	<i>Cornus amomum</i>	FACW+
	Smooth Sumac	<i>Rhus glabra</i>	UPL

5.4 Vegetation Observations and Conclusions

Overall, planted stems are surviving at the North Muddy Creek Stream and Wetland Restoration Site. The majority (82%) of planted stems for the entire restoration site had good or excellent vigor scores, but nearly 13% of planted stems were reported as dead or missing. Of these, pawpaw had the highest mortality. In particular, there was considerable planted stem mortality at VP4 and VP5 at UT6. Vegetation damage during Year 2 was primarily documented for buttonbush and swamp chestnut, a considerable amount of which was attributed to insects and dieback. In addition, invasive exotic plants such as multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), sericea lespedeza (*Lespedeza cuneata*), and privet (*Ligustrum sp.*) were observed in several vegetation plots. Of immediate concern is the presence of several developing patches of kudzu (*Pueraria montana var. lobata*) within the upper easement boundary of UT1. This population should be controlled to prevent further expansion into the restoration area. Invasive exotic plant species noted above were also documented outside of the vegetation monitoring plots but within the easement boundary (**Appendix A**). Representative photos of these areas during the Year 2 monitoring effort are included in **Appendix D**.

Excluding VP4 at UT6, which only had an average of 121 planted stems per acre, all vegetation monitoring plots meet success criteria and generally had good herbaceous cover (**Appendix A**). Planted stems were also low for VP3 at UT1 with 405 stems per acre, but the number of total stems nearly doubled when woody recruits were included. When planted and natural stems are combined, the average stem density for the entire restoration site is over 1,405 stems per acre, which is well above the interim success criterion of 320 stems per acre at the end of the Year 3 monitoring period.

6.0 CONCLUSIONS AND RECOMENDATIONS

- Morphologic data and observations of stream conditions at the site primarily indicate stable conditions between As-built and Year 2 monitoring. Areas of concern identified within the stream reaches will be monitored during subsequent years and recommendations made if these areas prevent criteria attainment as specified in the Restoration Plan (EBX, 2007).
- Data collected from the groundwater monitoring gauges in 2010 indicate that the majority of the wetland project components are currently meeting wetland threshold hydrology. Overall, the Bridgewater hydro station and on-site rain gauges indicated that the 2010 rainfall amounts were below normal for the majority of the growing season. The Bridgewater station data exceeded historical limits in January and August while below normal limits were recorded in March, April, June, September, and October. On-site rain gauges documented similar results with the exception that above average rainfall was recorded in May.
- Vegetation monitoring efforts have documented the average number of planted stems per acre for the entire restoration site to be 659 stems per acre for the 2010 monitoring year, indicating that 96% of the planted stems documented in Year 1 survived to Year 2. UT1 had an average of 678 planted stems per acre, UT5 had 1,052, and UT6 had 486 planted stems per acre, which suggest 102% survival at UT1 (due to relocated and re-sprouting stems), 100% for UT5, and 87% for UT6. Vegetation plot 4 at UT6 was the only plot not on track to meet the interim success criteria. With an overall average of 486 stems per acre UT6 is still above the minimum success criteria, but may require supplemental planting if stem loss continues. Lastly, expansion of invasive exotic plant populations should be monitored both within the vegetation plots in which they occur and within the larger restoration area. The kudzu patches within UT1 should be eradicated as soon as possible.
- Stream, hydrologic, and vegetation monitoring are scheduled to continue through 2013.

7.0 REFERENCES

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APPENDIX A

Current Condition Plan View



Prepared for:

Prepared by:

UT2

SHEET 2 (UT1)

UT4

SHEET 5 (UT2 & UT4)

SHEET 3 (UT5)

UT1-LOWER

UT1-UPPER

SHEET 4 (UT6)

SHEET 5 (UT5)

SHEET 6 (UT6)

SHEET 7 (UT7)

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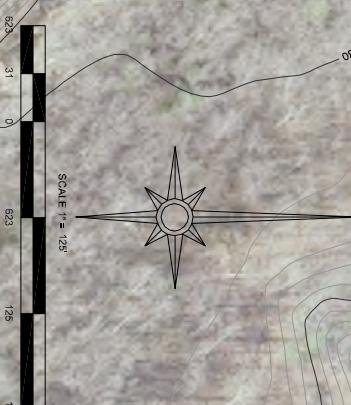
SHEET 183 (UT183)

SHEET 18



Prepared for:

Prepared by:



YEAR 2 CONDITIONS	
In-Stream Structure Conditions	
■	Failed
—	Stressed
Bank / Bed Conditions	
—	Bank Stressed
—	Bed Aggradation
■ ■	Bed Scour
Vegetation Plots	
■	Criteria Met
Wetland Gauges	
●	Criteria Unmet
Hydrology Met	
Hydrology Unmet	
Vegetation Problem Areas	
●	Invasive Population
Bare Bench	

LEGEND	
—	Easement Boundary
—	Stream
—	Longitudinal Profile Reach
—	Longitudinal Profile Begin/End
—	Cross Section
●	Crest Gauge
◆	Rain Gauge
—	Photo Point
—	Constructed Riffle
—	A-Vane
—	Cross Vane
—	J-Hook
—	Log Sill
—	Root Wad
●	Control Point

Current Condition Plan View
Final
YEAR 2 Monitoring-2010
UT1

North Muddy Creek

Burke & McDowell Counties, NC

Notes:
 1. Coordinate System is State Plane Feet NAD 83.
 2. Base map information including stationing provided by Kimley Horn.
 Dwg title: ACAD-018336001-BASE3.dwg
 3. Aerial photography is McDowell County 2005

Sheet:

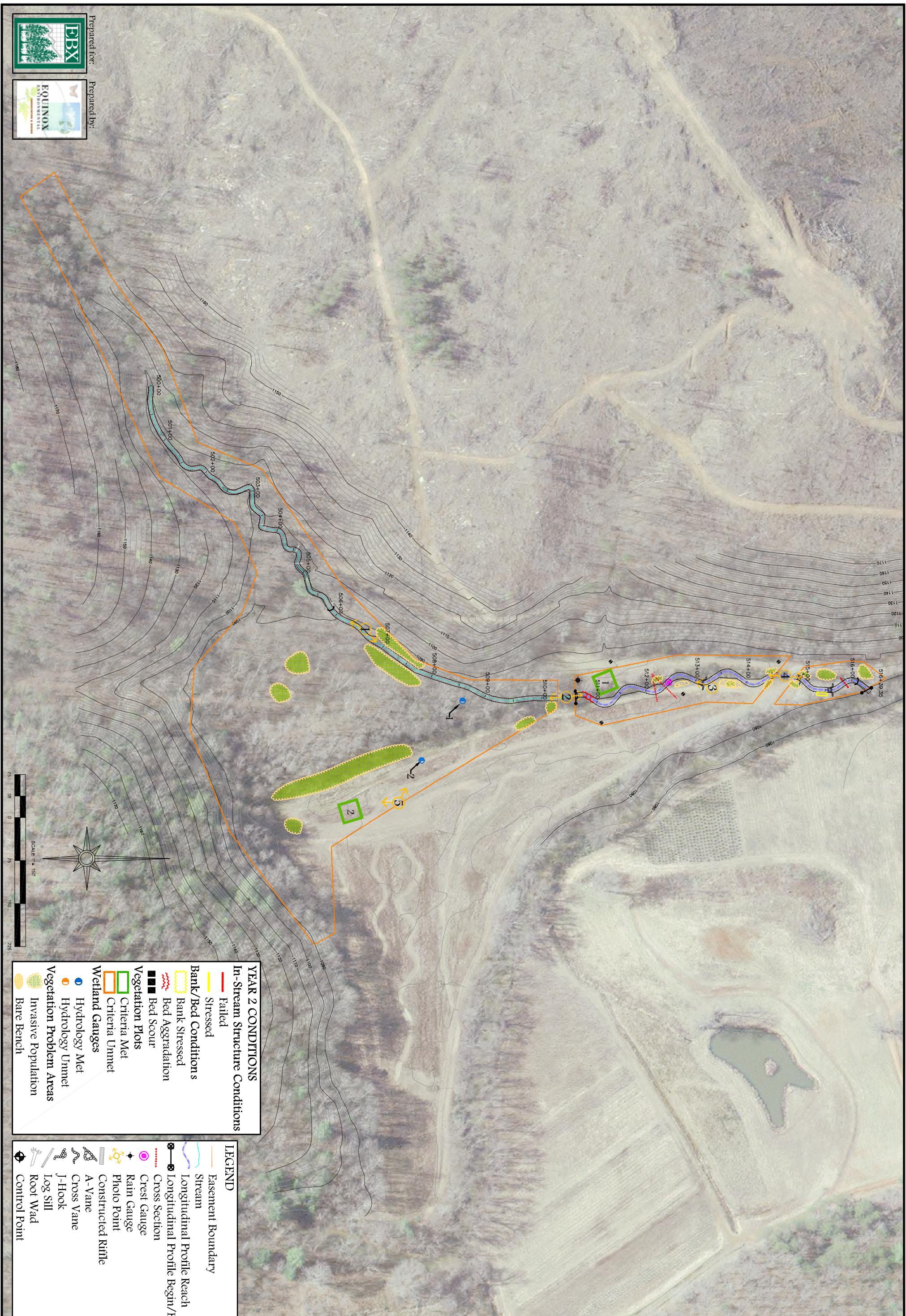
2

of 5



Prepared for:

Prepared by:

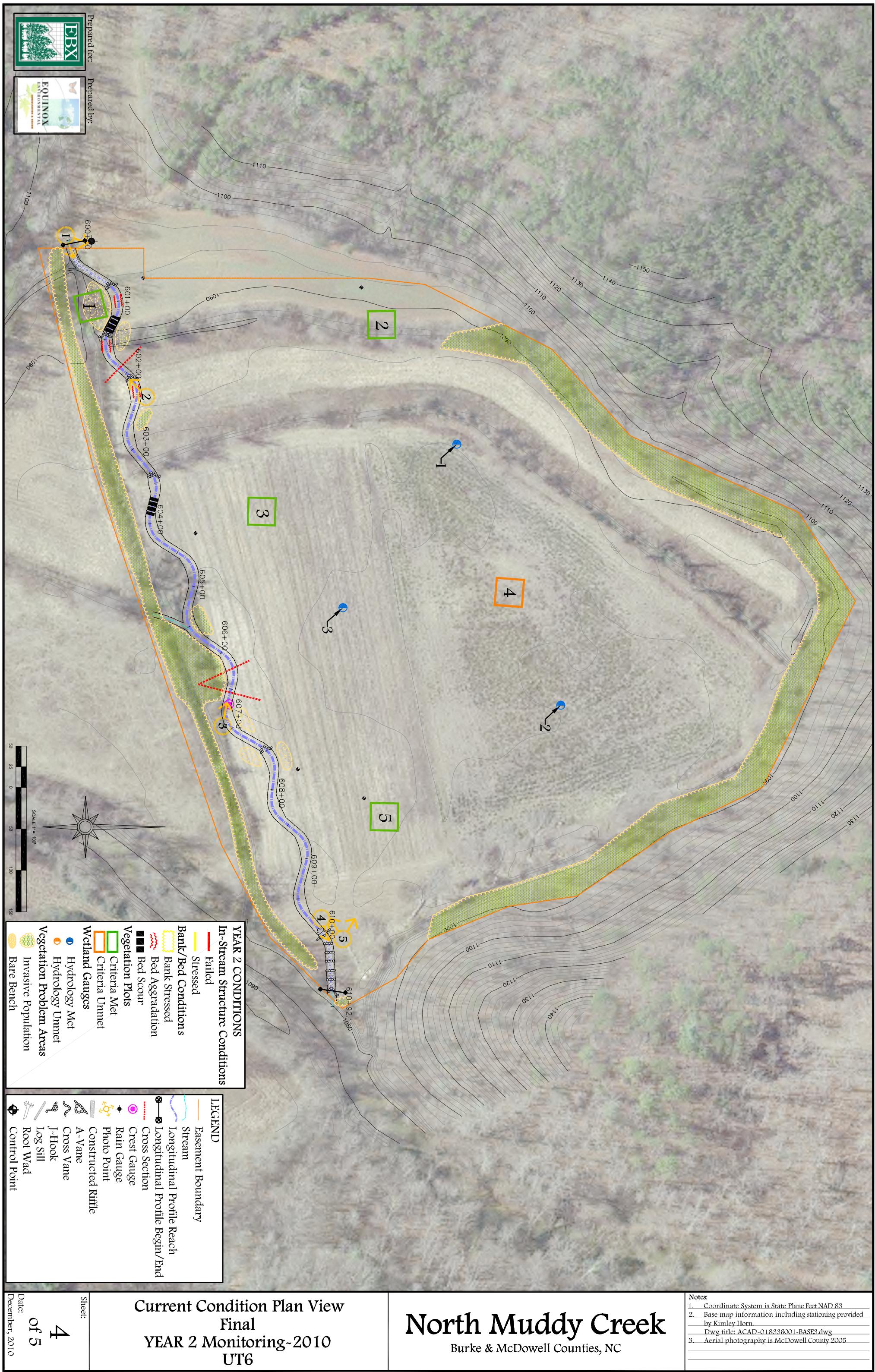


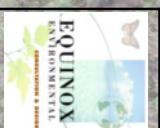
Current Condition Plan View
Final
YEAR 2 Monitoring-2010
UT5

North Muddy Creek

Burke & McDowell Counties, NC

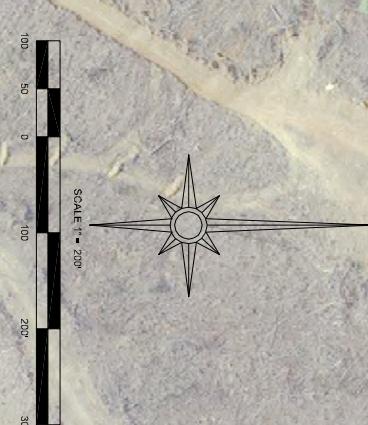
Notes:
1. Coordinate System is State Plane Feet NAD 83.
2. Base map information including stationing provided by Kimley Horn.
Dwg title: ACAD-018336001-BASE3.dwg
3. Aerial photography is McDowell County 2005





Prepared for:

Prepared by:



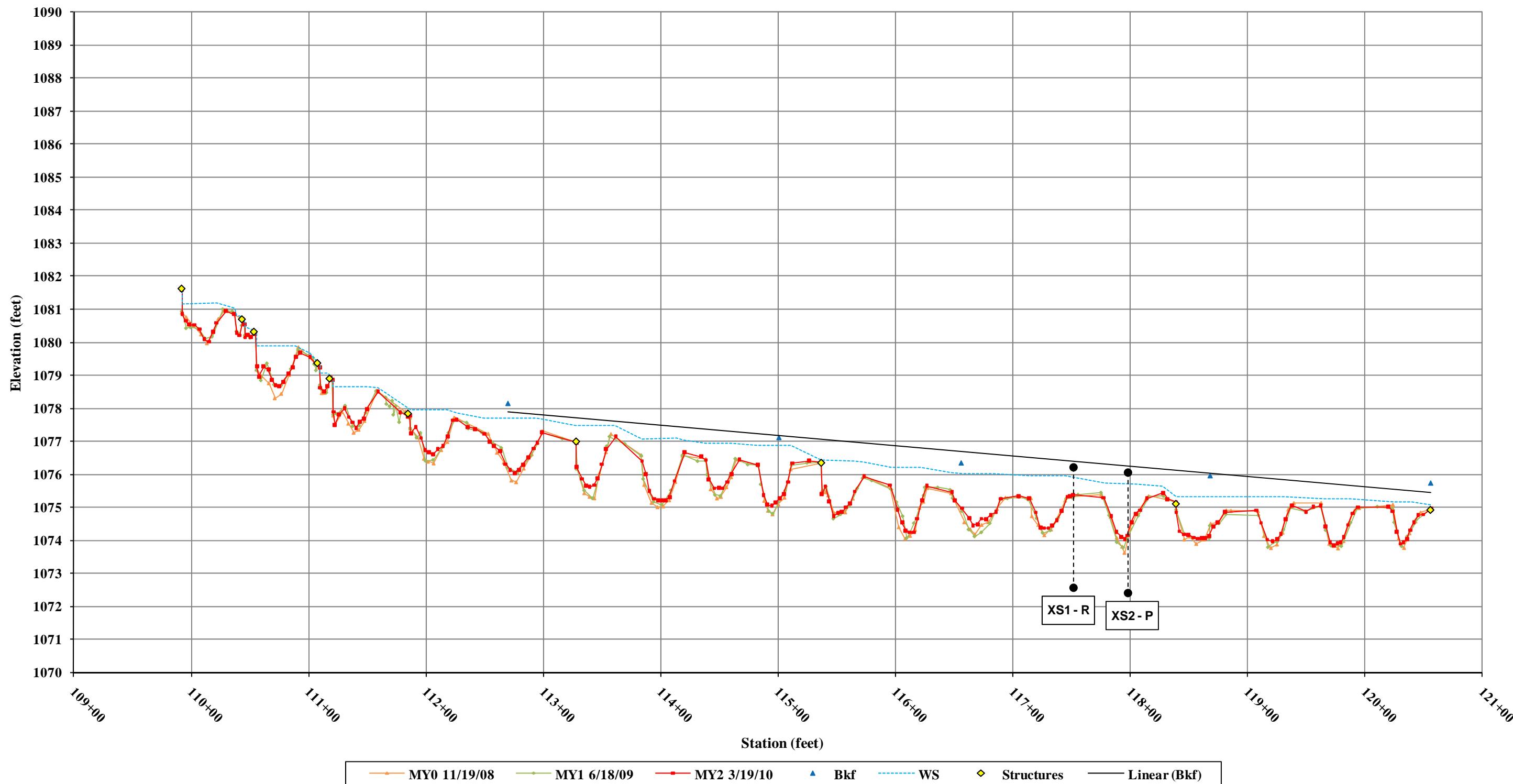
APPENDIX B

2010 Profile, Cross-Section, and Substrate Data

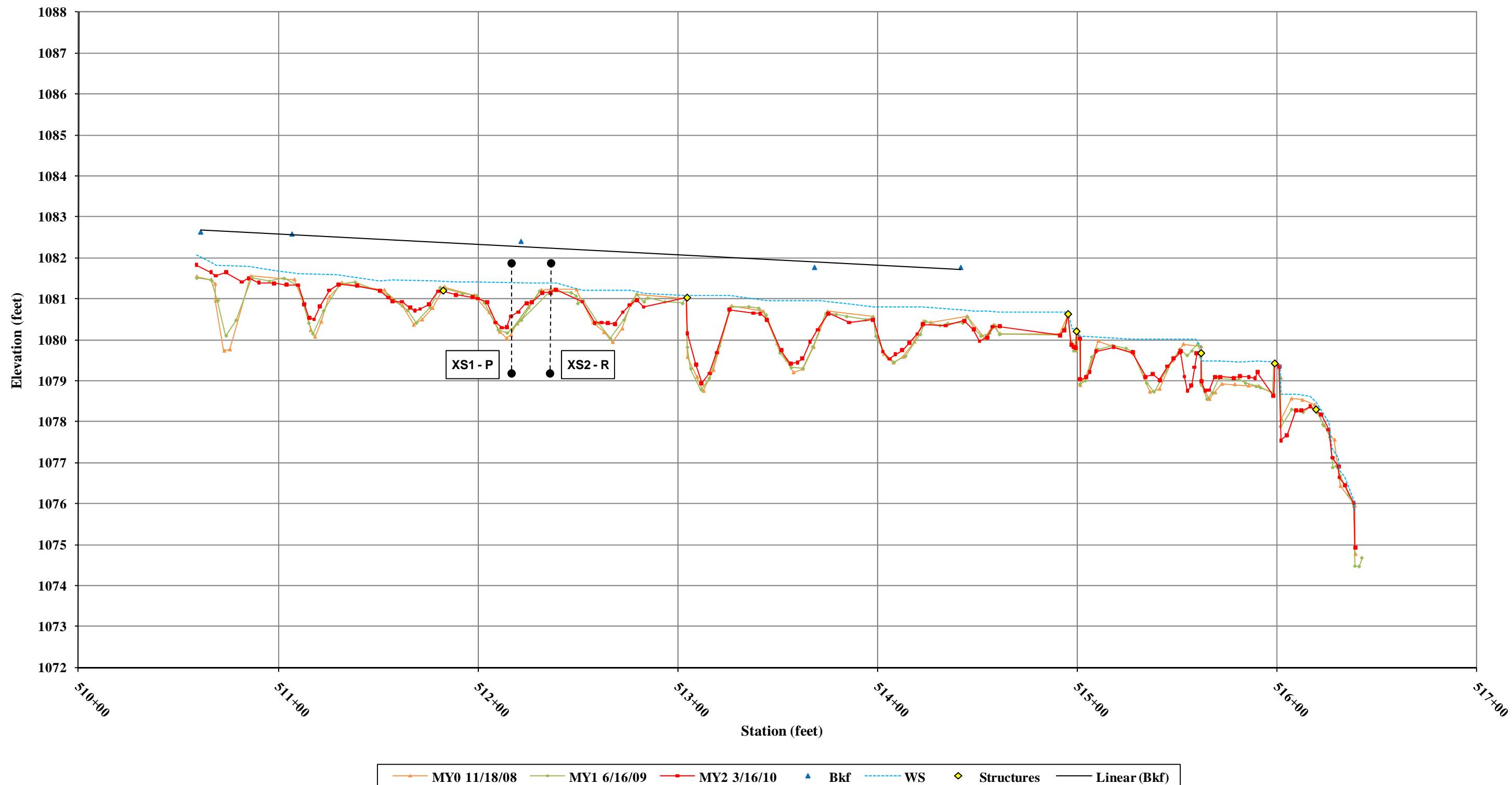
**North Muddy Creek UT1-Upper
Longitudinal Profile**



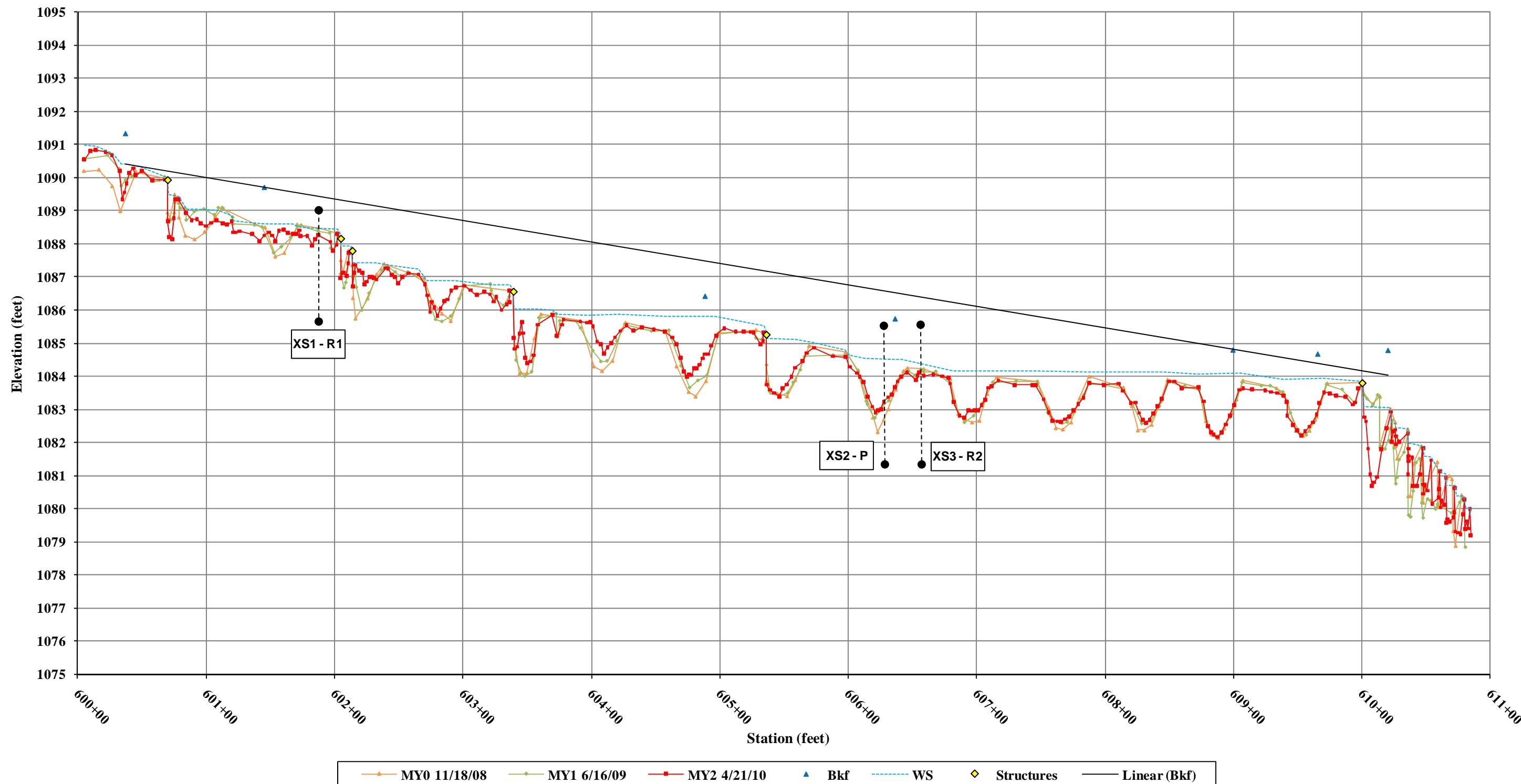
**North Muddy Creek UT1-Lower
Longitudinal Profile**



**North Muddy Creek UT5
Longitudinal Profile**



**North Muddy Creek UT6
Longitudinal Profile**



UT1 Upper – Cross-Section 1 – Pool

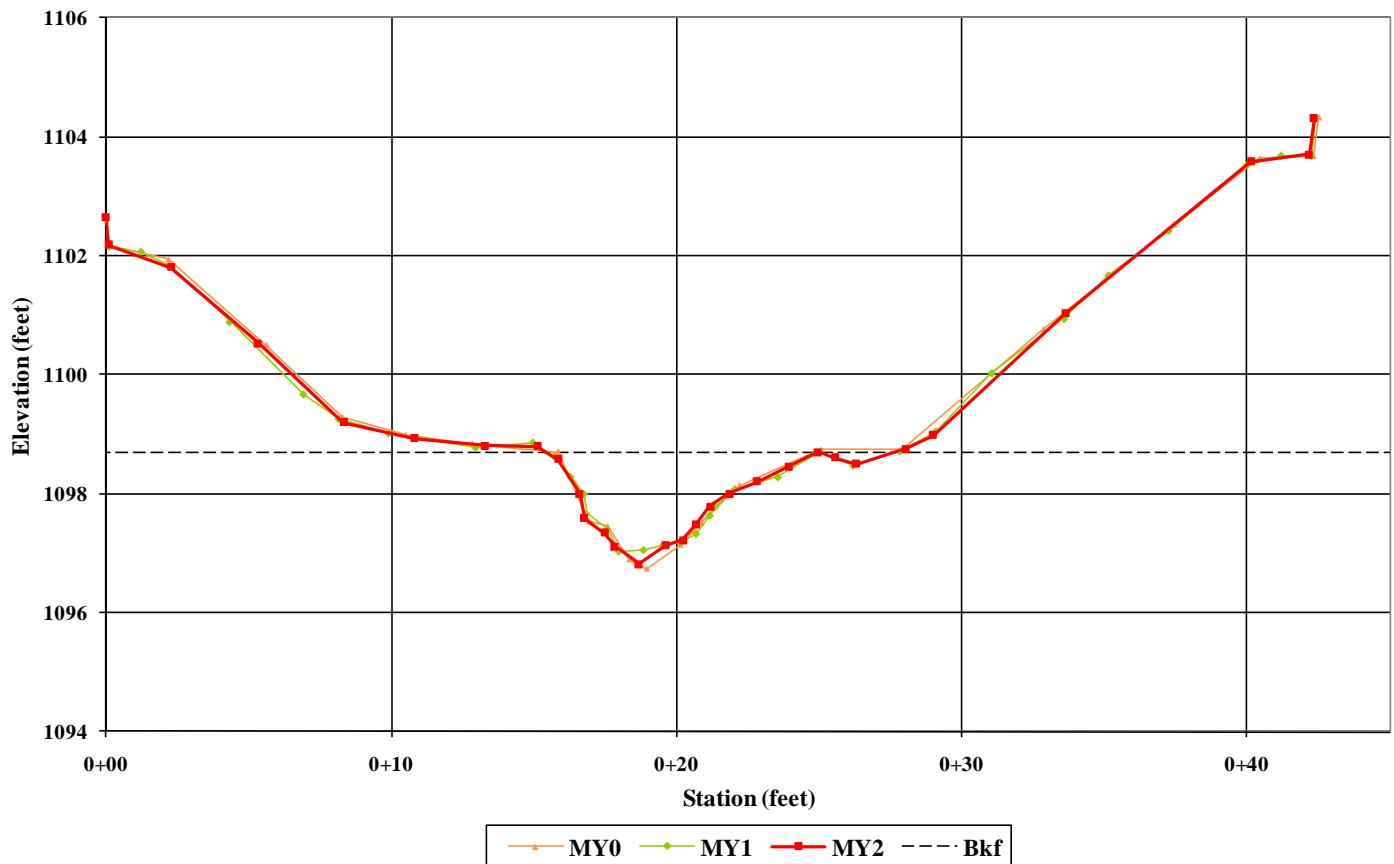


Looking at Left Bank



Looking at Right Bank

North Muddy UT1 - Upper Cross-Section 1 - Pool



UT1 Upper – Cross-Section 2 – Riffle

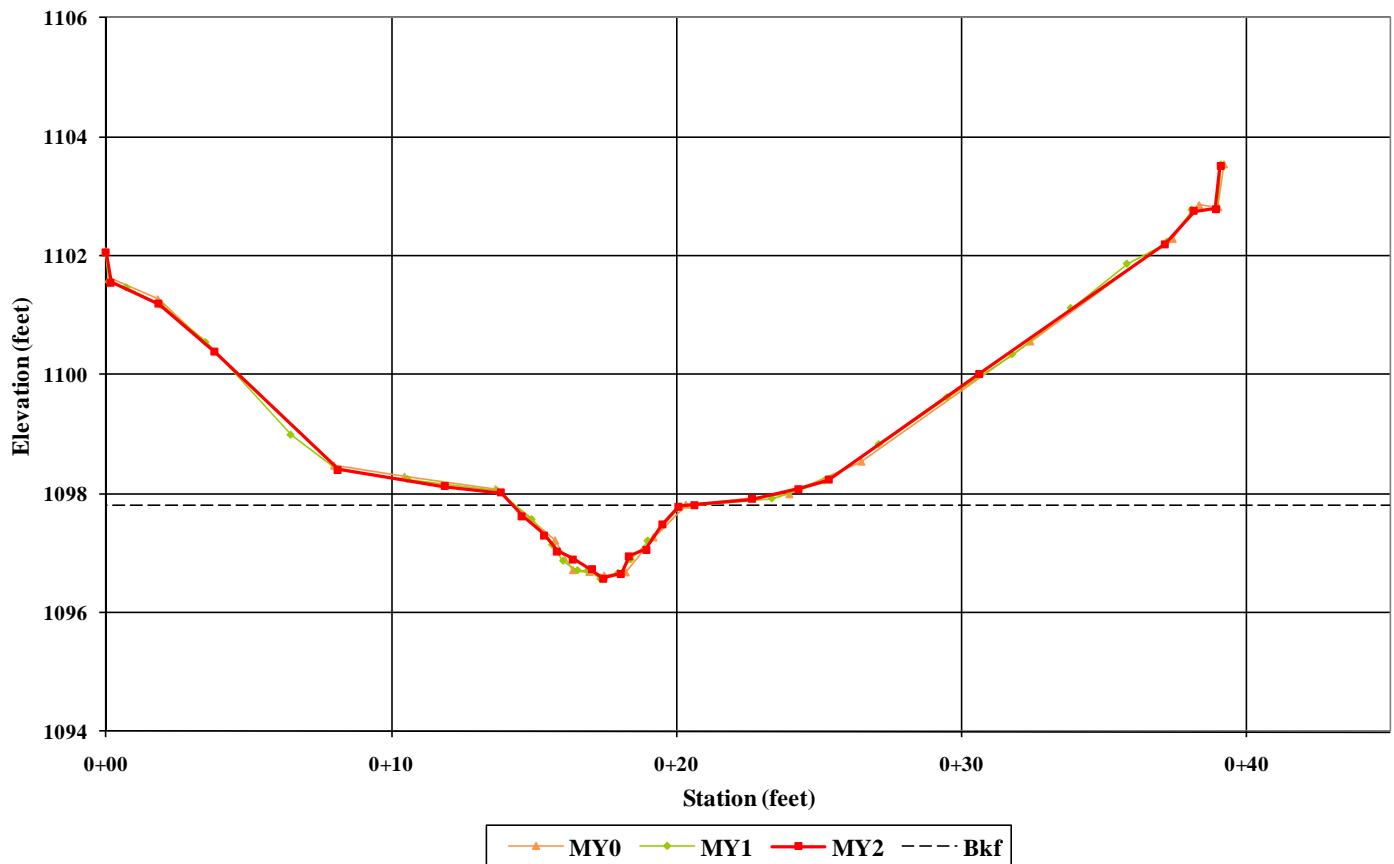


Looking at Left Bank

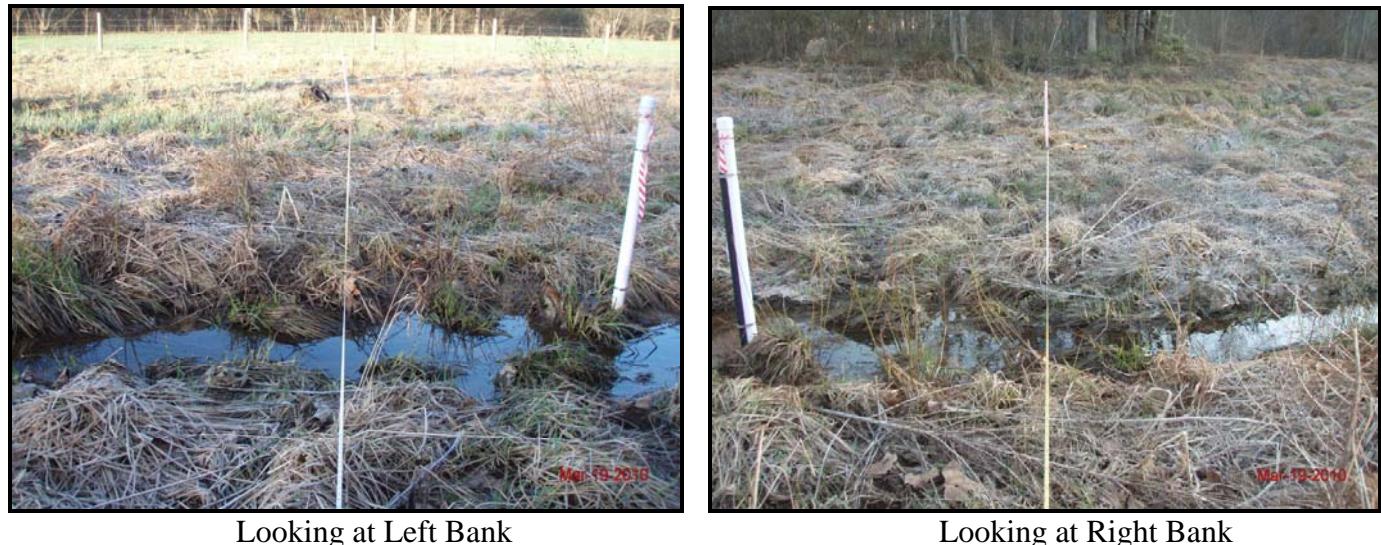


Looking at Right Bank

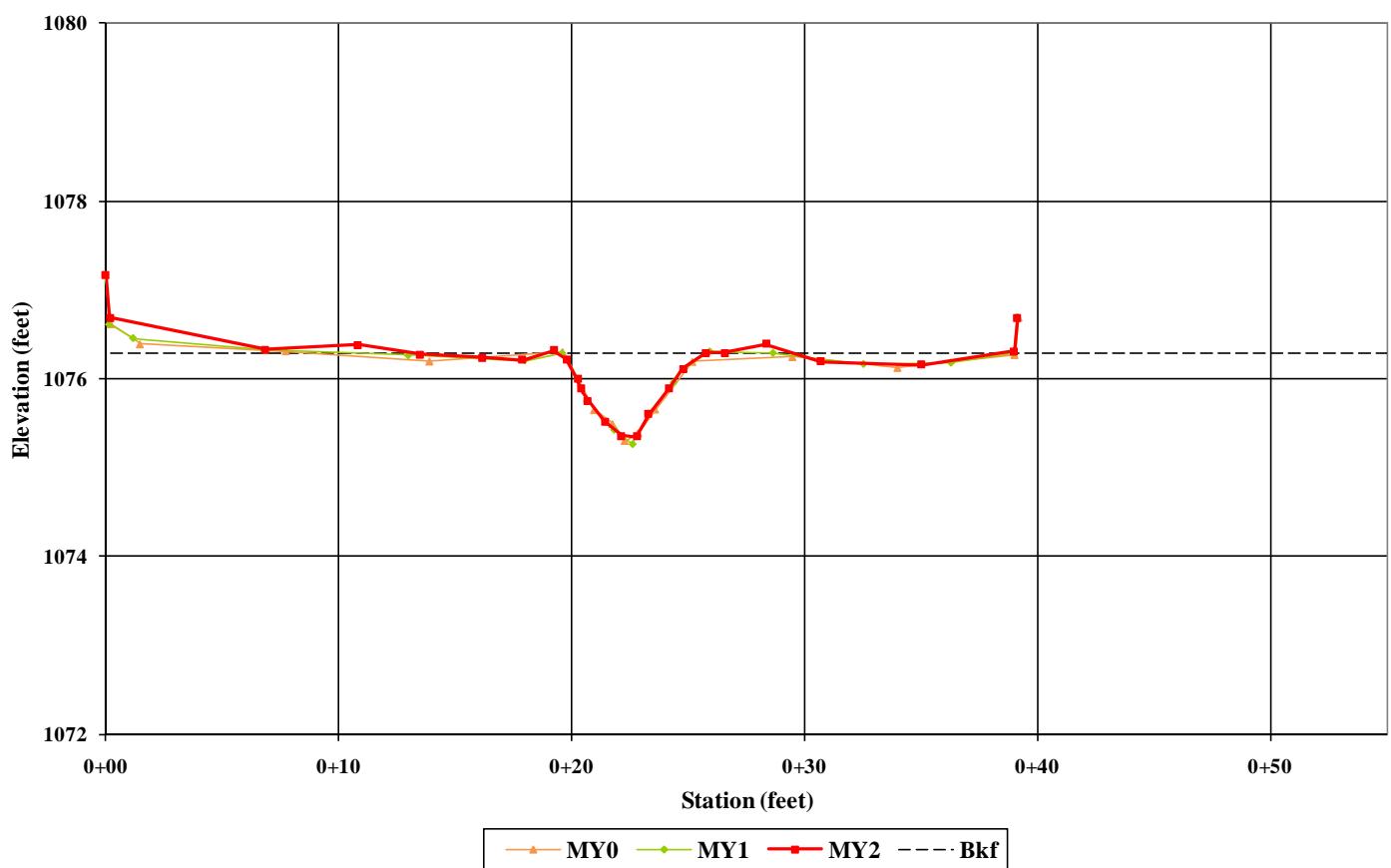
North Muddy UT1 - Upper Cross-Section 2 - Riffle

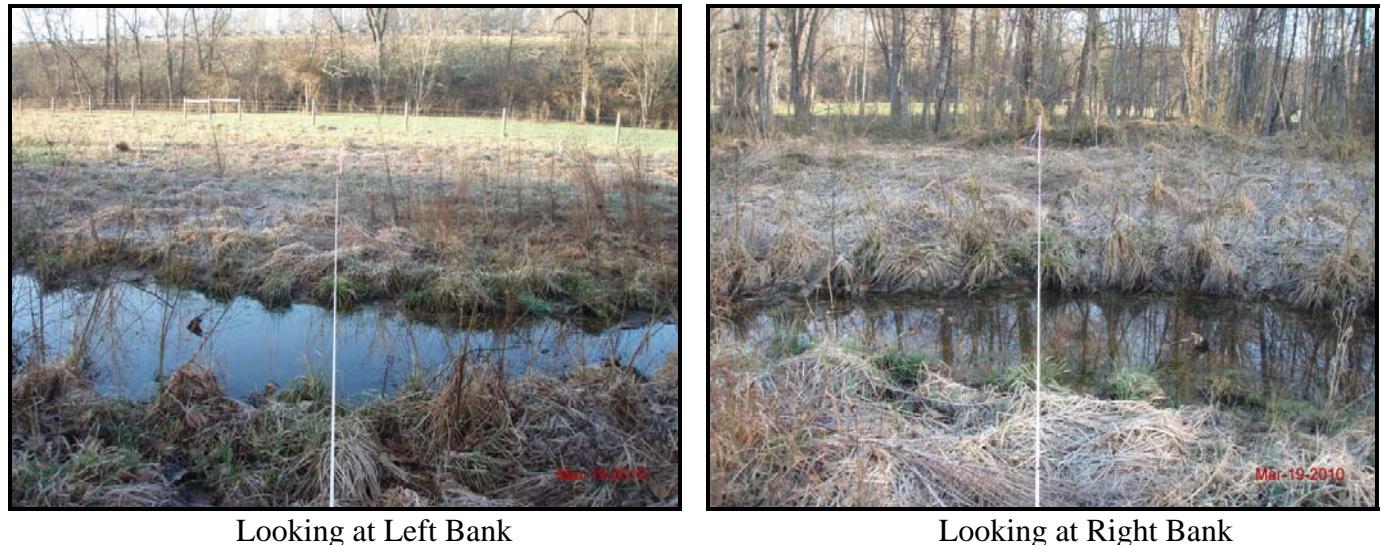


UT1 Lower – Cross-Section 1 – Riffle



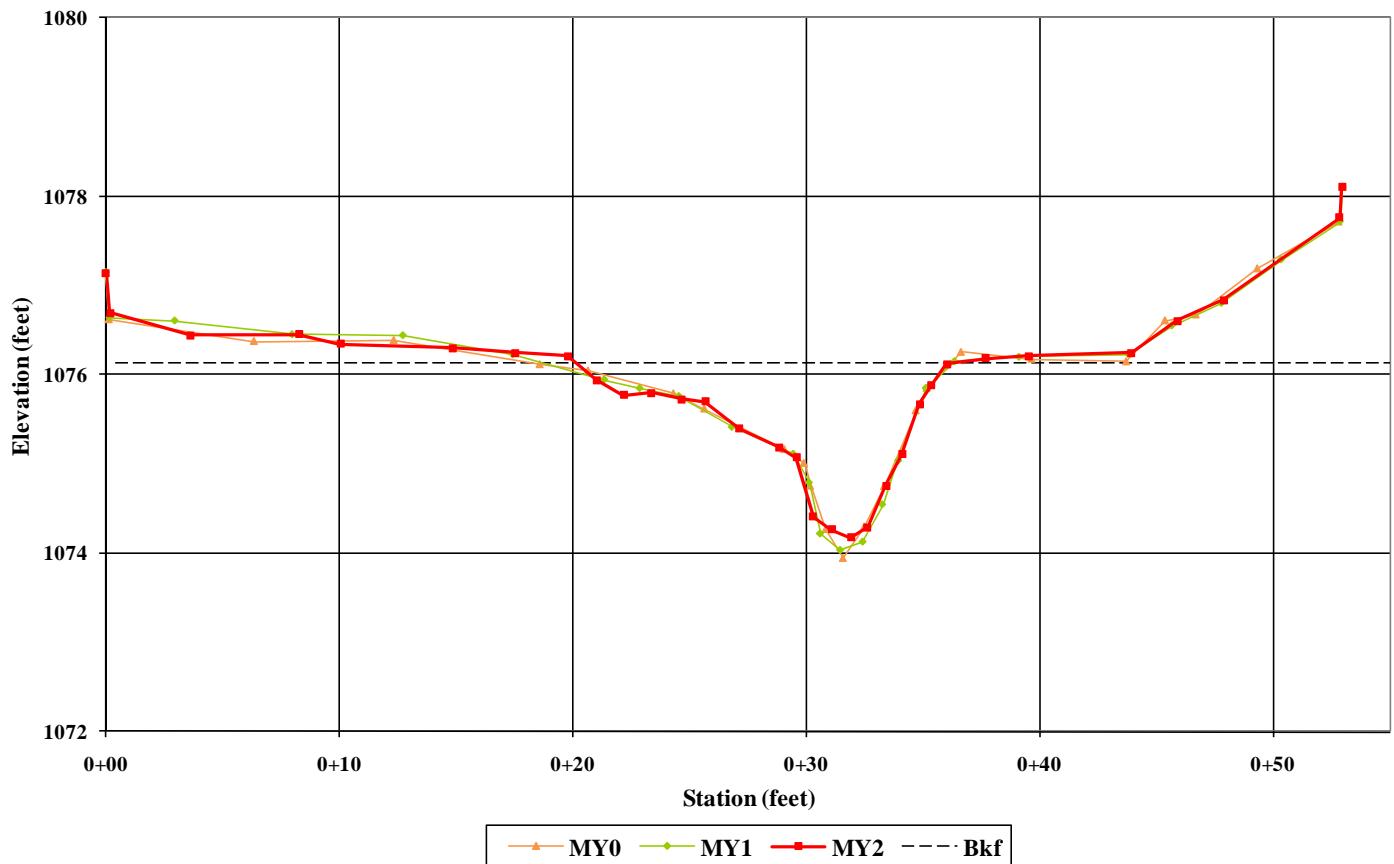
**North Muddy UT1 - Lower
Cross-Section 1 - Riffle**



UT1 Lower – Cross-Section 2 – Pool

Looking at Left Bank

Looking at Right Bank

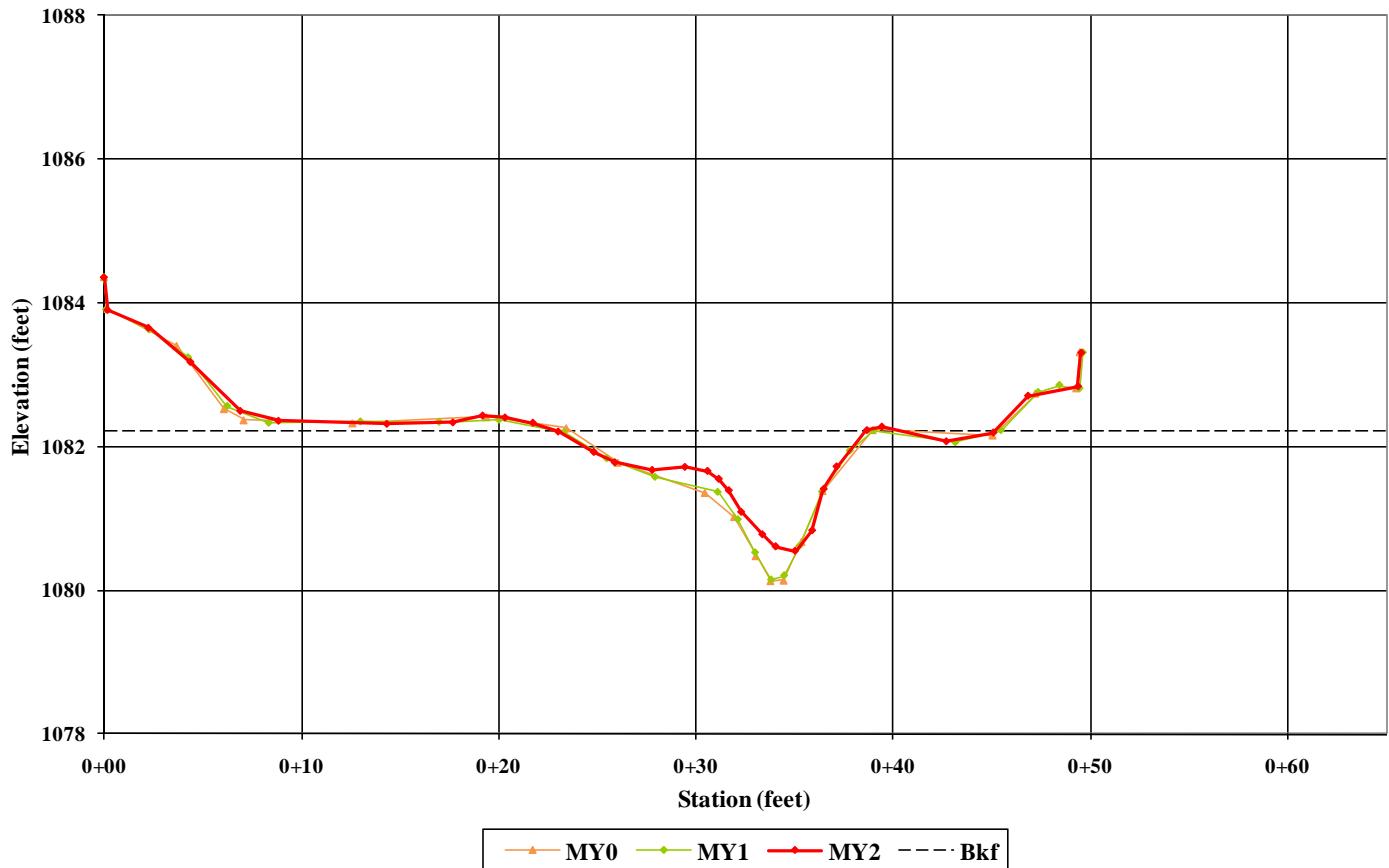
**North Muddy UT1 - Lower
Cross-Section 2 - Pool**

UT5 – Cross-Section 1 – Pool

Looking at Left Bank



Looking at Right Bank

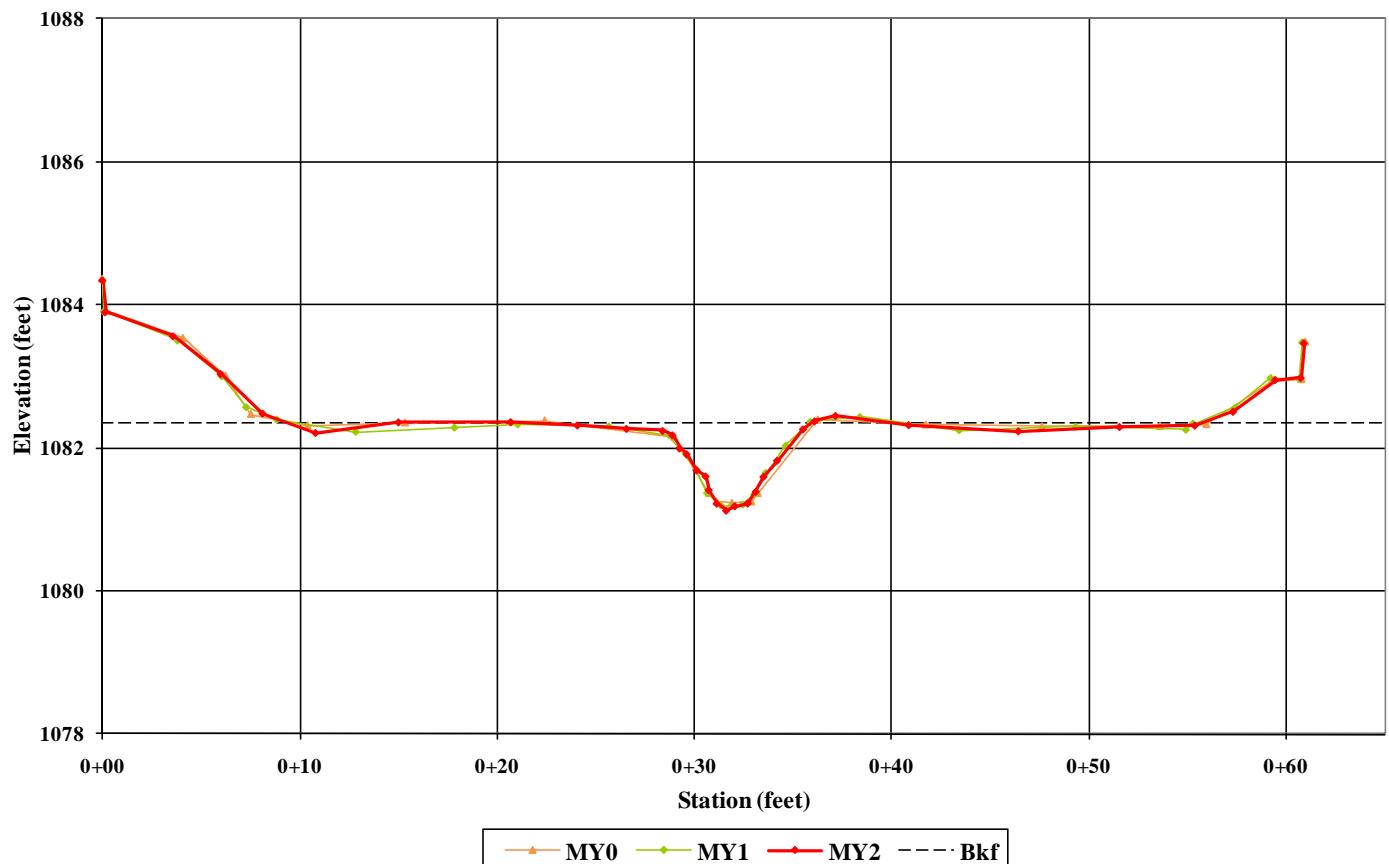
**North Muddy UT5
Cross-Section 1 - Pool**

UT5 – Cross-Section 2 – Riffle

Looking at Left Bank



Looking at Right Bank

**North Muddy UT5
Cross-Section 2 - Riffle**

UT6 – Cross-Section 1 – Riffle

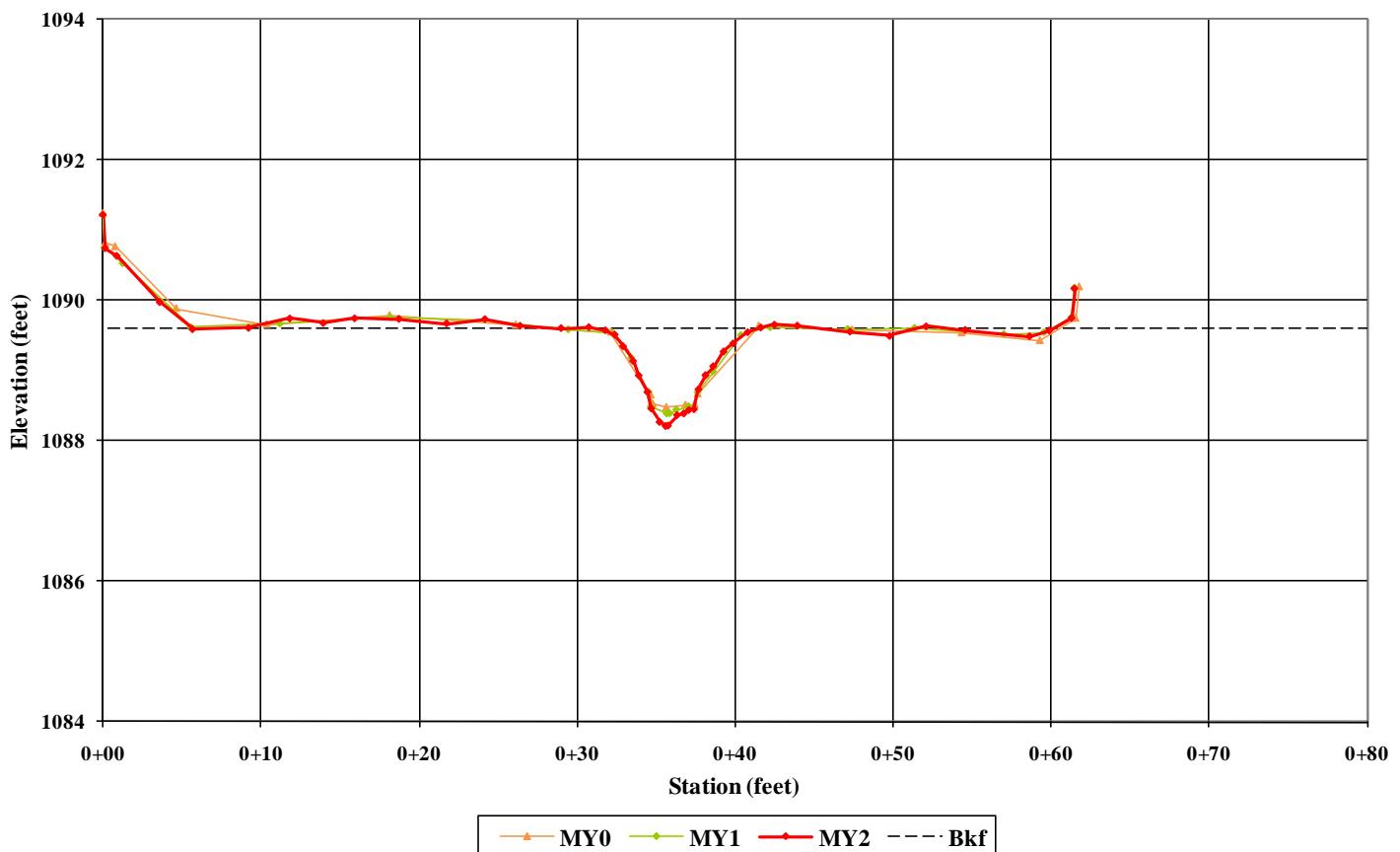


Looking at Left Bank



Looking at Right Bank

North Muddy UT6 Cross-Section 1 - Riffle

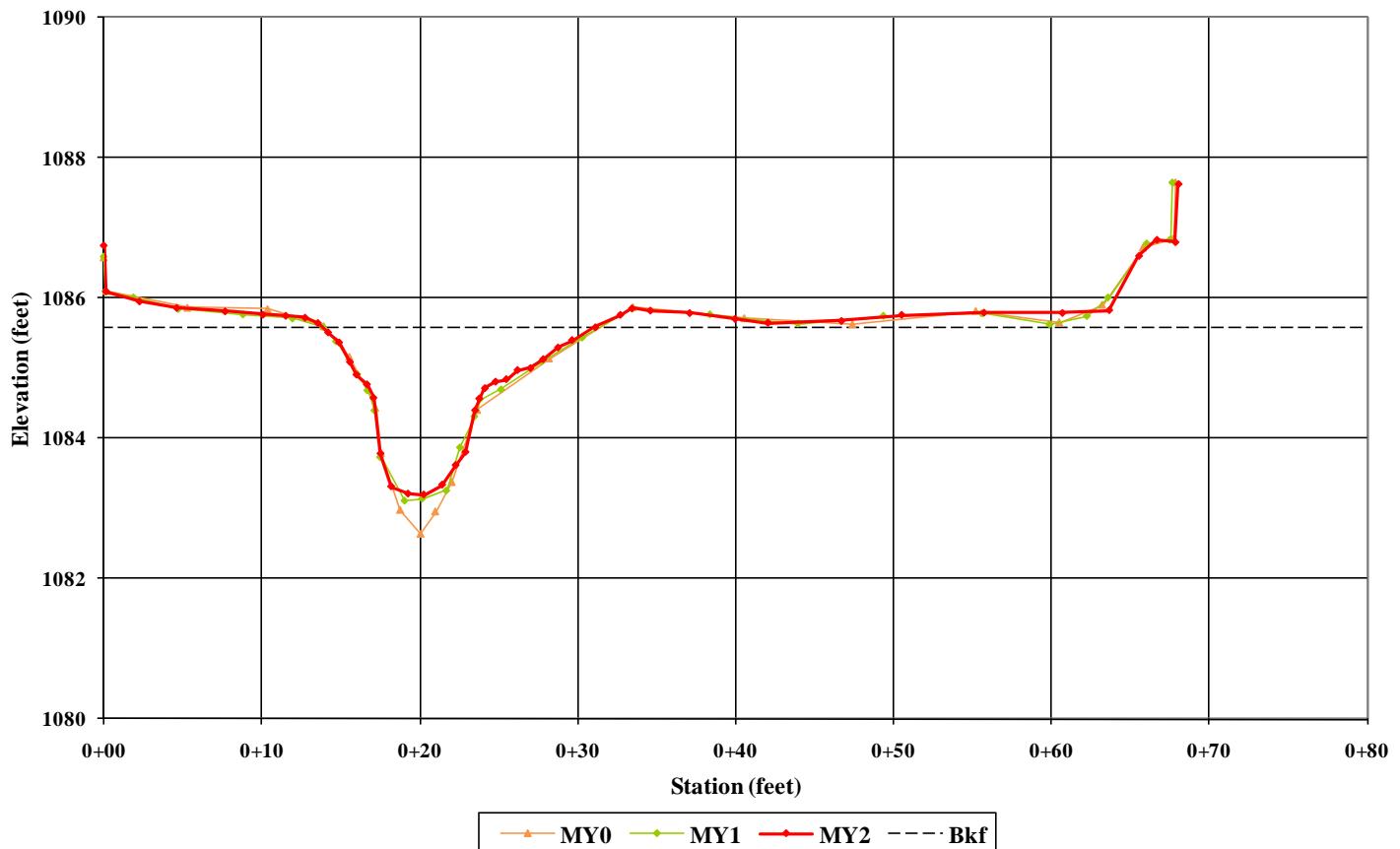


UT6 – Cross-Section 2 – Pool

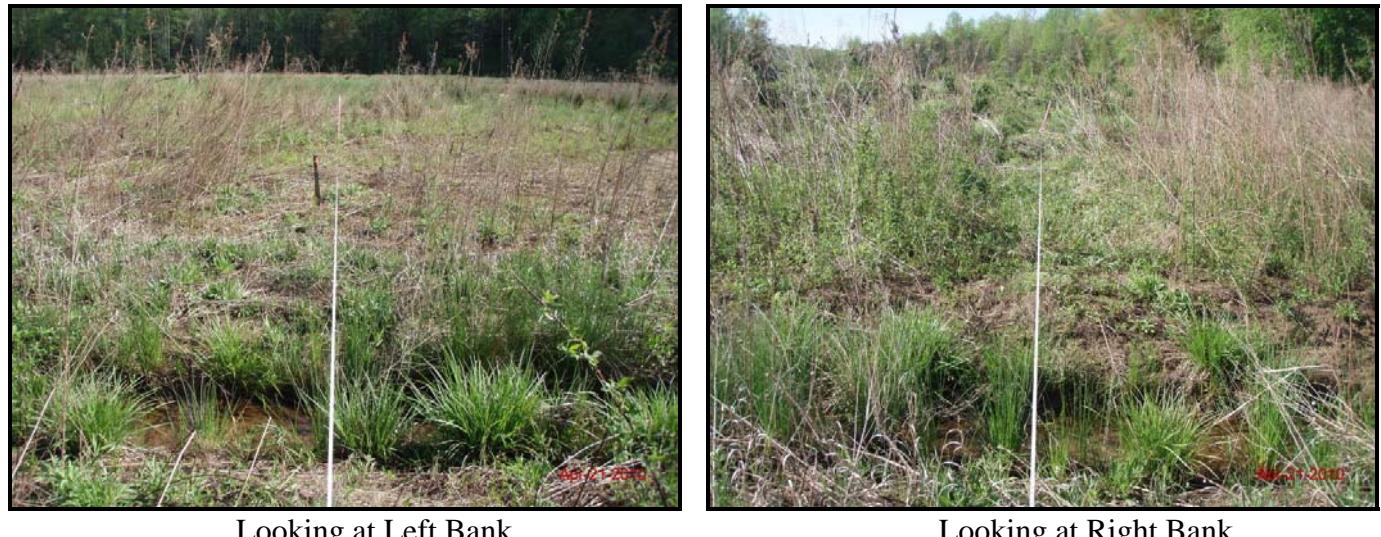
Looking at Left Bank



Looking at Right Bank

**North Muddy UT6
Cross-Section 2 - Pool**

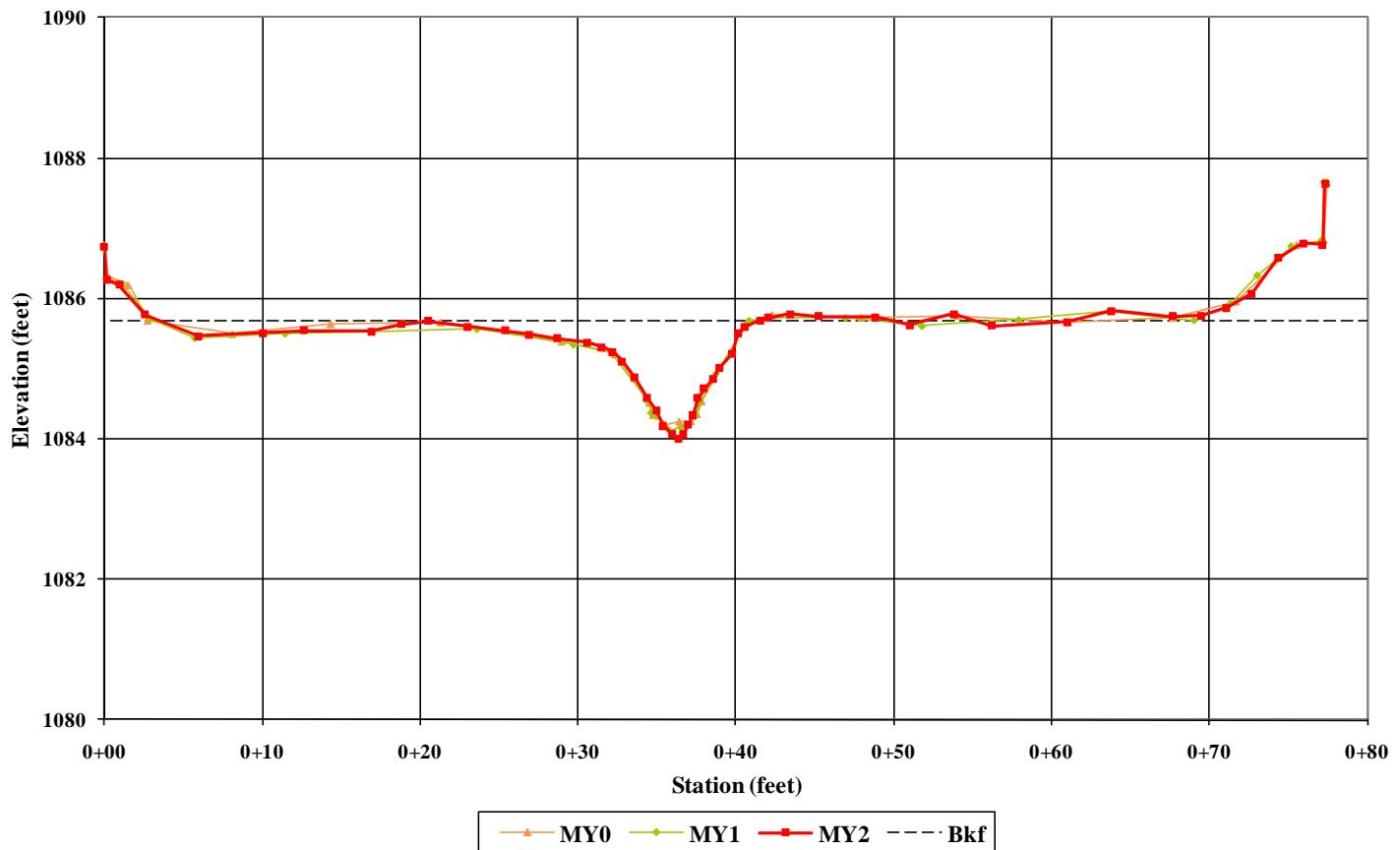
UT6 – Cross-Section 3 – Riffle



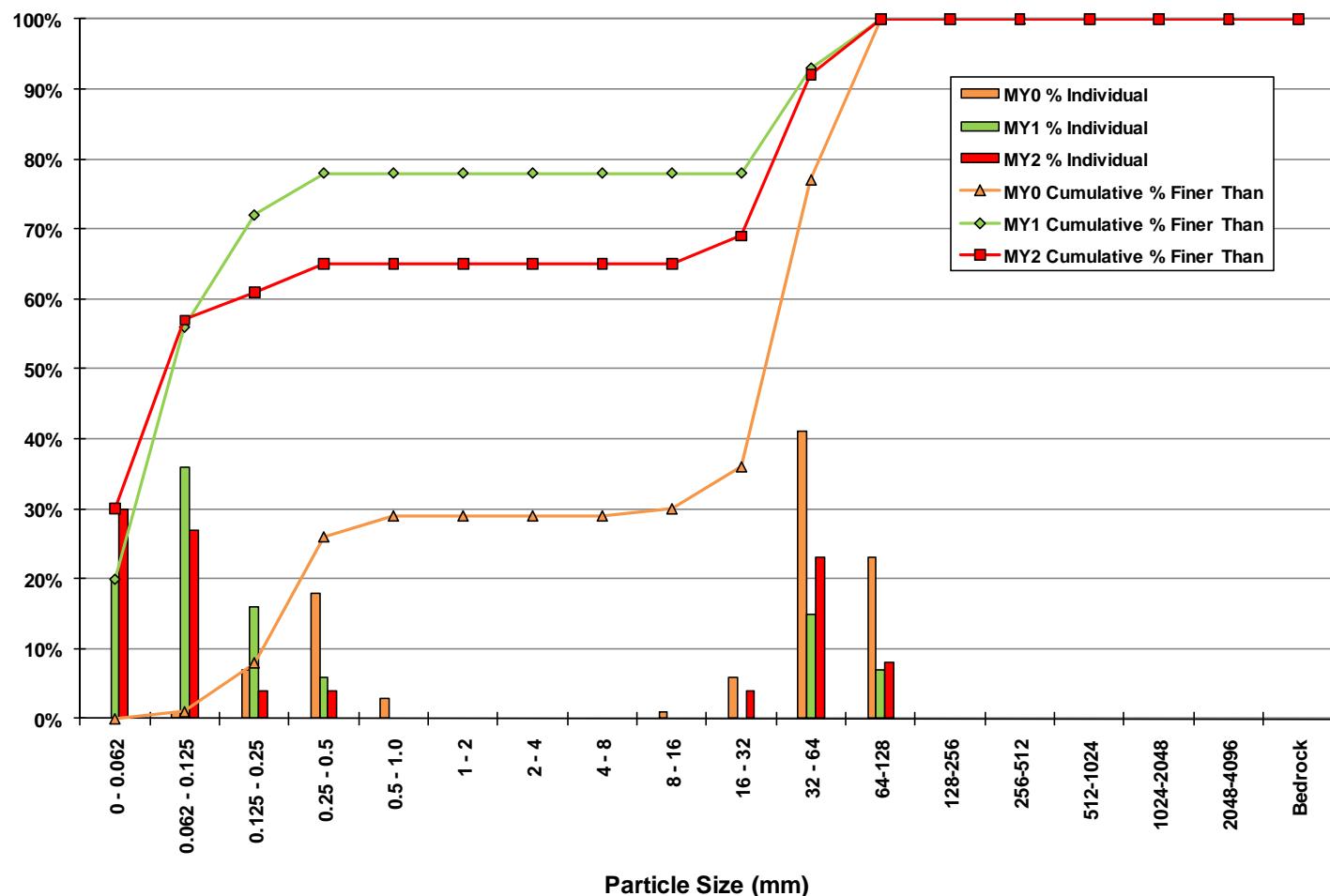
Looking at Left Bank

Looking at Right Bank

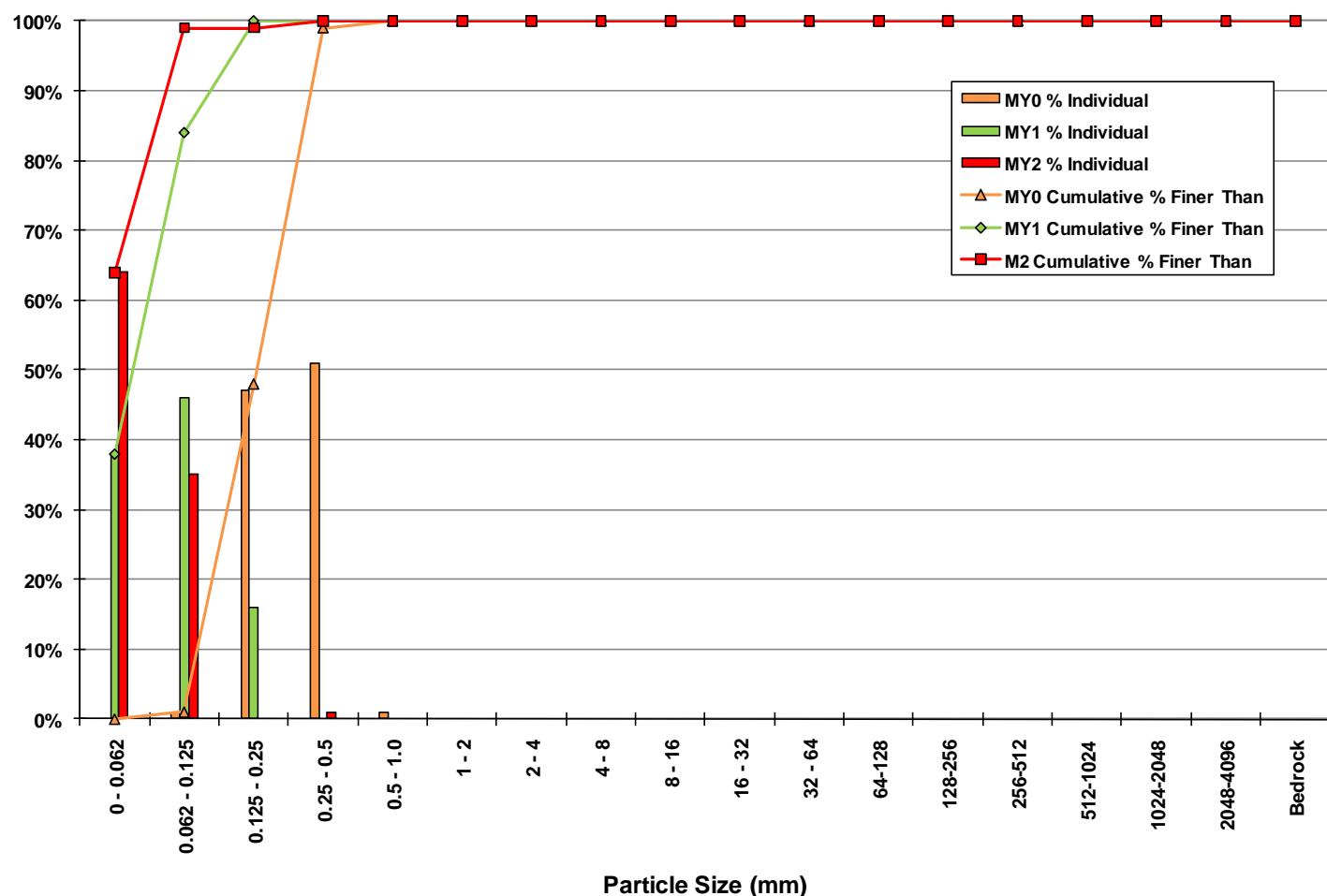
North Muddy UT6 Cross-Section 3 - Riffle



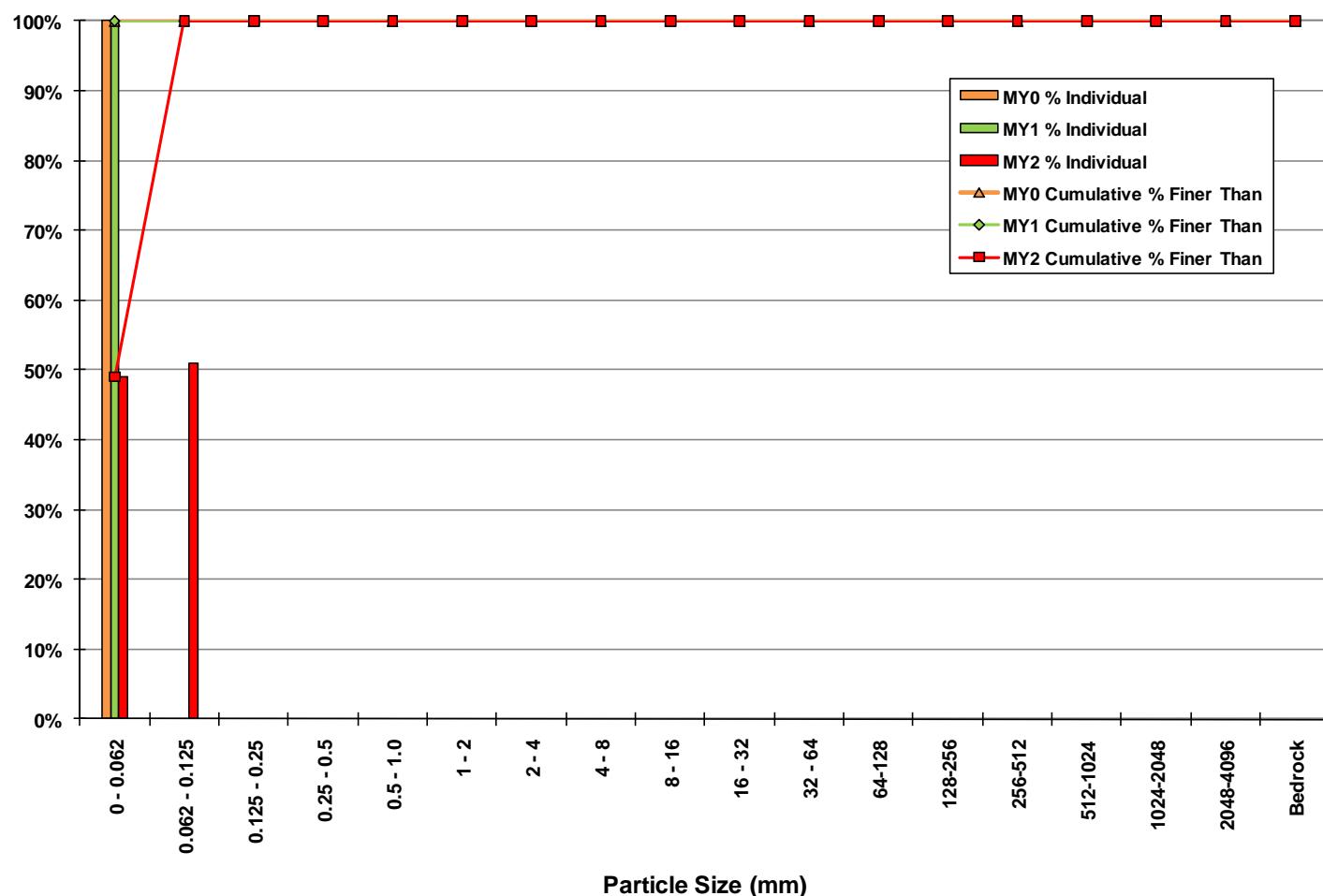
UT1 Upper – Cross Section 1 – Pool Pebble Count



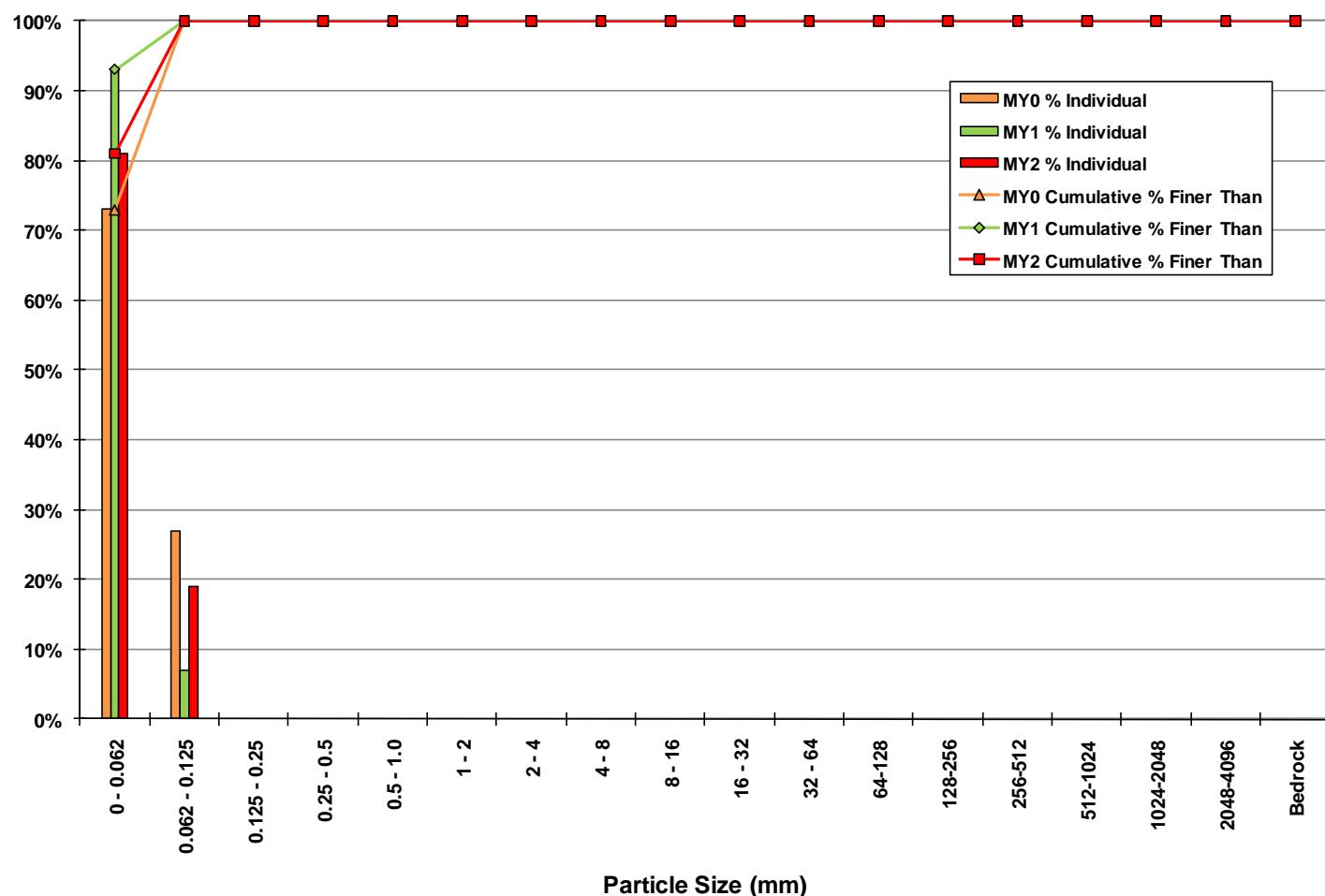
UT1 Upper – Cross Section 2 – Riffle Pebble Count



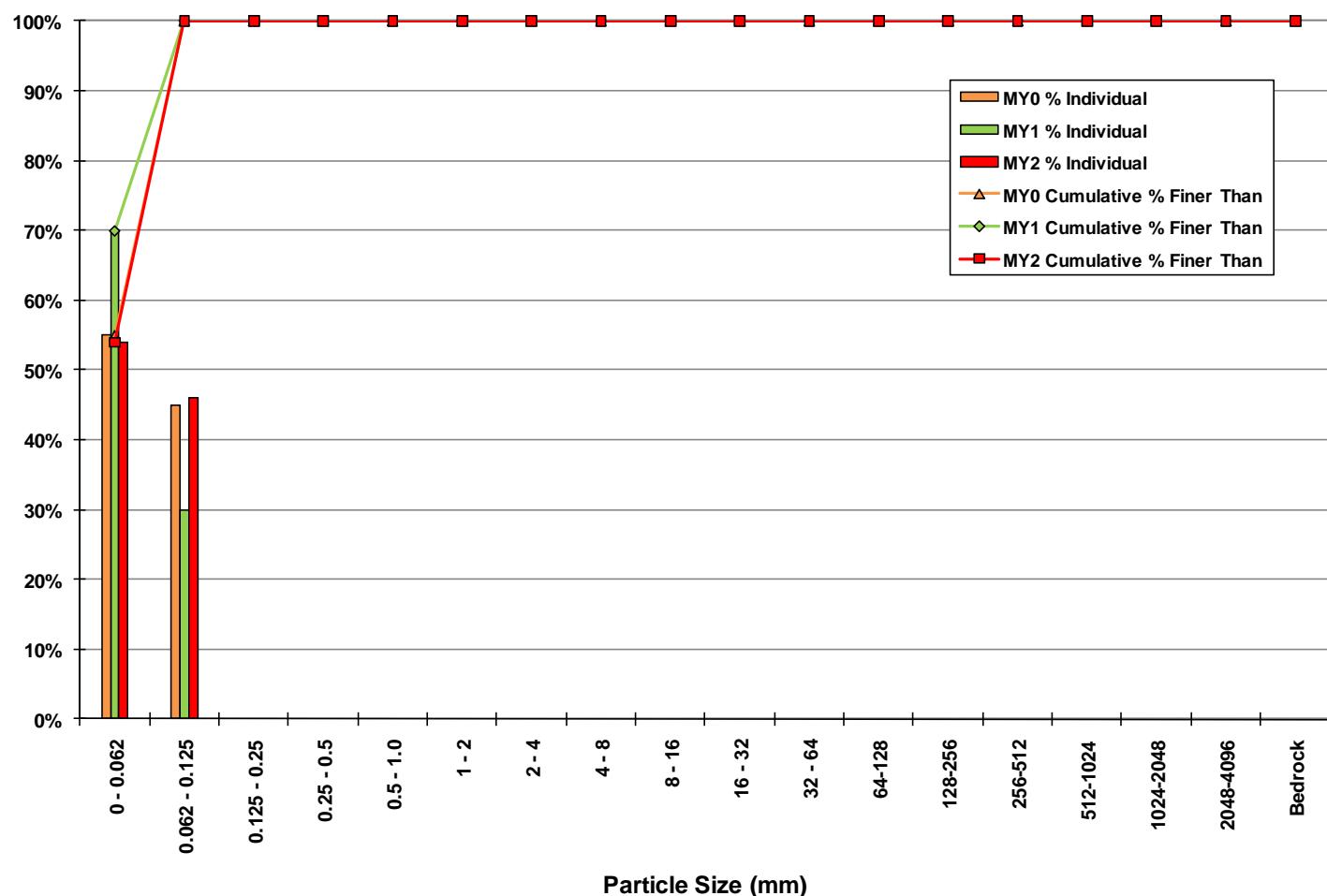
UT1 Lower – Cross Section 1 – Riffle Pebble Count



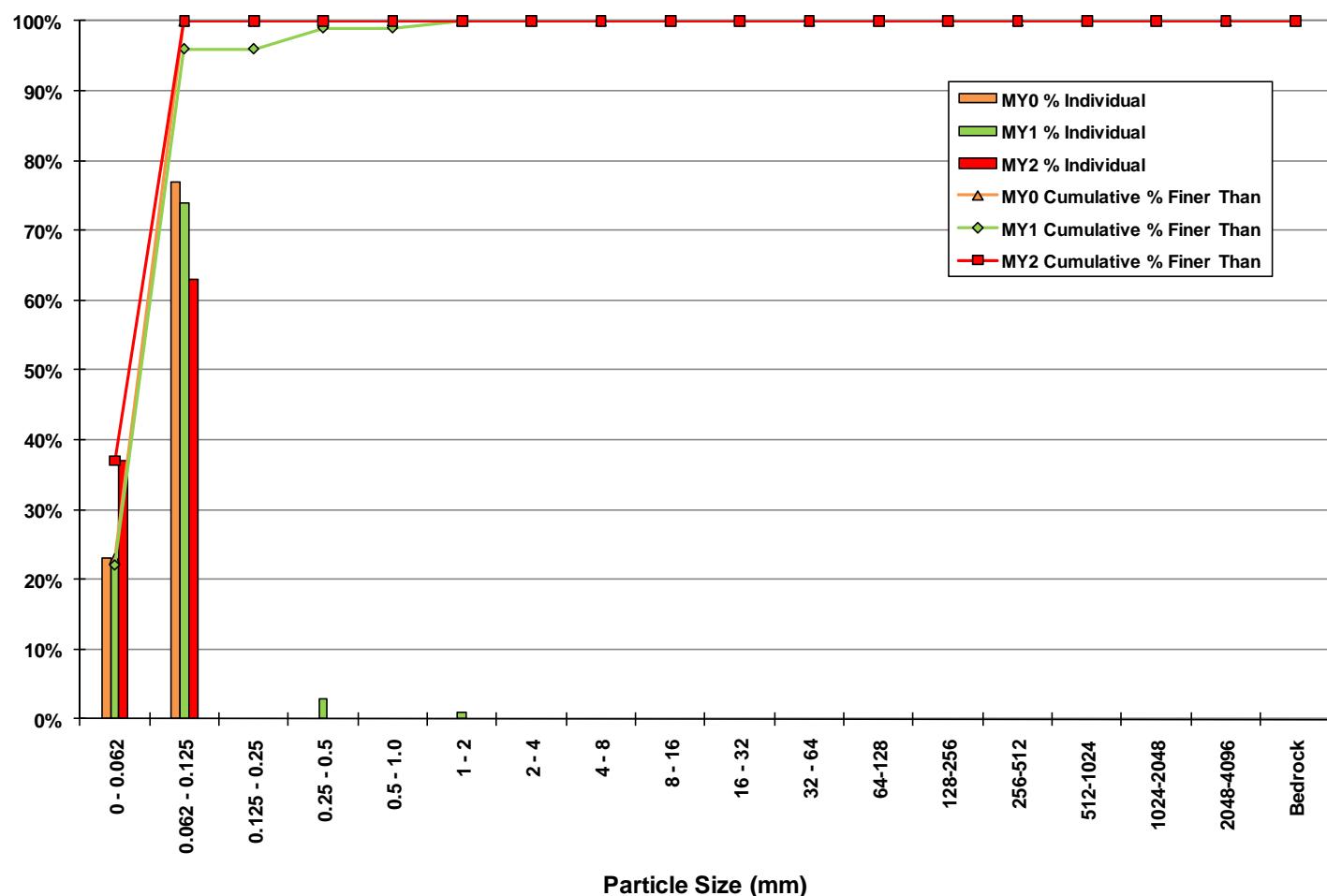
UT1 Lower – Cross Section 2 – Pool Pebble Count



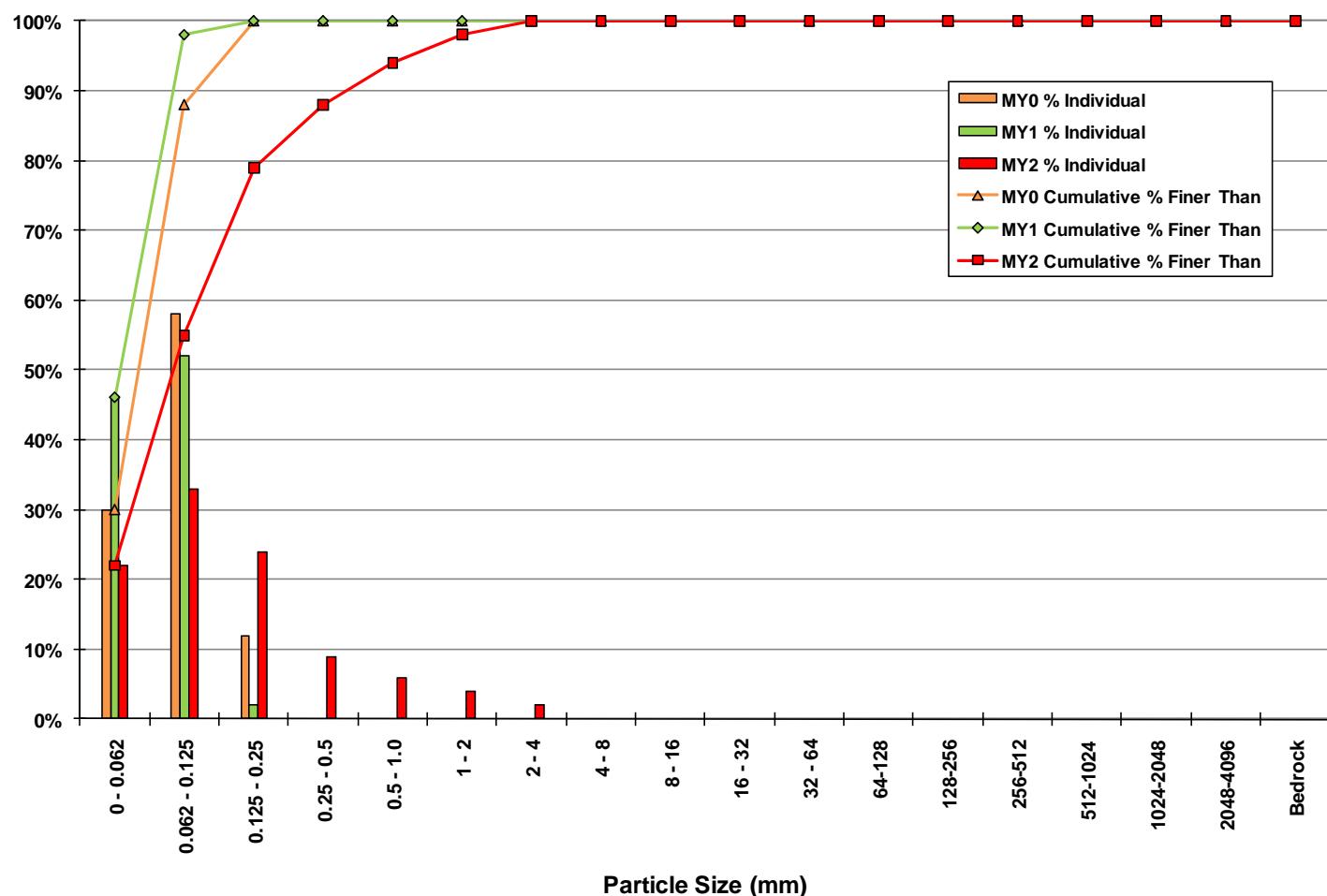
UT5 – Cross Section 1 – Pool Pebble Count



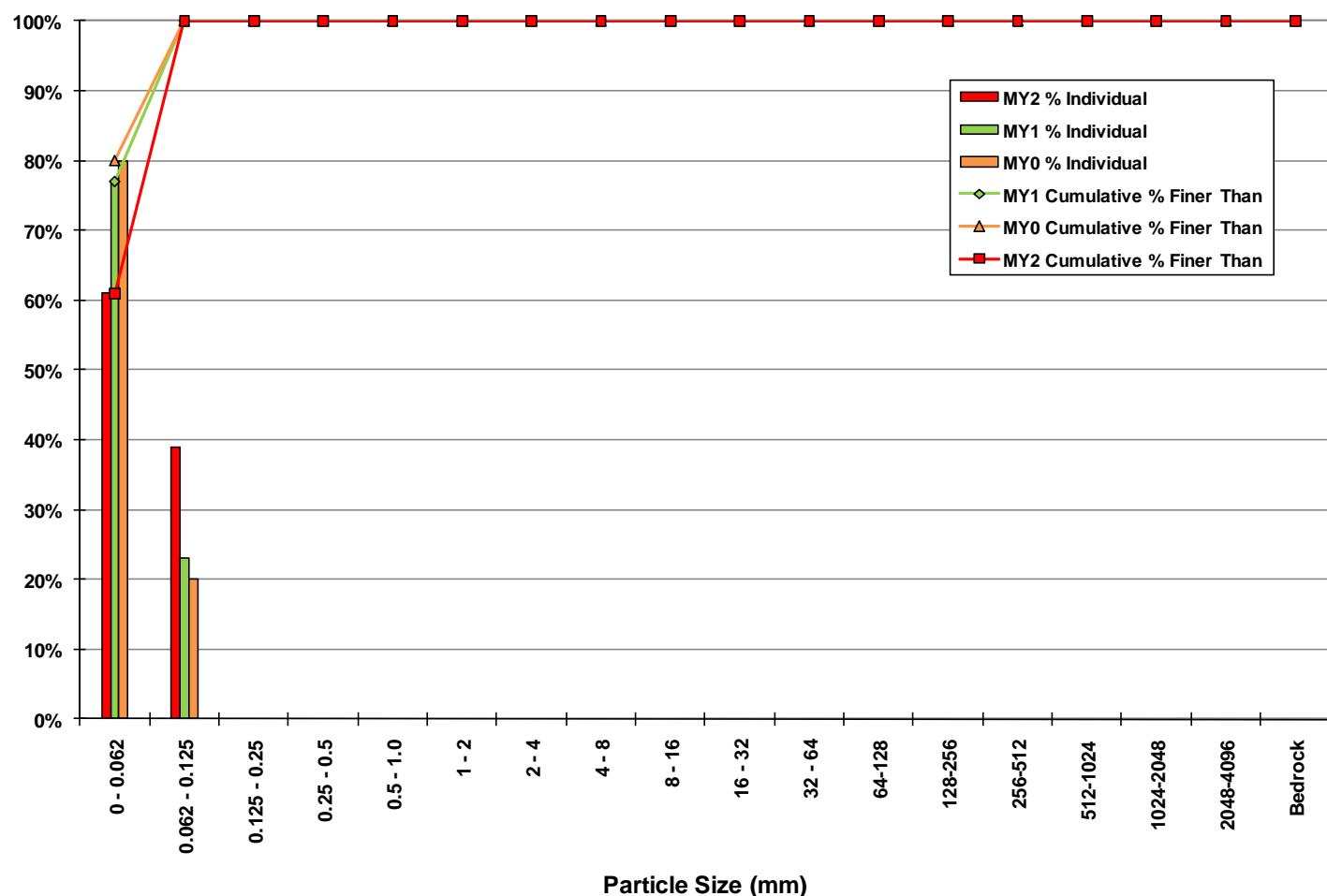
UT5 – Cross Section 2 – Riffle Pebble Count



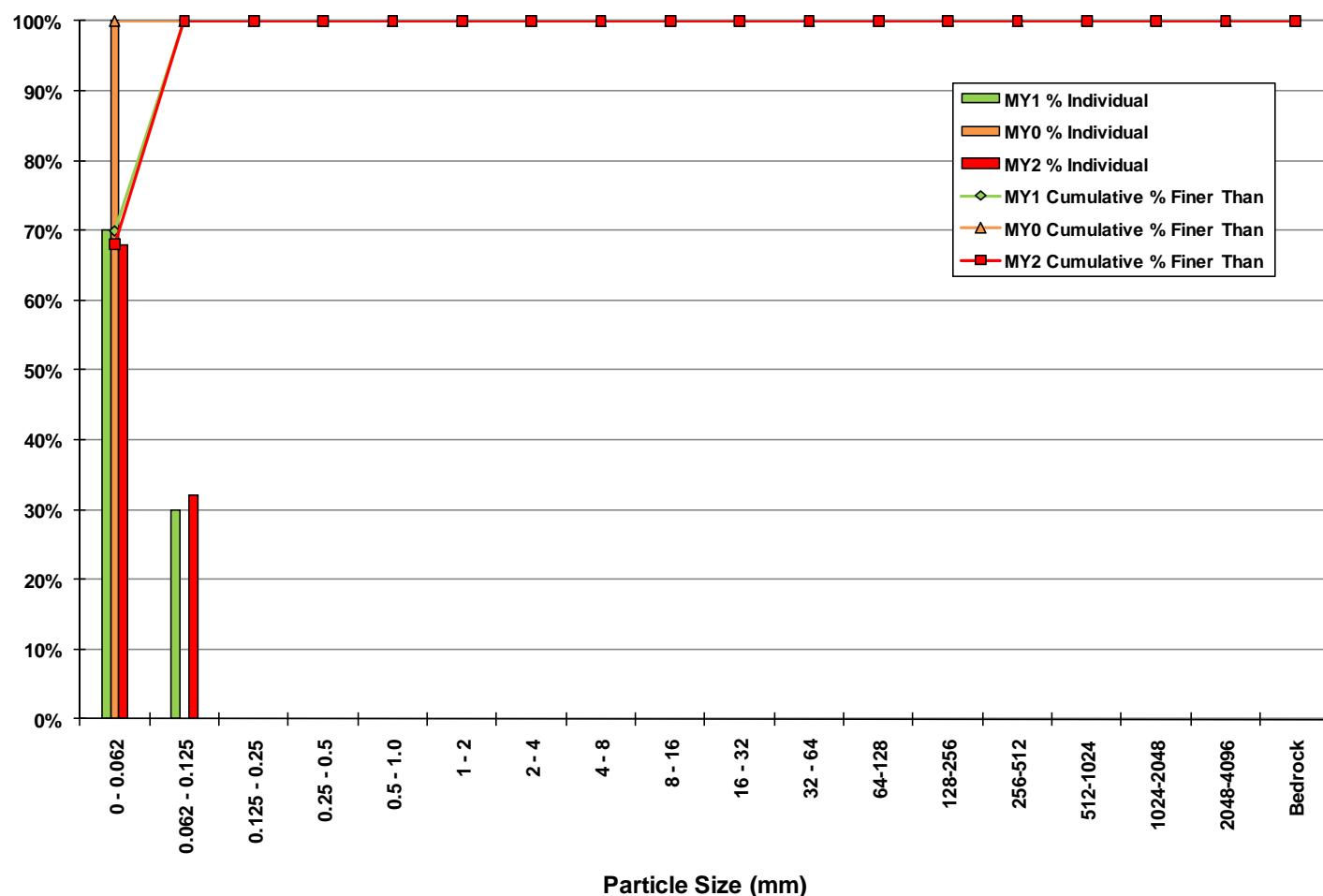
UT6 – Cross Section 1 – Riffle Pebble Count



UT6 – Cross Section 2 – Pool Pebble Count



UT6 – Cross Section 3 – Riffle Pebble Count



APPENDIX C

2010 Morphologic Monitoring Parameters

Unnamed Tributary 1 – Upper Reach											
Parameter	Cross Section 1 Pool						Cross Section 2 Riffle				
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4
Dimension											
BF Width (ft)	9.2	9.3	9.5				6.0	5.8	5.8		
Floodprone Width (ft)	23.4	24.1	23.7				21.0	21.5	20.5		
BF Cross Sectional Area (ft ²)	9.0	8.7	8.8				4.2	4.2	3.9		
BF Mean Depth (ft)	1.0	0.9	0.9				0.7	0.7	0.7		
BF Max Depth (ft)	2.0	1.7	1.9				1.2	1.2	1.2		
Width/Depth Ratio	9.3	9.9	10.3				8.6	8.0	8.5		
Entrenchment Ratio	2.5	2.6	2.5				3.5	3.7	3.6		
Wetted Perimeter (ft)	10.3	10.2	10.5				6.6	6.4	6.3		
Hydraulic Radius (ft)	0.9	0.9	0.8				0.6	0.7	0.6		

Unnamed Tributary 1 – Lower Reach											
Parameter	Cross Section 1 Riffle						Cross Section 2 Pool				
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4
Dimension											
BF Width (ft)	5.5	6.2	6.4				15.7	15.0	11.9		
Floodprone Width (ft)	>50.0	>50.0	>50.0				>50.0	>50.0	>50.0		
BF Cross Sectional Area (ft ²)	3.1	3.1	3.1				13.2	13.2	9.0		
BF Mean Depth (ft)	0.6	0.5	0.5				0.8	0.9	0.8		
BF Max Depth (ft)	1.0	1.0	0.9				2.2	2.1	2.0		
Width/Depth Ratio	9.9	12.2	12.9				18.7	17.0	15.7		
Entrenchment Ration	>9.0	>8.1	>7.9				>3.2	>3.3	>4.2		
Wetted Perimeter (ft)	5.9	6.6	6.7				16.6	15.9	12.2		
Hydraulic Radius (ft)	0.5	0.5	0.5				0.8	0.8	0.7		

Unnamed Tributary 5											
Parameter	Cross Section 1 Pool						Cross Section 2 Riffle				
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4
Dimension											
BF Width (ft)	15.4	15.7	15.6				7.2	7.2	7.6		
Floodprone Width (ft)	>50.0	>50.0	>50.0				>60.0	>60.0	>60.0		
BF Cross Sectional Area (ft ²)	13.4	13.1	11.2				5.4	5.0	5.0		
BF Mean Depth (ft)	0.9	0.8	0.7				0.7	0.7	0.7		
BF Max Depth (ft)	2.1	2.1	1.7				1.2	1.2	1.2		
Width/Depth Ratio	17.6	18.8	21.7				9.7	10.3	11.6		
Entrenchment Ratio	>3.3	>3.2	>3.2				>8.3	>8.4	>7.9		
Wetted Perimeter (ft)	16.2	16.5	16.3				7.6	7.6	8.1		
Hydraulic Radius (ft)	0.8	0.8	0.7				0.7	0.7	0.6		

Parameter	Unnamed Tributary 6																
	Cross Section 1 Riffle						Cross Section 2 Pool					Cross Section 3 Riffle					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4
Dimension																	
BF Width (ft)	9.3	9.8	9.8				17.6	17.6	17.3				11.6	11.1	11.7		
Floodprone Width (ft)	>100	>100	>100				>100	>100	>100				>100	>100	>100		
BF Cross Sectional Area (ft ²)	6.5	6.1	6.3				20.9	19.5	18.8				5.6	9.2	9.0		
BF Mean Depth (ft)	0.7	0.6	0.6				1.2	1.1	1.1				0.7	0.8	0.8		
BF Max Depth (ft)	1.2	1.2	1.4				3.0	2.5	2.4				1.4	1.6	1.7		
Width/Depth Ratio	13.3	15.9	15.3				14.8	15.9	15.9				15.7	13.5	15.1		
Entrenchment Ratio	>10.7	>10.2	>10.2				>5.7	>5.7	>5.8				>8.6	>9.0	>8.6		
Wetted Perimeter (ft)	9.7	10.3	10.4				19.0	18.8	18.5				12.1	11.6	12.2		
Hydraulic Radius (ft)	0.7	0.6	0.6				1.1	1.0	1.0				0.7	0.8	0.7		

Unnamed Tributary 1 – Upper Reach

Parameter	Baseline			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	18.2	31.2	21.4	18.2	31.2	21.4	18.2	31.2	21.4									
Radius of Curvature (ft)	27.8	89.4	36.9	27.8	89.4	36.9	27.8	89.4	36.9									
Meander Wavelength (ft)	30	54	38	30	54	38	30	54	38									
Meander Width Ratio		3.57			3.69			3.69										
Profile																		
Riffle Length (ft)	7.82	33.04	17.06	4.68	20.84	10.08	7.37	43.77	19.01									
Riffle Slope (ft/ft)	0.0134	0.0735	0.0317	0.0146	0.1044	0.0290	0.0176	0.1060	0.0331									
Pool Length (ft)	3.36	32.88	9.54	3.63	18.90	8.94	4.46	31.87	8.19									
Pool Spacing (ft)	8.98	44.60	18.26	8.16	34.83	16.33	10.03	60.52	29.81									
Additional Reach Parameters																		
Valley Length (ft)	369			369			369											
Channel Length (ft)	386			388			389											
Sinuosity	1.05			1.05			1.05											
Water Surface Slope (ft/ft)	0.0322			0.0328			0.0332											
BF Slope (ft/ft)	0.0341			0.0340			0.0319											
Rosgen Classification	B/C5			B/C6			B/C6											

Unnamed Tributary 1 – Lower Reach

Parameter	Baseline			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	28.5	82.1	55.7	28.5	82.1	55.7	28.5	82.1	55.7									
Radius of Curvature (ft)	18.2	26.3	21.9	18.2	26.3	21.9	18.2	26.3	21.9									
Meander Wavelength (ft)	86	113	101	86	113	101	86	113	101									
Meander Width Ratio		10.13			8.98			8.70										
Profile																		
Riffle Length (ft)	15.35	31.11	22.27	9.78	36.29	22.37	6.77	33.11	23.29									
Riffle Slope (ft/ft)	0.0000	0.0350	0.0053	0.0003	0.0241	0.0050	0.0004	0.0311	0.0070									
Pool Length (ft)	8.19	41.82	31.80	4.17	36.32	25.79	6.40	40.79	26.21									
Pool Spacing (ft)	27.09	70.09	57.33	28.99	78.41	58.27	26.48	69.18	56.72									
Additional Reach Parameters																		
Valley Length (ft)	833			833			833											
Channel Length (ft)	1062			1063			1064											
Sinuosity	1.27			1.28			1.28											
Water Surface Slope (ft/ft)	0.0062			0.0062			0.0060											
BF Slope (ft/ft)	0.0067			0.0070			0.0061											
Rosgen Classification	C6			C6			C6											

Unnamed Tributary 5

Parameter	Baseline			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	28.3	55.5	41.4	28.3	55.5	41.4	28.3	55.5	41.4									
Radius of Curvature (ft)	14.7	25.5	22.2	14.7	25.5	22.2	14.7	25.5	22.2									
Meander Wavelength (ft)	77	105	88	77	105	88	77	105	88									
Meander Width Ratio		5.75			5.75			5.45										
Profile																		
Riffle Length (ft)	13.64	22.74	17.96	16.19	24.41	21.24	9.29	25.23	18.17									
Riffle Slope (ft/ft)	0.0005	0.0105	0.0058	0.0054	0.0129	0.0065	0.0015	0.0129	0.0063									
Pool Length (ft)	7.57	30.38	21.59	5.16	26.03	20.24	6.71	36.46	18.50									
Pool Spacing (ft)	34.70	53.09	45.90	27.25	51.85	45.48	23.39	56.50	44.70									
Additional Reach Parameters																		
Valley Length (ft)	507		507		507													
Channel Length (ft)	578		583		581													
Sinuosity	1.14		1.15		1.15													
Water Surface Slope (ft/ft)	0.0027 – 0.0331		0.0031 – 0.0321		0.0034 – 0.0209													
BF Slope (ft/ft)	0.0019		0.0025		0.0023													
Rosgen Classification	*C6		*C6		C5													

*Low width/depth ratio C stream type.

Unnamed Tributary 6

Parameter	Baseline			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	30.6	60.7	48.1	31.8	60.9	48.4	29.5	60.0	47.3									
Radius of Curvature (ft)	20.2	38.1	30.1	16.7	31.8	27.0	12.4	30.2	25.5									
Meander Wavelength (ft)	111	126	117	109	127	116	105	138	117									
Meander Width Ratio	4.15	5.17	4.66	4.36	4.93	4.65	4.04	4.83	4.43									
Profile																		
Riffle Length (ft)	22.91	35.94	28.92	12.59	34.27	28.14	21.80	41.70	28.80									
Riffle Slope (ft/ft)	0.0001	0.0173	0.0085	0.0006	0.0380	0.0030	0.0003	0.0153	0.0054									
Pool Length (ft)	3.84	38.32	26.58	3.19	36.78	25.57	5.92	35.10	16.56									
Pool Spacing (ft)	8.24	74.02	59.15	11.70	77.07	61.97	6.80	76.16	55.53									
Additional Reach Parameters																		
Valley Length (ft)	955		955		955													
Channel Length (ft)	1072		1094		1110													
Sinuosity	1.12		1.15		1.16													
Water Surface Slope (ft/ft)	0.0066 – 0.0436		0.0070 – 0.0395		0.0072 - 0.0390													
BF Slope (ft/ft)	0.0089		0.0086		0.0066													
Rosgen Classification	C6		C6		C6													

APPENDIX D

2010 Site Photos

Unnamed Tributary 1 Permanent Photo Points

Unnamed Tributary 1 – Permanent Photo Point 1
Looking Downstream
February 3, 2010



Unnamed Tributary 1 – Permanent Photo Point 2
Looking Upstream
February 3, 2010

Unnamed Tributary 1 Permanent Photo Points**Unnamed Tributary 1 – Permanent Photo Point 3**

Looking Upstream

February 3, 2010

**Unnamed Tributary 1 – Permanent Photo Point 3**

Looking Downstream

February 3, 2010

Unnamed Tributary 1 Permanent Photo Points**Unnamed Tributary 1 – Permanent Photo Point 4**

Looking Upstream

February 3, 2010

**Unnamed Tributary 1 – Permanent Photo Point 5**

Looking Upstream

February 3, 2010

Unnamed Tributary 1 Permanent Photo Points

Unnamed Tributary 1 – Permanent Photo Point 5
Looking Downstream
February 3, 2010



Unnamed Tributary 1 – Permanent Photo Point 6
Looking 80 Degrees
February 3, 2010

Unnamed Tributary 1 Permanent Photo Points

Unnamed Tributary 1 – Permanent Photo Point 6
Looking 300 Degrees
February 3, 2010



Unnamed Tributary 1 – Permanent Photo Point 7
Looking Upstream
February 3, 2010

Unnamed Tributary 1 Permanent Photo Points**Unnamed Tributary 1 – Permanent Photo Point 8**

Looking Upstream

February 3, 2010

**Unnamed Tributary 1 – Permanent Photo Point 8**

Looking Downstream

February 3, 2010

Unnamed Tributary 1 Permanent Photo Points

Unnamed Tributary 1 – Permanent Photo Point 9

Looking 220 Degrees

February 3, 2010

Unnamed Tributary 2 Permanent Photo Points

Unnamed Tributary 2 – Permanent Photo Point 1
Looking Downstream
February 3, 2010



Unnamed Tributary 2 – Permanent Photo Point 2
Looking Upstream
February 3, 2010

Unnamed Tributary 4 Permanent Photo Points

Unnamed Tributary 4 – Permanent Photo Point 1
Looking Downstream
February 3, 2010



Unnamed Tributary 4 – Permanent Photo Point 2
Looking Upstream
February 3, 2010

Unnamed Tributary 5 Permanent Photo Points**Unnamed Tributary 5 – Permanent Photo Point 1**

Looking Upstream

February 3, 2010

**Unnamed Tributary 5 – Permanent Photo Point 1**

Looking Downstream

February 3, 2010

Unnamed Tributary 5 Permanent Photo Points**Unnamed Tributary 5 – Permanent Photo Point 2**

Looking Upstream

February 3, 2010

**Unnamed Tributary 5 – Permanent Photo Point 2**

Looking Downstream

February 3, 2010

Unnamed Tributary 5 Permanent Photo Points

Unnamed Tributary 5 – Permanent Photo Point 3

Looking Upstream

February 3, 2010



Unnamed Tributary 5 – Permanent Photo Point 4

Looking Upstream

February 3, 2010

Unnamed Tributary 5 Permanent Photo Points

Unnamed Tributary 5 – Permanent Photo Point 4
Looking Downstream
February 3, 2010



Unnamed Tributary 5 – Permanent Photo Point 5
Looking 180 Degrees
February 3, 2010

Unnamed Tributary 5 Permanent Photo Points

Unnamed Tributary 5 – Permanent Photo Point 5

Looking 305 Degrees

February 3, 2010

Unnamed Tributary 6 Permanent Photo Points

Unnamed Tributary 6 – Permanent Photo Point 1
Looking 35 Degrees
February 18, 2010



Unnamed Tributary 6 – Permanent Photo Point 1
Looking Downstream
February 18, 2010

Unnamed Tributary 6 Permanent Photo Points**Unnamed Tributary 6 – Permanent Photo Point 2**

Looking Upstream

February 18, 2010

**Unnamed Tributary 6 – Permanent Photo Point 3**

Looking Upstream

February 18, 2010

Unnamed Tributary 6 Permanent Photo Points

Unnamed Tributary 6 – Permanent Photo Point 4

Looking Downstream

February 18, 2010



Unnamed Tributary 6 – Permanent Photo Point 5

Looking Upstream

February 18, 2010

Unnamed Tributary 6 Permanent Photo Points**Unnamed Tributary 6 – Permanent Photo Point 5**

Looking 310 Degrees

February 18, 2010

Unnamed Tributary 1 Vegetation Plots

UT1 – Vegetation Plot 1



UT1 – Vegetation Plot 2

Unnamed Tributary 1 Vegetation Plots

UT1 – Vegetation Plot 3



UT1 – Vegetation Plot 4

Unnamed Tributary 5 Vegetation Plots

UT5 – Vegetation Plot 1



UT5 – Vegetation Plot 2

Unnamed Tributary 6 Vegetation Plots

UT6 – Vegetation Plot 1



UT6 – Vegetation Plot 2

Unnamed Tributary 6 Vegetation Plots

UT6 – Vegetation Plot 3



UT6 – Vegetation Plot 4

Unnamed Tributary 6 Vegetation Plots

UT6 – Vegetation Plot 5

Unnamed Tributary 1 Representative Photos of Stream and Vegetation Areas Requiring Observation

SPA2 UT1 Sta. 105+25 – Pool Aggradation



SPA3 UT1 Sta. 105+70 – Riffle Bed Scour

Unnamed Tributary 1 Representative Photos of Stream and Vegetation Areas Requiring Observation

UT1 – Bare Bench

UT1 – Isolated Area of Chinese privet *Ligustrum sinense*

Unnamed Tributary 1 Representative Photos of Stream and Vegetation Areas Requiring ObservationUT1 – Isolated Area of multiflora rose *Rosa multiflora* and Japanese honeysuckle *Lonicera japonica*UT1 – Isolated Area of kudzu *Pueraria montana*

Unnamed Tributary 1 Representative Photos of Stream and Vegetation Areas Requiring ObservationUT1 – Isolated Area of Chinese wisteria *Wisteria sinensis*

Unnamed Tributary 5 Representative Photos of Stream and Vegetation Areas Requiring Observation

SPA6 UT5 Sta. 510+75 – Pool Aggradation



SPA7 UT5 Sta. 515+50 – Bank Scour

Unnamed Tributary 5 Representative Photos of Stream and Vegetation Areas Requiring Observation



SPA8 UT5 Sta. 515+80 – Grade Control Degradation



UT5 – Bare Bench

Unnamed Tributary 5 Representative Photos of Stream and Vegetation Areas Requiring ObservationUT5 – Isolated Area of Japanese honeysuckle (*Lonicera japonica*)UT5 – Isolated Area of multiflora rose *Rosa multiflora* and Japanese honeysuckle *Lonicera japonica*

Unnamed Tributary 6 Representative Photos of Stream and Vegetation Areas Requiring Observation

SPA10 UT6 Sta. 601+30 – Riffle Bed Scour



SPA11 UT6 Sta. 601+60 – Pool Aggradation

Unnamed Tributary 6 Representative Photos of Stream and Vegetation Areas Requiring Observation

SPA12 UT6 Sta. 602+25 – Pool Aggradation



UT6 – Bare Bench

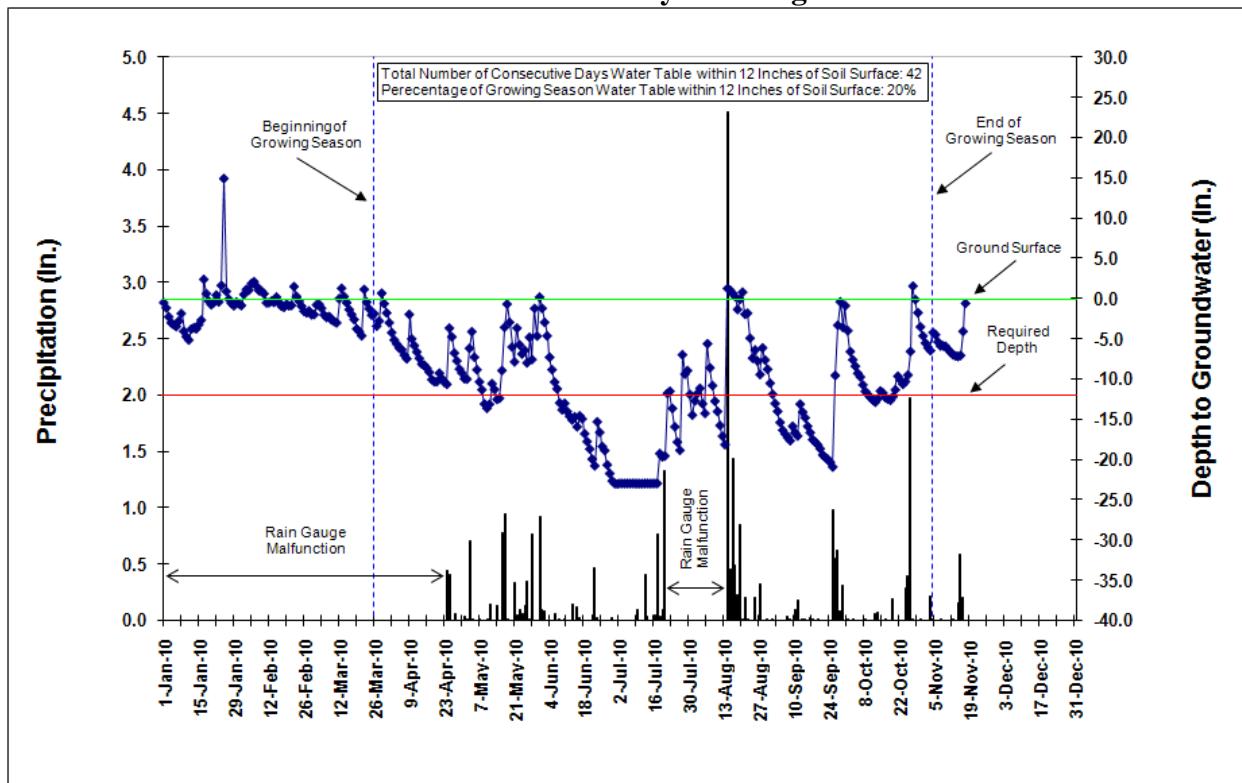
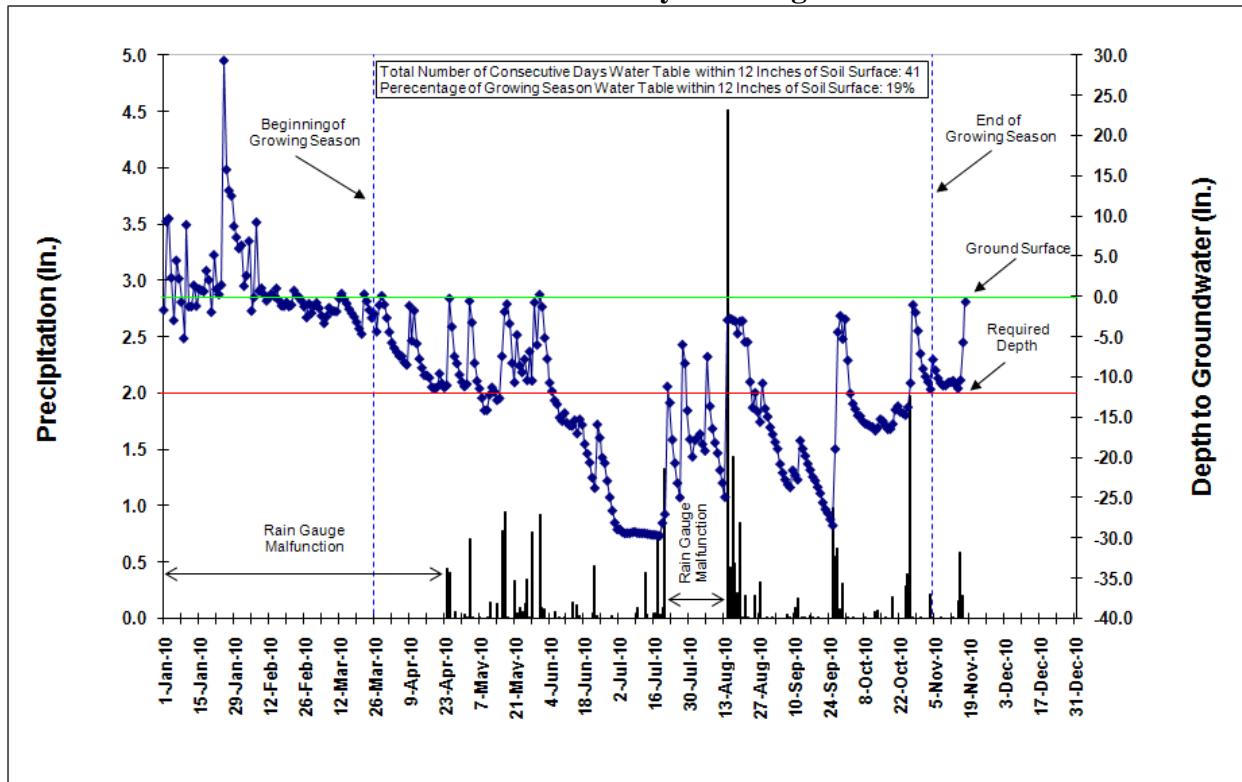
Unnamed Tributary 6 Representative Photos of Stream and Vegetation Areas Requiring Observation

UT6 – Bare Bench

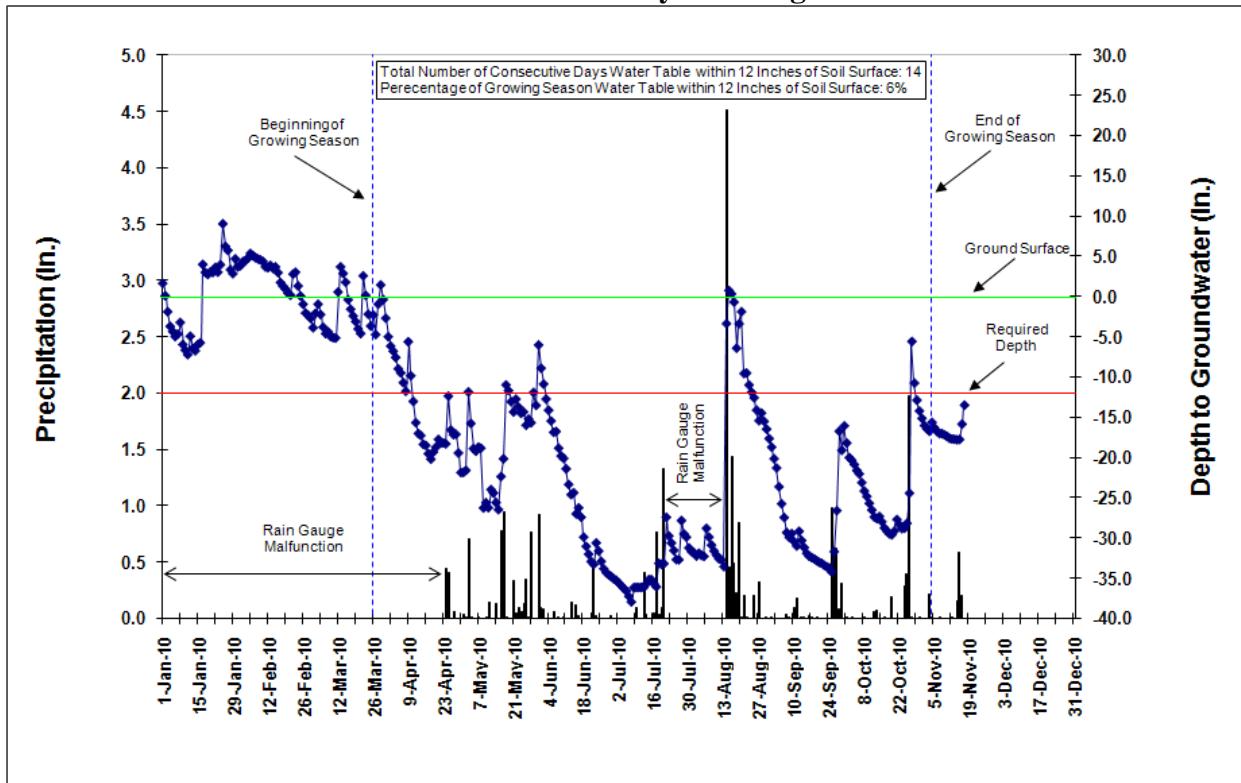
UT6 – Isolated Area of Japanese honeysuckle (*Lonicera japonica*)

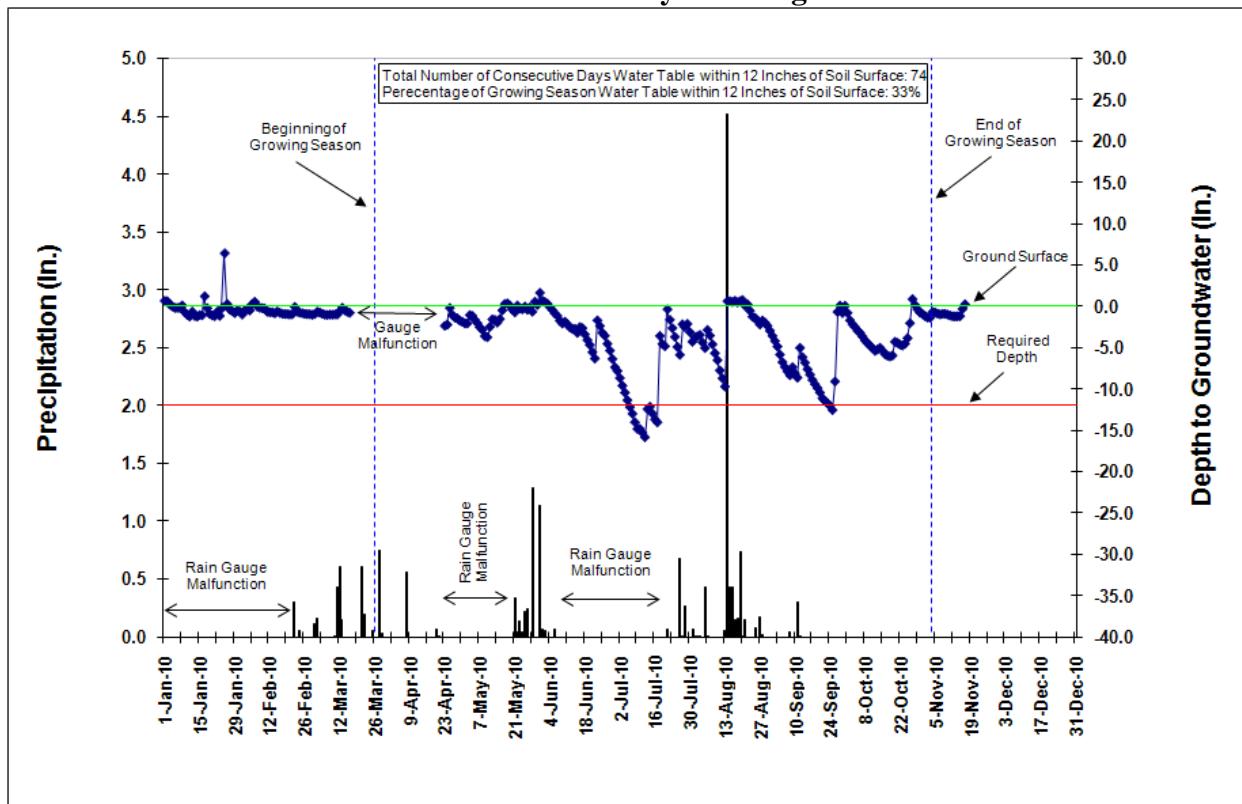
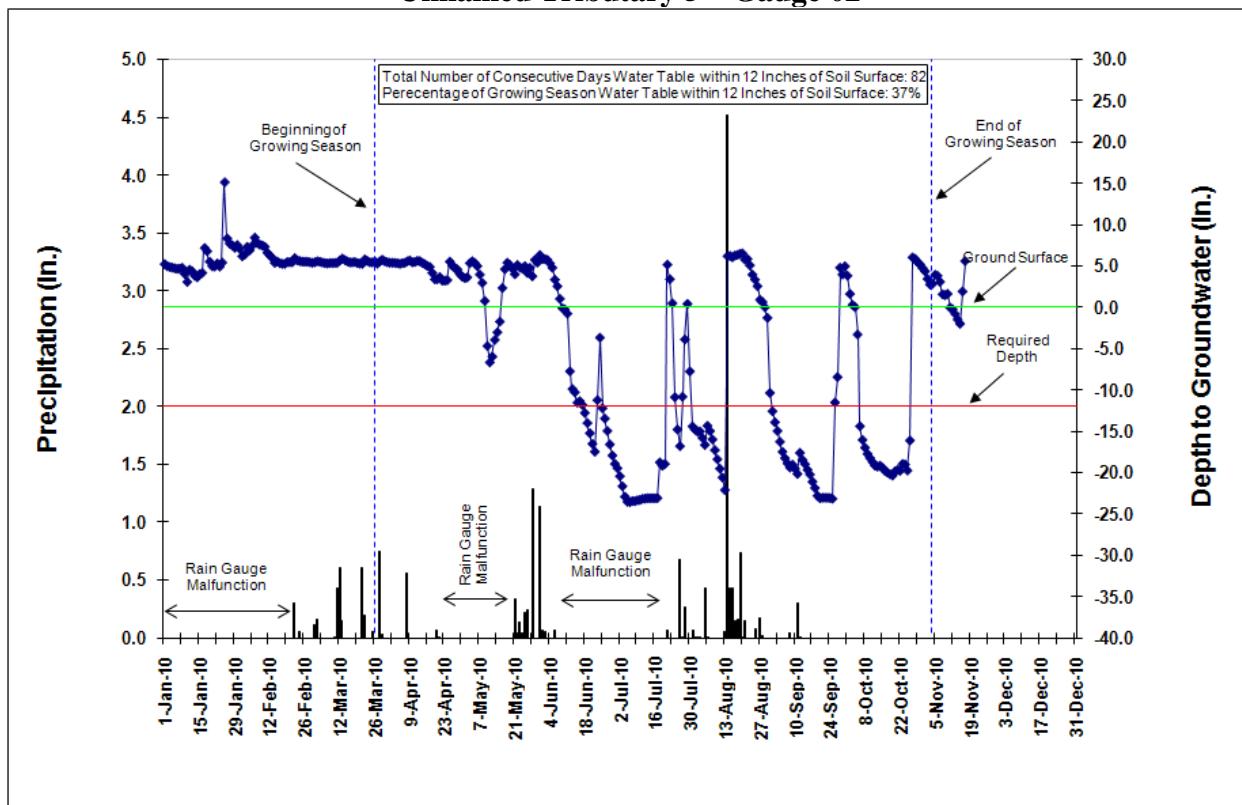
APPENDIX E

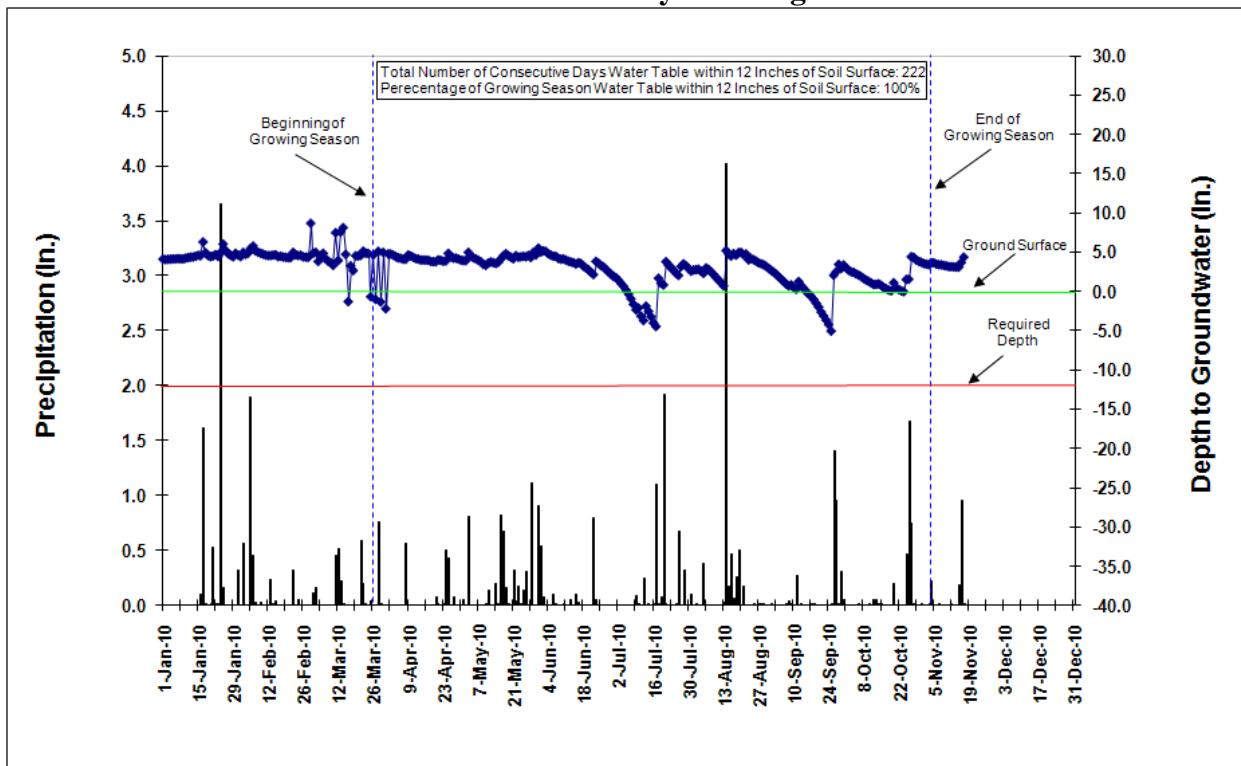
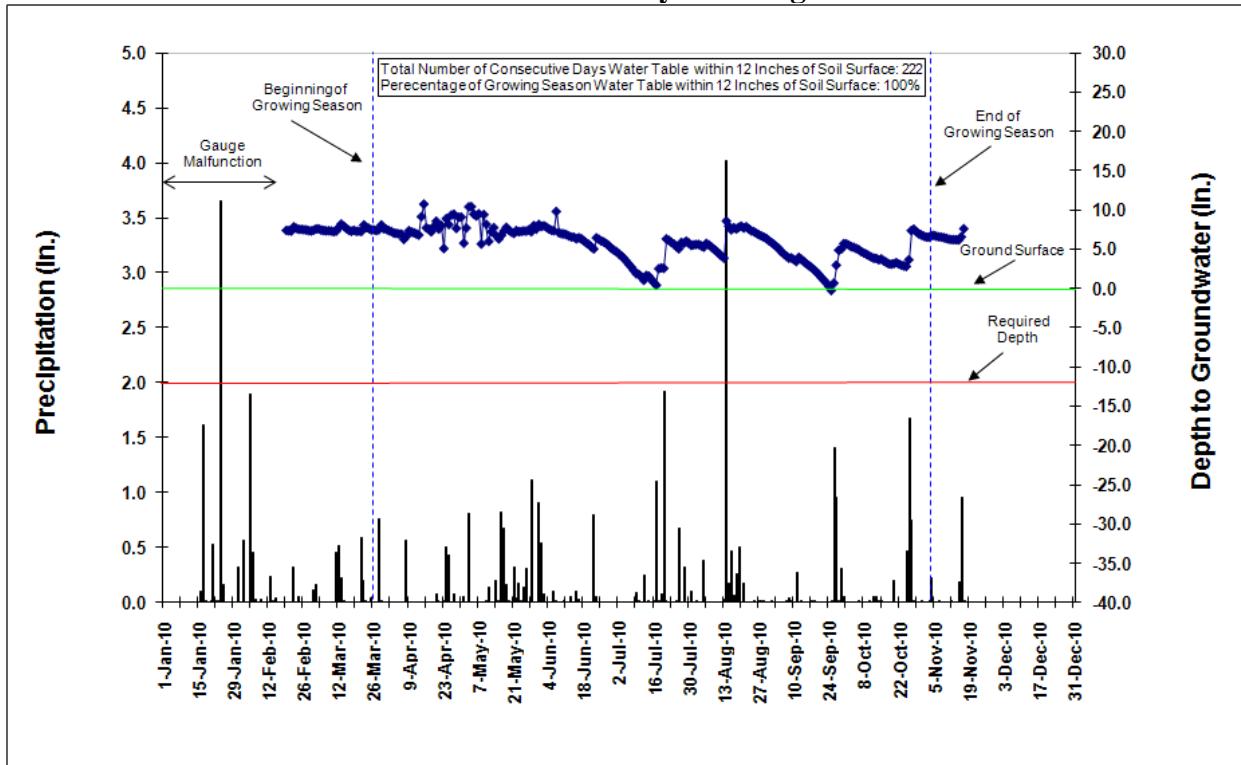
2010 Gauge Data

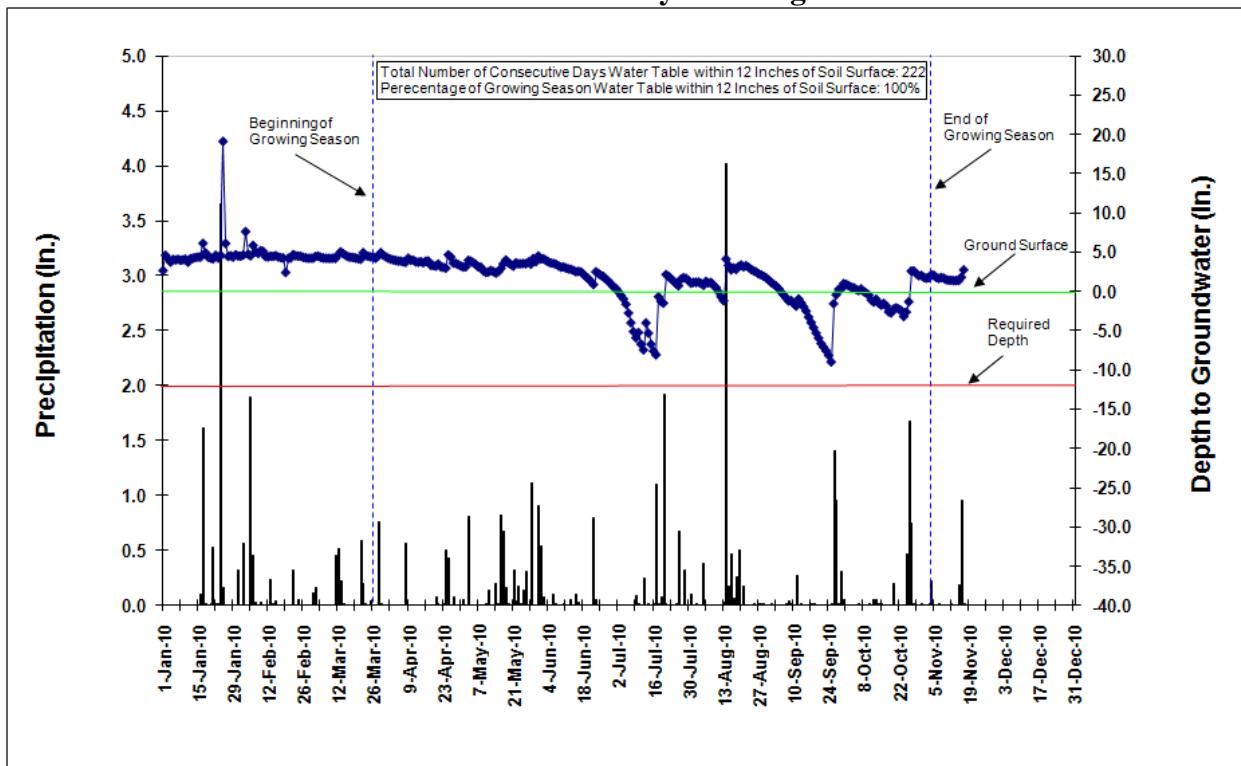
Unnamed Tributary 1 – Gauge 01**Unnamed Tributary 1 – Gauge 02**

Unnamed Tributary 1 – Gauge 03



Unnamed Tributary 5 – Gauge 01**Unnamed Tributary 5 – Gauge 02**

Unnamed Tributary 6 – Gauge 01**Unnamed Tributary 6 – Gauge 02**

Unnamed Tributary 6 – Gauge 03

Date	Time	Gauge Number and Water Level (inches)							
dd-mmm-yyyy	hh:mm:ss	UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
01-Jan-2010	08:00:00	-0.53	-1.68	1.61	0.62	5.19	4.06	Data Gap	2.64
01-Jan-2010	20:00:00	-0.40	3.21	1.26	0.65	5.11	4.15	Data Gap	7.11
02-Jan-2010	08:00:00	-1.19	9.35	0.06	0.58	4.93	4.01	Data Gap	4.60
02-Jan-2010	20:00:00	-1.63	8.40	-0.56	0.45	4.89	4.04	Data Gap	5.38
03-Jan-2010	08:00:00	-2.30	9.70	-1.92	0.18	4.83	4.05	Data Gap	4.15
03-Jan-2010	20:00:00	-2.24	5.33	-2.42	0.19	4.83	4.06	Data Gap	7.07
04-Jan-2010	08:00:00	-3.04	2.33	-3.74	-0.04	4.76	4.06	Data Gap	3.73
04-Jan-2010	20:00:00	-2.59	-2.06	-3.29	0.00	4.79	4.11	Data Gap	4.80
05-Jan-2010	08:00:00	-3.29	-2.96	-4.38	-0.23	4.68	4.10	Data Gap	4.05
05-Jan-2010	20:00:00	-2.72	1.96	-3.37	-0.01	4.74	4.13	Data Gap	5.66
06-Jan-2010	08:00:00	-3.52	4.49	-5.01	-0.23	4.61	4.09	Data Gap	4.00
06-Jan-2010	20:00:00	-2.61	7.78	-3.87	0.05	4.74	4.08	Data Gap	8.56
07-Jan-2010	08:00:00	-2.84	2.22	-4.70	-0.21	4.64	4.13	Data Gap	4.07
07-Jan-2010	20:00:00	-1.84	1.17	-3.43	0.19	4.85	4.10	Data Gap	4.72
08-Jan-2010	08:00:00	-1.88	14.07	-3.25	0.06	4.74	4.11	Data Gap	3.96
08-Jan-2010	20:00:00	-2.92	-0.68	-4.99	-0.36	4.47	4.08	Data Gap	4.00
09-Jan-2010	08:00:00	-4.09	-5.20	-6.00	-0.76	4.00	4.10	Data Gap	4.03
09-Jan-2010	20:00:00	-3.90	2.56	-4.98	-0.46	4.54	4.18	Data Gap	4.04
10-Jan-2010	08:00:00	-4.77	12.89	-6.69	-1.08	3.03	4.19	Data Gap	4.09
10-Jan-2010	20:00:00	-4.25	8.92	-5.37	-0.66	4.55	4.24	Data Gap	4.20
11-Jan-2010	08:00:00	-5.18	12.92	-7.26	-1.28	1.89	4.26	Data Gap	3.72
11-Jan-2010	20:00:00	-4.41	-1.24	-5.57	-0.65	4.50	4.24	Data Gap	5.11
12-Jan-2010	08:00:00	-3.82	-1.23	-4.97	-0.68	4.31	4.33	Data Gap	4.17
12-Jan-2010	20:00:00	-3.24	1.81	-4.41	-0.71	4.32	4.25	Data Gap	5.61
13-Jan-2010	08:00:00	-3.67	11.97	-6.49	-1.21	3.77	4.34	Data Gap	4.23
13-Jan-2010	20:00:00	-3.26	1.40	-5.04	-0.86	4.16	4.33	Data Gap	4.14
14-Jan-2010	08:00:00	-3.79	8.82	-6.78	-1.28	3.59	4.43	Data Gap	4.30
14-Jan-2010	20:00:00	-3.20	-1.18	-5.10	-0.86	4.19	4.37	Data Gap	4.16
15-Jan-2010	08:00:00	-3.27	6.33	-6.00	-1.10	3.98	4.54	Data Gap	4.37
15-Jan-2010	20:00:00	-2.62	0.95	-5.02	-0.87	4.28	4.45	Data Gap	6.18
16-Jan-2010	08:00:00	-2.71	0.80	-5.78	-1.12	4.12	4.50	Data Gap	4.36
16-Jan-2010	20:00:00	-2.00	2.38	-3.95	-0.69	4.65	4.61	Data Gap	6.35
17-Jan-2010	08:00:00	2.37	0.64	3.96	1.17	7.13	6.24	Data Gap	6.12
17-Jan-2010	20:00:00	1.20	5.52	3.30	0.34	7.26	5.76	Data Gap	8.41
18-Jan-2010	08:00:00	0.59	3.22	2.96	-0.27	6.73	4.88	Data Gap	4.92
18-Jan-2010	20:00:00	0.14	2.05	2.93	-0.67	6.23	5.02	Data Gap	4.67
19-Jan-2010	08:00:00	-0.35	2.06	2.71	-0.97	5.48	4.52	Data Gap	4.37
19-Jan-2010	20:00:00	-0.52	2.03	3.00	-1.03	5.16	4.44	Data Gap	4.38
20-Jan-2010	08:00:00	-0.78	-1.93	3.03	-1.15	4.91	4.38	Data Gap	4.24
20-Jan-2010	20:00:00	-0.74	4.64	3.09	-1.20	4.91	4.40	Data Gap	4.18
21-Jan-2010	08:00:00	-0.50	5.18	2.96	-1.22	4.89	4.47	Data Gap	4.14
21-Jan-2010	20:00:00	1.20	1.28	3.97	-0.39	5.41	4.89	Data Gap	4.71
22-Jan-2010	08:00:00	0.42	0.90	3.60	-0.70	5.26	4.65	Data Gap	4.60
22-Jan-2010	20:00:00	-0.08	1.61	3.32	-1.03	4.99	4.64	Data Gap	4.33
23-Jan-2010	08:00:00	-0.44	0.27	3.00	-1.20	4.88	4.40	Data Gap	4.24
23-Jan-2010	20:00:00	-0.65	0.15	2.71	-1.25	4.86	4.44	Data Gap	4.23
24-Jan-2010	08:00:00	1.60	1.44	3.91	-0.23	5.37	4.91	Data Gap	4.60
24-Jan-2010	20:00:00	5.89	7.29	5.89	4.23	11.07	7.94	Data Gap	7.43
25-Jan-2010	08:00:00	14.92	29.33	9.01	6.36	15.06	21.52	Data Gap	19.16
25-Jan-2010	20:00:00	1.63	11.02	6.57	0.91	8.99	5.98	Data Gap	12.26
26-Jan-2010	08:00:00	0.87	15.79	6.21	0.23	8.28	5.17	Data Gap	6.10
26-Jan-2010	20:00:00	0.44	9.22	8.97	-0.11	7.99	5.08	Data Gap	7.98
27-Jan-2010	08:00:00	-0.10	13.18	5.71	-0.43	7.66	4.76	Data Gap	4.44
27-Jan-2010	20:00:00	-0.25	9.71	5.76	-0.49	7.65	4.78	Data Gap	8.01
28-Jan-2010	08:00:00	-0.61	12.52	3.31	-0.63	7.45	4.56	Data Gap	4.55
28-Jan-2010	20:00:00	-0.67	6.56	9.02	-0.67	7.39	4.77	Data Gap	11.05
29-Jan-2010	08:00:00	-0.91	8.74	2.81	-0.85	7.15	4.36	Data Gap	4.36
29-Jan-2010	20:00:00	-0.81	5.69	5.12	-0.80	7.19	4.61	Data Gap	5.49

Appendix E

2010 Gauge Data

Date	Time	Gauge Number and Water Level (inches)							
dd-mmm-yyyy	hh:mm:ss	UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
30-Jan-2010	08:00:00	-0.45	7.36	4.66	-0.54	7.48	4.81	Data Gap	4.65
30-Jan-2010	20:00:00	-0.34	5.89	4.01	-0.39	7.44	4.82	Data Gap	4.73
31-Jan-2010	08:00:00	-0.66	19.27	3.65	-0.68	7.00	4.58	Data Gap	4.51
31-Jan-2010	20:00:00	-0.55	5.99	9.67	-0.69	6.94	5.02	Data Gap	4.66
01-Feb-2010	08:00:00	-0.89	21.65	3.80	-1.03	6.14	4.39	Data Gap	4.47
01-Feb-2010	20:00:00	-0.49	6.37	3.65	-0.91	6.32	4.79	Data Gap	7.86
02-Feb-2010	08:00:00	0.49	1.31	4.31	-0.55	6.33	4.90	Data Gap	4.61
02-Feb-2010	20:00:00	1.65	3.15	4.63	0.00	7.59	5.25	Data Gap	6.79
03-Feb-2010	08:00:00	1.11	2.60	4.42	-0.37	7.27	4.67	Data Gap	7.61
03-Feb-2010	20:00:00	1.67	8.26	5.12	-0.10	7.35	5.21	Data Gap	9.19
04-Feb-2010	08:00:00	1.02	6.89	4.74	-0.55	6.86	4.85	Data Gap	4.73
04-Feb-2010	20:00:00	1.04	-0.30	4.80	-0.42	6.90	4.95	Data Gap	6.95
05-Feb-2010	08:00:00	1.83	-1.79	5.33	0.23	7.41	5.42	Data Gap	4.52
05-Feb-2010	20:00:00	3.13	0.96	5.95	1.32	9.24	6.75	Data Gap	5.76
06-Feb-2010	08:00:00	2.09	-0.11	5.04	0.50	8.38	5.73	Data Gap	5.85
06-Feb-2010	20:00:00	2.06	8.36	5.13	0.28	8.07	5.54	Data Gap	8.79
07-Feb-2010	08:00:00	1.53	9.23	4.82	-0.07	7.71	5.10	Data Gap	5.05
07-Feb-2010	20:00:00	1.44	1.92	4.88	0.00	7.73	5.18	Data Gap	8.59
08-Feb-2010	08:00:00	0.96	0.70	4.64	-0.22	7.53	4.93	Data Gap	4.84
08-Feb-2010	20:00:00	1.26	1.50	4.71	-0.08	7.54	4.95	Data Gap	8.39
09-Feb-2010	08:00:00	0.93	1.04	4.52	-0.25	7.43	4.82	Data Gap	5.19
09-Feb-2010	20:00:00	1.14	1.14	4.63	-0.04	7.57	4.90	Data Gap	5.23
10-Feb-2010	08:00:00	0.58	0.28	4.32	-0.32	7.27	4.70	Data Gap	5.10
10-Feb-2010	20:00:00	0.18	0.72	4.16	-0.43	7.17	4.72	Data Gap	5.96
11-Feb-2010	08:00:00	-0.55	-0.53	3.65	-0.70	6.57	4.57	Data Gap	4.43
11-Feb-2010	20:00:00	0.01	1.11	3.84	-0.63	6.68	4.66	Data Gap	8.14
12-Feb-2010	08:00:00	-0.55	-0.11	3.56	-0.76	6.23	4.52	Data Gap	4.39
12-Feb-2010	20:00:00	-0.19	0.62	3.88	-0.68	6.32	4.68	Data Gap	5.43
13-Feb-2010	08:00:00	-0.35	0.36	3.84	-0.76	5.93	4.52	Data Gap	4.48
13-Feb-2010	20:00:00	-0.04	1.37	4.18	-0.70	5.91	4.88	Data Gap	4.63
14-Feb-2010	08:00:00	-0.49	0.04	3.48	-0.88	5.35	4.57	Data Gap	4.45
14-Feb-2010	20:00:00	0.65	1.06	3.76	-0.57	5.56	5.08	Data Gap	8.01
15-Feb-2010	08:00:00	0.16	1.02	3.66	-0.68	5.49	4.62	Data Gap	4.55
15-Feb-2010	20:00:00	0.55	0.91	3.71	-0.65	5.48	4.69	Data Gap	6.30
16-Feb-2010	08:00:00	-0.51	-0.47	2.94	-0.82	5.30	4.37	Data Gap	4.38
16-Feb-2010	20:00:00	-0.37	0.30	2.63	-0.83	5.33	4.6	Data Gap	4.39
17-Feb-2010	08:00:00	-0.99	-1.15	1.71	-0.94	5.22	4.43	Data Gap	4.29
17-Feb-2010	20:00:00	-0.56	0.25	1.76	-0.88	5.30	4.51	Data Gap	7.00
18-Feb-2010	08:00:00	-1.09	-1.18	1.26	-0.98	5.21	4.34	Data Gap	4.24
18-Feb-2010	20:00:00	-0.31	-0.54	1.36	-0.92	5.48	4.46	7.38	4.33
19-Feb-2010	08:00:00	-0.73	-0.72	0.91	-0.99	5.43	4.30	7.35	2.39
19-Feb-2010	20:00:00	-0.08	1.00	1.07	-0.95	5.48	4.43	7.34	4.29
20-Feb-2010	08:00:00	-0.92	-1.22	0.39	-1.03	5.40	4.26	7.3	4.21
20-Feb-2010	20:00:00	-0.19	0.76	0.73	-0.95	5.49	4.40	7.33	4.23
21-Feb-2010	08:00:00	-0.87	-1.03	0.14	-1.01	5.40	4.26	7.27	4.23
21-Feb-2010	20:00:00	-0.19	1.44	0.43	-0.90	5.54	4.42	7.34	4.24
22-Feb-2010	08:00:00	1.47	0.75	2.75	-0.11	5.91	4.91	7.8	4.68
22-Feb-2010	20:00:00	0.71	2.12	3.49	-0.54	5.73	4.88	7.72	4.63
23-Feb-2010	08:00:00	0.25	0.15	2.99	-0.69	5.63	4.60	7.61	4.54
23-Feb-2010	20:00:00	-0.07	0.60	2.17	-0.75	5.61	4.57	7.59	4.50
24-Feb-2010	08:00:00	-0.36	-0.04	1.28	-0.81	5.55	4.52	7.48	4.49
24-Feb-2010	20:00:00	-0.22	0.31	0.77	-0.73	5.62	4.60	7.6	4.51
25-Feb-2010	08:00:00	-0.97	-0.54	0.03	-0.87	5.49	4.56	7.47	4.47
25-Feb-2010	20:00:00	-1.08	-0.22	-0.34	-0.94	5.47	4.54	7.53	4.39
26-Feb-2010	08:00:00	-1.60	-1.23	-0.99	-0.96	5.47	4.36	7.44	4.33
26-Feb-2010	20:00:00	-1.15	0.44	-1.23	-0.93	5.52	4.48	7.43	4.33
27-Feb-2010	08:00:00	-1.79	-2.60	-2.08	-0.99	5.47	4.33	7.41	4.27
27-Feb-2010	20:00:00	-1.34	-0.18	-1.94	-0.97	5.50	4.44	7.35	4.28
28-Feb-2010	08:00:00	-1.56	-0.89	-2.34	-1.00	5.41	4.30	7.31	4.21

Appendix E

2010 Gauge Data

Date	Time	Gauge Number and Water Level (inches)							
dd-mmm-yyyy	hh:mm:ss	UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
28-Feb-2010	20:00:00	-1.87	-0.92	-2.58	-1.04	5.38	10.79	7.30	4.20
01-Mar-2010	08:00:00	-2.04	-2.05	-2.74	-1.06	5.34	8.61	7.28	4.22
01-Mar-2010	20:00:00	-2.00	-0.45	-3.34	-1.02	5.40	8.98	7.29	4.17
02-Mar-2010	08:00:00	-2.01	-1.16	-3.91	-0.98	5.40	4.83	7.39	4.22
02-Mar-2010	20:00:00	-0.48	-0.30	-2.01	-0.55	5.61	4.91	7.57	4.48
03-Mar-2010	08:00:00	-0.81	-0.78	-2.10	-0.69	5.53	4.93	7.54	4.45
03-Mar-2010	20:00:00	0.07	0.52	-0.72	-0.68	5.56	8.88	7.63	4.53
04-Mar-2010	08:00:00	-0.74	-1.43	-0.99	-0.80	5.47	3.78	7.53	4.49
04-Mar-2010	20:00:00	-0.89	-0.12	-1.45	-0.84	5.46	8.94	7.52	4.43
05-Mar-2010	08:00:00	-1.23	-2.38	-2.27	-0.94	5.38	4.47	7.40	4.33
05-Mar-2010	20:00:00	-1.51	-0.14	-2.66	-0.96	5.38	8.08	7.37	4.30
06-Mar-2010	08:00:00	-2.05	-3.32	-3.84	-1.05	5.31	12.08	7.33	4.25
06-Mar-2010	20:00:00	-1.79	-1.60	-3.74	-0.99	5.35	4.80	7.31	4.24
07-Mar-2010	08:00:00	-2.36	-2.48	-4.65	-1.08	5.26	4.12	7.29	4.21
07-Mar-2010	20:00:00	-2.06	-1.23	-4.24	-1.01	5.36	4.62	7.31	4.21
08-Mar-2010	08:00:00	-2.26	-1.38	-4.43	-1.04	5.32	3.79	7.30	4.21
08-Mar-2010	20:00:00	-2.48	-1.66	-4.6	-1.01	5.37	4.80	7.26	4.18
09-Mar-2010	08:00:00	-2.68	-1.83	-5.00	-1.05	5.31	3.62	7.27	4.20
09-Mar-2010	20:00:00	-2.82	-1.90	-4.83	-1.02	5.35	9.45	7.25	4.16
10-Mar-2010	08:00:00	-2.88	-1.82	-5.14	-1.02	5.33	3.28	7.18	4.22
10-Mar-2010	20:00:00	-2.98	-1.90	-4.80	-1.04	5.33	9.72	7.28	4.16
11-Mar-2010	08:00:00	-3.05	-1.85	-5.19	-1.04	5.34	7.41	7.27	4.20
11-Mar-2010	20:00:00	0.97	0.11	0.91	-0.28	5.75	5.98	7.86	4.75
12-Mar-2010	08:00:00	-0.04	-0.24	0.53	-0.60	5.62	3.90	7.73	4.66
12-Mar-2010	20:00:00	2.13	1.37	4.21	0.40	6.14	9.19	8.33	5.31
13-Mar-2010	08:00:00	1.26	0.37	3.66	-0.22	5.85	7.52	8.15	5.04
13-Mar-2010	20:00:00	0.70	0.07	3.31	-0.34	5.79	8.97	8.14	4.95
14-Mar-2010	08:00:00	0.23	-0.30	2.84	-0.53	5.67	1.54	7.87	4.80
14-Mar-2010	20:00:00	-0.21	-0.60	2.39	-0.62	5.57	8.06	7.89	4.66
15-Mar-2010	08:00:00	-0.54	-0.85	1.74	-0.71	5.51	4.67	7.61	4.58
15-Mar-2010	20:00:00	-1.06	-1.31	0.54	-0.79	5.44	6.05	7.60	4.49
16-Mar-2010	08:00:00	-1.39	-1.55	-0.43	-0.83	5.39	-1.31	7.36	4.40
16-Mar-2010	20:00:00	-1.76	-1.96	-1.21	Data Gap	5.37	6.05	7.55	4.31
17-Mar-2010	08:00:00	-2.02	-2.06	-1.60	Data Gap	5.39	3.21	7.24	4.34
17-Mar-2010	20:00:00	-2.32	-2.32	-1.98	Data Gap	5.41	11.14	7.62	4.33
18-Mar-2010	08:00:00	-2.64	-2.52	-2.44	Data Gap	5.43	2.62	7.36	4.31
18-Mar-2010	20:00:00	-3.11	-3.07	-2.69	Data Gap	5.39	4.46	7.56	4.26
19-Mar-2010	08:00:00	Data Gap	-3.18	-3.15	Data Gap	5.32	4.49	7.24	4.24
19-Mar-2010	20:00:00	-3.79	-3.75	-3.39	Data Gap	5.29	4.39	8.32	4.14
20-Mar-2010	08:00:00	-4.12	-3.99	-4.06	Data Gap	5.24	-0.69	7.26	4.16
20-Mar-2010	20:00:00	-4.47	-4.59	-4.39	Data Gap	5.23	4.46	8.28	4.07
21-Mar-2010	08:00:00	-4.65	-4.65	-4.64	Data Gap	5.22	4.54	7.22	4.09
21-Mar-2010	20:00:00	1.02	0.41	2.86	Data Gap	5.85	4.09	7.70	4.81
22-Mar-2010	08:00:00	1.11	0.30	2.54	Data Gap	5.75	5.08	8.04	4.93
22-Mar-2010	20:00:00	0.10	-0.16	1.37	Data Gap	5.64	10.87	7.94	4.73
23-Mar-2010	08:00:00	-0.47	-0.58	0.11	Data Gap	5.56	-0.74	7.73	4.58
23-Mar-2010	20:00:00	-0.91	-1.15	-1.48	Data Gap	5.48	4.82	8.31	4.50
24-Mar-2010	08:00:00	-1.30	-1.67	-2.23	Data Gap	5.40	4.80	7.60	4.45
24-Mar-2010	20:00:00	-1.66	-2.32	-3.03	Data Gap	5.40	4.67	9.25	4.35
25-Mar-2010	08:00:00	-2.08	-2.66	-3.71	Data Gap	5.38	-0.71	7.41	4.39
25-Mar-2010	20:00:00	-2.32	-2.79	-3.82	Data Gap	5.47	7.65	8.08	4.42
26-Mar-2010	08:00:00	-1.90	-2.14	-2.32	Data Gap	5.50	4.60	7.42	4.36
26-Mar-2010	20:00:00	-2.86	-3.68	-4.22	Data Gap	5.33	4.56	7.85	4.20
27-Mar-2010	08:00:00	-3.45	-4.36	-4.76	Data Gap	5.23	-1.04	7.34	4.22
27-Mar-2010	20:00:00	-4.00	-5.21	-5.06	Data Gap	5.23	4.59	7.97	4.17
28-Mar-2010	08:00:00	-2.81	-1.06	-0.98	Data Gap	5.52	5.05	7.43	4.50
28-Mar-2010	20:00:00	1.76	0.46	2.30	Data Gap	5.79	2.15	8.22	5.14
29-Mar-2010	08:00:00	0.64	0.10	1.41	Data Gap	5.71	-1.37	8.04	4.93
29-Mar-2010	20:00:00	-0.13	-0.45	0.38	Data Gap	5.59	7.73	8.59	4.71

Appendix E

2010 Gauge Data

Date	Time	Gauge Number and Water Level (inches)							
dd-mmm-yyyy	hh:mm:ss	UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
30-Mar-2010	08:00:00	-0.66	-0.99	-0.42	Data Gap	5.52	4.92	7.56	4.59
30-Mar-2010	20:00:00	-1.33	-2.05	-1.68	Data Gap	5.44	4.77	8.57	4.41
31-Mar-2010	08:00:00	-1.82	-2.65	-2.73	Data Gap	5.41	-2.23	7.49	4.40
31-Mar-2010	20:00:00	-2.47	-4.00	-4.11	Data Gap	5.38	4.66	9.11	4.23
01-Apr-2010	08:00:00	-3.04	-4.40	-5.04	Data Gap	5.35	4.73	7.32	4.23
01-Apr-2010	20:00:00	-3.75	-5.72	-5.74	Data Gap	5.35	4.65	9.67	4.15
02-Apr-2010	08:00:00	-4.26	-5.73	-6.20	Data Gap	5.35	4.71	7.21	4.09
02-Apr-2010	20:00:00	-4.86	-6.80	-6.59	Data Gap	5.34	4.53	9.82	4.00
03-Apr-2010	08:00:00	-5.18	-6.39	-6.84	Data Gap	5.33	4.58	7.00	4.01
03-Apr-2010	20:00:00	-5.40	-7.13	-7.26	Data Gap	5.32	4.39	8.77	3.97
04-Apr-2010	08:00:00	-5.68	-6.89	-7.61	Data Gap	5.29	4.38	6.96	3.92
04-Apr-2010	20:00:00	-6.02	-7.89	-8.25	Data Gap	5.26	4.19	9.57	3.85
05-Apr-2010	08:00:00	-6.20	-7.39	-9.02	Data Gap	5.22	4.23	6.91	3.86
05-Apr-2010	20:00:00	-6.36	-7.93	-9.34	Data Gap	5.28	4.12	9.21	3.85
06-Apr-2010	08:00:00	-6.39	-7.42	-9.53	Data Gap	5.30	4.18	6.88	3.86
06-Apr-2010	20:00:00	-6.98	-9.09	-10.38	Data Gap	5.26	3.98	9.69	3.72
07-Apr-2010	08:00:00	-7.08	-8.16	-10.74	Data Gap	5.34	4.05	6.20	3.74
07-Apr-2010	20:00:00	-7.64	-9.61	-11.54	Data Gap	5.39	3.88	7.80	3.63
08-Apr-2010	08:00:00	-7.52	-8.49	-11.81	Data Gap	5.52	4.05	6.58	3.69
08-Apr-2010	20:00:00	0.24	-0.15	-1.38	Data Gap	5.84	4.74	7.66	4.34
09-Apr-2010	08:00:00	-2.00	-1.14	-5.65	Data Gap	5.63	4.60	7.31	4.23
09-Apr-2010	20:00:00	-4.03	-4.30	-8.58	Data Gap	5.50	4.44	8.69	4.00
10-Apr-2010	08:00:00	-5.04	-5.49	-9.88	Data Gap	5.39	4.47	7.15	3.97
10-Apr-2010	20:00:00	-6.14	-0.09	-11.53	Data Gap	5.38	4.26	8.78	3.84
11-Apr-2010	08:00:00	-5.87	-1.76	-13.06	Data Gap	5.44	4.29	7.05	3.97
11-Apr-2010	20:00:00	-6.71	-4.63	-14.93	Data Gap	5.58	4.10	9.24	3.9
12-Apr-2010	08:00:00	-6.67	-5.84	-15.72	Data Gap	5.57	4.14	6.91	3.75
12-Apr-2010	20:00:00	-7.62	-7.63	-16.78	Data Gap	5.61	4.00	9.58	3.63
13-Apr-2010	08:00:00	-7.47	-7.74	-17.06	Data Gap	5.54	4.07	6.76	3.71
13-Apr-2010	20:00:00	-8.36	-9.88	-17.71	Data Gap	5.60	3.90	10.6	3.63
14-Apr-2010	08:00:00	-8.18	-8.86	-17.32	Data Gap	5.33	3.96	9.09	3.77
14-Apr-2010	20:00:00	-8.79	-10.69	-18.34	Data Gap	5.31	3.88	9.84	3.59
15-Apr-2010	08:00:00	-8.31	-9.76	-18.41	Data Gap	5.17	3.96	10.69	3.65
15-Apr-2010	20:00:00	-9.24	-11.12	-18.70	Data Gap	5.20	3.82	10.92	3.71
16-Apr-2010	08:00:00	-8.69	-9.78	-18.53	Data Gap	4.96	3.95	7.67	3.85
16-Apr-2010	20:00:00	-9.81	-11.41	-19.5	Data Gap	5.07	3.81	10.27	3.84
17-Apr-2010	08:00:00	-9.20	-10.08	-19.57	Data Gap	4.85	3.93	7.50	3.87
17-Apr-2010	20:00:00	-10.31	-12.05	-20.52	Data Gap	4.64	3.73	11.18	3.53
18-Apr-2010	08:00:00	-10.11	-11.25	-20.25	Data Gap	4.11	3.77	7.17	3.31
18-Apr-2010	20:00:00	-10.99	-12.71	-20.55	Data Gap	3.76	3.65	9.43	3.15
19-Apr-2010	08:00:00	-10.36	-11.41	-19.37	Data Gap	3.35	3.75	7.85	3.29
19-Apr-2010	20:00:00	-11.17	-12.70	-19.65	Data Gap	3.37	3.64	9.56	3.22
20-Apr-2010	08:00:00	-10.38	-11.28	-18.77	Data Gap	3.36	3.74	8.52	3.20
20-Apr-2010	20:00:00	-10.62	-11.01	-18.45	Data Gap	3.49	3.80	9.46	3.27
21-Apr-2010	08:00:00	-9.31	-9.57	-17.79	Data Gap	3.62	3.98	7.52	3.48
21-Apr-2010	20:00:00	-10.65	-11.54	-18.67	Data Gap	3.42	3.83	9.14	3.12
22-Apr-2010	08:00:00	-9.96	-10.78	-18.24	Data Gap	3.19	3.91	7.97	3.13
22-Apr-2010	20:00:00	-11.28	-12.62	-19.17	Data Gap	3.26	3.71	9.85	2.97
23-Apr-2010	08:00:00	-10.45	-11.30	-18.23	Data Gap	3.19	3.81	5.04	3.04
23-Apr-2010	20:00:00	-11.54	-12.43	-19.22	-2.4	3.28	3.68	9.98	2.90
24-Apr-2010	08:00:00	-10.70	-11.03	-18.34	-2.26	3.24	3.84	8.85	2.95
24-Apr-2010	20:00:00	-8.51	-4.53	-14.79	-1.47	4.42	4.23	10.07	3.47
25-Apr-2010	08:00:00	-0.47	-0.23	-12.41	-0.24	5.48	4.80	8.09	4.65
25-Apr-2010	20:00:00	-3.70	-1.87	-16.90	-0.96	5.13	4.42	11.49	4.45
26-Apr-2010	08:00:00	-4.80	-3.76	-16.62	-1.10	5.02	4.39	9.30	4.36
26-Apr-2010	20:00:00	-6.56	-6.40	-15.87	-1.33	4.76	4.22	10.67	3.88
27-Apr-2010	08:00:00	-6.81	-7.43	-17.20	-1.40	4.69	4.20	9.41	3.61
27-Apr-2010	20:00:00	-7.82	-8.39	-15.71	-1.41	4.70	4.18	10.13	3.48
28-Apr-2010	08:00:00	-7.78	-8.31	-17.16	-1.51	4.54	4.20	7.60	3.55

Appendix E

2010 Gauge Data

Date	Time	Gauge Number and Water Level (inches)							
dd-mmm-yyyy	hh:mm:ss	UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
28-Apr-2010	20:00:00	-9.27	-10.43	-16.82	-1.76	4.30	4.01	10.31	3.35
29-Apr-2010	08:00:00	-8.79	-9.72	-19.49	-1.78	3.98	4.08	9.01	3.40
29-Apr-2010	20:00:00	-10.03	-11.85	-22.10	-1.95	3.81	3.9	10.36	3.43
30-Apr-2010	08:00:00	-9.29	-10.61	-21.91	-1.91	3.65	3.95	9.05	3.22
30-Apr-2010	20:00:00	-10.86	-12.95	-22.81	-2.21	3.63	3.77	9.92	3.11
01-May-2010	08:00:00	-10.00	-11.18	-21.9	-2.11	3.49	3.88	5.72	3.10
01-May-2010	20:00:00	-11.28	-12.88	-22.19	-2.36	3.48	3.78	10.54	2.91
02-May-2010	08:00:00	-10.05	-10.87	-21.64	-2.11	3.58	3.88	7.64	3.13
02-May-2010	20:00:00	-11.53	-12.56	-23.17	-2.38	3.61	3.81	10.56	3.13
03-May-2010	08:00:00	-6.22	-0.56	-11.89	-1.10	5.30	4.93	10.35	3.95
03-May-2010	20:00:00	-2.94	-1.45	-15.42	-0.99	5.25	4.49	8.89	3.91
04-May-2010	08:00:00	-4.15	-3.22	-15.81	-1.20	5.53	4.47	10.37	3.85
04-May-2010	20:00:00	-7.22	-8.01	-16.62	-1.61	5.33	4.19	10.98	3.63
05-May-2010	08:00:00	-7.32	-8.26	-18.94	-1.68	5.32	4.24	9.43	3.64
05-May-2010	20:00:00	-9.58	-11.45	-18.32	-2.14	5.13	4.02	10.54	3.51
06-May-2010	08:00:00	-8.89	-10.50	-19.27	-2.07	4.93	4.11	9.18	3.40
06-May-2010	20:00:00	-11.40	-13.17	-19.67	-2.62	4.42	3.85	10.07	3.16
07-May-2010	08:00:00	-10.40	-11.43	-18.75	-2.58	3.91	3.93	9.47	3.10
07-May-2010	20:00:00	-12.46	-14.38	-19.96	-3.08	3.40	3.72	10.23	3.19
08-May-2010	08:00:00	-11.38	-12.60	-18.88	-2.89	2.91	3.74	5.62	3.09
08-May-2010	20:00:00	-13.63	-15.16	-26.52	-3.66	1.98	3.44	9.54	2.63
09-May-2010	08:00:00	-13.14	-14.14	-26.32	-3.65	0.73	3.41	9.36	2.60
09-May-2010	20:00:00	-14.53	-15.92	-27.32	-4.06	-0.41	3.24	9.22	2.36
10-May-2010	08:00:00	-13.68	-14.11	-25.66	-3.77	-4.71	3.29	8.12	2.40
10-May-2010	20:00:00	-14.46	-14.94	-26.50	-2.96	-7.95	3.20	5.86	2.29
11-May-2010	08:00:00	-13.19	-12.21	-26.29	-2.52	-6.69	3.58	5.94	2.45
11-May-2010	20:00:00	-11.28	-11.42	-24.59	-1.85	-6.42	3.60	6.21	2.64
12-May-2010	08:00:00	-10.62	-11.28	-24.03	-1.62	-5.98	3.71	7.18	2.66
12-May-2010	20:00:00	-12.23	-13.09	-25.62	-1.93	-4.09	3.57	9.69	2.58
13-May-2010	08:00:00	-11.33	-11.83	-24.46	-1.69	-3.97	3.62	7.70	2.51
13-May-2010	20:00:00	-13.88	-14.42	-26.39	-2.26	-3.29	3.42	9.86	2.35
14-May-2010	08:00:00	-12.59	-12.88	-25.65	-2.02	-3.05	3.51	6.65	2.32
14-May-2010	20:00:00	-14.74	-15.60	-28.13	-2.60	-2.69	3.58	5.91	2.42
15-May-2010	08:00:00	-12.44	-12.64	-26.53	-1.58	-1.76	3.67	6.27	2.51
15-May-2010	20:00:00	-14.20	-14.60	-28.08	-2.00	-1.92	3.49	6.13	2.49
16-May-2010	08:00:00	-8.99	-7.42	-22.42	-0.53	2.30	4.09	6.72	2.89
16-May-2010	20:00:00	-5.09	-2.34	-18.68	0.16	4.06	4.41	7.13	3.34
17-May-2010	08:00:00	-3.61	-1.88	-20.21	0.24	4.57	4.49	7.26	3.51
17-May-2010	20:00:00	1.37	-0.45	-8.910	1.15	5.66	5.08	8.12	4.31
18-May-2010	08:00:00	-0.71	-0.93	-11.02	0.31	5.35	4.76	7.75	4.00
18-May-2010	20:00:00	-2.28	-1.76	-11.97	0.12	5.18	4.59	7.50	3.83
19-May-2010	08:00:00	-2.99	-3.36	-11.73	0.05	5.07	4.50	7.39	3.64
19-May-2010	20:00:00	-5.87	-7.31	-12.93	-0.39	4.74	4.26	7.14	3.42
20-May-2010	08:00:00	-6.06	-8.26	-13.11	-0.44	4.60	4.31	7.14	3.41
20-May-2010	20:00:00	-8.44	-11.10	-14.81	-0.83	4.34	4.06	6.92	3.25
21-May-2010	08:00:00	-7.91	-10.67	-14.39	-0.77	3.96	4.11	6.96	3.21
21-May-2010	20:00:00	-3.20	-3.54	-12.99	0.16	5.14	4.52	7.29	3.62
22-May-2010	08:00:00	-3.70	-4.76	-12.79	0.05	5.07	4.51	7.33	3.63
22-May-2010	20:00:00	-5.63	-7.79	-13.83	-0.25	4.88	4.35	7.23	3.50
23-May-2010	08:00:00	-5.78	-8.58	-13.77	-0.29	4.78	4.32	7.19	3.51
23-May-2010	20:00:00	-8.69	-11.74	-15.04	-0.77	4.46	4.12	6.98	3.33
24-May-2010	08:00:00	-6.92	-9.41	-14.56	-0.40	4.65	4.36	7.22	3.51
24-May-2010	20:00:00	-9.18	-12.10	-15.69	-0.78	4.19	4.19	7.12	3.34
25-May-2010	08:00:00	-6.45	-7.79	-14.37	-0.06	4.94	4.42	7.28	3.55
25-May-2010	20:00:00	-8.88	-10.99	-16.01	-0.50	4.61	4.31	7.19	3.57
26-May-2010	08:00:00	-8.03	-10.41	-16.03	-0.46	4.11	4.36	7.26	3.51
26-May-2010	20:00:00	-4.46	-4.43	-14.87	-0.11	4.78	4.56	7.42	3.78
27-May-2010	08:00:00	-4.85	-6.84	-15.27	-0.18	4.74	4.53	7.41	3.73
27-May-2010	20:00:00	-8.18	-10.86	-16.31	-0.68	4.29	4.29	7.21	3.53

Appendix E

2010 Gauge Data

Date	Time	Gauge Number and Water Level (inches)							
dd-mmm-yyyy	hh:mm:ss	UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
28-May-2010	08:00:00	-7.61	-10.45	-15.73	-0.69	3.71	4.27	7.17	3.45
28-May-2010	20:00:00	0.82	0.26	-9.17	1.64	6.12	5.32	8.39	4.63
29-May-2010	08:00:00	-1.25	-0.73	-11.96	0.52	5.69	4.92	7.96	4.19
29-May-2010	20:00:00	-4.22	-4.05	-12.93	0.16	5.43	4.58	7.62	3.85
30-May-2010	08:00:00	-4.69	-6.01	-13.56	0.12	5.37	4.59	7.51	3.77
30-May-2010	20:00:00	-7.92	-10.36	-15.11	-0.30	5.08	4.45	7.28	3.55
31-May-2010	08:00:00	0.16	0.24	-6.05	1.59	6.28	5.46	8.11	4.51
31-May-2010	20:00:00	-0.17	-0.48	-8.47	0.73	5.85	5.06	8.10	4.34
01-Jun-2010	08:00:00	-1.24	-1.27	-8.95	0.63	5.79	4.97	7.85	4.11
01-Jun-2010	20:00:00	-2.63	-3.28	-10.02	0.40	5.75	5.19	8.04	4.30
02-Jun-2010	08:00:00	-2.98	-5.13	-10.92	0.48	5.78	5.13	7.94	4.16
02-Jun-2010	20:00:00	-4.37	-6.59	-12.27	0.27	5.74	5.02	7.75	4.10
03-Jun-2010	08:00:00	-4.67	-7.74	-12.78	0.28	5.70	5.03	7.78	3.94
03-Jun-2010	20:00:00	-7.89	-11.30	-14.41	-0.20	5.42	4.76	7.52	3.74
04-Jun-2010	08:00:00	-7.33	-10.71	-14.17	-0.14	5.28	4.75	7.54	3.75
04-Jun-2010	20:00:00	-9.85	-13.00	-15.37	-0.59	5.09	4.63	7.39	3.61
05-Jun-2010	08:00:00	-8.88	-11.75	-15.50	-0.48	4.74	4.57	7.37	3.62
05-Jun-2010	20:00:00	-11.61	-14.57	-16.96	-1.08	3.99	4.39	7.22	3.49
06-Jun-2010	08:00:00	-10.42	-12.91	-16.91	-0.92	3.30	4.43	7.30	3.55
06-Jun-2010	20:00:00	-12.35	-14.46	-17.28	-1.21	3.00	4.30	7.30	3.47
07-Jun-2010	08:00:00	-11.27	-13.39	-16.81	-1.20	2.50	4.42	9.76	3.45
07-Jun-2010	20:00:00	-14.30	-16.79	-19.17	-1.97	2.01	4.18	7.03	3.27
08-Jun-2010	08:00:00	-13.02	-15.03	-18.88	-1.80	0.98	4.16	7.05	3.25
08-Jun-2010	20:00:00	-15.23	-17.53	-20.68	-2.42	0.29	3.99	6.90	3.09
09-Jun-2010	08:00:00	-13.88	-15.47	-19.85	-2.12	-0.15	4.06	6.93	3.07
09-Jun-2010	20:00:00	-14.45	-15.71	-20.64	-2.23	-0.36	4.04	6.88	2.91
10-Jun-2010	08:00:00	-13.08	-14.46	-20.16	-1.91	-0.29	4.10	6.91	3.10
10-Jun-2010	20:00:00	-15.45	-17.44	-22.24	-2.55	-0.57	3.93	6.76	2.97
11-Jun-2010	08:00:00	-14.09	-15.72	-21.46	-2.22	-0.80	3.94	6.81	2.97
11-Jun-2010	20:00:00	-16.08	-17.91	-23.50	-2.96	-2.07	3.77	6.67	2.82
12-Jun-2010	08:00:00	-14.68	-16.01	-23.40	-2.58	-7.76	3.81	6.64	2.85
12-Jun-2010	20:00:00	-16.61	-18.02	-25.15	-3.26	-9.38	3.65	6.53	2.80
13-Jun-2010	08:00:00	-15.14	-16.07	-24.66	-2.78	-9.90	3.70	6.51	2.81
13-Jun-2010	20:00:00	-16.17	-16.10	-24.70	-3.11	-9.67	3.59	6.56	2.66
14-Jun-2010	08:00:00	-14.75	-15.37	-24.43	-2.76	-10.30	3.63	6.49	2.66
14-Jun-2010	20:00:00	-17.50	-18.70	-27.44	-3.73	-11.04	3.42	6.34	2.49
15-Jun-2010	08:00:00	-15.99	-17.02	-27.05	-3.26	-11.55	3.45	6.28	2.49
15-Jun-2010	20:00:00	-15.96	-16.21	-26.81	-2.92	-11.05	3.54	6.32	2.59
16-Jun-2010	08:00:00	-14.63	-15.25	-26.30	-2.55	-11.37	3.63	6.41	2.54
16-Jun-2010	20:00:00	-16.49	-17.42	-28.41	-3.09	-11.82	3.46	6.31	2.42
17-Jun-2010	08:00:00	-15.00	-15.93	-27.47	-2.68	-11.82	3.51	6.27	2.46
17-Jun-2010	20:00:00	-18.15	-20.02	-29.33	-3.82	-12.52	3.22	6.08	2.15
18-Jun-2010	08:00:00	-16.85	-18.32	-29.94	-3.43	-12.79	3.19	6.04	2.15
18-Jun-2010	20:00:00	-19.18	-21.11	-30.98	-4.71	-13.75	2.95	5.81	1.90
19-Jun-2010	08:00:00	-17.83	-19.51	-31.09	-4.13	-14.01	2.94	5.76	1.85
19-Jun-2010	20:00:00	-20.09	-22.06	-31.91	-5.57	-14.98	2.69	5.53	1.69
20-Jun-2010	08:00:00	-18.76	-20.62	-32.06	-4.71	-15.24	2.72	5.56	1.59
20-Jun-2010	20:00:00	-21.16	-23.32	-32.83	-6.62	-16.33	2.40	5.31	1.29
21-Jun-2010	08:00:00	-20.02	-22.51	-32.98	-5.59	-16.51	2.41	5.24	1.26
21-Jun-2010	20:00:00	-22.18	-24.74	-33.58	-7.61	-17.61	2.01	5.00	0.91
22-Jun-2010	08:00:00	-20.85	-23.80	-33.34	-6.36	-17.47	2.12	4.99	0.85
22-Jun-2010	20:00:00	-16.30	-15.95	-31.16	-1.81	-6.82	3.82	6.32	2.42
23-Jun-2010	08:00:00	-15.37	-15.90	-30.67	-1.75	-11.25	3.78	6.40	2.48
23-Jun-2010	20:00:00	-17.94	-18.59	-31.79	-2.58	-4.58	3.58	6.26	2.34
24-Jun-2010	08:00:00	-16.68	-17.54	-31.68	-2.42	-3.70	3.57	6.23	2.27
24-Jun-2010	20:00:00	-19.64	-21.06	-33.47	-3.48	-10.28	3.23	6.03	2.07
25-Jun-2010	08:00:00	-18.45	-20.00	-32.96	-3.24	-12.22	3.24	5.99	2.02
25-Jun-2010	20:00:00	-20.22	-21.84	-33.87	-4.13	-13.16	3.06	5.86	1.89
26-Jun-2010	08:00:00	-18.95	-20.68	-33.88	-3.61	-13.47	3.10	5.88	1.87

Appendix E

2010 Gauge Data

Date	Time	Gauge Number and Water Level (inches)							
		UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
dd-mmm-yyyy	hh:mm:ss								
26-Jun-2010	20:00:00	-21.92	-23.81	-34.35	-5.13	-14.78	2.77	5.66	1.61
27-Jun-2010	08:00:00	-20.74	-22.91	-34.35	-4.58	-14.96	2.76	5.66	1.55
27-Jun-2010	20:00:00	-22.93	-25.37	-34.69	-6.33	-16.36	2.55	5.32	1.41
28-Jun-2010	08:00:00	-21.81	-24.94	-34.64	-5.40	-16.59	2.45	5.39	1.27
28-Jun-2010	20:00:00	-23.74	-26.78	-35.09	-7.50	-17.93	2.13	5.16	0.93
29-Jun-2010	08:00:00	-22.73	-26.61	-34.84	-6.40	-17.93	2.16	5.08	0.95
29-Jun-2010	20:00:00	-23.04	-28.07	-35.41	-8.71	-19.01	1.86	4.88	0.62
30-Jun-2010	08:00:00	-23.06	-28.10	-35.14	-7.40	-18.94	1.86	4.84	0.57
30-Jun-2010	20:00:00	-23.07	-29.02	-35.70	-9.17	-19.65	1.63	4.67	0.34
01-Jul-2010	08:00:00	-23.10	-28.94	-35.31	-7.85	-19.46	1.73	4.67	0.34
01-Jul-2010	20:00:00	-23.05	-29.40	-35.92	-9.94	-20.48	1.31	4.43	-0.06
02-Jul-2010	08:00:00	-23.04	-28.91	-35.64	-8.72	-20.43	1.39	4.36	-0.08
02-Jul-2010	20:00:00	-23.04	-29.43	-36.18	-10.97	-21.54	0.88	4.13	-0.50
03-Jul-2010	08:00:00	-23.05	-29.27	-35.98	-9.63	-21.64	1.01	4.10	-0.55
03-Jul-2010	20:00:00	-23.05	-29.44	-36.50	-11.84	-22.68	0.50	3.83	-0.94
04-Jul-2010	08:00:00	-23.05	-29.43	-36.32	-10.48	-22.90	0.63	3.78	-0.98
04-Jul-2010	20:00:00	-23.05	-29.33	-37.01	-12.84	-23.50	-0.09	3.50	-1.62
05-Jul-2010	08:00:00	-23.05	-29.39	-36.64	-11.39	-23.52	0.15	3.43	-1.67
05-Jul-2010	20:00:00	-23.05	-29.32	-37.22	-13.75	-23.53	-0.66	3.11	-2.68
06-Jul-2010	08:00:00	-23.05	-29.41	-37.31	-12.23	-23.56	-0.37	3.04	-2.80
06-Jul-2010	20:00:00	-23.04	-29.28	-38.06	-14.54	-23.55	-1.27	2.71	-4.40
07-Jul-2010	08:00:00	-23.04	-29.31	-38.00	-13.03	-23.43	-0.94	2.67	-4.04
07-Jul-2010	20:00:00	-23.05	-29.25	-36.75	-15.40	-23.44	-2.06	2.33	-6.17
08-Jul-2010	08:00:00	-23.05	-29.24	-36.22	-14.05	-23.44	-1.66	2.25	-5.17
08-Jul-2010	20:00:00	-23.04	-29.37	-36.21	-16.15	-23.41	-2.80	1.96	-7.26
09-Jul-2010	08:00:00	-23.06	-29.37	-36.20	-14.85	-23.33	-2.37	1.82	-5.97
09-Jul-2010	20:00:00	-23.04	-29.45	-36.22	-16.36	-23.33	-1.91	1.72	-5.97
10-Jul-2010	08:00:00	-23.06	-29.40	-36.20	-14.85	-23.30	-2.13	1.74	-5.28
10-Jul-2010	20:00:00	-23.03	-29.36	-36.21	-16.65	-23.14	-3.70	1.48	-8.23
11-Jul-2010	08:00:00	-23.06	-29.41	-36.20	-15.33	-23.16	-3.16	1.44	-6.77
11-Jul-2010	20:00:00	-23.05	-29.38	-36.19	-17.32	-23.18	-4.78	1.05	-9.33
12-Jul-2010	08:00:00	-23.05	-29.41	-36.18	-15.87	-23.14	-3.72	0.99	-7.51
12-Jul-2010	20:00:00	-23.05	-29.43	-36.19	-13.32	-23.08	-1.59	1.46	-3.97
13-Jul-2010	08:00:00	-23.04	-29.49	-35.73	-12.46	-23.08	-1.89	1.60	-4.06
13-Jul-2010	20:00:00	-23.05	-29.49	-35.59	-13.35	-23.08	-2.65	1.46	-5.75
14-Jul-2010	08:00:00	-23.06	-29.54	-35.22	-12.18	-23.09	-2.56	1.52	-5.38
14-Jul-2010	20:00:00	-23.05	-29.55	-35.62	-14.33	-23.07	-3.72	1.12	-8.06
15-Jul-2010	08:00:00	-23.05	-29.61	-35.22	-13.00	-23.08	-3.23	1.11	-6.78
15-Jul-2010	20:00:00	-23.05	-29.57	-36.00	-15.06	-23.08	-4.81	0.68	-9.46
16-Jul-2010	08:00:00	-23.04	-29.61	-35.74	-13.71	-23.09	-4.02	0.71	-7.66
16-Jul-2010	20:00:00	-23.06	-29.65	-36.16	-15.35	-23.07	-5.53	0.30	-9.90
17-Jul-2010	08:00:00	-23.05	-29.68	-36.12	-14.07	-23.07	-4.47	0.36	-8.14
17-Jul-2010	20:00:00	-20.49	-29.70	-33.98	-3.71	-16.25	1.64	2.13	-0.51
18-Jul-2010	08:00:00	-19.32	-29.73	-33.20	-3.62	-18.76	1.64	2.47	-0.70
18-Jul-2010	20:00:00	-20.38	-29.37	-33.30	-4.64	-19.34	1.14	2.48	-1.12
19-Jul-2010	08:00:00	-19.73	-28.14	-33.31	-4.60	-19.16	1.01	2.57	-1.29
19-Jul-2010	20:00:00	-20.57	-27.69	-33.30	-5.13	-19.08	0.84	2.50	-1.44
20-Jul-2010	08:00:00	-19.62	-27.05	-33.24	-4.86	-18.94	0.79	2.51	-1.53
20-Jul-2010	20:00:00	-7.39	-2.54	-26.73	0.99	5.70	4.48	5.62	1.99
21-Jul-2010	08:00:00	-8.45	-4.87	-27.48	-0.40	5.11	3.74	6.26	2.13
21-Jul-2010	20:00:00	-11.83	-11.18	-29.08	-1.38	4.25	3.36	6.15	1.96
22-Jul-2010	08:00:00	-11.57	-13.2	-29.79	-1.67	3.37	3.32	6.08	1.89
22-Jul-2010	20:00:00	-14.4	-17.65	-30.42	-2.59	1.63	3.02	5.87	1.70
23-Jul-2010	08:00:00	-13.7	-17.79	-30.68	-2.68	0.45	3.02	5.84	1.61
23-Jul-2010	20:00:00	-16.78	-20.84	-31.46	-3.77	-3.71	2.69	5.62	1.34
24-Jul-2010	08:00:00	-15.99	-20.69	-31.60	-3.74	-10.89	2.64	5.61	1.30
24-Jul-2010	20:00:00	-18.72	-23.17	-32.19	-5.15	-14.01	2.33	5.28	1.04
25-Jul-2010	08:00:00	-17.89	-23.18	-32.73	-4.95	-14.79	2.27	5.29	0.97
25-Jul-2010	20:00:00	-19.74	-24.87	-32.70	-6.38	-16.37	2.03	5.04	0.72

Appendix E

2010 Gauge Data

Date	Time	Gauge Number and Water Level (inches)							
dd-mmm-yyyy	hh:mm:ss	UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
26-Jul-2010	08:00:00	-18.92	-24.97	-32.76	-5.91	-16.80	2.00	5.01	0.69
26-Jul-2010	20:00:00	-20.25	-25.92	-33.11	-7.28	-17.77	1.74	4.90	0.53
27-Jul-2010	08:00:00	-7.02	-5.98	-27.88	-2.21	-10.84	3.13	5.81	1.53
27-Jul-2010	20:00:00	-9.49	-11.41	-29.74	-2.78	-12.73	2.97	5.67	1.35
28-Jul-2010	08:00:00	-9.44	-8.30	-29.55	-2.55	-3.92	3.48	5.71	1.72
28-Jul-2010	20:00:00	-9.4	-13.29	-29.77	-2.19	0.22	3.20	5.92	1.67
29-Jul-2010	08:00:00	-8.99	-14.16	-29.94	-2.17	0.38	3.20	5.96	1.65
29-Jul-2010	20:00:00	-12.69	-18.43	-30.99	-3.19	-2.32	2.89	5.74	1.41
30-Jul-2010	08:00:00	-11.97	-17.74	-31.27	-3.17	-7.78	2.89	5.73	1.35
30-Jul-2010	20:00:00	-15.4	-20.99	-31.57	-4.40	-13.61	2.50	5.44	1.04
31-Jul-2010	08:00:00	-14.53	-19.91	-31.73	-4.32	-14.41	2.53	5.42	1.02
31-Jul-2010	20:00:00	-14.01	-19.16	-32.22	-4.10	-14.70	2.56	5.44	1.04
01-Aug-2010	08:00:00	-12.76	-17.85	-31.87	-3.80	-14.80	2.70	5.52	1.13
01-Aug-2010	20:00:00	-12.46	-18.09	-32.00	-3.86	-15.11	2.67	5.48	1.10
02-Aug-2010	08:00:00	-11.84	-17.54	-32.3	-3.66	-15.03	2.72	5.56	1.13
02-Aug-2010	20:00:00	-11.82	-17.68	-32.06	-3.70	-15.14	2.71	5.56	1.15
03-Aug-2010	08:00:00	-11.19	-17.07	-31.95	-3.50	-15.01	2.78	5.56	1.16
03-Aug-2010	20:00:00	-14.02	-19.69	-32.63	-4.66	-15.74	2.51	5.39	0.92
04-Aug-2010	08:00:00	-13.12	-18.34	-32.22	-4.41	-15.80	2.53	5.38	0.99
04-Aug-2010	20:00:00	-15.31	-20.39	-32.73	-5.46	-16.56	2.31	5.23	0.79
05-Aug-2010	08:00:00	-14.32	-19.16	-32.34	-5.08	-16.65	2.27	5.23	0.76
05-Aug-2010	20:00:00	-4.51	-4.93	-27.78	-3.03	-11.23	2.93	5.64	1.20
06-Aug-2010	08:00:00	-5.65	-7.48	-28.86	-2.90	-14.34	2.96	5.69	1.26
06-Aug-2010	20:00:00	-8.91	-12.62	-29.63	-3.72	-15.02	2.78	5.53	1.10
07-Aug-2010	08:00:00	-8.64	-13.63	-29.94	-3.58	-14.97	2.78	5.52	1.07
07-Aug-2010	20:00:00	-11.56	-17.10	-30.62	-4.81	-15.95	2.45	5.29	0.86
08-Aug-2010	08:00:00	-10.86	-16.42	-30.93	-4.64	-15.99	2.46	5.24	1.12
08-Aug-2010	20:00:00	-13.67	-19.36	-31.51	-6.16	-17.09	2.11	5.02	0.65
09-Aug-2010	08:00:00	-12.81	-18.16	-31.66	-5.71	-17.28	2.11	4.96	0.73
09-Aug-2010	20:00:00	-15.03	-20.40	-32.12	-7.18	-18.28	1.81	4.78	0.20
10-Aug-2010	08:00:00	-14.08	-19.45	-32.18	-6.56	-18.39	1.75	4.74	0.46
10-Aug-2010	20:00:00	-16.88	-22.32	-32.58	-8.78	-19.44	1.36	4.42	-0.23
11-Aug-2010	08:00:00	-15.82	-21.56	-32.64	-7.79	-19.52	1.41	4.40	-0.10
11-Aug-2010	20:00:00	-18.21	-23.75	-33.23	-9.84	-20.50	0.97	4.15	-0.73
12-Aug-2010	08:00:00	-17.16	-23.16	-32.78	-8.74	-20.59	1.09	4.12	-0.72
12-Aug-2010	20:00:00	-19.2	-25.12	-33.31	-10.78	-21.82	0.54	3.85	-1.14
13-Aug-2010	08:00:00	-18.2	-24.93	-33.61	-9.74	-22.1	0.67	3.82	-1.22
13-Aug-2010	20:00:00	-20.4	-26.68	-33.69	-12.17	-23.14	-0.02	3.56	-1.79
14-Aug-2010	08:00:00	1.24	-2.91	-3.40	0.58	6.14	5.16	8.54	4.10
14-Aug-2010	20:00:00	1.38	-2.30	1.44	0.63	6.21	4.86	8.10	3.41
15-Aug-2010	08:00:00	1.04	-2.71	0.71	0.58	6.18	4.74	7.90	3.30
15-Aug-2010	20:00:00	-1.16	2.29	3.91	0.06	6.12	4.50	7.52	2.86
16-Aug-2010	08:00:00	0.65	-2.90	0.30	0.47	6.02	4.46	7.43	2.72
16-Aug-2010	20:00:00	-1.11	-2.02	1.00	0.03	6.37	4.93	7.21	3.13
17-Aug-2010	08:00:00	0.23	-3.06	-0.73	0.62	6.22	4.77	7.69	2.99
17-Aug-2010	20:00:00	-1.00	-3.83	-3.63	0.38	6.25	4.56	7.58	2.81
18-Aug-2010	08:00:00	-1.38	-4.61	-6.45	0.43	6.29	4.57	7.52	2.79
18-Aug-2010	20:00:00	-0.53	-3.73	-4.76	0.39	6.26	4.70	7.57	2.94
19-Aug-2010	08:00:00	-0.12	-3.08	-3.42	0.57	6.42	4.90	7.75	3.16
19-Aug-2010	20:00:00	2.08	-2.46	0.89	1.28	6.73	5.08	8.03	3.47
20-Aug-2010	08:00:00	0.78	-3.03	-1.91	0.72	6.48	4.91	7.90	3.35
20-Aug-2010	20:00:00	-1.68	-4.59	-7.00	0.17	5.89	4.59	7.66	3.14
21-Aug-2010	08:00:00	-1.98	-5.65	-9.61	0.04	5.71	4.62	7.65	3.13
21-Aug-2010	20:00:00	-0.79	-4.13	-7.67	0.31	5.87	4.73	7.82	3.22
22-Aug-2010	08:00:00	-1.84	-5.65	-9.54	0.19	5.80	4.72	7.81	3.26
22-Aug-2010	20:00:00	-4.77	-9.79	-10.42	-0.45	5.33	4.43	7.60	3.04
23-Aug-2010	08:00:00	-4.96	-10.61	-11.03	-0.58	5.03	3.97	7.55	3.05
23-Aug-2010	20:00:00	-7.67	-14.04	-12.32	-1.22	4.39	4.19	7.33	2.82
24-Aug-2010	08:00:00	-7.44	-13.80	-11.92	-1.30	3.91	4.14	7.29	2.79

Appendix E

2010 Gauge Data

Date	Time	Gauge Number and Water Level (inches)							
dd-mmm-yyyy	hh:mm:ss	UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
24-Aug-2010	20:00:00	-9.20	-15.84	-13.62	-1.77	3.38	3.93	7.16	2.62
25-Aug-2010	08:00:00	-6.42	-11.94	-12.62	-1.43	3.30	4.00	7.20	2.61
25-Aug-2010	20:00:00	-8.26	-14.70	-13.89	-1.87	3.03	3.82	7.00	2.48
26-Aug-2010	08:00:00	-7.80	-14.29	-14.15	-1.79	2.51	3.82	6.99	2.47
26-Aug-2010	20:00:00	-10.17	-16.71	-15.50	-2.41	1.74	3.60	6.82	2.27
27-Aug-2010	08:00:00	-9.48	-15.59	-15.46	-2.24	0.87	3.60	6.80	2.22
27-Aug-2010	20:00:00	-11.19	-17.42	-16.61	-2.88	0.43	3.37	6.59	2.01
28-Aug-2010	08:00:00	-6.17	-10.78	-14.52	-1.76	0.61	3.49	6.65	2.10
28-Aug-2010	20:00:00	-8.19	-14.04	-15.55	-2.13	0.20	3.35	6.54	1.97
29-Aug-2010	08:00:00	-7.68	-13.92	-15.56	-2.01	-0.04	3.35	6.49	1.92
29-Aug-2010	20:00:00	-9.50	-15.78	-16.63	-2.53	-0.63	3.14	6.35	1.74
30-Aug-2010	08:00:00	-8.83	-14.93	-16.52	-2.40	-1.31	3.17	6.32	1.71
30-Aug-2010	20:00:00	-11.27	-17.51	-17.86	-3.16	-5.76	2.92	6.08	1.49
31-Aug-2010	08:00:00	-10.56	-16.25	-17.70	-3.00	-10.37	2.90	6.06	1.43
31-Aug-2010	20:00:00	-12.81	-18.60	-19.22	-3.82	-11.88	2.66	5.82	1.23
01-Sep-2010	08:00:00	-11.94	-17.12	-18.76	-3.62	-12.58	2.65	5.81	1.15
01-Sep-2010	20:00:00	-14.10	-19.63	-20.51	-4.58	-13.59	2.39	5.56	0.96
02-Sep-2010	08:00:00	-13.10	-18.09	-20.19	-4.23	-13.91	2.42	5.58	0.89
02-Sep-2010	20:00:00	-15.17	-20.28	-21.95	-5.43	-14.70	2.15	5.32	0.68
03-Sep-2010	08:00:00	-14.07	-18.93	-21.34	-4.91	-14.97	2.16	5.29	0.68
03-Sep-2010	20:00:00	-16.11	-21.25	-23.51	-6.26	-15.93	1.91	5.07	0.43
04-Sep-2010	08:00:00	-15.45	-20.81	-23.68	-5.88	-16.27	1.83	5.03	0.33
04-Sep-2010	20:00:00	-17.38	-22.64	-25.88	-7.43	-17.26	1.50	4.71	-0.02
05-Sep-2010	08:00:00	-16.41	-21.90	-25.80	-6.79	-17.48	1.54	4.63	-0.09
05-Sep-2010	20:00:00	-17.92	-23.41	-27.60	-8.10	-18.12	1.16	4.39	-0.41
06-Sep-2010	08:00:00	-16.89	-22.75	-27.50	-7.40	-18.25	1.24	4.36	-0.48
06-Sep-2010	20:00:00	-18.46	-24.20	-29.09	-8.78	-18.83	0.81	4.10	-0.84
07-Sep-2010	08:00:00	-17.33	-23.36	-29.37	-7.91	-18.87	0.92	4.07	-0.88
07-Sep-2010	20:00:00	-18.97	-24.65	-30.39	-9.40	-19.42	0.47	3.85	-1.24
08-Sep-2010	08:00:00	-17.72	-23.71	-29.97	-8.38	-19.39	0.69	3.82	-1.25
08-Sep-2010	20:00:00	-16.87	-22.62	-29.75	-7.84	-19.08	0.76	3.89	-1.19
09-Sep-2010	08:00:00	-15.93	-21.59	-29.51	-7.40	-19.04	0.80	3.85	-1.18
09-Sep-2010	20:00:00	-17.86	-23.00	-30.42	-9.09	-19.57	0.34	3.67	-1.57
10-Sep-2010	08:00:00	-16.75	-22.18	-30.50	-8.13	-19.55	0.51	3.63	-1.59
10-Sep-2010	20:00:00	-18.31	-23.71	-31.02	-9.54	-20.22	0.05	3.45	-1.98
11-Sep-2010	08:00:00	-17.14	-22.76	-31.05	-8.67	-20.16	0.24	3.38	-1.91
11-Sep-2010	20:00:00	-15.76	-21.21	-30.90	-7.73	-19.70	0.48	3.57	-1.68
12-Sep-2010	08:00:00	-13.17	-17.90	-29.22	-5.07	-17.61	1.23	3.91	-0.99
12-Sep-2010	20:00:00	-15.23	-19.86	-30.25	-6.61	-18.54	0.65	3.73	-1.44
13-Sep-2010	08:00:00	-14.15	-18.91	-30.35	-6.19	-18.47	0.72	3.68	-1.48
13-Sep-2010	20:00:00	-15.98	-20.64	-31.16	-7.49	-19.02	0.18	3.46	-1.95
14-Sep-2010	08:00:00	-14.87	-19.80	-31.24	-6.85	-18.96	0.36	3.37	-2.00
14-Sep-2010	20:00:00	-17.00	-21.80	-31.80	-8.39	-19.63	-0.28	3.16	-2.56
15-Sep-2010	08:00:00	-15.93	-20.78	-31.95	-7.65	-19.65	-0.04	3.13	-2.55
15-Sep-2010	20:00:00	-17.82	-22.56	-32.25	-9.21	-20.24	-0.71	2.88	-3.37
16-Sep-2010	08:00:00	-16.71	-21.54	-32.32	-8.29	-20.23	-0.34	2.87	-3.32
16-Sep-2010	20:00:00	-18.61	-23.18	-32.49	-10.06	-21.12	-1.04	2.65	-4.51
17-Sep-2010	08:00:00	-17.6	-22.41	-32.49	-8.94	-21.09	-0.65	2.65	-4.01
17-Sep-2010	20:00:00	-18.95	-23.63	-32.62	-10.36	-21.67	-1.29	2.41	-5.15
18-Sep-2010	08:00:00	-17.87	-22.89	-32.65	-9.46	-21.86	-1.04	2.36	-4.68
18-Sep-2010	20:00:00	-19.32	-24.38	-32.88	-10.83	-22.62	-1.83	2.15	-6.13
19-Sep-2010	08:00:00	-18.23	-23.68	-32.88	-9.92	-22.79	-1.51	2.06	-5.37
19-Sep-2010	20:00:00	-19.82	-24.97	-33.09	-11.5	-23.22	-2.41	1.78	-7.03
20-Sep-2010	08:00:00	-18.73	-24.44	-33.08	-10.47	-23.09	-2	1.74	-6.01
20-Sep-2010	20:00:00	-20.5	-25.89	-33.27	-12.23	-23.04	-3.13	1.44	-7.96
21-Sep-2010	08:00:00	-19.5	-25.59	-33.2	-11.16	-23.02	-2.63	1.33	-6.71
21-Sep-2010	20:00:00	-20.89	-26.72	-33.41	-12.53	-22.98	-3.79	1.11	-8.57
22-Sep-2010	08:00:00	-19.81	-26.42	-33.45	-11.49	-23.03	-3.13	1.01	-7.17
22-Sep-2010	20:00:00	-21.09	-27.28	-33.6	-12.81	-23.03	-4.34	0.73	-8.98

Appendix E

2010 Gauge Data

Date	Time	Gauge Number and Water Level (inches)							
dd-mmm-yyyy	hh:mm:ss	UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
23-Sep-2010	08:00:00	-20.03	-26.91	-33.63	-11.75	-23.03	-3.66	0.65	-7.63
23-Sep-2010	20:00:00	-21.54	-27.94	-33.8	-13.22	-23.04	-5.13	0.29	-9.67
24-Sep-2010	08:00:00	-20.41	-27.68	-33.76	-12.07	-23.05	-4.23	0.22	-8.22
24-Sep-2010	20:00:00	-22.05	-28.65	-33.96	-13.85	-23.10	-6.23	-0.23	-10.71
25-Sep-2010	08:00:00	-21.00	-28.45	-34.29	-12.58	-23.15	-5.05	-0.31	-9.05
25-Sep-2010	20:00:00	-22.37	-29.19	-34.14	-14.23	-23.16	-6.68	-0.75	-11.01
26-Sep-2010	08:00:00	-20.91	-18.94	-31.74	-9.13	-11.53	2.02	0.63	-1.60
26-Sep-2010	20:00:00	-9.60	-11.84	-29.90	-2.41	-17.31	1.74	1.90	-0.88
27-Sep-2010	08:00:00	-3.34	-4.42	-26.65	-0.72	-8.46	2.46	2.92	-0.45
27-Sep-2010	20:00:00	-3.59	-5.39	-24.69	-0.76	-0.67	2.51	3.52	-0.47
28-Sep-2010	08:00:00	-0.43	-2.39	-16.78	0.04	4.75	3.39	4.83	0.25
28-Sep-2010	20:00:00	-2.86	-3.49	-18.53	-0.61	4.36	3.00	4.88	0.20
29-Sep-2010	08:00:00	-3.61	-5.27	-19.15	-0.86	3.92	2.86	4.97	0.27
29-Sep-2010	20:00:00	-3.45	-5.16	-18.22	-0.77	3.60	3.00	5.14	0.45
30-Sep-2010	08:00:00	-0.90	-2.83	-16.12	0.02	4.92	3.32	5.66	0.97
30-Sep-2010	20:00:00	-3.36	-6.01	-18.01	-0.54	4.46	3.02	5.60	0.84
01-Oct-2010	08:00:00	-4.03	-7.93	-18.24	-0.84	3.78	2.94	5.64	0.88
01-Oct-2010	20:00:00	-6.50	-11.44	-19.64	-1.51	2.68	2.71	5.44	0.74
02-Oct-2010	08:00:00	-6.63	-12.04	-20.06	-1.74	1.58	2.65	5.46	0.71
02-Oct-2010	20:00:00	-7.92	-13.47	-20.56	-2.13	0.86	2.49	5.31	0.53
03-Oct-2010	08:00:00	-7.65	-13.31	-20.39	-2.23	0.26	2.46	5.27	0.51
03-Oct-2010	20:00:00	-8.56	-14.44	-20.99	-2.47	0.17	2.39	5.20	0.44
04-Oct-2010	08:00:00	-8.45	-14.00	-20.92	-2.54	-0.01	2.38	5.20	0.46
04-Oct-2010	20:00:00	-9.88	-15.58	-21.81	-2.94	-0.62	2.22	5.06	0.31
05-Oct-2010	08:00:00	-9.33	-14.78	-21.66	-2.99	-3.32	2.18	5.03	0.22
05-Oct-2010	20:00:00	-10.44	-15.96	-22.40	-3.30	-11.12	2.05	4.91	0.08
06-Oct-2010	08:00:00	-9.78	-14.84	-22.08	-3.25	-14.39	2.04	4.90	0.08
06-Oct-2010	20:00:00	-11.23	-16.47	-23.26	-3.65	-15.69	1.83	4.72	-0.08
07-Oct-2010	08:00:00	-10.77	-15.49	-23.17	-3.70	-16.05	1.84	4.65	0.30
07-Oct-2010	20:00:00	-12.26	-17.06	-24.36	-4.19	-16.74	1.61	4.50	0.08
08-Oct-2010	08:00:00	-11.59	-15.81	-24.21	-4.17	-16.99	1.62	4.47	-0.04
08-Oct-2010	20:00:00	-12.76	-17.05	-25.09	-4.56	-17.44	1.41	4.34	-0.59
09-Oct-2010	08:00:00	-11.96	-15.92	-24.89	-4.49	-17.73	1.41	4.32	-0.24
09-Oct-2010	20:00:00	-13.24	-17.20	-25.97	-4.94	-18.10	1.19	4.14	-0.77
10-Oct-2010	08:00:00	-12.34	-16.11	-25.75	-4.81	-18.24	1.25	4.14	-0.48
10-Oct-2010	20:00:00	-13.65	-17.29	-26.82	-5.27	-18.58	0.98	3.98	-1.18
11-Oct-2010	08:00:00	-12.66	-16.23	-26.58	-5.11	-18.72	1.06	3.96	-1.12
11-Oct-2010	20:00:00	-13.93	-17.58	-27.59	-5.64	-19.07	0.76	3.83	-1.51
12-Oct-2010	08:00:00	-12.93	-16.66	-27.44	-5.43	-19.15	0.84	3.81	-1.40
12-Oct-2010	20:00:00	-13.81	-17.69	-28.12	-5.82	-19.45	0.67	3.69	-1.16
13-Oct-2010	08:00:00	-12.49	-16.29	-27.64	-5.27	-19.27	0.88	3.78	-1.02
13-Oct-2010	20:00:00	-12.98	-16.71	-28.06	-5.66	-19.42	0.97	3.65	-1.23
14-Oct-2010	08:00:00	-11.53	-15.24	-27.37	-5.05	-19.16	0.94	3.61	-1.55
14-Oct-2010	20:00:00	-12.61	-16.47	-28.23	-5.65	-19.44	0.63	3.69	-1.67
15-Oct-2010	08:00:00	-11.77	-15.46	-28.03	-5.41	-19.42	0.75	3.71	-1.78
15-Oct-2010	20:00:00	-12.92	-17.06	-28.85	-5.97	-19.76	0.34	3.47	-1.56
16-Oct-2010	08:00:00	-12.34	-16.00	-28.81	-5.84	-19.80	0.47	3.45	-1.57
16-Oct-2010	20:00:00	-13.32	-17.39	-29.28	-6.20	-19.95	0.19	3.27	-2.24
17-Oct-2010	08:00:00	-12.56	-16.49	-29.19	-6.02	-19.99	0.31	3.28	-1.87
17-Oct-2010	20:00:00	-13.54	-17.39	-29.65	-6.34	-20.20	-0.04	3.14	-2.68
18-Oct-2010	08:00:00	-12.69	-16.45	-29.54	-6.11	-20.20	0.14	3.09	-2.64
18-Oct-2010	20:00:00	-13.14	-16.71	-29.77	-6.25	-20.38	-0.08	3.05	-2.79
19-Oct-2010	08:00:00	-12.25	-15.84	-29.66	-5.99	-20.35	0.06	3.04	-2.79
19-Oct-2010	20:00:00	-13.19	-16.83	-29.90	-6.28	-20.49	-0.27	2.93	-3.05
20-Oct-2010	08:00:00	-11.39	-14.07	-29.19	-4.33	-19.84	1.08	3.13	-2.27
20-Oct-2010	20:00:00	-10.35	-13.77	-28.12	-4.45	-19.71	0.44	3.24	-2.23

Appendix E

2010 Gauge Data

Date	Time	Gauge Number and Water Level (inches)							
dd-mmm-yyyy	hh:mm:ss	UT1 - 01	UT1 - 02	UT1 - 03	UT5 - 01	UT5 - 02	UT6 - 01	UT6 - 02	UT6 - 03
21-Oct-2010	08:00:00	-9.69	-13.61	-27.75	-4.47	-19.66	0.43	3.23	-2.13
21-Oct-2010	20:00:00	-10.56	-14.77	-28.32	-4.63	-19.75	0.13	3.10	-2.50
22-Oct-2010	08:00:00	-10.17	-14.36	-28.40	-4.67	-19.78	0.22	3.07	-2.28
22-Oct-2010	20:00:00	-11.17	-15.31	-29.03	-4.86	-19.58	-0.11	2.92	-2.57
23-Oct-2010	08:00:00	-10.69	-14.48	-28.89	-4.79	-18.95	0.06	2.92	-2.48
23-Oct-2010	20:00:00	-10.99	-15.52	-29.14	-4.73	-19.15	-0.22	2.78	-3.29
24-Oct-2010	08:00:00	-10.37	-14.73	-28.85	-4.57	-19.02	-0.06	2.83	-3.23
24-Oct-2010	20:00:00	-10.60	-15.28	-28.99	-4.46	-20.20	-0.35	2.69	-3.63
25-Oct-2010	08:00:00	-9.54	-13.75	-28.22	-3.89	-19.74	1.49	2.75	-2.66
25-Oct-2010	20:00:00	-6.82	-10.16	-25.14	-2.27	-16.59	1.37	3.51	-1.40
26-Oct-2010	08:00:00	-6.61	-10.75	-24.48	-2.08	-16.12	1.51	3.60	-1.35
26-Oct-2010	20:00:00	-2.45	3.00	-1.33	-0.55	5.58	4.66	4.12	1.32
27-Oct-2010	08:00:00	1.53	-1.03	-5.62	0.82	5.98	4.37	7.32	2.57
27-Oct-2010	20:00:00	0.85	-1.36	-7.98	0.40	5.87	4.45	7.66	2.84
28-Oct-2010	08:00:00	-0.16	-1.98	-10.79	0.11	5.82	4.29	7.50	2.59
28-Oct-2010	20:00:00	-0.95	-2.81	-11.79	-0.13	5.55	4.10	7.27	2.45
29-Oct-2010	08:00:00	-1.79	-4.25	-12.93	-0.42	5.42	3.95	7.18	2.25
29-Oct-2010	20:00:00	-2.68	-6.06	-13.75	-0.63	5.28	3.82	6.97	2.09
30-Oct-2010	08:00:00	-3.55	-7.10	-14.26	-0.80	5.16	3.79	6.92	1.98
30-Oct-2010	20:00:00	-4.10	-8.17	-14.50	-0.85	4.87	3.71	6.84	2.10
31-Oct-2010	08:00:00	-4.67	-8.97	-15.18	-0.98	4.71	3.67	6.77	2.02
31-Oct-2010	20:00:00	-5.04	-9.51	-15.16	-1.05	4.55	3.55	6.66	1.88
01-Nov-2010	08:00:00	-5.56	-9.94	-16.07	-1.22	4.30	3.51	6.61	1.78
01-Nov-2010	20:00:00	-5.82	-10.74	-16.34	-1.27	3.49	3.44	6.57	1.70
02-Nov-2010	08:00:00	-6.15	-10.60	-16.49	-1.39	3.40	3.44	6.50	1.66
02-Nov-2010	20:00:00	-6.34	-11.59	-16.69	-1.39	3.15	3.35	6.49	1.65
03-Nov-2010	08:00:00	-6.51	-11.52	-16.79	-1.43	2.70	3.35	6.48	1.71
03-Nov-2010	20:00:00	-6.46	-11.44	-16.87	-1.41	2.40	3.35	6.48	1.78
04-Nov-2010	08:00:00	-4.24	-7.83	-15.67	-0.73	2.80	3.63	6.69	2.10
04-Nov-2010	20:00:00	-3.92	-7.98	-15.87	-0.65	4.01	3.63	6.81	2.13
05-Nov-2010	08:00:00	-4.54	-9.16	-16.33	-0.78	3.89	3.61	6.72	2.04
05-Nov-2010	20:00:00	-5.06	-9.80	-16.66	-0.87	3.95	3.47	6.61	1.86
06-Nov-2010	08:00:00	-5.42	-10.15	-16.80	-0.92	3.77	3.44	6.60	1.76
06-Nov-2010	20:00:00	-5.70	-10.69	-16.96	-0.95	3.51	3.38	6.53	1.68
07-Nov-2010	08:00:00	-5.92	-10.73	-17.06	-1.02	3.04	3.36	6.53	1.63
07-Nov-2010	20:00:00	-5.82	-11.19	-17.06	-0.96	2.13	3.33	6.50	1.73
08-Nov-2010	08:00:00	-5.91	-11.07	-17.06	-0.96	1.54	3.35	6.49	1.76
08-Nov-2010	20:00:00	-5.88	-11.36	-17.13	-0.94	1.70	3.28	6.43	1.69
09-Nov-2010	08:00:00	-5.98	-11.05	-17.23	-0.95	1.43	3.27	6.42	1.66
09-Nov-2010	20:00:00	-6.09	-11.38	-17.36	-0.96	1.52	3.18	6.32	1.55
10-Nov-2010	08:00:00	-6.33	-10.7	-17.42	-1.04	1.59	3.21	6.34	1.47
10-Nov-2010	20:00:00	-6.43	-10.77	-17.55	-1.06	1.02	3.13	6.25	1.39
11-Nov-2010	08:00:00	-6.72	-10.63	-17.66	-1.16	-0.07	3.13	6.23	1.40
11-Nov-2010	20:00:00	-6.80	-10.69	-17.73	-1.17	-0.02	3.09	6.20	1.34
12-Nov-2010	08:00:00	-7.02	-10.46	-17.74	-1.24	-0.26	3.12	6.19	1.40
12-Nov-2010	20:00:00	-7.01	-11.09	-17.77	-1.22	-0.36	3.06	6.15	1.36
13-Nov-2010	08:00:00	-7.16	-10.95	-17.78	-1.26	-0.83	3.09	6.17	1.35
13-Nov-2010	20:00:00	-7.07	-11.29	-17.79	-1.21	-0.70	3.06	6.17	1.37
14-Nov-2010	08:00:00	-7.24	-11.40	-17.84	-1.24	-1.51	3.06	6.15	1.36
14-Nov-2010	20:00:00	-7.07	-10.90	-17.80	-1.20	-1.41	3.01	6.13	1.37
15-Nov-2010	08:00:00	-7.11	-10.39	-17.80	-1.23	-2.02	3.06	6.13	1.36
15-Nov-2010	20:00:00	-4.62	-6.79	-16.46	-0.47	0.16	3.37	6.43	1.57
16-Nov-2010	08:00:00	-4.12	-5.70	-15.89	-0.36	1.87	3.64	6.52	1.78
16-Nov-2010	20:00:00	1.40	-0.65	-10.39	1.16	5.68	4.68	7.64	3.03
17-Nov-2010	08:00:00	-0.62	-0.67	-13.53	0.20	5.55	4.33	7.56	2.72

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Bridgewater Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-Jan-2010							0.12
2-Jan-2010							
3-Jan-2010							
4-Jan-2010							
5-Jan-2010							
6-Jan-2010							
7-Jan-2010							
8-Jan-2010							
9-Jan-2010							
10-Jan-2010							
11-Jan-2010							
12-Jan-2010							
13-Jan-2010							
14-Jan-2010							
15-Jan-2010							
16-Jan-2010				*	*	0.10	
17-Jan-2010				*	*	1.62	1.53
18-Jan-2010				*	*	0.01	0.04
19-Jan-2010							
20-Jan-2010				*	*	0.01	
21-Jan-2010				*	*	0.53	0.01
22-Jan-2010				*	*	0.02	0.42
23-Jan-2010				*	*	0.01	
24-Jan-2010				*	*	3.65	0.15
25-Jan-2010	>4.00	3.50	>4.00	*	*	0.16	3.26
26-Jan-2010							
27-Jan-2010							
28-Jan-2010							
29-Jan-2010							
30-Jan-2010							
31-Jan-2010				*	*	0.32	

*Rain gauges malfunctioned and no data was recorded during rain events documented for UT6.

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Bridgewater Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-Feb-2010							0.41
2-Feb-2010				*	*	0.57	0.18
3-Feb-2010							0.48
4-Feb-2010							
5-Feb-2010				*	*	1.89	
6-Feb-2010				*	*	0.46	1.88
7-Feb-2010				*	*	0.03	0.24
8-Feb-2010							
9-Feb-2010				*	*	0.03	
10-Feb-2010							0.02
11-Feb-2010							
12-Feb-2010							
13-Feb-2010				*	*	0.24	
14-Feb-2010				*	*	0.01	0.14
15-Feb-2010				*	*	0.04	0.01
16-Feb-2010							0.04
17-Feb-2010							
18-Feb-2010							
19-Feb-2010							
20-Feb-2010							
21-Feb-2010							
22-Feb-2010				*	0.30	0.32	0.20
23-Feb-2010							0.06
24-Feb-2010				*	0.05	0.05	
25-Feb-2010							0.02
26-Feb-2010							
27-Feb-2010							
28-Feb-2010							

*Rain gauges malfunctioned and no data was recorded during rain events documented for UT6.

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Bridgewater Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-Mar-2010							
2-Mar-2010				*	0.11	0.11	
3-Mar-2010				*	0.16	0.16	0.13
4-Mar-2010							
5-Mar-2010							
6-Mar-2010							
7-Mar-2010							
8-Mar-2010							
9-Mar-2010							
10-Mar-2010				*	0.01		0.01
11-Mar-2010				*	0.43	0.45	
12-Mar-2010				*	0.61	0.52	0.41
13-Mar-2010				*	0.15	0.22	0.67
14-Mar-2010				*			0.01
15-Mar-2010							
16-Mar-2010							
17-Mar-2010							
18-Mar-2010							
19-Mar-2010							
20-Mar-2010							
21-Mar-2010				*	0.60	0.59	
22-Mar-2010				*	0.20	0.20	1.08
23-Mar-2010				*			0.01
24-Mar-2010							
25-Mar-2010				*	0.05	0.04	
26-Mar-2010							0.04
27-Mar-2010							
28-Mar-2010				*	0.75	0.76	
29-Mar-2010				*	0.03	0.02	0.85
30-Mar-2010							0.01
31-Mar-2010							

*Rain gauge malfunctioned and no data was recorded during rain events documented for UT 5 and UT6.

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Bridgewater Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-Apr-2010							
2-Apr-2010							
3-Apr-2010							
4-Apr-2010							
5-Apr-2010							
6-Apr-2010							
7-Apr-2010							
8-Apr-2010				*	0.56	0.57	
9-Apr-2010							0.68
10-Apr-2010							
11-Apr-2010							
12-Apr-2010							
13-Apr-2010							
14-Apr-2010							
15-Apr-2010							
16-Apr-2010							
17-Apr-2010							
18-Apr-2010							
19-Apr-2010							
20-Apr-2010				*	0.07	0.08	
21-Apr-2010				*	0.01	0.02	0.11
22-Apr-2010							
23-Apr-2010				*	*	0.01	
24-Apr-2010				0.44	*	0.51	
25-Apr-2010				0.41	*	0.43	0.80
26-Apr-2010							0.01
27-Apr-2010				0.06	*	0.08	
28-Apr-2010							0.09
29-Apr-2010							
30-Apr-2010							

*Rain gauges malfunctioned and no data was recorded during rain events documented for UT6.

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Bridgewater Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-May-2010				0.03	*	0.05	
2-May-2010				0.01	*		0.01
3-May-2010				0.71	*	0.81	0.17
4-May-2010				0.01	*		0.24
5-May-2010							
6-May-2010							
7-May-2010				0.01	*		
8-May-2010							
9-May-2010							
10-May-2010				0.01	*	0.01	
11-May-2010				0.14	*	0.14	
12-May-2010							0.16
13-May-2010							
14-May-2010				0.13	*	0.20	
15-May-2010					*	0.01	0.20
16-May-2010				0.78	*	0.82	0.40
17-May-2010				0.94	*	0.68	0.49
18-May-2010				0.01	*	0.16	0.30
19-May-2010					*	0.01	
20-May-2010							
21-May-2010				0.33	0.33	0.32	
22-May-2010				0.05	0.04	0.04	0.33
23-May-2010				0.10	0.13	0.17	0.07
24-May-2010				0.06	0.04	0.02	0.02
25-May-2010				0.13	0.22	0.14	0.27
26-May-2010				0.35	0.24	0.31	0.01
27-May-2010				0.01			0.04
28-May-2010				0.76	1.29	1.11	0.88
29-May-2010							0.01
30-May-2010							0.01
31-May-2010				0.92	1.13	0.91	1.67

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Bridgewater Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-Jun-2010				0.09	0.07	0.54	
2-Jun-2010				0.08	0.05	0.08	0.14
3-Jun-2010							0.28
4-Jun-2010							
5-Jun-2010							
6-Jun-2010				0.06	0.06	0.10	0.04
7-Jun-2010					*	0.01	
8-Jun-2010				0.01	*		
9-Jun-2010							
10-Jun-2010				0.01	*	0.02	
11-Jun-2010							0.03
12-Jun-2010							
13-Jun-2010				0.14	*	0.05	0.01
14-Jun-2010							
15-Jun-2010				0.12	*	0.10	0.57
16-Jun-2010				0.02	*	0.03	
17-Jun-2010							
18-Jun-2010							
19-Jun-2010							
20-Jun-2010							
21-Jun-2010				0.05	*		
22-Jun-2010				0.47	*	0.80	
23-Jun-2010				0.02	*	0.05	
24-Jun-2010							
25-Jun-2010							
26-Jun-2010							
27-Jun-2010							0.02
28-Jun-2010							0.02
29-Jun-2010				0.02	*		
30-Jun-2010							

*Rain gauge malfunctioned and no data was recorded during rain events documented for UT 1 and UT6.

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Bridgewater Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-Jul-2010							
2-Jul-2010							
3-Jul-2010							
4-Jul-2010							
5-Jul-2010							
6-Jul-2010							
7-Jul-2010							
8-Jul-2010							
9-Jul-2010				0.10	*	0.09	0.06
10-Jul-2010					*	0.01	0.01
11-Jul-2010							
12-Jul-2010				0.41	*	0.25	0.42
13-Jul-2010				0.03			0.10
14-Jul-2010					*	0.01	
15-Jul-2010							
16-Jul-2010				0.05	*	0.01	2.02
17-Jul-2010				0.76	*	1.10	
18-Jul-2010				0.03	*	0.01	0.15
19-Jul-2010				0.09	*	0.08	0.07
20-Jul-2010				1.33	*	1.92	0.35
21-Jul-2010				*	0.06	0.01	0.01
22-Jul-2010							
23-Jul-2010							
24-Jul-2010							
25-Jul-2010						0.01	
26-Jul-2010				*	0.68	0.67	1.94
27-Jul-2010				*	0.01		0.11
28-Jul-2010				*	0.26	0.32	0.19
29-Jul-2010							
30-Jul-2010							0.14
31-Jul-2010				*	0.07	0.1	

*Rain gauges malfunctioned and no data was recorded during rain events documented for UT6.

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Bridgewater Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-Aug-2010				*	0.01		
2-Aug-2010				*	0.01	0.02	
3-Aug-2010				*	0.01		
4-Aug-2010							
5-Aug-2010				*	0.43	0.38	1.64
6-Aug-2010				*	0.01		
7-Aug-2010							
8-Aug-2010							
9-Aug-2010							
10-Aug-2010							
11-Aug-2010							
12-Aug-2010							
13-Aug-2010					0.05	0.03	
14-Aug-2010				4.51	4.52	4.02	1.60
15-Aug-2010				0.45	0.43	0.17	0.23
16-Aug-2010				1.43	0.43	0.47	0.05
17-Aug-2010				0.49	0.15	0.07	0.48
18-Aug-2010				0.23	0.16	0.26	
19-Aug-2010				0.85	0.73	0.50	1.46
20-Aug-2010				0.01	0.01		0.25
21-Aug-2010				0.20	0.15	0.17	
22-Aug-2010				0.01			0.01
23-Aug-2010							
24-Aug-2010							
25-Aug-2010				0.20	0.08	0.02	
26-Aug-2010							
27-Aug-2010				0.32	0.17	0.02	0.33
28-Aug-2010					0.02	0.01	
29-Aug-2010						0.01	
30-Aug-2010				0.01			
31-Aug-2010							

*Rain gauge malfunctioned and no data was recorded during rain events documented for UT 5 and UT6.

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Bridgewater Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-Sep-2010				0.01		0.01	
2-Sep-2010							
3-Sep-2010							
4-Sep-2010							
5-Sep-2010							
6-Sep-2010							
7-Sep-2010				0.04		0.01	
8-Sep-2010				0.01	0.04	0.04	
9-Sep-2010						0.01	0.03
10-Sep-2010				0.09			
11-Sep-2010				0.18	0.30	0.27	
12-Sep-2010					0.01		0.26
13-Sep-2010				0.01	*	0.01	
14-Sep-2010				0.01	*		
15-Sep-2010							
16-Sep-2010				0.02	*		
17-Sep-2010				0.01	*	0.02	
18-Sep-2010					*	0.01	
19-Sep-2010				0.01	*		
20-Sep-2010							
21-Sep-2010							
22-Sep-2010							
23-Sep-2010							
24-Sep-2010							
25-Sep-2010				0.98	*	0.01	
26-Sep-2010				0.55	*	1.41	0.32
27-Sep-2010				0.62	*	0.96	1.03
28-Sep-2010				0.08	*	0.01	1.4
29-Sep-2010				0.31	*	0.31	0.01
30-Sep-2010					*	0.05	0.42

*Rain gauge malfunctioned and no data was recorded during rain events documented for UT 1 and UT6.

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Bridgewater Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-Oct-2010				0.01	*		0.01
2-Oct-2010							
3-Oct-2010				0.01	*		
4-Oct-2010							
5-Oct-2010							
6-Oct-2010					*	0.01	
7-Oct-2010							
8-Oct-2010				0.01	*		
9-Oct-2010							
10-Oct-2010					*	0.01	
11-Oct-2010							
12-Oct-2010				0.06	*	0.05	
13-Oct-2010				0.07	*	0.05	0.06
14-Oct-2010					*	0.01	0.01
15-Oct-2010					*	0.01	
16-Oct-2010				0.01	*		
17-Oct-2010							
18-Oct-2010							
19-Oct-2010				0.19	*		
20-Oct-2010					*	0.2	0.16
21-Oct-2010							0.02
22-Oct-2010							
23-Oct-2010							
24-Oct-2010				0.29	*		
25-Oct-2010				0.39	*	0.47	0.05
26-Oct-2010				1.97	*	1.68	0.24
27-Oct-2010				0.01	*	0.75	1.72
28-Oct-2010					*	0.01	0.04
29-Oct-2010							
30-Oct-2010				0.01	*		
31-Oct-2010					*	0.01	

*Rain gauge malfunctioned and no data was recorded during rain events documented for UT 1 and UT6.

Date (dd-mmm-yyyy)	Crest Gauges			On-Site Auto Rain Gauges			Burke County Weather Station
	UT1 (ft above bkf)	UT5 (ft above bkf)	UT6 (ft above bkf)	UT1 (in)	UT5 (in)	UT6 (in)	Rainfall (in)
1-Nov-2010							
2-Nov-2010							
3-Nov-2010				0.21	*	0.01	
4-Nov-2010				0.01	*	0.22	0.12
5-Nov-2010							0.08
6-Nov-2010							
7-Nov-2010				0.01	*	0.01	
8-Nov-2010							
9-Nov-2010							
10-Nov-2010							
11-Nov-2010							
12-Nov-2010				0.01	*	0.01	
13-Nov-2010							
14-Nov-2010				0.16	*		
15-Nov-2010				0.58	*	0.19	
16-Nov-2010				0.20	*	0.95	0.20
17-Nov-2010					*	0.01	0.80

*Rain gauge malfunctioned and no data was recorded during rain events documented for UT 1 and UT6.