Beaverdam Mitigation Project
Harnett County, North Carolina

Cape Fear River Basin No. 03030004
DENR-EEP Contract No. D06029-B

Year 5 Monitoring Report

Prepared for
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November 2012

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1.0 SUMMARY

This Annual Report details the monitoring activities during the 2012 growing season on the Beaverdam Swamp Mitigation Site. Construction of the site, including planting of trees, was completed in February 2008. The 2012 data represents results from the fifth year of hydrology and vegetation monitoring for both wetlands and streams.

The design for the Beaverdam Swamp Site involved stream restoration, riverine wetland restoration, and wetland enhancement. After construction, it was determined that the project generated 10,114 linear feet of stream restoration, 292 linear feet of stream enhancement, 9.90 acres of wetland restoration, and 2.04 acres of wetland enhancement. The As-Built drawings are included as **Appendix A**.

This Annual Report presents the data from eight automated hydrology monitoring stations, 14 vegetation monitoring plots, three crest gauges, one tipping bucket rain gauge, one funnel rain gauge, 20 cross sections, 3,455 linear feet of profile survey, and photographic reference locations. Data were also collected from three reference automated hydrology monitoring stations.

In 2012, data collected from the groundwater monitoring gauges on the Beaverdam Mitigation Site indicate that three of the five hydrology monitoring stations in the restoration area recorded hydroperiods of at least 10 percent of the growing season. The remaining two gauges (AW2 and AW6) experienced hydroperiods of less than 5 percent. All three reference gauges experienced hydroperiods of greater than 10 percent of the growing season. The groundwater elevation at RAW2 may be affected by its relatively close location to the channel. Gauges AW3, AW4, and AW8 are located in potential additional wetland restoration areas and recorded hydroperiods below the hydrology success criterion for the site. The groundwater elevations appear to follow rainfall trends over the last three seasons.

Weather station data from the Dunn Weather Station were used in conjunction with the rain gauges located on the site to document precipitation amounts. The Dunn weather station data for 2012 was below normal limits throughout most of the growing season. On-site rainfall amounts indicate a dry start to the growing season. During the months of March and April, the rainfall was within the normal limits but below the annual average for May. Rainfall trends during 2009 through 2012 are mostly below normal monthly rainfall amounts.

This Annual Monitoring Report documents vegetation survival on 14 vegetation-monitoring plots. The vegetation monitoring documented surviving planted stem density between 300 and 720 stems per acre. All plots exceeded the minimum criteria of 260 stems per acre after five years. Herbaceous vegetation is now estimated at over 90 percent cover across the site. Volunteer woody species are present but do not pose a threat to the target natural community except as noted around Plot 5.

During the 2012 monitoring season, two of the three crest gauges recorded bankfull events at the site. The restored stream channel is stable and is providing the intended habitat and hydrologic functions. All monitored cross sections and longitudinal profile for 2012 show little adjustment in stream dimension.

2.0 INTRODUCTION

2.1 PROJECT DESCRIPTION

The Beaverdam Swamp Stream and Wetland Mitigation project is in Harnett County, North Carolina, approximately 3 miles southwest of Erwin (**Figure 1**). The property is on an old floodplain terrace to either side of Bunnlevel Erwin Road (SR 1779). Access is directly from Bunnlevel Erwin Road through pasture and agricultural fields. Construction at the site was completed in February 2008. Groundwater, surface water, and rain gauges were functional beginning in February 2008. This report details the results of the 2012 monitoring season, and represents Year 5 of monitoring for the site.

The mitigation site consists of three stream systems and associated riparian wetlands along the floodplain. The three distinct unnamed tributaries (UT) are identified as UT1, UT2, and UT3. The USGS Erwin, NC topographic quadrangle (**Figure 2**) shows UT 1 and UT 2 drain into Beaverdam Swamp and UT3 discharges directly into the Cape Fear River. UT1 has a drainage area of 602 acres (0.94 mi^2), UT2 has a drainage area of 147 acres (0.23 mi^2), and UT3 has a drainage area of 262 acres (0.41 mi^2). Surrounding land use consists of existing forest, open pasture, and agricultural fields. On-site topography, soils, and existing wetland areas demonstrate that the site historically supported riverine wetlands. A conservation easement protects the restoration and preservation areas (**Figure 3**).

The pre-restoration altered conditions of the stream and the riparian buffer reduced water quality and impaired habitat. Livestock access resulted in the direct input of nutrients and biochemical oxygen demand (BOD) into the stream and wetlands. Hoof-shear created bank instability resulting in heavy sedimentation. Water quality was also diminished due to raised turbidity from bank erosion and elevated water temperatures caused by the lack of tree shading. Habitat was reduced by the diminished water quality and loss of physical habitat such as bed features, woody debris, and a well-developed vegetative community. Migrating head-cuts had incised the channels and drained wetlands. There are two wetland restoration areas (WR) associated with UT3 and three wetland enhancement areas (WE) associated with UT1.

2.2 PROJECT PURPOSE

The objective of this project is to provide 10,200 stream mitigation units (SMU) and 9 wetland mitigation units (WMU) to the North Carolina Ecosystem Enhancement Program (EEP) through the full delivery process in the Cape Fear River Basin 03030004110020 hydrologic unit, and to improve riparian and aquatic habitats and water quality through ecological restoration practices. Stream mitigation was provided through restoration and enhancement on three stream systems that are tributaries to Beaverdam Swamp. Riverine wetland mitigation was provided through enhancement and restoration. The site was identified and developed by Environmental Banc and Exchange, LLC (EBX) through the EEP full delivery mitigation process.

Monitoring of the Beaverdam Swamp Mitigation Site is required to demonstrate successful mitigation based on criteria in the Restoration Plan and through a comparison to reference site conditions. The success criteria components adhere to EEP and USACE guidelines. Hydrology, vegetation, and stream monitoring are conducted on an annual basis. This Annual Monitoring Report details the results of the monitoring efforts for 2012 (Year 5) at the Beaverdam Swamp Mitigation Site.

1.0 SUMMARY

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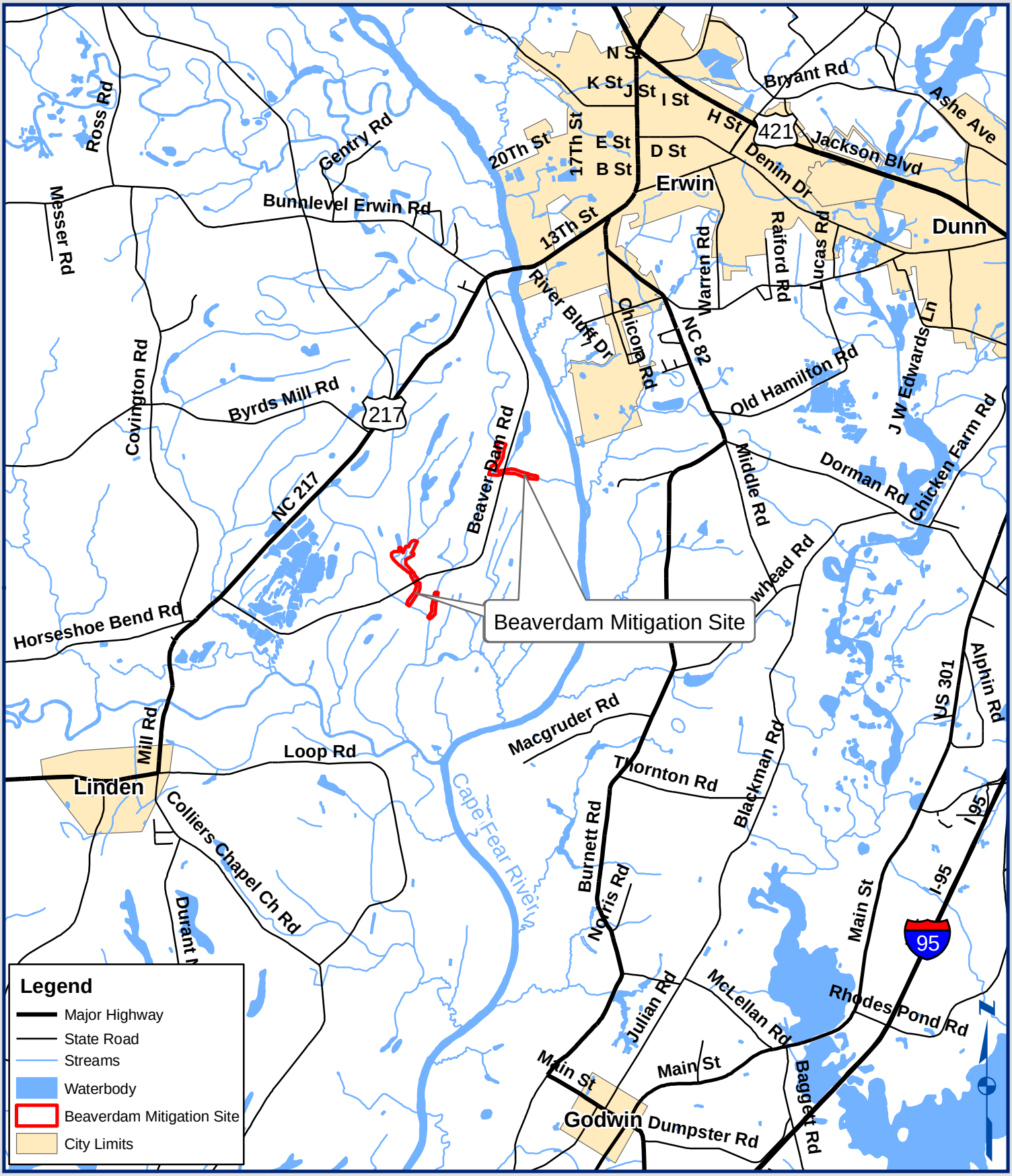
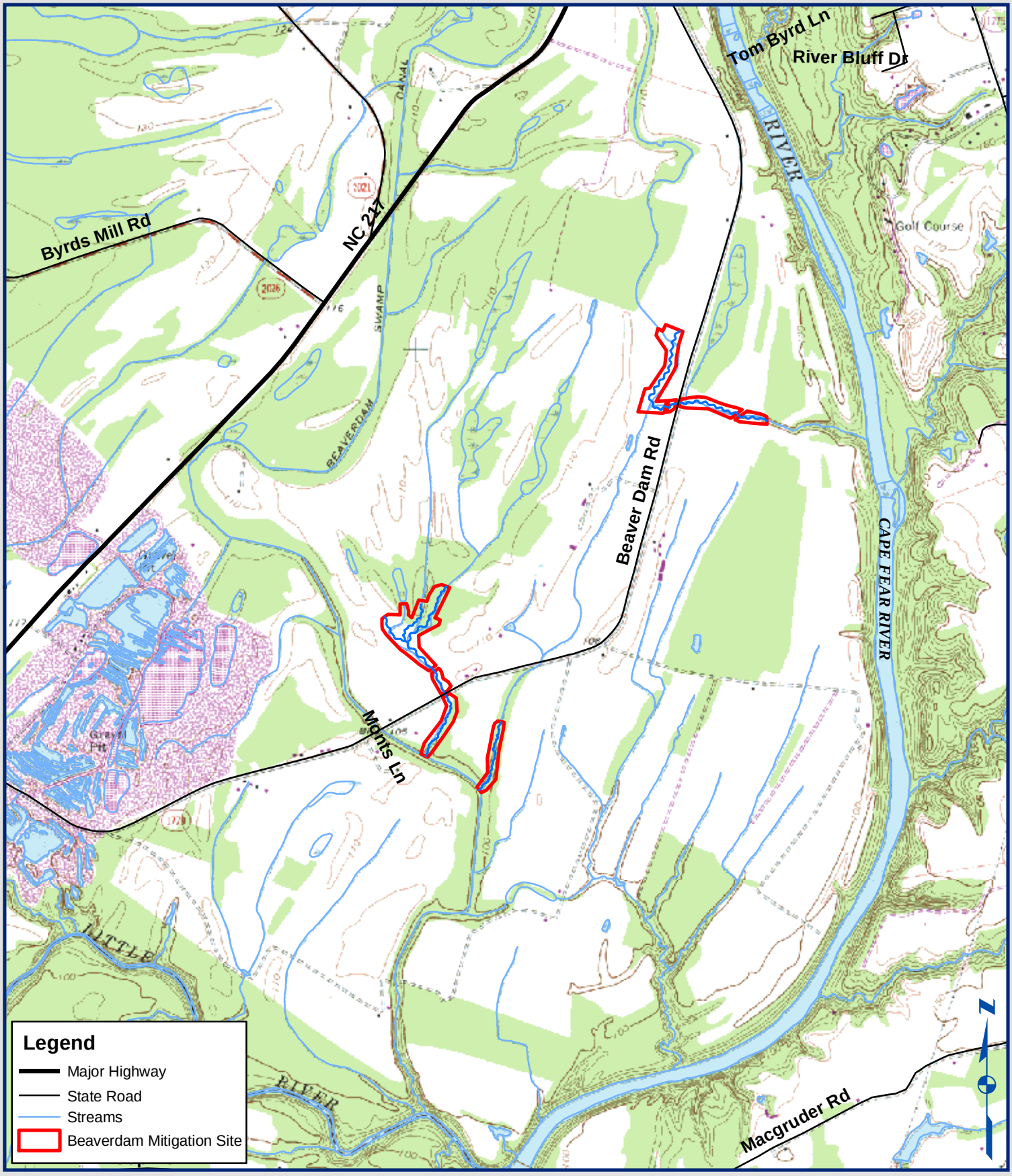


Figure 1.
Beaverdam Creek Mitigation Site
Project Vicinity Map

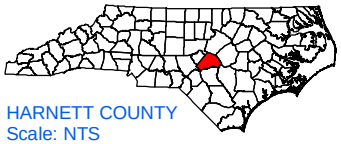


EBX

SOURCE: USGS,
Erwin, NC Quadrangle, 1973

Figure 2.
Beaverdam Creek Mitigation Site
USGS Map

0 1,000 2,000 4,000 Feet



HARNETT COUNTY
Scale: NTS

The Beaverdam Swamp Mitigation Report (May 2008) documented 10,114 linear feet of stream restoration, 292 linear feet of stream enhancement Level II, 9.90 acres of wetland restoration, and 2.04 acres of wetland enhancement, resulting in 10,231 SMUs and 10.9 WMUs for the project (**Table 1**). The raised streambed elevation will provide the hydrology for restoring the wetlands. The wetland and stream restoration will provide multiple ecological and water quality benefits within the Cape Fear River Basin. Benefits include nutrient removal, sediment and BOD reduction, water storage, improved groundwater recharge, improved in-stream and riparian habitat, and restored wetland habitat.

Table 1. Project Mitigation Structure and Objectives

Reach Name	As-Built Length (feet)	Wetland (acres)	WMU	SMU	Restoration Approach
UT1-A/B/C	3,403			3,403	Restoration
UT1-D	829			829	Restoration
UT1-E (Valley)	556			556	Restoration
UT1-F	583			583	Restoration
UT2	1,264			1,264	Restoration
UT3-A/B	3,479			3,479	Restoration
UT3-C	292			117	Enhancement
WR-A		3.70	3.70		Restoration
WR-B		6.20	6.20		Restoration
WE-A		0.80	0.40		Enhancement
WE-B		0.70	0.35		Enhancement
WE-C		0.14	0.07		Enhancement
WE-D		0.40	0.20		Enhancement
Total	**10,406**	**11.94**	**10.92**	**10,231**	

2.3 PROJECT HISTORY & SCHEDULE

The project was constructed in the fall and winter of 2007/2008, and the five year monitoring is expected to be completed in the fall of 2012 (**Table 2**). **Table 3** lists the project contacts.

Table 2. Project Activity and Reporting History

Month	Activity
February 2008	Construction Completed
February 2008	Planting Completed
February 2008	Post Construction Monitoring Gauges Installed
May 2008	As-Built Report Submitted
November 2008	1st Annual Monitoring Report
November 2009	2nd Annual Monitoring Report
October 2010	3rd Annual Monitoring Report
November 2011	4th Annual Monitoring Report
November 2012	5th Annual Monitoring Report

Table 3. Project Contacts

Contact	Firm Information
Project Manager Norton Webster	Environmental Banc & Exchange , LLC (919) 608-9688
Designer Todd St. John, PE	Kimley-Horn and Associates (919) 653-2950
Monitoring Contractor Daniel Ingram	WK Dickson and Co., Inc (919) 782-0495

3.0 HYDROLOGY

3.1 HYDROLOGIC SUCCESS CRITERIA

As stated in the Restoration Plan, the hydrology success criterion for the site is to restore wetland hydrology at the site so that water table remains within 12 inches of the soil surface continuously for at least 10 percent of the growing season (24 days). The growing season is from March 16 to November 11. Based on daily minimum temperatures greater than 28 degrees Fahrenheit occurring in 5 of 10 years, the growing season for Harnett County is 240 days long. Gauge data will be compared to gauge data from a reference wetland in growing seasons with less than normal rainfall. In periods of low rainfall, if a restoration gauge hydroperiod exceeds the reference gauge hydroperiods, and both exceed five percent of the growing season, then the gauge will be deemed successful. The results of hydrology monitoring across the wetland restoration site are presented in this annual monitoring report.

Additional potential wetland enhancement acreage was identified outside of the proposed wetland restoration and enhancement acreage shown in the Restoration Plan. These are in the forested section of UT1A, UT1C, and UT2. These areas have appropriate bottomland hardwood species; however, because of the channelization of the streams, these areas lacked hydrology prior to restoration. Three monitoring gauges have been established in these locations to verify if wetland hydrology is restored in this acreage.

3.2 DESCRIPTION OF HYDROLOGY MONITORING EFFORTS

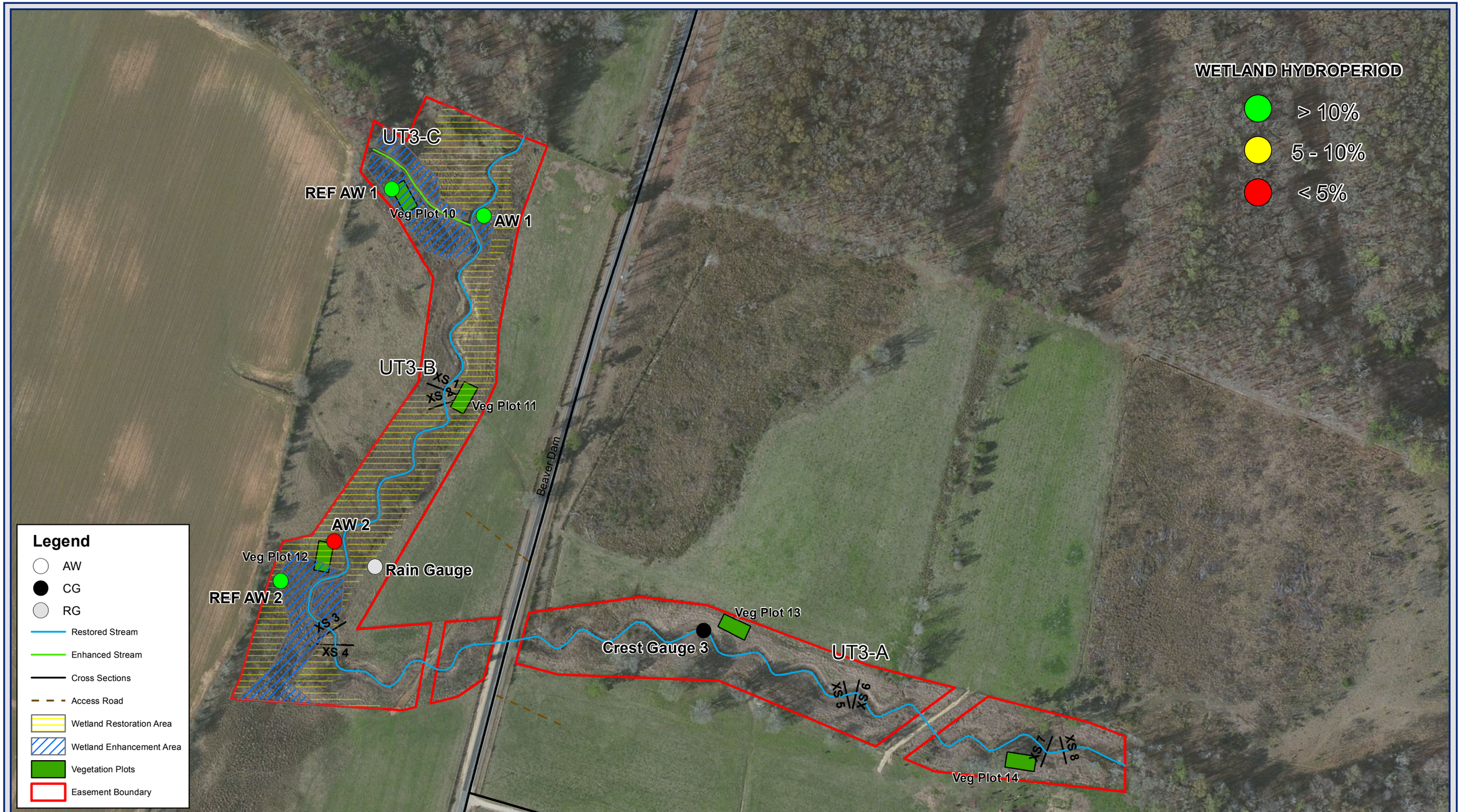
Eight automated HOBO groundwater gauges, one tipping bucket rain gauge, and one funnel rain gauge were installed prior to the beginning of the first growing season (**Figure 3**). Three additional automated groundwater gauges were installed in a reference wetland. Groundwater gauges are installed to a minimum depth of 40 inches below the ground surface. The monitoring protocol for the site specifies that automated monitoring stations will be downloaded and checked for malfunctions on a monthly basis. During monthly site visits, manual groundwater gauges are read, crest gauge readings are taken, and cumulative rainfall totals are collected from the on-site rain gauges. During the 2012 growing season, all eight automated loggers performed well with no periods of missing data.

Automated Gauges
HOBO automatic groundwater gauges record water table elevations four times daily at 06:00, 12:00, 18:00, and 24:00. These automatic gauges employ pressure sensors that record water elevation above the bottom of the sensor (with atmospheric pressure compensation). The calibration water table depth is recorded at monthly downloads. To determine wetland hydroperiods, the automatically recorded data are compared to the calibration data to determine a standard correction factor between the calibration gauge and the automatic gauge for each

location. The standard correction factor is applied to correct daily readings. The corrected daily readings are used to determine wetland hydroperiods.

Data Interpretation

Wetland hydroperiods are calculated for four daily water table depth elevations. A hydroperiod is calculated if the water table is equal to or less than 12 inches below ground surface for at least 24 hours. If a gauge falls below -12 inches for four consecutive readings (24 hours) then the hydroperiod ends at the last reading within 12 inches of the ground surface. If a gauge falls below -12 inches for only three readings then maintains a reading above -12 inches for a minimum of



EBX

0 100 200 400 Feet

1 inch = 200 feet

Figure 3a
Beaverdam
2012 Monitoring Site Map

N W E S

WK DICKSON
WATERSHED SCIENCES

Figure 3b
Beaverdam
2012 Monitoring Site Map

24 hours, the hydroperiod is calculated continuously. This methodology accounts for minor technical malfunctions experienced by the automatic gauges.

3.3 RESULTS OF HYDROLOGY MONITORING

The following hydroperiod statistics were calculated for each monitoring station during the growing season: 1) period of most consecutive days and percent of growing season that the water table was within twelve inches of the surface; 2) cumulative number of days and percent of growing season that the water table was within twelve inches of the soil surface; and 3) number of times that the water table rose to within twelve inches of the soil surface (**Table 4**). Raw hydrograph data collected from the monitoring gauges are provided in **Appendix C**.

Table 4. Hydrologic Monitoring Results

2012 Max Hydroperiod (Growing Season 16-Mar through 11-Nov, 240 days)					
	Consecutive		Cumulative		
	Days	Percent of growing Season	Days	Percent of growing Season	Occurrences
Restoration/Enhancement Area					
BD AW1	23	10	37	15	7
BD AW2	9	4	22	9	7
BD AW5	30	12	92	38	19
BD AW6	10	4	36	15	14
BD AW7	25	10	44	18	14
Gauges OutsideRestoration/Enhancement Area					
BD AW3	6	3	10	4	3
BD AW4	1	0	1	0	2
BD AW8	13	5	27	11	6
Reference Gauges					
BD RAW1	29	12	61	26	10
BD RAW2	26	11	69	29	12
BD RAW3	27	11	65	27	14

The site was designed to re-integrate the streams with the drained wetlands, restoring stream and wetland habitat features, and re-establishing a native, forested hardwood wetland ecosystem. Hydrology in the riparian areas is driven primarily by high groundwater and overbank flooding. Three monitoring gauges (AW1, AW5, and AW7) have hydroperiods greater than or equal to ten percent of the growing season in Year 5. Gauges AW2 and AW6 have hydroperiods of four percent respectively. Gauge AW2 is located relatively close to the channel and groundwater may be influenced by its proximity to the channel. Rainfall immediately prior to and during the early growing season was below normal limits. This resulted in diminished wetland hydroperiods. All of three reference gauges recorded hydroperiods greater than the success criterion. **Table 5** lists the minimum depth at which the under performing gauges achieved a 10 percent hydroperiod.

Table 5. Hydroperiod Depths for Unsuccessful Gauges

Gauge	10 Percent Hydroperiod Depth
AW2	-27.84
AW6	-18.30
AW3*	-24.18
AW4*	-33.70
AW8*	-44.70

*Gauge is not located in restoration area

Gauge data indicate the groundwater elevations experienced a slow decline from 2009 to 2012 monitoring years (**Table 6**). This trend follows the rainfall recorded at nearby Dunn where rainfall patterns are trending below the normal limits most months as discussed on climate data in Section 3.3.3. On-site reference gauges also follow a similar pattern in groundwater elevation.

Table 6. Summary of Annual Hydrology Monitoring Data 2008-2012

Gauge	Max Consecutive Hydroperiod (percent of growing season)				
	2008	2009	2010	2011	2012
Restoration/Enhancement Area					
AW1	23	31	20	14	10
AW2	4	10	8	4	4
AW5	7	21	13	8	12
AW6	4	10	4	5	4
AW7	7	16	13	7	10
Gauges Outside Restoration/Enhancement Area					
AW3	12	100	48	0	3
AW4	2	3	0	0	0
AW8	6	24	20	4	5
Reference Gauges					
RAW1	30	32	24	20	12
RAW2	6	14	10	8	11
RAW3	6	21	13	8	11

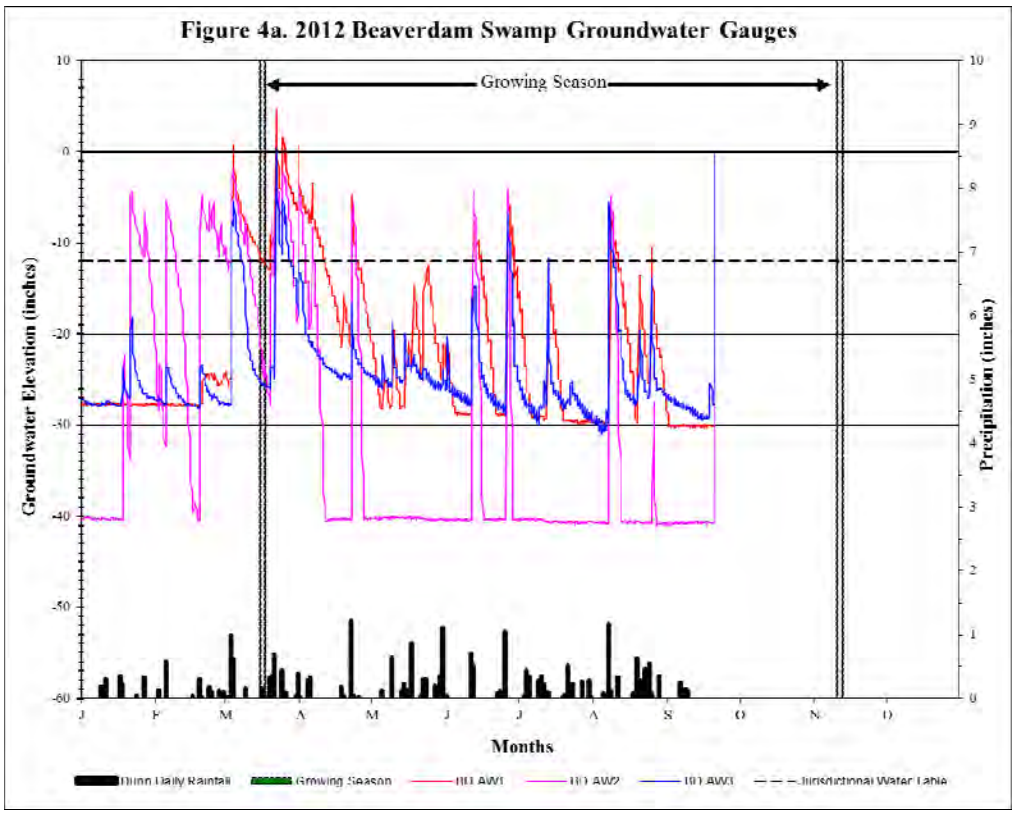
Of the five gauges within the proposed restoration area, two gauges (AW2 and AW6) did not meet success criteria during the 2012 monitoring year. None of the gauges located outside of the proposed restoration area met success during the 2012 monitoring year. The restoration gauges and the reference gauges show a similar trend across the years of the monitoring period. The gauges outside of the restoration/enhancement area appear to have greater exaggerations in the trend. The exaggeration is likely due to the existing mature hardwood canopy removing the groundwater more efficiently during the period with less rainfall.

3.3.1 Site Data

Depth of groundwater for each of the monitoring gauges is shown in a graph with precipitation (**Figure 4**). This hydrograph demonstrates the reaction at each monitoring location of the

groundwater level to specific rainfall events. Raw hydrograph data collected from the monitoring gauges is provided in **Appendix C**.

Figure 4. Groundwater Hydrographs



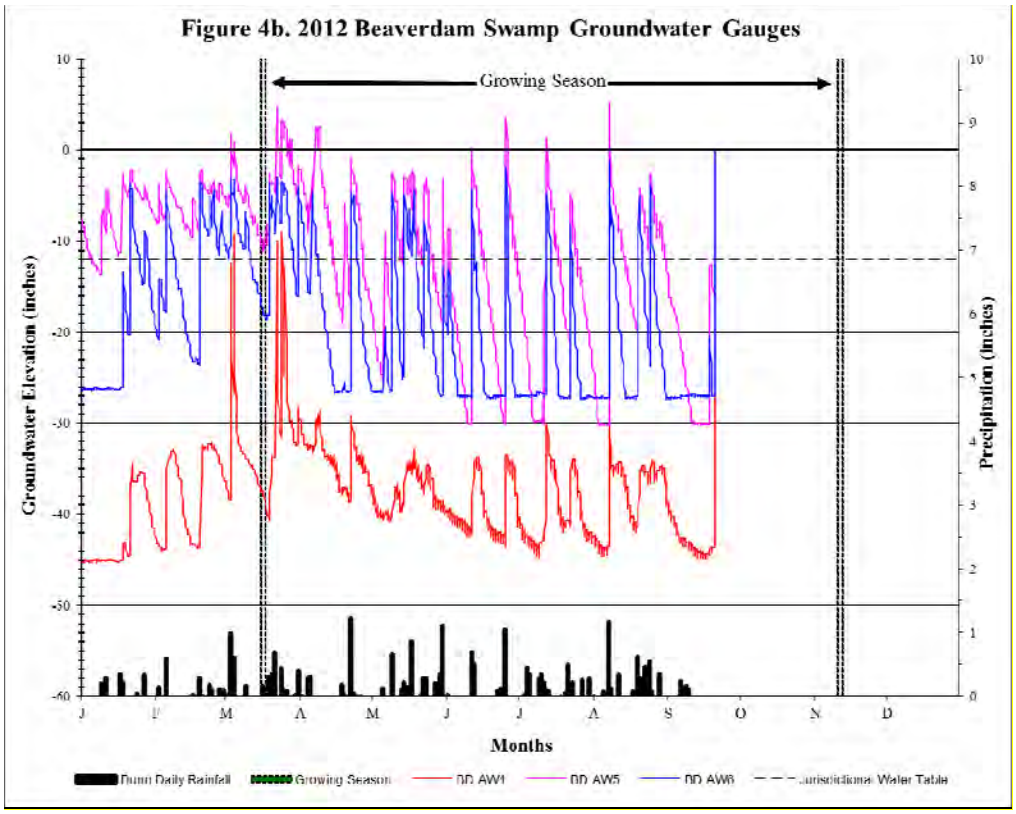
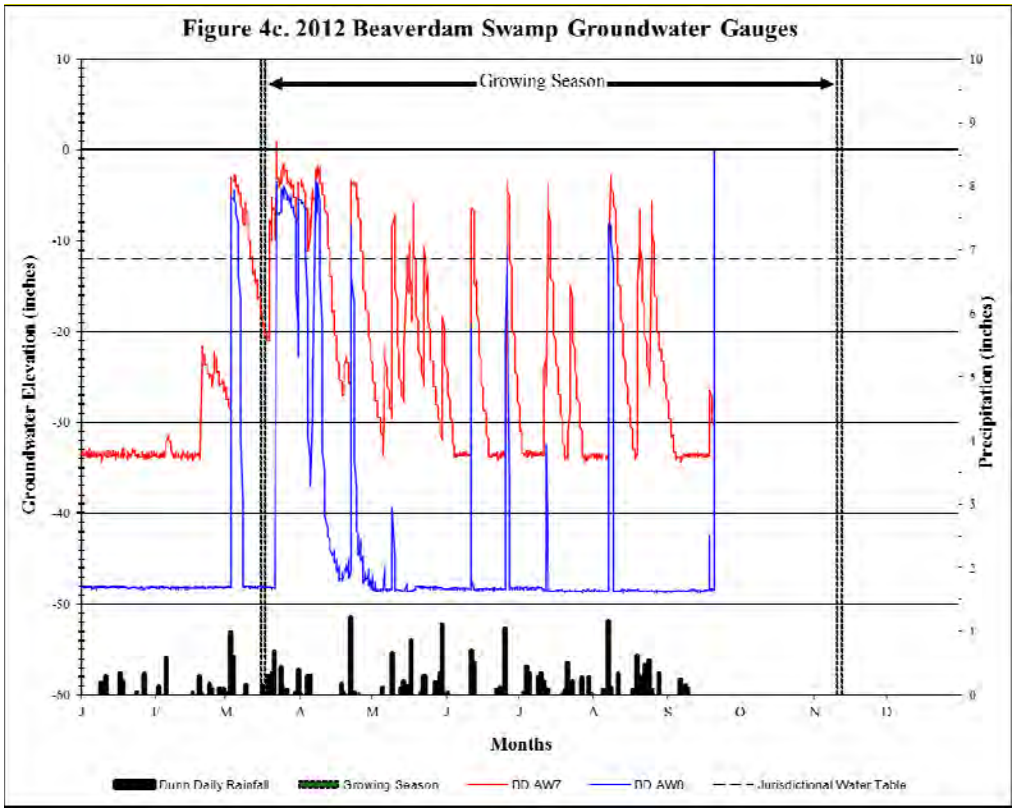


Figure 4b. 2012 Beaverdam Swamp Groundwater Gauges
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
J
F
M
A
M
J
J
A
S
O
N
D
Dunn Daily Rainfall
Growing Season
DD AW1
DD AW5
DD AW6
Jurisdictional Water Table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Precipitation (inches)
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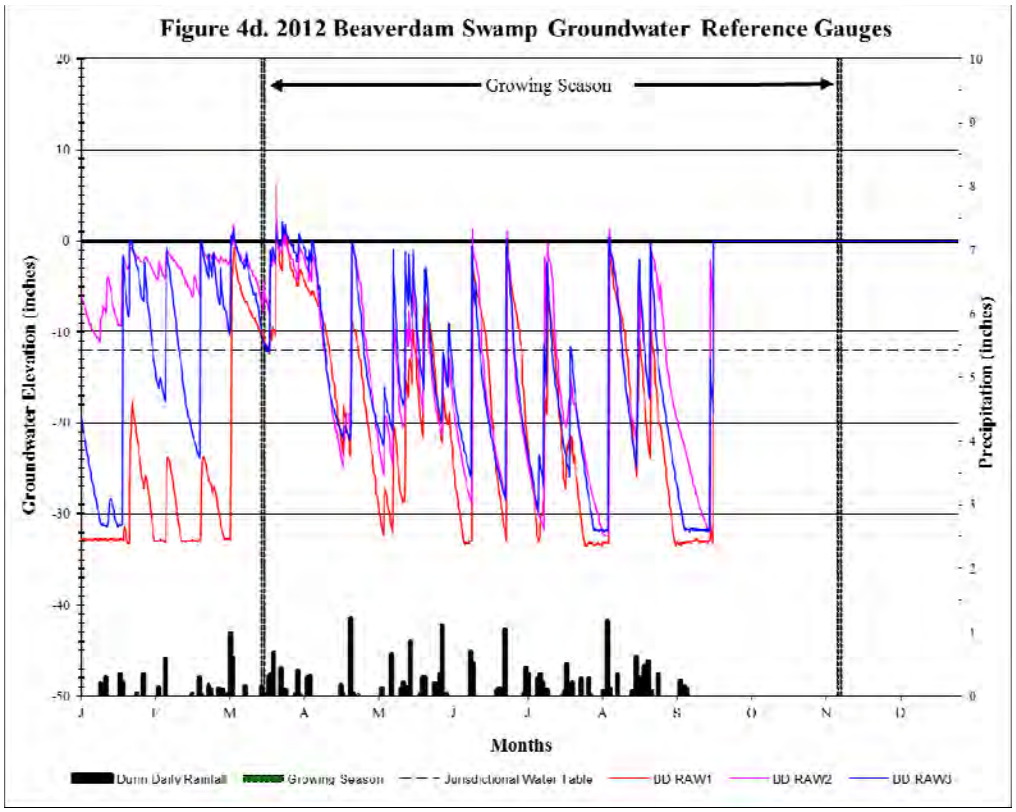
J
J
A
S
O
N
D
Dunn Daily Rainfall
Growing Season
DD AW7
DD AW8
Jurisdictional Water Table



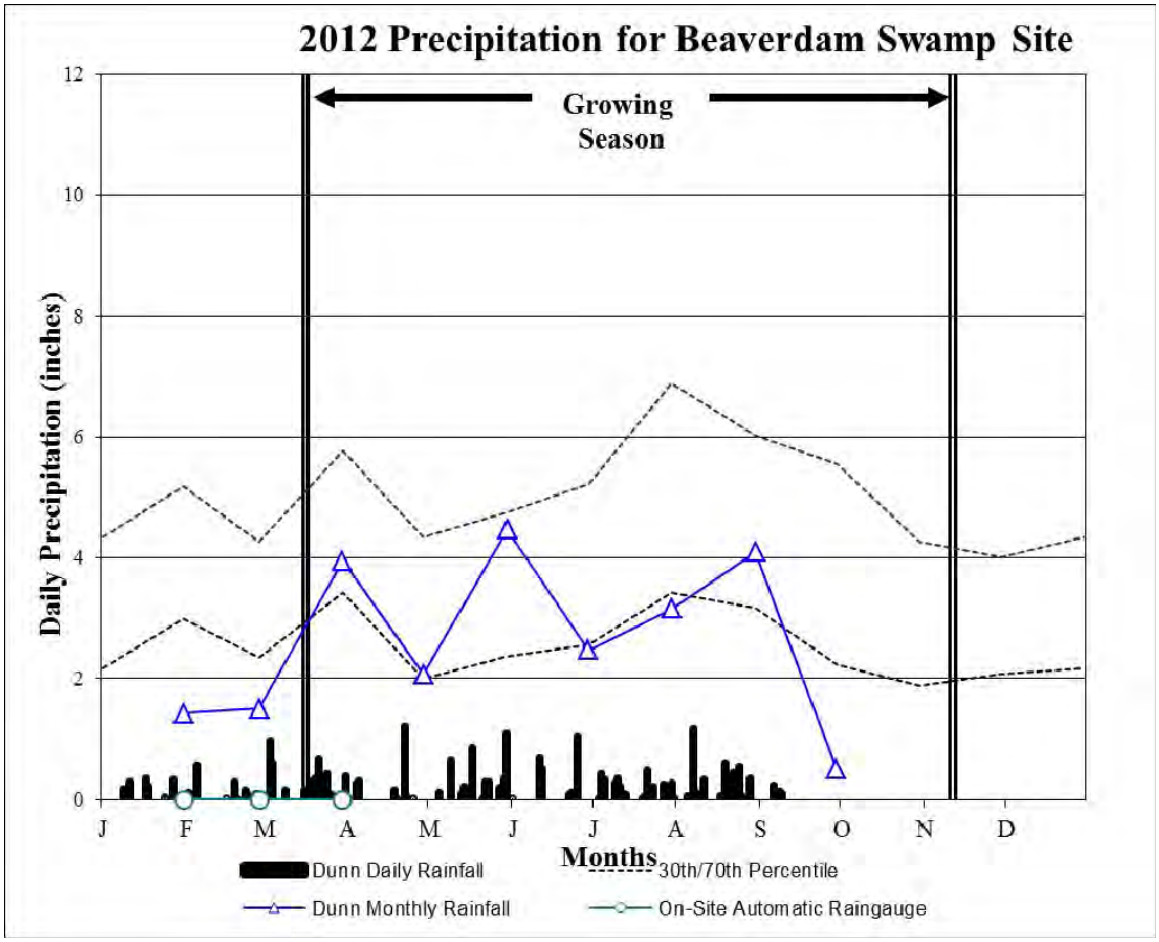
3.3.2 Reference Data

The approved Mitigation Plan provides that if the rainfall data for any given year during the monitoring period is not normal, the reference wetland data can be assessed to determine if there is a positive correlation between the performance of the restoration site and the natural hydrology of the reference site. The three reference gauges had hydroperiods ranging from 11 to 12 percent of the growing season. Two reference gauges (RAW2, and RAW3) indicate a downward trend in groundwater elevation in 2010 and 2011 but slightly increased in 2012 Year 5 monitoring (**Table 6**).

3.3.3 Climate Data

Monthly rainfall for 2011 was compared to historical precipitation for Harnett County (**Table 7** and **Figure 5**). Observed precipitation data were collected from an automated weather station in Dunn (Harnett County). The Dunn weather station data for 2012 was below normal limits for January, February, June, and July, and within normal limits for March, April, May, and August. No data was collected using the automatic on-site rain gauge due to malfunction.

Table 7. Comparison of Normal Rainfall to 2012 Observed Rainfall



Long-term rainfall patterns show the rainfall has been below normal limits most of the last three years, most importantly prior to the growing season (**Table 8**).

Table 8. Observed Rainfall Summary

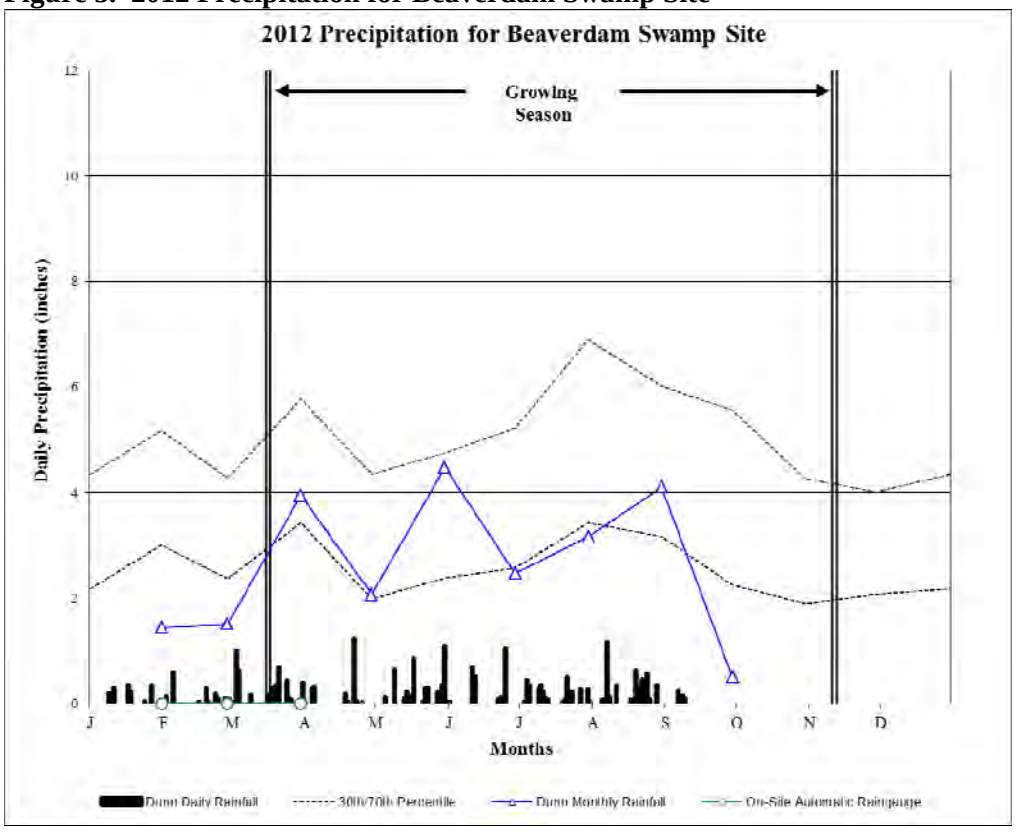
Month	Average	Normal Limits		Dunn Precipitation				
		30 Percent	70 Percent	2008	2009	2010	2011	2012
January	4.12	3.00	5.18	1.65	1.48	3.02	0.66	1.43
February	3.59	2.36	4.27	3.29	1.83	2.56	1.73	1.51
March	4.71	3.42	5.78	3.69	3.84	1.96	2.54	3.95
April	3.25	1.99	4.34	8.88	0.56	0.63	2.13	2.07
May	3.82	2.37	4.75	2.86	2.17	2.75	2.99	4.47
June	4.50	2.56	5.22	2.69	0.43	1.28	6.31	2.47
July	5.64	3.42	6.89	4.31	2.50	2.71	1.70	3.16
August	4.86	3.17	6.02	4.72	2.65	1.38	4.74	4.10
September	4.50	2.24	5.56	5.01	1.84	0.36	2.19	
October	3.16	1.89	4.26	1.43	1.83	0.55	2.53	

November	3.08	2.07	4.01	2.18	0.90	0.82	2.42	
December	3.57	2.18	4.35	2.04	3.95	1.25	0.80	
Average	---	42.45	51.56	---	---	---	---	
Total	48.80	---	---	42.75	23.98	19.27	30.74	

Below 30 percentile

Below monthly average

Figure 5. 2012 Precipitation for Beaverdam Swamp Site



3.4 HYDROLOGIC CONCLUSIONS

Data collected from the groundwater monitoring gauges on the Beaverdam Mitigation Site in 2012 indicate that three of the five restoration area hydrology monitoring stations recorded hydroperiods of at least 10 percent of the growing season and meet the hydrologic success criterion for 2012. Two gauges (AW2 and AW6) experiences hydroperiods less than five percent, but achieved a 10 percent hydroperiod at a depth of no greater than 27.84 inches below the soil surface. All three of the reference gauges experienced hydroperiods greater than 10 percent of the growing season. The groundwater elevation at RAW2 may be affected by its relatively close location to the channel. Gauges BDAW3, BDAW4, and BDAW8 are located in areas of potential additional wetland restoration. These gauges failed to demonstrate wetland hydrology during 2012.

Dunn weather station rainfall data indicates that the 2012 rainfall amounts were below normal in January, February, June, and July. In March and April, rainfall amounts were below average, but within the range to be considered normal. Rainfall amounts were within normal range during March, April, May, and August. Rainfall trends for 2009 through 2012 are below normal or below average amount for most months.

4.0 VEGETATION

4.1 VEGETATION SUCCESS CRITERIA

Successful establishment of vegetation in wetland restoration and riparian areas will be the survival of 260-planted stems following Year 5 monitoring. The site must also meet the interim success criterion of the survival of at least 320 planted stems per acre at the end of the Year 3 monitoring period. Up to 20 percent of the species composition may be comprised of volunteers. Remedial action may be required should volunteers present a problem or exceed 20 percent composition.

A digital image photo log will be used to subjectively evaluate the restoration site over time. A series of images over the five-year monitoring period should demonstrate maturation of planted vegetation and volunteer hydrophytic species.

4.2 DESCRIPTION OF SPECIES AND VEGETATION MONITORING

Fourteen vegetation sampling plots were established within the planted restoration areas to monitor the success of planted vegetation. The vegetation plots are 0.05 acres in size. The vegetation plots are distributed across the site, but the precise location and orientation of the plots was random (see locations on as-built drawings in **Appendix A**). The plots cover approximately two percent of the planted area. Twelve tree species were planted on the site (**Table 9**).

Table 9. Planted Tree Species

Common Name	Scientific Name	*Indicator Status
River Birch	*Betula nigra*	FACW
Pignut Hickory	*Carya glabra*	FACU
Green Ash	*Fraxinus pennsylvanica*	FACW
Black Walnut	*Juglans nigra*	UPL
Tulip Poplar	*Liquidambar styraciflua*	FAC
Swamp Tupelo	*Nyssa biflora*	OBL
Overcup Oak	*Quercus lyrata*	OBL
Swamp Chestnut Oak	*Quercus michauxii*	FACW
Coastal Willow Oak	*Quercus phellos*	FACW
Northern Red Oak	*Quercus rubra*	FACU
Bald Cypress	*Taxodium distichum*	OBL
Slippery Elm	*Ulmus rubra*	FAC

*2012 National Wetland Plant List

Planted stems inside each plot were marked using colored flagging to help in locating them in the future. Each stem is tagged with a sequentially numbered aluminum tag.

4.3 RESULTS OF VEGETATION MONITORING

Stem counts for each of the 14 vegetation-monitoring plots were recorded by species (**Table 10**). Most of the planted stems appeared healthy and have recent growth. During Year 1 (2008), a number of the plots were located in areas where livestock accidentally accessed the restoration area and damaged many stems. The access points have since been secured. The damage increased mortality in a number of the plots. Because of mortality during the first year, areas of the site were supplemented with additional trees.

The planted stems in the monitoring range in height from 1.5 feet to 22 feet. The average height is around 7 feet. Most planted trees show typical growth. Plot survival ranged from 300 to 720 stems per acre with an average of 473 stems per acre (**Table 11**). Some of the numbered tags have been lost or damaged over the last five years. This may be due to tags being swept over small stems during early flooding shortly after planting or small animal theft.

Table 10. Results of 2012 Vegetation Monitoring by Plot

Species	VP 1	VP 2	VP 3	VP 4	VP 5	VP 6	VP 7	VP 8	VP 9	VP 10	VP 11	VP 12	VP 13	VP 14
Black gum	2	12	2	3	3	6		2	1	10	4	9		
Black walnut														
Cypress	5	3	3	3					5	11	1	3		
Green ash	14	7	3	2	5	5	5	1			1	7		
Hickory			2		1			1	2		2	4		
Northern red oak							6						9	15
Overcup oak	2	4	5	3	6		8	3		6	4			3
Paw Paw									1					
River birch		3	2	10	7	8		3	4	1	3			
Slippery elm				1			2				1		13	11
Swamp chestnut oak								1	3			3		6
Tulip poplar	1			2				2			1			
Unknown								1			1			
Willow oak			2			4	4	1				1	2	1

Table 11. Summary of Vegetation Monitoring Results – Year 5

Plot Number	Stems Planted	2012 Stems	Stems per Acre					
			As-Built	2008 Year 1	2009 Year 2	2010 Year 3	2011 Year 4	2012 Year 5
1	35	24	620	360	540	480	520	480
2	40	29	640	420	580	500	580	580
3	37	19	600	340	420	380	380	380
4	41	24	640	340	520	540	520	480
5	41	22	620	260	500	380	240	440
6	35	23	660	360	380	360	420	460
7	43	25	620	360	600	480	480	500
8	33	15	660	560	540	480	360	300
9	26	16	400	340	340	340	320	320
10	32	28	460	420	600	600	640	560
11	38	19	760	480	440	400	360	380
12	35	24	700	640	640	560	480	480
13	34	27	680	500	540	500	480	540
14	33	36	660	480	480	620	720	720

2012 Average Stems per Acre: 473
2012 Range of Stems per Acre: 300-720

A few plots have planted trees that exhibit smaller height. This may be due to competition from Eastern baccharis (*Baccharis halimifolia*) (VP 5), past herbicide treatment (VP 8 and VP 9), or locally dry conditions (VP 3, VP 8, VP 11, VP 13, and VP 14). At the conclusion of monitoring Year 5, all vegetation plots have met the 5-year success criteria of 260 stems per acre. A plan view drawing of the vegetation plots is provided in **Figures 6a** and **6b**. The drawing includes the appropriate information pertaining to vegetation monitoring of the project. The herbaceous vegetation coverage at the site averages over 90 percent with most plots over 95 percent. Due to the existing forest cover around Plots 7, Plot 8, and Plot 9, these plots exhibit the least dense herbaceous coverage with a few small areas having limited herbaceous cover. A number of plots have become dominated by one or two species. Figure 6 also shows the locations of the following features:

- Vegetation monitoring plots
- Locations of any vegetation problem areas
- Symbology to represent vegetative problem types (if appropriate)

In most plots, the herbaceous vegetation shows vigorous growth and diversity. The herbaceous cover is typically dense across most of the site and a few weeds typical of pasture and disturbed land are still present. The most common herbaceous species across the site (occurrence in at least 50 percent of the plots) are common rush (*Juncus effusus*), tall fescue (*Schedonorus phoenix*), sawtooth blackberry (*Rubus argutus*), and Canada goldenrod (*Solidago canadensis*). Other species found across the site are beaked panic grass (*Panicum anceps*), deertongue (*Dichanthelium clandestinum*), dog fennel (*Eupatorium capillifolium*), and swamp sunflower (*Helianthus angustifolius*). Overall diversity appears to be unchanged from the previous monitoring period, but weedy species have decreased in dominance. The herbaceous coverage across the mitigation site is variable in composition, as would be expected in a natural riparian system.

Woody volunteer species are also monitored throughout the five-year monitoring period (**Table 12).** These volunteer species are not always obvious due to germination after construction and planting. Vigor and survival due to the earlier drought as well as proximity to seed sources have affected the volunteer species. In some areas, dense herbaceous cover also obscures smaller volunteer individuals. Twenty different species were observed within the monitoring plots as volunteers. No remedial action is recommended at this time.

Table 12. Volunteer Tree Species

Common Name	Scientific Name	*Indicator Status
Red Maple	*Acer rubrum*	FAC
Eastern Baccharis	*Baccharis halimifolia*	FAC
River Birch	*Betula nigra*	FACW
American Hornbeam	*Carpinus caroliniana*	FAC
Common Buttonbush	*Cephalanthus occidentalis*	OBL
Persimmon	*Diospyros virginiana*	FAC
Green Ash	*Fraxinus pennsylvanica*	FACW
Chinese Privet	*Ligustrum sinense*	FAC
Sweetgum	*Liquidambar styraciflua*	FAC+
Tuliptree	*Liriodendron tulipifera*	FAC
Blackgum	*Nyssa sylvatica*	FAC
Loblolly Pine	*Pinus taeda*	FAC
American Sycamore	*Platanus occidentalis*	FACW-
Southern Red Oak	*Quercus falcata*	FACU-
Willow Oak	*Quercus phellos*	FACW-
Northern Red Oak	*Quercus rubra*	FACU
Winged Sumac	*Rhus copallinum*	NI
Black Willow	*Salix nigra*	OBL
American Black Elderberry	*Sambucus nigra*	FACW-
Winged Elm	*Ulmus alata*	FACU+

*1996 National List of Vascular Plant Species that Occur in Wetlands

4.4 VEGETATION OBSERVATIONS & CONCLUSIONS

In general, the live stems were healthy and most exhibited new growth. In the past, a number of incidents where cattle entered the planted easement area were recorded. This has been corrected and the site appears to have recovered with healthy vegetative growth across the site. Because of low survival in the initial planting, areas with low survival were replanted during the winter/spring of 2009. The replanted trees appear healthy with new growth.. All plots have met the success criteria of 260 stems per acres after five years, as documented by this report. For the 2012 monitoring year, the average number of stems per acre on site is 473 and plots range from 300 to 720 stems per acre. No additional remedial actions are recommended.

Herbaceous vegetation is healthy and locally dense. The plots in the enhancement areas exhibit less herbaceous density due to the forest canopy. Both hydrophytic and non-hydrophytic herbaceous vegetation is found across the site. The most common herbaceous species across the site (occurrence in at least 50 percent of the plots) are common rush, tall fescue, sawtooth blackberry, and Canada goldenrod.

5.0 STREAM MONITORING

5.1 STREAM SUCCESS CRITERIA

As stated in the approved Mitigation Plan, the stream restoration success criteria for the site includes the following:

- *Bankfull Events*: Two bankfull flow events must be documented within the five-year monitoring period.
- *Cross-Sections*: There should be little change in as-built cross sections. Cross sections shall be classified using the Rosgen stream classification method and all monitored cross-sections should fall within the quantitative parameters defined for "E" or "C" type channels.
- *Longitudinal Profiles*: The longitudinal profiles should show that the bedform features are remaining stable, e.g. they are not aggrading or degrading. Bedforms observed should be consistent with those observed in "E" and "C" type channels.
- *Photo Reference Stations*: Photographs will be used to subjectively evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation and effectiveness of erosion control measures.
- *Benthic Macroinvertebrates*: Sampling of benthic macroinvertebrates within the restored stream channel shall be conducted for the first three years of post-restoration monitoring.

5.2 STREAM MORPHOLOGY MONITORING PLAN

The stream monitoring program will be implemented to document system development and progress toward achieving the success criteria. The monitoring program will be undertaken for 5 years or until the final success criteria are achieved, whichever is longer.

5.2.1 Cross Sections

Two permanent cross sections will be installed per 1,000 linear feet of stream restoration work, with one located at a riffle and one located at a pool. Each cross section will be marked on both banks with permanent pins to establish the exact transect used. A common benchmark will be used for cross sections to facilitate easy comparison of year-to-year data. The annual cross-section survey will include points measured at all breaks in slope, including top of bank, bankfull, inner berm, edge of water, and thalweg, if the features are present. Riffle cross sections will be classified using the Rosgen stream classification system.

5.2.2 Longitudinal Profile

A longitudinal profile will be measured annually throughout the five-year monitoring period. The profile will be measured along a representative length of restored channel. Measurements will include thalweg, water surface, bankfull, and top of low bank. Each of these measurements will be taken at the head of each feature, for example, shallow, pool, and the max pool depth. The survey will be tied to a permanent benchmark.

5.2.3 Hydrology

The occurrence of bankfull events within the monitoring period will be documented by the use of a crest gauge and photographs. The three crest gauges will record the highest watermark between site visits, and the gauge will be checked monthly to document high flows. Digital images will be used to document the occurrence of debris lines and sediment deposition on the floodplain during monitoring site visits.

5.2.4 Photo Reference Stations

Photographs will be used to subjectively evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation and effectiveness of erosion control measures.

5.3 STREAM MORPHOLOGY MONITORING RESULTS

5.3.1 Cross Sections

The cross sections were surveyed during the monitoring set-up, Year 1, Year 2, Year 3, Year 4 and in September 2012 for Year 5. The baseline data has been compared with the Year 1-4 monitoring data in **Appendix B**. Compared to the documented baseline data, the Year 5 channel cross sections showed that overall stream dimensions remained stable throughout the growing season. Very little change is noticed through Year 5 Monitoring on most cross sections. Cross Sections 6, 7 and 13 show a slight amount of aggradation but present no threat to channel stability.

5.3.2 Longitudinal Profile

A longitudinal profile survey was conducted along six separate reaches of the restoration project, totaling approximately 3,455 linear feet. Survey was conducted in reach UT1-B Upper from STA 112+72 to STA 119+20, in reach UT1-C from STA 107+00 to STA 112+72, in reach UT1-D from STA 154+00 to STA 158+30, in reach UT1-F from STA 182+80 to STA 185+80, in UT3-A from STA 239+00 to STA 335+00, and in reach UT3-B from STA 307+00 to STA 315+20. The longitudinal profile information documents the elevations and locations of known streambed features and in-stream grade control structures according to the As-Built survey plans, as shown in **Appendix A**. The profile and cross sections show that there has been very little adjustment to stream dimension since construction. **Table 13** summarizes stream areas requiring observation. **Figure 6** shows the locations of the stream areas that require observation.

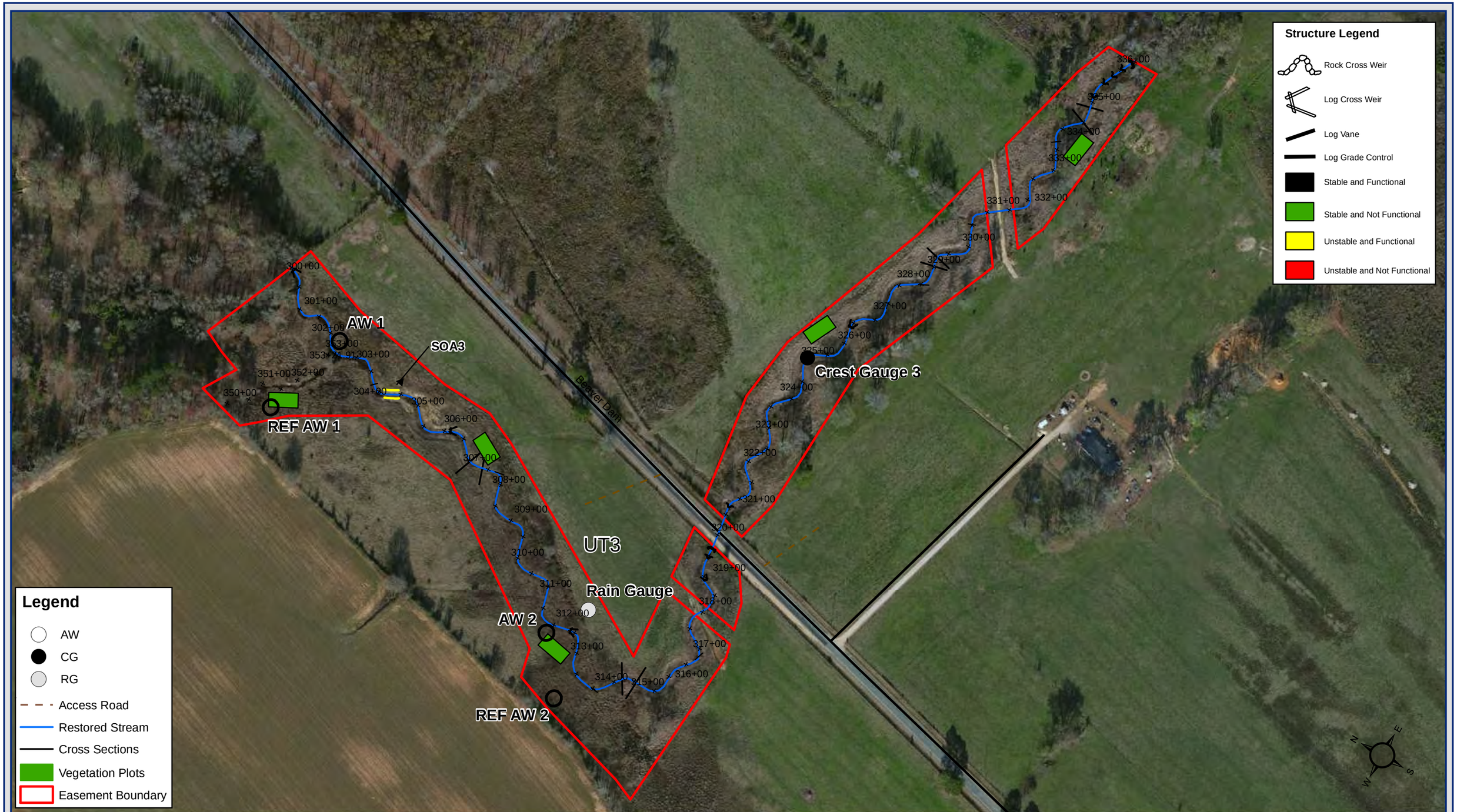
Table 13. Stream Observation Areas

SOA	Feature	STA	Description
SOA1	Left/Right Banks	UT1-A 153+00 - 153+30	Sparse vegetation on left and right banks, Remedial actions are underway to correct sparsely vegetated areas.
SOA2	Left/Right Bank Fencing	UT1-B 118+90- 119+51	Easement fencing is loose at stream crossing allowing limited cattle access, *Easement fencing has been repaired.
SOA3	Left/Right Banks	UT3 304+30 - 304+50	Sparse vegetation on left and right banks, Remedial actions are underway to correct sparsely vegetated areas.

5.3.3 Hydrology

During 2012, three crest gauges were monitored to determine if there were any out-of-bank events in the Beaverdam stream channel (**Table 14**). Two of the three crest gauges recorded bankfull events between May and October. CG3 (UT3-A) had two bankfull events in the months of May and September while CG1 (UT1-A) recorded a single bankfull event in September. CG2 (UT2) did not record any bankfull events in 2012. The largest stream flow documented for Year 5 by the onsite crest gauges was a flow that occurred during May by CG3 at a height of 1.30 feet.

Figure 6a
Beaverdam Mitigation Project
2012 Stream Current Conditions Map



0 100 200 400 Feet

1 inch = 200 feet

Figure 6b
Beaverdam Mitigation Project
2012 Stream Current Conditions Map

Table 14. Crest Gauge Data

Month Recorded	CG1	CG2	CG3
January	---	---	---
February	---	---	---
March	---	---	---
April	---	---	---
May	---	---	1.30
June	---	---	---
July	---	---	---
August	---	---	---
September	0.50	---	0.60
October	---	---	---
November	---	---	---
December	---	---	---

5.5 STREAM CONCLUSIONS

In-stream structures installed within the channel include cross vanes, log vanes, rock vanes, log weirs, and step-pools. Visual observations of structures throughout the 2012 growing season indicated that structures are functioning as designed. Sparse vegetation along both left and right banks of UT1-A from station 153+00 to 153+30 is present. On UT3 there is an area of sparse vegetation from station 304+30 to 304+50 on the left and right banks. It is recommended that this area be reseeded with a permanent seed. Remedial actions are underway to correct these sparsely vegetated areas. No major areas of bank erosion or stability issues were observed. **Table 15** summarizes the morphologic parameters; a more detailed morphologic parameters table is provided in **Appendix E.**

Table 15. Summary of Morphologic Monitoring Parameter

Parameter		Bankfull Xsec Area, Abkf (sq ft)	Avg. Bankfull Width, Wbkf (ft)	Bankfull W/D Ratio	Bankfull Mean Depth, Dbkf (ft)	Bankfull Max Depth, Dmax (ft)
Reach UT1-A	**As-Built**	9.6	7.6	6.1	1.3	1.9
	Year 1	7.5	7.4	7.3	1	1.7
	Year 2	8	10.2	13.1	0.8	1.8
	Year 3	8.5	9.1	9.8	0.9	1.9
	Year 4	8.2	8.4	8.6	1	1.7
	Year 5	7.4	7.5	7.5	1	1.7
Reach UT1-B Upper	**As-Built**	5.8	9.9	16.9	0.6	1.1
	Year 1	4.6	9	17.5	0.5	0.9
	Year 2	4.4	9.1	18.8	0.5	0.9
	Year 3	4.5	11.2	28.1	0.4	0.9
	Year 4	5	9.3	17.6	0.5	1
	Year 5	4.6	8.5	16.5	0.5	1
Reach UT1-C	**As-Built**	18.4	16.4	14.6	1.1	2.5
	Year 1	16.5	15.1	13.7	1.1	2.1
	Year 2	9.5	10.1	12.5	0.9	1.6

Parameter		Bankfull Xsec Area, Abkf (sq ft)	Avg. Bankfull Width, Wbkf (ft)	Bankfull W/D Ratio	Bankfull Mean Depth, Dbkf (ft)	Bankfull Max Depth, Dmax (ft)
	Year 3	15.1	16.9	18.8	0.8	2.3
	Year 4	15.5	16.8	18.3	0.9	2
	Year 5	14.8	17.8	21.5	0.8	2
Reach UT1-D	**As-Built**	6.8	9.8	14	0.7	1.3
	Year 1	9	11.8	15.4	0.8	1.5
	Year 2	8.7	11.5	15.1	0.8	1.5
	Year 3	8.3	12.4	18.4	0.7	1.4
	Year 4	8.1	12.2	18.5	0.7	1.3
	Year 5	6.9	11.0	17.6	0.6	1.3
Reach UT1-F	**As-Built**	5.4	9	15.1	0.6	1.2
	Year 1	4.8	9.2	17.4	0.5	1
	Year 2	5.2	9.9	18.7	0.5	1
	Year 3	4.8	8.9	16.5	0.5	1
	Year 4	4.5	9.6	20.4	0.5	1
	Year 5	4.2	9.0	19.3	0.5	0.9
Reach UT2	**As-Built**	9.5	10.5	11.6	0.9	1.7
	Year 1	9.1	10.4	11.9	0.9	1.6
	Year 2	8.9	10.4	12.1	0.9	1.6
	Year 3	9.2	10.7	12.4	0.9	1.7
	Year 4	8.4	10.5	13.1	0.8	1.5
	Year 5	9.7	12.1	15	0.8	1.7
Reach UT3-A	**As-Built**	4.7	7.3	11.1	0.6	1.2
	Year 1	4.9	7.4	11.2	0.6	1.4
	Year 2	4.7	8.2	14.3	0.6	1.3
	Year 3	5.1	9.4	17.2	0.5	1.3
	Year 4	4	8.4	18.65	0.5	1
	Year 5	4.4	8.2	15.3	0.6	1.2
Reach UT3-B Upper	**As-Built**	14.9	24.1	39.8	0.6	1.4
	Year 1	13.9	23.6	40.7	0.6	1.3
	Year 2	3.4	7.8	18.7	0.4	0.8
	Year 3	15	24.2	39	0.6	1.3
	Year 4	11.5	18.7	30.55	0.55	1.1
	Year 5	12.8	26.4	57.9	0.5	1.4

Note: The data presented here are averages of the cross section data for each stream reach. Variations in the data are due to channel adjustment and changes in bankfull elevation.

6.0 CONCLUSIONS AND RECOMMENDATIONS

- Three of the five hydrology monitoring stations within the restoration/enhancement area recorded hydroperiods of at least 10 percent of the growing season and met the

hydrologic success criterion for 2012. All three of the reference gauges experienced hydroperiods greater than 10 percent of the growing season. Gauges AW2 and AW6 experienced hydroperiods below 5 percent of the growing season.

- Gauges AW 3, AW4, and AW8 are located in potential wetland restoration areas and had hydroperiods less than the success criterion.

- Dunn weather station rainfall data indicates that the 2012 growing season rainfall amounts were below normal for most of the growing season, except for March, April, May, and August when rainfall levels were within the normal range or slightly above.

- Dunn weather station rainfall data indicates that 2010, 2011, and 2012 annual rainfall patterns are below normal limits.

- Vegetation monitoring efforts have documented the average number of stems per acre on site to be 473 for the 2012 monitoring year, with the range of stem density being 300 to 720 stems per acre.

- All plots met the success criteria of 260 stems per acres after five years. No remedial action is recommended.

- Data collected during monitoring Year 5 and observations of conditions at the site indicate that the project is successful. The stream morphology is generally stable. The easement fencing on UT1-B has been fixed to keep cattle out of the easement. One area along UT1-A from station 153+00 to 153+30 on both the left and right banks and one area on UT3 from 335+10 to 335+40 right bank need to be reseeded with a permanent seed. Remedial actions are underway to correct these sparsely vegetated areas. It was concluded that the site has achieved the stream success criteria specified in the Restoration Plan.

Table 16. Beaverdam Vegetation Summary 2008-2012

Plot Number	Stems per Acre					
	As-Built	2008 Year 1	2009 Year 2	2010 Year 3	2011 Year 4	2012 Year 5
1	620	360	540	480	520	480
2	640	420	580	500	580	580
3	600	340	420	380	380	380
4	640	340	520	540	520	480
5	620	260	500	380	240	440
6	660	360	380	360	420	460
7	620	360	600	480	480	500
8	660	560	540	480	360	300
9	400	340	340	340	320	320
10	460	420	600	600	640	560
11	760	480	440	400	360	380
12	700	640	640	560	480	480
13	680	500	540	500	480	540
14	660	480	480	620	720	720
Average	**623**	**419**	**509**	**469**	**469**	**477**

Table 17. Beaverdam Hydrology Summary 2008-2012

Gauge	Max Consecutive Hydroperiod (percent of growing season)				
	2008	2009	2010	2011	2012
Restoration/Enhancement Area					
AW1	23	31	20	14	10
AW2	4	10	8	4	4
AW5	7	21	13	8	12
AW6	4	10	4	5	4
AW7	7	16	13	7	10
Gauges Outside Restoration/Enhancement Area					
AW3	12	100	48	0	3
AW4	2	3	0	0	0
AW8	6	24	20	4	5
Reference Gauges					
RAW1	30	32	24	20	12
RAW2	6	14	10	8	11
RAW3	6	21	13	8	11

Table 18. Beaverdam Crest Gauge Summary 2008-2012

	2008			2009			2010			2011			2012		
	CG1	CG2	CG3	CG1	CG2	CG3	CG1	CG2	CG3	CG1	CG2	CG3	CG1	CG2	CG3
Number of Bankfull Events	0	0	3	1	1	5	2	1	5	2	1	3	1	0	2
Maximum Height Above Bankfull (feet)	0.6			1.4			1.4			1.1			1.3		

APPENDIX A

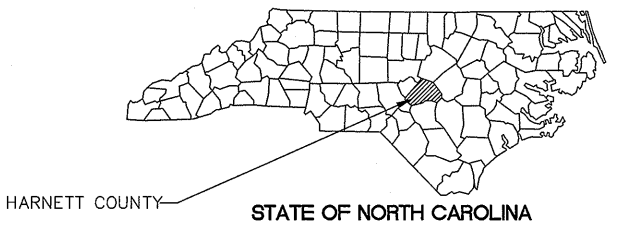
As-Built Survey

RECORD SET FOR

BEAVERDAM SWAMP

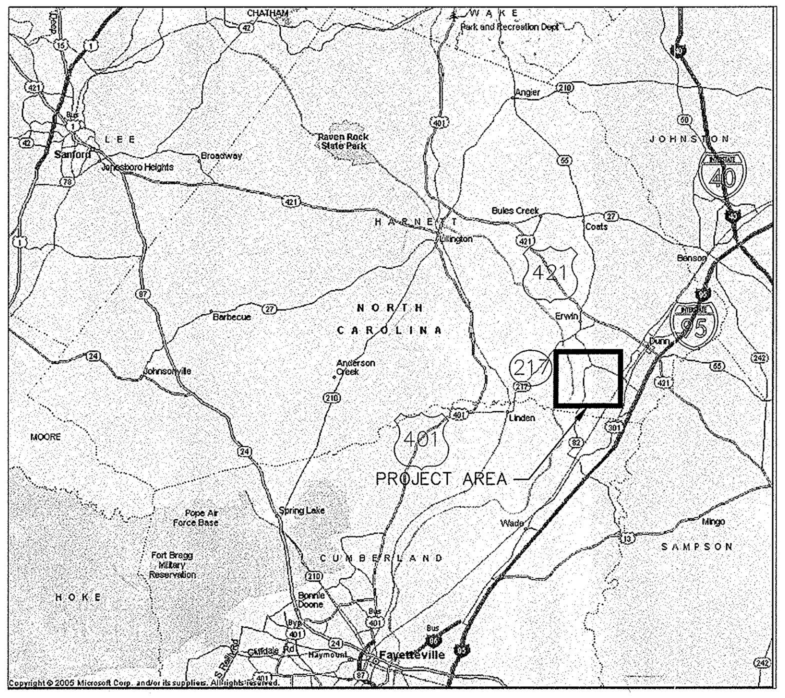
STREAM AND WETLAND RESTORATION PROJECT

EBX NEUSE I, LLC

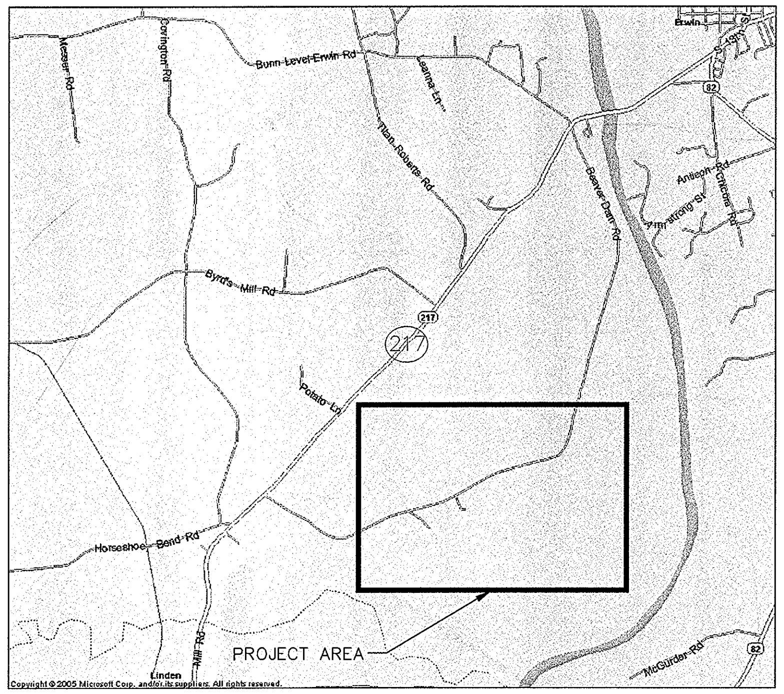


STATE OF NORTH CAROLINA

HARNETT COUNTY, NORTH CAROLINA
STATE PROJECT NO.: D06029-B



VICINITY MAP



LOCATION MAP

INDEX OF SHEETS

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

NC–EEP CONTACT: GUY PEARCE (919) 715–1656
KIMLEY–HORN AND ASSOCIATES CONTACT: TODD ST. JOHN, P.E. (919) 653–2950
ENVIRONMENTAL BANC & EXCHANGE CONTACT: NORTON WEBSTER (919) 829–9909

DISTURBED AREA: 33.4 ACRES

SURVEY PREPARED BY:

MATRIX EAST, PLLC
906 N. QUEEN ST., SUITE A
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REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

PREPARED IN THE OFFICE OF:
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CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: TITLE SHEET

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

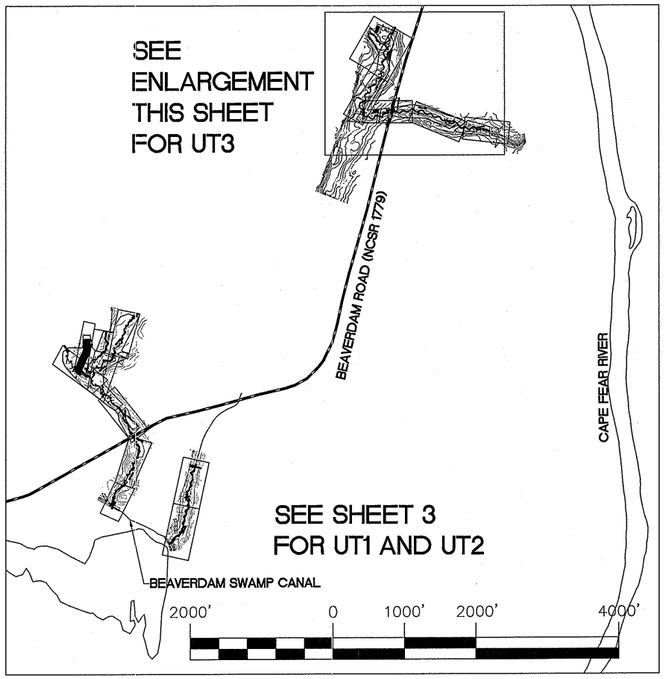
PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

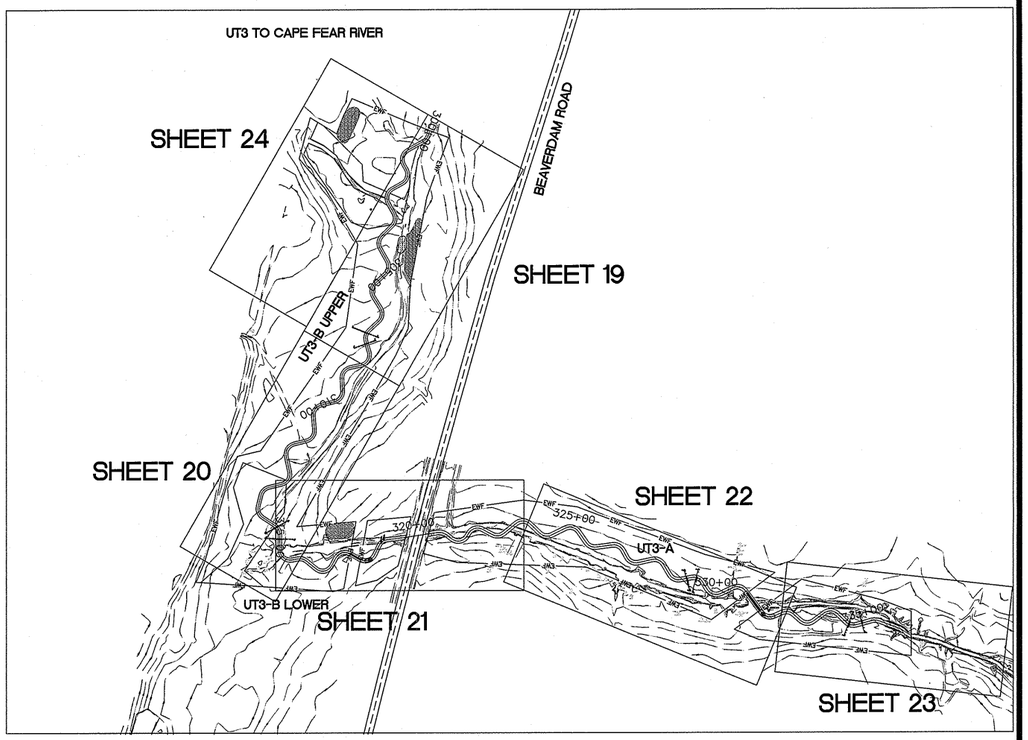
JOB NUMBER: 012620010
SHEET NUMBER: 1

April 28, 2008 - 3:41pm By: JimJohnble

T:\jim\012620010 Beaverdam Swamp Restoration\0010_LDD\dwg\RECORD SET 04-10-08\02-KEY.dwg



SITE MAP
N.T.S.



SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- WETLAND RESTORATION
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- STEP POOL
- LOG SILL
- LOG VANE
- LOG CROSS VANE

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

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CONTACT ONE-CALL CENTER
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REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: LEGENDS AND SYMBOLS

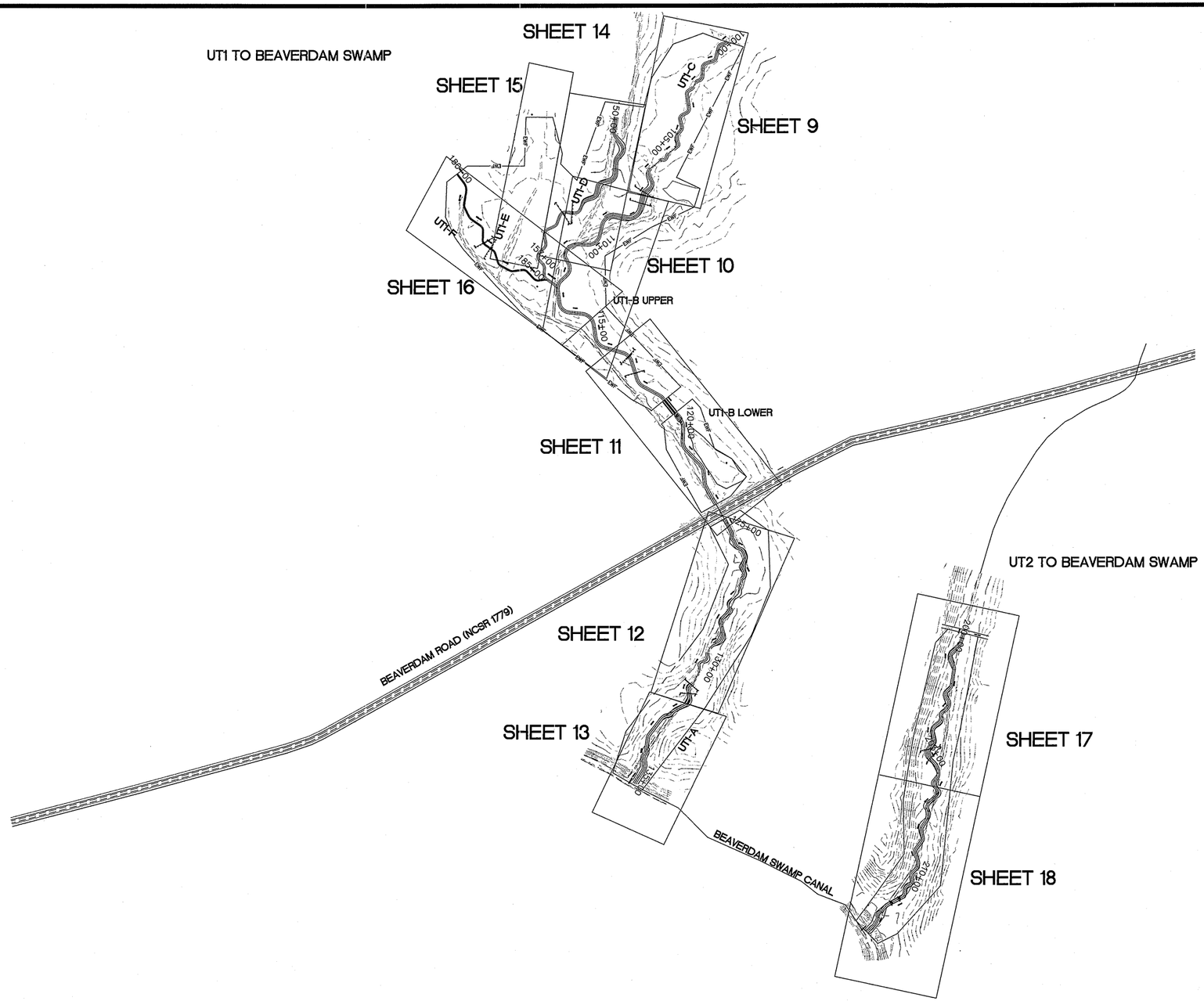
4/24/2008
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024915 TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 2



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REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

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CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: LEGENDS AND SYMBOLS

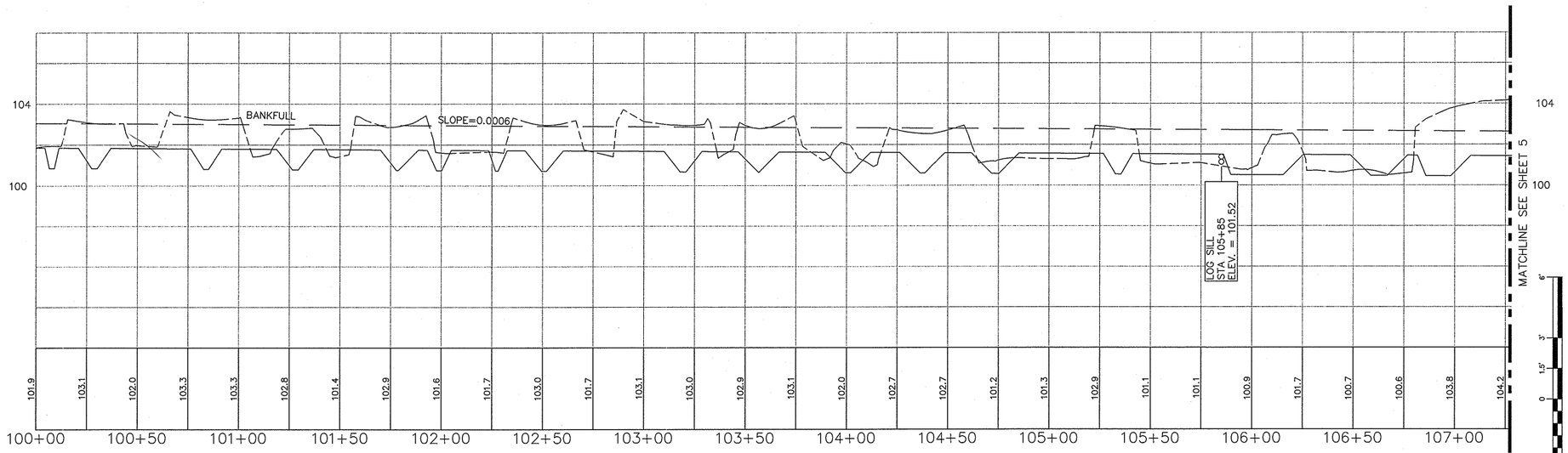
NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TODD W. ST. JOHN

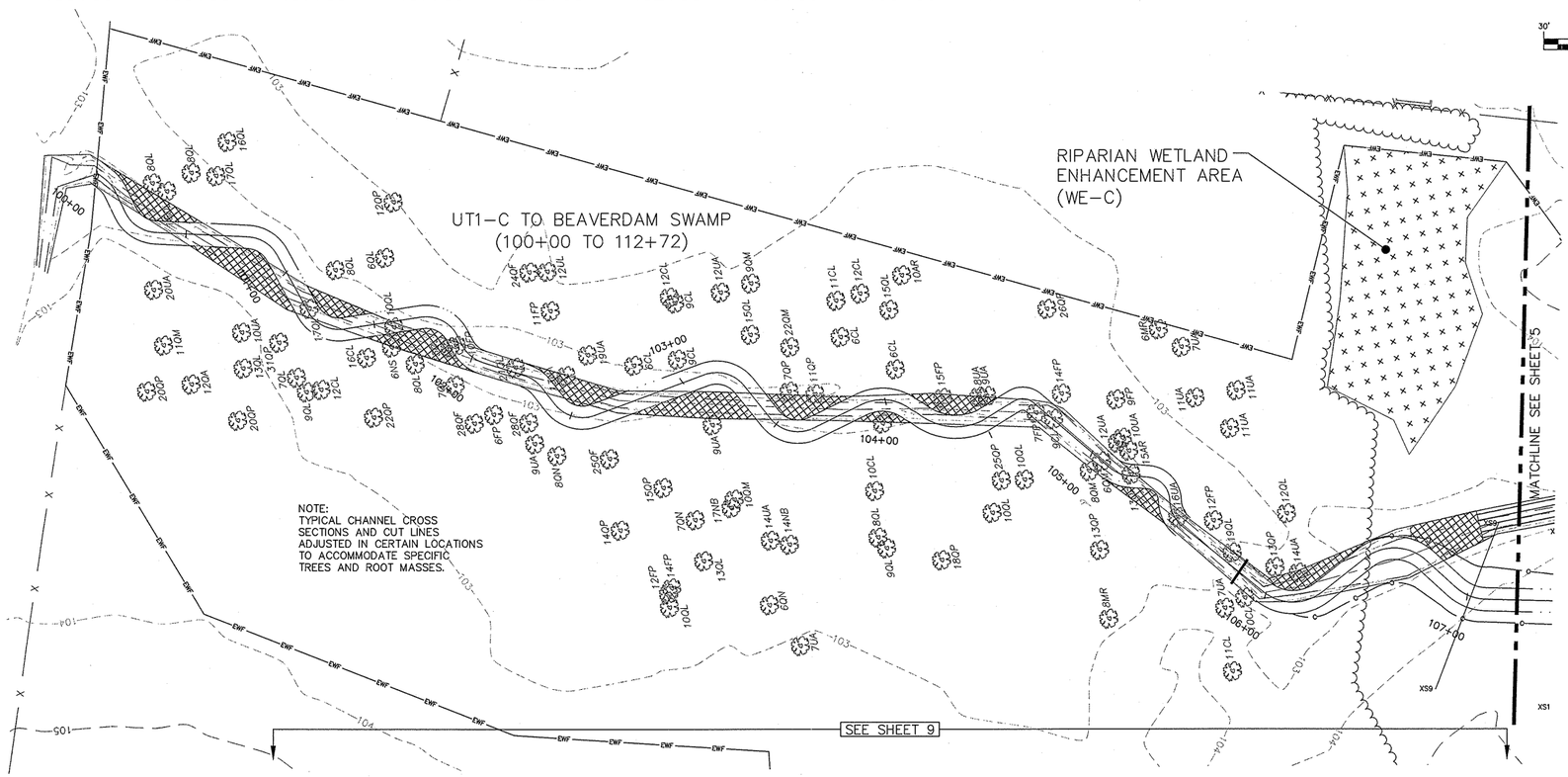
DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 3





PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND–CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A–VANE

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- EWF PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- C CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A–VANE
- ROCK VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

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30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

PREPARED IN THE OFFICE OF:
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PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024915 TODD W. ST. JOHN

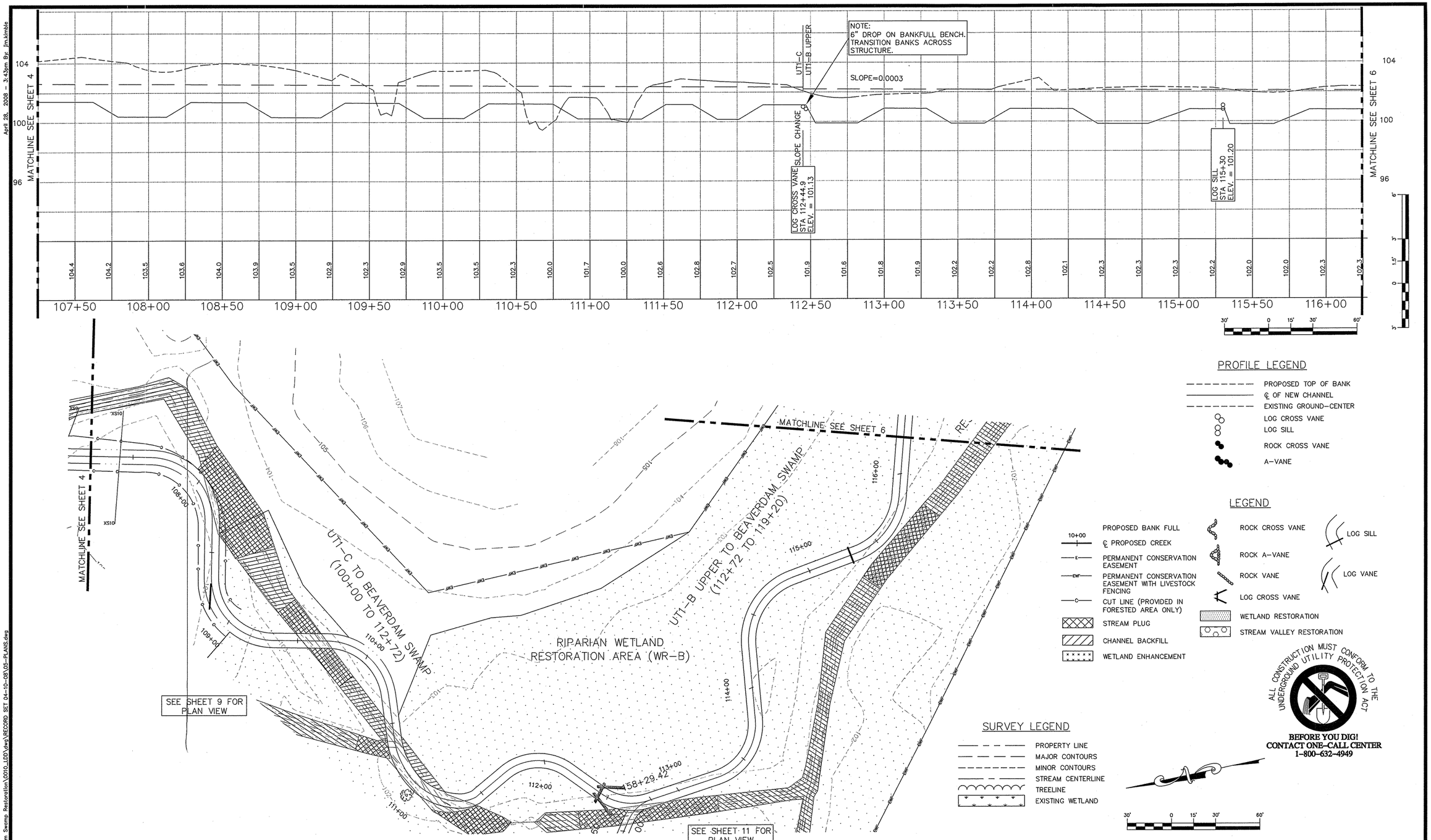
DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 4

April 28, 2008 – 3:42pm By: jim.kimble
T:\jim\012620010 Beaverdam Swamp Restoration\0010_LDD\dwg\RECORD SET 04-10-08\05-PLANS.dwg



REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

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CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024915 JOHN W. ST. JOHN

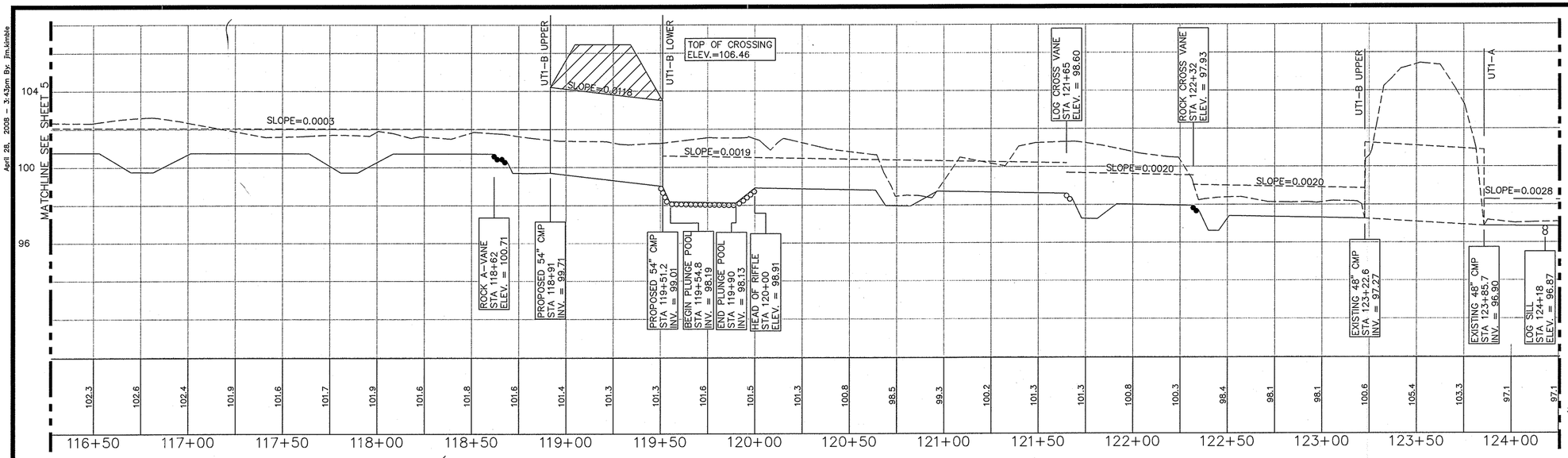
DATE:	02/25/08
DRAWN BY:	JIK
DESIGNED BY:	RTL
CHECKED BY:	TSJ

PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 5



PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND–CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A–VANE

10+00 PROPOSED BANK FULL

℄ PROPOSED CREEK

—E— PERMANENT CONSERVATION EASEMENT

—EWF— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING

—C— CUT LINE (PROVIDED IN FORESTED AREA ONLY)

STREAM PLUG

CHANNEL BACKFILL

WETLAND ENHANCEMENT

ROCK CROSS VANE

ROCK A–VANE

ROCK VANE

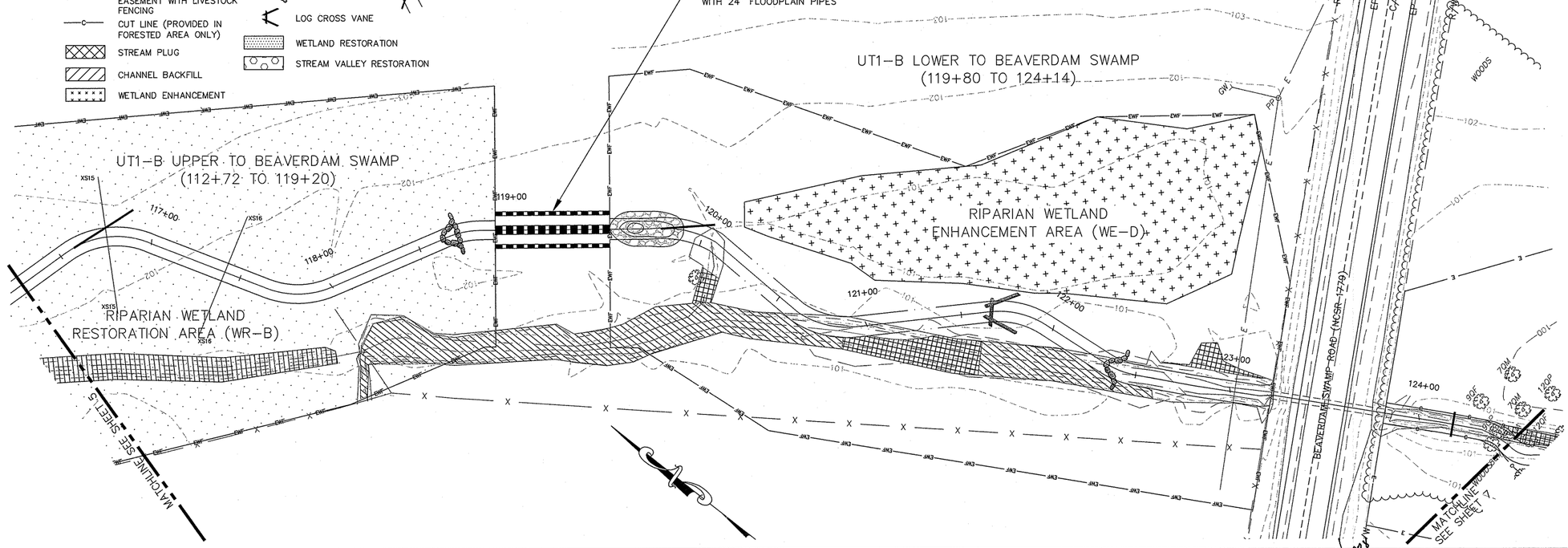
LOG CROSS VANE

WETLAND RESTORATION

STREAM VALLEY RESTORATION

LOG SILL

LOG VANE



SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

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30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

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PHONE: (919) 677–2000 FAX: (919) 677–2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

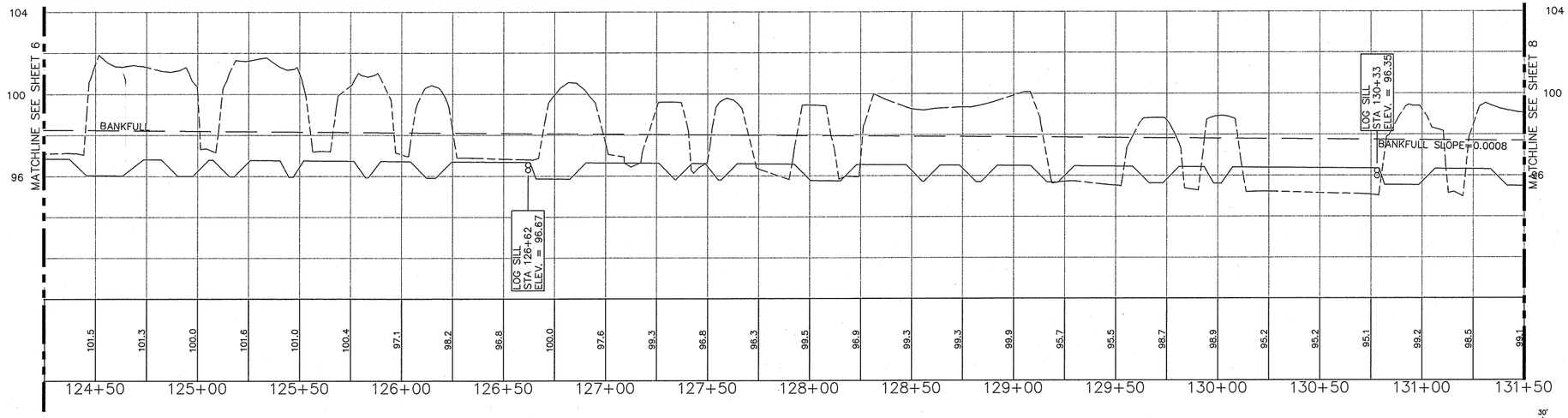
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024916 TIMOTHY W. ST. JOHN

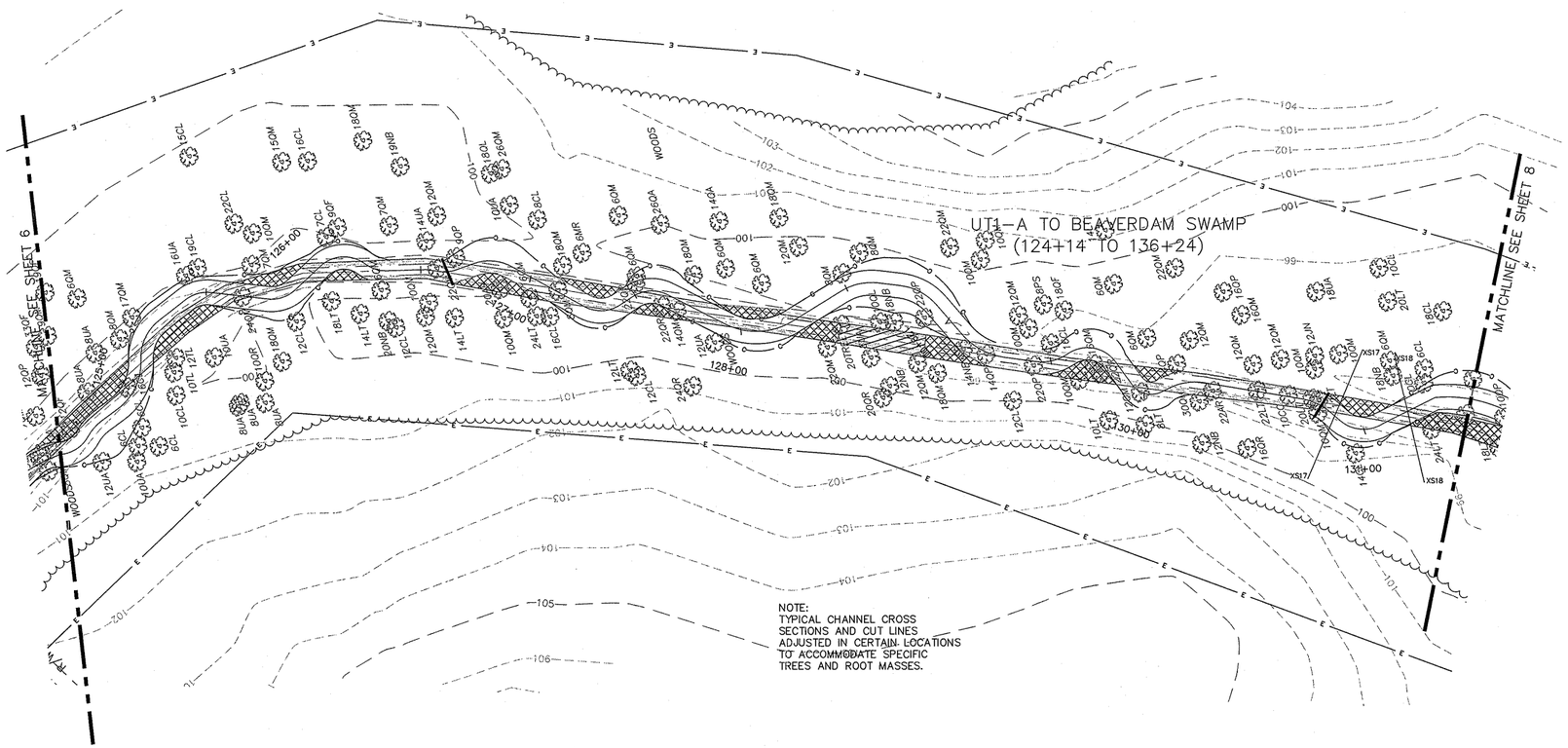
DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 6





PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND–CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A–VANE

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- E PERMANENT CONSERVATION EASEMENT
- EWF PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- C CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A–VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

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30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

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PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

4/24/2008
NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER T. W. STOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

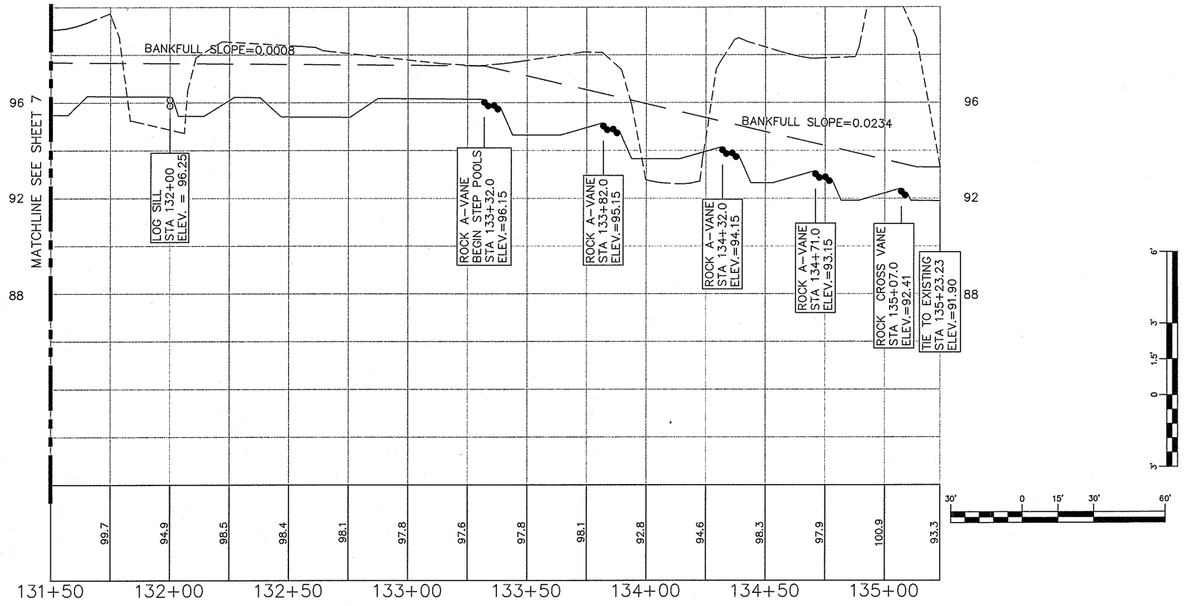
JOB NUMBER: 012620010

SHEET NUMBER: 7

April 28, 2008 - 3:44pm By: jimkimble

PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND–CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A–VANE

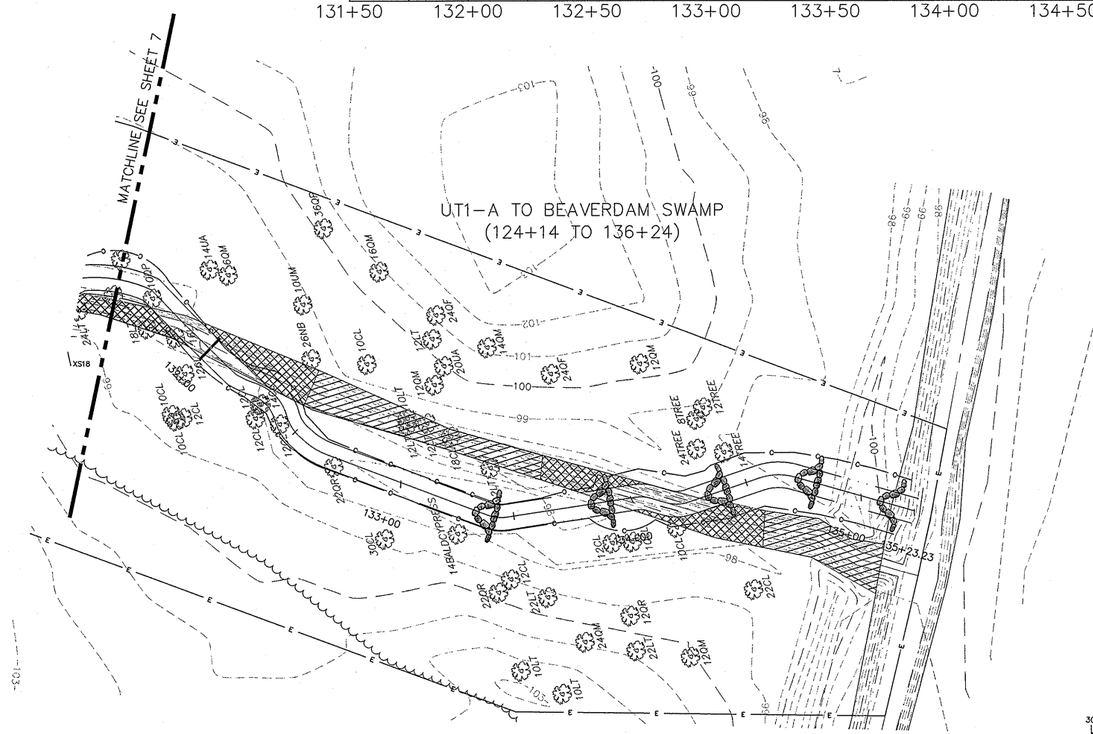


LEGEND

- PROPOSED BANK FULL (10+00)
- ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A–VANE
- ROCK VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND



NOTE:
TYPICAL CHANNEL CROSS SECTIONS AND CUT LINES ADJUSTED IN CERTAIN LOCATIONS TO ACCOMMODATE SPECIFIC TREES AND ROOT MASSES.

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1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

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PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TODD W. ST. JOHN

DATE:	02/25/08
DRAWN BY:	JIK
DESIGNED BY:	RTL
CHECKED BY:	TSJ

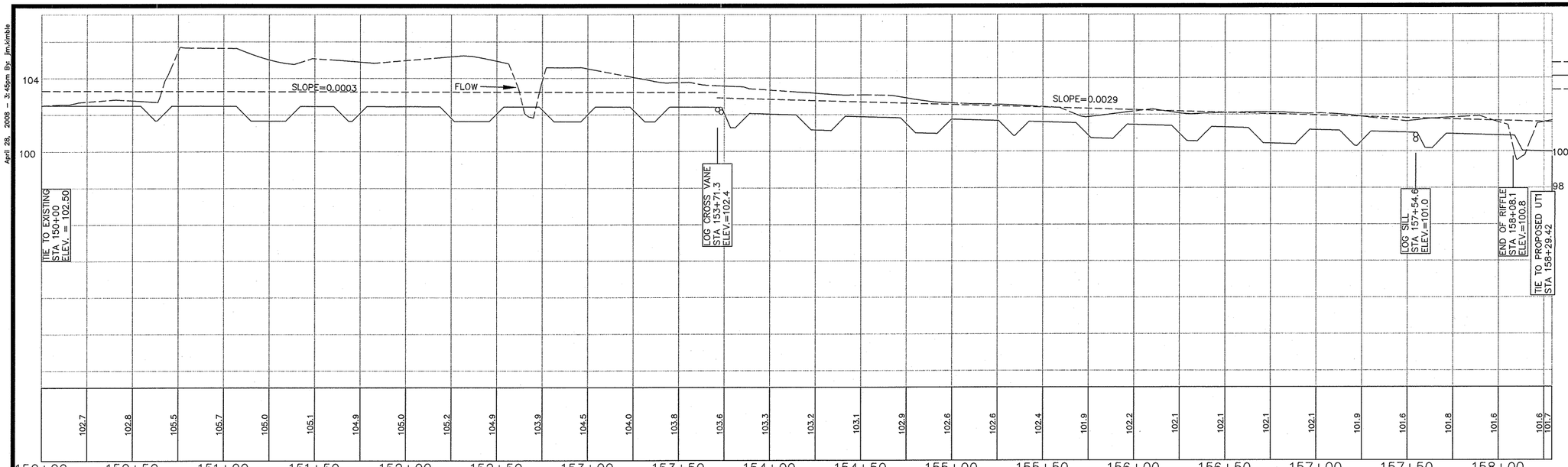
PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

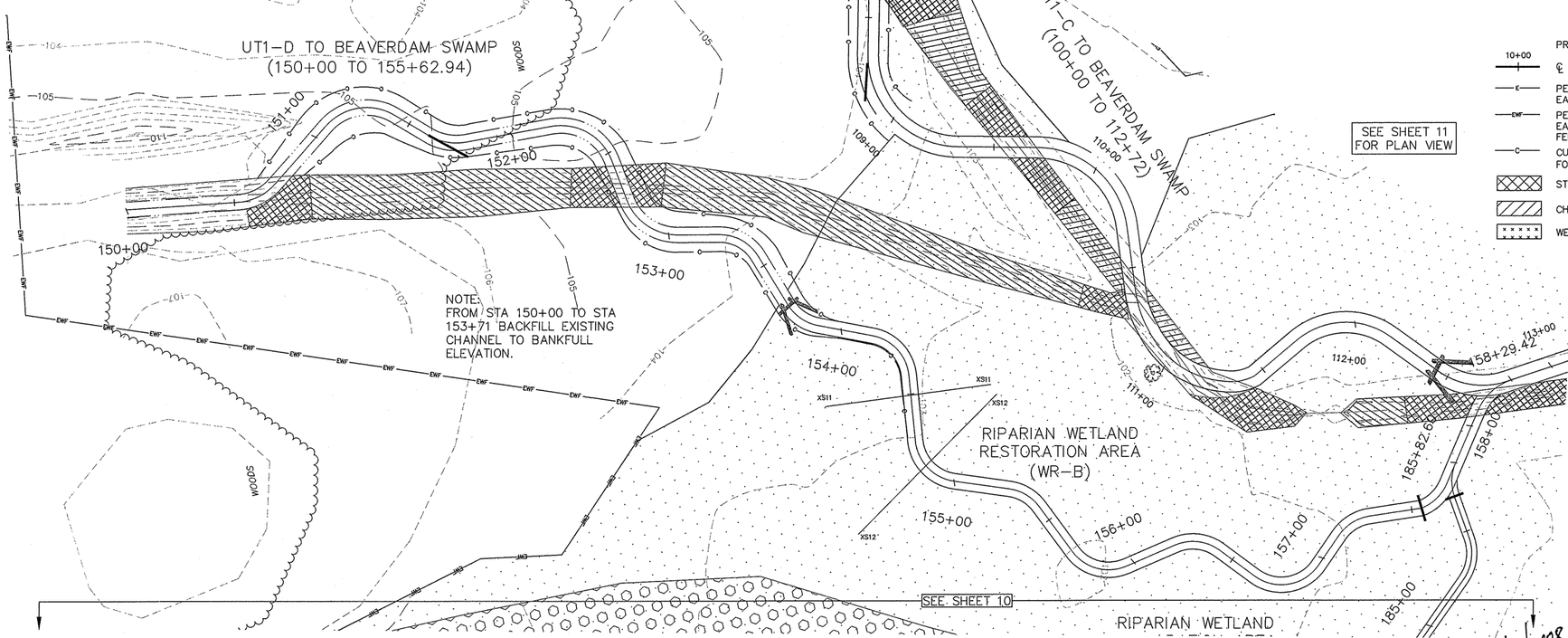
SHEET NUMBER: 8

T:\jobs\012620010 Beaverdam Swamp Restoration\0010_LDD\dwg\RECORD SET 04-10-08\05-PLANS.dwg



PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND–CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A–VANE



LEGEND

- PROPOSED BANK FULL
- ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A–VANE
- ROCK VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

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30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

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CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024915 TODD W. ST. JOHN
6/27/2008

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 9

LEGEND

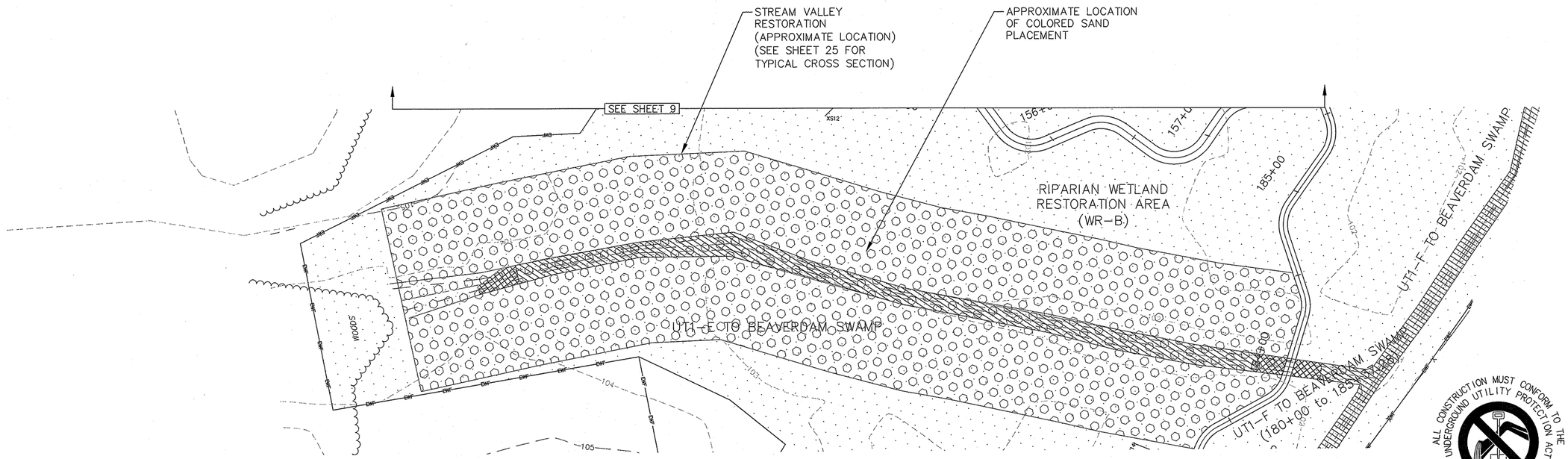
- 10+00 — PROPOSED BANK FULL
- ℄ PROPOSED CREEK
- E — PERMANENT CONSERVATION EASEMENT
- EWF — PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- C — CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A–VANE
- ROCK VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND–CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A–VANE



SEE SHEET 11 FOR PLAN VIEW

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30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

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CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 10

PROFILE LEGEND

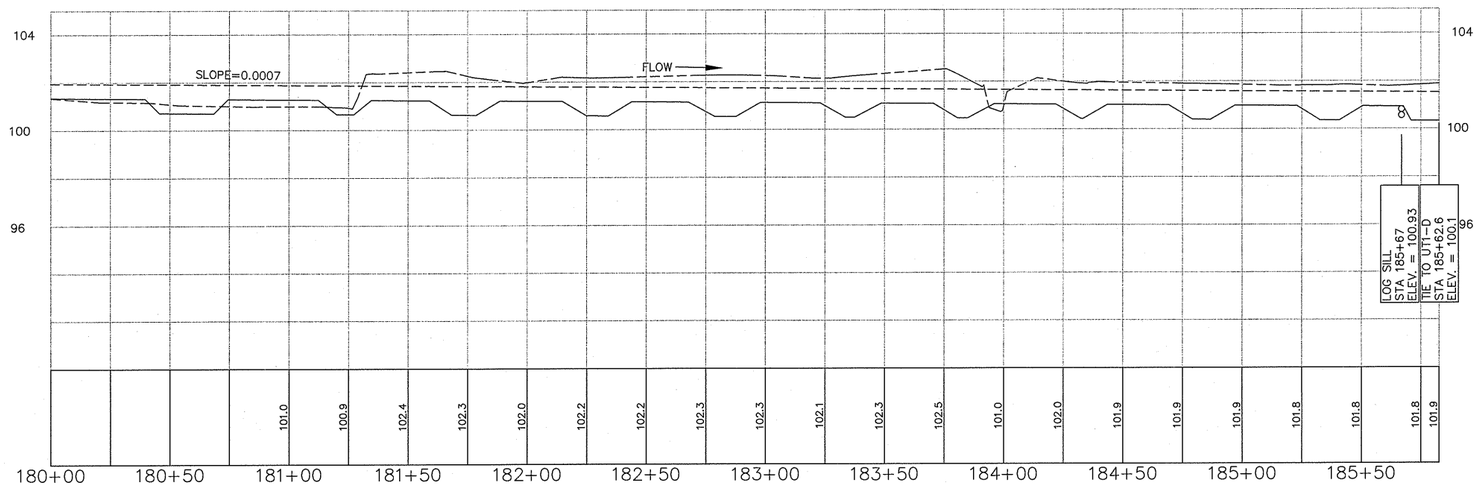
- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND-CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A-VANE

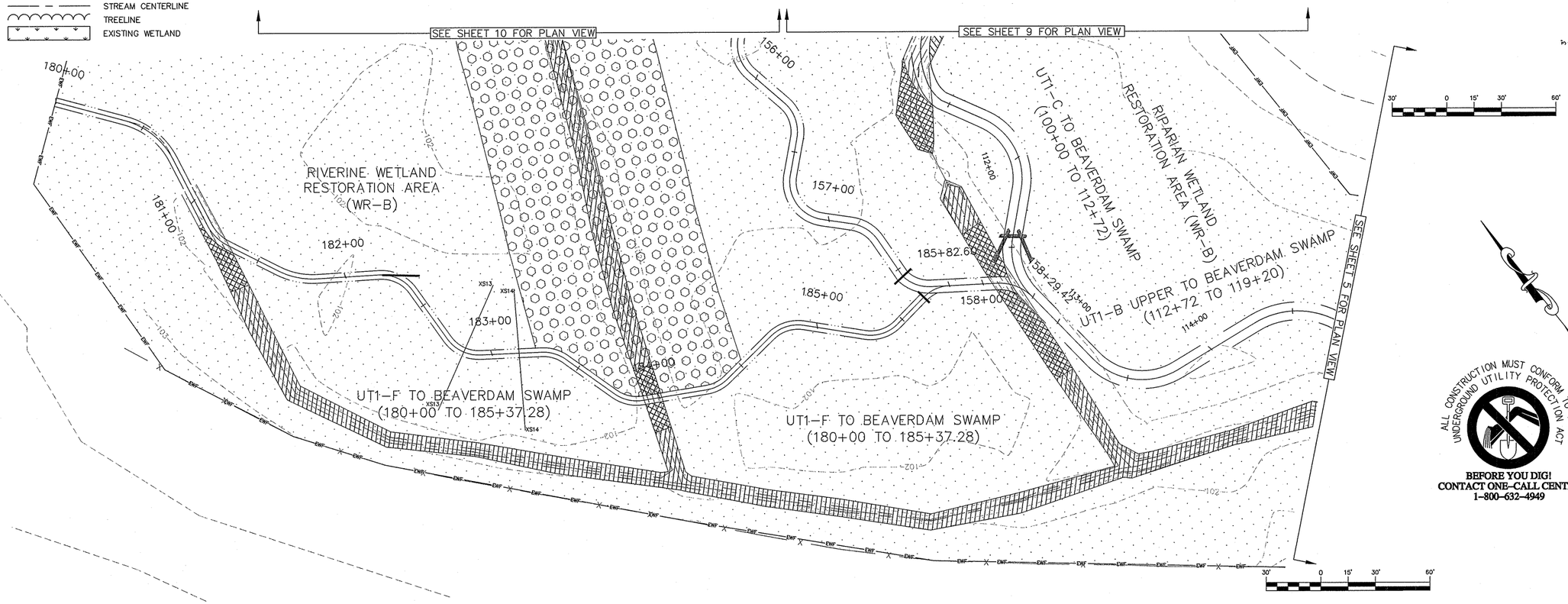
LEGEND

- 10+00 — PROPOSED BANK FULL
- ℄ PROPOSED CREEK
- —E— PERMANENT CONSERVATION EASEMENT
- —EWF— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- —C— CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND





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CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024915 TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
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PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

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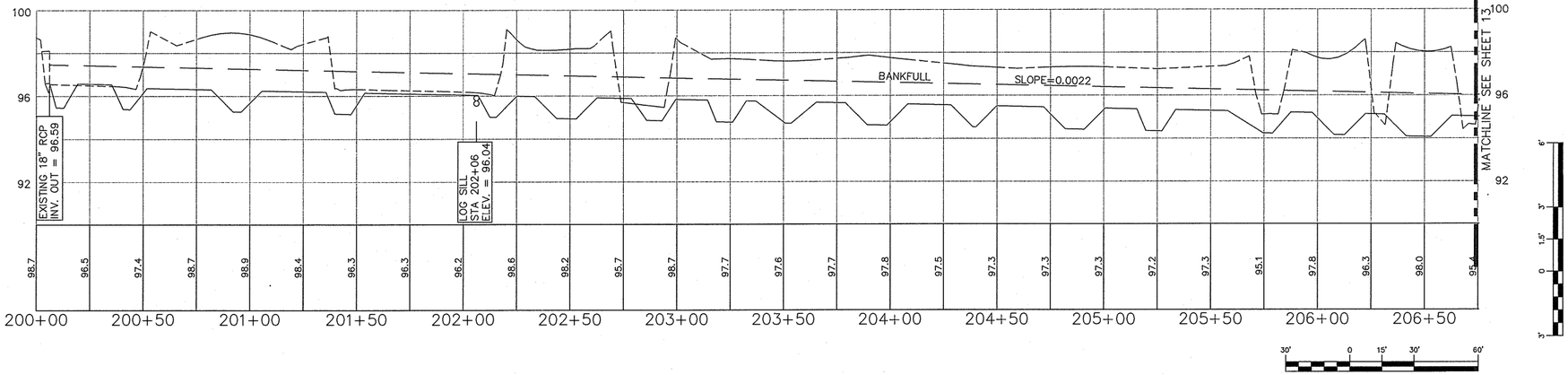
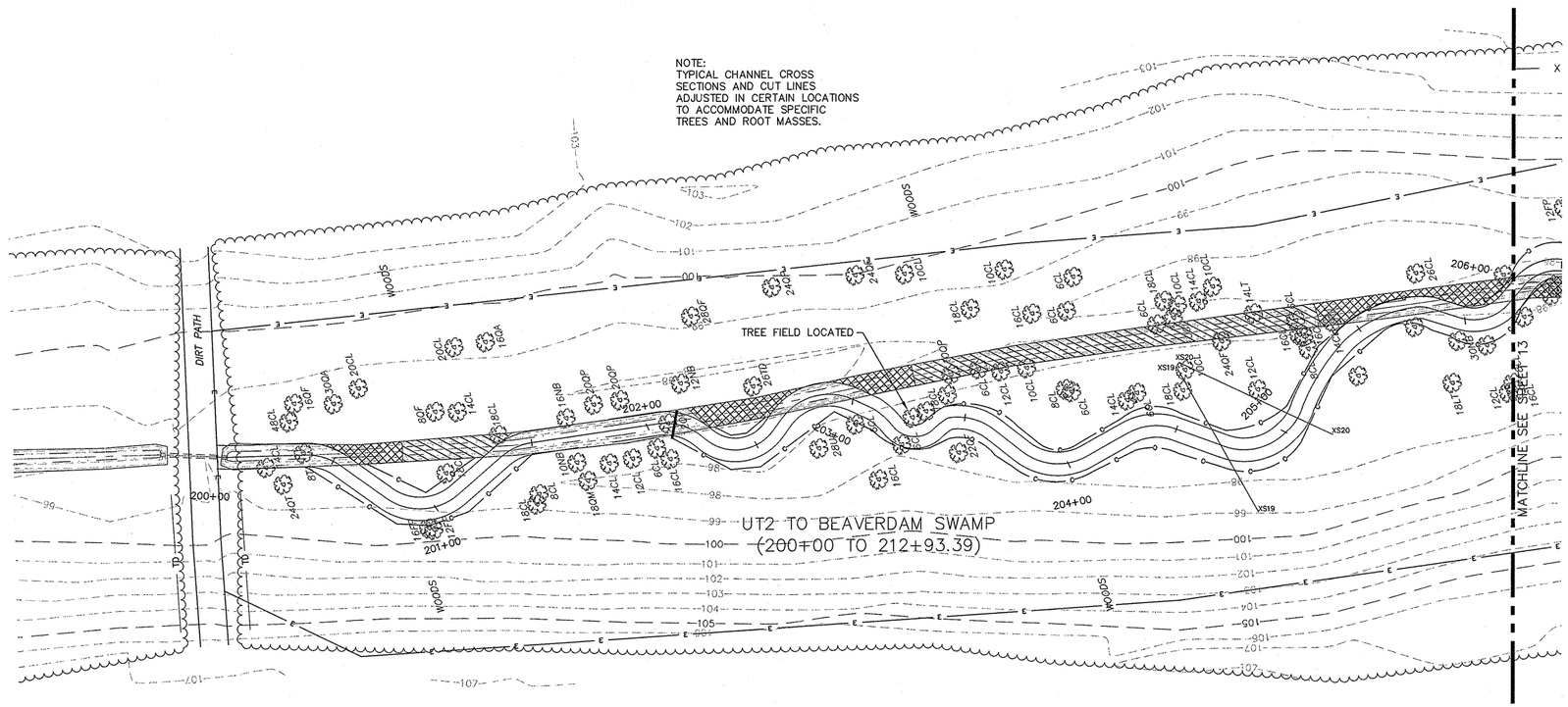
JOB NUMBER: 012620010
SHEET NUMBER: 11



NOTE:
TYPICAL CHANNEL CROSS SECTIONS AND CUT LINES ADJUSTED IN CERTAIN LOCATIONS TO ACCOMMODATE SPECIFIC TREES AND ROOT MASSES.



PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND–CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A–VANE

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A–VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

BEFORE YOU DIG!
CONTACT ONE–CALL CENTER
1–800–632–4949

30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 – RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER JOHN W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

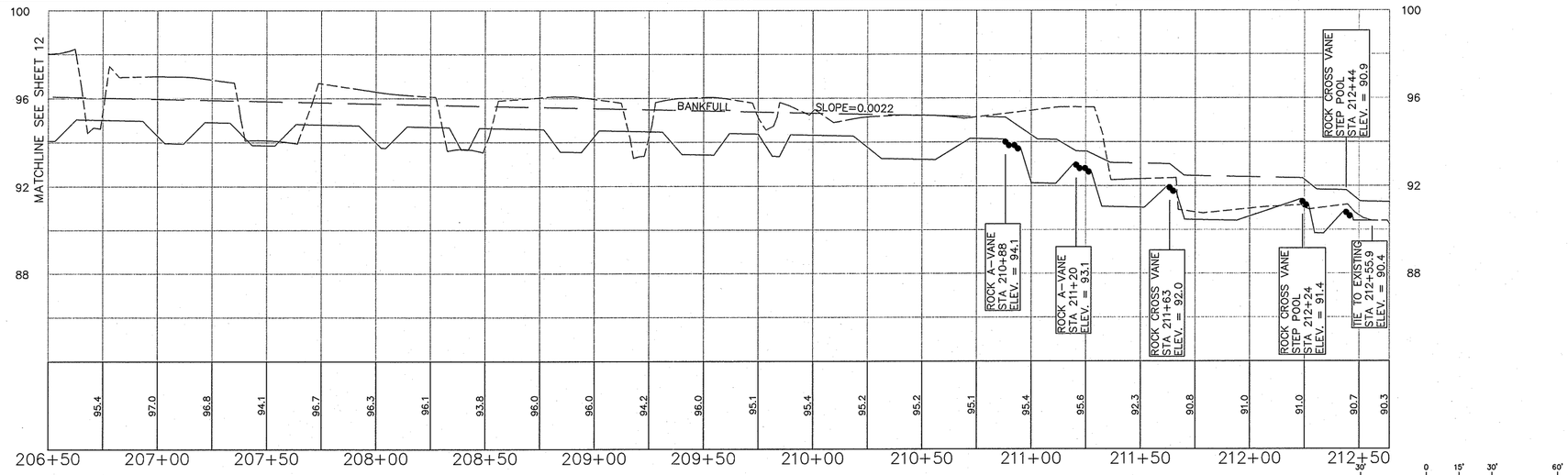
PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 12

April 28, 2008 - 3:47pm By: jim.kimble



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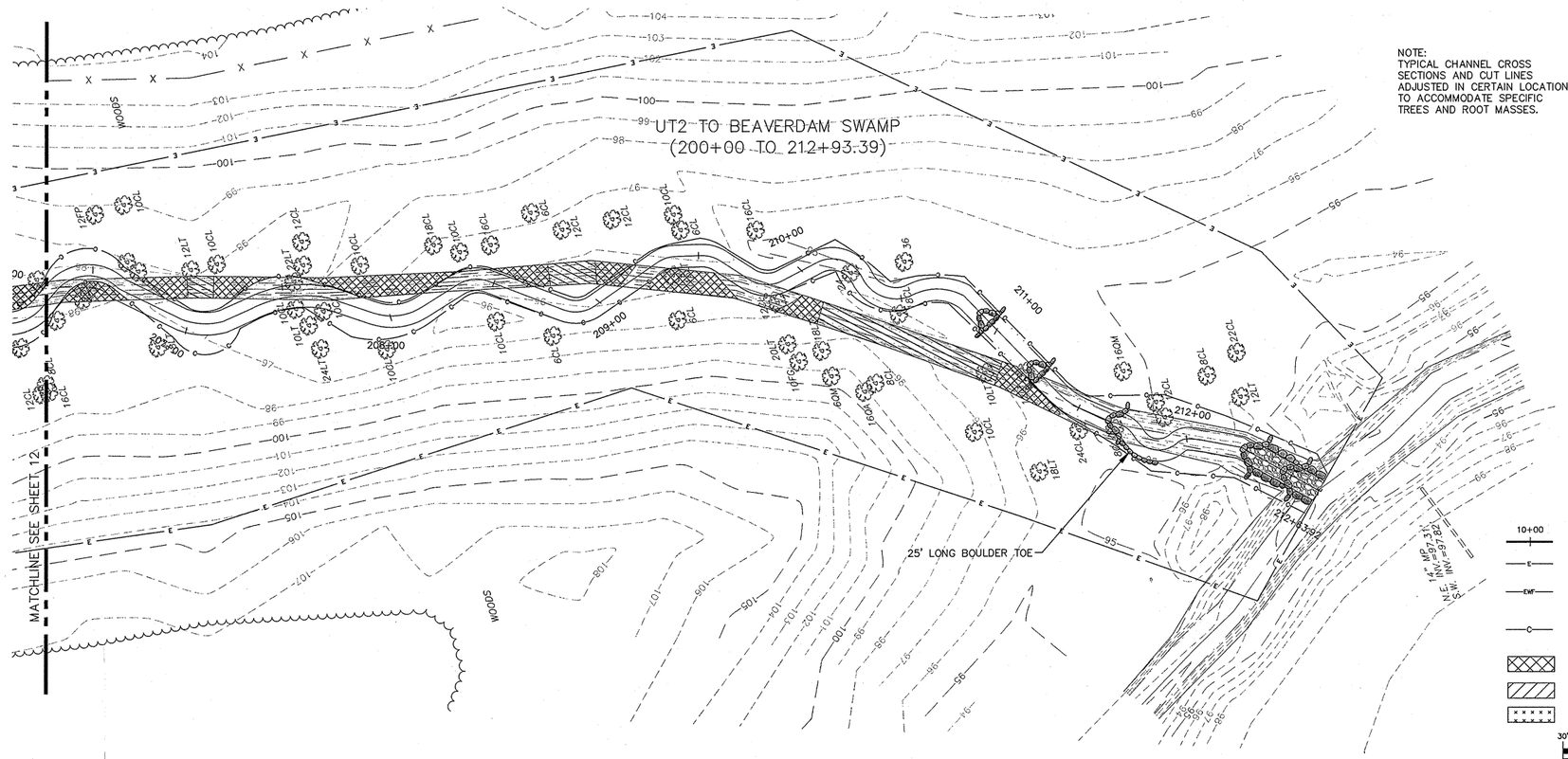
BEFORE YOU DIG!
CONTACT ONE-CALL CENTER
1-800-632-4949



NOTE:
TYPICAL CHANNEL CROSS SECTIONS AND CUT LINES ADJUSTED IN CERTAIN LOCATIONS TO ACCOMMODATE SPECIFIC TREES AND ROOT MASSES.

PROFILE LEGEND

– – – – – – – –	PROPOSED TOP OF BANK
————————	℄ OF NEW CHANNEL
– – – – – – – –	EXISTING GROUND-CENTER
○○	LOG CROSS VANE
○○	LOG SILL
●●	ROCK CROSS VANE
●●●	A-VANE

SURVEY LEGEND

— — – – —	PROPERTY LINE
— — — —	MAJOR CONTOURS
– – – – – –	MINOR CONTOURS
——— – ———	STREAM CENTERLINE
⌒⌒⌒⌒	TREELINE
▭	EXISTING WETLAND

LEGEND

	PROPOSED BANK FULL		ROCK CROSS VANE
10+00	℄ PROPOSED CREEK		ROCK A-VANE
—E—	PERMANENT CONSERVATION EASEMENT		ROCK VANE
—EMF—	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING		LOG CROSS VANE
—C—	CUT LINE (PROVIDED IN FORESTED AREA ONLY)	▨	WETLAND RESTORATION
▩	STREAM PLUG	○○	STREAM VALLEY RESTORATION
▧	CHANNEL BACKFILL		LOG SILL
××××	WETLAND ENHANCEMENT		LOG VANE

30' 0 15' 30' 60'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

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P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT:
STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE:
GRADING PLAN AND PROFILE

4/29/2008
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024915 TODD W. ST. JOHN

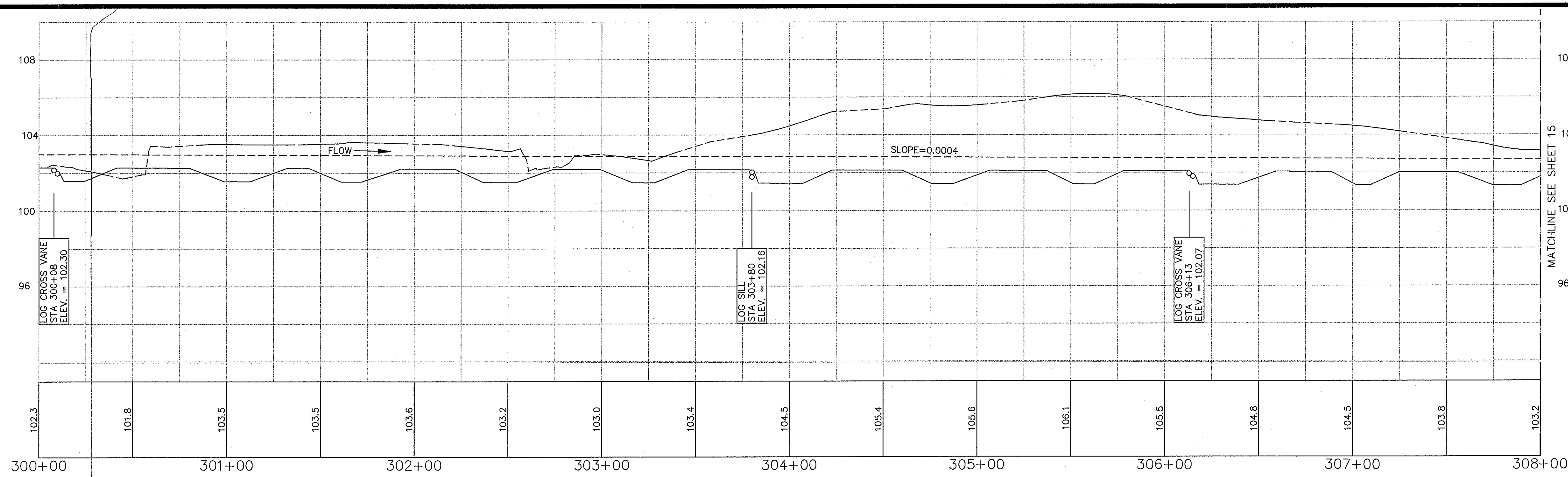
DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

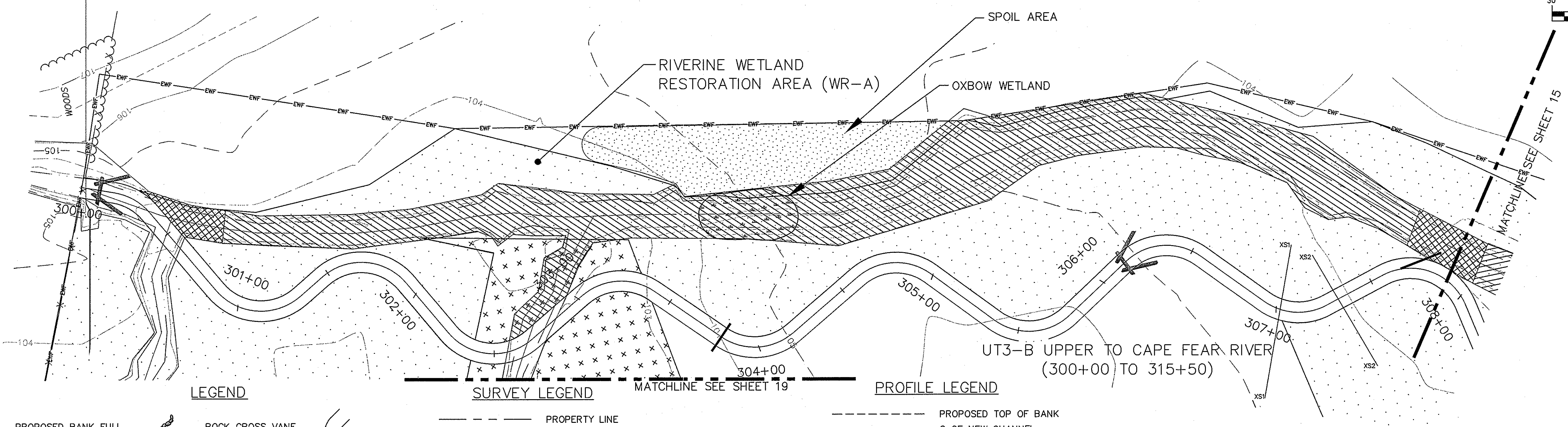
PROJECT:
BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 13

T:\pn\012620010 Beaverdam Swamp Restoration\0010_LDD\dwg\RECORD SET 04-10-08\05-PLANS.dwg





ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

BEFORE YOU DIG!
CONTACT ONE-CALL CENTER
1-800-632-4949

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE
- SPOIL AREA

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND-CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A-VANE

REV. No.	REVISION	DATE	DRAWN BY	CHECKED BY
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX
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P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

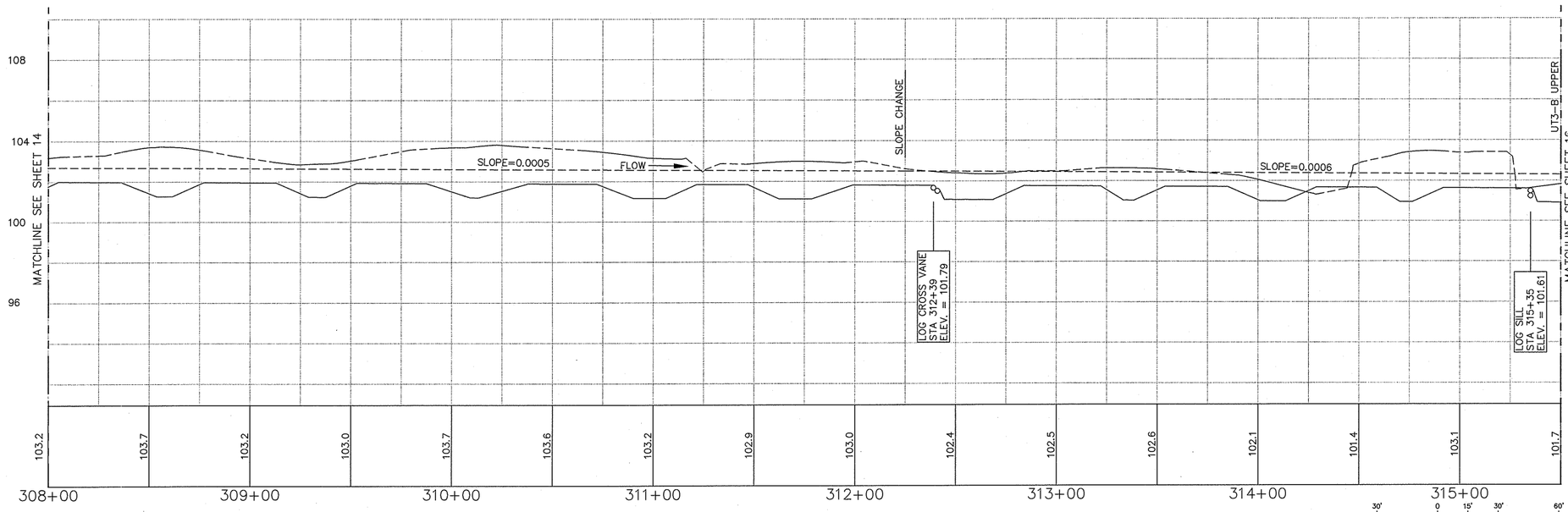
TITLE: GRADING PLAN AND PROFILE

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 14



PROFILE LEGEND

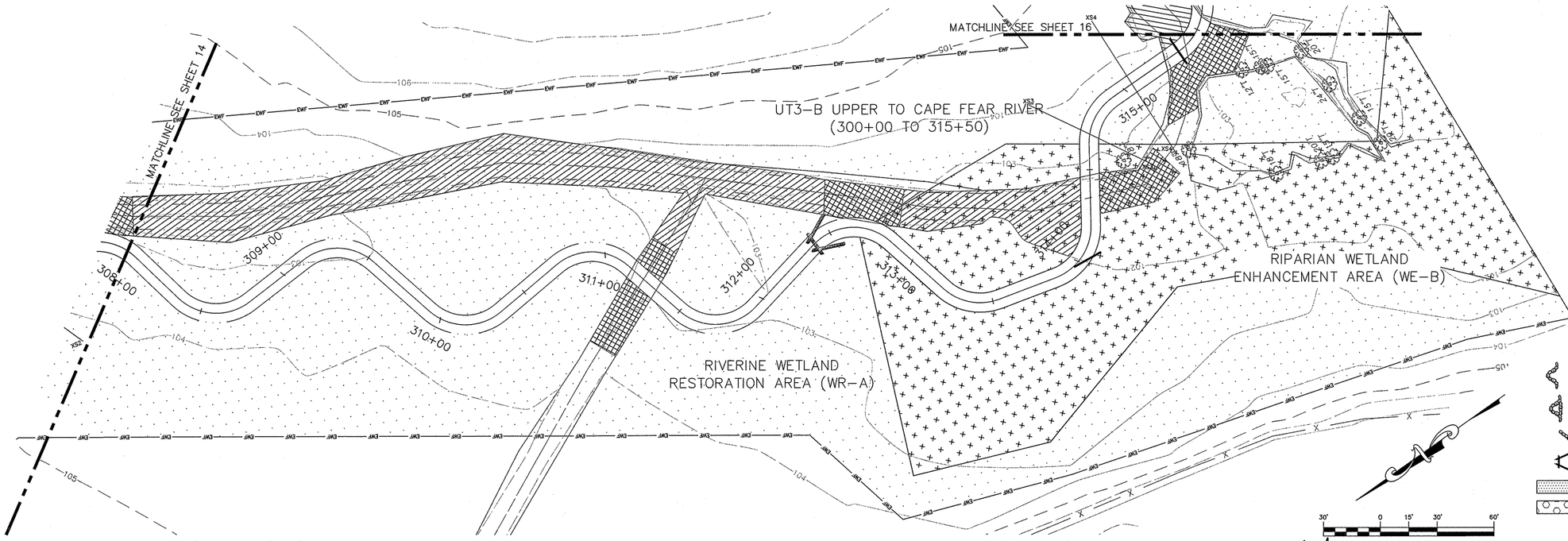
- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND–CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A–VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

6' 3' 1.5' 0 3'

30' 0 15' 30' 60'



30' 0 15' 30' 60'

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

BEFORE YOU DIG!
CONTACT ONE–CALL CENTER
1–800–632–4949

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- E PERMANENT CONSERVATION EASEMENT
- EWF PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- C CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- LOG SILL
- ROCK A–VANE
- ROCK VANE
- LOG VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

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P.O. BOX 33068 – RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 019419 TODD W. ST. JOHN

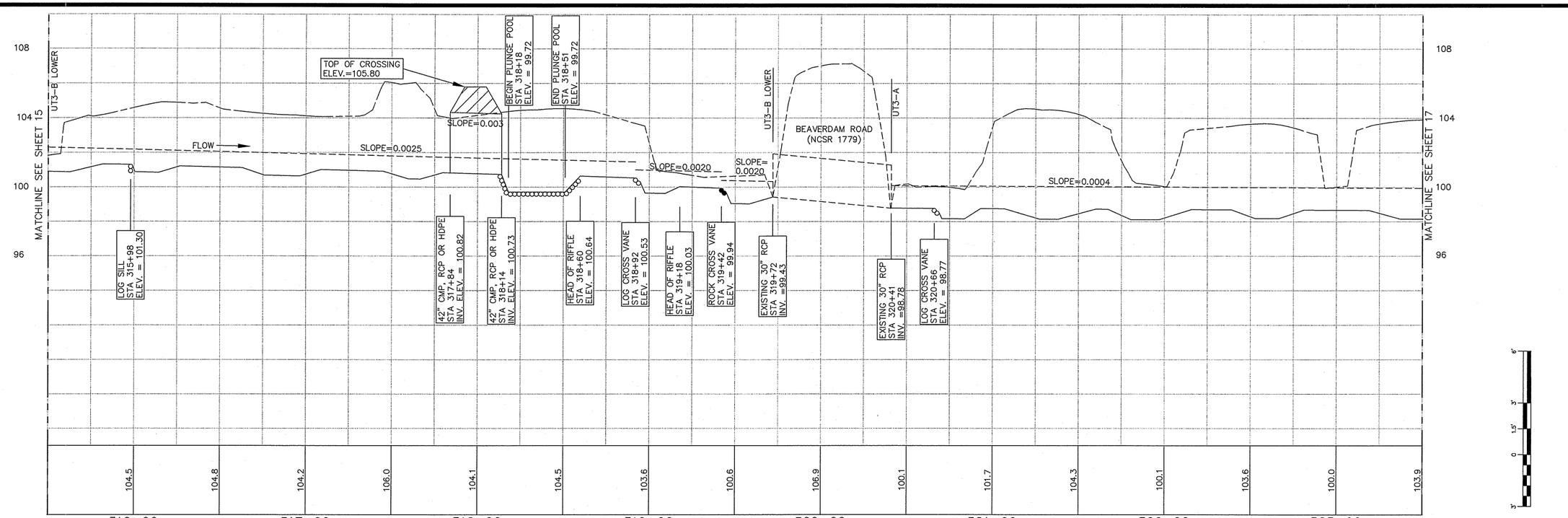
DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

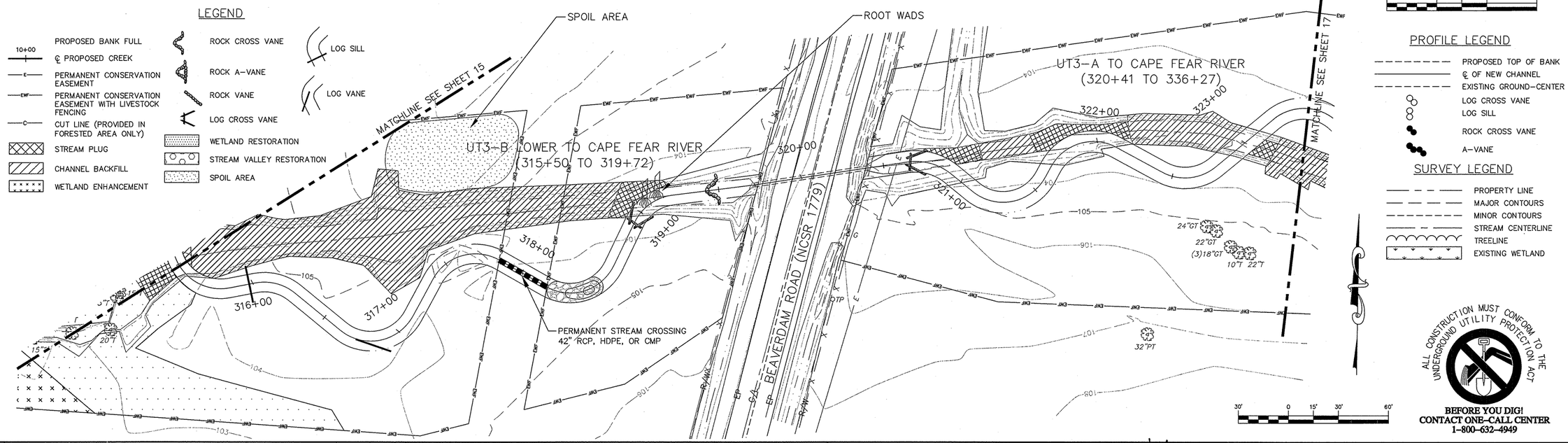
PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 15





REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 024919 ENGINEER TIMOTHY W. ST. JOHN

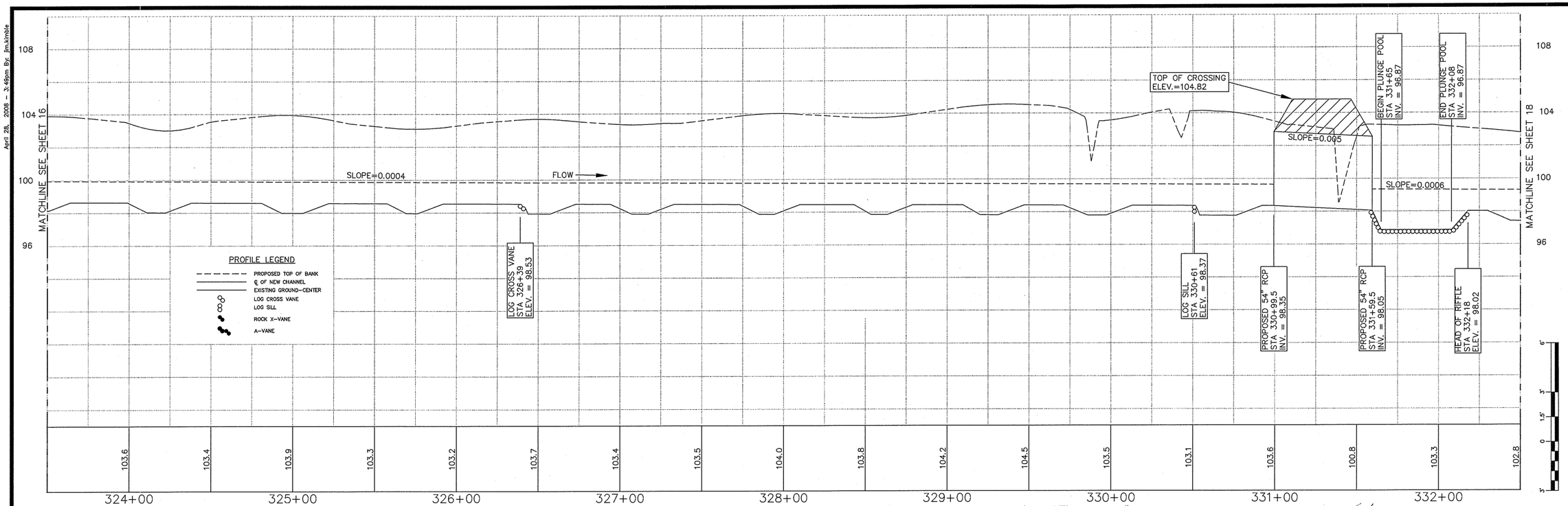
DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

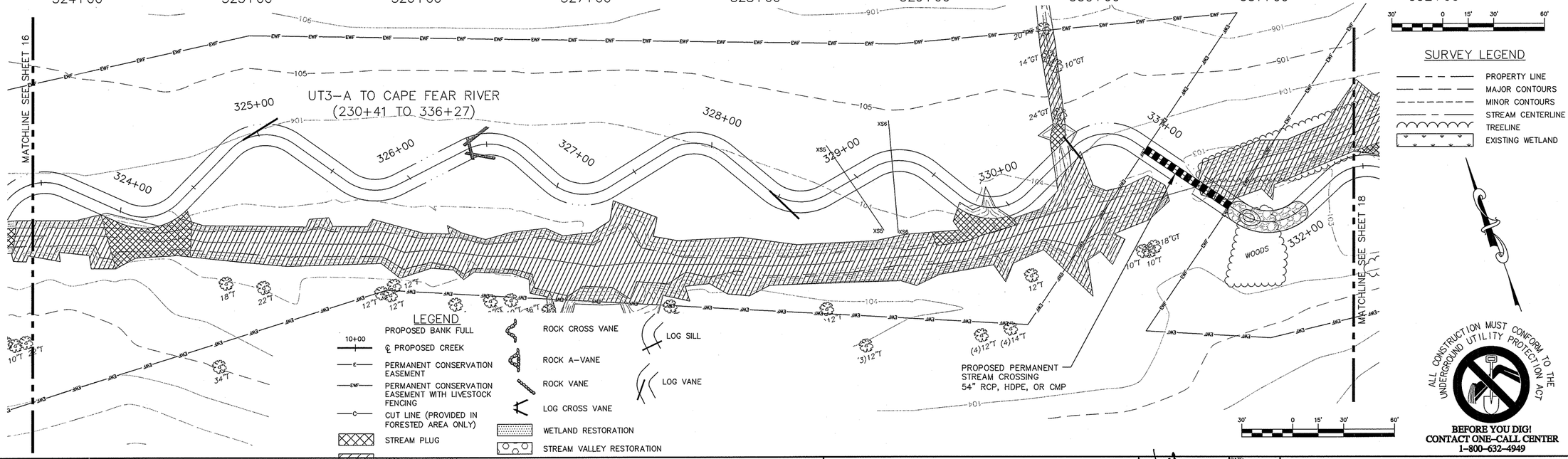
PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 16





REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
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CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TIMOTHY W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 17

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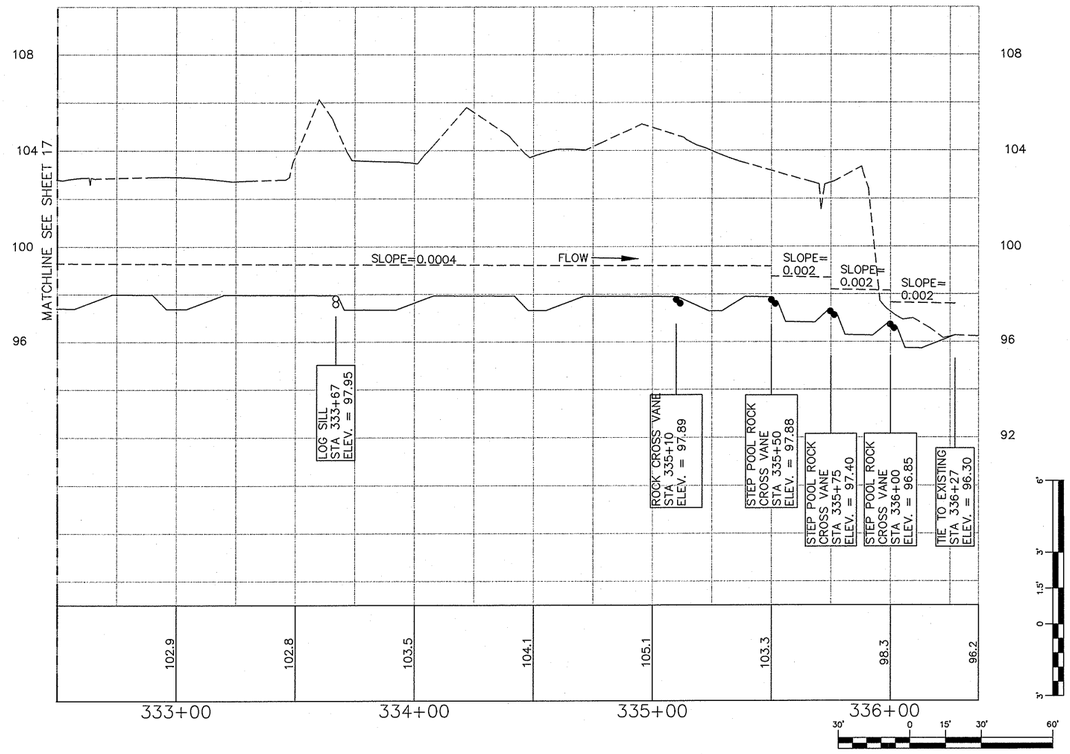

PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND-CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A-VANE

LEGEND

- 10+00 — PROPOSED BANK FULL
- ℄ PROPOSED CREEK
- E — PERMANENT CONSERVATION EASEMENT
- EWF — PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- C — CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

30' 0 15' 30' 60'

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

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REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
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EBX

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P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023915 TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 18

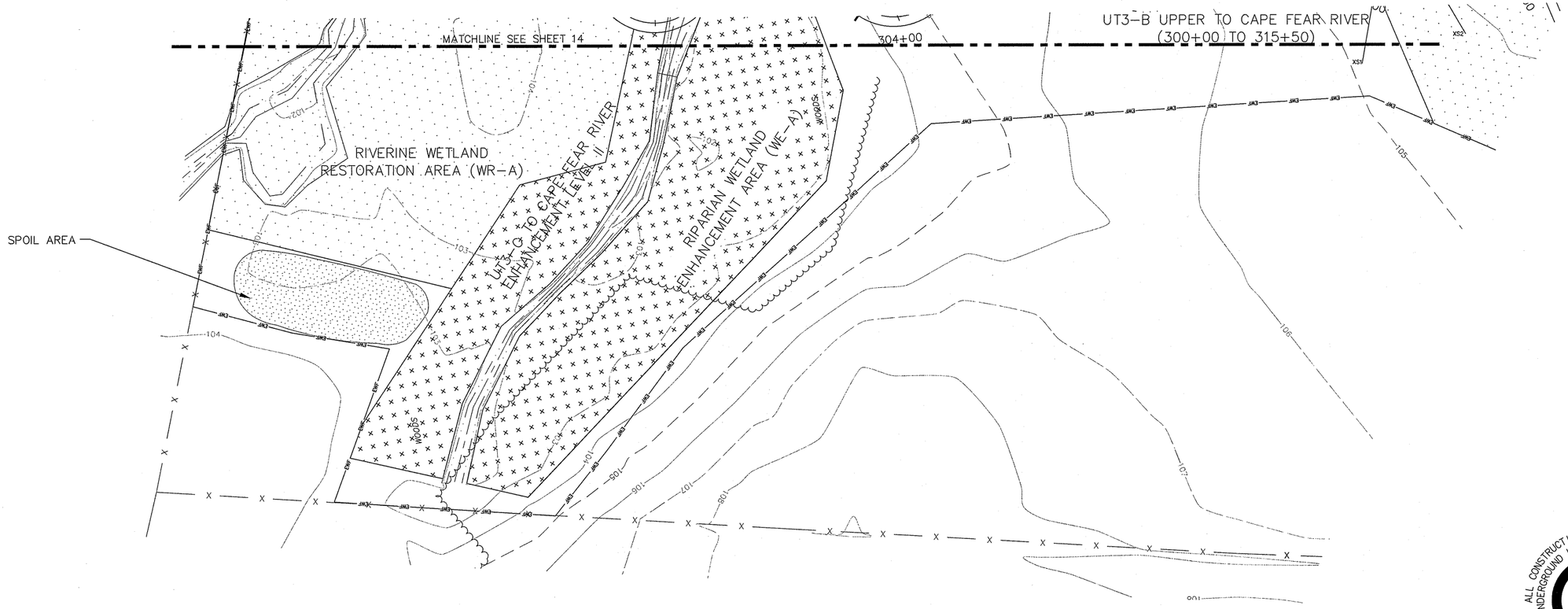
April 28, 2008 - 3:50pm By: jim.kimble

LEGEND

- PROPOSED BANK FULL
- 10+00 — ℄ PROPOSED CREEK
- —E— PERMANENT CONSERVATION EASEMENT
- —EW— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- —C— CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- SPOIL AREA
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND



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1-800-632-4949

30' 0 15' 30' 60'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
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PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER JOHN W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 19

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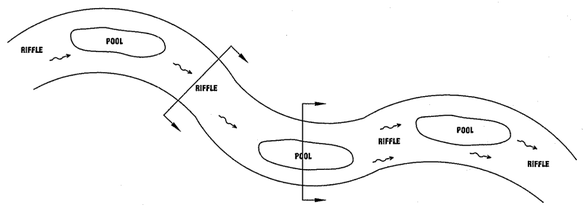


TYPICAL PLAN VIEW SCHEMATIC

NTS

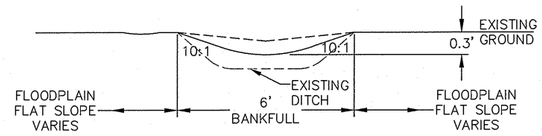
NOTES:

TYPICAL SECTIONS ARE PROVIDED TO GIVE THE GENERAL DIMENSIONS OF THE CHANNEL. FINAL GRADING WILL GIVE THE CHANNEL A MORE "NATURAL" APPEARANCE AND ALLOW A SMOOTH TRANSITION FROM EXISTING CHANNEL TO NEW CHANNEL.

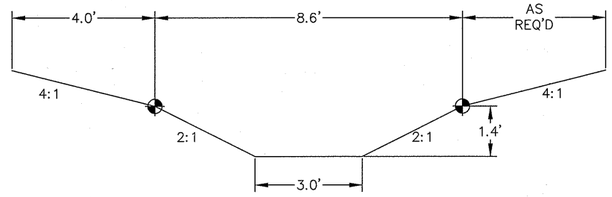
ALL POOLS SHALL BE OVERDUG 1' TO ACCOUNT FOR SEDIMENTATION.

LEGEND:

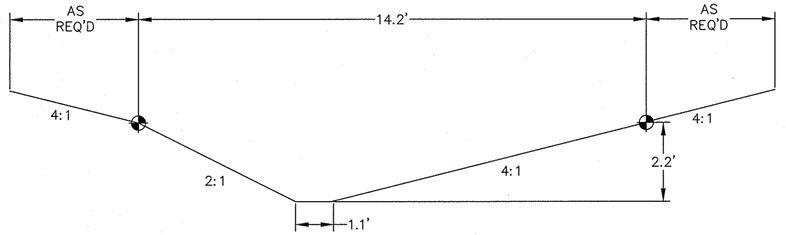
BANKFULL ELEVATION TO ACT AS VERTICAL CONTROL POINT. POINT SHOULD BE VERIFIED BY DESIGNER BEFORE EARTHWORK BEGINS.



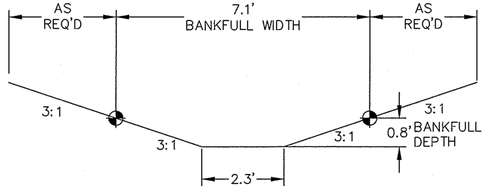
UT1-E VALLEY



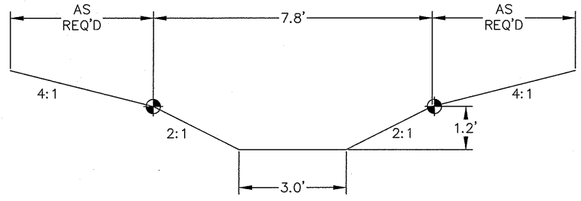
UT1-A RIFFLE
STA 123+82 TO 135+23



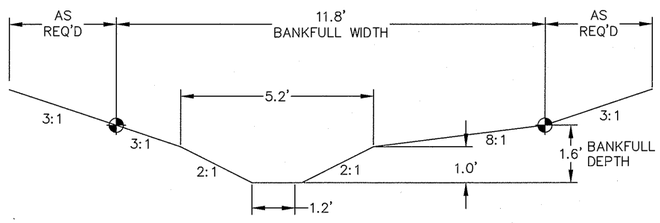
UT1-A POOL
STA 123+82 TO 135+23



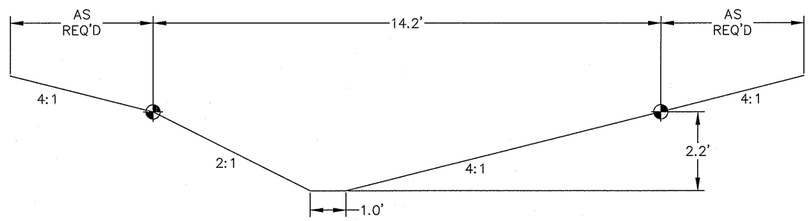
UT1-D RIFFLE
STA 150+00 TO 155+63



UT1-C RIFFLE
STA 100+00 TO 112+63



UT1-D POOL
STA 150+00 TO 155+63



UT1-C POOL
STA 100+00 TO 112+63

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: TYPICAL CROSS SECTIONS

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 20

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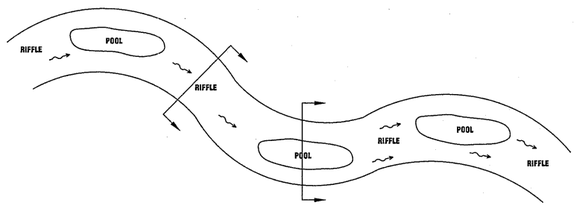
April 28, 2008 - 3:50pm By: jim.kimble



TYPICAL PLAN VIEW SCHEMATIC

NTS

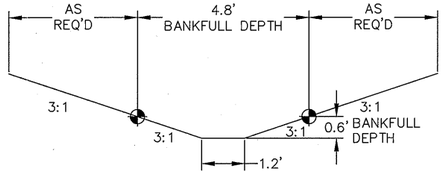
NOTES:

TYPICAL SECTIONS ARE PROVIDED TO GIVE THE GENERAL DIMENSIONS OF THE CHANNEL. FINAL GRADING WILL GIVE THE CHANNEL A MORE "NATURAL" APPEARANCE AND ALLOW A SMOOTH TRANSITION FROM EXISTING CHANNEL TO NEW CHANNEL.

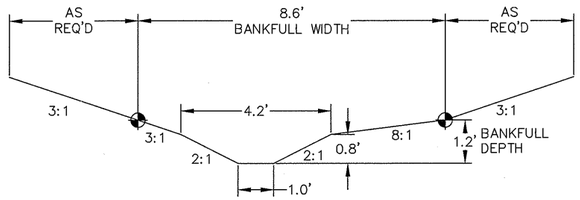
ALL POOLS SHALL BE OVERDUG 1' TO ACCOUNT FOR SEDIMENTATION.

LEGEND:

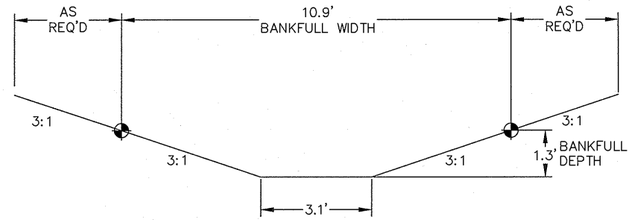
◈ BANKFULL ELEVATION TO ACT AS VERTICAL CONTROL POINT. POINT SHOULD BE VERIFIED BY DESIGNER BEFORE EARTHWORK BEGINS.



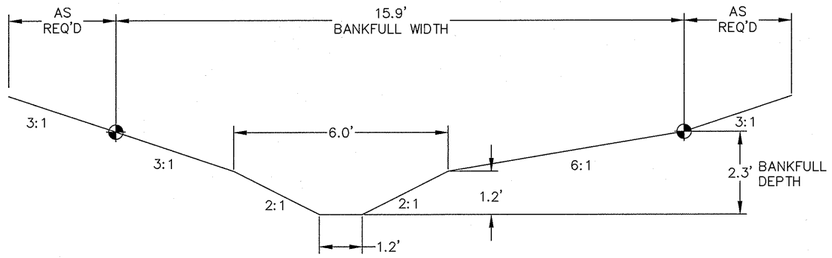
UT1-F RIFFLE
STA 180+00 TO 186+31



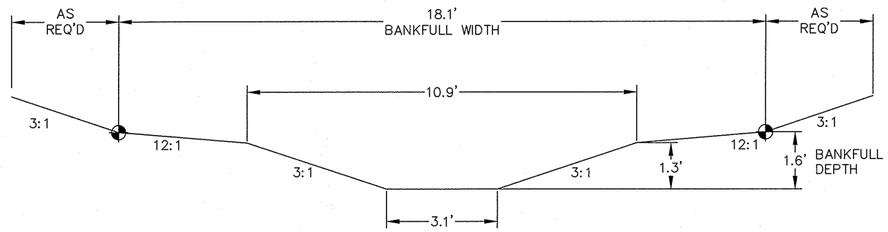
UT1-F POOL
STA 180+00 TO 186+31



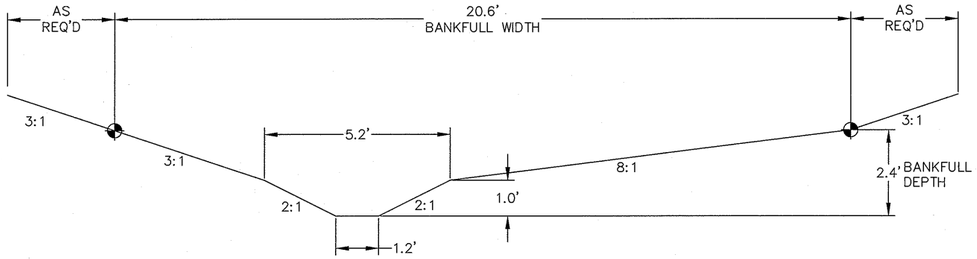
UT1-B UPPER RIFFLE
STA 112+63 TO 118+91



UT1-B UPPER POOL
STA 112+63 TO 118+91



UT1-B LOWER RIFFLE
STA 119+01 TO 123+22



UT1-B LOWER POOL
STA 119+01 TO 123+22

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: TYPICAL CROSS SECTIONS

NORTH CAROLINA PROFESSIONAL SEAL 024615 ENGINEER TODD W. ST. JOHN

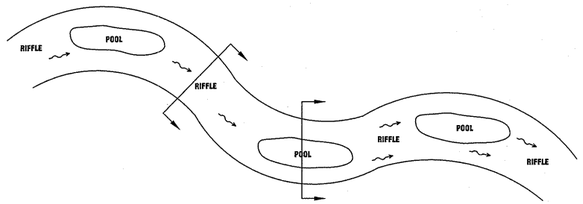
DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 21



TYPICAL PLAN VIEW SCHEMATIC

NTS

NOTES:

TYPICAL SECTIONS ARE PROVIDED TO GIVE THE GENERAL DIMENSIONS OF THE CHANNEL. FINAL GRADING WILL GIVE THE CHANNEL A MORE "NATURAL" APPEARANCE AND ALLOW A SMOOTH TRANSITION FROM EXISTING CHANNEL TO NEW CHANNEL.

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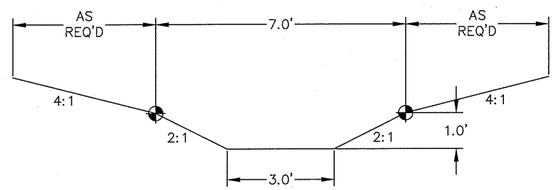
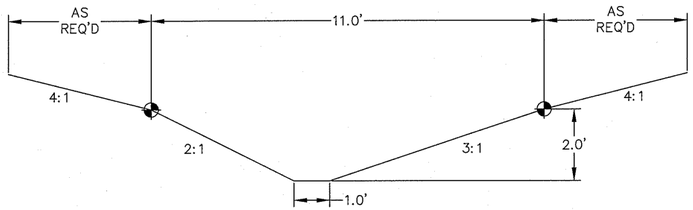
LEGEND:

◆ BANKFULL ELEVATION TO ACT AS VERTICAL CONTROL POINT. POINT SHOULD BE VERIFIED BY DESIGNER BEFORE EARTHWORK BEGINS.



UT2 RIFFLE
STA 200+00 TO 212+63.92



UT2 POOL
STA 200+00 TO 212+62.94

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: TYPICAL CROSS SECTIONS

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TIMOTHY S. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

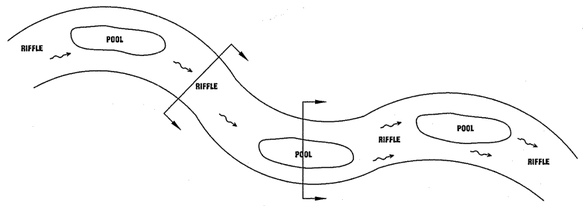
The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 22

April 28, 2008 - 3:50pm By: jim.kimble

T:\jon\012620010 Beaverdam Swamp Restoration\0310_LIDV\dwg\RECORD SET 04-10-08\08-TYPICALS.dwg



TYPICAL PLAN VIEW SCHEMATIC

NTS

NOTES:

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LEGEND:

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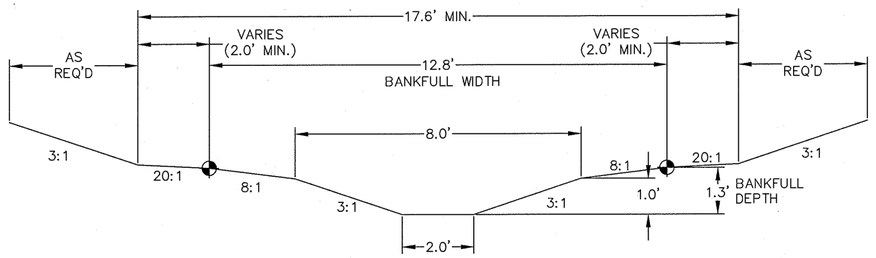
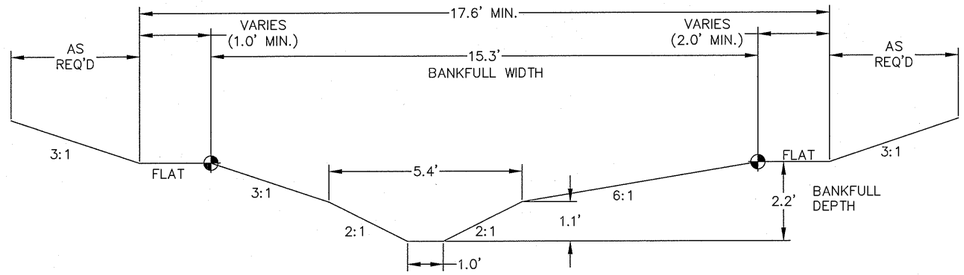
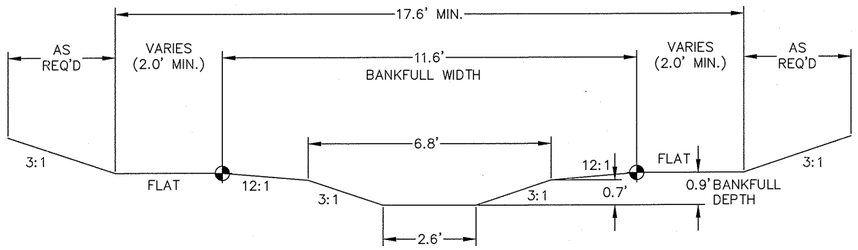


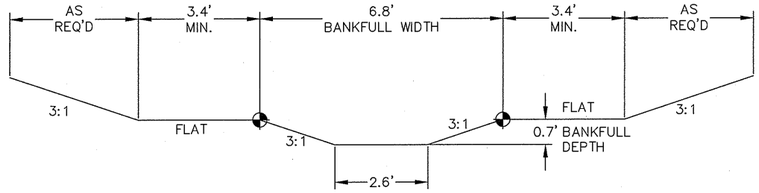
UT3-A RIFFLE
STA 320+41 TO 336+27



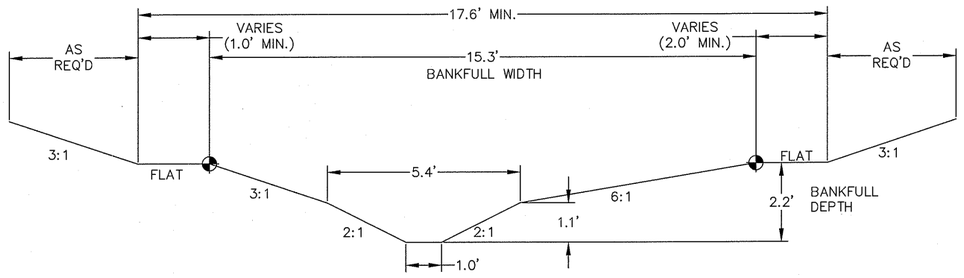
UT3-A POOL
STA 320+41 TO 336+27



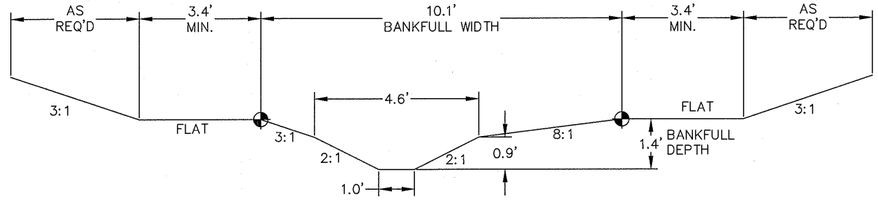
UT3-B LOWER RIFFLE
STA 315+50 TO 319+72



UT3-B UPPER RIFFLE
STA 300+00 TO 315+50



UT3-B LOWER POOL
STA 315+50 TO 319+72



UT3-B UPPER POOL
STA 300+00 TO 315+50

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: TYPICAL CROSS SECTIONS

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 23

April 28, 2008 - 3:50pm By: jim.kimble
T:\jm\012620010 Beaverdam Swamp Restoration\0010_LDD\dwg\RECORD SET 04-10-08\06-TYPICALS.dwg

LEGEND

- PROPOSED BANK FULL
- 10+00 — ℄ PROPOSED CREEK
- —c— PERMANENT CONSERVATION EASEMENT
- —cwf— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

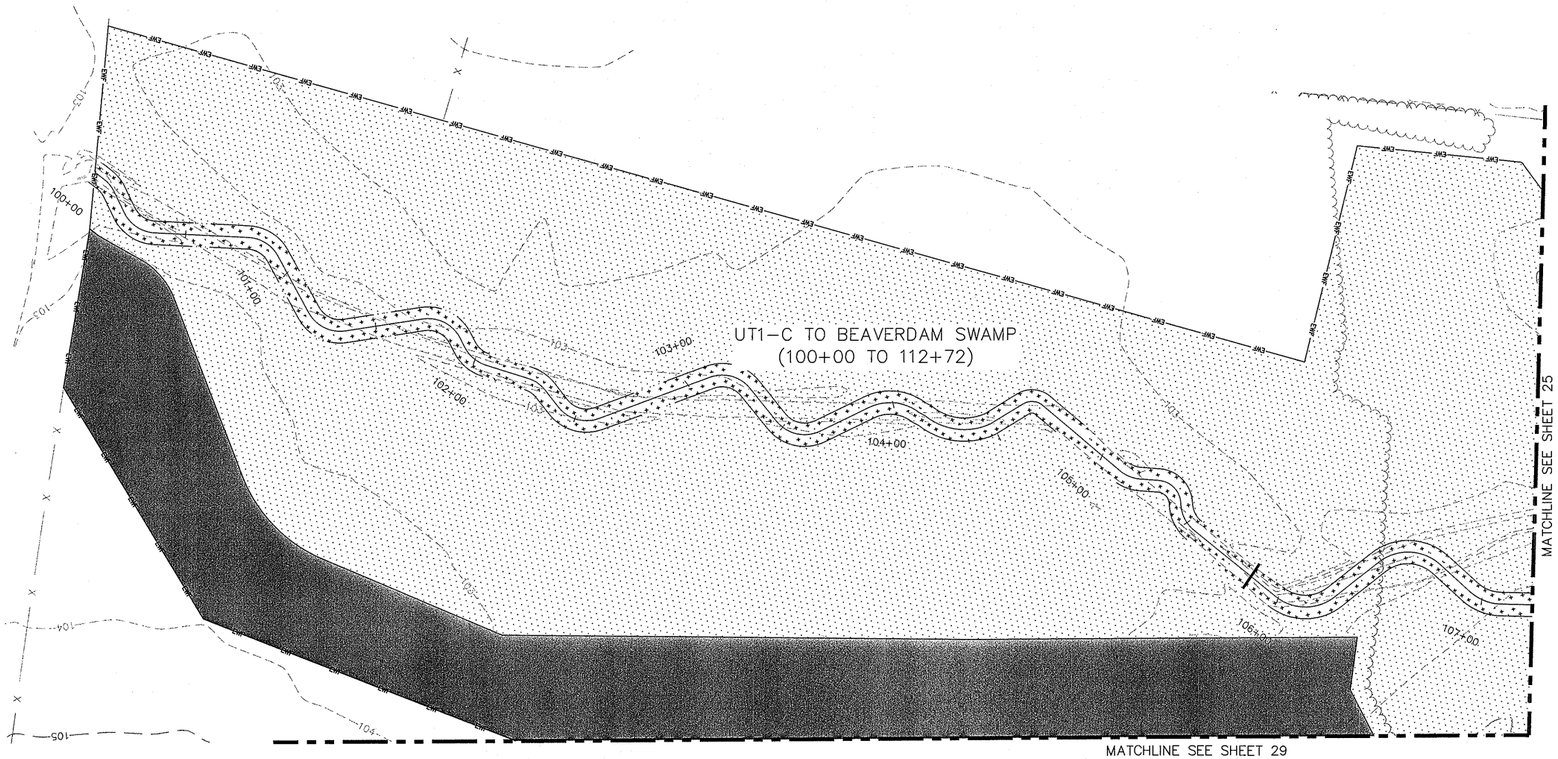
SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

- ZONE 1 — STREAM BANKS
- ZONE 2 — RIPARIAN
- ZONE 3 — UPLAND
- ZONE 4 — TO REMAIN

NOTE:
UT1-C DOWN TO STA 106+50 TO RECEIVE INVASIVE REMOVAL TREATMENT AND SUPPLEMENTAL PLANTING ONLY WITHIN THE FORESTED AREA. FORESTED AREA SHALL NOT BE RIPPED.



ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

BEFORE YOU DIG!
CONTACT ONE-CALL CENTER
1-800-632-4949

30' 0 15' 30' 60'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 24

April 28, 2008 - 3:51pm By: jimkimble

PLANTING LEGEND

ZONE 1		STREAM BANKS
ZONE 2		RIPARIAN
ZONE 3		UPLAND
ZONE 4		TO REMAIN

LEGEND

- 10+00 — PROPOSED BANK FULL
- ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

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1-800-632-4949

30' 0 15' 30' 60'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

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Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

L-2915 NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 25

T:\jon\012620010 Beaverdam Swamp Restoration\0010_LDD\dwg\RECORD SET 04-10-08\09-VEG PLANS.dwg

LEGEND

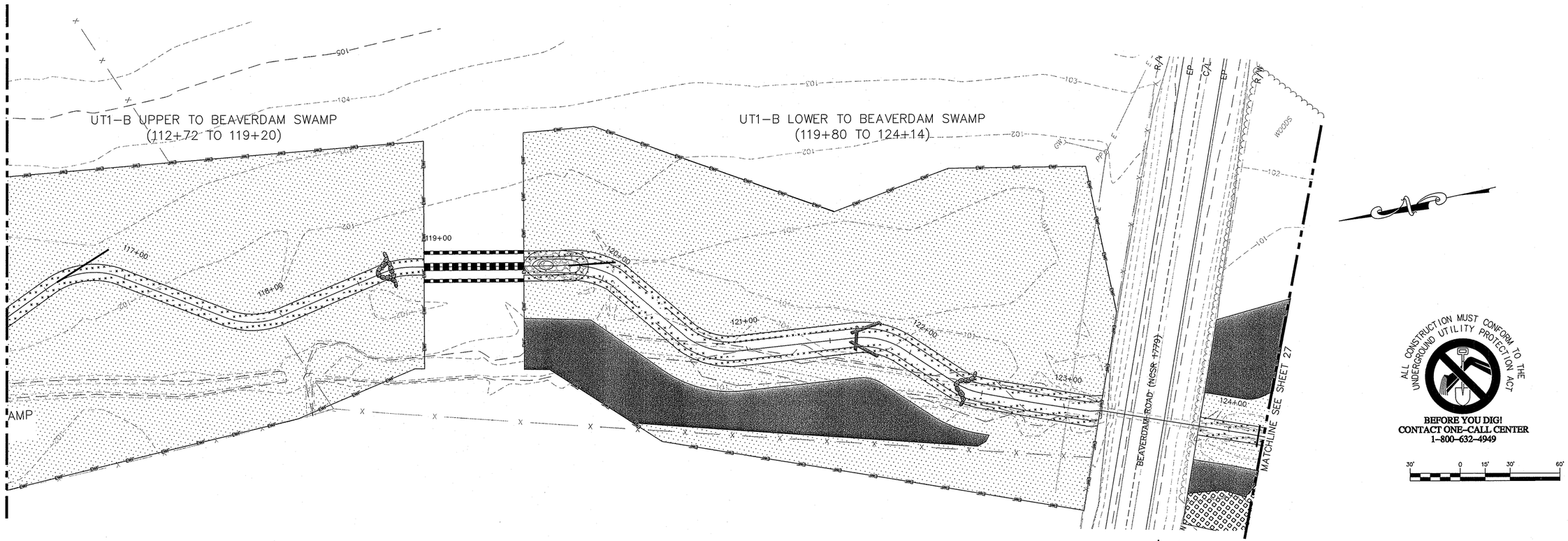
- PROPOSED BANK FULL
- 10+00 — ℄ PROPOSED CREEK
- —E— PERMANENT CONSERVATION EASEMENT
- —EWF— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

- ZONE 1 — STREAM BANKS
- ZONE 2 — RIPARIAN
- ZONE 3 — UPLAND
- ZONE 4 — TO REMAIN



ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

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CONTACT ONE-CALL CENTER
1-800-632-4949

30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 024911 ENGINEER TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 26

LEGEND

- PROPOSED BANK FULL (10+00)
- ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

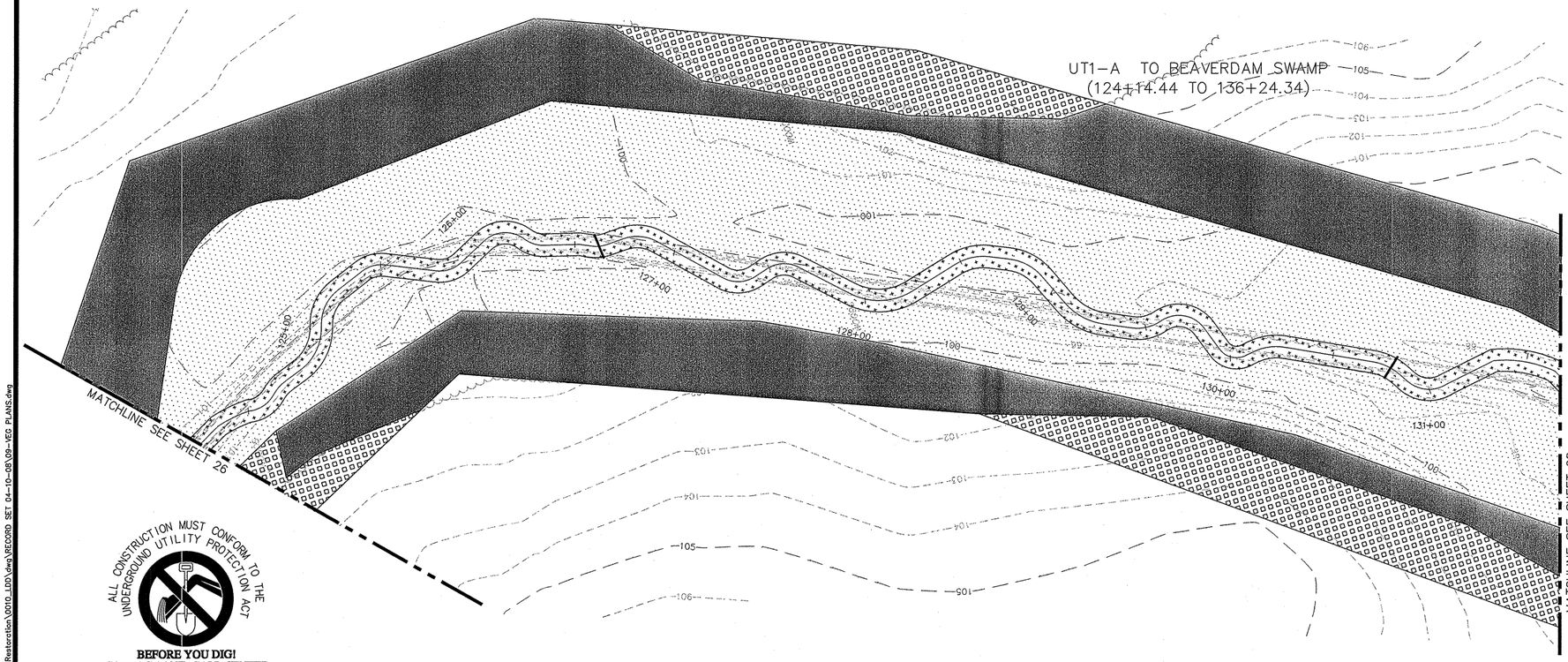
SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

ZONE 1	STREAM BANKS
ZONE 2	RIPARIAN
ZONE 3	UPLAND
ZONE 4	TO REMAIN

NOTE:
UT1-A BELOW BEAVERDAM ROAD TO RECEIVE INVASIVE REMOVAL TREATMENT AND SUPPLEMENTAL PLANTING ONLY WITHIN THE FORESTED AREA. FORESTED AREA SHALL NOT BE RIPPED.



ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

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CONTACT ONE-CALL CENTER
1-800-632-4949

30' 0 15' 30' 60'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

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PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TIMOTHY W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 27

PLANTING LEGEND

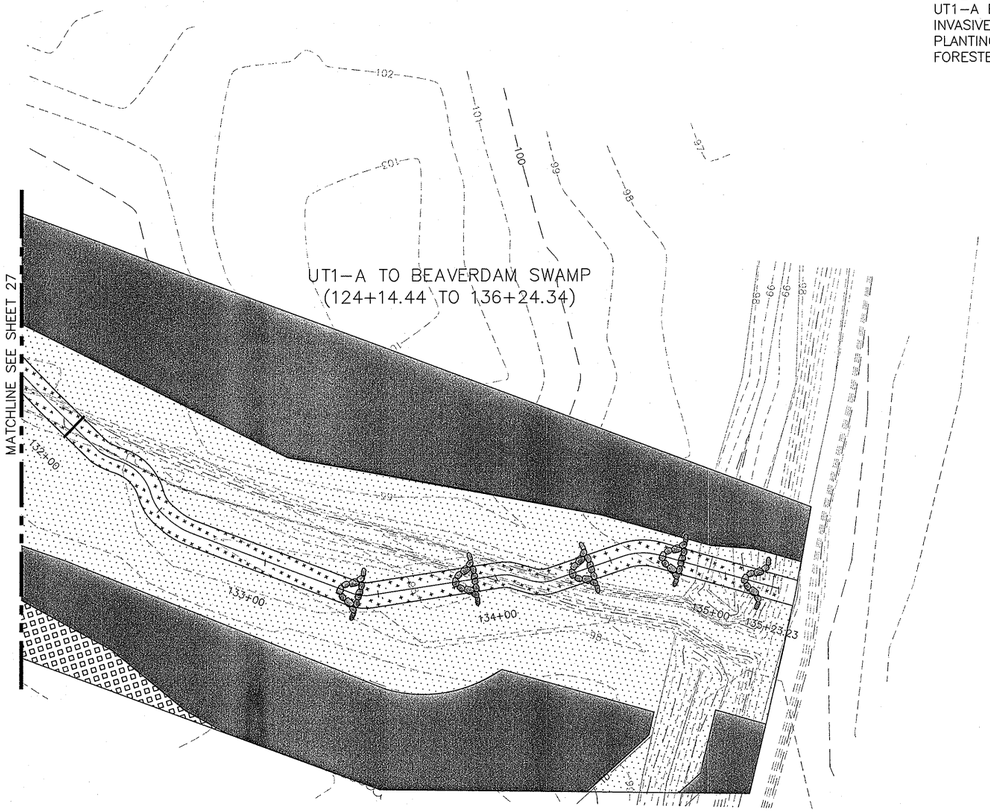
ZONE 1		STREAM BANKS
ZONE 2		RIPARIAN
ZONE 3		UPLAND
ZONE 4		TO REMAIN

LEGEND

10+00	PROPOSED BANK FULL	ROCK CROSS VANE	LOG SILL
	℄ PROPOSED CREEK	ROCK A-VANE	
E	PERMANENT CONSERVATION EASEMENT	ROCK VANE	LOG VANE
CWF	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING	LOG CROSS VANE	

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND



NOTE:
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30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

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P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 024918 ENGINEER TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 28

April 28, 2008 - 3:52pm By: jim.kimble

PLANTING LEGEND

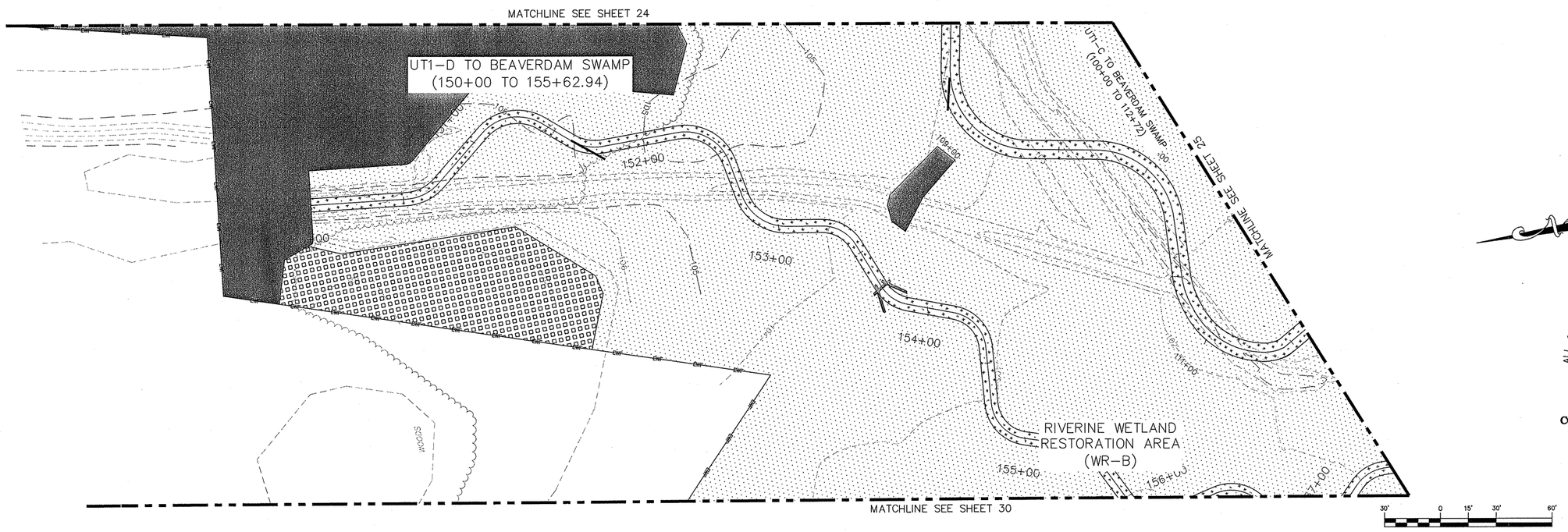
ZONE 1		STREAM BANKS
ZONE 2		RIPARIAN
ZONE 3		UPLAND
ZONE 4		TO REMAIN

LEGEND

10+00	PROPOSED BANK FULL	ROCK CROSS VANE	LOG SILL
	℄ PROPOSED CREEK	ROCK A-VANE	
——c——	PERMANENT CONSERVATION EASEMENT	ROCK VANE	LOG VANE
——CWF——	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING	LOG CROSS VANE	

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND



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1-800-632-4949

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

PREPARED IN THE OFFICE OF:
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PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER JOHN W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 29

T:\jm\012620010 Beaverdam Swamp Restoration\0010_100\dwg\RECORD SET 04-10-08\09-VEG PLANS.dwg

April 28, 2008 - 3:52pm By: jmukimble

LEGEND

10+00 — PROPOSED BANK FULL

℄ PROPOSED CREEK

—E— PERMANENT CONSERVATION EASEMENT

—CVE— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING

ROCK CROSS VANE

ROCK A–VANE

ROCK VANE

LOG CROSS VANE

LOG SILL

LOG VANE

SURVEY LEGEND

PROPERTY LINE

MAJOR CONTOURS

MINOR CONTOURS

STREAM CENTERLINE

TREELINE

EXISTING WETLAND

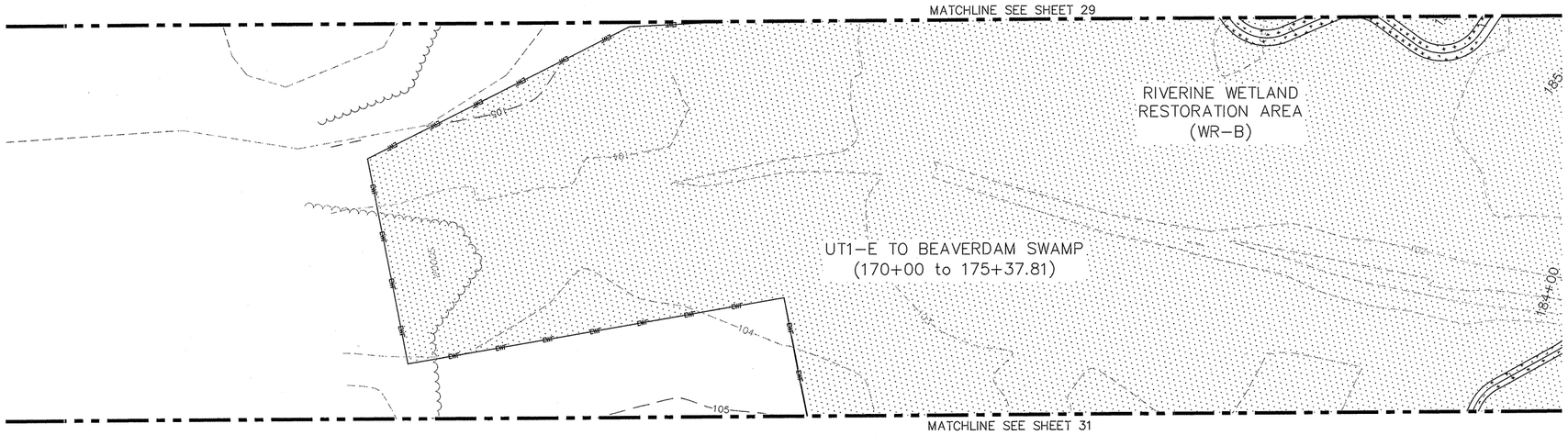
PLANTING LEGEND

ZONE 1 — STREAM BANKS

ZONE 2 — RIPARIAN

ZONE 3 — UPLAND

ZONE 4 — TO REMAIN



ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

BEFORE YOU DIG!
CONTACT ONE-CALL CENTER
1-800-632-4949

30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT:
STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE:
PLANTING PLAN

1-23-2008 NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT:
BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 30

I:\jm\012620010 Beaverdam Swamp Restoration\0010_LDD\dwg\RECORD SET 04-10-08\09-VEG PLANS.dwg

April 28, 2008 - 3:53pm By: jim.kimble

LEGEND

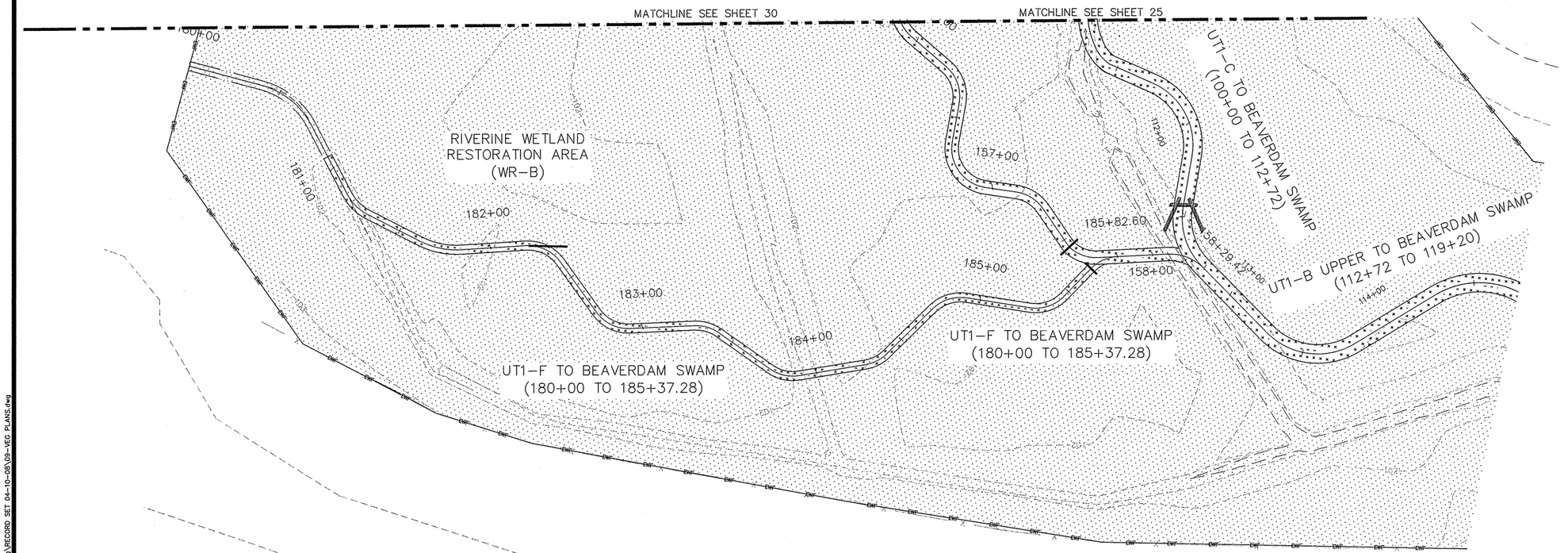
- 10+00 — PROPOSED BANK FULL
- ℄ PROPOSED CREEK
- —E— PERMANENT CONSERVATION EASEMENT
- —EWF— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

- ZONE 1 — STREAM BANKS
- ZONE 2 — RIPARIAN
- ZONE 3 — UPLAND
- ZONE 4 — TO REMAIN



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1-800-632-4949

30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
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P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 31

T:\pn\012620010 Beaverdam Swamp Restoration\0310_LDD\dwg\RECORD SET 04-10-08\09-VEG PLANS.dwg

April 28, 2008 - 3:53pm By: jim.kimble

LEGEND

- 10+00 — PROPOSED BANK FULL
- ℄ PROPOSED CREEK
- —E— PERMANENT CONSERVATION EASEMENT
- —EW— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

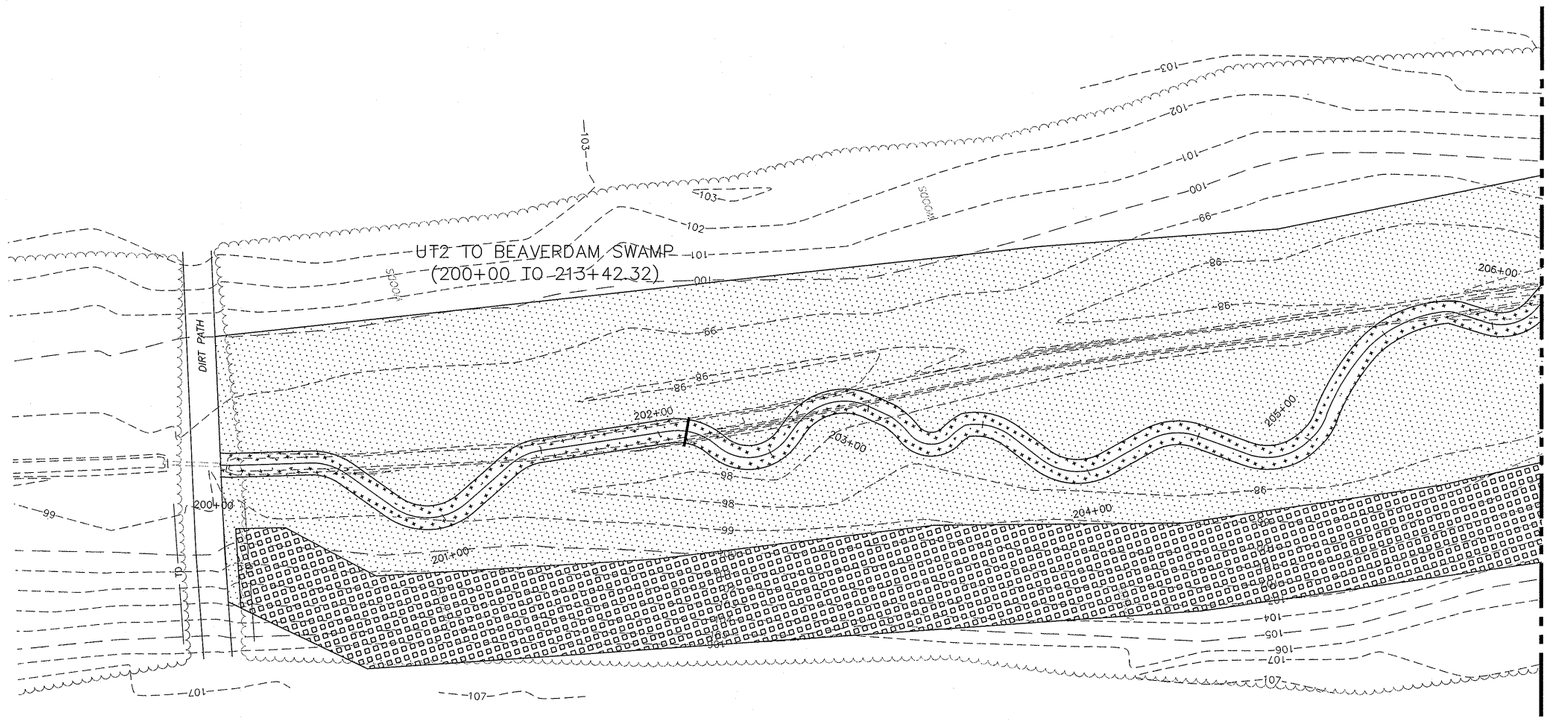
SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

- ZONE 1 — STREAM BANKS
- ZONE 2 — RIPARIAN
- ZONE 3 — UPLAND
- ZONE 4 — TO REMAIN

NOTE:
FORESTED AREA TO RECEIVE INVASIVE REMOVAL TREATMENT AND SUPPLEMENTAL PLANTING ONLY. FORESTED AREA SHALL NOT BE RIPPED.



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1-800-632-4949

30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TIMOTHY W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 32

T:\pn\012620010 Beaverdam Swamp Restoration\0010_LDD\dwg\RECORD SET 04-10-08\03-VEG PLANS.dwg

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

- ZONE 1 STREAM BANKS
- ZONE 2 RIPARIAN
- ZONE 3 UPLAND
- ZONE 4 TO REMAIN

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

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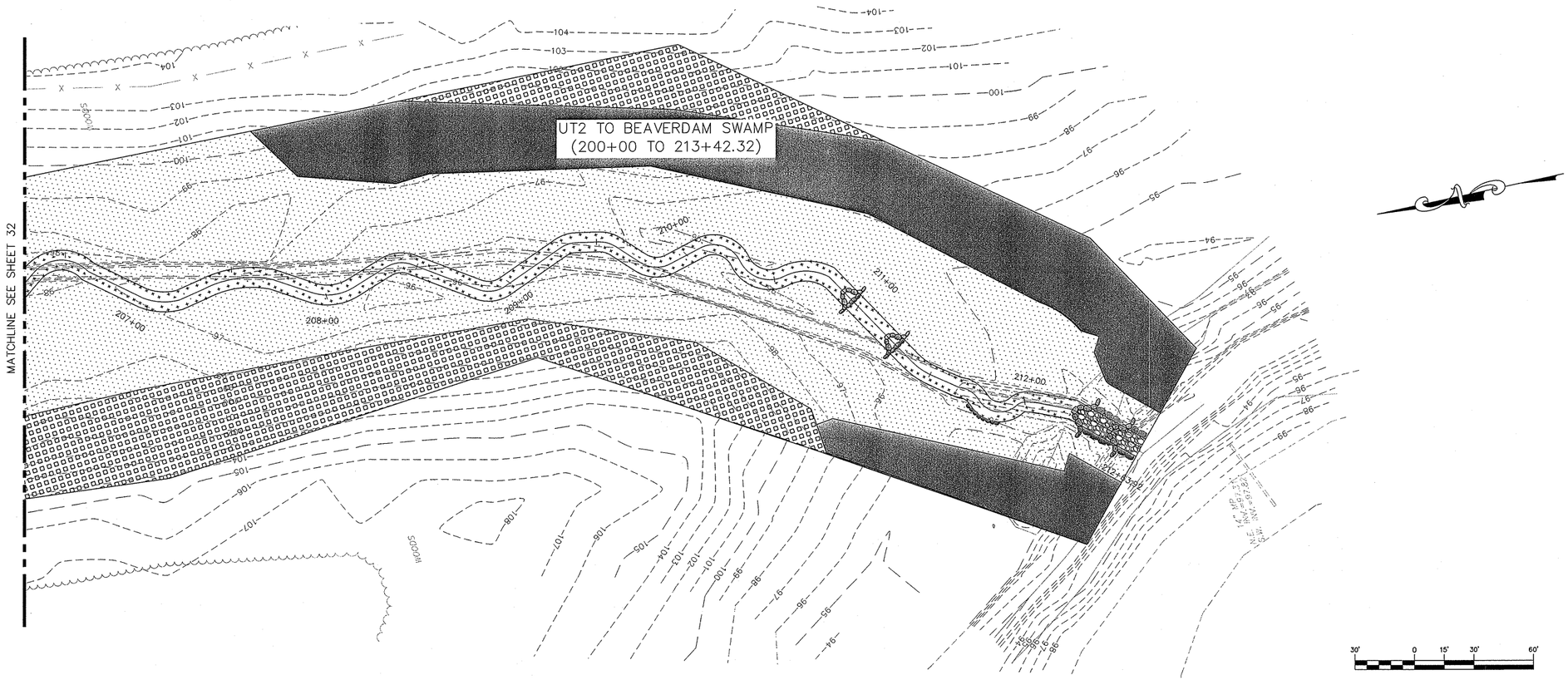
1-800-632-4949

NOTE:
FORESTED AREA TO RECEIVE INVASIVE REMOVAL TREATMENT AND SUPPLEMENTAL PLANTING ONLY. FORESTED AREA SHALL NOT BE RIPPED.



REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT:
STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE:
PLANTING PLAN

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024975 TODD W. ST. JOHN

DATE:	02/25/08
DRAWN BY:	JIK
DESIGNED BY:	RTL
CHECKED BY:	TSJ

PROJECT:
BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 33

LEGEND

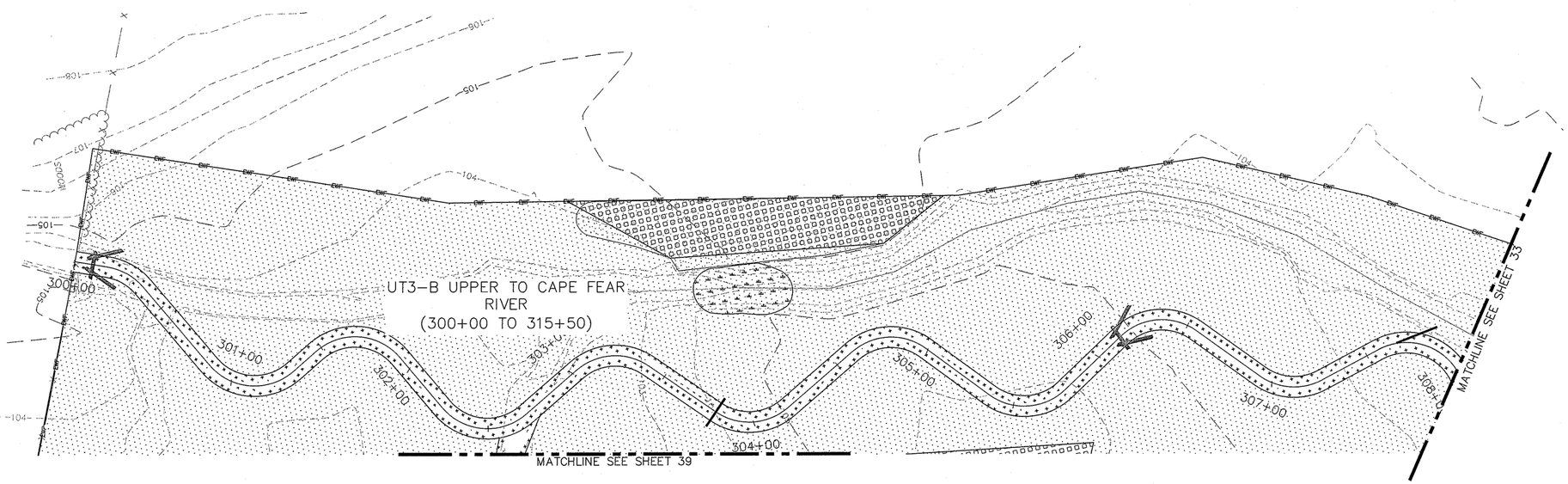
10+00 — PROPOSED BANK FULL	ROCK CROSS VANE
℄ PROPOSED CREEK	ROCK A–VANE
—E— PERMANENT CONSERVATION EASEMENT	ROCK VANE
—EWF— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING	LOG CROSS VANE
	LOG SILL
	LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

ZONE 1	STREAM BANKS
ZONE 2	RIPARIAN
ZONE 3	UPLAND
ZONE 4	TO REMAIN



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CONTACT ONE-CALL CENTER
1-800-632-4949

30' 0 15' 30' 60'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024915 JOHN W. ST. JOHN

DATE:	02/25/08
DRAWN BY:	JIK
DESIGNED BY:	RTL
CHECKED BY:	TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 34

April 28, 2008 - 3:54pm By: jim.kimble

LEGEND

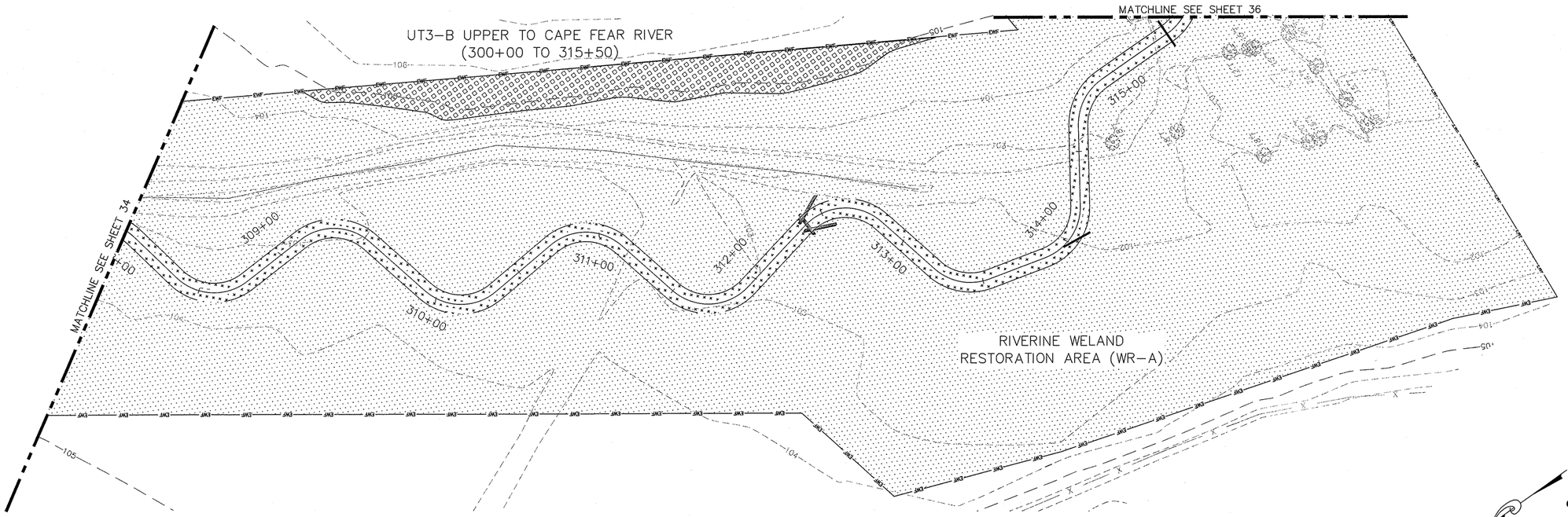
- PROPOSED BANK FULL (10+00)
- ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

- ZONE 1 — STREAM BANKS
- ZONE 2 — RIPARIAN
- ZONE 3 — UPLAND
- ZONE 4 — TO REMAIN



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CONTACT ONE-CALL CENTER
1-800-632-4949

30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 024919 ENGINEER TODD W. ST. JOHN

DATE:	02/25/08
DRAWN BY:	JIK
DESIGNED BY:	RTL
CHECKED BY:	TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 35

T:\pn\012620010 Beaverdam Swamp Restoration\0010_LOD\dwg\RECORD SET 04-10-08\09-YEG PLANS.dwg

LEGEND

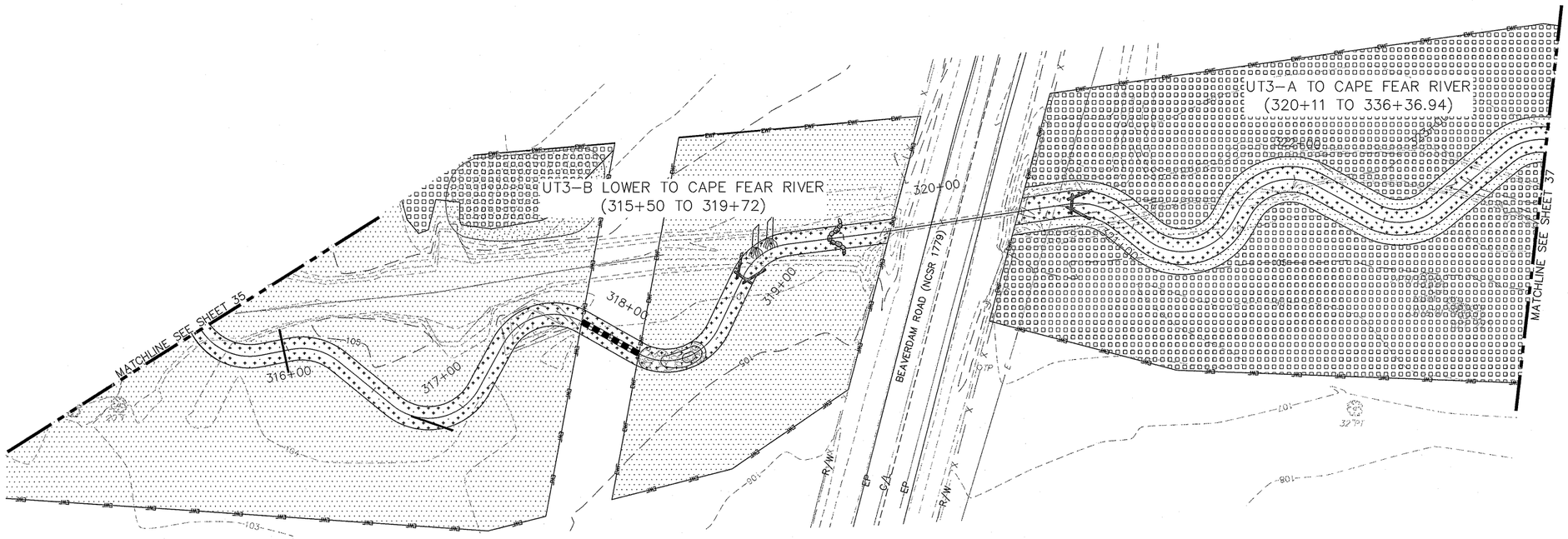
- PROPOSED BANK FULL
- ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

- ZONE 1 — STREAM BANKS
- ZONE 2 — RIPARIAN
- ZONE 3 — UPLAND
- ZONE 4 — TO REMAIN



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CONTACT ONE-CALL CENTER
1-800-632-4949

30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
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P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

4-28-08
NORTH CAROLINA PROFESSIONAL SEAL 024915 ENGINEER TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010

SHEET NUMBER: 36

T:\jm\012820010 Beaverdam Swamp Restoration\0010_LDD\dwg\RECORD SET 04-10-08\09-VEG PLANS.dwg

April 28, 2008 - 3:55pm By: jim.kimble

LEGEND

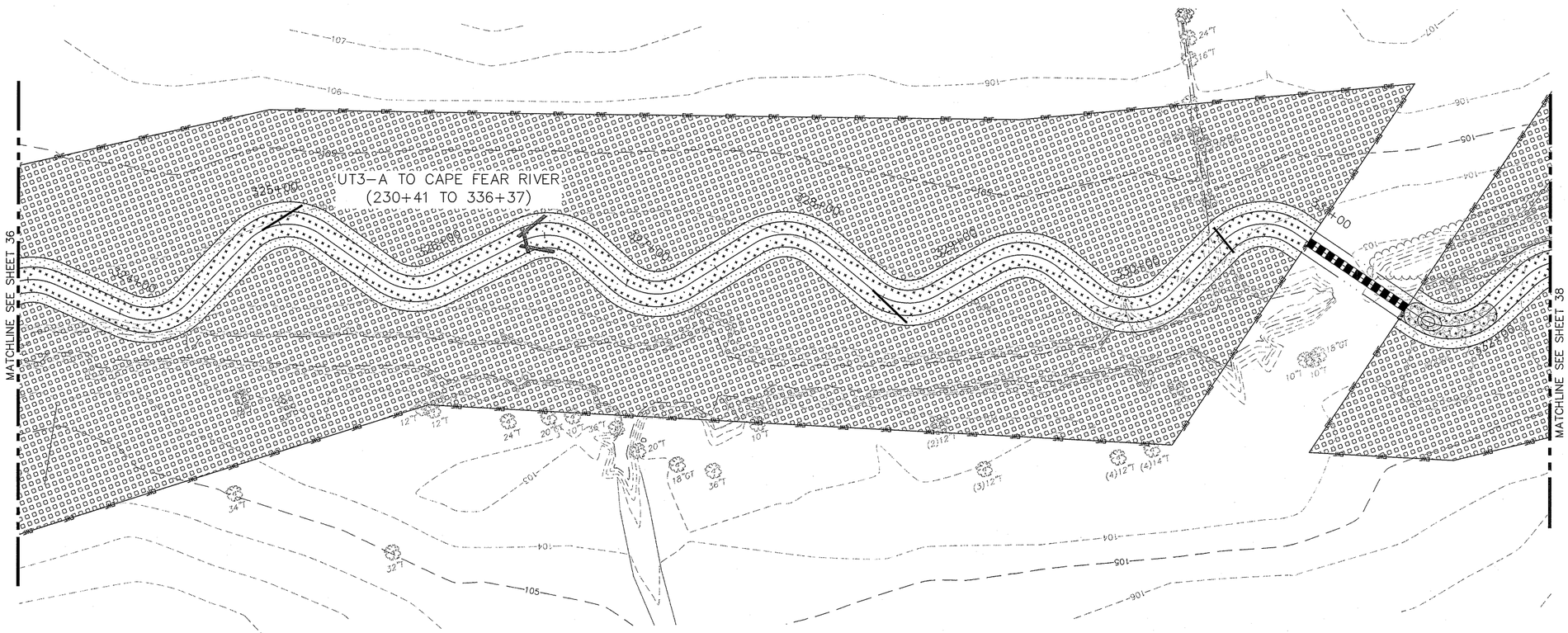
- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

- ZONE 1 — STREAM BANKS
- ZONE 2 — RIPARIAN
- ZONE 3 — UPLAND
- ZONE 4 — TO REMAIN



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30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024915 TODD W. ST. JOHN 4/24/08

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 37

T:\prj\012620010 Beaverdam Swamp Restoration\0010_LDD\dwg\RECORD SET 04-10-08\09-VEG PLANS.dwg

LEGEND

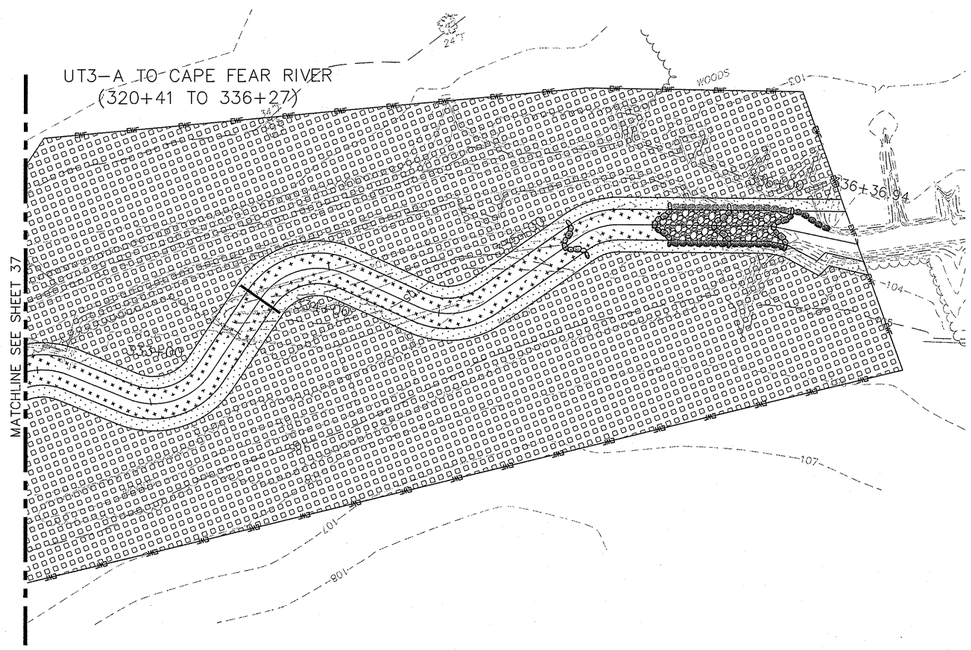
- PROPOSED BANK FULL
- 10+00 — ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

- ZONE 1 — STREAM BANKS
- ZONE 2 — RIPARIAN
- ZONE 3 — UPLAND
- ZONE 4 — TO REMAIN



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30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

EBX

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CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024915 TODD W. ST. JOHN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010
SHEET NUMBER: 38

LEGEND

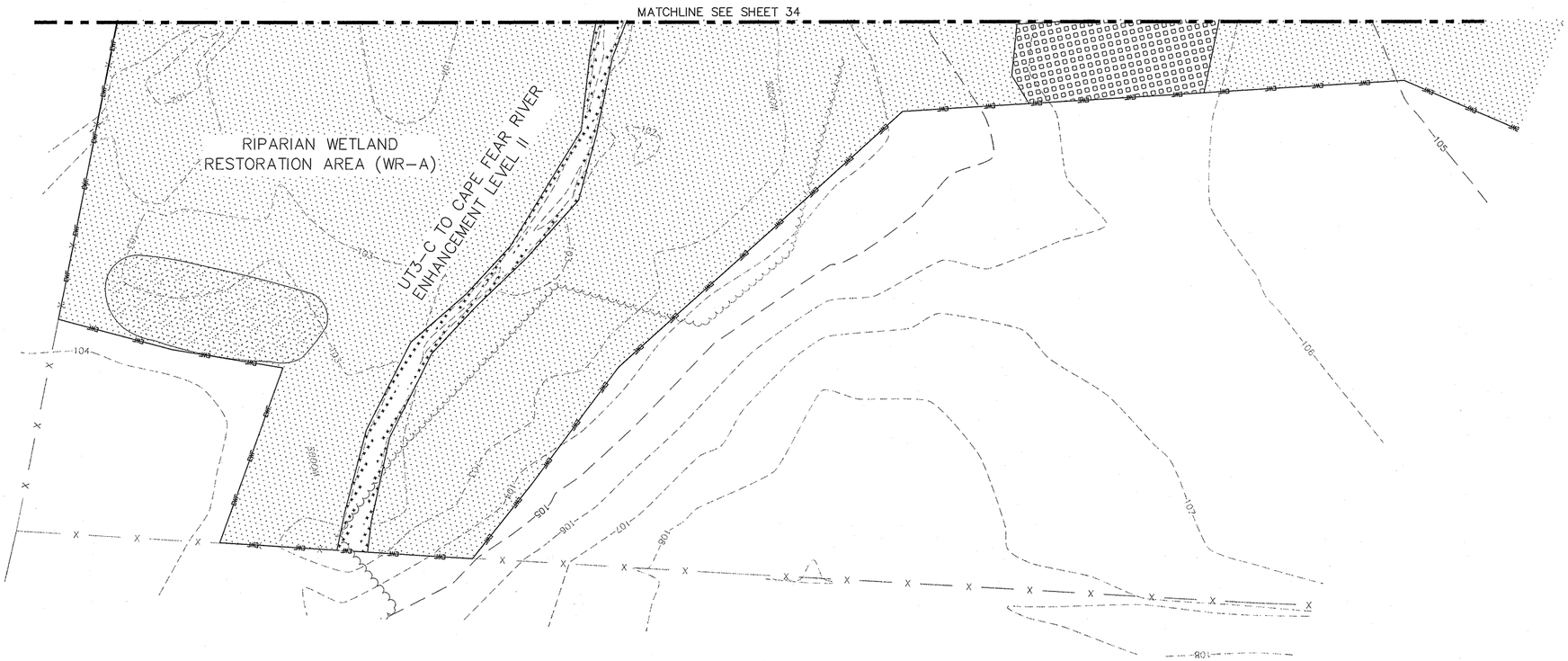
- PROPOSED BANK FULL
- 10+00 — ℄ PROPOSED CREEK
- —E— PERMANENT CONSERVATION EASEMENT
- —EW— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

ZONE 1	STREAM BANKS
ZONE 2	RIPARIAN
ZONE 3	UPLAND
ZONE 4	TO REMAIN



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30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:
1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

PREPARED IN THE OFFICE OF:
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PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024815 TODD W. ST. JOHN 4/28/2008

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

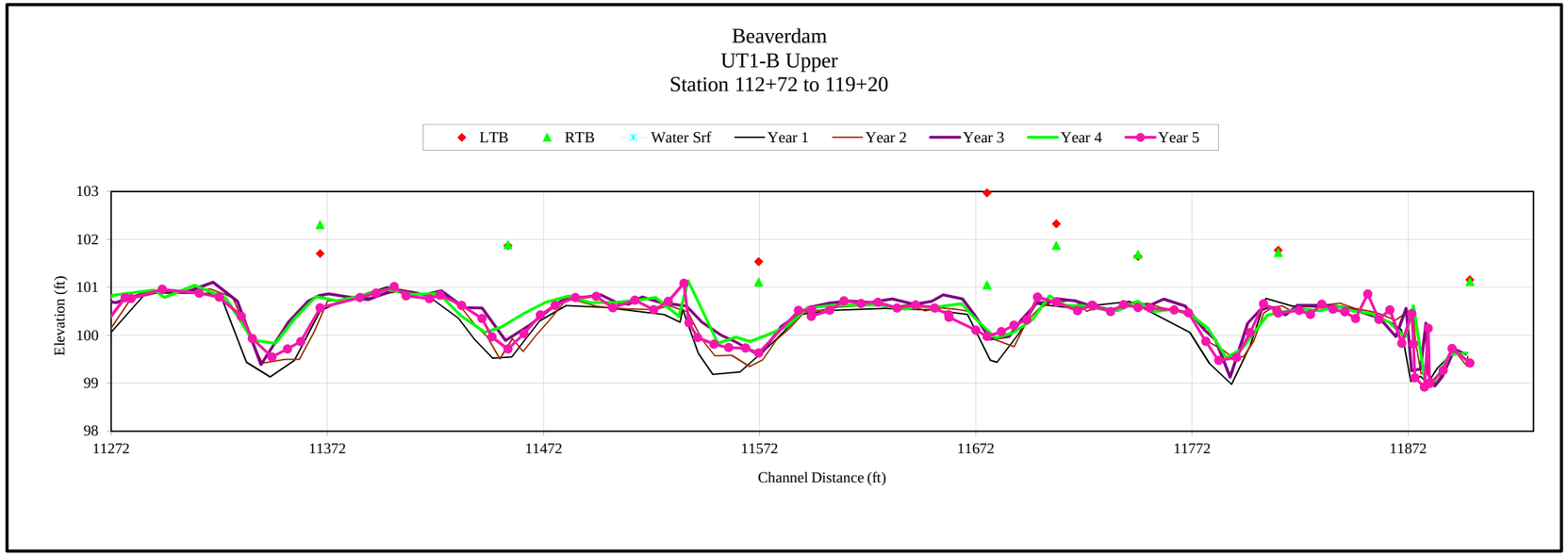
The record drawings represent the construction plans with adjustments made to represent constructed conditions.

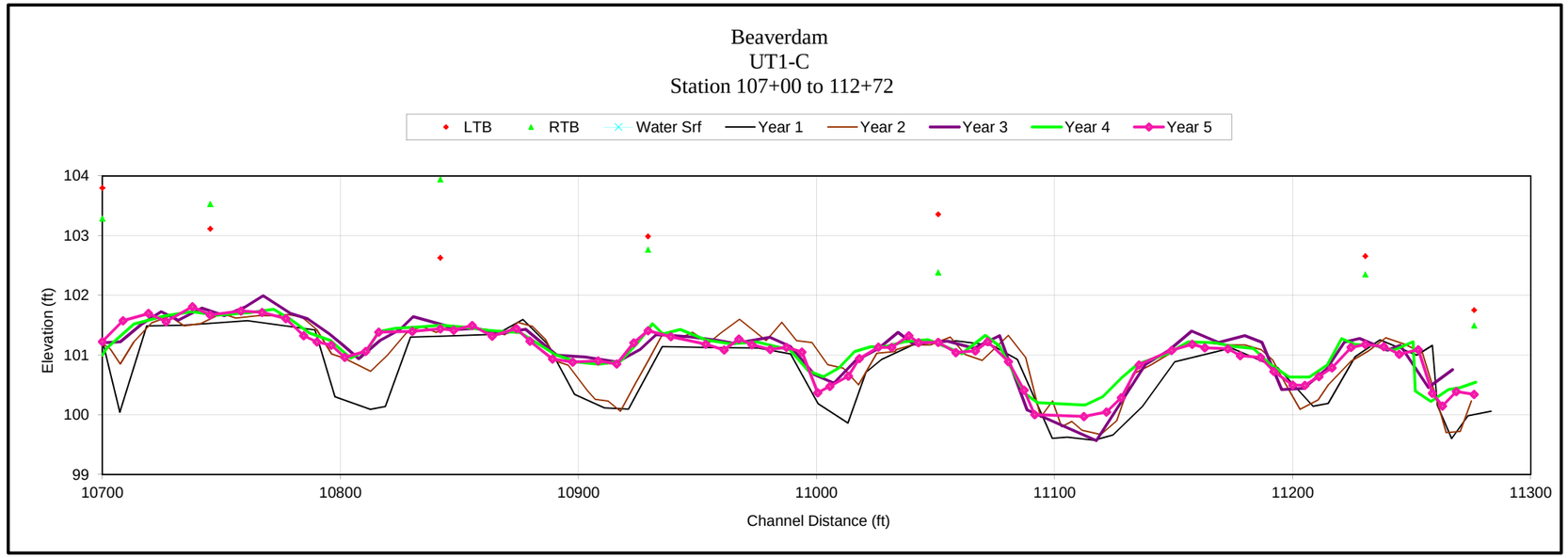
JOB NUMBER: 012620010

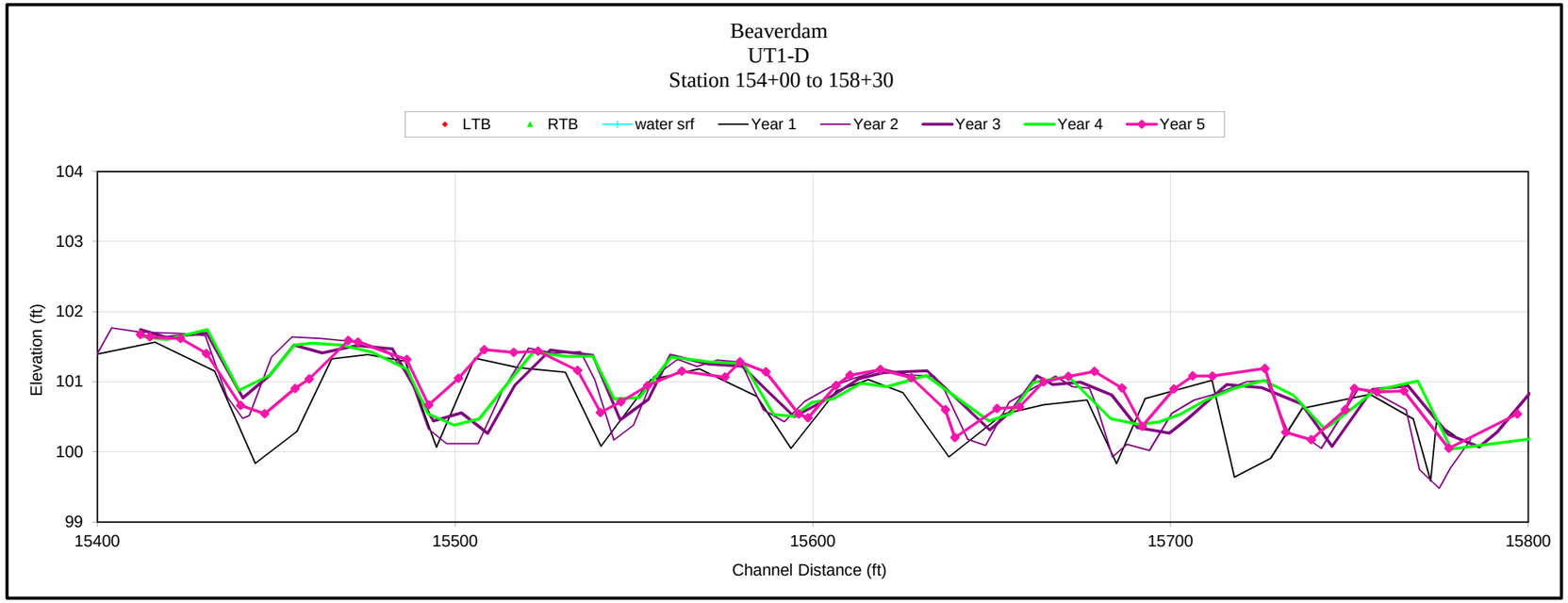
SHEET NUMBER: 39

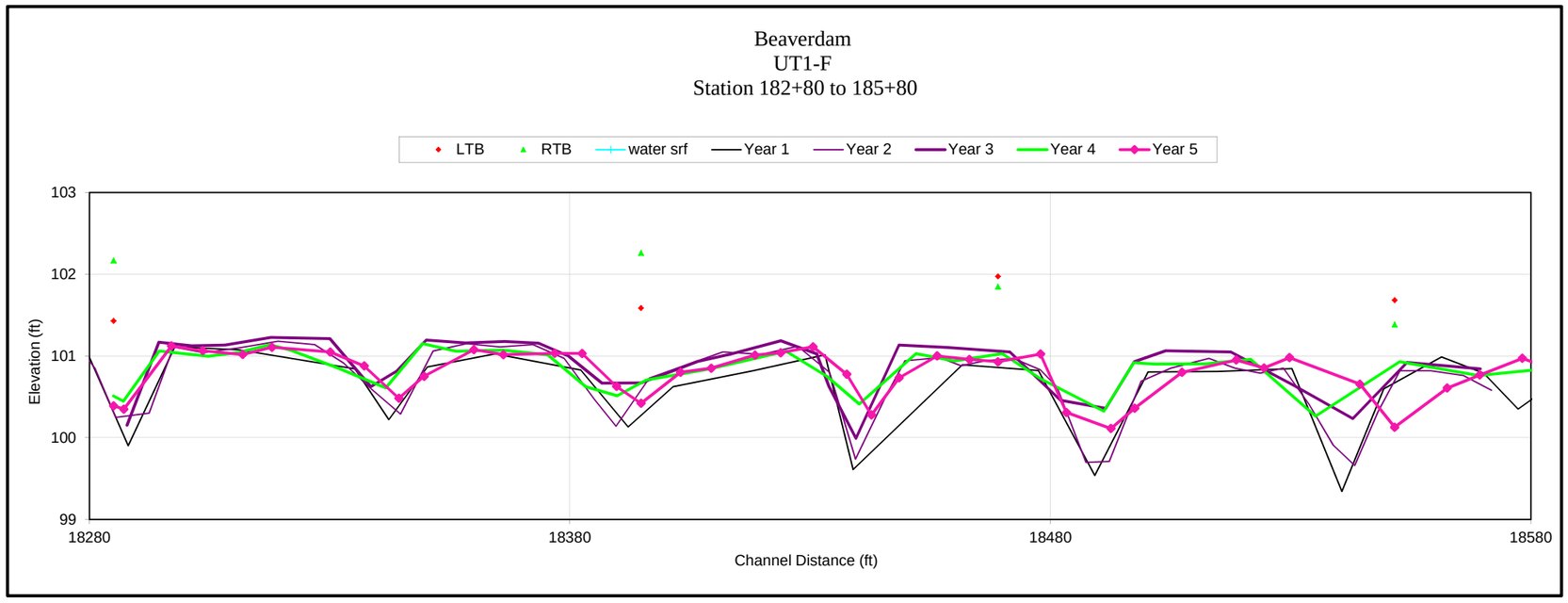
APPENDIX B

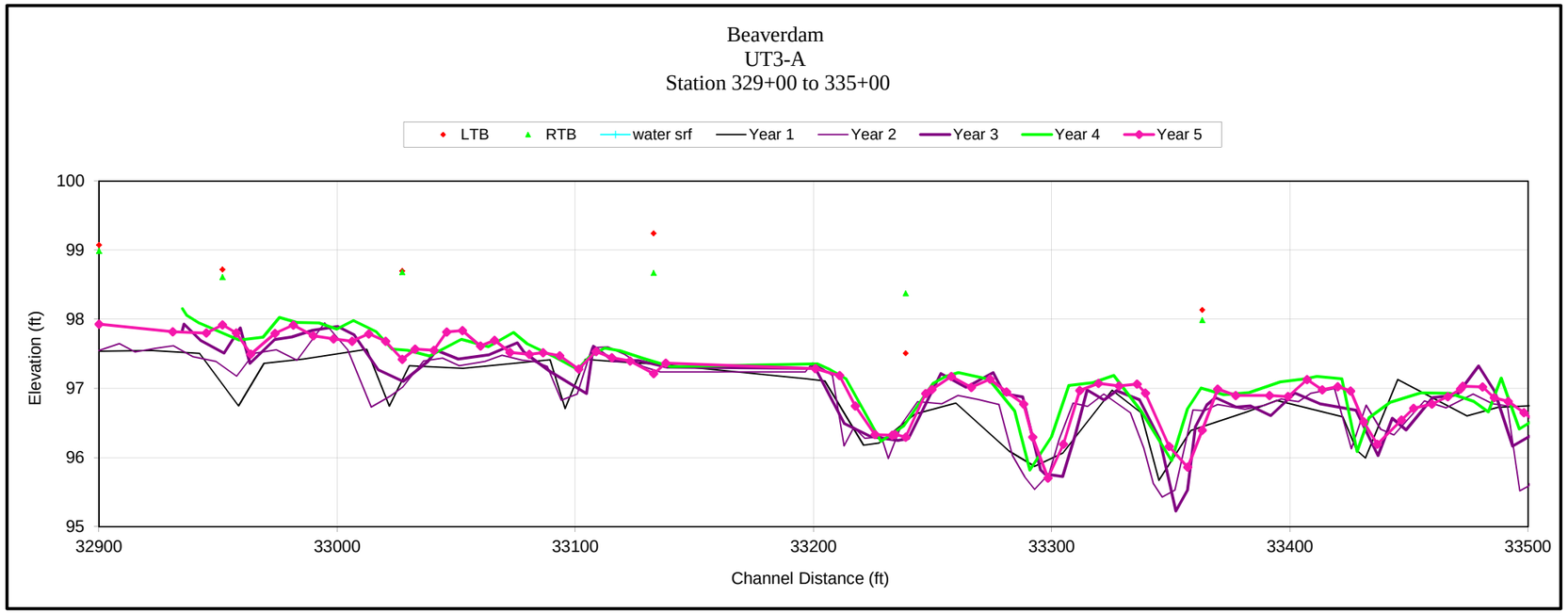
2012 Profile and Cross Section Data

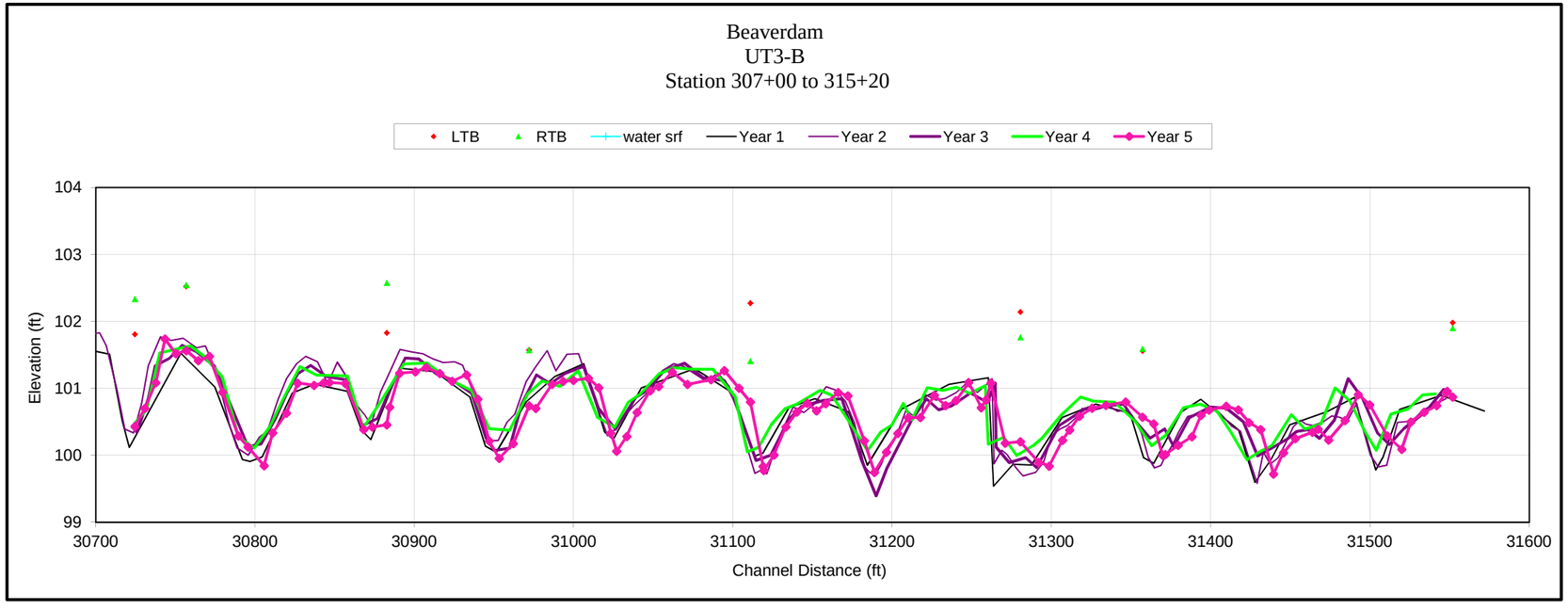

Beaverdam
UT1-B Upper
Station 112+72 to 119+20
LTB
RTB
Water Srf
Year 1
Year 2
Year 3
Year 4
Year 5
Elevation (ft)
103
102
101
100
99
98
11272
11372
11472
11572
11672
11772
11872
Channel Distance (ft)


Beaverdam
UT1-C
Station 107+00 to 112+72
LTB
RTB
Water Srf
Year 1
Year 2
Year 3
Year 4
Year 5
Elevation (ft)
104
103
102
101
100
99
10700
10800
10900
11000
11100
11200
11300
Channel Distance (ft)


Beaverdam
UT1-D
Station 154+00 to 158+30
LTB
RTB
water srf
Year 1
Year 2
Year 3
Year 4
Year 5
104
103
102
101
100
99
Elevation (ft)
15400
15500
15600
15700
15800
Channel Distance (ft)

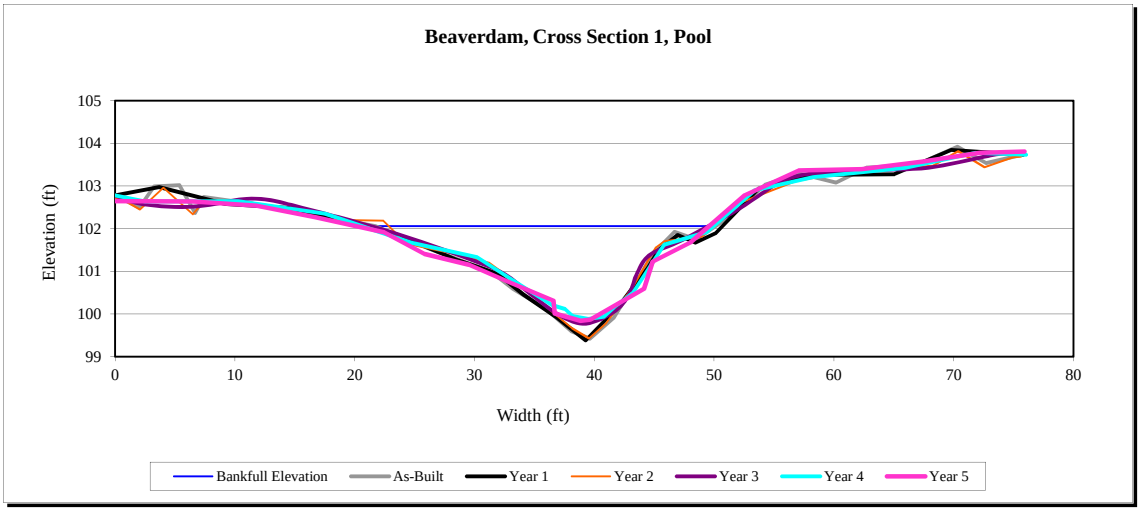

Beaverdam
UT1-F
Station 182+80 to 185+80
LTB
RTB
water srf
Year 1
Year 2
Year 3
Year 4
Year 5
103
102
101
100
99
Elevation (ft)
18280
18380
18480
18580
Channel Distance (ft)


Beaverdam
UT3-A
Station 329+00 to 335+00
LTB
RTB
water srf
Year 1
Year 2
Year 3
Year 4
Year 5
100
99
98
97
96
95
Elevation (ft)
32900
33000
33100
33200
33300
33400
33500
Channel Distance (ft)


Beaverdam
UT3-B
Station 307+00 to 315+20
LTB
RTB
water srf
Year 1
Year 2
Year 3
Year 4
Year 5
104
103
102
101
100
99
Elevation (ft)
30700
30800
30900
31000
31100
31200
31300
31400
31500
31600
Channel Distance (ft)

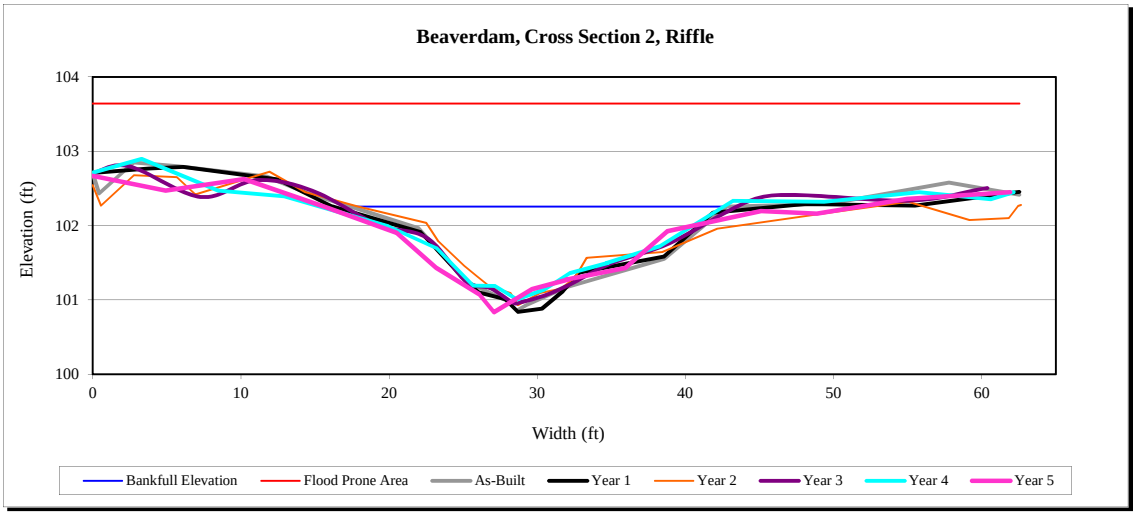
Left bank

Right bank



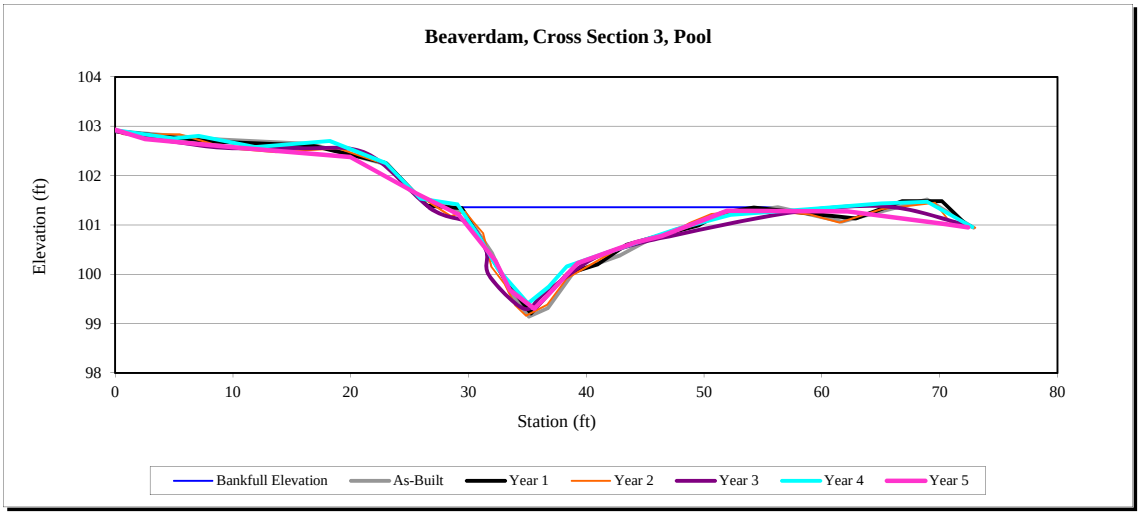
Left bank

Right bank



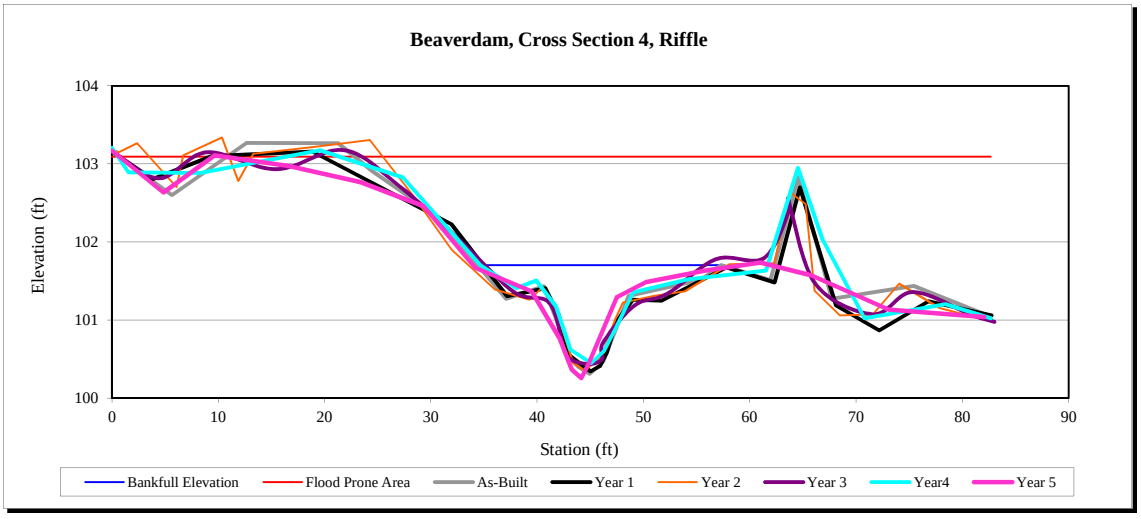
Left bank

Right bank



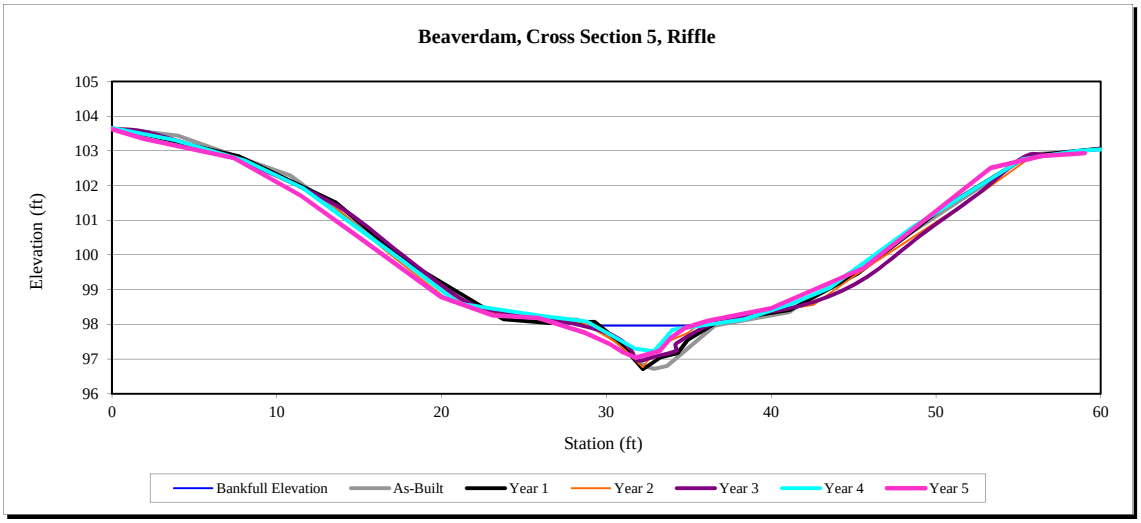
Left bank

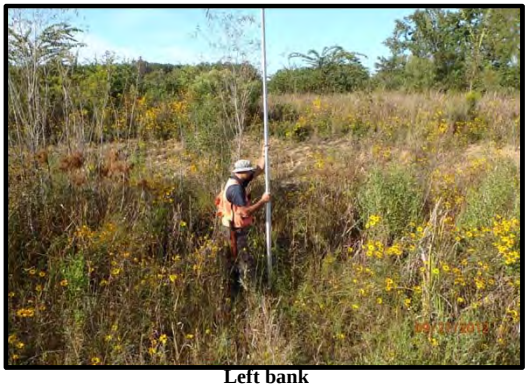
Right bank



Left bank

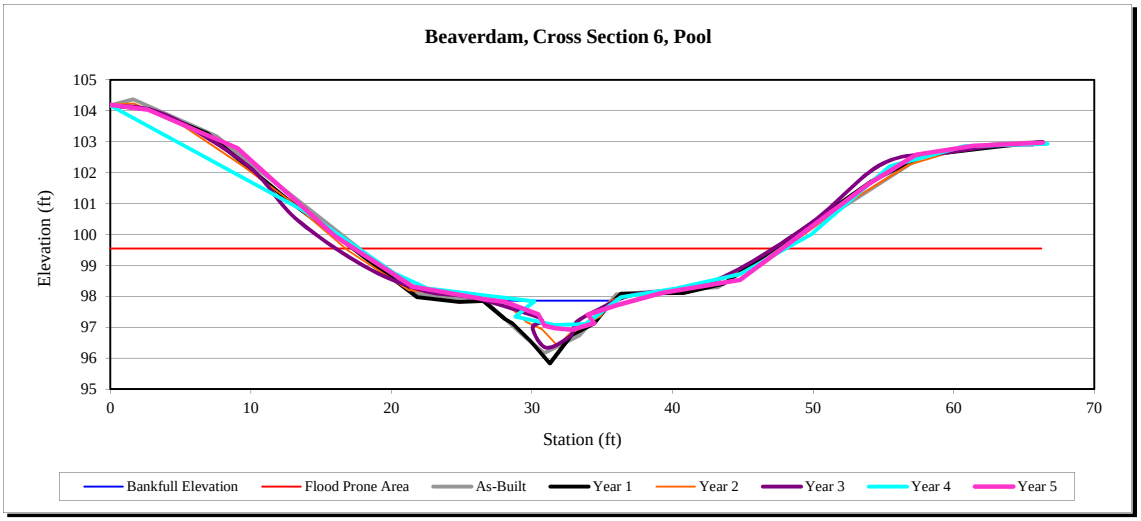
Right bank



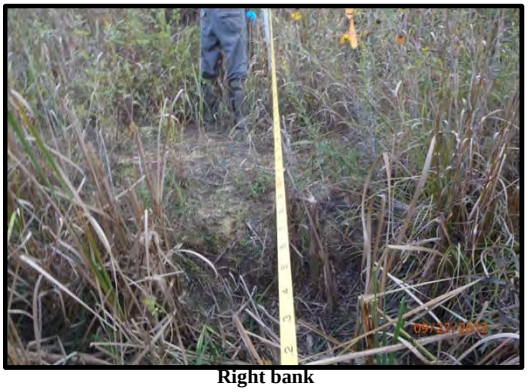


Left bank

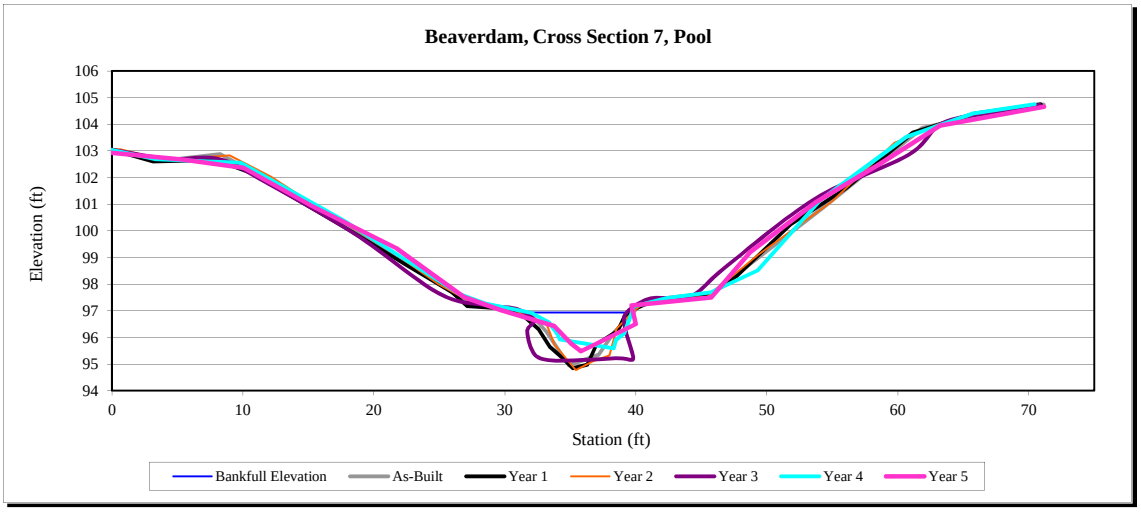
Right bank



Left bank

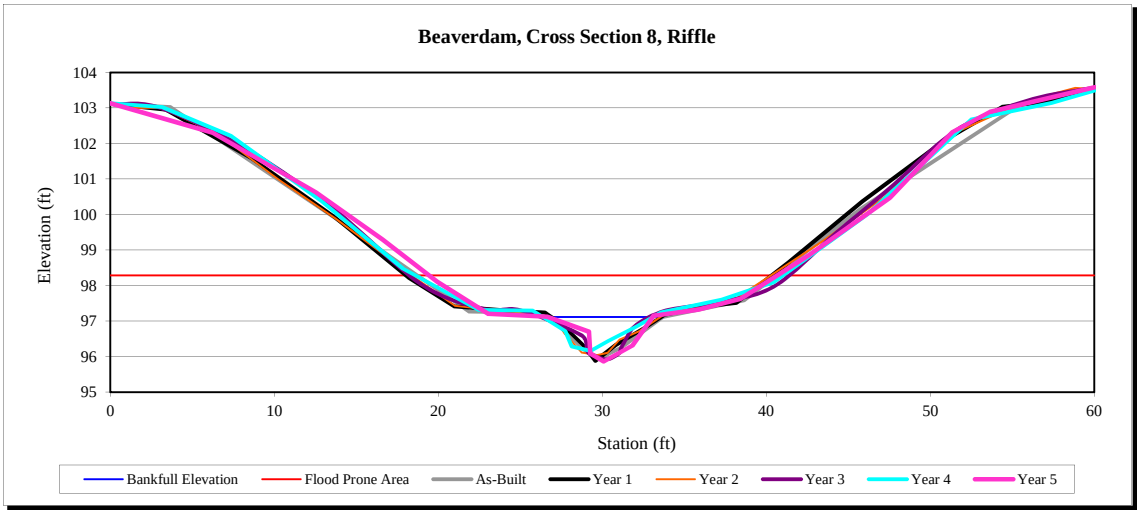


Right bank



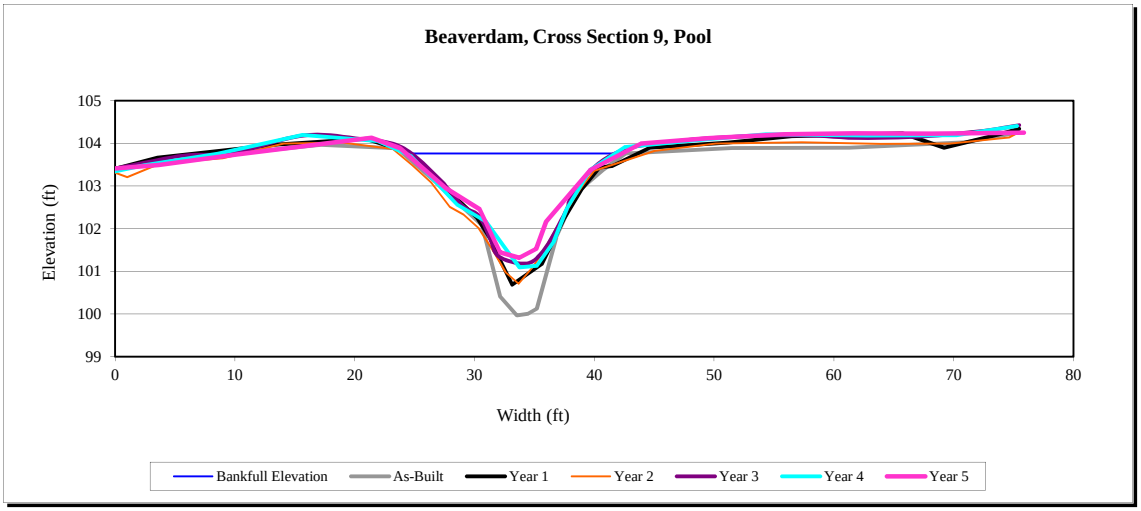
Left bank

Right bank



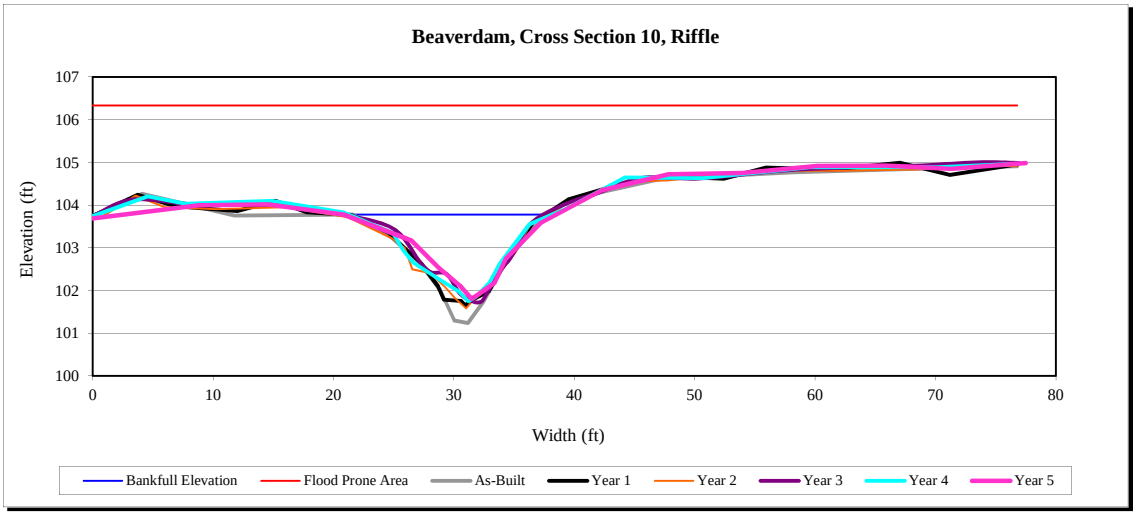
Left bank

Right bank



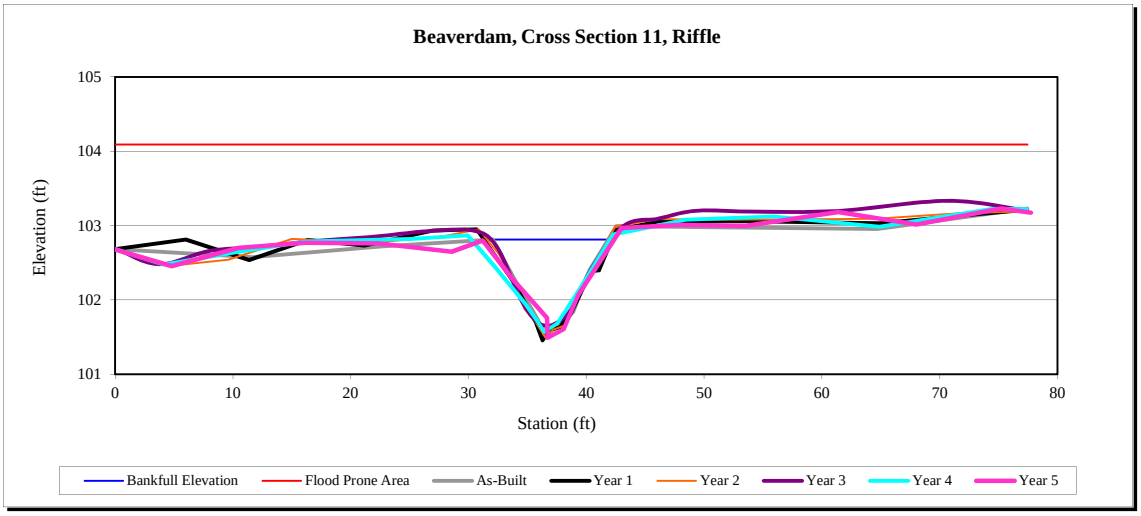
Left bank

Right bank



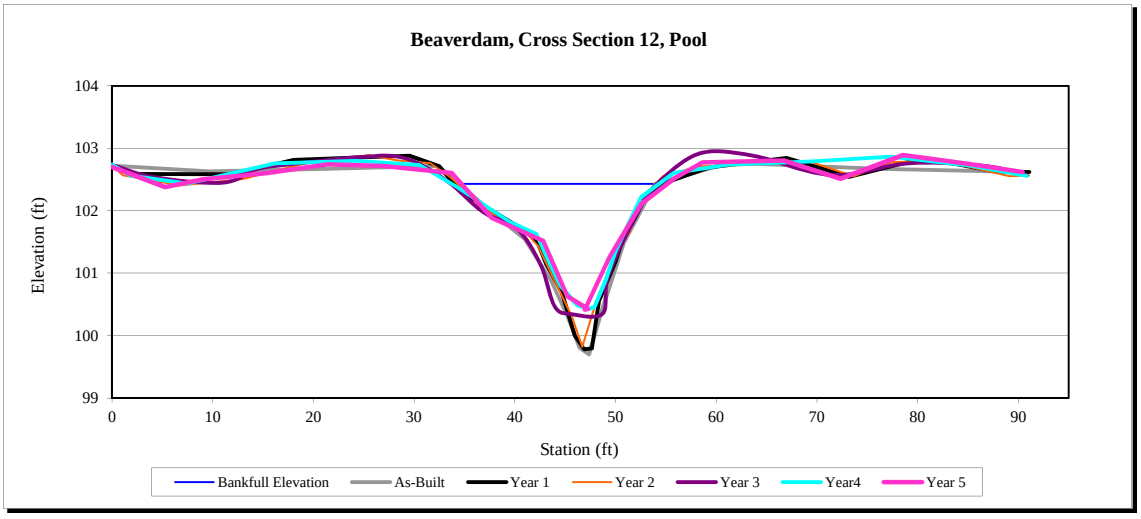
Left bank

Right bank

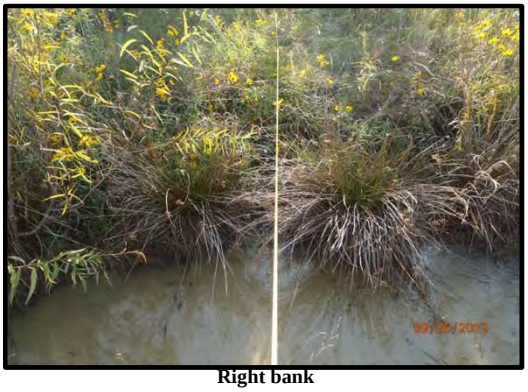


Left bank

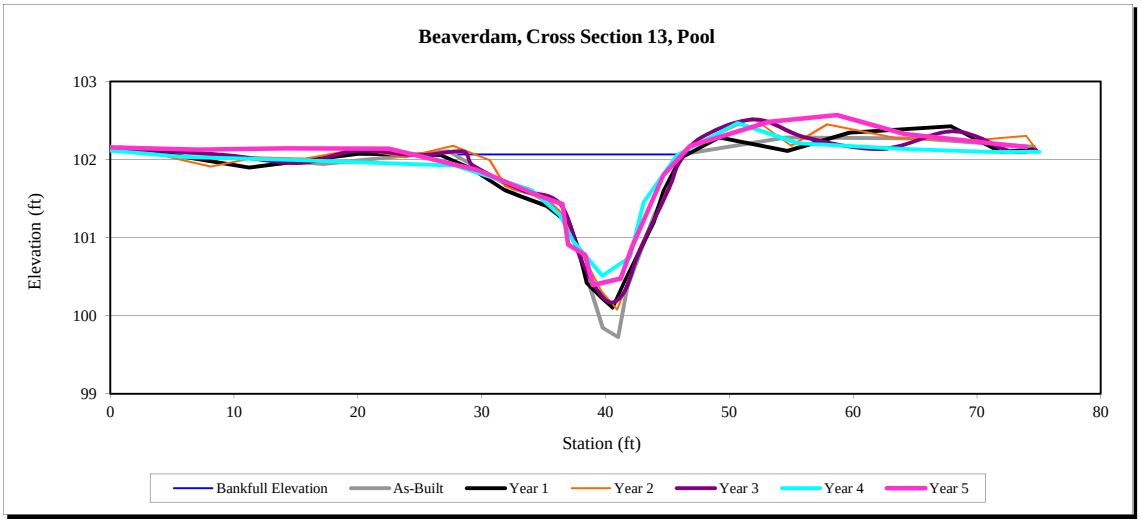
Right bank



Left bank

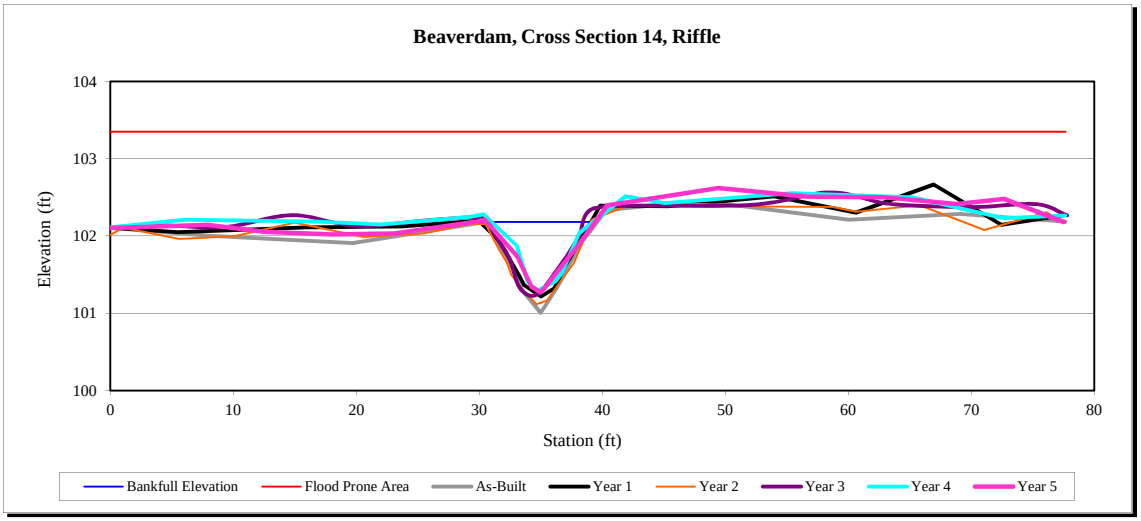


Right bank



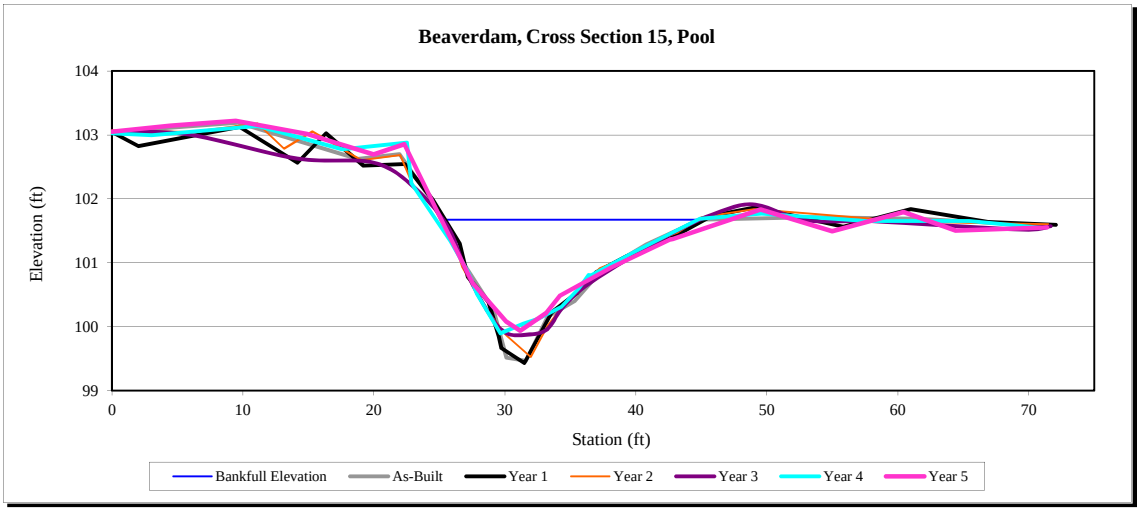
Left bank

Right bank



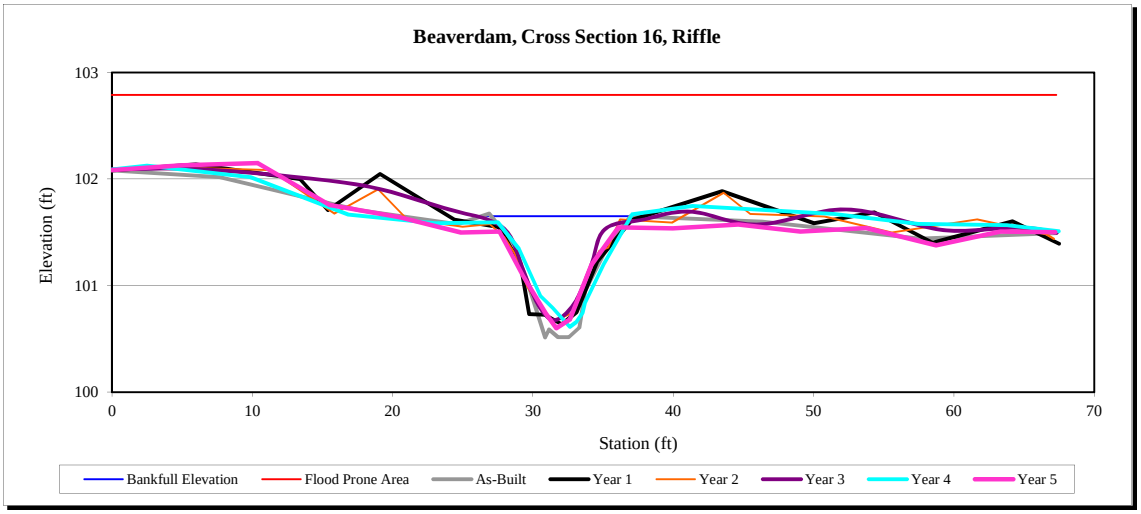
Left bank

Right bank



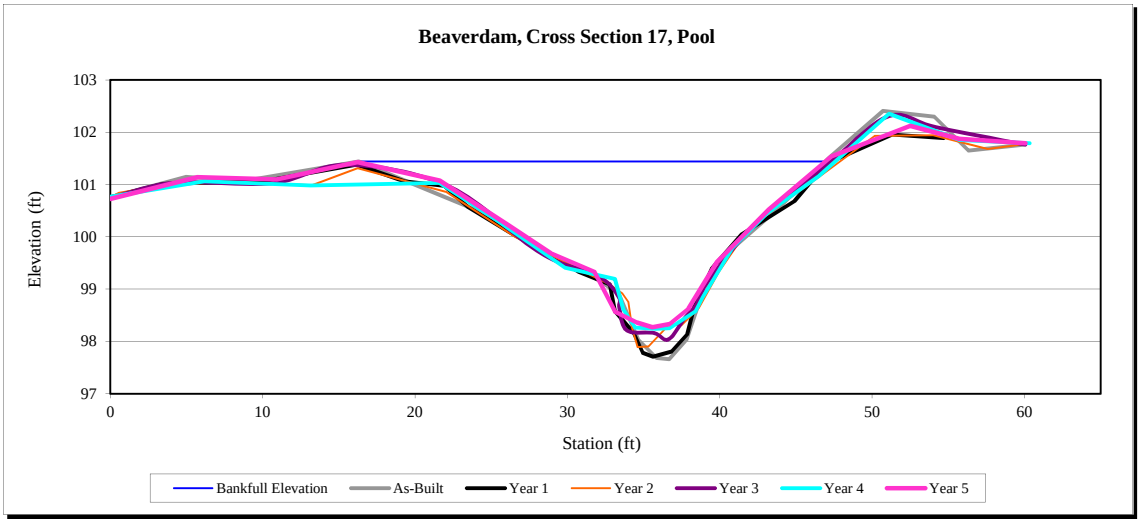
Left bank

Right bank



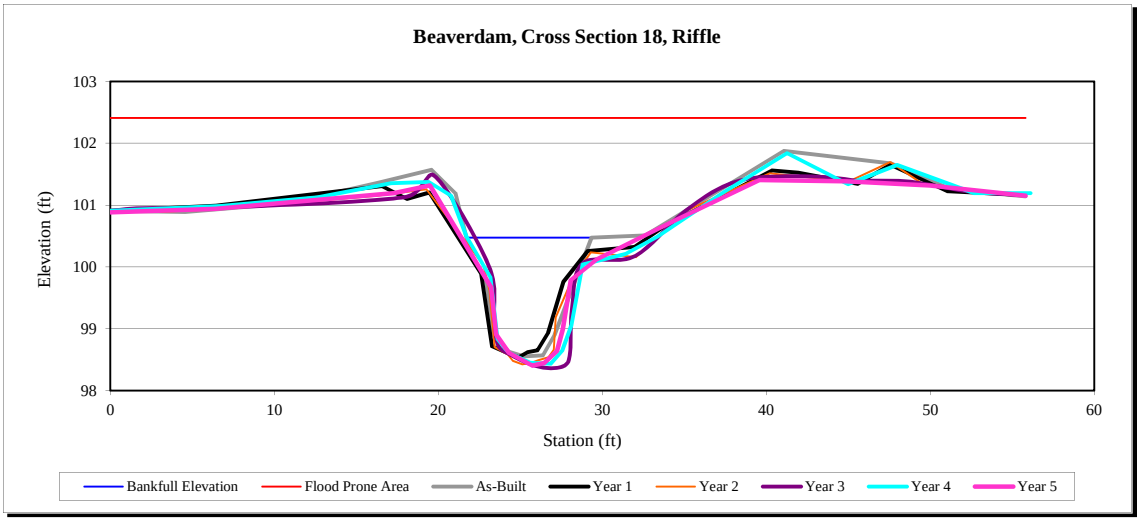
Left bank

Right bank



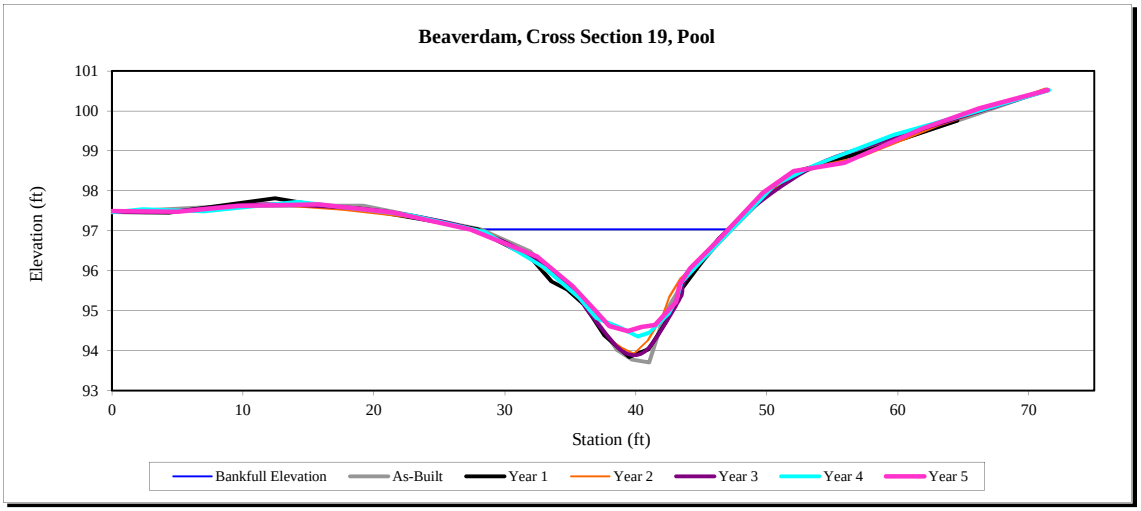
Left bank

Right bank



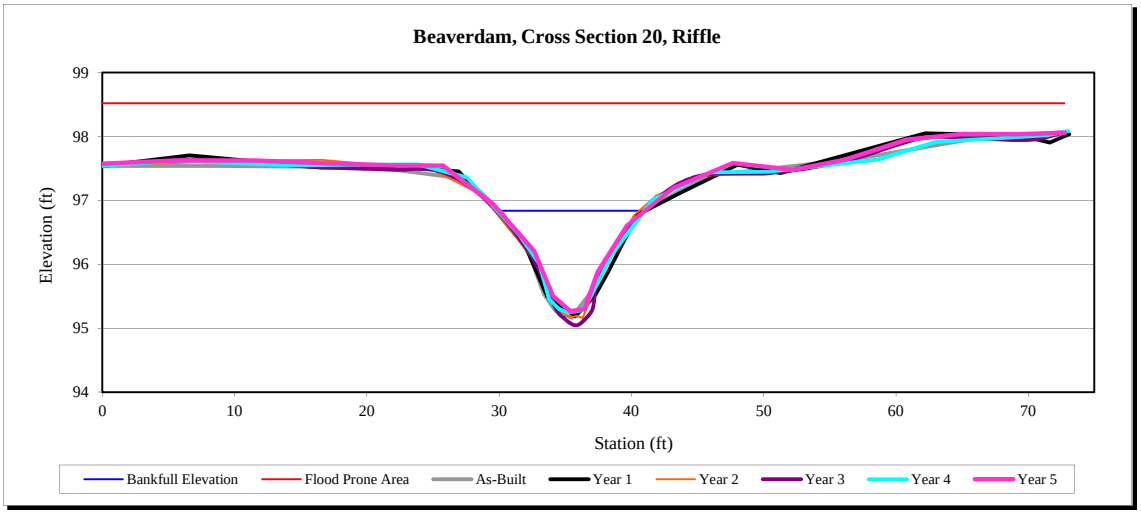
Left bank

Right bank



Left bank

Right bank



APPENDIX C

2012 Gauge Data

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
1-Jan-2012	06:00:00	-27.59	-40.32	-27.11	-45.28	-7.64	-26.21	-33.44	-48.14	-32.74	-6.15	-19.51								
1-Jan-2012	12:00:00	-27.53	-40.18	-27.23	-45.31	-7.93	-26.21	-33.65	-48.07	-32.80	-6.46	-19.90								
1-Jan-2012	18:00:00	-27.71	-40.33	-27.30	-45.36	-8.19	-26.46	-33.17	-48.20	-32.91	-6.63	-20.41								
1-Jan-2012	24:00:00	-27.68	-40.32	-27.26	-45.18	-8.47	-26.26	-33.71	-48.17	-32.86	-6.63	-20.71								
2-Jan-2012	06:00:00	-27.71	-40.27	-27.29	-45.28	-8.41	-26.32	-33.52	-48.15	-32.75	-6.75	-21.02								
2-Jan-2012	12:00:00	-27.60	-40.12	-27.24	-45.23	-8.72	-26.15	-33.44	-48.05	-32.73	-6.92	-21.34								
2-Jan-2012	18:00:00	-27.90	-40.33	-27.56	-45.25	-9.25	-26.34	-33.01	-48.26	-32.97	-7.37	-21.94								
2-Jan-2012	24:00:00	-27.62	-40.23	-27.32	-44.98	-9.45	-26.06	-33.77	-48.07	-32.77	-7.36	-22.06								
3-Jan-2012	06:00:00	-27.65	-40.10	-27.44	-45.09	-9.76	-26.21	-33.17	-48.07	-32.75	-7.61	-22.46								
3-Jan-2012	12:00:00	-27.67	-40.14	-27.47	-45.06	-10.14	-26.20	-33.62	-48.03	-32.80	-7.96	-22.84								
3-Jan-2012	18:00:00	-27.81	-40.23	-27.66	-45.21	-10.60	-26.39	-33.17	-48.23	-32.93	-8.25	-23.45								
3-Jan-2012	24:00:00	-27.60	-40.15	-27.56	-45.10	-10.88	-26.25	-33.91	-48.09	-32.85	-8.45	-23.63								
4-Jan-2012	06:00:00	-27.56	-40.11	-27.49	-45.18	-11.22	-26.22	-33.13	-47.99	-32.78	-8.70	-24.03								
4-Jan-2012	12:00:00	-27.66	-40.17	-27.77	-45.33	-11.85	-26.34	-33.31	-48.11	-32.78	-9.12	-24.57								
4-Jan-2012	18:00:00	-27.74	-40.30	-27.74	-45.31	-11.88	-26.45	-32.83	-48.20	-32.85	-9.22	-24.92								
4-Jan-2012	24:00:00	-27.68	-40.20	-27.59	-45.15	-11.42	-26.21	-33.97	-48.14	-32.79	-9.12	-25.12								
5-Jan-2012	06:00:00	-27.61	-40.20	-27.60	-45.07	-11.72	-26.19	-33.32	-48.14	-32.85	-9.22	-25.52								
5-Jan-2012	12:00:00	-27.81	-40.40	-27.78	-45.22	-12.21	-26.30	-33.88	-48.19	-32.93	-9.62	-25.97								
5-Jan-2012	18:00:00	-27.96	-40.42	-27.85	-45.30	-12.46	-26.50	-33.17	-48.32	-33.01	-9.80	-26.49								
5-Jan-2012	24:00:00	-27.72	-40.30	-27.73	-45.15	-12.15	-26.26	-33.73	-48.24	-32.86	-9.75	-26.67								
6-Jan-2012	06:00:00	-27.75	-40.33	-27.64	-45.13	-12.40	-26.21	-33.43	-48.18	-32.83	-10.00	-27.04								
6-Jan-2012	12:00:00	-27.69	-40.32	-27.79	-45.16	-12.70	-26.28	-33.85	-48.29	-32.78	-10.17	-27.41								
6-Jan-2012	18:00:00	-27.77	-40.27	-27.70	-45.15	-12.69	-26.18	-33.24	-48.08	-32.81	-10.20	-27.81								
6-Jan-2012	24:00:00	-27.54	-40.22	-27.70	-45.04	-12.56	-26.02	-33.82	-48.12	-32.81	-10.24	-28.06								
7-Jan-2012	06:00:00	-27.69	-40.26	-27.73	-44.99	-12.76	-26.18	-33.40	-48.13	-32.83	-10.44	-28.33								
7-Jan-2012	12:00:00	-27.63	-40.29	-27.77	-45.03	-12.93	-26.09	-33.76	-48.09	-32.83	-10.47	-28.75								
7-Jan-2012	18:00:00	-27.96	-40.51	-28.02	-45.25	-13.18	-26.36	-33.32	-48.38	-33.05	-10.78	-29.18								
7-Jan-2012	24:00:00	-27.71	-40.26	-27.85	-45.05	-12.98	-26.14	-33.86	-48.18	-32.84	-10.61	-29.41								
8-Jan-2012	06:00:00	-27.68	-40.26	-27.79	-44.97	-13.02	-26.12	-33.50	-48.05	-32.87	-10.68	-29.56								
8-Jan-2012	12:00:00	-27.72	-40.18	-27.79	-45.09	-13.15	-26.16	-33.71	-48.07	-32.75	-10.77	-29.79								
8-Jan-2012	18:00:00	-27.80	-40.30	-27.86	-45.24	-13.36	-26.32	-33.14	-48.19	-32.83	-11.04	-30.40								
8-Jan-2012	24:00:00	-27.69	-40.26	-27.73	-45.06	-13.45	-26.19	-33.65	-48.00	-32.73	-10.97	-30.52								
9-Jan-2012	06:00:00	-27.63	-40.35	-27.83	-45.19	-13.66	-26.24	-33.49	-48.18	-32.92	-11.13	-30.87							0.19	
9-Jan-2012	12:00:00	-27.57	-40.16	-27.52	-45.06	-7.35	-26.18	-33.62	-48.00	-32.71	-8.72	-31.07								
9-Jan-2012	18:00:00	-27.57	-40.30	-27.62	-45.10	-7.22	-26.20	-33.28	-48.06	-32.83	-8.48	-31.22								
9-Jan-2012	24:00:00	-27.66	-40.23	-27.67	-45.15	-7.41	-26.33	-34.32	-48.08	-32.87	-8.30	-31.33								
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10-Jan-2012	12:00:00	-27.63	-40.20	-27.61	-45.06	-6.97	-26.18	-33.60	-48.06	-32.80	-7.22	-31.16								
10-Jan-2012	18:00:00	-27.60	-40.32	-27.61	-45.10	-7.65	-26.21	-33.23	-48.15	-32.97	-7.36	-31.28								
10-Jan-2012	24:00:00	-27.65	-40.22	-27.71	-45.07	-8.23	-26.14	-33.64	-48.08	-32.83	-7.36	-31.28								
11-Jan-2012	06:00:00	-27.62	-40.33	-27.77	-45.13	-8.86	-26.15	-33.71	-48.09	-32.80	-7.66	-31.27							0.29	
11-Jan-2012	12:00:00	-27.71	-40.40	-27.68	-45.18	-9.19	-26.28	-33.53	-48.24	-32.80	-7.92	-31.34								
11-Jan-2012	18:00:00	-27.74	-40.36	-27.65	-45.17	-8.92	-26.20	-33.16	-48.24	-32.89	-7.78	-31.30								
11-Jan-2012	24:00:00	-27.84	-40.44	-27.42	-45.18	-4.29	-26.22	-33.79	-48.27	-33.08	-4.31	-31.43								
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12-Jan-2012	12:00:00	-27.71	-40.32	-27.44	-45.07	-5.61	-26.21	-33.66	-48.14	-32.84	-4.25	-30.02								
12-Jan-2012	18:00:00	-27.60	-40.41	-27.37	-45.00	-6.21	-26.14	-33.04	-48.13	-32.80	-4.46	-29.15								
12-Jan-2012	24:00:00	-27.69	-40.35	-27.43	-45.03	-6.80	-26.07	-33.62	-48.15	-32.81	-4.76	-28.75								
13-Jan-2012	06:00:00	-27.72	-40.42	-27.48	-44.99	-7.05	-26.15	-33.76	-48.08	-32.80	-4.94	-28.42								
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13-Jan-2012	18:00:00	-27.67	-40.32	-27.64	-45.15	-8.18	-26.31	-33.17	-48.15	-32.79	-5.97	-28.52								
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14-Jan-2012	06:00:00	-27.60	-40.21	-27.71	-45.07	-8.89	-26.16	-33.46	-48.02	-32.71	-6.71	-28.84								
14-Jan-2012	12:00:00	-27.55	-40.33	-27.73	-45.07	-9.27	-26.24	-33.67	-48.14	-32.72	-7.07	-29.17								
14-Jan-2012	18:00:00	-27.79	-40.40	-27.73	-45.21	-9.55	-26.32	-33.08	-48.19	-32.96	-7.44	-29.50								
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15-Jan-2012	06:00:00	-27.67	-40.26	-27.76	-45.19	-10.06	-26.31	-33.40	-48.14	-32.79	-7.88	-30.20								
15-Jan-2012	12:00:00	-27.72	-40.38	-27.88	-45.22	-10.29	-26.31	-34.09	-48.19	-32.93	-8.06	-30.56								
15-Jan-2012	18:00:00	-27.62	-40.33	-27.74	-45.18	-10.52	-26.26	-33.25	-48.14	-32.96	-8.37	-30.86								
15-Jan-2012	24:00:00	-27.67	-40.22	-27.78	-45.13	-10.66	-26.21	-33.68	-48.07	-32.77	-8.43	-31.04								
16-Jan-2012	06:00:00	-27.63	-40.32	-27.83	-45.21	-11.19	-26.34	-33.48	-48.05	-32.83	-8.80	-31.27								
16-Jan-2012	12:00:00	-27.67	-40.36	-27.88	-45.30	-11.66	-26.40	-33.88	-48.20	-32.79	-9.09	-31.39								
16-Jan-2012	18:00:00	-27.78	-40.40	-28.04	-45.34	-11.67	-26.36	-33.20	-48.25	-32.87	-9.27	-31.39								
16-Jan-2012	24:00:00	-27.63	-40.35	-27.85	-45.22	-11.35	-26.31	-33.70	-48.14	-32.92	-9.22	-31.24								
17-Jan-2012	06:00:00	-27.59	-40.30	-27.86	-45.16	-11.36	-26.20	-33.70	-48.06	-32.73	-9.30	-31.21							0.35	
17-Jan-2012	12:00:00	-27.62	-40.24	-27.76	-45.11	-11.38	-26.18	-33.79	-48.17	-32.75	-9.32	-31.27								
17-Jan-2012	18:00:00	-27.77	-40.32	-27.80	-45.12	-11.40	-26.19	-33.41	-48.17	-32.86	-9.36	-31.31								
17-Jan-2012	24:00:00	-27.66	-40.35	-27.77	-45.04	-11.28	-26.07	-33.86	-48.02	-32.83	-9.20	-31.17								
18-Jan-2012	06:00:00	-27.63	-40.33	-26.27	-44.94	-2.70	-26.06	-32.86	-48.19	-32.87	-2.87	-31.23							0.22	
18-Jan-2012	12:00:00	-27.75	-40.46	-23.63	-45.07	-2.65	-15.16	-33.96	-48.21	-32.91	-1.89	-1.61								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
18-Jan-2012	18:00:00	-27.75	-30.75	-24.17	-44.39	-3.40	-13.40	-33.18	-48.18	-32.93	-2.00	-1.84								
18-Jan-2012	24:00:00	-27.62	-23.49	-24.61	-43.30	-3.75	-14.73	-33.95	-48.07	-31.95	-2.12	-2.91								
19-Jan-2012	06:00:00	-27.68	-22.29	-25.28	-43.08	-4.03	-15.65	-33.30	-48.12	-31.41	-2.31	-3.98								
19-Jan-2012	12:00:00	-27.73	-23.04	-25.61	-43.31	-4.22	-16.31	-33.65	-48.12	-31.48	-2.38	-4.85								
19-Jan-2012	18:00:00	-27.74	-24.50	-25.93	-43.72	-4.44	-17.27	-33.01	-48.13	-31.85	-2.60	-5.62								
19-Jan-2012	24:00:00	-27.59	-25.74	-26.14	-43.85	-4.48	-17.66	-33.60	-48.09	-32.08	-2.62	-6.08								
20-Jan-2012	06:00:00	-27.84	-27.46	-26.42	-44.31	-4.83	-18.32	-34.08	-48.20	-32.67	-2.91	-6.76								
20-Jan-2012	12:00:00	-27.80	-29.02	-26.70	-44.46	-5.00	-18.81	-33.89	-48.18	-33.10	-2.94	-7.31								
20-Jan-2012	18:00:00	-27.85	-31.03	-26.94	-44.57	-5.22	-19.70	-33.22	-48.31	-33.17	-3.12	-8.02								
20-Jan-2012	24:00:00	-27.78	-32.53	-26.95	-44.58	-4.74	-20.21	-33.61	-48.27	-33.23	-2.86	-8.25								
21-Jan-2012	06:00:00	-27.81	-33.62	-27.02	-44.53	-3.87	-20.37	-33.47	-48.21	-33.19	-2.33	-7.25								
21-Jan-2012	12:00:00	-27.74	-7.68	-20.11	-42.85	-2.23	-3.68	-33.67	-48.19	-28.12	-1.10	0.07								
21-Jan-2012	18:00:00	-27.72	-5.40	-21.22	-36.51	-2.46	-5.88	-33.54	-48.18	-21.99	-1.01	-0.47								
21-Jan-2012	24:00:00	-27.89	-4.66	-19.46	-37.47	-2.42	-4.25	-33.89	-48.27	-21.05	-0.90	-0.10								
22-Jan-2012	06:00:00	-27.74	-4.39	-18.17	-34.38	-2.26	-4.31	-33.13	-48.12	-18.38	-0.63	-0.03								
22-Jan-2012	12:00:00	-27.63	-5.12	-19.52	-35.09	-2.77	-6.26	-32.95	-48.13	-17.78	-0.87	-0.46								
22-Jan-2012	18:00:00	-27.78	-6.08	-21.04	-35.97	-3.39	-7.80	-32.92	-48.19	-18.41	-1.20	-0.98								
22-Jan-2012	24:00:00	-27.79	-6.58	-22.20	-36.28	-3.52	-8.45	-33.28	-48.15	-18.94	-1.25	-1.13								
23-Jan-2012	06:00:00	-27.65	-7.14	-22.85	-36.51	-3.67	-9.10	-33.08	-48.18	-19.51	-1.30	-1.47								
23-Jan-2012	12:00:00	-27.69	-7.48	-23.16	-36.46	-3.93	-9.54	-33.52	-48.15	-19.97	-1.53	-1.83								
23-Jan-2012	18:00:00	-27.73	-7.80	-23.74	-36.40	-4.06	-9.95	-33.56	-48.23	-20.50	-1.53	-2.14								
23-Jan-2012	24:00:00	-27.77	-7.95	-24.00	-36.35	-4.09	-10.10	-33.64	-48.14	-20.95	-1.66	-2.39								
24-Jan-2012	06:00:00	-27.78	-8.37	-24.38	-36.37	-4.29	-10.55	-33.59	-48.31	-21.41	-1.79	-2.85							0.04	
24-Jan-2012	12:00:00	-27.85	-8.37	-24.66	-36.30	-4.30	-10.62	-33.95	-48.21	-21.92	-1.76	-2.86								
24-Jan-2012	18:00:00	-27.83	-8.62	-24.84	-36.15	-4.38	-10.92	-33.49	-48.26	-22.31	-1.82	-3.20								
24-Jan-2012	24:00:00	-27.68	-8.74	-25.00	-35.85	-4.48	-11.16	-33.89	-48.21	-22.73	-1.84	-3.37								
25-Jan-2012	06:00:00	-27.79	-9.21	-25.22	-35.63	-4.64	-11.69	-33.41	-48.24	-23.30	-1.96	-3.97								
25-Jan-2012	12:00:00	-27.62	-9.67	-25.45	-35.58	-4.75	-12.08	-33.79	-48.17	-23.68	-1.89	-4.47								
25-Jan-2012	18:00:00	-27.83	-10.21	-25.85	-35.56	-5.05	-13.12	-33.46	-48.38	-24.41	-2.24	-5.00								
25-Jan-2012	24:00:00	-27.77	-10.24	-25.80	-35.31	-5.10	-13.41	-33.94	-48.18	-24.67	-2.14	-5.26								
26-Jan-2012	06:00:00	-27.71	-10.60	-26.03	-35.45	-5.29	-13.94	-33.61	-48.13	-25.18	-2.21	-5.75								
26-Jan-2012	12:00:00	-27.83	-11.14	-26.33	-35.37	-5.47	-14.49	-33.78	-48.33	-25.78	-2.31	-6.29								
26-Jan-2012	18:00:00	-27.80	-11.30	-26.40	-35.41	-5.43	-14.86	-33.19	-48.32	-26.21	-2.37	-6.38								
26-Jan-2012	24:00:00	-27.84	-11.36	-26.50	-35.53	-5.55	-14.79	-33.91	-48.37	-26.61	-2.46	-6.49								
27-Jan-2012	06:00:00	-27.77	-11.46	-26.51	-35.47	-5.40	-14.55	-33.44	-48.15	-26.87	-2.32	-6.59							0.33	
27-Jan-2012	12:00:00	-27.67	-11.49	-26.56	-35.68	-5.26	-14.34	-34.00	-48.19	-27.22	-2.30	-6.56								
27-Jan-2012	18:00:00	-27.99	-6.61	-26.71	-36.46	-4.00	-9.27	-33.53	-48.43	-26.27	-1.90	-2.49								
27-Jan-2012	24:00:00	-27.71	-7.69	-26.54	-37.00	-4.40	-8.85	-34.07	-48.24	-25.83	-1.77	-3.79								
28-Jan-2012	06:00:00	-27.59	-8.89	-26.51	-37.41	-4.65	-9.70	-33.28	-48.21	-25.95	-1.80	-4.90								
28-Jan-2012	12:00:00	-27.66	-9.61	-26.71	-37.69	-4.88	-10.44	-33.38	-48.11	-26.27	-1.90	-5.79								
28-Jan-2012	18:00:00	-27.81	-10.35	-27.02	-38.09	-5.17	-11.27	-33.30	-48.23	-26.74	-2.08	-6.67								
28-Jan-2012	24:00:00	-27.73	-10.92	-26.98	-38.43	-5.48	-11.73	-34.06	-48.19	-27.11	-2.21	-7.15								
29-Jan-2012	06:00:00	-27.73	-11.78	-26.93	-38.74	-5.64	-12.36	-33.40	-48.25	-27.70	-2.32	-7.63								
29-Jan-2012	12:00:00	-27.67	-12.33	-26.95	-39.09	-5.76	-13.18	-33.44	-48.15	-28.28	-2.33	-8.20								
29-Jan-2012	18:00:00	-27.77	-13.22	-27.12	-39.51	-6.09	-14.45	-33.32	-48.26	-28.84	-2.60	-8.97								
29-Jan-2012	24:00:00	-27.63	-13.84	-26.88	-39.67	-6.21	-14.94	-33.95	-48.13	-29.25	-2.58	-9.29								
30-Jan-2012	06:00:00	-27.65	-14.61	-27.00	-40.17	-6.50	-15.57	-33.54	-48.11	-29.89	-2.75	-10.05								
30-Jan-2012	12:00:00	-27.72	-15.68	-27.05	-40.81	-6.69	-16.30	-33.74	-48.15	-30.45	-3.03	-10.73								
30-Jan-2012	18:00:00	-27.71	-16.54	-27.12	-41.25	-6.60	-17.13	-33.11	-48.19	-30.98	-3.15	-11.51								
30-Jan-2012	24:00:00	-27.69	-17.05	-27.02	-41.41	-6.98	-17.58	-33.78	-48.17	-31.52	-3.15	-11.92								
31-Jan-2012	06:00:00	-27.60	-17.92	-27.04	-41.74	-7.08	-18.04	-33.44	-48.07	-31.96	-3.27	-12.51								
31-Jan-2012	12:00:00	-27.68	-18.88	-27.20	-42.19	-7.22	-18.63	-33.71	-48.14	-32.54	-3.44	-13.11								
31-Jan-2012	18:00:00	-27.74	-19.84	-27.24	-42.46	-7.34	-19.13	-33.23	-48.17	-32.98	-3.69	-13.63								
31-Jan-2012	24:00:00	-27.67	-20.78	-27.19	-42.41	-7.58	-19.29	-33.72	-48.15	-32.96	-3.71	-13.97						0.00		1.43
1-Feb-2012	06:00:00	-27.68	-21.97	-27.29	-42.64	-7.64	-19.68	-33.43	-48.14	-32.99	-3.86	-14.59								
1-Feb-2012	12:00:00	-27.65	-23.22	-27.25	-42.95	-7.57	-19.86	-33.61	-48.13	-32.93	-3.96	-14.96								
1-Feb-2012	18:00:00	-27.89	-24.90	-27.36	-43.32	-7.72	-20.31	-33.35	-48.27	-33.03	-4.16	-15.44								
1-Feb-2012	24:00:00	-27.73	-26.36	-27.35	-43.15	-7.96	-20.43	-33.91	-48.15	-32.99	-4.07	-15.68								
2-Feb-2012	06:00:00	-27.83	-28.26	-27.31	-43.38	-7.98	-20.81	-33.53	-48.24	-33.05	-4.24	-16.10							0.13	
2-Feb-2012	12:00:00	-27.79	-28.40	-27.04	-43.33	-3.81	-16.86	-33.59	-48.14	-32.99	-2.43	-16.29								
2-Feb-2012	18:00:00	-27.81	-24.54	-27.25	-43.49	-4.64	-14.69	-33.54	-48.27	-33.08	-2.62	-15.65								
2-Feb-2012	24:00:00	-27.67	-23.31	-27.22	-43.54	-5.44	-14.10	-33.96	-48.11	-32.91	-2.64	-15.15								
3-Feb-2012	06:00:00	-27.54	-23.89	-27.24	-43.62	-6.02	-14.30	-33.34	-48.02	-32.81	-2.75	-15.20								
3-Feb-2012	12:00:00	-27.75	-25.39	-27.41	-43.93	-6.60	-15.04	-33.65	-48.15	-33.02	-3.20	-15.70								
3-Feb-2012	18:00:00	-27.86	-26.89	-27.48	-44.05	-6.91	-15.84	-33.42	-48.20	-33.03	-3.47	-16.24								
3-Feb-2012	24:00:00	-27.67	-27.61	-27.44	-43.86	-7.17	-16.07	-33.91	-48.14	-33.01	-3.51	-16.23								
4-Feb-2012	06:00:00	-27.69	-28.83	-27.56	-43.80	-7.44	-16.52	-33.41	-48.08	-32.90	-3.69	-16.58								
4-Feb-2012	12:00:00	-27.75	-29.92	-27.50	-43.93	-7.53	-17.02	-33.62	-48.13	-32.97	-3.88	-17.03								
4-Feb-2012	18:00:00	-27.90	-31.10	-27.73	-43.95	-7.52	-17.55	-33.13	-48.29	-33.10	-4.08	-17.30								
4-Feb-2012	24:00:00	-27.79	-31.57	-27.66	-43.85	-7.29	-17.60	-33.86	-48.23	-33.08	-3.98	-17.51								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
5-Feb-2012	06:00:00	-27.87	-32.35	-27.64	-43.79	-7.34	-17.84	-33.49	-48.23	-33.14	-4.02	-17.68							0.58	
5-Feb-2012	12:00:00	-27.80	-28.72	-25.64	-43.65	-2.35	-5.92	-33.58	-48.13	-32.98	-1.26	-9.76								
5-Feb-2012	18:00:00	-27.69	-5.26	-23.53	-35.86	-2.71	-4.53	-33.38	-48.12	-25.59	-0.92	-0.71								
5-Feb-2012	24:00:00	-27.71	-5.78	-23.78	-34.86	-3.13	-5.88	-32.12	-48.13	-24.19	-1.01	-1.06								
6-Feb-2012	06:00:00	-27.71	-6.42	-23.63	-33.88	-3.54	-6.94	-31.44	-48.15	-23.85	-1.20	-1.65								
6-Feb-2012	12:00:00	-27.75	-6.87	-23.90	-34.07	-3.76	-7.53	-31.62	-48.15	-23.79	-1.24	-2.19								
6-Feb-2012	18:00:00	-27.78	-6.94	-24.23	-33.93	-4.00	-8.15	-31.44	-48.29	-23.99	-1.48	-2.75								
6-Feb-2012	24:00:00	-27.67	-7.24	-24.36	-33.55	-4.05	-8.31	-31.96	-48.19	-24.11	-1.49	-3.13								
7-Feb-2012	06:00:00	-27.81	-7.68	-24.86	-33.76	-4.16	-8.78	-32.11	-48.32	-24.50	-1.61	-3.79								
7-Feb-2012	12:00:00	-27.71	-7.83	-24.97	-33.40	-4.21	-9.06	-32.35	-48.11	-24.74	-1.59	-4.12								
7-Feb-2012	18:00:00	-27.91	-8.66	-25.44	-33.40	-4.54	-9.74	-32.48	-48.29	-25.46	-1.85	-4.90								
7-Feb-2012	24:00:00	-27.60	-8.76	-25.40	-33.03	-4.56	-9.92	-33.04	-48.09	-25.57	-1.74	-5.19								
8-Feb-2012	06:00:00	-27.75	-9.46	-25.84	-32.99	-4.93	-10.61	-33.55	-48.23	-26.23	-2.02	-6.02								
8-Feb-2012	12:00:00	-27.69	-9.84	-25.94	-32.89	-4.90	-10.89	-33.60	-48.13	-26.62	-1.98	-6.57								
8-Feb-2012	18:00:00	-27.85	-10.24	-25.69	-32.98	-5.10	-11.44	-33.61	-48.24	-27.09	-2.15	-7.10								
8-Feb-2012	24:00:00	-27.84	-10.53	-25.82	-33.17	-5.20	-11.62	-33.98	-48.26	-27.49	-2.21	-7.40								
9-Feb-2012	06:00:00	-27.79	-11.10	-25.94	-33.49	-5.38	-12.08	-33.42	-48.11	-28.07	-2.16	-8.09								
9-Feb-2012	12:00:00	-27.86	-11.74	-26.15	-33.89	-5.67	-12.57	-33.77	-48.21	-28.72	-2.36	-8.69								
9-Feb-2012	18:00:00	-27.90	-12.55	-26.47	-34.25	-5.90	-13.49	-33.32	-48.32	-29.39	-2.56	-9.67								
9-Feb-2012	24:00:00	-27.86	-13.00	-26.50	-34.47	-6.04	-13.91	-33.80	-48.25	-29.81	-2.63	-10.07								
10-Feb-2012	06:00:00	-27.90	-13.46	-26.65	-34.84	-6.19	-14.27	-33.64	-48.13	-30.32	-2.67	-10.63								
10-Feb-2012	12:00:00	-27.91	-14.18	-26.83	-35.57	-6.39	-14.80	-33.72	-48.17	-30.85	-2.86	-11.44								
10-Feb-2012	18:00:00	-27.86	-14.67	-27.00	-36.01	-6.36	-15.26	-33.38	-48.39	-31.28	-2.93	-12.02								
10-Feb-2012	24:00:00	-27.75	-14.79	-26.84	-36.00	-6.19	-15.20	-33.78	-48.23	-31.60	-2.86	-12.37								
11-Feb-2012	06:00:00	-27.68	-14.95	-26.86	-36.21	-6.33	-15.17	-33.73	-48.19	-31.79	-2.88	-12.62								
11-Feb-2012	12:00:00	-27.81	-15.37	-27.01	-36.55	-6.25	-15.33	-33.88	-48.23	-32.33	-2.99	-13.04								
11-Feb-2012	18:00:00	-27.86	-15.69	-27.02	-36.91	-6.38	-15.47	-33.48	-48.29	-32.83	-2.98	-13.46								
11-Feb-2012	24:00:00	-27.80	-16.38	-27.05	-37.61	-6.74	-15.83	-34.21	-48.15	-32.98	-3.16	-13.87								
12-Feb-2012	06:00:00	-27.74	-17.49	-27.19	-38.37	-7.14	-16.65	-33.40	-48.15	-32.98	-3.40	-14.54								
12-Feb-2012	12:00:00	-27.75	-18.61	-27.36	-39.07	-7.56	-17.37	-33.64	-48.14	-33.02	-3.74	-15.14								
12-Feb-2012	18:00:00	-27.84	-19.57	-27.42	-39.85	-7.71	-18.18	-33.07	-48.21	-33.01	-3.89	-15.87								
12-Feb-2012	24:00:00	-27.77	-20.13	-27.38	-40.00	-7.87	-18.33	-33.72	-48.17	-32.95	-3.96	-16.23								
13-Feb-2012	06:00:00	-27.66	-21.21	-27.49	-40.61	-8.29	-18.87	-33.53	-48.08	-32.93	-4.13	-16.73								
13-Feb-2012	12:00:00	-27.79	-22.34	-27.71	-41.09	-8.83	-19.42	-33.86	-48.24	-32.95	-4.70	-17.43								
13-Feb-2012	18:00:00	-27.92	-23.70	-27.84	-41.49	-8.13	-19.89	-33.47	-48.33	-33.16	-4.40	-17.91								
13-Feb-2012	24:00:00	-27.81	-24.67	-27.77	-41.56	-8.10	-20.08	-33.94	-48.23	-33.11	-4.46	-18.25								
14-Feb-2012	06:00:00	-27.75	-26.00	-27.62	-41.70	-8.41	-20.27	-33.50	-48.19	-33.02	-4.64	-18.53								
14-Feb-2012	12:00:00	-27.73	-27.21	-27.73	-42.12	-8.41	-20.48	-33.70	-48.21	-33.01	-4.86	-18.92								
14-Feb-2012	18:00:00	-27.89	-28.82	-27.85	-42.25	-8.40	-20.85	-33.23	-48.35	-33.08	-5.10	-19.35								
14-Feb-2012	24:00:00	-27.63	-29.82	-27.68	-42.15	-8.55	-20.94	-34.03	-48.14	-32.93	-5.10	-19.35								
15-Feb-2012	06:00:00	-27.73	-31.44	-27.79	-42.37	-8.76	-21.27	-33.66	-48.19	-33.07	-5.19	-19.61								
15-Feb-2012	12:00:00	-27.80	-33.00	-27.73	-43.02	-8.91	-21.58	-33.65	-48.26	-32.96	-5.37	-19.90								
15-Feb-2012	18:00:00	-27.77	-34.70	-27.90	-43.36	-9.13	-22.17	-33.44	-48.29	-33.08	-5.62	-20.35								
15-Feb-2012	24:00:00	-27.71	-36.14	-27.94	-43.31	-9.45	-22.55	-33.94	-48.30	-32.95	-5.84	-20.66								
16-Feb-2012	06:00:00	-27.73	-37.41	-27.96	-43.29	-9.51	-22.91	-33.38	-48.18	-32.85	-5.97	-20.84							0.03	
16-Feb-2012	12:00:00	-27.67	-38.61	-27.97	-43.35	-9.58	-23.13	-33.84	-48.19	-32.90	-6.15	-21.25								
16-Feb-2012	18:00:00	-27.77	-39.40	-28.02	-43.37	-9.03	-23.26	-33.73	-48.21	-33.03	-5.84	-21.57								
16-Feb-2012	24:00:00	-27.75	-39.55	-28.00	-43.32	-5.31	-23.24	-34.22	-48.21	-33.01	-3.94	-21.69								
17-Feb-2012	06:00:00	-27.83	-39.12	-27.91	-43.36	-5.70	-23.12	-33.43	-48.24	-33.01	-3.83	-21.94								
17-Feb-2012	12:00:00	-27.72	-38.59	-27.70	-43.29	-6.26	-22.74	-33.54	-48.02	-32.86	-3.81	-22.09								
17-Feb-2012	18:00:00	-27.77	-38.94	-27.92	-43.45	-6.82	-22.96	-33.32	-48.24	-32.92	-4.10	-22.34								
17-Feb-2012	24:00:00	-27.74	-38.83	-27.98	-43.51	-7.38	-22.85	-33.85	-48.08	-32.93	-4.32	-22.54								
18-Feb-2012	06:00:00	-27.77	-39.39	-28.03	-43.61	-7.80	-22.89	-33.50	-48.19	-32.99	-4.76	-22.75								
18-Feb-2012	12:00:00	-27.75	-39.82	-28.00	-43.61	-8.00	-23.02	-33.77	-48.13	-32.93	-5.01	-22.91								
18-Feb-2012	18:00:00	-27.91	-40.39	-28.15	-43.77	-8.40	-23.48	-33.36	-48.29	-33.13	-5.36	-23.36								
18-Feb-2012	24:00:00	-27.75	-40.29	-27.97	-43.48	-8.62	-23.34	-33.56	-48.07	-32.86	-5.46	-23.27								
19-Feb-2012	06:00:00	-27.85	-40.47	-28.15	-43.66	-8.86	-23.64	-33.30	-48.25	-33.03	-5.79	-23.72							0.29	
19-Feb-2012	12:00:00	-27.72	-40.51	-28.10	-43.57	-7.09	-23.61	-34.06	-48.24	-33.03	-4.86	-23.80								
19-Feb-2012	18:00:00	-27.75	-40.40	-28.00	-43.38	-5.23	-23.57	-33.30	-48.18	-32.86	-3.51	-23.86								
19-Feb-2012	24:00:00	-27.63	-8.83	-23.63	-42.09	-2.48	-3.50	-33.82	-48.20	-32.90	-1.02	-0.26								
20-Feb-2012	06:00:00	-27.61	-4.68	-23.38	-35.26	-2.13	-3.90	-23.28	-48.00	-26.39	-0.71	-0.03							0.01	
20-Feb-2012	12:00:00	-26.06	-5.23	-24.16	-32.35	-2.84	-5.12	-21.56	-48.12	-24.33	-0.93	-0.52								
20-Feb-2012	18:00:00	-25.26	-5.77	-24.24	-32.50	-3.40	-6.29	-21.49	-48.18	-23.86	-1.17	-0.98								
20-Feb-2012	24:00:00	-24.98	-6.33	-24.29	-32.80	-3.76	-7.06	-22.52	-48.24	-23.74	-1.32	-1.58								
21-Feb-2012	06:00:00	-24.80	-6.79	-24.54	-32.74	-3.87	-7.65	-22.61	-48.08	-23.73	-1.32	-1.89								
21-Feb-2012	12:00:00	-24.78	-7.16	-24.98	-32.76	-4.17	-8.22	-23.18	-48.17	-24.05	-1.53	-2.36								
21-Feb-2012	18:00:00	-24.69	-7.54	-25.34	-32.92	-4.28	-8.51	-23.22	-48.31	-24.38	-1.61	-2.66								
21-Feb-2012	24:00:00	-24.33	-7.54	-25.51	-32.65	-4.32	-8.46	-23.71	-48.18	-24.46	-1.65	-2.90								
22-Feb-2012	06:00:00	-24.71	-7.96	-25.78	-32.88	-4.36	-8.78	-23.65	-48.29	-24.89	-1.74	-3.27								
22-Feb-2012	12:00:00	-24.77	-8.19	-25.90	-32.70	-4.50	-8.98	-24.10	-48.18	-25.27	-1.79	-3.55								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
22-Feb-2012	18:00:00	-24.69	-8.46	-26.29	-32.59	-4.63	-9.46	-23.83	-48.29	-25.75	-1.94	-3.70								
22-Feb-2012	24:00:00	-24.38	-8.44	-26.22	-32.26	-4.72	-9.22	-24.67	-48.19	-25.84	-1.85	-3.94								
23-Feb-2012	06:00:00	-24.50	-8.67	-26.33	-32.20	-4.78	-9.33	-24.78	-48.03	-26.20	-1.85	-4.18							0.17	
23-Feb-2012	12:00:00	-24.85	-5.55	-26.44	-32.44	-3.61	-5.15	-24.96	-48.08	-26.32	-1.44	-1.48								
23-Feb-2012	18:00:00	-24.67	-6.19	-26.64	-32.52	-4.00	-6.16	-24.48	-48.18	-26.48	-1.59	-2.12								
23-Feb-2012	24:00:00	-24.50	-6.94	-26.87	-32.37	-4.40	-7.01	-25.08	-48.21	-26.66	-1.67	-2.80								
24-Feb-2012	06:00:00	-24.29	-7.52	-26.77	-32.19	-4.51	-7.43	-24.76	-48.08	-26.73	-1.60	-3.16							0.09	
24-Feb-2012	12:00:00	-24.24	-7.90	-26.86	-32.35	-4.45	-7.80	-24.96	-48.09	-27.02	-1.68	-3.46								
24-Feb-2012	18:00:00	-24.56	-8.36	-27.18	-32.55	-4.81	-8.46	-25.00	-48.23	-27.51	-1.79	-3.97								
24-Feb-2012	24:00:00	-24.51	-6.54	-27.17	-32.71	-4.00	-5.78	-26.08	-48.25	-27.69	-1.60	-2.01								
25-Feb-2012	06:00:00	-25.13	-5.53	-26.71	-32.86	-3.39	-4.50	-24.28	-48.17	-27.49	-1.34	-1.35								
25-Feb-2012	12:00:00	-24.67	-6.54	-26.60	-32.43	-3.67	-5.96	-22.74	-48.05	-27.01	-1.29	-1.91								
25-Feb-2012	18:00:00	-24.29	-7.46	-26.82	-32.37	-4.08	-7.18	-22.15	-48.15	-27.11	-1.42	-2.57								
25-Feb-2012	24:00:00	-24.55	-8.28	-26.92	-32.71	-4.32	-7.91	-22.94	-48.14	-27.29	-1.77	-3.35								
26-Feb-2012	06:00:00	-25.17	-9.15	-27.04	-33.07	-4.51	-8.84	-22.85	-48.11	-27.77	-1.80	-4.23								
26-Feb-2012	12:00:00	-25.55	-9.74	-27.24	-33.29	-4.81	-9.71	-23.45	-48.27	-28.27	-1.97	-4.94								
26-Feb-2012	18:00:00	-25.65	-10.32	-27.38	-33.35	-5.05	-10.32	-23.71	-48.20	-28.76	-2.09	-5.42								
26-Feb-2012	24:00:00	-25.37	-10.57	-27.36	-33.37	-5.28	-10.60	-24.42	-48.21	-29.01	-2.13	-5.85								
27-Feb-2012	06:00:00	-25.43	-10.92	-27.31	-33.51	-5.43	-11.03	-24.42	-48.09	-29.51	-2.20	-6.29							0.11	
27-Feb-2012	12:00:00	-25.70	-11.49	-27.62	-33.94	-5.60	-11.55	-25.13	-48.19	-30.04	-2.44	-6.77								
27-Feb-2012	18:00:00	-25.62	-11.65	-27.59	-34.13	-5.28	-11.66	-25.14	-48.17	-30.39	-2.30	-7.03								
27-Feb-2012	24:00:00	-25.57	-9.85	-27.72	-34.43	-3.67	-10.00	-25.87	-48.20	-30.79	-1.74	-5.31								
28-Feb-2012	06:00:00	-25.41	-7.82	-27.53	-34.62	-3.99	-6.80	-25.68	-48.14	-31.19	-1.77	-3.01							0.01	
28-Feb-2012	12:00:00	-25.44	-8.40	-27.50	-34.98	-4.28	-7.41	-25.62	-48.08	-31.54	-1.77	-3.92								
28-Feb-2012	18:00:00	-25.45	-9.13	-27.55	-35.37	-4.56	-8.13	-25.22	-48.17	-31.69	-1.84	-4.88								
28-Feb-2012	24:00:00	-25.04	-9.90	-27.54	-35.71	-4.98	-9.00	-25.78	-48.20	-31.99	-2.07	-5.83						0.00		1.51
29-Feb-2012	06:00:00	-24.90	-10.53	-27.52	-36.11	-5.08	-9.66	-25.39	-48.19	-32.21	-2.12	-6.56							0.09	
29-Feb-2012	12:00:00	-24.72	-10.90	-27.56	-36.17	-5.22	-10.18	-25.92	-48.11	-32.35	-2.13	-7.04								
29-Feb-2012	18:00:00	-24.38	-11.11	-27.73	-36.19	-5.23	-10.26	-25.68	-48.29	-32.60	-2.27	-7.33								
29-Feb-2012	24:00:00	-24.35	-11.36	-27.68	-36.34	-5.41	-10.48	-26.62	-48.20	-32.77	-2.32	-7.46								
1-Mar-2012	06:00:00	-24.19	-10.70	-27.65	-36.35	-5.13	-10.48	-25.99	-48.18	-32.80	-2.06	-7.72							0.01	
1-Mar-2012	12:00:00	-24.33	-10.48	-27.59	-36.64	-5.14	-10.29	-26.51	-48.07	-32.75	-2.01	-7.69								
1-Mar-2012	18:00:00	-24.60	-11.19	-27.77	-36.99	-5.47	-10.60	-26.24	-48.20	-32.91	-2.12	-8.05								
1-Mar-2012	24:00:00	-24.78	-11.94	-27.76	-37.15	-5.98	-11.01	-27.50	-48.08	-32.83	-2.37	-8.45								
2-Mar-2012	06:00:00	-25.35	-12.54	-27.59	-37.51	-6.14	-11.46	-27.30	-48.21	-32.83	-2.51	-9.19							0.02	
2-Mar-2012	12:00:00	-25.74	-13.03	-27.78	-37.97	-6.24	-11.92	-27.83	-48.06	-32.80	-2.58	-9.76								
2-Mar-2012	18:00:00	-25.51	-12.85	-27.82	-38.09	-4.80	-11.99	-27.90	-48.11	-32.81	-2.18	-10.29								
2-Mar-2012	24:00:00	-25.05	-11.95	-27.79	-38.29	-5.07	-10.85	-28.37	-48.08	-32.83	-2.33	-9.75								
3-Mar-2012	06:00:00	-24.79	-12.31	-27.65	-38.50	-5.46	-10.49	-28.57	-48.14	-32.75	-2.34	-9.73							0.99	
3-Mar-2012	12:00:00	-21.27	-3.02	-17.63	-12.35	-1.45	-3.00	-28.78	-42.98	-23.38	-0.08	0.51								
3-Mar-2012	18:00:00	-6.90	-2.26	-7.58	-13.69	1.72	-4.14	-2.98	-5.17	-4.11	0.88	0.53								
3-Mar-2012	24:00:00	-5.28	-2.54	-7.56	-22.87	-0.24	-4.59	-3.22	-5.28	-3.50	-0.04	0.29								
4-Mar-2012	06:00:00	-4.89	-2.88	-8.18	-26.73	-1.80	-4.86	-3.25	-5.48	-3.16	-0.41	0.09							0.61	
4-Mar-2012	12:00:00	0.78	-1.78	-5.66	-9.22	1.05	-3.23	-2.74	-4.51	-1.84	1.75	1.18								
4-Mar-2012	18:00:00	-1.44	-2.50	-5.26	-16.03	1.00	-4.56	-2.75	-5.31	-0.73	0.50	0.58								
4-Mar-2012	24:00:00	-2.00	-2.97	-6.05	-24.67	-0.52	-5.34	-3.54	-5.66	-0.97	-0.32	0.29								
5-Mar-2012	06:00:00	-2.60	-3.51	-6.90	-27.27	-1.77	-5.98	-2.90	-6.00	-1.71	-0.57	-0.03								
5-Mar-2012	12:00:00	-3.06	-3.91	-7.63	-28.71	-2.56	-6.30	-3.32	-6.43	-2.25	-0.82	-0.21								
5-Mar-2012	18:00:00	-3.74	-4.41	-8.28	-30.07	-3.06	-6.75	-4.13	-6.71	-2.95	-0.93	-0.47								
5-Mar-2012	24:00:00	-4.32	-5.12	-8.68	-31.03	-3.51	-7.47	-4.09	-7.08	-3.35	-1.05	-0.74								
6-Mar-2012	06:00:00	-4.67	-5.68	-9.10	-31.56	-3.80	-7.80	-3.89	-8.06	-3.68	-1.13	-0.91								
6-Mar-2012	12:00:00	-4.92	-6.19	-9.56	-32.03	-3.96	-8.32	-4.45	-9.79	-4.01	-1.23	-1.09								
6-Mar-2012	18:00:00	-5.23	-6.63	-9.97	-32.27	-4.21	-8.79	-4.26	-11.91	-4.47	-1.41	-1.35								
6-Mar-2012	24:00:00	-5.35	-6.87	-10.36	-32.23	-4.44	-9.09	-4.90	-13.82	-4.54	-1.48	-1.65								
7-Mar-2012	06:00:00	-5.55	-7.26	-10.79	-32.50	-4.56	-9.34	-4.63	-16.40	-4.75	-1.49	-1.85								
7-Mar-2012	12:00:00	-5.85	-7.59	-11.18	-32.51	-4.69	-9.58	-5.28	-20.24	-4.95	-1.55	-2.01								
7-Mar-2012	18:00:00	-6.33	-8.00	-11.88	-32.88	-4.99	-10.07	-5.47	-25.81	-5.38	-1.86	-2.33								
7-Mar-2012	24:00:00	-6.84	-8.71	-11.88	-33.16	-5.10	-10.11	-6.16	-31.79	-5.71	-1.88	-2.30								
8-Mar-2012	06:00:00	-7.14	-9.09	-12.42	-33.18	-5.12	-10.30	-6.43	-38.90	-5.89	-1.91	-2.39	0.00	0.00	0.00					
8-Mar-2012	12:00:00	-7.28	-9.32	-12.97	-33.36	-5.17	-10.23	-6.90	-43.55	-6.11	-2.02	-2.54								
8-Mar-2012	18:00:00	-7.44	-9.67	-13.68	-33.29	-5.42	-10.52	-7.04	-47.15	-6.28	-2.09	-2.71								
8-Mar-2012	24:00:00	-7.63	-10.04	-14.12	-33.37	-5.84	-10.84	-8.18	-48.12	-6.47	-2.20	-3.04								
9-Mar-2012	06:00:00	-7.69	-10.28	-14.99	-33.39	-5.71	-10.84	-8.30	-48.09	-6.52	-2.25	-2.95							0.16	
9-Mar-2012	12:00:00	-7.80	-10.26	-16.46	-33.43	-5.44	-10.84	-8.34	-48.17	-6.73	-2.16	-2.89								
9-Mar-2012	18:00:00	-7.33	-7.17	-16.55	-33.81	-3.90	-6.80	-5.78	-48.07	-6.68	-1.72	-1.36								
9-Mar-2012	24:00:00	-7.85	-8.25	-17.78	-33.89	-4.48	-7.47	-6.62	-47.99	-6.67	-1.82	-1.93								
10-Mar-2012	06:00:00	-8.05	-9.37	-19.54	-34.02	-5.07	-8.63	-7.18	-48.06	-6.89	-1.98	-2.60								
10-Mar-2012	12:00:00	-8.37	-10.09	-20.35	-34.27	-5.17	-9.33	-8.03	-48.06	-7.05	-1.97	-2.79								
10-Mar-2012	18:00:00	-8.48	-10.71	-21.00	-34.36	-5.55	-10.18	-8.46	-48.09	-7.29	-2.24	-3.19								
10-Mar-2012	24:00:00	-8.67	-11.23	-21.54	-34.43	-6.22	-10.85	-9.92	-48.11	-7.45	-2.48	-3.62								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
11-Mar-2012	06:00:00	-8.76	-11.78	-21.94	-34.61	-6.31	-11.37	-10.13	-48.03	-7.54	-2.57	-3.87								
11-Mar-2012	12:00:00	-9.03	-12.28	-22.31	-34.65	-6.44	-11.79	-10.64	-48.13	-7.51	-2.79	-4.03								
11-Mar-2012	18:00:00	-9.37	-13.00	-22.76	-34.89	-6.85	-12.46	-10.88	-48.31	-7.96	-3.09	-4.43								
11-Mar-2012	24:00:00	-9.30	-13.58	-22.85	-34.65	-7.30	-12.76	-12.00	-48.11	-7.88	-3.20	-4.81								
12-Mar-2012	06:00:00	-9.44	-14.10	-23.04	-34.72	-7.34	-13.05	-11.78	-48.09	-8.08	-3.27	-5.01								
12-Mar-2012	12:00:00	-9.50	-14.34	-23.40	-34.66	-7.33	-13.53	-12.14	-48.14	-8.15	-3.44	-5.21								
12-Mar-2012	18:00:00	-9.85	-14.91	-23.82	-34.83	-7.50	-14.00	-12.28	-48.20	-8.45	-3.72	-5.49								
12-Mar-2012	24:00:00	-9.92	-15.68	-23.93	-34.98	-8.18	-14.32	-13.63	-48.23	-8.51	-3.89	-5.91								
13-Mar-2012	06:00:00	-9.85	-15.76	-23.95	-35.10	-7.81	-14.26	-13.21	-48.13	-8.53	-3.94	-5.86								
13-Mar-2012	12:00:00	-9.89	-15.92	-24.11	-35.31	-7.58	-14.16	-13.42	-48.06	-8.59	-3.98	-5.95								
13-Mar-2012	18:00:00	-10.29	-16.11	-24.43	-35.63	-7.30	-14.21	-13.39	-48.29	-8.92	-4.11	-5.74								
13-Mar-2012	24:00:00	-10.20	-16.78	-24.44	-35.57	-8.16	-14.54	-14.63	-48.07	-8.90	-4.26	-6.33								
14-Mar-2012	06:00:00	-10.41	-17.11	-24.66	-35.87	-8.10	-14.62	-14.30	-48.18	-9.14	-4.52	-6.67								
14-Mar-2012	12:00:00	-10.52	-17.31	-24.72	-35.93	-8.07	-14.76	-14.81	-48.11	-9.20	-4.60	-6.86								
14-Mar-2012	18:00:00	-10.89	-17.92	-25.00	-36.42	-8.37	-15.29	-14.75	-48.27	-9.50	-4.97	-7.25								
14-Mar-2012	24:00:00	-10.98	-18.97	-24.97	-36.60	-9.38	-15.69	-16.45	-48.08	-9.64	-5.40	-7.83								
15-Mar-2012	06:00:00	-10.95	-19.23	-24.91	-36.93	-9.25	-15.84	-16.07	-47.97	-9.61	-5.51	-8.14								
15-Mar-2012	12:00:00	-11.27	-19.75	-25.26	-37.31	-9.45	-16.23	-16.63	-48.14	-9.95	-5.93	-8.79								
15-Mar-2012	18:00:00	-11.72	-20.34	-25.46	-37.51	-9.86	-16.72	-16.92	-48.27	-10.33	-6.36	-9.29								
15-Mar-2012	24:00:00	-11.71	-21.33	-25.43	-37.44	-10.63	-17.10	-18.34	-48.13	-10.35	-6.81	-9.74								
16-Mar-2012	06:00:00	-11.72	-21.82	-25.32	-37.50	-10.38	-17.26	-18.00	-48.08	-10.39	-6.88	-10.10							0.16	
16-Mar-2012	12:00:00	-11.78	-22.23	-25.46	-37.68	-9.78	-17.48	-18.31	-48.03	-10.51	-7.04	-10.39								
16-Mar-2012	18:00:00	-12.18	-22.87	-25.64	-38.08	-9.79	-17.74	-18.22	-48.19	-10.85	-7.44	-10.76								
16-Mar-2012	24:00:00	-12.17	-23.84	-25.62	-37.98	-11.01	-18.02	-19.42	-48.09	-11.03	-7.80	-11.03								
17-Mar-2012	06:00:00	-11.77	-25.04	-25.50	-38.27	-9.92	-18.30	-19.01	-48.08	-9.97	-4.44	-11.42								
17-Mar-2012	12:00:00	-11.64	-23.50	-25.63	-38.58	-8.53	-18.02	-19.38	-48.20	-10.69	-5.06	-11.06								
17-Mar-2012	18:00:00	-12.19	-22.86	-25.79	-39.03	-8.95	-18.16	-19.26	-48.20	-11.24	-5.68	-11.20								
17-Mar-2012	24:00:00	-12.38	-23.90	-25.72	-39.43	-10.63	-18.47	-20.53	-48.14	-11.35	-6.57	-11.60								
18-Mar-2012	06:00:00	-12.56	-24.79	-25.68	-39.72	-10.47	-18.60	-20.46	-48.15	-11.50	-6.89	-12.09							0.02	
18-Mar-2012	12:00:00	-12.54	-25.32	-25.82	-39.94	-8.20	-18.60	-21.04	-48.19	-11.62	-6.41	-12.05								
18-Mar-2012	18:00:00	-12.74	-25.87	-25.74	-40.19	-8.22	-18.30	-20.16	-48.09	-11.81	-6.77	-11.74								
18-Mar-2012	24:00:00	-12.77	-26.34	-25.74	-40.15	-9.02	-18.09	-20.64	-48.17	-12.07	-7.20	-11.60								
19-Mar-2012	06:00:00	-12.91	-26.92	-25.93	-40.35	-9.40	-18.15	-20.54	-48.23	-12.28	-7.53	-11.93							0.31	
19-Mar-2012	12:00:00	-12.93	-27.42	-25.99	-40.62	-9.52	-18.16	-20.96	-48.19	-12.46	-7.82	-12.17								
19-Mar-2012	18:00:00	-9.06	-27.84	-23.70	-40.21	-2.53	-3.78	-21.01	-48.14	-9.09	-2.06	-1.07								
19-Mar-2012	24:00:00	-9.68	-13.41	-23.71	-37.75	-3.63	-5.68	-7.72	-48.12	-10.33	-2.37	-1.36								
20-Mar-2012	06:00:00	-10.58	-13.12	-23.62	-35.61	-3.69	-6.74	-8.42	-48.15	-10.59	-2.57	-1.77							0.35	
20-Mar-2012	12:00:00	-11.15	-13.74	-24.07	-35.23	-3.80	-7.43	-10.03	-48.20	-10.83	-2.85	-2.21								
20-Mar-2012	18:00:00	-8.10	-7.52	-23.41	-34.48	-3.39	-4.94	-5.24	-48.38	-9.47	-1.80	-0.70								
20-Mar-2012	24:00:00	-9.50	-9.38	-23.53	-33.58	-3.73	-6.38	-6.61	-48.21	-9.73	-1.98	-1.09								
21-Mar-2012	06:00:00	-10.10	-10.21	-23.78	-33.70	-3.72	-7.19	-6.26	-48.17	-9.76	-2.06	-1.27							0.68	
21-Mar-2012	12:00:00	-10.51	-10.90	-24.01	-33.60	-4.00	-7.61	-7.16	-48.14	-9.92	-2.18	-1.53								
21-Mar-2012	18:00:00	-10.77	-11.94	-24.34	-33.60	-4.39	-8.25	-7.49	-48.25	-10.17	-2.45	-1.95								
21-Mar-2012	24:00:00	-11.25	-13.70	-24.84	-33.69	-4.71	-9.21	-9.97	-48.25	-10.53	-2.67	-2.49								
22-Mar-2012	06:00:00	4.65	-2.08	0.44	-10.01	4.83	-3.00	0.96	-3.45	6.10	3.57	1.85								
22-Mar-2012	12:00:00	1.97	-2.82	-1.46	-18.66	3.50	-4.01	-0.78	-5.78	3.34	2.70	0.93								
22-Mar-2012	18:00:00	0.51	-3.50	-3.36	-25.26	2.26	-4.80	-1.86	-6.89	1.42	1.29	0.38								
22-Mar-2012	24:00:00	-0.71	-4.10	-4.88	-27.37	1.16	-5.56	-3.25	-6.98	0.29	0.28	0.11								
23-Mar-2012	06:00:00	-1.71	-4.39	-6.52	-28.61	-0.09	-6.05	-3.06	-7.09	-0.69	-0.45	-0.04								
23-Mar-2012	12:00:00	-2.55	-4.75	-7.91	-29.56	-1.30	-6.39	-3.64	-7.19	-1.34	-0.78	-0.14								
23-Mar-2012	18:00:00	-3.39	-5.78	-9.12	-30.34	-2.22	-7.17	-3.35	-7.15	-2.14	-1.20	-0.39								
23-Mar-2012	24:00:00	-3.91	-6.66	-10.02	-30.96	-2.82	-7.98	-4.06	-6.98	-2.65	-1.29	-0.59								
24-Mar-2012	06:00:00	-4.08	-6.64	-10.61	-31.47	-3.06	-8.07	-3.50	-6.91	-3.04	-1.31	-0.45							0.43	
24-Mar-2012	12:00:00	-3.29	-4.47	-10.90	-31.47	-2.95	-5.58	-3.85	-6.65	-2.93	-0.90	0.02								
24-Mar-2012	18:00:00	-3.59	-4.30	-11.22	-31.33	-3.03	-4.47	-3.12	-6.55	-3.29	-0.90	0.09								
24-Mar-2012	24:00:00	1.73	-2.37	-5.47	-8.99	3.24	-3.42	-2.33	-4.31	0.10	1.84	2.03								
25-Mar-2012	06:00:00	0.53	-2.73	-5.89	-14.43	3.05	-3.80	-1.48	-4.93	0.86	0.62	1.36							0.10	
25-Mar-2012	12:00:00	-0.69	-3.07	-6.91	-20.59	2.07	-4.48	-2.62	-5.24	0.39	0.00	0.92								
25-Mar-2012	18:00:00	-1.32	-3.45	-7.91	-24.83	1.23	-5.02	-2.77	-5.37	-0.21	-0.50	0.76								
25-Mar-2012	24:00:00	0.97	-2.59	-6.70	-12.85	2.76	-3.96	-2.52	-4.09	1.61	1.68	1.79								
26-Mar-2012	06:00:00	0.09	-2.89	-7.15	-21.57	2.22	-4.54	-2.26	-4.91	1.34	0.33	1.13							0.08	
26-Mar-2012	12:00:00	-0.39	-3.13	-7.99	-24.63	1.54	-4.58	-3.05	-5.12	0.69	-0.17	0.87								
26-Mar-2012	18:00:00	-1.51	-3.92	-8.87	-26.46	0.58	-5.58	-2.92	-5.31	0.03	-0.66	0.59								
26-Mar-2012	24:00:00	-2.05	-4.75	-9.67	-27.87	-0.70	-6.98	-3.73	-5.53	-0.55	-1.00	0.29								
27-Mar-2012	06:00:00	-2.69	-5.17	-10.39	-28.69	1.17	-7.35	-3.43	-4.93	-1.04	-1.16	0.22								
27-Mar-2012	12:00:00	-2.94	-5.35	-10.87	-28.91	1.06	-7.70	-3.22	-5.72	-1.25	-1.06	0.31								
27-Mar-2012	18:00:00	-3.48	-6.44	-11.45	-29.44	-0.57	-8.62	-3.34	-5.88	-1.88	-1.41	-0.04								
27-Mar-2012	24:00:00	-3.69	-7.40	-11.71	-29.86	-1.69	-9.53	-4.00	-5.79	-2.18	-1.48	-0.14								
28-Mar-2012	06:00:00	-3.84	-7.72	-12.02	-29.95	1.20	-9.86	-3.66	-5.13	-2.49	-1.64	-0.10								
28-Mar-2012	12:00:00	-4.08	-7.89	-12.07	-29.67	0.90	-9.95	-3.54	-5.90	-2.75	-1.68	-0.19								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
28-Mar-2012	18:00:00	-4.29	-8.83	-12.56	-30.01	-0.74	-10.32	-3.35	-6.14	-3.08	-1.90	-0.35								
28-Mar-2012	24:00:00	-4.50	-9.93	-12.58	-30.43	-1.86	-10.98	-4.30	-6.27	-3.27	-2.02	-0.55								
29-Mar-2012	06:00:00	-4.52	-9.82	-12.60	-30.67	-2.34	-10.91	-3.92	-6.19	-3.21	-2.01	-0.39								
29-Mar-2012	12:00:00	-4.79	-10.06	-12.95	-31.12	-2.77	-10.80	-4.33	-6.27	-3.52	-2.12	-0.41								
29-Mar-2012	18:00:00	-5.49	-11.97	-13.51	-31.85	-3.58	-11.79	-4.32	-6.78	-3.92	-2.73	-1.01								
29-Mar-2012	24:00:00	-5.70	-14.80	-13.70	-32.09	-3.78	-13.12	-5.32	-7.03	-4.03	-3.00	-1.31								
30-Mar-2012	06:00:00	-5.53	-14.58	-13.98	-32.10	-3.84	-14.00	-5.26	-7.53	-4.13	-3.11	-1.35							0.03	
30-Mar-2012	12:00:00	-5.70	-14.73	-14.40	-32.10	-3.85	-14.33	-5.34	-8.29	-4.22	-3.32	-1.41								
30-Mar-2012	18:00:00	-6.26	-16.18	-15.38	-32.32	-4.51	-15.02	-5.77	-10.47	-4.65	-3.93	-1.82								
30-Mar-2012	24:00:00	-6.47	-18.51	-16.68	-32.61	-4.94	-15.93	-7.91	-15.61	-4.93	-4.37	-2.29						0.00		3.95
31-Mar-2012	06:00:00	-6.06	-17.83	-17.27	-32.19	-4.30	-16.01	-7.33	-19.22	-4.85	-4.22	-1.54							0.39	
31-Mar-2012	12:00:00	-6.13	-17.35	-18.12	-32.19	-4.08	-16.05	-7.02	-22.80	-4.91	-4.06	-1.37								
31-Mar-2012	18:00:00	0.71	-3.67	-12.14	-28.29	-1.75	-4.07	-3.44	-5.41	-3.77	-0.54	0.83								
31-Mar-2012	24:00:00	-3.55	-4.63	-13.32	-29.39	-1.94	-5.24	-3.67	-5.55	-3.37	-0.90	0.29								
1-Apr-2012	06:00:00	-4.23	-4.92	-13.43	-29.76	-2.22	-6.04	-3.64	-5.59	-3.23	-1.00	0.20							0.01	
1-Apr-2012	12:00:00	-4.27	-4.94	-13.42	-30.37	-2.47	-6.35	-3.53	-5.58	-3.21	-0.99	0.26								
1-Apr-2012	18:00:00	-4.85	-5.68	-13.81	-30.95	-3.12	-7.00	-3.26	-5.81	-3.51	-1.26	-0.05								
1-Apr-2012	24:00:00	-4.89	-6.51	-14.06	-31.25	-3.43	-7.85	-4.06	-5.87	-3.63	-1.38	-0.10								
2-Apr-2012	06:00:00	-4.86	-6.78	-14.34	-31.29	-3.50	-8.04	-3.79	-5.81	-3.64	-1.42	-0.11								
2-Apr-2012	12:00:00	-4.97	-6.90	-14.82	-31.43	-3.63	-8.15	-4.21	-5.81	-3.79	-1.40	-0.10								
2-Apr-2012	18:00:00	-5.85	-8.34	-16.39	-32.07	-4.15	-8.96	-4.31	-6.06	-4.21	-1.72	-0.45								
2-Apr-2012	24:00:00	-6.08	-10.14	-17.57	-32.43	-4.89	-10.52	-4.45	-6.12	-4.41	-1.97	-0.81								
3-Apr-2012	06:00:00	-5.95	-10.16	-18.28	-32.27	-4.65	-11.09	-4.64	-6.29	-4.42	-2.00	-0.82								
3-Apr-2012	12:00:00	-5.99	-10.62	-18.86	-32.17	-4.69	-11.51	-4.91	-6.56	-4.54	-2.18	-1.03								
3-Apr-2012	18:00:00	-6.73	-12.21	-19.61	-32.67	-5.74	-12.34	-5.16	-7.61	-4.94	-2.62	-1.57								
3-Apr-2012	24:00:00	-6.73	-14.41	-19.99	-32.61	-6.73	-13.67	-6.70	-11.64	-5.00	-2.91	-2.03								
4-Apr-2012	06:00:00	-6.39	-14.12	-20.12	-32.14	-6.00	-14.10	-6.40	-16.97	-5.09	-3.04	-1.83							0.28	
4-Apr-2012	12:00:00	-6.72	-14.31	-20.27	-32.20	-5.83	-14.12	-7.31	-21.96	-5.23	-3.15	-1.82								
4-Apr-2012	18:00:00	-7.45	-15.94	-20.58	-32.57	-7.22	-14.69	-7.91	-26.19	-5.50	-3.68	-2.48								
4-Apr-2012	24:00:00	-7.85	-19.56	-20.84	-32.98	-9.02	-15.63	-11.10	-31.68	-5.69	-4.32	-3.40								
5-Apr-2012	06:00:00	-6.49	-18.50	-20.80	-32.28	-5.48	-15.84	-9.71	-34.01	-5.60	-3.30	-1.12							0.31	
5-Apr-2012	12:00:00	-7.15	-16.76	-21.05	-32.37	-5.23	-14.81	-7.44	-33.87	-5.73	-3.63	-1.64								
5-Apr-2012	18:00:00	-7.85	-18.13	-21.24	-32.85	-6.31	-14.74	-8.12	-35.91	-5.98	-4.32	-2.18								
5-Apr-2012	24:00:00	-7.57	-18.88	-21.38	-32.69	-6.50	-14.80	-9.55	-37.07	-5.96	-4.34	-2.29								
6-Apr-2012	06:00:00	-3.49	-10.10	-20.96	-32.51	-2.71	-4.72	-4.27	-29.10	-5.44	-1.71	0.13								
6-Apr-2012	12:00:00	-5.57	-8.20	-20.87	-32.55	-3.27	-4.55	-4.81	-26.03	-5.42	-1.64	0.07								
6-Apr-2012	18:00:00	-6.41	-8.90	-21.12	-32.87	-3.66	-5.69	-4.48	-23.04	-5.67	-1.83	-0.28								
6-Apr-2012	24:00:00	-7.39	-11.78	-21.42	-33.25	-4.71	-7.56	-5.59	-25.52	-5.89	-2.37	-1.01								
7-Apr-2012	06:00:00	-7.52	-12.30	-21.59	-32.13	1.73	-8.46	-5.40	-3.43	-6.01	-2.48	-1.31								
7-Apr-2012	12:00:00	-7.67	-12.80	-21.60	-29.55	2.62	-9.20	-2.17	-5.91	-6.10	-2.70	-1.51								
7-Apr-2012	18:00:00	-8.33	-14.42	-21.80	-29.87	1.20	-10.22	-2.84	-7.68	-6.45	-3.28	-2.17								
7-Apr-2012	24:00:00	-8.60	-16.95	-21.84	-30.40	1.95	-11.49	-3.24	-4.67	-6.61	-3.93	-3.17								
8-Apr-2012	06:00:00	-8.42	-16.78	-21.98	-29.08	2.52	-11.88	-1.76	-5.64	-6.76	-4.36	-3.17								
8-Apr-2012	12:00:00	-8.36	-16.89	-21.82	-29.02	1.62	-11.43	-3.07	-6.89	-6.73	-4.56	-3.11								
8-Apr-2012	18:00:00	-9.07	-18.54	-22.25	-30.45	-0.07	-12.04	-2.94	-6.15	-7.05	-5.26	-3.75								
8-Apr-2012	24:00:00	-9.48	-21.91	-22.42	-30.42	2.34	-13.78	-2.70	-3.74	-7.24	-6.42	-5.21								
9-Apr-2012	06:00:00	-9.23	-21.64	-22.30	-28.57	2.64	-13.74	-1.87	-5.75	-7.17	-6.65	-4.99								
9-Apr-2012	12:00:00	-9.43	-21.73	-22.50	-28.98	1.29	-13.19	-2.95	-6.98	-7.34	-7.07	-5.11								
9-Apr-2012	18:00:00	-10.25	-23.64	-22.69	-30.55	-0.63	-14.02	-3.17	-8.24	-7.81	-8.13	-5.93								
9-Apr-2012	24:00:00	-10.50	-28.28	-22.74	-31.36	-2.01	-15.69	-3.84	-14.39	-8.01	-9.16	-7.46								
10-Apr-2012	06:00:00	-10.33	-29.97	-22.64	-31.61	-2.47	-15.89	-3.61	-19.27	-7.96	-9.42	-7.96								
10-Apr-2012	12:00:00	-10.50	-31.03	-22.84	-32.05	-3.03	-16.04	-3.92	-24.00	-8.21	-9.90	-8.49								
10-Apr-2012	18:00:00	-11.13	-32.94	-23.11	-32.73	-3.64	-16.41	-3.98	-28.21	-8.60	-10.66	-9.05								
10-Apr-2012	24:00:00	-11.77	-37.36	-23.34	-33.10	-4.12	-17.31	-4.87	-33.23	-9.02	-11.62	-10.27								
11-Apr-2012	06:00:00	-11.54	-38.97	-23.17	-32.92	-4.04	-17.74	-5.02	-35.29	-9.02	-11.87	-10.95								
11-Apr-2012	12:00:00	-11.66	-40.00	-23.22	-32.99	-4.05	-18.08	-5.02	-36.96	-9.11	-12.08	-11.45								
11-Apr-2012	18:00:00	-12.24	-40.45	-23.28	-33.18	-4.92	-18.60	-5.04	-38.63	-9.52	-12.78	-12.16								
11-Apr-2012	24:00:00	-12.89	-40.57	-23.54	-33.75	-6.49	-19.55	-6.70	-40.27	-9.99	-13.91	-13.16								
12-Apr-2012	06:00:00	-12.87	-40.56	-23.57	-33.46	-6.19	-20.21	-7.01	-41.66	-10.23	-14.27	-13.97								
12-Apr-2012	12:00:00	-13.03	-40.44	-23.64	-33.39	-6.07	-20.70	-7.94	-41.89	-10.45	-14.52	-14.55								
12-Apr-2012	18:00:00	-13.33	-40.53	-23.74	-33.83	-7.11	-21.15	-8.47	-42.45	-11.07	-15.12	-15.13								
12-Apr-2012	24:00:00	-13.69	-40.44	-23.80	-34.11	-8.52	-21.71	-10.70	-42.55	-11.51	-15.92	-15.51								
13-Apr-2012	06:00:00	-13.68	-40.41	-23.74	-33.66	-7.82	-22.12	-10.92	-42.87	-11.66	-16.14	-15.95								
13-Apr-2012	12:00:00	-13.73	-40.39	-23.68	-33.47	-7.77	-22.66	-11.58	-42.83	-11.96	-16.30	-16.28								
13-Apr-2012	18:00:00	-14.24	-40.54	-23.94	-34.33	-8.62	-23.34	-11.59	-43.68	-12.64	-16.78	-16.79								
13-Apr-2012	24:00:00	-14.63	-40.35	-23.86	-34.60	-10.57	-23.78	-13.91	-44.03	-13.17	-17.42	-17.03								
14-Apr-2012	06:00:00	-14.67	-40.35	-23.83	-33.84	-9.90	-24.27	-13.88	-44.28	-13.35	-17.87	-17.29								
14-Apr-2012	12:00:00	-14.84	-40.33	-23.84	-33.66	-9.72	-24.70	-14.52	-44.46	-13.84	-18.05	-17.75								
14-Apr-2012	18:00:00	-15.31	-40.52	-24.18	-34.62	-11.07	-25.25	-15.29	-44.70	-14.48	-18.56	-18.07								
14-Apr-2012	24:00:00	-15.74	-40.36	-24.11	-34.78	-12.70	-25.74	-17.94	-44.51	-15.22	-19.17	-18.22								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
15-Apr-2012	06:00:00	-15.78	-40.29	-24.01	-33.87	-12.33	-25.95	-17.71	-44.49	-15.44	-19.58	-18.37								
15-Apr-2012	12:00:00	-15.83	-40.24	-23.92	-33.47	-11.71	-26.10	-17.99	-44.04	-15.68	-19.76	-18.50								
15-Apr-2012	18:00:00	-16.41	-40.46	-24.26	-34.63	-12.87	-26.91	-18.30	-44.95	-16.36	-20.36	-18.93								
15-Apr-2012	24:00:00	-16.92	-40.48	-24.40	-35.16	-14.30	-26.70	-20.38	-45.42	-17.26	-20.76	-19.05								
16-Apr-2012	06:00:00	-16.93	-40.30	-24.18	-34.47	-13.95	-26.67	-20.52	-45.30	-17.43	-20.98	-19.30								
16-Apr-2012	12:00:00	-17.03	-40.33	-24.16	-34.27	-13.41	-26.63	-20.93	-45.01	-17.68	-20.85	-19.46								
16-Apr-2012	18:00:00	-17.72	-40.41	-24.49	-35.47	-14.52	-26.58	-21.26	-45.93	-18.50	-21.15	-19.72								
16-Apr-2012	24:00:00	-18.55	-40.41	-24.77	-36.15	-15.92	-26.60	-23.20	-46.45	-19.40	-21.68	-20.08								
17-Apr-2012	06:00:00	-18.51	-40.28	-24.40	-35.59	-16.04	-26.51	-23.48	-46.11	-19.58	-21.95	-20.12								
17-Apr-2012	12:00:00	-18.75	-40.28	-24.43	-35.85	-15.79	-26.51	-24.12	-45.77	-19.96	-22.31	-20.33								
17-Apr-2012	18:00:00	-19.55	-40.45	-24.90	-36.95	-16.33	-26.68	-24.04	-46.91	-20.75	-22.90	-20.65								
17-Apr-2012	24:00:00	-20.07	-40.24	-24.83	-37.62	-17.19	-26.48	-25.28	-47.43	-21.53	-23.31	-20.84								
18-Apr-2012	06:00:00	-20.34	-40.27	-24.54	-37.15	-17.77	-26.44	-25.50	-47.05	-21.74	-23.57	-20.95							0.17	
18-Apr-2012	12:00:00	-20.58	-40.35	-24.62	-37.02	-18.28	-26.52	-26.24	-46.51	-22.04	-23.88	-21.13								
18-Apr-2012	18:00:00	-21.20	-40.41	-25.19	-37.77	-18.87	-26.66	-26.08	-47.55	-22.78	-24.45	-21.45								
18-Apr-2012	24:00:00	-21.43	-40.17	-24.96	-37.72	-19.08	-26.39	-27.01	-47.16	-23.31	-24.60	-21.34								
19-Apr-2012	06:00:00	-17.60	-40.34	-24.26	-37.08	-10.87	-25.64	-26.94	-46.88	-18.35	-24.81	-20.91							0.03	
19-Apr-2012	12:00:00	-15.77	-40.24	-24.47	-37.17	-5.83	-25.54	-25.66	-46.34	-17.99	-23.87	-20.29								
19-Apr-2012	18:00:00	-16.37	-40.40	-24.54	-37.36	-6.82	-26.13	-24.19	-46.64	-18.61	-22.70	-20.39								
19-Apr-2012	24:00:00	-16.83	-40.28	-24.48	-37.39	-7.89	-26.37	-23.78	-46.20	-19.10	-21.16	-20.37								
20-Apr-2012	06:00:00	-17.09	-40.21	-24.42	-37.15	-8.37	-26.56	-23.05	-46.09	-19.45	-20.08	-20.56								
20-Apr-2012	12:00:00	-17.47	-40.20	-24.35	-37.21	-8.88	-26.57	-23.22	-45.57	-19.84	-19.13	-20.68								
20-Apr-2012	18:00:00	-18.17	-40.46	-24.66	-37.53	-9.68	-26.70	-22.73	-46.02	-20.49	-18.81	-21.04								
20-Apr-2012	24:00:00	-18.74	-40.35	-24.79	-37.97	-12.00	-26.58	-23.46	-46.47	-21.17	-18.89	-21.02								
21-Apr-2012	06:00:00	-18.92	-40.26	-24.49	-37.71	-12.74	-26.42	-23.53	-45.79	-21.33	-19.01	-21.15								
21-Apr-2012	12:00:00	-19.11	-40.24	-24.46	-37.65	-13.18	-26.42	-24.12	-45.09	-21.59	-19.06	-21.31								
21-Apr-2012	18:00:00	-20.12	-40.42	-25.04	-38.41	-14.37	-26.55	-24.19	-46.21	-22.43	-19.84	-21.71								
21-Apr-2012	24:00:00	-21.20	-40.29	-25.02	-38.82	-15.84	-26.43	-25.56	-47.12	-23.35	-20.50	-21.81								
22-Apr-2012	06:00:00	-21.29	-40.34	-24.85	-38.57	-16.35	-26.51	-25.86	-46.37	-23.63	-20.85	-21.86							1.22	
22-Apr-2012	12:00:00	-15.56	-40.34	-21.71	-38.07	-2.30	-16.26	-26.42	-45.03	-15.11	-13.92	-19.99								
22-Apr-2012	18:00:00	-4.67	-6.64	-16.60	-29.16	-0.80	-4.64	-3.34	-8.40	-8.81	-0.83	-0.32								
22-Apr-2012	24:00:00	-7.58	-6.91	-19.18	-30.31	-2.22	-6.12	-3.88	-14.00	-9.47	-1.20	-0.62								
23-Apr-2012	06:00:00	-8.00	-5.72	-20.42	-31.06	-2.72	-4.86	-3.49	-16.87	-9.20	-1.18	-0.35							0.04	
23-Apr-2012	12:00:00	-8.24	-5.65	-20.81	-31.54	-3.07	-5.26	-3.76	-18.97	-9.32	-1.28	-0.73								
23-Apr-2012	18:00:00	-9.33	-6.93	-21.38	-32.50	-3.52	-6.81	-3.83	-26.95	-9.71	-1.58	-1.30								
23-Apr-2012	24:00:00	-9.98	-7.71	-21.65	-32.87	-3.76	-7.71	-4.01	-34.11	-9.76	-1.68	-1.78								
24-Apr-2012	06:00:00	-10.13	-8.17	-21.76	-32.64	-3.75	-8.42	-3.82	-37.37	-9.97	-1.78	-2.11								
24-Apr-2012	12:00:00	-10.47	-8.66	-22.03	-32.70	-3.96	-9.24	-4.42	-38.30	-10.15	-1.95	-2.72								
24-Apr-2012	18:00:00	-11.17	-10.68	-22.42	-33.60	-4.64	-10.49	-4.46	-40.19	-10.69	-2.34	-3.55								
24-Apr-2012	24:00:00	-11.96	-13.46	-22.67	-34.24	-6.02	-12.02	-5.44	-41.93	-11.19	-2.96	-5.12								
25-Apr-2012	06:00:00	-12.02	-13.88	-22.68	-33.61	-6.00	-12.93	-5.38	-42.38	-11.51	-3.09	-5.59							0.01	
25-Apr-2012	12:00:00	-12.25	-15.01	-22.90	-33.76	-6.12	-14.15	-6.25	-42.87	-11.68	-3.41	-5.74								
25-Apr-2012	18:00:00	-12.25	-16.05	-23.03	-33.51	-5.85	-14.92	-5.39	-43.43	-11.99	-3.58	-5.69								
25-Apr-2012	24:00:00	-12.93	-20.92	-23.33	-34.59	-7.81	-16.04	-7.45	-44.65	-12.81	-4.52	-7.04								
26-Apr-2012	06:00:00	-12.71	-22.36	-23.15	-33.30	-7.56	-16.49	-7.64	-43.81	-12.93	-4.46	-7.47								
26-Apr-2012	12:00:00	-12.77	-23.29	-23.12	-33.12	-7.20	-16.78	-8.15	-42.86	-13.16	-4.61	-7.70								
26-Apr-2012	18:00:00	-13.47	-27.03	-23.52	-34.35	-8.79	-17.78	-9.06	-43.93	-13.96	-5.81	-8.43								
26-Apr-2012	24:00:00	-14.30	-33.21	-23.77	-34.89	-10.88	-18.66	-11.08	-45.21	-14.81	-6.92	-9.56								
27-Apr-2012	06:00:00	-14.40	-35.67	-23.64	-33.67	-10.76	-19.07	-11.33	-44.72	-15.19	-7.01	-10.18								
27-Apr-2012	12:00:00	-14.47	-36.92	-23.60	-33.55	-10.22	-19.59	-11.76	-44.70	-15.45	-7.26	-10.65								
27-Apr-2012	18:00:00	-15.53	-40.35	-24.22	-35.23	-12.01	-20.50	-12.66	-46.64	-16.64	-8.98	-11.63								
27-Apr-2012	24:00:00	-16.27	-40.29	-24.18	-35.55	-13.89	-21.27	-15.37	-47.78	-17.50	-10.23	-12.32								
28-Apr-2012	06:00:00	-16.51	-40.22	-24.07	-34.78	-14.28	-21.75	-15.60	-47.23	-17.90	-10.48	-12.94								
28-Apr-2012	12:00:00	-16.59	-40.11	-23.99	-34.56	-13.98	-22.17	-16.27	-46.50	-18.15	-10.64	-13.41								
28-Apr-2012	18:00:00	-17.13	-40.27	-24.31	-35.19	-14.42	-22.84	-16.45	-47.42	-18.80	-11.45	-14.00								
28-Apr-2012	24:00:00	-17.65	-40.23	-24.43	-35.51	-15.27	-23.33	-17.65	-47.43	-19.51	-12.35	-14.39								
29-Apr-2012	06:00:00	-17.81	-40.28	-24.24	-35.23	-15.39	-23.82	-17.94	-46.75	-19.78	-12.59	-14.90								
29-Apr-2012	12:00:00	-17.91	-40.34	-24.17	-35.25	-15.18	-24.09	-18.64	-46.19	-20.00	-12.70	-15.21								
29-Apr-2012	18:00:00	-18.62	-40.39	-24.49	-36.09	-15.39	-24.88	-18.56	-47.34	-20.71	-13.46	-15.83								
29-Apr-2012	24:00:00	-19.23	-40.27	-24.56	-36.97	-16.26	-25.24	-20.57	-47.99	-21.45	-14.50	-16.23						0.00		2.07
30-Apr-2012	06:00:00	-19.41	-40.23	-24.40	-36.71	-16.72	-25.76	-21.20	-47.34	-21.70	-14.78	-16.57								
30-Apr-2012	12:00:00	-19.59	-40.39	-24.30	-36.78	-16.83	-26.08	-21.74	-47.03	-21.95	-14.87	-16.93								
30-Apr-2012	18:00:00	-19.92	-40.32	-24.73	-37.17	-17.11	-26.50	-21.25	-47.72	-22.41	-15.29	-17.25								
30-Apr-2012	24:00:00	-20.83	-40.24	-24.71	-37.68	-17.77	-26.54	-23.27	-48.36	-23.29	-16.49	-17.59								
1-May-2012	06:00:00	-20.88	-40.28	-24.54	-37.15	-18.22	-26.44	-23.54	-47.37	-23.49	-16.72	-17.84								
1-May-2012	12:00:00	-20.97	-40.26	-24.53	-37.09	-18.57	-26.55	-24.13	-46.75	-23.67	-17.03	-17.98								
1-May-2012	18:00:00	-21.81	-40.32	-25.04	-38.01	-19.05	-26.68	-23.90	-48.14	-24.35	-17.57	-18.37								
1-May-2012	24:00:00	-22.70	-40.27	-25.13	-39.00	-19.72	-26.60	-25.46	-48.44	-25.51	-18.54	-18.67								
2-May-2012	06:00:00	-22.71	-40.10	-24.77	-38.16	-19.93	-26.40	-25.70	-48.33	-25.64	-18.83	-18.85								
2-May-2012	12:00:00	-22.94	-40.16	-24.64	-38.02	-20.35	-26.43	-26.35	-47.64	-25.79	-19.23	-19.10								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
2-May-2012	18:00:00	-23.79	-40.23	-25.33	-39.16	-21.10	-26.66	-26.27	-48.54	-26.65	-19.82	-19.51								
2-May-2012	24:00:00	-24.68	-40.29	-25.54	-39.79	-21.63	-26.66	-27.55	-48.59	-27.77	-20.63	-19.88								
3-May-2012	06:00:00	-24.75	-40.18	-25.07	-39.23	-21.72	-26.39	-27.60	-48.33	-27.89	-20.82	-19.95								
3-May-2012	12:00:00	-24.96	-40.17	-24.85	-38.97	-22.11	-26.38	-28.33	-48.30	-28.10	-21.06	-20.08								
3-May-2012	18:00:00	-25.67	-40.33	-25.81	-39.94	-22.81	-26.54	-28.27	-48.53	-28.87	-21.93	-20.59								
3-May-2012	24:00:00	-26.69	-40.35	-25.80	-40.45	-23.26	-26.57	-29.47	-48.57	-29.71	-22.73	-20.84								
4-May-2012	06:00:00	-26.54	-40.16	-25.19	-39.61	-23.46	-26.38	-29.50	-48.33	-29.84	-22.98	-20.99								
4-May-2012	12:00:00	-26.79	-40.15	-25.07	-39.48	-23.80	-26.37	-30.06	-48.30	-30.11	-23.25	-21.16								
4-May-2012	18:00:00	-27.37	-40.23	-25.86	-40.15	-24.20	-26.52	-30.25	-48.49	-30.65	-23.72	-21.43								
4-May-2012	24:00:00	-28.11	-40.39	-25.88	-40.50	-24.60	-26.56	-31.13	-48.39	-31.40	-24.44	-21.71								
5-May-2012	06:00:00	-28.14	-40.27	-25.48	-39.95	-24.87	-26.52	-31.31	-48.44	-31.58	-24.72	-22.00							0.12	
5-May-2012	12:00:00	-28.08	-40.17	-25.37	-39.72	-25.27	-26.50	-31.93	-48.43	-31.71	-24.95	-22.17								
5-May-2012	18:00:00	-28.05	-40.34	-26.04	-40.65	-25.66	-26.54	-31.82	-48.51	-32.38	-25.38	-22.47								
5-May-2012	24:00:00	-27.83	-40.23	-22.40	-40.61	-24.04	-26.40	-33.68	-48.45	-32.11	-25.67	-22.29								
6-May-2012	06:00:00	-25.29	-40.15	-24.32	-39.90	-8.97	-19.37	-21.36	-45.57	-27.63	-22.23	-16.10								
6-May-2012	12:00:00	-24.51	-40.20	-24.47	-39.61	-9.70	-20.20	-22.09	-48.24	-27.17	-20.34	-16.29								
6-May-2012	18:00:00	-24.68	-40.09	-24.74	-39.65	-10.36	-21.18	-22.31	-48.37	-27.29	-19.32	-16.78								
6-May-2012	24:00:00	-25.31	-40.22	-25.25	-40.08	-12.27	-22.24	-23.22	-48.42	-27.63	-19.24	-17.27								
7-May-2012	06:00:00	-25.47	-40.22	-24.97	-39.79	-12.54	-23.07	-23.92	-48.31	-27.81	-19.48	-17.54								
7-May-2012	12:00:00	-25.63	-40.10	-24.82	-39.59	-12.66	-23.63	-24.71	-48.31	-28.03	-19.62	-17.90								
7-May-2012	18:00:00	-26.37	-40.28	-25.55	-40.14	-14.00	-24.78	-25.10	-48.60	-28.75	-20.25	-18.59								
7-May-2012	24:00:00	-27.33	-40.35	-25.80	-40.67	-15.96	-25.60	-26.15	-48.49	-29.33	-20.69	-18.91								
8-May-2012	06:00:00	-27.67	-40.16	-25.38	-40.15	-16.17	-26.07	-26.47	-48.36	-29.51	-21.03	-19.01								
8-May-2012	12:00:00	-27.75	-40.30	-25.26	-39.95	-16.35	-26.50	-27.32	-48.42	-29.85	-21.50	-19.51								
8-May-2012	18:00:00	-28.19	-40.35	-25.85	-40.59	-16.95	-26.57	-27.56	-48.54	-30.38	-22.41	-19.90								
8-May-2012	24:00:00	-27.96	-40.09	-25.87	-40.75	-17.37	-26.39	-28.44	-48.33	-30.97	-23.12	-20.08								
9-May-2012	06:00:00	-27.79	-40.09	-25.44	-40.21	-17.62	-26.25	-28.68	-48.29	-31.24	-23.55	-20.36							0.65	
9-May-2012	12:00:00	-27.69	-40.08	-25.27	-39.97	-17.77	-26.38	-29.44	-48.30	-31.47	-23.96	-20.57								
9-May-2012	18:00:00	-27.84	-40.26	-25.88	-40.38	-18.43	-26.49	-29.62	-48.43	-32.08	-24.58	-20.92								
9-May-2012	24:00:00	-26.35	-40.15	-18.59	-39.70	-2.49	-4.62	-8.38	-39.32	-23.62	-13.24	-0.87								
10-May-2012	06:00:00	-19.46	-40.14	-22.07	-38.28	-3.48	-7.38	-7.24	-45.00	-21.05	-8.72	-3.62								
10-May-2012	12:00:00	-19.71	-40.03	-22.49	-37.02	-3.68	-8.91	-9.86	-47.10	-20.59	-9.39	-5.08								
10-May-2012	18:00:00	-21.01	-40.17	-23.21	-37.36	-4.57	-10.78	-11.66	-48.47	-21.08	-10.91	-6.28								
10-May-2012	24:00:00	-22.56	-40.26	-23.76	-37.66	-5.71	-12.88	-15.34	-48.50	-22.03	-12.41	-8.33								
11-May-2012	06:00:00	-23.17	-40.09	-23.69	-36.78	-5.59	-14.24	-16.56	-48.33	-22.49	-12.94	-9.52								
11-May-2012	12:00:00	-23.75	-40.06	-23.87	-36.66	-6.07	-15.53	-17.75	-48.32	-22.94	-13.35	-10.54								
11-May-2012	18:00:00	-24.78	-40.22	-24.48	-37.74	-7.53	-17.38	-18.86	-48.39	-23.84	-14.38	-11.67								
11-May-2012	24:00:00	-26.01	-40.23	-24.74	-38.34	-9.75	-19.00	-21.40	-48.43	-24.82	-15.78	-12.81								
12-May-2012	06:00:00	-26.43	-40.17	-24.67	-37.37	-9.90	-20.01	-22.43	-48.43	-25.37	-16.50	-13.71								
12-May-2012	12:00:00	-26.85	-40.23	-24.77	-37.49	-9.76	-20.94	-23.36	-48.48	-25.84	-17.01	-14.51								
12-May-2012	18:00:00	-27.61	-40.26	-25.30	-38.71	-10.80	-22.07	-23.75	-48.56	-26.67	-17.87	-15.45								
12-May-2012	24:00:00	-28.26	-40.23	-25.37	-39.78	-12.08	-23.16	-25.13	-48.44	-27.39	-18.84	-16.04								
13-May-2012	06:00:00	-28.03	-40.16	-25.01	-39.07	-11.76	-23.82	-25.46	-48.41	-27.70	-19.25	-16.58							0.11	
13-May-2012	12:00:00	-27.98	-40.20	-25.09	-38.89	-11.72	-24.58	-26.41	-48.53	-28.05	-19.59	-17.14								
13-May-2012	18:00:00	-28.03	-40.22	-25.39	-39.60	-12.33	-25.19	-26.58	-48.54	-28.58	-20.13	-17.56								
13-May-2012	24:00:00	-27.83	-40.18	-24.98	-38.77	-9.79	-25.26	-27.05	-48.42	-28.60	-20.25	-17.75								
14-May-2012	06:00:00	-28.03	-40.28	-24.90	-38.73	-7.02	-24.45	-27.36	-48.60	-28.82	-20.50	-17.98							0.22	
14-May-2012	12:00:00	-27.93	-40.18	-24.71	-38.55	-6.86	-24.30	-27.86	-48.50	-28.37	-20.25	-17.41								
14-May-2012	18:00:00	-28.07	-40.28	-25.13	-39.05	-8.08	-24.93	-27.76	-48.57	-28.61	-20.02	-17.55								
14-May-2012	24:00:00	-26.21	-40.28	-19.97	-36.54	-2.91	-4.88	-21.58	-48.60	-23.33	-13.06	-1.19								
15-May-2012	06:00:00	-22.65	-40.09	-22.20	-35.16	-3.20	-7.04	-13.82	-47.81	-16.65	-9.46	-3.53							0.14	
15-May-2012	12:00:00	-21.71	-40.11	-22.42	-34.39	-3.63	-7.25	-11.68	-47.87	-15.45	-9.00	-3.92								
15-May-2012	18:00:00	-22.03	-40.26	-22.92	-34.60	-4.32	-8.56	-12.10	-48.59	-16.04	-10.02	-5.21								
15-May-2012	24:00:00	-22.95	-40.27	-23.46	-35.28	-5.08	-10.07	-15.26	-48.63	-17.18	-11.60	-6.58								
16-May-2012	06:00:00	-23.03	-40.04	-23.38	-34.37	-4.86	-10.92	-15.89	-48.49	-17.09	-11.61	-7.15							0.08	
16-May-2012	12:00:00	-22.55	-40.21	-22.44	-34.12	-2.73	-6.50	-14.36	-48.57	-14.32	-7.58	-1.43								
16-May-2012	18:00:00	-20.76	-40.30	-23.11	-34.54	-4.09	-6.87	-10.22	-48.62	-12.99	-8.79	-3.32								
16-May-2012	24:00:00	-21.59	-40.14	-23.58	-35.19	-4.57	-8.70	-14.27	-48.50	-13.41	-10.67	-5.62								
17-May-2012	06:00:00	-21.98	-40.16	-23.48	-34.44	-4.51	-9.66	-14.88	-48.47	-13.91	-11.10	-6.56							0.86	
17-May-2012	12:00:00	-22.40	-40.32	-23.51	-34.33	-4.82	-10.58	-15.94	-48.54	-14.56	-11.54	-7.51								
17-May-2012	18:00:00	-23.35	-40.38	-24.13	-35.61	-6.55	-11.70	-16.68	-48.65	-15.81	-12.72	-8.41								
17-May-2012	24:00:00	-23.89	-40.26	-23.89	-35.67	-2.40	-10.46	-18.91	-48.61	-11.92	-8.22	-5.35								
18-May-2012	06:00:00	-15.44	-40.21	-22.38	-32.79	-2.74	-4.34	-5.86	-48.42	-9.37	-2.43	-0.83								
18-May-2012	12:00:00	-14.55	-40.14	-22.32	-32.89	-3.37	-5.45	-7.09	-48.42	-10.15	-3.22	-2.06								
18-May-2012	18:00:00	-15.50	-40.26	-23.12	-34.78	-4.38	-7.42	-8.50	-48.53	-10.95	-5.63	-3.50								
18-May-2012	24:00:00	-16.32	-40.20	-23.48	-35.02	-5.10	-8.88	-11.68	-48.45	-11.65	-7.59	-5.20								
19-May-2012	06:00:00	-16.51	-40.21	-23.29	-34.05	-4.29	-9.83	-11.99	-48.30	-11.96	-8.02	-5.83								
19-May-2012	12:00:00	-16.56	-40.14	-23.48	-34.14	-4.48	-10.53	-12.66	-48.32	-12.43	-8.56	-6.41								
19-May-2012	18:00:00	-18.18	-40.41	-24.24	-35.93	-7.29	-11.80	-14.36	-48.21	-13.87	-10.80	-7.65								
19-May-2012	24:00:00	-19.23	-40.18	-24.24	-36.16	-9.48	-13.04	-18.31	-48.02	-15.10	-12.59	-9.26								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
20-May-2012	06:00:00	-19.57	-40.10	-23.96	-34.92	-8.80	-14.08	-18.68	-48.03	-15.71	-12.94	-10.31								
20-May-2012	12:00:00	-19.65	-40.05	-23.99	-34.57	-8.53	-14.88	-19.37	-48.02	-16.39	-13.20	-11.07								
20-May-2012	18:00:00	-20.99	-40.27	-24.76	-36.37	-10.58	-16.20	-20.09	-48.23	-17.79	-14.64	-12.07								
20-May-2012	24:00:00	-22.15	-40.10	-24.70	-36.37	-11.62	-17.51	-22.18	-48.11	-18.80	-16.26	-12.82								
21-May-2012	06:00:00	-22.28	-40.22	-24.40	-35.50	-10.90	-18.17	-22.81	-48.02	-19.23	-16.62	-13.42							0.03	
21-May-2012	12:00:00	-22.68	-40.30	-24.40	-35.41	-10.48	-18.86	-23.42	-48.12	-19.61	-16.91	-13.99								
21-May-2012	18:00:00	-23.23	-40.32	-24.77	-36.15	-11.31	-19.54	-23.82	-48.30	-20.32	-17.45	-14.57								
21-May-2012	24:00:00	-24.15	-40.26	-24.96	-37.21	-12.60	-20.16	-24.71	-48.17	-21.16	-18.27	-15.05								
22-May-2012	06:00:00	-24.49	-40.17	-24.71	-36.66	-12.07	-20.67	-25.18	-48.06	-21.51	-18.75	-15.39							0.29	
22-May-2012	12:00:00	-18.54	-40.27	-24.67	-36.79	-11.59	-21.10	-26.02	-48.15	-8.62	-11.18	-15.85								
22-May-2012	18:00:00	-17.58	-40.30	-25.18	-37.86	-12.68	-21.90	-25.87	-48.30	-9.34	-11.88	-16.33								
22-May-2012	24:00:00	-15.36	-40.22	-23.76	-36.95	-3.81	-7.85	-10.74	-48.21	-6.35	-7.98	-3.14								
23-May-2012	06:00:00	-13.95	-40.28	-23.95	-36.03	-4.38	-9.41	-12.82	-48.13	-7.00	-8.49	-4.99							0.29	
23-May-2012	12:00:00	-13.67	-40.35	-24.12	-35.50	-4.75	-10.92	-14.66	-48.19	-7.46	-9.14	-5.97								
23-May-2012	18:00:00	-14.22	-40.36	-24.83	-35.37	-3.09	-11.19	-15.53	-48.20	-8.08	-10.18	-2.90								
23-May-2012	24:00:00	-13.21	-40.42	-24.50	-34.69	-3.99	-9.88	-15.85	-48.15	-7.29	-7.05	-3.52								
24-May-2012	06:00:00	-12.38	-40.34	-24.19	-34.42	-4.38	-10.38	-13.58	-48.17	-7.52	-7.77	-4.63								
24-May-2012	12:00:00	-12.55	-40.23	-24.28	-35.46	-5.84	-11.76	-14.38	-48.30	-7.76	-8.51	-5.78								
24-May-2012	18:00:00	-13.45	-40.33	-25.01	-36.69	-8.70	-14.33	-15.29	-48.21	-8.32	-9.98	-8.05								
24-May-2012	24:00:00	-14.66	-40.44	-25.24	-35.23	-8.56	-15.44	-19.06	-48.21	-8.87	-11.72	-9.08								
25-May-2012	06:00:00	-14.60	-40.39	-24.82	-34.83	-8.32	-16.36	-19.69	-48.12	-9.10	-12.09	-9.93								
25-May-2012	12:00:00	-14.77	-40.32	-24.68	-35.82	-9.73	-17.66	-20.42	-48.33	-9.39	-12.51	-10.90								
25-May-2012	18:00:00	-15.44	-40.54	-25.30	-37.38	-12.48	-18.89	-20.90	-48.27	-10.06	-13.31	-12.03								
25-May-2012	24:00:00	-16.81	-40.47	-25.60	-36.16	-11.84	-19.47	-23.11	-48.15	-10.79	-14.91	-12.52								
26-May-2012	06:00:00	-16.50	-40.23	-25.02	-36.13	-11.44	-20.04	-23.35	-48.13	-10.90	-15.21	-13.28								
26-May-2012	12:00:00	-16.73	-40.33	-24.96	-37.60	-12.60	-20.86	-24.11	-48.18	-11.21	-15.59	-13.99								
26-May-2012	18:00:00	-17.70	-40.42	-25.61	-39.31	-14.55	-21.87	-24.60	-48.35	-12.28	-16.16	-14.87								
26-May-2012	24:00:00	-19.14	-40.56	-25.94	-38.35	-14.04	-22.32	-26.08	-48.11	-13.66	-17.31	-15.26								
27-May-2012	06:00:00	-18.92	-40.33	-25.33	-37.91	-13.53	-22.83	-26.12	-48.13	-14.11	-17.75	-15.81							0.20	
27-May-2012	12:00:00	-19.03	-40.35	-25.20	-38.47	-14.25	-23.60	-26.83	-48.38	-14.57	-17.93	-16.42								
27-May-2012	18:00:00	-19.83	-40.53	-25.80	-39.49	-15.69	-24.39	-27.07	-48.35	-15.53	-18.44	-16.91								
27-May-2012	24:00:00	-21.00	-40.45	-26.00	-38.58	-15.56	-24.68	-28.02	-48.09	-16.97	-18.93	-17.17								
28-May-2012	06:00:00	-21.06	-40.34	-25.36	-38.27	-15.63	-25.04	-28.20	-48.18	-17.20	-19.00	-17.55							0.03	
28-May-2012	12:00:00	-21.19	-40.33	-25.26	-39.41	-16.21	-25.79	-28.45	-48.27	-17.66	-19.38	-17.98								
28-May-2012	18:00:00	-22.15	-40.41	-26.05	-39.33	-16.78	-26.39	-28.84	-48.25	-18.74	-19.73	-18.35								
28-May-2012	24:00:00	-23.04	-40.42	-25.88	-38.80	-16.94	-26.49	-29.68	-48.17	-19.63	-20.08	-18.52								
29-May-2012	06:00:00	-23.10	-40.28	-25.40	-38.50	-17.26	-26.92	-29.71	-48.18	-19.82	-20.08	-18.88							0.35	
29-May-2012	12:00:00	-23.35	-40.29	-25.40	-39.53	-17.83	-27.04	-30.54	-48.33	-20.15	-20.22	-19.21								
29-May-2012	18:00:00	-24.21	-40.40	-26.21	-39.61	-18.18	-26.90	-30.70	-48.15	-20.99	-20.69	-19.45								
29-May-2012	24:00:00	-24.87	-40.32	-25.98	-39.30	-18.44	-26.97	-31.40	-48.21	-21.69	-20.80	-19.66								
30-May-2012	06:00:00	-25.10	-40.32	-25.55	-39.01	-18.73	-26.92	-31.60	-48.21	-22.01	-21.00	-19.93							1.10	
30-May-2012	12:00:00	-25.07	-40.39	-25.45	-38.41	-3.06	-13.48	-31.94	-48.27	-22.18	-21.15	-16.82								
30-May-2012	18:00:00	-22.15	-40.32	-23.92	-39.69	-8.16	-12.98	-25.74	-48.37	-15.51	-14.45	-12.20								
30-May-2012	24:00:00	-21.13	-40.44	-25.24	-39.28	-9.70	-13.76	-18.38	-48.27	-16.66	-13.28	-12.20						0.00		4.47
31-May-2012	06:00:00	-21.30	-40.34	-25.06	-39.03	-10.32	-14.79	-19.56	-48.31	-17.54	-13.83	-12.71								
31-May-2012	12:00:00	-21.80	-40.34	-25.02	-40.18	-12.44	-16.40	-20.72	-48.35	-18.27	-14.48	-13.37								
31-May-2012	18:00:00	-23.25	-40.54	-26.08	-40.20	-15.46	-17.96	-21.91	-48.37	-19.61	-15.29	-14.20								
31-May-2012	24:00:00	-23.70	-40.36	-26.20	-39.81	-15.87	-18.86	-23.68	-48.27	-18.92	-15.54	-14.75								
1-Jun-2012	06:00:00	-23.41	-40.26	-25.73	-39.58	-16.22	-19.55	-24.41	-48.35	-19.39	-15.53	-15.31							0.03	
1-Jun-2012	12:00:00	-23.55	-40.38	-25.66	-39.79	-16.56	-20.22	-25.55	-48.31	-19.91	-15.95	-15.86								
1-Jun-2012	18:00:00	-23.94	-40.57	-25.99	-40.30	-15.10	-14.76	-25.82	-48.30	-20.15	-15.95	-16.06								
1-Jun-2012	24:00:00	-24.87	-40.38	-20.21	-39.69	-8.61	-13.11	-26.95	-48.37	-20.02	-15.76	-9.04								
2-Jun-2012	06:00:00	-22.29	-40.42	-24.37	-39.27	-8.71	-13.96	-27.61	-48.17	-18.77	-12.88	-9.26								
2-Jun-2012	12:00:00	-22.05	-40.29	-24.55	-40.27	-11.42	-15.53	-28.31	-48.36	-19.21	-13.06	-10.03								
2-Jun-2012	18:00:00	-23.47	-40.48	-25.81	-40.74	-14.86	-17.26	-28.56	-48.41	-20.51	-14.22	-11.43								
2-Jun-2012	24:00:00	-25.27	-40.48	-26.44	-40.02	-15.66	-18.26	-29.52	-48.26	-21.94	-15.59	-12.26								
3-Jun-2012	06:00:00	-25.55	-40.35	-25.91	-39.85	-15.86	-19.07	-29.96	-48.15	-22.25	-16.42	-12.99								
3-Jun-2012	12:00:00	-25.88	-40.39	-25.70	-40.73	-16.34	-20.38	-30.91	-48.32	-22.64	-16.76	-13.99								
3-Jun-2012	18:00:00	-26.76	-40.54	-26.70	-41.05	-17.04	-21.58	-31.25	-48.32	-23.73	-17.55	-14.97								
3-Jun-2012	24:00:00	-27.77	-40.51	-26.83	-40.36	-17.29	-22.17	-32.29	-48.21	-24.93	-18.33	-15.49								
4-Jun-2012	06:00:00	-28.01	-40.38	-26.10	-39.95	-17.47	-22.65	-32.65	-48.19	-25.13	-18.72	-16.00								
4-Jun-2012	12:00:00	-28.05	-40.23	-25.81	-40.83	-18.18	-23.48	-33.22	-48.41	-25.35	-19.02	-16.65								
4-Jun-2012	18:00:00	-28.70	-40.52	-26.84	-41.25	-18.69	-24.39	-33.74	-48.41	-26.18	-19.59	-17.23								
4-Jun-2012	24:00:00	-28.76	-40.57	-26.96	-40.57	-18.88	-24.75	-33.86	-48.21	-27.01	-20.06	-17.62								
5-Jun-2012	06:00:00	-28.57	-40.27	-26.22	-40.32	-19.22	-25.36	-33.40	-48.21	-27.23	-20.19	-18.10								
5-Jun-2012	12:00:00	-28.59	-40.30	-26.15	-41.08	-19.86	-26.30	-33.88	-48.42	-27.56	-20.57	-18.73								
5-Jun-2012	18:00:00	-28.88	-40.41	-26.87	-41.26	-20.25	-26.98	-33.40	-48.19	-28.15	-21.17	-18.98								
5-Jun-2012	24:00:00	-28.62	-40.28	-26.92	-40.80	-21.03	-27.02	-33.79	-48.29	-28.72	-21.46	-19.54								
6-Jun-2012	06:00:00	-28.74	-40.36	-26.48	-40.47	-21.16	-26.93	-33.35	-48.21	-29.26	-21.96	-19.85								
6-Jun-2012	12:00:00	-28.69	-40.36	-26.20	-41.02	-21.90	-27.18	-33.40	-48.41	-29.48	-22.24	-20.37								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
6-Jun-2012	18:00:00	-28.85	-40.44	-26.95	-41.44	-22.63	-27.09	-33.46	-48.30	-29.95	-22.70	-20.74								
6-Jun-2012	24:00:00	-28.75	-40.47	-27.23	-40.84	-23.16	-27.05	-33.62	-48.25	-30.74	-23.14	-20.86								
7-Jun-2012	06:00:00	-28.70	-40.33	-26.57	-40.48	-23.58	-26.88	-33.38	-48.19	-31.00	-23.36	-21.25								
7-Jun-2012	12:00:00	-28.67	-40.27	-26.39	-41.41	-24.32	-27.04	-33.41	-48.35	-31.31	-23.66	-21.76								
7-Jun-2012	18:00:00	-28.83	-40.44	-27.19	-41.77	-25.08	-27.15	-33.30	-48.36	-31.85	-24.28	-22.05								
7-Jun-2012	24:00:00	-28.81	-40.56	-27.46	-40.97	-25.58	-26.94	-33.71	-48.19	-32.80	-24.77	-22.18								
8-Jun-2012	06:00:00	-28.67	-40.29	-26.74	-40.63	-26.16	-26.99	-33.25	-48.25	-32.85	-24.82	-22.58								
8-Jun-2012	12:00:00	-28.65	-40.29	-26.53	-41.71	-27.12	-27.14	-33.46	-48.50	-33.11	-25.11	-23.07								
8-Jun-2012	18:00:00	-28.89	-40.57	-27.53	-42.10	-27.73	-27.12	-33.48	-48.31	-33.34	-25.72	-23.13								
8-Jun-2012	24:00:00	-28.82	-40.41	-27.56	-41.34	-28.14	-26.93	-33.64	-48.23	-33.25	-25.94	-23.35								
9-Jun-2012	06:00:00	-28.64	-40.32	-26.84	-41.07	-28.59	-26.99	-33.14	-48.25	-33.15	-26.18	-23.57								
9-Jun-2012	12:00:00	-28.63	-40.38	-26.75	-42.00	-29.23	-27.12	-33.53	-48.38	-33.17	-26.45	-24.02								
9-Jun-2012	18:00:00	-28.91	-40.56	-27.65	-42.46	-29.94	-27.20	-33.43	-48.37	-33.31	-26.98	-24.33								
9-Jun-2012	24:00:00	-28.82	-40.51	-27.84	-41.64	-29.98	-27.11	-33.83	-48.27	-33.28	-27.33	-24.46								
10-Jun-2012	06:00:00	-28.73	-40.44	-27.20	-41.33	-30.04	-27.02	-33.44	-48.23	-33.20	-27.47	-24.68								
10-Jun-2012	12:00:00	-28.74	-40.42	-26.99	-42.25	-30.13	-27.11	-33.58	-48.36	-33.08	-27.63	-25.03								
10-Jun-2012	18:00:00	-28.91	-40.51	-27.73	-42.48	-30.01	-27.05	-33.47	-48.27	-33.17	-28.04	-25.23								
10-Jun-2012	24:00:00	-28.76	-40.41	-27.88	-41.88	-30.01	-27.02	-33.67	-48.31	-32.98	-28.19	-25.45								
11-Jun-2012	06:00:00	-28.73	-40.27	-27.36	-41.59	-29.98	-27.10	-33.28	-48.24	-33.03	-28.37	-25.72							0.69	
11-Jun-2012	12:00:00	-28.85	-40.36	-27.04	-42.19	-30.09	-27.15	-33.64	-48.35	-32.98	-28.47	-26.00								
11-Jun-2012	18:00:00	-28.77	-40.34	-27.59	-41.03	0.18	-4.32	-33.26	-19.16	-33.03	-28.71	-0.56								
11-Jun-2012	24:00:00	-16.65	-19.62	-16.04	-37.92	-2.02	-6.89	-6.35	-47.30	-2.31	1.35	-2.79								
12-Jun-2012	06:00:00	-10.07	-4.20	-17.71	-35.94	-2.97	-8.98	-6.78	-48.35	-2.84	-1.06	-4.11							0.51	
12-Jun-2012	12:00:00	-7.87	-4.72	-15.00	-35.21	-3.79	-10.96	-10.14	-48.48	-3.43	-1.41	-5.39								
12-Jun-2012	18:00:00	-7.68	-5.91	-14.82	-34.80	-4.02	-12.72	-11.77	-48.42	-4.16	-1.79	-6.40								
12-Jun-2012	24:00:00	-7.85	-6.66	-14.87	-34.13	-4.26	-13.25	-14.80	-48.42	-4.55	-1.96	-7.04								
13-Jun-2012	06:00:00	-7.58	-7.20	-14.76	-33.99	-4.00	-12.26	-15.10	-48.44	-4.87	-2.08	-4.61								
13-Jun-2012	12:00:00	-7.88	-7.66	-15.38	-34.61	-4.76	-13.08	-14.28	-48.61	-5.27	-2.26	-6.25								
13-Jun-2012	18:00:00	-9.20	-9.46	-16.98	-34.96	-6.31	-14.67	-15.14	-48.43	-5.71	-2.78	-8.20								
13-Jun-2012	24:00:00	-10.29	-13.06	-18.60	-33.76	-6.30	-15.50	-18.08	-48.36	-6.02	-3.40	-9.14								
14-Jun-2012	06:00:00	-9.71	-14.13	-19.93	-33.63	-6.48	-16.38	-19.06	-48.36	-6.14	-3.66	-9.91								
14-Jun-2012	12:00:00	-9.72	-15.69	-20.74	-34.99	-8.25	-17.87	-20.03	-48.56	-6.47	-4.01	-10.85								
14-Jun-2012	18:00:00	-11.34	-19.72	-22.40	-35.21	-9.36	-18.93	-20.94	-48.51	-7.06	-5.70	-11.56								
14-Jun-2012	24:00:00	-11.75	-24.32	-23.03	-34.57	-8.91	-19.64	-22.52	-48.25	-7.22	-7.17	-12.08								
15-Jun-2012	06:00:00	-11.28	-26.55	-23.09	-34.98	-8.94	-20.34	-22.93	-48.29	-7.18	-7.44	-12.73								
15-Jun-2012	12:00:00	-11.46	-28.50	-23.34	-36.51	-10.36	-21.42	-24.06	-48.49	-7.43	-7.90	-13.47								
15-Jun-2012	18:00:00	-12.79	-32.08	-24.20	-37.84	-11.67	-22.62	-24.37	-48.60	-7.91	-9.99	-14.19								
15-Jun-2012	24:00:00	-14.09	-37.70	-24.88	-37.36	-11.20	-23.21	-25.74	-48.26	-8.47	-12.14	-14.51								
16-Jun-2012	06:00:00	-13.62	-40.12	-24.54	-37.69	-10.98	-23.93	-26.06	-48.36	-8.47	-12.32	-15.11								
16-Jun-2012	12:00:00	-13.67	-40.28	-24.74	-39.25	-12.02	-25.05	-26.95	-48.53	-8.71	-12.84	-15.82								
16-Jun-2012	18:00:00	-15.02	-40.42	-25.48	-40.47	-13.20	-25.86	-27.54	-48.43	-9.27	-14.03	-16.30								
16-Jun-2012	24:00:00	-16.17	-40.33	-25.86	-39.88	-12.16	-26.46	-28.60	-48.30	-9.70	-15.20	-16.63								
17-Jun-2012	06:00:00	-15.74	-40.29	-25.45	-39.47	-11.96	-26.96	-28.84	-48.26	-9.81	-15.90	-17.07								
17-Jun-2012	12:00:00	-15.80	-40.27	-25.43	-40.41	-13.09	-27.21	-29.77	-48.47	-10.04	-16.28	-17.71								
17-Jun-2012	18:00:00	-17.15	-40.41	-26.23	-41.39	-14.36	-27.20	-30.20	-48.41	-10.90	-17.07	-18.16								
17-Jun-2012	24:00:00	-18.49	-40.47	-26.51	-40.71	-14.20	-27.12	-31.37	-48.23	-12.03	-17.63	-18.55								
18-Jun-2012	06:00:00	-18.25	-40.34	-26.17	-40.49	-14.73	-26.99	-31.64	-48.30	-12.34	-18.03	-18.93								
18-Jun-2012	12:00:00	-18.36	-40.36	-26.00	-41.21	-15.70	-27.11	-32.54	-48.32	-12.85	-18.27	-19.35								
18-Jun-2012	18:00:00	-19.25	-40.35	-26.72	-41.82	-16.64	-27.04	-32.88	-48.26	-13.73	-18.64	-19.88								
18-Jun-2012	24:00:00	-20.87	-40.34	-26.99	-41.32	-17.00	-27.18	-33.89	-48.27	-15.34	-19.10	-20.18								
19-Jun-2012	06:00:00	-20.66	-40.39	-26.58	-41.15	-17.32	-27.23	-33.56	-48.41	-15.91	-19.41	-20.72								
19-Jun-2012	12:00:00	-20.69	-40.45	-26.45	-41.91	-17.89	-27.17	-33.80	-48.30	-16.54	-19.68	-21.10								
19-Jun-2012	18:00:00	-22.08	-40.44	-27.24	-42.47	-18.70	-27.21	-33.67	-48.39	-17.72	-20.08	-21.49								
19-Jun-2012	24:00:00	-23.82	-40.46	-27.42	-41.80	-18.97	-27.23	-33.91	-48.31	-19.42	-20.64	-21.80								
20-Jun-2012	06:00:00	-23.65	-40.29	-26.88	-41.50	-19.16	-27.05	-33.38	-48.23	-19.83	-20.75	-22.09								
20-Jun-2012	12:00:00	-23.82	-40.24	-26.62	-42.67	-19.98	-27.21	-33.66	-48.49	-20.12	-21.11	-22.65								
20-Jun-2012	18:00:00	-25.33	-40.53	-27.76	-42.91	-20.84	-27.22	-33.73	-48.47	-21.38	-21.95	-22.97								
20-Jun-2012	24:00:00	-26.70	-40.50	-27.82	-42.04	-20.95	-27.03	-33.76	-48.19	-22.66	-22.35	-23.07								
21-Jun-2012	06:00:00	-26.76	-40.26	-27.20	-41.74	-21.52	-27.03	-33.37	-48.23	-22.94	-22.42	-23.48								
21-Jun-2012	12:00:00	-26.90	-40.34	-26.94	-42.91	-22.35	-27.24	-33.76	-48.44	-23.27	-22.70	-23.99								
21-Jun-2012	18:00:00	-27.84	-40.54	-28.09	-43.11	-22.70	-27.03	-33.56	-48.33	-24.29	-23.32	-24.14								
21-Jun-2012	24:00:00	-28.79	-40.38	-28.01	-42.31	-23.20	-26.98	-33.76	-48.25	-25.31	-23.64	-24.51								
22-Jun-2012	06:00:00	-28.81	-40.35	-27.58	-41.95	-23.67	-26.96	-33.26	-48.25	-25.60	-23.85	-24.67							0.08	
22-Jun-2012	12:00:00	-28.77	-40.38	-27.35	-43.13	-24.69	-27.14	-33.59	-48.43	-26.03	-24.02	-25.13								
22-Jun-2012	18:00:00	-29.03	-40.53	-28.34	-42.85	-25.14	-26.99	-33.47	-48.25	-26.90	-24.65	-25.34								
22-Jun-2012	24:00:00	-28.88	-40.30	-28.03	-42.15	-25.76	-26.98	-34.21	-48.32	-27.55	-24.84	-25.59								
23-Jun-2012	06:00:00	-28.91	-40.28	-27.50	-41.85	-26.26	-26.90	-33.31	-48.17	-27.79	-25.12	-25.67							0.12	
23-Jun-2012	12:00:00	-28.58	-40.11	-27.22	-42.73	-27.14	-27.02	-33.41	-48.37	-27.91	-25.19	-26.18								
23-Jun-2012	18:00:00	-28.98	-40.44	-27.97	-43.19	-27.87	-26.92	-33.43	-48.29	-28.61	-25.64	-26.47								
23-Jun-2012	24:00:00	-28.86	-40.33	-28.34	-42.49	-28.44	-26.99	-33.96	-48.31	-29.43	-26.07	-26.71								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
24-Jun-2012	06:00:00	-28.83	-40.30	-27.83	-42.22	-28.92	-27.02	-33.17	-48.43	-29.69	-26.33	-27.13								
24-Jun-2012	12:00:00	-28.86	-40.41	-27.59	-43.07	-29.60	-27.09	-33.47	-48.44	-30.01	-26.58	-27.35								
24-Jun-2012	18:00:00	-28.93	-40.38	-28.39	-43.32	-29.86	-26.96	-33.19	-48.31	-30.67	-27.02	-27.50								
24-Jun-2012	24:00:00	-28.82	-40.39	-28.56	-42.49	-29.94	-26.98	-33.64	-48.30	-31.39	-27.30	-27.75								
25-Jun-2012	06:00:00	-28.87	-40.33	-27.90	-42.21	-29.98	-27.04	-33.23	-48.30	-31.61	-27.38	-27.92							1.04	
25-Jun-2012	12:00:00	-28.85	-40.40	-27.71	-43.09	-30.09	-27.06	-33.64	-48.39	-31.87	-27.60	-28.33								
25-Jun-2012	18:00:00	-28.94	-40.36	-28.45	-43.63	-30.09	-27.11	-33.37	-48.30	-32.36	-27.92	-28.51								
25-Jun-2012	24:00:00	-28.98	-40.45	-28.93	-33.39	3.58	-1.80	-33.74	-19.69	-33.01	-28.19	0.21								
26-Jun-2012	06:00:00	-7.70	-12.85	-6.80	-33.64	0.92	-6.04	-6.70	-11.09	1.16	1.16	-0.23								
26-Jun-2012	12:00:00	-4.07	-4.03	-8.05	-34.81	-2.25	-10.14	-3.31	-10.91	0.62	-0.99	-1.16								
26-Jun-2012	18:00:00	-5.78	-6.18	-8.88	-35.29	-3.22	-13.94	-3.78	-10.73	-0.91	-1.59	-2.09								
26-Jun-2012	24:00:00	-6.45	-8.82	-9.56	-34.27	-3.70	-15.83	-4.68	-15.92	-2.11	-2.14	-2.49								
27-Jun-2012	06:00:00	-5.87	-10.04	-9.88	-34.11	-4.21	-16.90	-4.90	-37.29	-2.74	-2.22	-2.75								
27-Jun-2012	12:00:00	-6.37	-11.58	-10.51	-35.59	-5.82	-18.94	-5.89	-48.37	-3.26	-2.51	-3.91								
27-Jun-2012	18:00:00	-8.41	-18.01	-11.62	-35.68	-7.66	-20.26	-7.45	-48.24	-4.07	-3.75	-5.98								
27-Jun-2012	24:00:00	-9.41	-27.30	-12.97	-34.20	-7.05	-21.02	-12.08	-48.14	-4.58	-5.87	-6.13								
28-Jun-2012	06:00:00	-8.16	-30.15	-13.21	-34.12	-7.26	-22.08	-12.94	-48.15	-4.90	-6.24	-6.38								
28-Jun-2012	12:00:00	-8.24	-32.42	-13.86	-35.85	-9.37	-23.54	-13.78	-48.37	-5.23	-6.84	-7.22								
28-Jun-2012	18:00:00	-10.16	-38.72	-16.24	-36.21	-10.70	-24.78	-15.90	-48.30	-5.78	-9.46	-9.16								
28-Jun-2012	24:00:00	-11.52	-40.47	-19.16	-35.01	-9.85	-25.47	-19.78	-48.24	-6.34	-12.05	-10.22								
29-Jun-2012	06:00:00	-10.37	-40.39	-18.59	-34.74	-9.52	-26.09	-20.52	-48.23	-6.52	-12.54	-11.01								
29-Jun-2012	12:00:00	-10.15	-40.26	-18.53	-36.87	-11.17	-27.08	-21.24	-48.32	-6.59	-12.80	-12.04								
29-Jun-2012	18:00:00	-12.24	-40.36	-21.67	-38.02	-12.15	-27.16	-22.32	-48.42	-7.27	-13.98	-13.11								
29-Jun-2012	24:00:00	-13.81	-40.47	-23.58	-37.85	-11.44	-26.91	-24.43	-48.24	-7.89	-15.71	-13.57						0.00		2.47
30-Jun-2012	06:00:00	-12.89	-40.36	-23.46	-37.68	-11.32	-26.91	-24.85	-48.08	-7.81	-16.23	-14.09								
30-Jun-2012	12:00:00	-12.66	-40.27	-23.51	-40.18	-12.85	-27.17	-25.64	-48.39	-7.95	-16.62	-14.97								
30-Jun-2012	18:00:00	-14.60	-40.50	-24.62	-41.44	-13.82	-26.97	-26.38	-48.25	-8.79	-17.39	-15.62								
30-Jun-2012	24:00:00	-16.10	-40.39	-25.26	-40.61	-13.29	-26.97	-27.73	-48.17	-9.44	-17.92	-16.12								
1-Jul-2012	06:00:00	-15.37	-40.18	-25.04	-40.30	-13.66	-27.16	-28.18	-48.31	-9.43	-17.99	-16.71								
1-Jul-2012	12:00:00	-15.27	-40.47	-25.21	-41.47	-14.82	-27.05	-28.66	-48.41	-9.83	-18.27	-17.33								
1-Jul-2012	18:00:00	-16.91	-40.52	-26.16	-41.65	-15.56	-27.10	-29.35	-48.31	-10.75	-18.80	-17.84								
1-Jul-2012	24:00:00	-17.70	-40.41	-26.14	-41.14	-15.13	-26.81	-31.10	-48.09	-11.29	-19.35	-18.01								
2-Jul-2012	06:00:00	-17.22	-40.23	-25.85	-41.10	-15.61	-27.04	-30.65	-48.26	-11.73	-19.50	-18.55								
2-Jul-2012	12:00:00	-17.39	-40.41	-26.08	-42.24	-16.62	-27.05	-31.21	-48.33	-12.35	-19.88	-19.16								
2-Jul-2012	18:00:00	-19.28	-40.46	-27.02	-42.83	-17.70	-27.09	-31.94	-48.37	-13.87	-20.38	-19.66								
2-Jul-2012	24:00:00	-20.51	-40.44	-27.26	-42.03	-17.92	-26.97	-33.36	-48.23	-15.58	-21.00	-19.84								
3-Jul-2012	06:00:00	-20.19	-40.34	-26.77	-41.77	-18.37	-26.98	-33.42	-48.27	-16.03	-21.21	-20.25							0.03	
3-Jul-2012	12:00:00	-20.19	-40.32	-26.62	-42.95	-19.17	-27.11	-33.62	-48.32	-16.64	-21.45	-20.87								
3-Jul-2012	18:00:00	-21.91	-40.45	-27.65	-43.17	-19.96	-27.03	-33.36	-48.31	-18.03	-22.17	-21.26								
3-Jul-2012	24:00:00	-23.53	-40.34	-27.80	-42.57	-20.32	-26.91	-33.70	-48.17	-19.85	-22.72	-21.56								
4-Jul-2012	06:00:00	-23.54	-40.17	-27.23	-42.24	-20.74	-26.96	-33.10	-48.12	-20.30	-22.97	-21.79							0.44	
4-Jul-2012	12:00:00	-23.76	-40.22	-27.19	-43.39	-21.70	-27.09	-33.58	-48.41	-20.65	-23.27	-22.49								
4-Jul-2012	18:00:00	-25.28	-40.35	-28.18	-43.27	-22.48	-27.05	-33.30	-48.27	-21.75	-23.99	-22.87								
4-Jul-2012	24:00:00	-26.35	-40.36	-28.01	-42.71	-22.86	-26.96	-33.90	-48.25	-22.76	-24.44	-23.20								
5-Jul-2012	06:00:00	-26.47	-40.27	-27.62	-42.45	-23.60	-27.08	-33.25	-48.33	-23.02	-24.64	-23.54							0.34	
5-Jul-2012	12:00:00	-26.82	-40.44	-27.49	-43.60	-24.56	-27.12	-33.59	-48.42	-23.45	-25.01	-24.13								
5-Jul-2012	18:00:00	-27.62	-40.50	-28.55	-43.35	-25.33	-26.94	-33.41	-48.20	-24.35	-25.52	-24.32								
5-Jul-2012	24:00:00	-28.57	-40.20	-28.12	-42.87	-26.26	-26.94	-33.10	-48.27	-25.24	-25.74	-24.79								
6-Jul-2012	06:00:00	-28.88	-40.35	-27.78	-42.53	-26.74	-26.86	-33.31	-48.21	-25.30	-26.14	-24.87								
6-Jul-2012	12:00:00	-29.03	-40.30	-27.58	-43.63	-27.86	-26.98	-33.40	-48.37	-25.66	-26.33	-25.52								
6-Jul-2012	18:00:00	-29.05	-40.42	-28.72	-43.81	-28.66	-26.99	-33.46	-48.36	-26.29	-26.82	-25.89								
6-Jul-2012	24:00:00	-29.13	-40.40	-28.78	-42.99	-29.16	-26.94	-33.79	-48.18	-27.34	-27.27	-26.09								
7-Jul-2012	06:00:00	-28.94	-40.24	-28.08	-42.82	-29.88	-26.94	-33.24	-48.19	-27.59	-27.38	-26.48								
7-Jul-2012	12:00:00	-29.05	-40.33	-27.96	-44.15	-29.96	-27.04	-33.35	-48.43	-27.99	-27.63	-27.01								
7-Jul-2012	18:00:00	-29.15	-40.42	-29.21	-44.26	-29.85	-27.05	-33.38	-48.29	-28.93	-28.12	-27.41								
7-Jul-2012	24:00:00	-29.05	-40.42	-29.27	-43.65	-29.86	-27.00	-33.67	-48.38	-29.78	-28.44	-27.69								
8-Jul-2012	06:00:00	-29.11	-40.53	-28.74	-43.25	-29.89	-27.03	-33.31	-48.29	-30.23	-28.72	-28.03								
8-Jul-2012	12:00:00	-29.11	-40.47	-28.44	-44.56	-29.95	-27.00	-33.58	-48.38	-30.44	-28.89	-28.54								
8-Jul-2012	18:00:00	-29.19	-40.54	-29.77	-44.70	-29.80	-26.63	-33.52	-48.21	-31.25	-29.32	-28.65								
8-Jul-2012	24:00:00	-29.06	-40.29	-29.72	-43.81	-29.76	-26.61	-33.70	-48.18	-32.31	-29.49	-29.05								
9-Jul-2012	06:00:00	-29.03	-40.38	-29.08	-43.48	-29.74	-26.64	-33.37	-48.13	-32.55	-29.64	-29.27							0.27	
9-Jul-2012	12:00:00	-28.99	-40.39	-28.78	-44.80	-29.90	-26.94	-33.41	-48.29	-32.85	-29.84	-29.79								
9-Jul-2012	18:00:00	-29.13	-40.47	-30.10	-43.72	-29.88	-26.72	-33.34	-48.14	-33.05	-30.23	-23.50								
9-Jul-2012	24:00:00	-29.07	-40.36	-28.08	-43.29	-29.76	-26.61	-33.66	-48.17	-32.18	-30.33	-23.92								
10-Jul-2012	06:00:00	-28.92	-40.27	-27.77	-42.93	-29.90	-26.63	-33.22	-48.23	-31.65	-30.38	-24.43							0.35	
10-Jul-2012	12:00:00	-29.06	-40.29	-27.92	-43.06	-27.69	-26.72	-33.44	-48.20	-30.29	-30.56	-24.94								
10-Jul-2012	18:00:00	-29.07	-40.36	-28.01	-43.33	-28.86	-26.78	-33.20	-48.25	-30.17	-30.77	-25.42								
10-Jul-2012	24:00:00	-28.99	-40.45	-28.37	-42.87	-29.38	-26.67	-33.53	-48.24	-30.23	-31.01	-25.76								
11-Jul-2012	06:00:00	-29.01	-40.39	-27.76	-42.76	-29.88	-26.74	-33.40	-48.35	-29.51	-31.18	-26.26							0.22	
11-Jul-2012	12:00:00	-29.19	-40.45	-27.82	-42.97	-30.18	-26.98	-33.68	-48.56	-28.65	-31.37	-26.95								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
11-Jul-2012	18:00:00	-29.48	-40.65	-28.12	-42.69	-18.91	-26.92	-33.43	-48.49	-28.64	-31.74	-11.55								
11-Jul-2012	24:00:00	-29.30	-40.59	-25.16	-42.03	-15.40	-26.78	-23.92	-48.44	-19.10	-1.73	-13.15								
12-Jul-2012	06:00:00	-29.30	-40.57	-26.59	-40.43	-13.57	-26.82	-22.99	-48.47	-18.16	-3.06	-14.11							0.10	
12-Jul-2012	12:00:00	-29.29	-40.52	-26.68	-38.69	-12.75	-26.90	-23.68	-48.60	-17.18	-4.83	-15.13								
12-Jul-2012	18:00:00	-29.23	-40.66	-27.13	-37.86	-12.31	-26.93	-24.08	-48.50	-17.67	-6.87	-16.01								
12-Jul-2012	24:00:00	-29.31	-40.54	-27.89	-30.11	1.41	-4.84	-25.94	-32.46	-19.07	-9.36	-2.29								
13-Jul-2012	06:00:00	-18.07	-40.56	-11.75	-31.60	-2.24	-7.05	-3.66	-47.64	-6.20	-0.33	-4.47							0.08	
13-Jul-2012	12:00:00	-15.61	-40.58	-14.46	-33.17	-3.61	-8.61	-4.99	-48.59	-6.49	-1.43	-5.93								
13-Jul-2012	18:00:00	-15.50	-40.65	-19.92	-33.48	-3.91	-7.67	-5.89	-48.53	-7.19	-1.96	-5.02								
13-Jul-2012	24:00:00	-14.65	-40.66	-22.67	-33.46	-4.26	-9.08	-6.61	-48.45	-7.28	-1.96	-6.53								
14-Jul-2012	06:00:00	-14.49	-40.59	-23.47	-33.67	-4.44	-9.88	-7.90	-48.51	-7.57	-2.14	-7.19								
14-Jul-2012	12:00:00	-14.53	-40.63	-24.01	-35.01	-5.35	-11.25	-8.87	-48.72	-7.94	-2.32	-8.41								
14-Jul-2012	18:00:00	-15.90	-40.80	-24.83	-35.25	-6.60	-13.48	-10.13	-48.51	-8.67	-2.93	-10.17								
14-Jul-2012	24:00:00	-17.40	-40.66	-25.52	-34.08	-6.28	-14.93	-14.30	-48.50	-9.25	-3.69	-11.13								
15-Jul-2012	06:00:00	-16.80	-40.53	-25.32	-34.02	-6.42	-16.07	-14.50	-48.49	-9.43	-3.88	-12.08								
15-Jul-2012	12:00:00	-16.82	-40.56	-25.34	-35.70	-8.70	-17.90	-15.41	-48.62	-9.64	-4.17	-13.04								
15-Jul-2012	18:00:00	-18.42	-40.72	-26.24	-36.11	-10.54	-19.35	-16.80	-48.60	-10.84	-6.48	-13.89								
15-Jul-2012	24:00:00	-20.01	-40.69	-26.66	-35.15	-9.38	-20.02	-20.38	-48.49	-11.91	-9.46	-14.44								
16-Jul-2012	06:00:00	-19.71	-40.45	-26.22	-35.08	-9.20	-20.76	-21.00	-48.57	-12.10	-9.63	-14.99								
16-Jul-2012	12:00:00	-19.47	-40.65	-26.16	-36.57	-11.07	-21.84	-21.66	-48.59	-12.63	-9.88	-15.69								
16-Jul-2012	18:00:00	-20.81	-40.64	-26.81	-36.51	-10.96	-22.77	-22.19	-48.51	-13.97	-11.66	-16.05								
16-Jul-2012	24:00:00	-21.39	-40.60	-26.53	-36.42	-10.63	-23.54	-23.60	-48.45	-14.97	-12.68	-16.53								
17-Jul-2012	06:00:00	-21.55	-40.64	-26.33	-37.20	-10.59	-24.18	-23.99	-48.45	-15.56	-13.05	-16.90								
17-Jul-2012	12:00:00	-21.85	-40.62	-26.24	-38.67	-12.19	-25.41	-24.70	-48.59	-16.04	-13.26	-17.55								
17-Jul-2012	18:00:00	-23.30	-40.65	-27.10	-39.84	-12.76	-26.40	-25.09	-48.65	-17.48	-14.45	-18.07								
17-Jul-2012	24:00:00	-25.05	-40.72	-27.23	-39.40	-11.85	-26.90	-26.95	-48.45	-19.33	-15.94	-18.44								
18-Jul-2012	06:00:00	-25.04	-40.62	-26.76	-39.25	-11.95	-27.15	-26.98	-48.48	-19.65	-16.34	-18.76								
18-Jul-2012	12:00:00	-25.40	-40.54	-26.66	-40.35	-13.57	-27.21	-27.62	-48.63	-20.11	-16.86	-19.43								
18-Jul-2012	18:00:00	-26.84	-40.78	-27.66	-41.27	-14.48	-27.17	-28.22	-48.59	-21.33	-17.70	-19.93								
18-Jul-2012	24:00:00	-28.21	-40.69	-27.76	-40.68	-14.59	-27.08	-29.20	-48.44	-22.73	-18.24	-20.18								
19-Jul-2012	06:00:00	-28.51	-40.60	-27.19	-40.30	-15.07	-27.06	-29.56	-48.36	-23.09	-18.36	-20.57							0.01	
19-Jul-2012	12:00:00	-28.69	-40.51	-27.06	-41.33	-16.68	-27.26	-30.48	-48.59	-23.35	-18.35	-21.28								
19-Jul-2012	18:00:00	-29.59	-40.74	-28.06	-42.00	-17.60	-27.27	-30.98	-48.63	-24.55	-19.04	-21.91								
19-Jul-2012	24:00:00	-29.47	-40.69	-28.37	-41.21	-17.95	-27.16	-32.38	-48.51	-25.94	-19.53	-22.15								
20-Jul-2012	06:00:00	-29.39	-40.66	-27.66	-40.91	-18.42	-27.21	-32.58	-48.61	-26.25	-19.80	-22.59							0.06	
20-Jul-2012	12:00:00	-29.42	-40.66	-27.49	-41.55	-19.06	-27.28	-33.44	-48.75	-26.57	-19.92	-23.14								
20-Jul-2012	18:00:00	-29.67	-40.83	-28.26	-41.05	-19.18	-27.17	-33.85	-48.63	-27.21	-20.28	-23.32								
20-Jul-2012	24:00:00	-29.48	-40.69	-27.64	-40.71	-19.50	-27.14	-34.12	-48.53	-25.35	-20.36	-23.61								
21-Jul-2012	06:00:00	-29.43	-40.51	-27.22	-40.66	-19.83	-27.27	-33.56	-48.60	-24.29	-20.48	-24.13							0.50	
21-Jul-2012	12:00:00	-29.57	-40.71	-27.13	-40.92	-20.14	-27.23	-34.06	-48.59	-22.47	-19.76	-24.61								
21-Jul-2012	18:00:00	-29.58	-40.66	-27.56	-40.98	-20.46	-27.11	-33.77	-48.62	-22.67	-19.16	-24.79								
21-Jul-2012	24:00:00	-29.51	-40.59	-27.32	-40.71	-20.78	-27.02	-31.00	-48.53	-22.00	-17.93	-25.03								
22-Jul-2012	06:00:00	-29.45	-40.52	-27.11	-40.72	-21.12	-27.08	-28.57	-48.48	-22.12	-17.31	-25.37								
22-Jul-2012	12:00:00	-29.46	-40.62	-27.12	-41.29	-21.70	-27.32	-28.92	-48.68	-22.65	-17.49	-26.00								
22-Jul-2012	18:00:00	-29.65	-40.80	-27.74	-37.75	-4.80	-8.16	-29.27	-48.63	-23.44	-18.02	-11.72								
22-Jul-2012	24:00:00	-29.61	-40.65	-25.44	-34.95	-5.20	-10.50	-15.06	-48.50	-21.51	-15.45	-11.84								
23-Jul-2012	06:00:00	-29.54	-40.60	-25.39	-34.17	-5.65	-12.16	-16.27	-48.56	-21.59	-15.99	-12.57							0.22	
23-Jul-2012	12:00:00	-29.57	-40.63	-25.56	-35.08	-7.62	-14.25	-17.46	-48.61	-22.00	-16.43	-13.46								
23-Jul-2012	18:00:00	-29.65	-40.69	-26.27	-35.07	-10.09	-16.11	-18.56	-48.66	-22.89	-17.15	-14.37								
23-Jul-2012	24:00:00	-29.71	-40.66	-26.72	-34.05	-8.44	-17.09	-21.19	-48.59	-24.32	-18.03	-15.08								
24-Jul-2012	06:00:00	-29.59	-40.63	-26.44	-34.01	-8.61	-18.21	-21.89	-48.71	-23.60	-17.88	-15.81								
24-Jul-2012	12:00:00	-29.63	-40.87	-26.48	-35.82	-11.11	-19.53	-22.63	-48.73	-23.90	-18.02	-16.49								
24-Jul-2012	18:00:00	-29.71	-40.98	-27.24	-35.07	-11.54	-20.44	-23.34	-48.41	-24.83	-18.32	-16.97								
24-Jul-2012	24:00:00	-29.53	-40.63	-26.95	-34.93	-10.81	-21.33	-24.11	-48.48	-25.53	-18.52	-17.57								
25-Jul-2012	06:00:00	-29.54	-40.57	-26.78	-35.10	-10.87	-22.10	-25.16	-48.55	-25.88	-18.72	-18.09								
25-Jul-2012	12:00:00	-29.53	-40.56	-26.87	-36.79	-12.37	-23.19	-25.67	-48.66	-26.33	-18.95	-18.85								
25-Jul-2012	18:00:00	-29.69	-40.74	-27.44	-38.11	-13.94	-24.28	-26.12	-48.73	-27.07	-19.47	-19.54								
25-Jul-2012	24:00:00	-29.82	-40.83	-27.95	-37.37	-13.12	-24.94	-27.42	-48.59	-28.09	-20.13	-19.83								
26-Jul-2012	06:00:00	-29.65	-40.58	-27.37	-37.69	-12.96	-25.60	-27.90	-48.57	-28.23	-20.28	-20.31								
26-Jul-2012	12:00:00	-29.71	-40.66	-27.23	-39.42	-14.16	-26.85	-28.76	-48.66	-28.54	-20.57	-20.93								
26-Jul-2012	18:00:00	-29.82	-40.86	-28.13	-40.62	-14.91	-27.44	-29.26	-48.57	-29.42	-21.15	-21.58								
26-Jul-2012	24:00:00	-29.73	-40.75	-28.24	-39.99	-14.42	-27.28	-30.58	-48.51	-30.29	-21.47	-21.83								
27-Jul-2012	06:00:00	-29.60	-40.65	-27.66	-39.61	-14.28	-27.33	-31.01	-48.54	-30.59	-21.63	-22.36							0.26	
27-Jul-2012	12:00:00	-29.66	-40.69	-27.59	-40.89	-15.34	-27.40	-31.99	-48.74	-30.87	-21.90	-22.95								
27-Jul-2012	18:00:00	-29.84	-40.76	-28.63	-41.89	-16.12	-27.36	-32.64	-48.56	-31.66	-22.32	-23.48								
27-Jul-2012	24:00:00	-29.75	-40.71	-28.74	-41.35	-16.39	-27.23	-33.84	-48.47	-32.44	-22.82	-23.95								
28-Jul-2012	06:00:00	-29.55	-40.65	-28.26	-40.92	-16.75	-27.15	-33.74	-48.48	-32.90	-23.14	-24.29								
28-Jul-2012	12:00:00	-29.54	-40.60	-27.96	-41.82	-17.35	-27.45	-33.68	-48.67	-33.14	-23.37	-25.00								
28-Jul-2012	18:00:00	-29.87	-40.78	-28.82	-42.46	-17.80	-27.26	-33.59	-48.62	-33.45	-23.88	-25.45								
28-Jul-2012	24:00:00	-29.70	-40.78	-29.15	-41.98	-17.96	-27.21	-34.28	-48.51	-33.43	-24.26	-25.72								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
29-Jul-2012	06:00:00	-29.60	-40.71	-28.50	-41.73	-18.40	-27.17	-33.68	-48.60	-33.28	-24.54	-26.26								
29-Jul-2012	12:00:00	-29.72	-40.72	-28.30	-42.59	-19.00	-27.22	-34.08	-48.61	-33.37	-24.87	-26.83								
29-Jul-2012	18:00:00	-29.78	-40.72	-29.11	-42.95	-19.34	-27.20	-33.76	-48.50	-33.46	-25.37	-27.17								
29-Jul-2012	24:00:00	-29.60	-40.63	-29.39	-42.27	-19.54	-26.99	-34.22	-48.35	-33.31	-25.71	-27.57								
30-Jul-2012	06:00:00	-29.48	-40.54	-28.72	-41.92	-19.98	-27.03	-33.58	-48.47	-33.23	-25.84	-28.00							0.27	
30-Jul-2012	12:00:00	-29.60	-40.58	-28.57	-42.83	-20.67	-27.08	-33.83	-48.61	-33.22	-26.19	-28.54								
30-Jul-2012	18:00:00	-29.75	-40.63	-29.52	-42.73	-21.21	-27.16	-33.49	-48.44	-33.28	-26.68	-28.84								
30-Jul-2012	24:00:00	-29.72	-40.63	-29.26	-42.23	-21.54	-27.00	-33.96	-48.49	-33.08	-26.92	-29.25						0.00		3.16
31-Jul-2012	06:00:00	-29.52	-40.50	-28.76	-41.97	-21.94	-27.08	-33.62	-48.50	-33.19	-27.09	-29.51							0.01	
31-Jul-2012	12:00:00	-29.63	-40.63	-28.54	-42.51	-22.53	-27.20	-33.85	-48.54	-33.20	-27.38	-29.93								
31-Jul-2012	18:00:00	-29.75	-40.70	-29.12	-43.21	-23.37	-27.16	-33.48	-48.53	-33.31	-27.64	-30.50								
31-Jul-2012	24:00:00	-29.73	-40.69	-29.76	-42.58	-24.00	-27.04	-33.80	-48.42	-33.22	-28.05	-30.73								
1-Aug-2012	06:00:00	-29.73	-40.65	-29.14	-42.30	-24.46	-27.23	-33.37	-48.53	-33.28	-28.19	-31.10								
1-Aug-2012	12:00:00	-29.75	-40.64	-28.99	-43.12	-25.38	-27.32	-33.68	-48.65	-33.34	-28.42	-31.63								
1-Aug-2012	18:00:00	-29.93	-40.76	-29.63	-43.66	-26.31	-27.22	-33.49	-48.50	-33.43	-28.76	-31.76								
1-Aug-2012	24:00:00	-29.77	-40.68	-30.07	-42.88	-26.84	-27.17	-34.02	-48.39	-33.37	-29.08	-31.61								
2-Aug-2012	06:00:00	-29.65	-40.66	-29.35	-42.60	-27.55	-27.10	-33.36	-48.53	-33.27	-29.14	-31.71								
2-Aug-2012	12:00:00	-29.69	-40.68	-28.99	-43.39	-28.24	-27.22	-33.83	-48.51	-33.29	-29.38	-31.77								
2-Aug-2012	18:00:00	-29.73	-40.70	-29.87	-43.63	-28.99	-27.24	-33.59	-48.55	-33.37	-29.73	-31.84								
2-Aug-2012	24:00:00	-29.69	-40.68	-29.93	-43.02	-29.44	-27.20	-34.12	-48.54	-33.22	-29.90	-31.78								
3-Aug-2012	06:00:00	-29.64	-40.62	-29.46	-42.88	-30.07	-27.18	-33.38	-48.45	-33.21	-30.09	-31.79								
3-Aug-2012	12:00:00	-29.67	-40.68	-29.27	-43.93	-30.24	-27.29	-33.47	-48.63	-33.33	-30.38	-31.93								
3-Aug-2012	18:00:00	-29.87	-40.72	-30.29	-44.34	-30.15	-27.15	-33.53	-48.59	-33.35	-30.84	-31.88								
3-Aug-2012	24:00:00	-29.73	-40.76	-30.65	-43.63	-30.13	-27.12	-34.02	-48.54	-33.38	-31.14	-31.82								
4-Aug-2012	06:00:00	-29.66	-40.63	-29.90	-43.33	-30.13	-27.14	-33.48	-48.55	-33.28	-31.30	-31.77								
4-Aug-2012	12:00:00	-29.55	-40.62	-29.62	-44.53	-30.28	-27.32	-33.90	-48.63	-33.31	-31.58	-31.89								
4-Aug-2012	18:00:00	-29.99	-40.87	-30.68	-44.73	-30.14	-27.12	-33.62	-48.51	-33.44	-31.97	-31.76								
4-Aug-2012	24:00:00	-29.69	-40.69	-30.96	-43.85	-30.08	-27.03	-34.09	-48.43	-33.25	-32.16	-31.71								
5-Aug-2012	06:00:00	-29.69	-40.57	-30.14	-43.59	-30.12	-27.16	-33.47	-48.55	-33.02	-32.20	-31.66							0.07	
5-Aug-2012	12:00:00	-29.78	-40.65	-29.84	-44.43	-30.24	-27.22	-33.73	-48.59	-33.11	-32.32	-31.85								
5-Aug-2012	18:00:00	-29.79	-40.76	-30.47	-44.68	-30.31	-27.28	-33.65	-48.65	-33.13	-32.40	-31.96								
5-Aug-2012	24:00:00	-29.83	-40.77	-30.70	-44.05	-30.15	-27.22	-33.71	-48.61	-33.23	-32.43	-31.90								
6-Aug-2012	06:00:00	-29.75	-40.75	-30.13	-43.44	-30.22	-27.12	-33.66	-48.51	-33.17	-32.30	-31.76								
6-Aug-2012	12:00:00	-29.73	-40.77	-29.69	-44.49	-30.27	-27.22	-33.78	-48.65	-33.08	-32.32	-31.87								
6-Aug-2012	18:00:00	-29.83	-40.84	-30.59	-44.50	-30.20	-27.15	-33.64	-48.60	-33.23	-32.42	-31.77								
6-Aug-2012	24:00:00	-29.75	-40.75	-28.43	-43.79	-30.18	-27.17	-34.13	-48.57	-33.11	-32.34	-31.79								
7-Aug-2012	06:00:00	-29.70	-40.76	-29.82	-43.30	-30.09	-27.15	-33.55	-48.45	-33.11	-32.36	-31.69							1.17	
7-Aug-2012	12:00:00	-29.57	-40.66	-29.33	-43.44	-30.28	-27.28	-33.88	-48.56	-33.05	-32.28	-31.91								
7-Aug-2012	18:00:00	-29.87	-40.76	-28.74	-12.47	5.09	-1.25	-33.58	-12.00	-33.21	-32.38	0.39								
7-Aug-2012	24:00:00	-26.58	-12.07	-5.51	-31.08	1.32	-5.31	-10.80	-8.12	0.31	1.30	-0.41								
8-Aug-2012	06:00:00	-13.85	-4.90	-9.13	-32.62	-2.00	-6.86	-2.84	-8.39	-0.57	-1.19	-0.86							0.12	
8-Aug-2012	12:00:00	-9.63	-5.84	-9.90	-33.90	-3.20	-6.46	-3.80	-8.91	-1.77	-1.70	-1.06								
8-Aug-2012	18:00:00	-7.03	-5.25	-10.28	-34.97	-3.97	-8.33	-3.76	-9.73	-2.49	-1.77	-1.70								
8-Aug-2012	24:00:00	-8.52	-7.06	-10.74	-34.61	-3.98	-7.07	-4.46	-10.49	-3.38	-2.09	-1.53								
9-Aug-2012	06:00:00	-7.38	-6.56	-10.98	-34.63	-4.30	-8.34	-4.61	-12.63	-3.77	-2.13	-1.95								
9-Aug-2012	12:00:00	-8.04	-7.53	-11.26	-35.81	-5.20	-9.84	-4.60	-22.49	-4.28	-2.26	-2.62								
9-Aug-2012	18:00:00	-9.53	-9.09	-12.07	-35.85	-5.76	-11.40	-4.94	-45.41	-4.93	-2.76	-3.40								
9-Aug-2012	24:00:00	-10.38	-11.17	-12.65	-35.01	-5.89	-12.28	-6.17	-48.59	-5.24	-3.14	-3.51								
10-Aug-2012	06:00:00	-9.75	-11.94	-12.80	-35.01	-6.12	-13.08	-6.67	-48.56	-5.49	-3.30	-3.86								
10-Aug-2012	12:00:00	-9.95	-13.20	-13.48	-35.15	-6.62	-14.16	-7.91	-48.63	-5.86	-3.54	-4.30								
10-Aug-2012	18:00:00	-10.51	-15.44	-14.30	-35.08	-7.11	-15.42	-8.47	-48.60	-6.05	-3.94	-4.96								
10-Aug-2012	24:00:00	-11.13	-18.98	-15.77	-34.66	-7.04	-16.19	-10.10	-48.57	-6.45	-4.62	-5.07								
11-Aug-2012	06:00:00	-11.04	-20.97	-17.00	-34.43	-7.10	-16.86	-10.50	-48.49	-6.63	-4.74	-5.29							0.33	
11-Aug-2012	12:00:00	-11.23	-22.84	-16.99	-35.52	-8.61	-17.94	-11.32	-48.61	-6.71	-4.97	-6.26								
11-Aug-2012	18:00:00	-12.41	-26.46	-18.37	-35.11	-8.95	-19.07	-12.08	-48.67	-7.15	-6.48	-7.24								
11-Aug-2012	24:00:00	-13.07	-30.88	-19.82	-34.35	-8.72	-19.60	-14.68	-48.54	-7.34	-7.50	-7.47								
12-Aug-2012	06:00:00	-12.74	-33.92	-19.46	-34.35	-8.85	-20.25	-15.08	-48.51	-7.31	-7.68	-7.69								
12-Aug-2012	12:00:00	-12.67	-36.54	-19.48	-35.27	-9.99	-21.20	-15.67	-48.67	-7.45	-7.97	-8.54								
12-Aug-2012	18:00:00	-13.68	-39.69	-20.56	-36.01	-11.00	-22.11	-16.22	-48.63	-7.97	-9.21	-10.18								
12-Aug-2012	24:00:00	-14.71	-40.74	-22.61	-34.93	-10.36	-22.70	-18.59	-48.42	-8.29	-11.00	-10.99								
13-Aug-2012	06:00:00	-14.31	-40.53	-22.90	-34.81	-10.33	-23.39	-19.19	-48.35	-8.24	-11.15	-11.53								
13-Aug-2012	12:00:00	-14.39	-40.50	-23.08	-36.29	-11.68	-24.69	-20.04	-48.79	-8.42	-11.55	-12.68								
13-Aug-2012	18:00:00	-15.80	-40.72	-24.07	-36.91	-12.18	-25.22	-20.72	-48.44	-9.33	-12.99	-13.39								
13-Aug-2012	24:00:00	-17.03	-40.56	-25.10	-35.95	-11.62	-25.92	-22.69	-48.48	-9.73	-14.27	-13.89								
14-Aug-2012	06:00:00	-16.57	-40.48	-25.38	-35.68	-11.79	-26.42	-23.21	-48.45	-9.75	-14.72	-14.63								
14-Aug-2012	12:00:00	-16.47	-40.47	-25.28	-37.15	-12.70	-27.28	-23.69	-48.60	-10.04	-15.09	-15.34								
14-Aug-2012	18:00:00	-17.89	-40.71	-26.15	-37.66	-13.53	-27.22	-24.22	-48.50	-11.07	-15.86	-16.06								
14-Aug-2012	24:00:00	-19.50	-40.63	-26.69	-37.14	-13.15	-27.32	-25.57	-48.57	-12.08	-16.55	-16.66								
15-Aug-2012	06:00:00	-19.35	-40.75	-26.34	-37.17	-12.99	-27.08	-26.00	-48.49	-12.59	-17.07	-17.17								
15-Aug-2012	12:00:00	-19.20	-40.59	-26.15	-38.70	-13.78	-27.24	-26.70	-48.61	-12.95	-17.13	-17.86								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
15-Aug-2012	18:00:00	-20.40	-40.63	-26.78	-39.47	-14.10	-27.22	-26.92	-48.63	-14.23	-17.61	-18.34								
15-Aug-2012	24:00:00	-21.07	-40.63	-26.89	-38.99	-14.46	-27.04	-28.06	-48.38	-15.19	-17.91	-18.63								
16-Aug-2012	06:00:00	-21.14	-40.42	-26.51	-39.06	-14.98	-27.12	-28.18	-48.41	-15.79	-17.81	-19.07								
16-Aug-2012	12:00:00	-21.43	-40.62	-26.58	-39.99	-15.86	-27.28	-28.99	-48.54	-16.41	-18.03	-19.67								
16-Aug-2012	18:00:00	-22.59	-40.72	-27.13	-40.96	-16.80	-27.30	-29.42	-48.55	-17.68	-18.48	-20.37								
16-Aug-2012	24:00:00	-24.17	-40.68	-27.35	-40.48	-16.96	-27.14	-30.41	-48.42	-19.31	-19.01	-20.62								
17-Aug-2012	06:00:00	-24.20	-40.63	-26.98	-40.17	-17.29	-27.11	-30.68	-48.48	-19.75	-19.20	-21.10							0.07	
17-Aug-2012	12:00:00	-24.30	-40.62	-26.78	-41.03	-17.80	-27.29	-31.67	-48.56	-20.14	-19.35	-21.64								
17-Aug-2012	18:00:00	-25.67	-40.72	-27.48	-41.79	-18.31	-27.34	-31.87	-48.54	-21.22	-19.83	-22.17								
17-Aug-2012	24:00:00	-27.19	-40.76	-27.60	-41.09	-18.40	-27.08	-32.96	-48.41	-22.64	-20.18	-22.59								
18-Aug-2012	06:00:00	-27.27	-40.47	-27.17	-40.75	-18.63	-27.10	-33.01	-48.44	-22.83	-20.33	-23.05							0.01	
18-Aug-2012	12:00:00	-27.56	-40.54	-27.06	-41.25	-19.20	-27.41	-33.85	-48.72	-23.24	-20.63	-23.63								
18-Aug-2012	18:00:00	-28.35	-40.77	-27.68	-42.05	-19.53	-27.22	-33.50	-48.57	-23.95	-21.12	-24.11								
18-Aug-2012	24:00:00	-29.41	-40.64	-27.82	-41.56	-19.57	-27.08	-34.07	-48.47	-25.11	-21.47	-24.34								
19-Aug-2012	06:00:00	-29.58	-40.52	-27.25	-41.38	-19.94	-27.03	-33.32	-48.41	-25.60	-21.62	-24.79							0.62	
19-Aug-2012	12:00:00	-29.73	-40.52	-27.20	-41.14	-15.66	-17.40	-33.60	-48.53	-25.90	-21.87	-21.01								
19-Aug-2012	18:00:00	-28.14	-40.65	-24.71	-40.62	-15.08	-17.54	-20.60	-48.47	-18.02	-15.30	-19.49								
19-Aug-2012	24:00:00	-23.85	-40.54	-26.15	-39.16	-8.62	-7.83	-14.77	-48.38	-17.47	-14.51	-4.94								
20-Aug-2012	06:00:00	-17.36	-40.58	-24.12	-37.68	-4.42	-5.13	-10.20	-48.49	-12.88	-11.07	-2.02							0.28	
20-Aug-2012	12:00:00	-17.84	-40.60	-24.14	-36.34	-4.15	-5.25	-12.95	-48.57	-10.96	-9.08	-2.05								
20-Aug-2012	18:00:00	-13.56	-40.68	-19.38	-36.07	-4.81	-7.59	-6.49	-48.51	-10.82	-5.19	-4.77								
20-Aug-2012	24:00:00	-15.99	-40.58	-21.46	-35.19	-4.89	-8.93	-10.98	-48.50	-12.34	-7.72	-6.16								
21-Aug-2012	06:00:00	-16.76	-40.66	-22.33	-34.77	-5.08	-10.10	-12.19	-48.53	-13.09	-8.26	-6.99								
21-Aug-2012	12:00:00	-17.35	-40.75	-23.23	-35.04	-5.91	-11.15	-13.68	-48.66	-13.87	-8.75	-7.94								
21-Aug-2012	18:00:00	-18.21	-40.81	-24.04	-35.31	-6.79	-12.42	-14.26	-48.67	-14.72	-9.60	-9.11								
21-Aug-2012	24:00:00	-19.34	-40.81	-25.04	-34.67	-6.57	-13.25	-16.73	-48.50	-16.04	-11.15	-9.91								
22-Aug-2012	06:00:00	-19.46	-40.69	-25.10	-34.68	-6.67	-14.16	-16.92	-48.51	-16.35	-11.16	-10.54							0.46	
22-Aug-2012	12:00:00	-19.71	-40.75	-25.30	-35.63	-8.10	-15.48	-17.63	-48.65	-16.83	-11.48	-11.36								
22-Aug-2012	18:00:00	-20.96	-40.77	-25.72	-35.83	-9.10	-16.84	-18.31	-48.61	-17.90	-12.51	-12.20								
22-Aug-2012	24:00:00	-22.35	-40.69	-26.39	-35.34	-8.48	-17.84	-20.54	-48.48	-19.17	-13.67	-12.82								
23-Aug-2012	06:00:00	-22.56	-40.62	-26.36	-35.35	-8.44	-18.75	-21.14	-48.56	-19.57	-14.22	-13.57								
23-Aug-2012	12:00:00	-22.82	-40.66	-26.39	-36.27	-10.12	-19.83	-21.78	-48.59	-20.06	-14.62	-14.42								
23-Aug-2012	18:00:00	-23.85	-40.76	-26.82	-36.70	-11.05	-20.88	-22.31	-48.71	-20.87	-15.10	-15.04								
23-Aug-2012	24:00:00	-25.33	-40.81	-27.07	-35.79	-10.62	-21.60	-23.84	-48.60	-22.11	-15.72	-15.56								
24-Aug-2012	06:00:00	-25.44	-40.81	-26.82	-35.87	-10.50	-22.29	-24.46	-48.51	-22.51	-16.12	-16.17							0.55	
24-Aug-2012	12:00:00	-25.58	-40.68	-26.64	-36.25	-10.80	-23.09	-24.97	-48.71	-22.89	-16.34	-16.72								
24-Aug-2012	18:00:00	-26.00	-40.78	-26.77	-36.57	-11.26	-23.74	-25.19	-48.57	-23.36	-16.68	-17.24								
24-Aug-2012	24:00:00	-26.34	-40.63	-26.77	-34.97	-2.62	-3.87	-25.81	-48.55	-23.78	-17.03	-0.27								
25-Aug-2012	06:00:00	-17.01	-40.68	-14.06	-34.02	-3.48	-5.27	-10.39	-48.48	-10.34	-1.14	-1.15							0.07	
25-Aug-2012	12:00:00	-10.50	-40.71	-13.97	-34.81	-4.39	-7.68	-5.62	-48.65	-9.83	-1.17	-2.71								
25-Aug-2012	18:00:00	-12.84	-40.77	-17.27	-34.80	-4.58	-9.34	-6.50	-48.44	-11.02	-1.64	-4.13								
25-Aug-2012	24:00:00	-14.72	-36.91	-20.74	-34.37	-4.68	-10.40	-9.28	-48.55	-11.73	-1.78	-5.05								
26-Aug-2012	06:00:00	-15.39	-30.90	-21.71	-34.32	-4.98	-11.21	-10.32	-48.56	-12.23	-1.97	-5.66								
26-Aug-2012	12:00:00	-15.93	-27.49	-22.48	-35.39	-6.45	-12.87	-11.12	-48.78	-12.67	-2.08	-6.73								
26-Aug-2012	18:00:00	-17.29	-29.35	-23.62	-36.49	-7.94	-14.66	-12.20	-48.68	-14.03	-2.67	-8.60								
26-Aug-2012	24:00:00	-18.83	-37.72	-24.88	-35.74	-7.06	-15.47	-16.00	-48.51	-15.56	-3.29	-9.44								
27-Aug-2012	06:00:00	-18.96	-40.57	-24.89	-35.52	-7.02	-16.23	-16.32	-48.43	-15.91	-3.29	-10.22								
27-Aug-2012	12:00:00	-19.19	-40.82	-24.88	-36.30	-8.97	-17.52	-16.80	-48.80	-16.47	-3.44	-11.06								
27-Aug-2012	18:00:00	-20.31	-41.01	-25.74	-36.24	-9.73	-18.60	-17.30	-48.67	-17.68	-4.56	-11.95								
27-Aug-2012	24:00:00	-21.56	-40.89	-26.18	-35.21	-8.83	-19.12	-20.02	-48.56	-19.01	-5.70	-12.69								
28-Aug-2012	06:00:00	-21.59	-40.75	-25.97	-35.05	-8.79	-19.90	-20.17	-48.67	-19.27	-5.75	-13.33							0.35	
28-Aug-2012	12:00:00	-21.80	-40.86	-26.03	-35.26	-9.55	-20.49	-20.94	-48.60	-19.72	-5.88	-13.90								
28-Aug-2012	18:00:00	-22.20	-40.86	-26.02	-35.07	-8.13	-20.92	-21.04	-48.59	-20.23	-6.64	-14.45								
28-Aug-2012	24:00:00	-22.63	-40.84	-26.06	-34.78	-7.88	-21.45	-22.10	-48.57	-20.15	-4.77	-14.81								
29-Aug-2012	06:00:00	-22.32	-40.90	-25.91	-34.77	-8.29	-21.90	-21.91	-48.56	-19.99	-4.76	-15.20								
29-Aug-2012	12:00:00	-22.45	-40.76	-25.94	-35.26	-9.64	-22.65	-22.24	-48.69	-20.37	-5.10	-15.74								
29-Aug-2012	18:00:00	-23.06	-40.84	-26.21	-35.65	-11.05	-23.30	-22.07	-48.66	-21.05	-6.59	-16.24								
29-Aug-2012	24:00:00	-24.03	-40.92	-26.47	-35.04	-10.58	-23.72	-23.36	-48.49	-21.87	-8.19	-16.57								
30-Aug-2012	06:00:00	-24.25	-40.71	-26.27	-34.92	-10.40	-24.28	-23.36	-48.60	-22.12	-8.21	-16.96								
30-Aug-2012	12:00:00	-24.49	-40.84	-26.16	-35.81	-11.47	-25.26	-24.32	-48.78	-22.48	-8.34	-17.72								
30-Aug-2012	18:00:00	-25.45	-40.99	-26.62	-36.55	-12.04	-25.86	-24.46	-48.60	-23.24	-9.53	-18.04								
30-Aug-2012	24:00:00	-26.42	-40.78	-26.76	-35.92	-11.95	-26.33	-25.45	-48.67	-24.19	-11.49	-18.38						0.00		4.10
31-Aug-2012	06:00:00	-26.77	-40.77	-26.51	-36.31	-11.98	-26.92	-25.79	-48.49	-24.62	-11.74	-18.92								
31-Aug-2012	12:00:00	-27.00	-40.83	-26.45	-37.83	-12.91	-27.44	-26.60	-48.77	-25.05	-12.10	-19.51								
31-Aug-2012	18:00:00	-27.69	-40.93	-27.06	-39.16	-13.38	-27.21	-26.58	-48.57	-25.88	-13.07	-19.84								
31-Aug-2012	24:00:00	-28.55	-40.86	-27.07	-38.76	-13.27	-27.15	-27.44	-48.51	-26.83	-14.13	-20.20								
1-Sep-2012	06:00:00	-28.79	-40.80	-26.72	-38.63	-13.66	-27.20	-27.68	-48.56	-27.15	-14.43	-20.62								
1-Sep-2012	12:00:00	-28.89	-40.68	-26.69	-39.97	-15.14	-27.38	-28.37	-48.73	-27.55	-14.68	-21.32								
1-Sep-2012	18:00:00	-29.72	-41.02	-27.37	-40.14	-16.08	-27.27	-28.68	-48.62	-28.36	-15.32	-21.64								
1-Sep-2012	24:00:00	-30.17	-40.99	-27.26	-39.70	-16.16	-27.15	-29.69	-48.56	-29.19	-15.94	-21.86								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Rainguage	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
2-Sep-2012	06:00:00	-29.96	-40.90	-26.93	-39.64	-16.23	-27.29	-29.63	-48.71	-29.32	-16.07	-22.33								
2-Sep-2012	12:00:00	-30.13	-40.93	-26.90	-40.43	-16.72	-27.39	-30.48	-48.79	-29.90	-16.47	-22.88								
2-Sep-2012	18:00:00	-30.26	-40.95	-27.53	-40.75	-16.84	-27.24	-30.46	-48.71	-30.50	-16.90	-23.23								
2-Sep-2012	24:00:00	-30.15	-40.82	-27.41	-40.37	-17.05	-27.11	-31.64	-48.56	-30.94	-17.16	-23.53								
3-Sep-2012	06:00:00	-30.01	-40.76	-27.12	-40.25	-17.26	-27.21	-31.37	-48.62	-31.24	-17.37	-23.98								
3-Sep-2012	12:00:00	-30.12	-40.90	-27.00	-40.95	-17.56	-27.34	-32.27	-48.69	-31.77	-17.62	-24.45								
3-Sep-2012	18:00:00	-30.23	-40.90	-27.53	-41.43	-17.78	-27.18	-32.40	-48.61	-32.37	-18.11	-24.67								
3-Sep-2012	24:00:00	-30.08	-40.76	-27.66	-41.25	-17.97	-27.09	-33.24	-48.60	-32.86	-18.35	-25.16								
4-Sep-2012	06:00:00	-30.11	-40.74	-27.38	-40.92	-18.16	-27.15	-33.34	-48.50	-33.20	-18.70	-25.41								
4-Sep-2012	12:00:00	-29.97	-40.63	-27.07	-41.79	-18.75	-27.33	-34.07	-48.73	-33.19	-18.84	-26.07								
4-Sep-2012	18:00:00	-30.21	-40.89	-27.67	-42.31	-18.90	-27.20	-33.97	-48.67	-33.44	-19.35	-26.45								
4-Sep-2012	24:00:00	-30.03	-40.70	-27.88	-42.06	-18.97	-27.12	-34.07	-48.51	-33.25	-19.60	-26.73								
5-Sep-2012	06:00:00	-30.00	-40.66	-27.43	-41.93	-19.28	-27.16	-33.72	-48.47	-33.05	-19.68	-27.08								
5-Sep-2012	12:00:00	-30.02	-40.66	-27.43	-42.64	-19.69	-27.27	-33.94	-48.63	-33.17	-19.94	-27.63								
5-Sep-2012	18:00:00	-30.14	-40.77	-27.88	-42.99	-20.08	-27.22	-33.71	-48.62	-33.32	-20.34	-28.18								
5-Sep-2012	24:00:00	-30.18	-40.83	-28.03	-42.66	-20.40	-27.20	-33.98	-48.59	-33.35	-20.66	-28.49								
6-Sep-2012	06:00:00	-30.09	-40.71	-27.80	-42.52	-20.79	-27.15	-33.82	-48.62	-33.20	-20.81	-28.88							0.24	
6-Sep-2012	12:00:00	-30.03	-40.65	-27.62	-42.99	-21.38	-27.32	-34.08	-48.69	-33.27	-21.10	-29.44								
6-Sep-2012	18:00:00	-30.20	-40.87	-28.04	-43.19	-21.60	-27.14	-33.68	-48.61	-33.49	-21.51	-29.69								
6-Sep-2012	24:00:00	-30.11	-40.72	-28.12	-42.66	-21.91	-26.99	-34.43	-48.49	-33.17	-21.53	-30.01								
7-Sep-2012	06:00:00	-30.05	-40.68	-27.82	-42.51	-22.24	-26.97	-33.50	-48.48	-33.21	-21.75	-30.32								
7-Sep-2012	12:00:00	-29.95	-40.60	-27.49	-42.78	-22.87	-26.98	-33.94	-48.55	-33.19	-21.96	-30.86								
7-Sep-2012	18:00:00	-30.13	-40.70	-27.68	-43.47	-23.38	-27.10	-33.36	-48.61	-33.20	-22.34	-31.45								
7-Sep-2012	24:00:00	-30.20	-40.84	-28.18	-42.89	-23.66	-27.04	-33.79	-48.53	-33.27	-22.56	-31.48								
8-Sep-2012	06:00:00	-30.03	-40.66	-27.73	-42.65	-24.14	-27.05	-33.49	-48.53	-33.13	-22.77	-31.69							0.15	
8-Sep-2012	12:00:00	-30.14	-40.77	-27.79	-43.14	-24.78	-27.08	-33.67	-48.68	-33.05	-22.92	-31.85								
8-Sep-2012	18:00:00	-30.19	-40.84	-27.98	-43.55	-25.29	-27.09	-33.46	-48.55	-33.20	-23.24	-31.73								
8-Sep-2012	24:00:00	-30.20	-40.76	-28.33	-43.17	-25.90	-27.02	-33.78	-48.59	-33.04	-23.36	-31.65								
9-Sep-2012	06:00:00	-30.06	-40.69	-27.97	-42.96	-26.40	-27.03	-33.37	-48.59	-33.02	-23.58	-31.73							0.11	
9-Sep-2012	12:00:00	-30.07	-40.64	-27.64	-43.50	-26.96	-26.98	-33.76	-48.53	-33.11	-23.78	-31.66								
9-Sep-2012	18:00:00	-30.14	-40.66	-28.01	-43.84	-27.38	-27.02	-33.42	-48.55	-33.07	-24.09	-31.70								
9-Sep-2012	24:00:00	-30.14	-40.66	-28.34	-43.39	-27.80	-26.91	-33.89	-48.55	-33.10	-24.40	-31.70								
10-Sep-2012	06:00:00	-30.09	-40.71	-28.08	-43.15	-28.26	-26.82	-33.42	-48.47	-33.04	-24.70	-31.75								
10-Sep-2012	12:00:00	-30.05	-40.63	-27.98	-44.01	-29.02	-27.03	-33.79	-48.73	-32.99	-24.87	-31.94								
10-Sep-2012	18:00:00	-30.29	-40.90	-28.50	-44.03	-29.47	-26.90	-33.49	-48.57	-33.33	-25.46	-31.70								
10-Sep-2012	24:00:00	-30.03	-40.72	-28.61	-43.59	-29.85	-26.85	-33.79	-48.43	-33.10	-25.62	-31.58								
11-Sep-2012	06:00:00	-30.05	-40.74	-28.26	-43.41	-29.80	-26.88	-33.38	-48.39	-32.95	-25.86	-31.53								
11-Sep-2012	12:00:00	-30.03	-40.60	-28.08	-44.32	-30.09	-26.99	-33.79	-48.68	-32.99	-26.07	-31.79								
11-Sep-2012	18:00:00	-30.23	-40.87	-28.70	-44.41	-30.02	-26.96	-33.58	-48.56	-33.02	-26.61	-31.76								
11-Sep-2012	24:00:00	-30.25	-40.84	-28.91	-43.84	-29.83	-26.78	-33.85	-48.38	-33.07	-26.87	-31.55								
12-Sep-2012	06:00:00	-30.06	-40.46	-28.38	-43.61	-29.94	-26.86	-33.42	-48.41	-32.86	-26.98	-31.61								
12-Sep-2012	12:00:00	-29.93	-40.50	-28.30	-44.50	-30.15	-27.15	-33.67	-48.62	-32.77	-27.14	-31.90								
12-Sep-2012	18:00:00	-30.23	-40.74	-28.88	-44.63	-29.92	-26.98	-33.48	-48.59	-33.08	-27.70	-31.75								
12-Sep-2012	24:00:00	-30.13	-40.63	-29.04	-44.09	-29.97	-26.87	-33.80	-48.48	-32.91	-27.78	-31.58								
13-Sep-2012	06:00:00	-30.03	-40.54	-28.63	-43.83	-29.98	-26.91	-33.40	-48.56	-32.80	-27.96	-31.69								
13-Sep-2012	12:00:00	-30.09	-40.57	-28.54	-44.63	-30.13	-27.03	-33.77	-48.74	-32.85	-28.22	-31.76								
13-Sep-2012	18:00:00	-30.18	-40.77	-29.08	-44.83	-30.09	-27.05	-33.35	-48.65	-32.98	-28.56	-31.82								
13-Sep-2012	24:00:00	-30.14	-40.75	-29.35	-44.17	-29.98	-26.96	-33.80	-48.47	-32.98	-28.82	-31.63								
14-Sep-2012	06:00:00	-30.03	-40.69	-28.87	-43.95	-30.02	-26.93	-33.46	-48.50	-32.92	-28.88	-31.65								
14-Sep-2012	12:00:00	-30.08	-40.63	-28.72	-44.70	-30.26	-27.17	-33.66	-48.78	-32.96	-29.03	-31.90								
14-Sep-2012	18:00:00	-30.27	-40.75	-29.12	-44.83	-29.98	-26.94	-33.59	-48.56	-33.20	-29.43	-31.75								
14-Sep-2012	24:00:00	-30.07	-40.63	-29.33	-44.35	-30.06	-26.99	-33.71	-48.48	-32.98	-29.51	-31.69								
15-Sep-2012	06:00:00	-30.02	-40.63	-29.03	-44.14	-30.15	-27.03	-33.38	-48.57	-33.02	-29.69	-31.72								
15-Sep-2012	12:00:00	-30.06	-40.62	-28.81	-44.79	-30.15	-27.04	-33.74	-48.61	-33.03	-29.86	-31.78								
15-Sep-2012	18:00:00	-30.21	-40.76	-29.16	-44.94	-30.01	-27.00	-33.43	-48.57	-33.09	-30.23	-31.77								
15-Sep-2012	24:00:00	-30.19	-40.70	-29.51	-44.53	-30.03	-26.99	-33.83	-48.49	-32.97	-30.27	-31.78								
16-Sep-2012	06:00:00	-30.12	-40.63	-29.11	-44.31	-30.02	-27.02	-33.59	-48.48	-32.96	-30.48	-31.81								
16-Sep-2012	12:00:00	-30.20	-40.57	-29.02	-44.86	-30.10	-27.15	-33.86	-48.63	-33.03	-30.60	-31.81								
16-Sep-2012	18:00:00	-30.24	-40.74	-29.30	-44.67	-30.02	-26.94	-33.48	-48.47	-33.16	-30.92	-31.79								
16-Sep-2012	24:00:00	-29.95	-40.60	-29.40	-44.45	-30.07	-26.98	-33.88	-48.44	-33.01	-31.00	-31.78								
17-Sep-2012	06:00:00	-30.07	-40.51	-29.10	-44.20	-30.02	-27.08	-33.41	-48.47	-32.96	-31.20	-31.63								
17-Sep-2012	12:00:00	-30.05	-40.64	-28.93	-44.55	-30.16	-27.33	-33.77	-48.72	-33.01	-31.37	-31.99								
17-Sep-2012	18:00:00	-30.21	-40.92	-29.03	-44.99	-30.12	-27.09	-33.66	-48.57	-33.19	-31.72	-31.82								
17-Sep-2012	24:00:00	-30.17	-40.75	-29.41	-44.29	-29.96	-26.94	-33.88	-48.45	-33.07	-31.76	-31.69								
18-Sep-2012	06:00:00	-30.02	-40.65	-29.02	-44.23	-30.12	-26.99	-33.29	-48.43	-32.96	-31.76	-31.73								
18-Sep-2012	12:00:00	-30.09	-40.65	-28.88	-44.46	-30.08	-27.04	-33.71	-48.51	-32.93	-31.96	-31.79								
18-Sep-2012	18:00:00	-30.05	-40.72	-28.94	-44.09	-14.06	-20.37	-33.60	-42.39	-32.86	-32.08	-13.03								
18-Sep-2012	24:00:00	-30.05	-40.66	-25.43	-43.83	-12.79	-22.02	-26.46	-48.47	-31.16	-2.08	-14.71								
19-Sep-2012	06:00:00	-30.13	-40.71	-26.06	-43.57	-12.52	-23.44	-27.20	-48.30	-31.54	-3.40	-15.74								
19-Sep-2012	12:00:00	-29.96	-40.66	-26.38	-43.96	-13.32	-25.16	-27.89	-48.53	-32.24	-4.77	-16.93								

																			Weather Station Rainfall Data	
Date	Time	Water Level (inches)														On-site Manual Raingauge	On-site Auto Raingauge	On-site Auto RG Monthly Totals	Dunn Daily Rainfall	Dunn Monthly Rainfall
dd-mmm-yyyy	hh:mm:ss	BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3					
19-Sep-2012	18:00:00	-30.13	-40.75	-27.07	-44.15	-14.46	-26.45	-28.63	-48.53	-33.19	-6.64	-17.68								
19-Sep-2012	24:00:00	-30.13	-40.72	-27.65	-43.77	-15.00	-27.10	-29.81	-48.37	-33.16	-8.48	-18.33								
20-Sep-2012	06:00:00	-30.06	-40.58	-27.65	-43.62	-15.76	-27.00	-30.25	-48.47	-33.01	-9.32	-19.19								
20-Sep-2012	12:00:00																			
20-Sep-2012	18:00:00																			
20-Sep-2012	24:00:00																			
21-Sep-2012	06:00:00																			
21-Sep-2012	12:00:00																			
21-Sep-2012	18:00:00																			
21-Sep-2012	24:00:00																			
22-Sep-2012	06:00:00																			
22-Sep-2012	12:00:00																			
22-Sep-2012	18:00:00																			
22-Sep-2012	24:00:00																			
23-Sep-2012	06:00:00																			
23-Sep-2012	12:00:00																			
23-Sep-2012	18:00:00																			
23-Sep-2012	24:00:00																			
24-Sep-2012	06:00:00																			
24-Sep-2012	12:00:00																			
24-Sep-2012	18:00:00																			
24-Sep-2012	24:00:00																			
25-Sep-2012	06:00:00																			
25-Sep-2012	12:00:00																			
25-Sep-2012	18:00:00																			
25-Sep-2012	24:00:00																			
26-Sep-2012	06:00:00																			
26-Sep-2012	12:00:00																			
26-Sep-2012	18:00:00																			
26-Sep-2012	24:00:00																			
27-Sep-2012	06:00:00																			
27-Sep-2012	12:00:00																			
27-Sep-2012	18:00:00																			
27-Sep-2012	24:00:00																			
28-Sep-2012	06:00:00																			
28-Sep-2012	12:00:00																			
28-Sep-2012	18:00:00																			
28-Sep-2012	24:00:00																			
29-Sep-2012	06:00:00																			
29-Sep-2012	12:00:00																			
29-Sep-2012	18:00:00																			
29-Sep-2012	24:00:00																	0.00		0.50
30-Sep-2012	06:00:00																			
30-Sep-2012	12:00:00																			
30-Sep-2012	18:00:00																			
30-Sep-2012	24:00:00																			
1-Oct-2012	06:00:00																			
1-Oct-2012	12:00:00																			
1-Oct-2012	18:00:00																			
1-Oct-2012	24:00:00																			
2-Oct-2012	06:00:00																			
2-Oct-2012	12:00:00																			
2-Oct-2012	18:00:00																			
2-Oct-2012	24:00:00																			
3-Oct-2012	06:00:00																			
3-Oct-2012	12:00:00																			
3-Oct-2012	18:00:00																			
3-Oct-2012	24:00:00																			
4-Oct-2012	06:00:00																			
4-Oct-2012	12:00:00																			
4-Oct-2012	18:00:00																			
4-Oct-2012	24:00:00																			
5-Oct-2012	06:00:00																			
5-Oct-2012	12:00:00																			
5-Oct-2012	18:00:00																			
5-Oct-2012	24:00:00																			
6-Oct-2012	06:00:00																			
6-Oct-2012	12:00:00																			
6-Oct-2012	18:00:00																			
6-Oct-2012	24:00:00																			

APPENDIX D

2012 Site Photos

SOA1 – Sparse vegetation on left and right banks at Sta. 153+00 – 153+30 (UT1-A)

SOA2 – Easement fencing is loose at Sta. 118+90 (UT1-B)

SOA2 – Easement fencing is loose at Sta. 119+50 (UT1-B)

SOA3 – Sparse vegetation on left and right banks at Sta. 304+30 – 304+50 (UT3)

Log Cross Vane (typical)

Pool (typical)

Riffle (typical)

Log weir (typical)

Log Sill (typical)

Rock cross vane (typical)

Vegetation Plot #1

Vegetation Plot #2

Vegetation Plot #3

Vegetation Plot #4

Vegetation Plot #5

Vegetation Plot #6

Vegetation Plot #7

Vegetation Plot #8

Vegetation Plot #9

Vegetation Plot #10

Vegetation Plot #11

Vegetation Plot #12

Vegetation Plot #13

Vegetation Plot #14

APPENDIX E

2012 Morphologic Monitoring Parameters

Parameter	Cross Section 1 Pool						Cross Section 2 Riffle						Cross Section 3 Pool						Cross Section 4 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	28.4	26.4	25.0	22.3	23.0	24.0	25.3	24.4	22.8	26.2	29.1	28.4	26.6	21.8	20.8	27.5	22.5	22.3	22.8	22.8	24.8	22.1	14.3	24.3
BF Cross Sectional Area (ft^2)	31.7	26.4	23.4	20.7	20.3	21.6	18.1	16.2	11.4	16.8	18.7	16.8	22.8	19.2	19.0	19.2	16.8	17.6	11.7	11.6	12.9	13.2	6.3	8.7
BF Mean Depth (ft)	1.1	1.0	0.9	0.9	0.9	0.9	0.7	0.7	0.5	0.6	0.6	0.6	0.9	0.9	0.9	0.7	0.7	0.8	0.5	0.5	0.5	0.6	0.4	0.4
BF Max Depth (ft)	2.6	2.5	2.4	2.0	2.0	1.8	1.4	1.3	1.1	1.3	1.3	1.4	2.2	2.0	2.1	1.9	1.8	1.7	1.4	1.3	1.4	1.3	1.1	1.3
Width/Depth Ratio	25.5	26.2	26.8	24.0	26.1	26.6	35.2	36.6	45.9	40.8	45.3	47.8	31.0	24.7	22.7	39.3	30.1	28.2	44.4	44.8	47.7	37.1	32.6	68.1
Parameter	Cross Section 5 Riffle						Cross Section 6 Pool						Cross Section 7 Pool						Cross Section 8 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	7.6	7.5	8.7	10.0	9.0	9.9	9.0	9.2	9.7	11.2	8.6	10.7	7.9	9.8	9.4	10.7	10.2	11.0	6.9	7.3	7.7	8.7	8.3	6.4
BF Cross Sectional Area (ft^2)	5.0	5.0	4.7	5.1	3.4	4.9	8.4	8.7	6.9	7.4	5.4	4.8	8.7	10.7	10.6	15.4	8.7	9.6	4.4	4.7	4.8	5.2	4.7	3.8
BF Mean Depth (ft)	0.7	0.7	0.5	0.5	0.4	0.5	0.9	0.9	0.7	0.7	0.6	0.4	1.1	1.1	1.1	1.4	0.8	0.9	0.6	0.6	0.6	0.6	0.6	0.6
BF Max Depth (ft)	1.2	1.4	1.4	1.2	0.9	1.1	1.7	2.0	1.6	1.7	1.0	1.0	2.0	2.2	2.3	2.1	1.6	1.7	1.2	1.4	1.2	1.4	1.1	1.3
Width/Depth Ratio	11.4	11.1	16.3	19.6	24.3	19.9	9.5	9.8	13.6	16.9	13.8	24.0	7.2	9.0	8.3	7.5	12.0	12.6	10.7	11.3	12.4	14.7	14.8	10.7
Parameter	Cross Section 9 Pool						Cross Section 10 Riffle						Cross Section 11 Riffle						Cross Section 12 Pool					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	18.5	19.7	19.9	18.4	18.7	21.1	16.4	15.1	16.1	16.9	16.8	17.8	9.8	11.8	11.5	12.4	12.2	11.0	19.5	19.8	18.8	20.5	19.6	21.6
BF Cross Sectional Area (ft^2)	29.3	25.9	25.0	24.0	24.4	24.8	18.4	16.5	15.8	15.1	15.5	14.8	6.8	9.0	8.7	8.3	8.1	6.9	22.2	20.4	18.5	21.2	16.9	19.6
BF Mean Depth (ft)	1.6	1.3	1.3	1.0	1.3	1.2	1.1	1.1	1.0	0.8	0.9	0.8	0.7	0.8	0.8	0.7	0.7	0.6	1.1	1.0	1.0	1.1	0.9	0.9
BF Max Depth (ft)	3.8	3.1	3.0	3.0	2.8	2.7	2.5	2.1	2.1	2.3	2.0	2.0	1.3	1.5	1.5	1.3	1.3	1.3	2.7	2.6	2.5	2.5	2.0	2.1
Width/Depth Ratio	11.8	14.9	15.8	14.1	14.4	18.0	14.6	13.7	16.3	18.8	18.3	21.5	14.0	15.4	15.1	18.4	18.5	17.6	17.2	19.2	19.7	19.7	22.7	23.9
Parameter	Cross Section 13 Pool						Cross Section 14 Riffle						Cross Section 15 Pool						Cross Section 16 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	18.3	19.4	19.5	18.2	17.3	15.3	9.0	9.2	9.9	8.9	9.6	9.0	19.7	24.2	24.3	24.6	24.5	23.8	9.9	9.0	9.1	11.2	9.3	8.5
BF Cross Sectional Area (ft^2)	15.8	15.3	16.3	15.2	10.0	9.7	5.4	4.8	5.2	4.8	4.5	4.2	18.8	23.0	22.2	23.7	19.5	20.1	5.8	4.6	4.4	4.5	5.0	4.4
BF Mean Depth (ft)	0.9	0.8	0.8	0.8	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	1.0	1.0	0.9	1.0	0.8	0.8	0.6	0.5	0.5	0.4	0.5	0.5
BF Max Depth (ft)	2.3	2.0	2.1	1.9	1.4	1.5	1.2	1.0	1.0	1.0	1.0	1.0	2.2	2.4	2.3	2.0	1.9	1.8	1.1	0.9	0.9	0.9	1.0	1.0
Width/Depth Ratio	21.3	24.6	23.2	21.8	29.9	24.2	15.1	17.4	18.7	16.5	20.4	19.3	20.7	25.4	26.5	25.6	30.8	28.2	16.9	17.5	18.8	28.1	17.6	16.5

Parameter	Cross Section 17 Pool						Cross Section 18 Riffle						Cross Section 19 Pool						Cross Section 20 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	30.6	30.7	31.3	31.4	24.3	23.4	7.6	7.4	7.1	9.1	8.4	7.5	19.2	18.5	20.5	19.5	18.6	19.5	10.5	10.4	10.4	10.7	10.5	12.1
BF Cross Sectional Area (ft^2)	46.3	45.8	44.6	43.5	33.6	32.2	9.6	7.5	7.9	8.5	8.2	7.4	28.2	28.9	27.4	28.2	24.8	24.2	9.5	9.1	8.9	9.2	8.4	9.7
BF Mean Depth (ft)	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.0	1.1	0.9	1.0	1.0	1.5	1.6	1.3	1.4	1.3	1.2	0.9	0.9	0.9	0.9	0.8	0.8
BF Max Depth (ft)	3.7	3.7	3.5	3.3	2.8	2.8	1.9	1.7	1.8	1.8	1.7	1.7	3.3	3.2	3.1	3.1	2.6	2.5	1.7	1.6	1.6	1.7	1.5	1.7
Width/Depth Ratio	19.7	20.6	22.0	22.6	17.6	17.0	6.1	7.3	6.5	9.8	8.6	7.5	13.1	11.8	15.3	13.5	13.9	15.6	11.6	11.9	12.1	12.4	13.1	15.0

APPENDIX F

Beaverdam Mitigation Project
Closeout Report

Beaverdam Mitigation Project

DENR-EEP Contract No. D06029-B

Closeout Report

Project Setting and Classifications

County	Harnett
General Location	Erwin, NC
Basin	Cape Fear
Physiographic Region	Coastal Plain
Ecoregion	Southeastern Plains
USGS Hydro Unit	03030004-110020
NCDWQ Sub-basin	03-06-14
Wetland Classification	Riparian
Thermal Regime	Warm
Trout Water	No

Project Performers

Source Agency	NC EEP
Provider	EBX-Neuse 1, LLC
Designer	Kimley-Horn and Associates
Monitoring Firm	WK Dickson & Co., Inc.

Overall Project Activities and Timeline

Month	**Activity**
February 2008	Construction Completed
February 2008	Planting Completed
February 2008	Post Construction Monitoring Gauges Installed
May 2008	As-Built Report Submitted
November 2008	1st Annual Monitoring Report
Late 2008	Cattle accessed and damaged vegetation plots
Early 2009	Supplemental Planting and Fence Repaired
November 2009	2nd Annual Monitoring Report
October 2010	3rd Annual Monitoring Report
November 2011	4th Annual Monitoring Report
November 2012	5th Annual Monitoring Report

Project Setting and Background Summary

This stream and wetland mitigation project was developed to provide stream and wetland mitigation units for the NC EEP full delivery process. Previous stream conditions demonstrated significant degradation as a result of livestock access. Livestock access resulted in the direct input of nutrients and biochemical oxygen demand into the streams and wetlands. Hoof-shear created bank instability resulting in heavy sedimentation. Water quality was also diminished due to increased turbidity from bank erosion and elevated water temperatures caused by a lack of vegetative shading. Habitat was reduced by the diminished water quality and continued loss of physical habitat such as bed features, woody debris, and a well-developed vegetation community. Migrating head cuts incised the channels and drained wetlands. The project is located in a relict floodplain terrace. Restoration of the stream included establishment of stable cross-sectional geometry, restoration of planform sinuosity, preventing livestock access, and increased streambed diversity. The site required supplemental planting in year 2 to meet vegetative success criteria.

Goals and Objectives

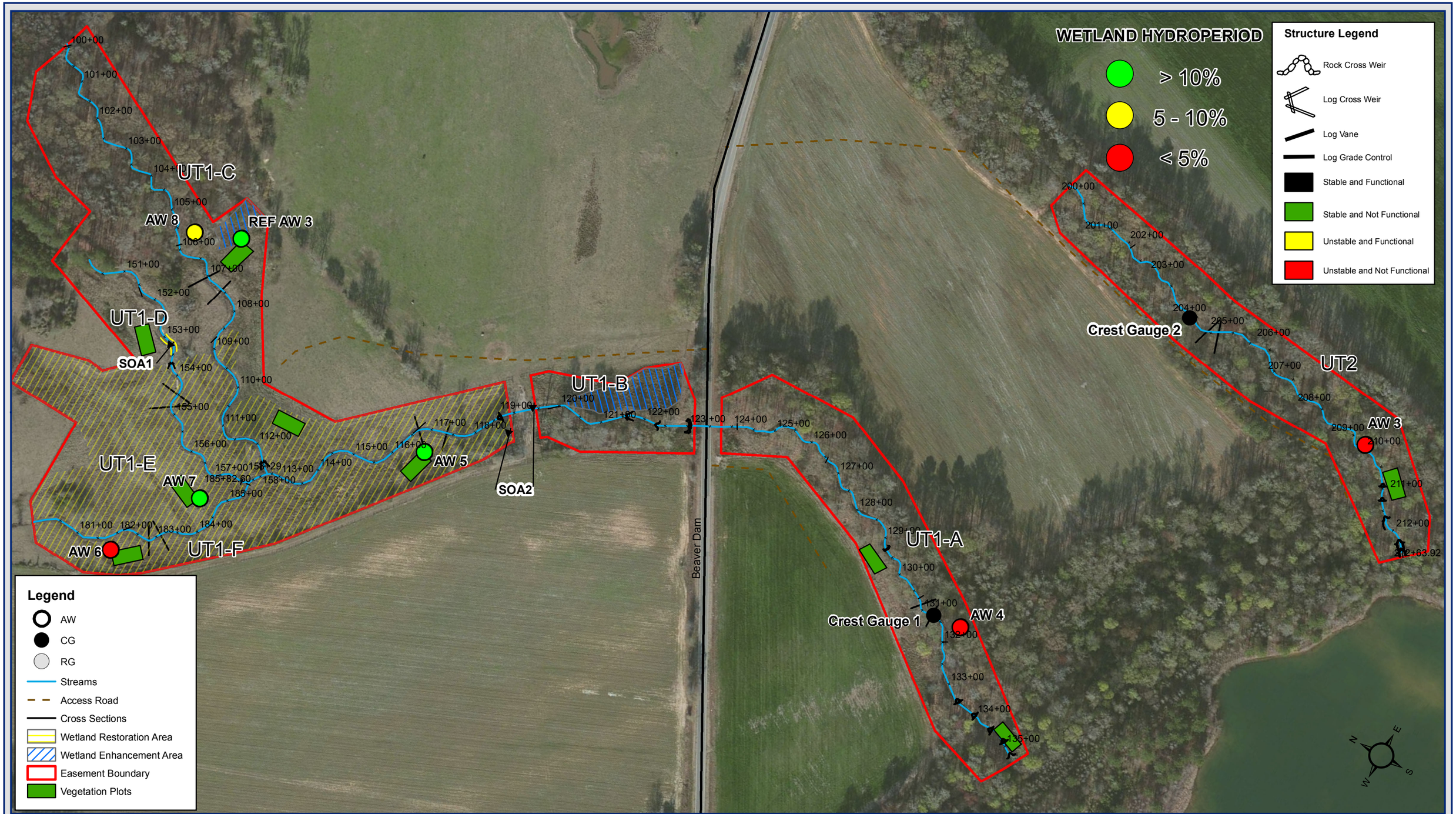
- Produce a minimum of 10,200 stream mitigation units (SMU) and 9 riverine wetland mitigation units (WMU) for the NCEEP.
- Improve riparian and aquatic habitats and water quality through ecological restoration practices.

Success Criteria

Wetland Hydrology	Restoration of the water table to within 12 inches of the soil surface for at least 10% of the growing season continuously (approximately 24 days).
	During periods of low rainfall, the restoration gauge hydroperiod must exceed that of the reference gauge, provided the gauges both exceed 5% of the growing season, to be deemed successful.
Stream and Wetland Vegetation	Survival of at least 320 planted stems per acre after the year three monitoring period
	Survival of at least 260 planted stems per acre after the year five monitoring period
	A maximum of 20 percent of the site species composition may be comprised of non-invasive volunteers
	A photo log will be maintained over the monitoring period and must demonstrate maturation of planted vegetation and volunteer hydrophytic species
Stream	Bankfull events: a minimum of two bankfull events must be documented within the five-year monitoring period
	Cross-Sections: There should be little change in as-built cross sections. Cross sections shall be classified using the Rosgen stream classification method and all monitored cross-sections should fall within the quantitative parameters defined for "E" or "C" type channels.
	The longitudinal profiles should show that the bedform features are remaining stable. Bedforms observed should be consistent with those observed in "E" and "C" type channels.
	Photographs will be used to evaluate stream characteristics
	Sampling of benthic macroinvertebrates within the restored stream channel shall be conducted in the first three years of post-restoration monitoring.

Restoration Reach	Mitigation Approach	As-Built Linear Footage (Streams)	As-Built Acreage (Wetlands)	Mitigation Ratio	Stream Mitigation Units (SMU)	Wetland Mitigation Units (WMU)
STREAM						
UT1-A/B/C	Restoration	3,403		1:1	3,403	
UT1-D	Restoration	829		1:1	829	
UT1-E (Valley)	Restoration	556		1:1	556	
UT1-F	Restoration	583		1:1	583	
UT2	Restoration	1,264		1:1	1,264	
UT3-A/B	Restoration	3,479		1:1	3,479	
UT3-C	Enhancement	292		2.5:1	117	
WETLAND						
WR-A	Riverine Wetland Restoration		3.70	1:1		3.70
WR-B	Riverine Wetland Restoration		6.20	1:1		6.20
WE-A	Riverine Wetland Enhancement		0.80	2:1		0.40
WE-B	Riverine Wetland Enhancement		0.70	2:1		0.35
WE-C	Riverine Wetland Enhancement		0.14	2:1		0.07
WE-D	Riverine Wetland Enhancement		0.40	2:1		0.20
WR-A	Riverine Wetland Enhancement		3.70	2:1		3.70
Total		**10,406**	**11.94**		**10,231**	**10.92**

Mitigation Unit Type	Mitigation Unit Total
Stream Mitigation Units (SMU)	10,231
Wetland Mitigation Units (WMU)	10.92


WETLAND HYDROPERIOD
> 10%
5 - 10%
< 5%
Structure Legend
Rock Cross Weir
Log Cross Weir
Log Vane
Log Grade Control
Stable and Functional
Stable and Not Functional
Unstable and Functional
Unstable and Not Functional
UT1-C
UT1-D
UT1-E
UT1-F
UT1-B
UT1-A
UT2
AW 8
REF AW 3
SOA1
AW 5
AW 7
AW 6
SOA2
Crest Gauge 2
AW 3
Crest Gauge 1
AW 4
Beaver Dam
Legend
AW
CG
RG
Streams
Access Road
Cross Sections
Wetland Restoration Area
Wetland Enhancement Area
Easement Boundary
Vegetation Plots
Feet
0 100 200 400
1 inch = 200 feet
Beaverdam Mitigation Project
2012 Stream Current Conditions Map - A
EBX
WK DICKSON
WATERSHED SCIENCES

EBX

0 100 200 400 Feet

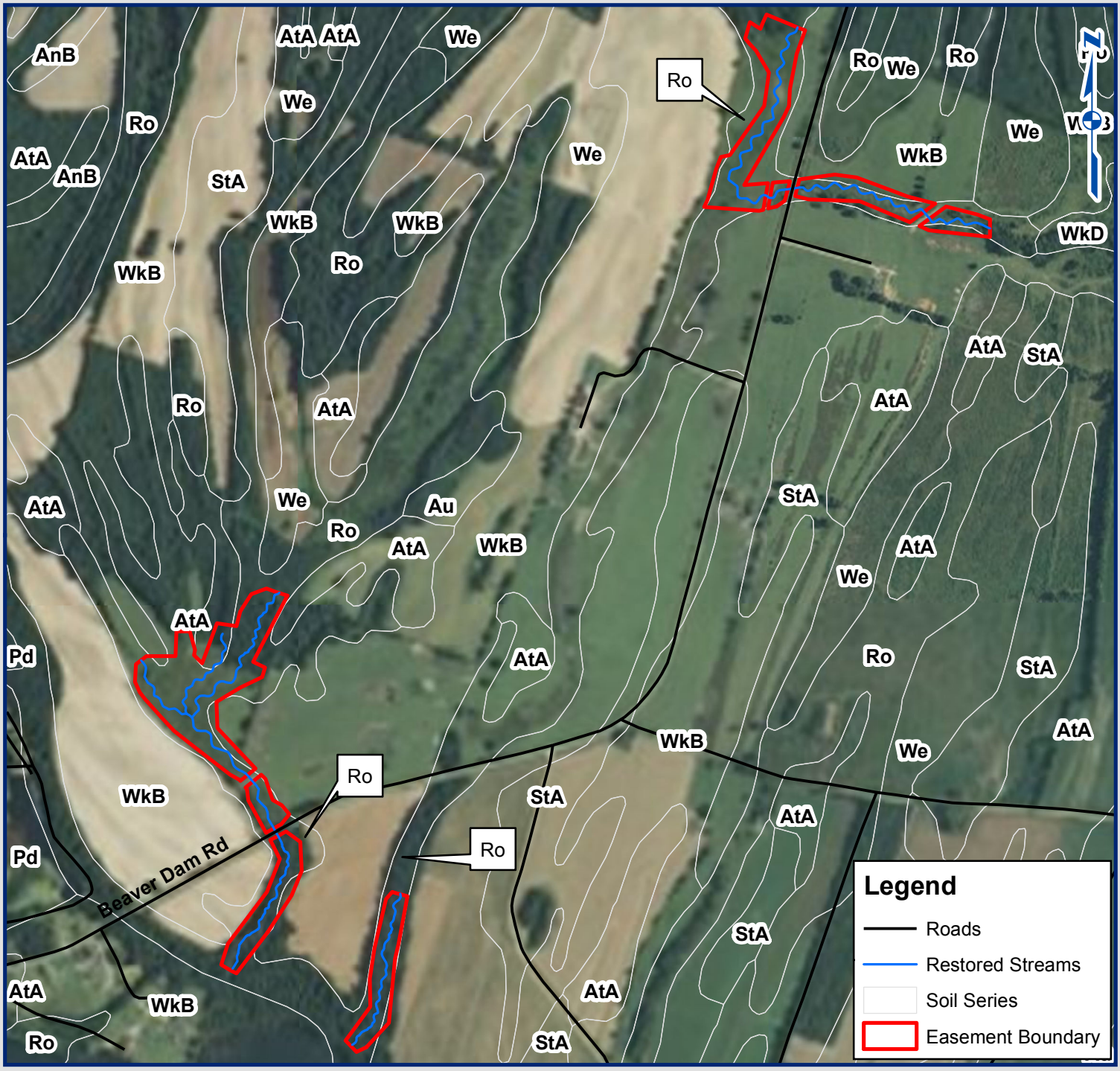
1 inch = 200 feet

Beaverdam Mitigation Project
2012 Stream Current Conditions Map - B

WK DICKSON
WATERSHED SCIENCES

Stream Observation Areas

SOA	Feature	STA	Description
SOA1	Left/Right Banks	UT1-A 153+00 - 153+30	Sparse vegetation on left and right banks, Remedial actions are underway to correct sparsely vegetated areas.
SOA2	Left/Right Bank Fencing	UT1-B 118+90- 119+51	Easement fencing is loose at stream crossing allowing limited cattle access, *Easement fencing has been repaired.
SOA3	Left/Right Banks	UT3 304+30 - 304+50	Sparse vegetation on left and right banks, Remedial actions are underway to correct sparsely vegetated areas.



SOIL SERIES LEGEND

Non-Hydric Soils

AnB	Alpin sand, 0 to 6% slopes
DyF	Dysstrochrepts, steep
MaA	Marlboro sandy loam, 0 to 2% slopes
MaB	Marlboro sandy loam, 2 to 6% slopes
Pd	Pits-Dumps complex
StA	State fine sandy loam, 0 to 3% slopes, rarely flooded

Hydric Soils

AtA	Altavista fine sandy loam, 0-3 percent slopes, rarely flooded
Au	Augusta fine sandy loam, rarely flooded
Ch	Chewacla and Congaree loams, frequently flooded
GoA	Goldsboro loamy sand, 0-2 percent slopes
Ro	Roanoke loam, occasionally flooded
We	Wahee fine sandy loam, occasionally flooded
WkB	Wickham fine sandy loam, 0-6 percent slopes, rarely flooded
WkD	Wickham fine sandy loam, 6-15 percent slopes, rarely flooded

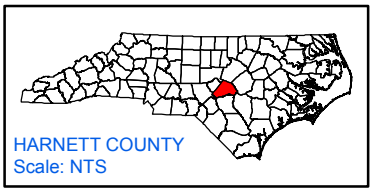
EBX

SOURCE: 2010 Bing Aerial Photography

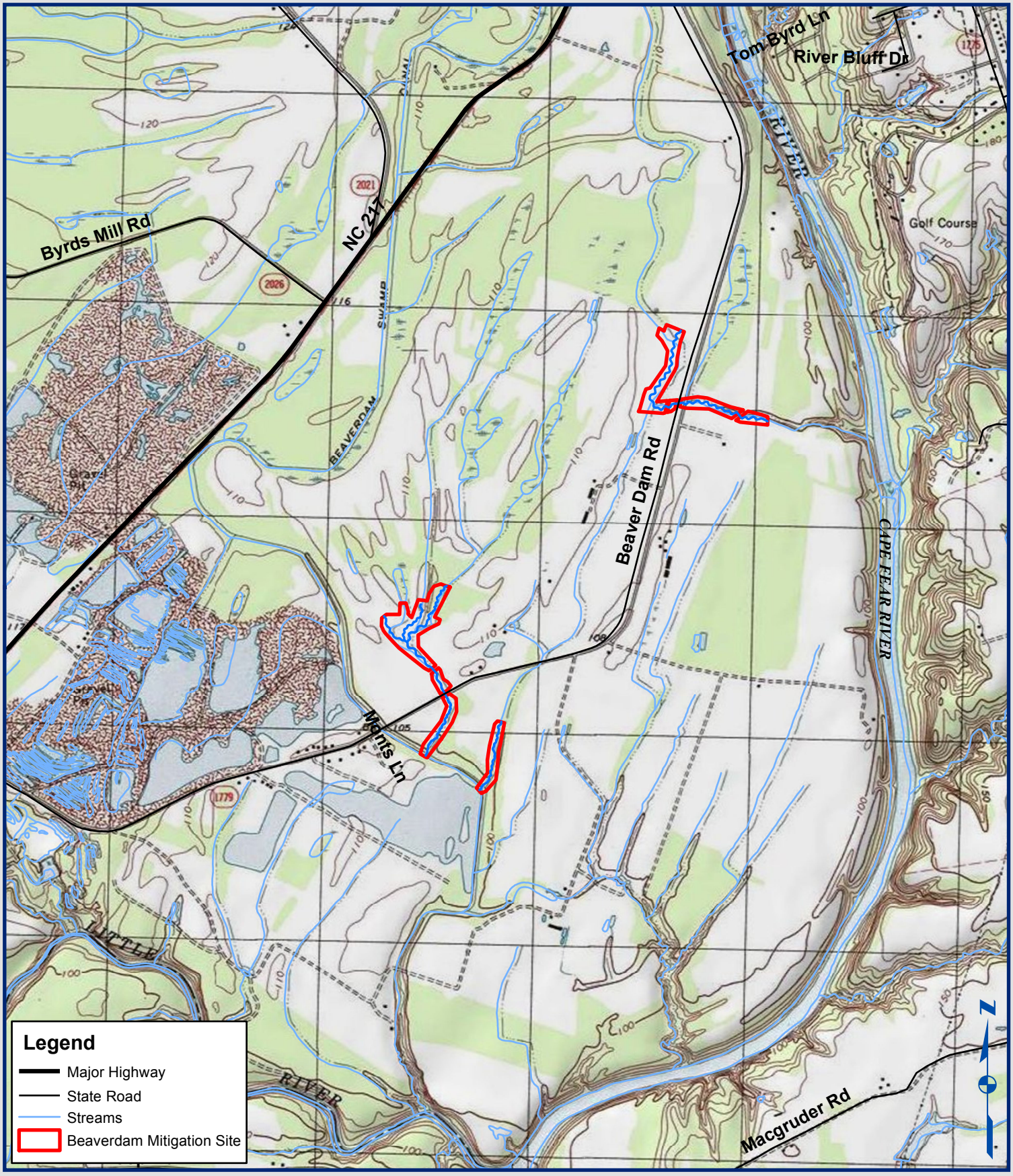
Beaverdam Creek Mitigation Site
Soils Map

0 500 1,000 2,000 Feet

1 inch = 1,000 feet



HARNETT COUNTY
Scale: NTS

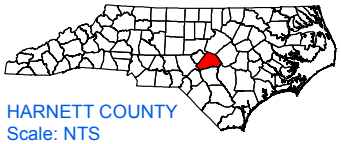


EBX

SOURCE: USGS,
Erwin, NC Quadrangle, 1973

Beaverdam Creek Mitigation Site
USGS Map

0 1,000 2,000 4,000 Feet



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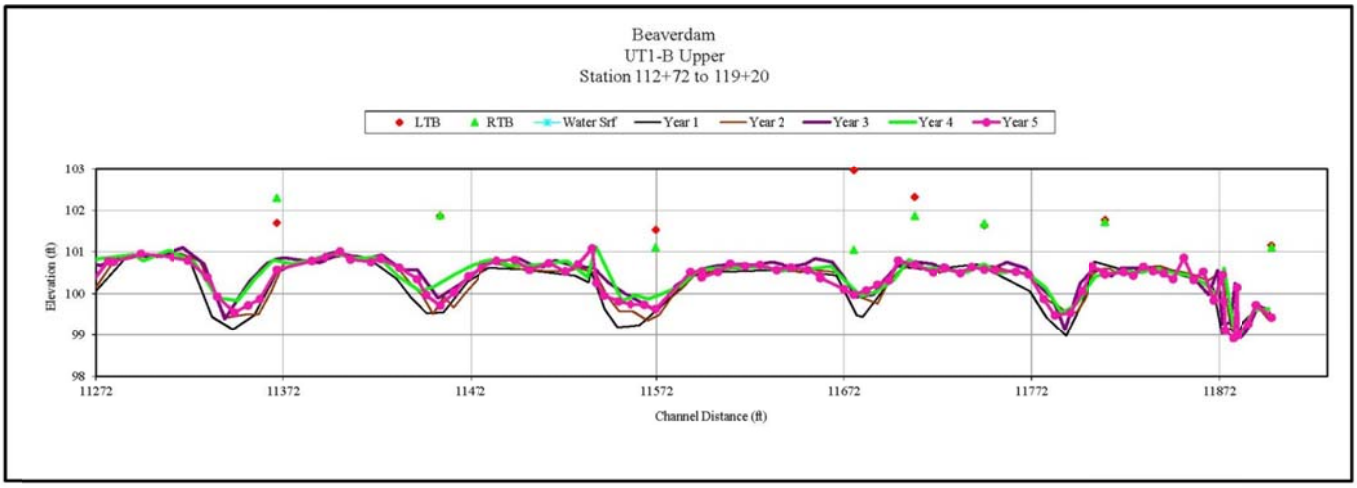
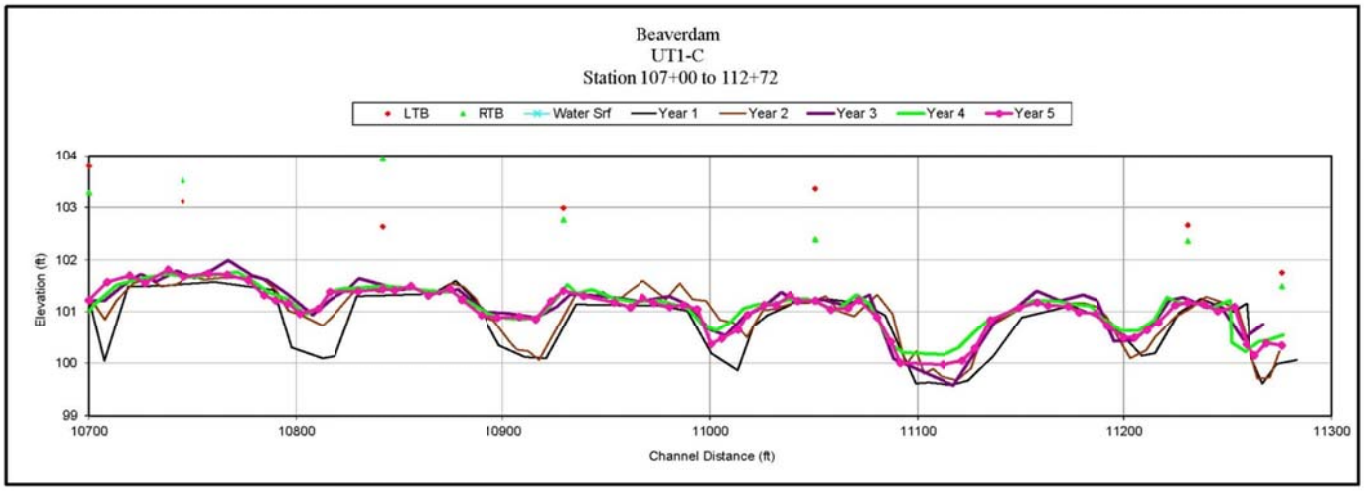
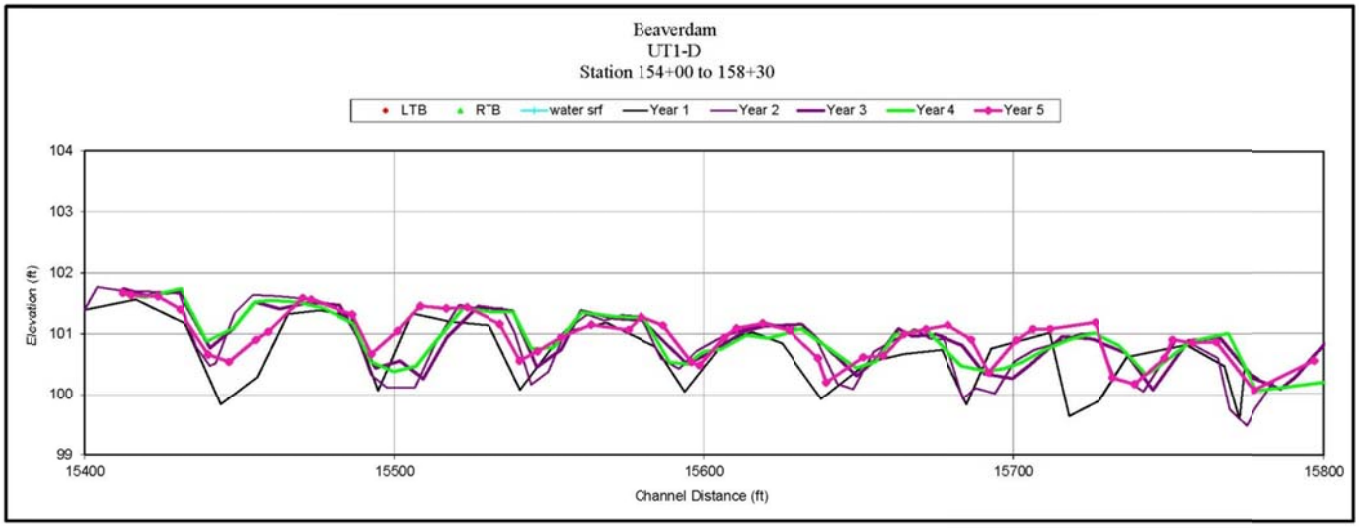
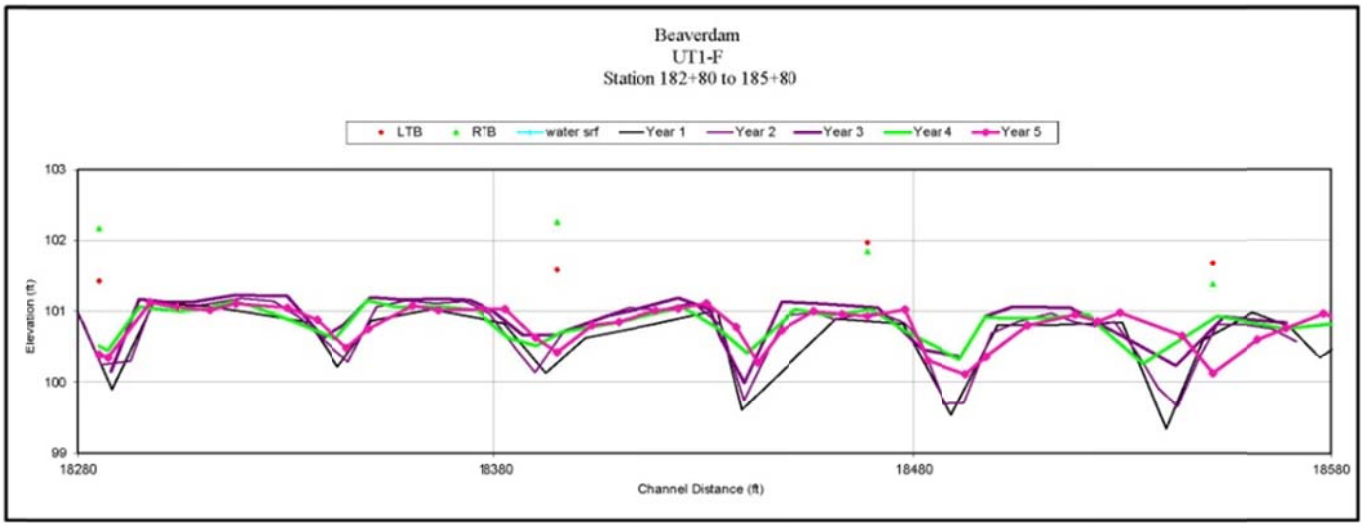
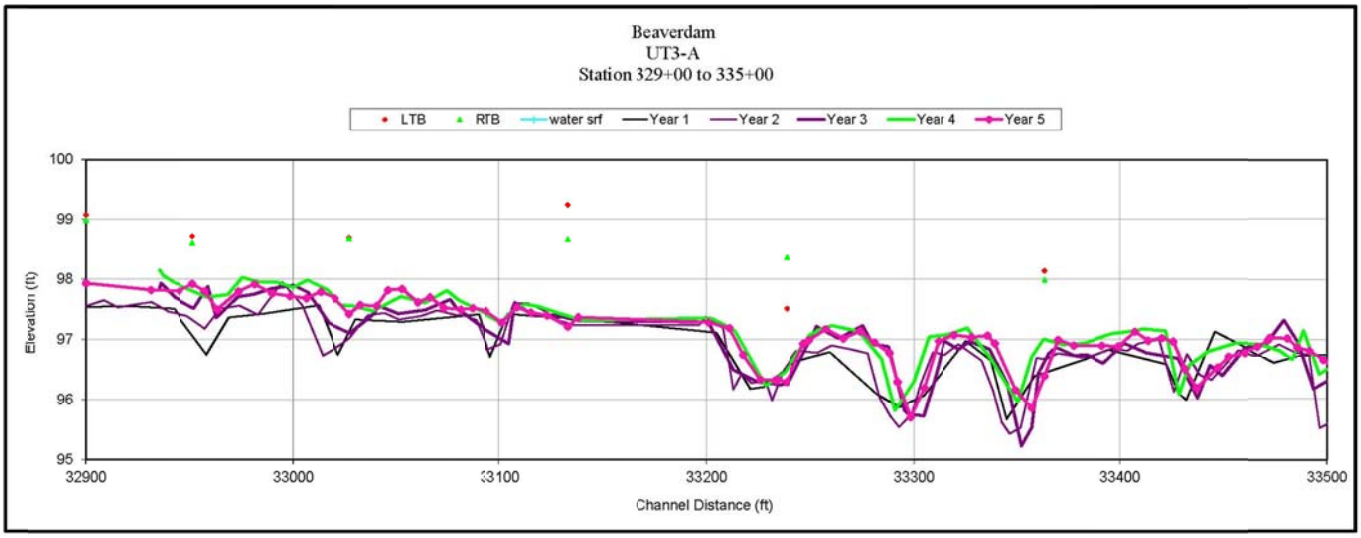
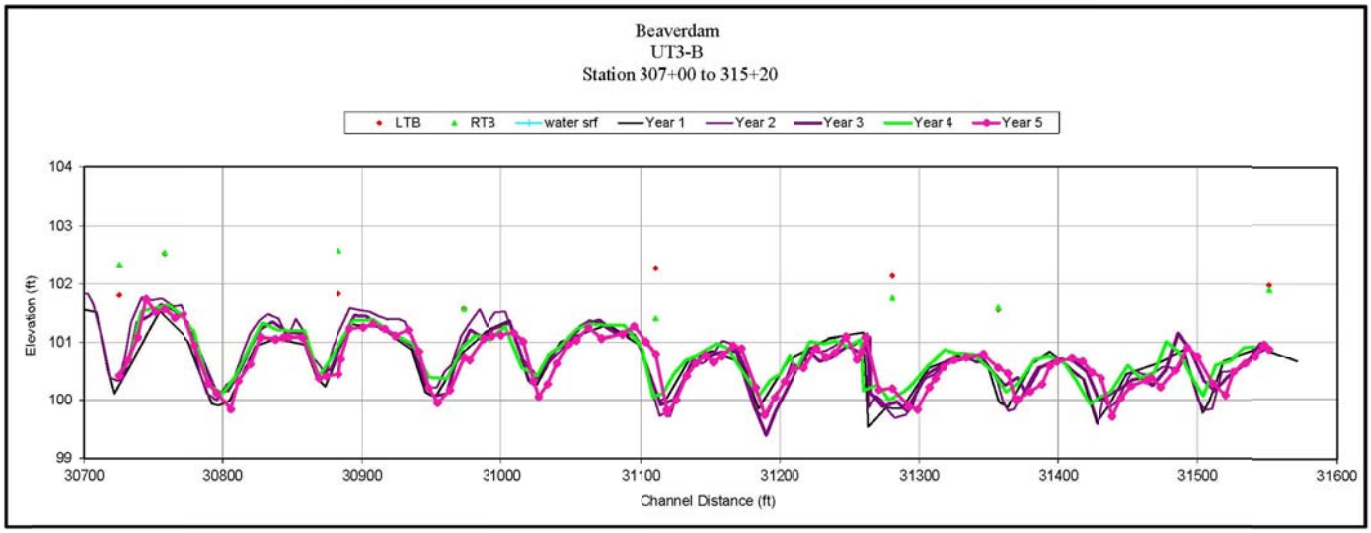

Beaverdam
UT1-B Upper
Station 112+72 to 119+20
LTB
RTB
Water Srf
Year 1
Year 2
Year 3
Year 4
Year 5
Elevation (ft)
103
102
101
100
99
98
11272
11372
11472
11572
11672
11772
11872
Channel Distance (ft)

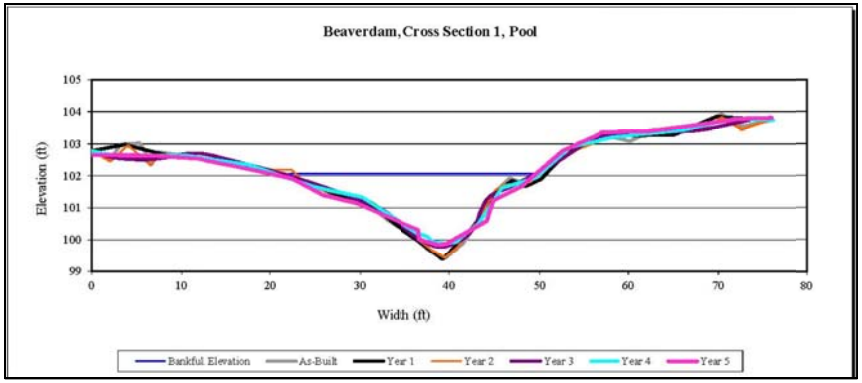

Beaverdam
UT1-C
Station 107+00 to 112+72
LTB
RTB
Water Srf
Year 1
Year 2
Year 3
Year 4
Year 5
Elevation (ft)
104
103
102
101
100
99
10700
10800
10900
11000
11100
11200
11300
Channel Distance (ft)

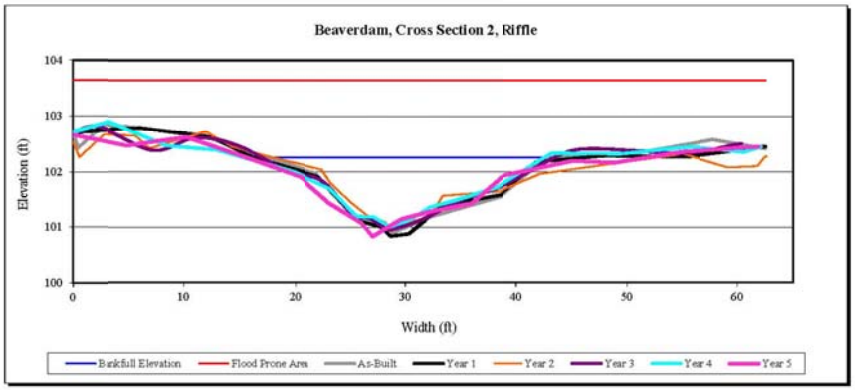

Beaverdam
UT1-D
Station 154+00 to 158+30
LTB
RTB
water srf
Year 1
Year 2
Year 3
Year 4
Year 5
Elevation (ft)
104
103
102
101
100
99
15400
15500
15600
15700
15800
Channel Distance (ft)

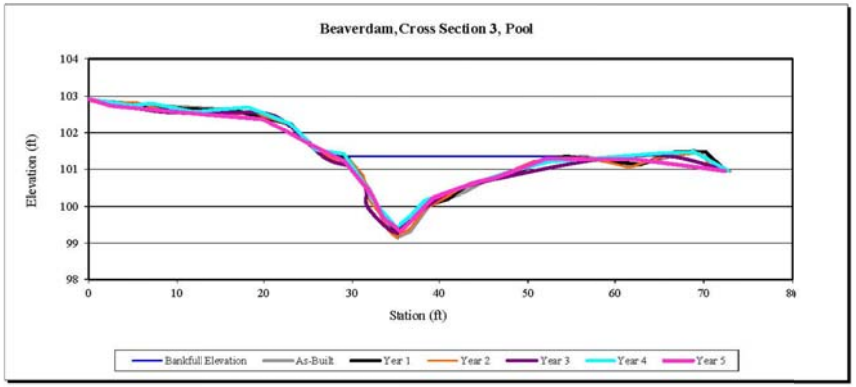

Beaverdam
UT1-F
Station 182+80 to 185+80
LTB
RTB
water srf
Year 1
Year 2
Year 3
Year 4
Year 5
Elevation (ft)
103
102
101
100
99
18280
18380
18480
18580
Channel Distance (ft)

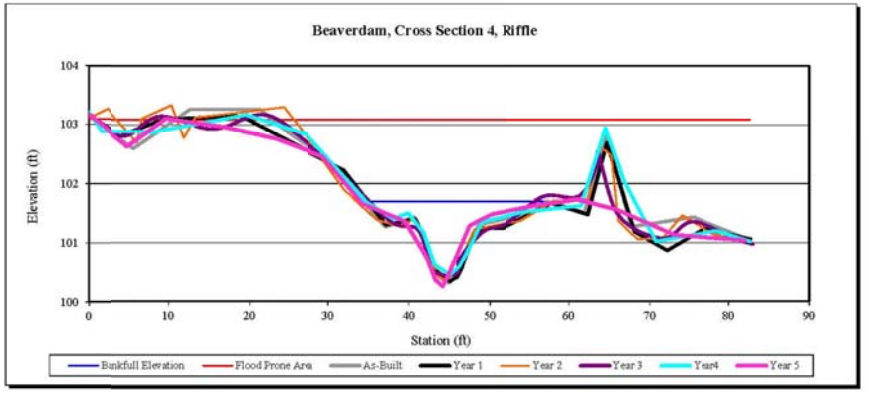

Beaverdam
UT3-A
Station 329+00 to 335+00
LTB
RTB
water srf
Year 1
Year 2
Year 3
Year 4
Year 5
Elevation (ft)
100
99
98
97
96
95
32900
33000
33100
33200
33300
33400
33500
Channel Distance (ft)

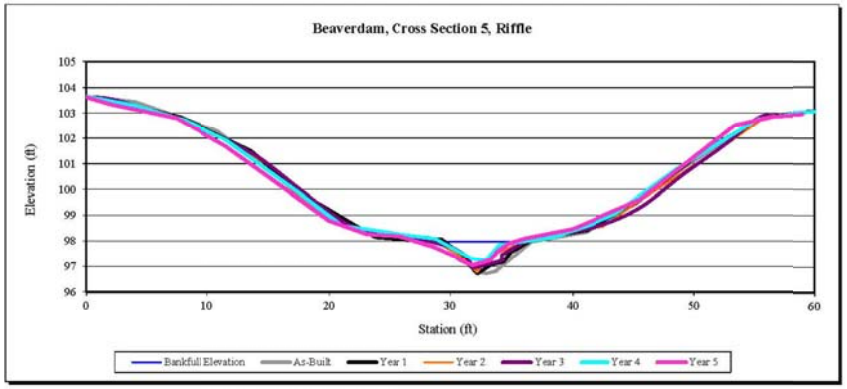

Beaverdam
UT3-B
Station 307+00 to 315+20
LTB
RTB
water srf
Year 1
Year 2
Year 3
Year 4
Year 5
Elevation (ft)
104
103
102
101
100
99
30700
30800
30900
31000
31100
31200
31300
31400
31500
31600
Channel Distance (ft)

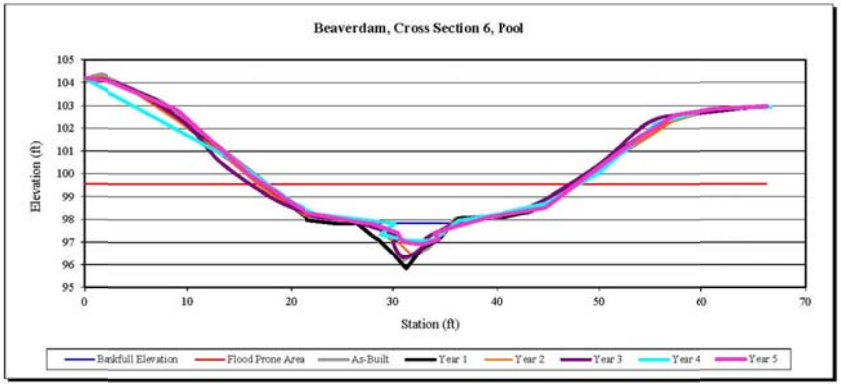

Beaverdam, Cross Section 1, Pool
Elevation (ft)
Width (ft)
Bankfull Elevation
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

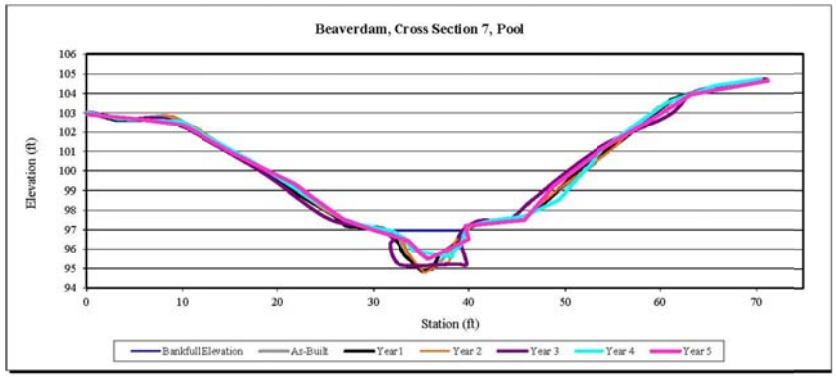

Beaverdam, Cross Section 2, Riffle
Elevation (ft)
Width (ft)
Bankfull Elevation
Flood Prone Area
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

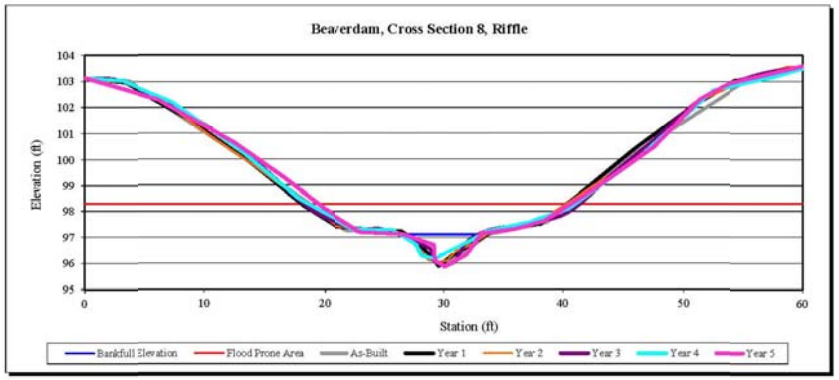

Beaverdam, Cross Section 3, Pool
Elevation (ft)
Station (ft)
Bankfull Elevation
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

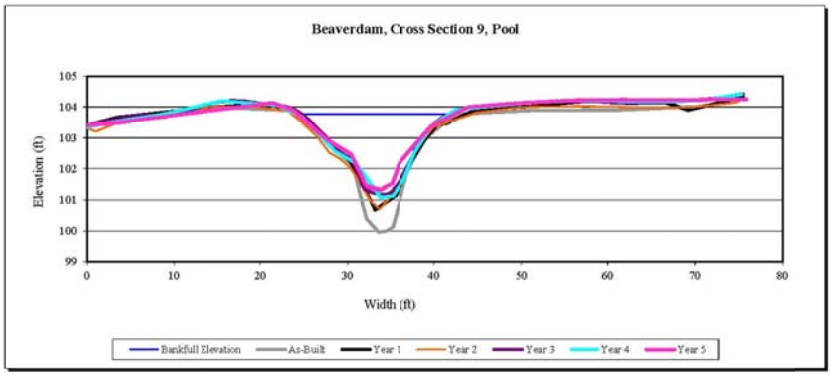

Beaverdam, Cross Section 4, Riffle
Elevation (ft)
Station (ft)
Bankfull Elevation
Flood Prone Area
As-Built
Year 1
Year 2
Year 3
Year4
Year 5

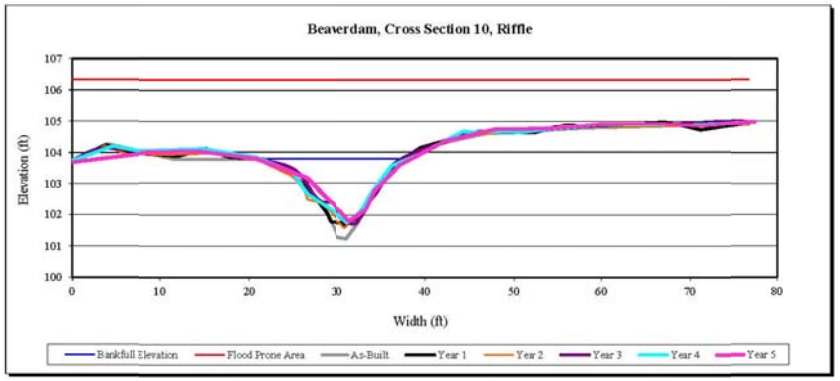

Beaverdam, Cross Section 5, Riffle
Elevation (ft)
Station (ft)
Bankfull Elevation
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

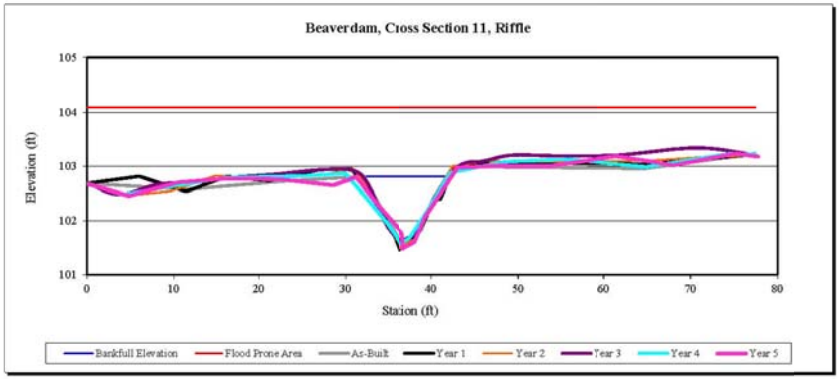

Beaverdam, Cross Section 6, Pool
Elevation (ft)
Station (ft)
Bankfull Elevation
Flood Prone Area
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

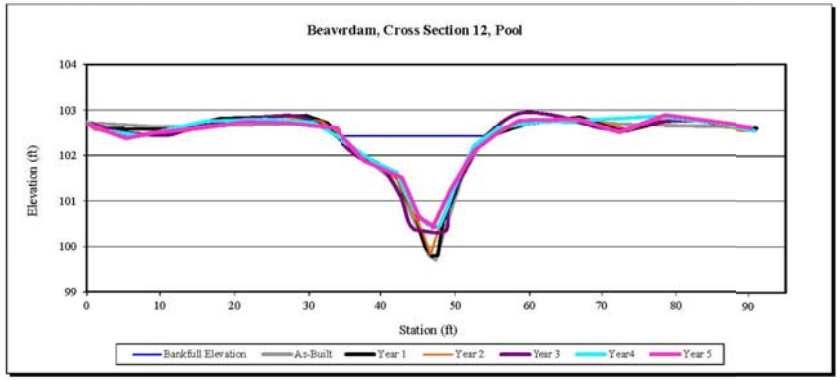

Beaverdam, Cross Section 7, Pool
Elevation (ft)
Station (ft)
Bankfull Elevation
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

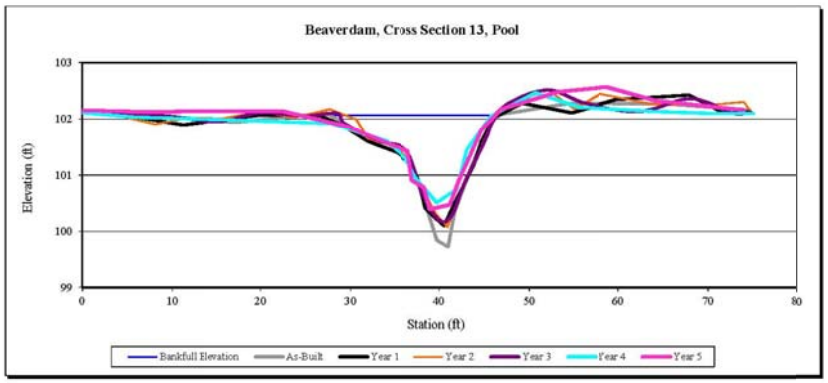

Beaverdam, Cross Section 8, Riffle
Elevation (ft)
Station (ft)
Bankfull Elevation
Flood Prone Area
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

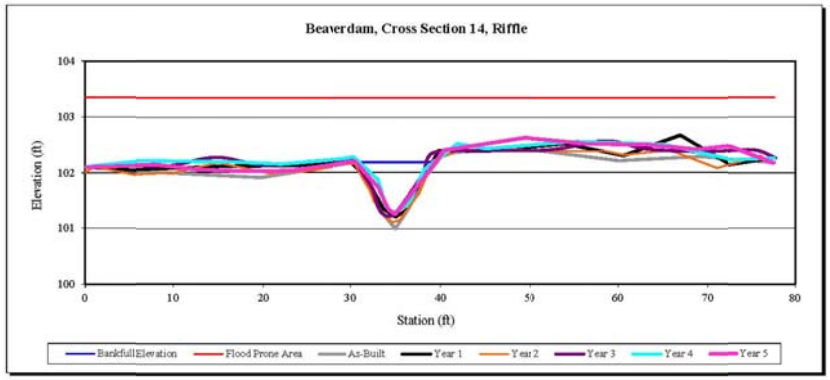

Beaverdam, Cross Section 9, Pool
Elevation (ft)
Width (ft)
Bankfull Elevation
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

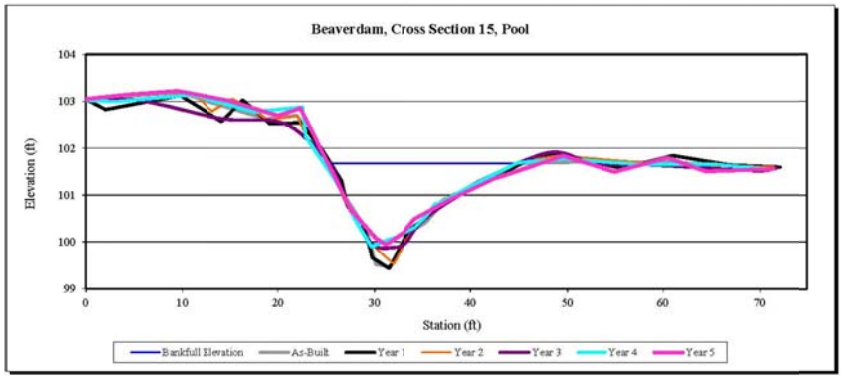

Beaverdam, Cross Section 10, Riffle
Elevation (ft)
Width (ft)
Bankfull Elevation
Flood Prone Area
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

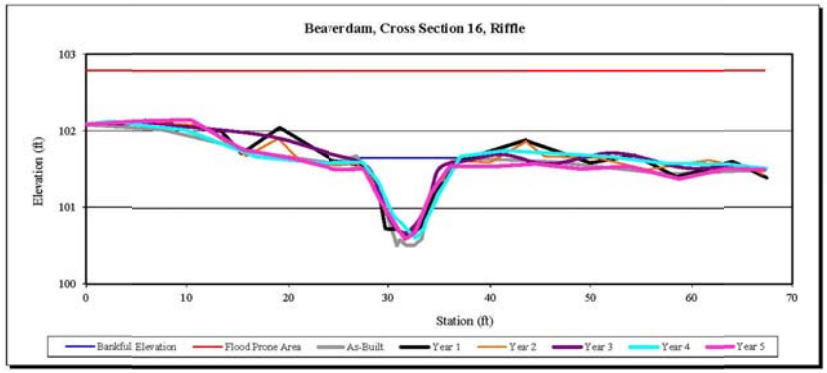

Beaverdam, Cross Section 11, Riffle
Elevation (ft)
Station (ft)
Bankfull Elevation
Flood Prone Area
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

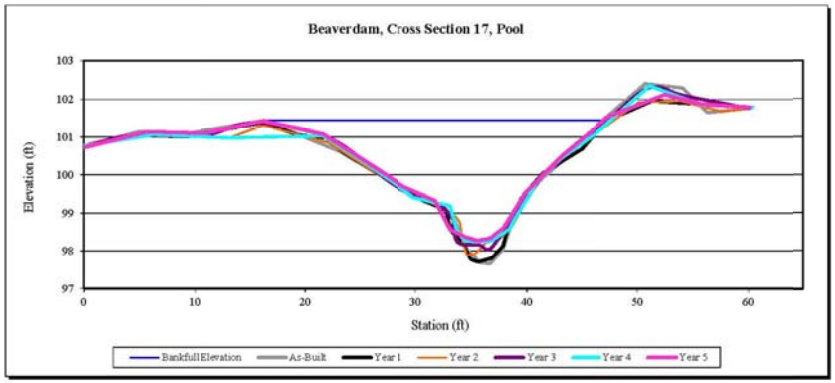

Beavrdam, Cross Section 12, Pool
Elevation (ft)
Station (ft)
Bankfull Elevation
As-Built
Year 1
Year 2
Year 3
Year4
Year 5

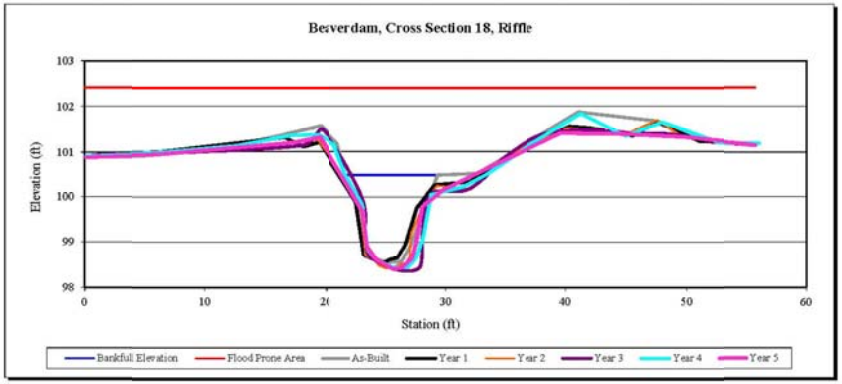

Beaverdam, Cross Section 13, Pool
Elevation (ft)
Station (ft)
Bankfull Elevation
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

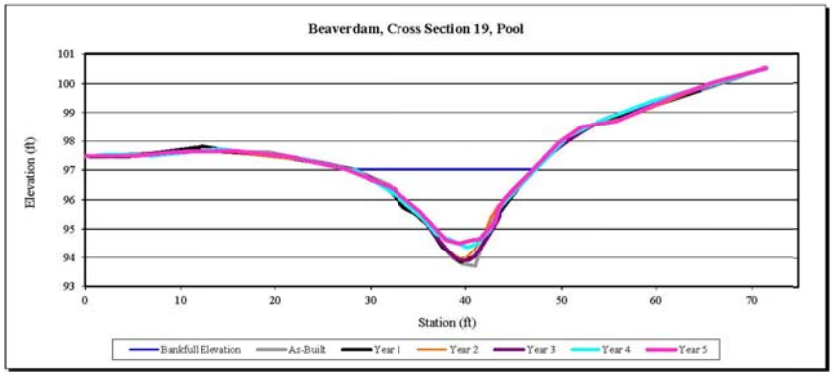

Beaverdam, Cross Section 14, Riffle
Elevation (ft)
Station (ft)
Bankfull Elevation
Flood Prone Area
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5

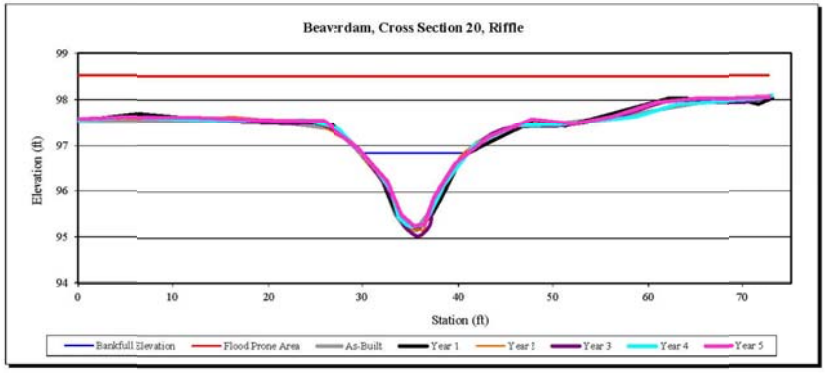

Beaverdam, Cross Section 15, Pool
Elevation (ft)
Station (ft)
Bankfull Elevation
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5


Beaverdam, Cross Section 16, Riffle
Elevation (ft)
Station (ft)
Bankfull Elevation
Flood Prone Area
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5


Beaverdam, Cross Section 17, Pool
Elevation (ft)
Station (ft)
Bankfull Elevation
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5


Beaverdam, Cross Section 18, Riffle
Elevation (ft)
Station (ft)
Bankfull Elevation
Flood Prone Area
As-Built
Year 1
Year 2
Year 3
Year 4
Year 5





Summary of Crest Gauge Monitoring Results

	2008			2009			2010			2011			2012		
	CG1	CG2	CG3	CG1	CG2	CG3	CG1	CG2	CG3	CG1	CG2	CG3	CG1	CG2	CG3
Number of Bankfull Events	0	0	3	1	1	5	2	1	5	2	1	3	1	0	2
Maximum Height Above Bankfull (feet)	0.6			1.4			1.4			1.1			1.3		

Summary of Morphologic Parameters Monitoring Results

Parameter	Cross Section 1 Pool						Cross Section 2 Riffle						Cross Section 3 Pool						Cross Section 4 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	28.4	26.4	25.0	22.3	23.0	24.0	25.3	24.4	22.8	26.2	29.1	28.4	26.6	21.8	20.8	27.5	22.5	22.3	22.8	22.8	24.8	22.1	14.3	24.3
BF Cross Sectional Area (ft^2)	31.7	26.4	23.4	20.7	20.3	21.6	18.1	16.2	11.4	16.8	18.7	16.8	22.8	19.2	19.0	19.2	16.8	17.6	11.7	11.6	12.9	13.2	6.3	8.7
BF Mean Depth (ft)	1.1	1.0	0.9	0.9	0.9	0.9	0.7	0.7	0.5	0.6	0.6	0.6	0.9	0.9	0.9	0.7	0.7	0.8	0.5	0.5	0.5	0.6	0.4	0.4
BF Max Depth (ft)	2.6	2.5	2.4	2.0	2.0	1.8	1.4	1.3	1.1	1.3	1.3	1.4	2.2	2.0	2.1	1.9	1.8	1.7	1.4	1.3	1.4	1.3	1.1	1.3
Width/Depth Ratio	25.5	26.2	26.8	24.0	26.1	26.6	35.2	36.6	45.9	40.8	45.3	47.8	31.0	24.7	22.7	39.3	30.1	28.2	44.4	44.8	47.7	37.1	32.6	68.1

Parameter	Cross Section 5 Riffle						Cross Section 6 Pool						Cross Section 7 Pool						Cross Section 8 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	7.6	7.5	8.7	10.0	9.0	9.9	9.0	9.2	9.7	11.2	8.6	10.7	7.9	9.8	9.4	10.7	10.2	11.0	6.9	7.3	7.7	8.7	8.3	6.4
BF Cross Sectional Area (ft^2)	5.0	5.0	4.7	5.1	3.4	4.9	8.4	8.7	6.9	7.4	5.4	4.8	8.7	10.7	10.6	15.4	8.7	9.6	4.4	4.7	4.8	5.2	4.7	3.8
BF Mean Depth (ft)	0.7	0.7	0.5	0.5	0.4	0.5	0.9	0.9	0.7	0.7	0.6	0.4	1.1	1.1	1.1	1.4	0.8	0.9	0.6	0.6	0.6	0.6	0.6	0.6
BF Max Depth (ft)	1.2	1.4	1.4	1.2	0.9	1.1	1.7	2.0	1.6	1.7	1.0	1.0	2.0	2.2	2.3	2.1	1.6	1.7	1.2	1.4	1.2	1.4	1.1	1.3
Width/Depth Ratio	11.4	11.1	16.3	19.6	24.3	19.9	9.5	9.8	13.6	16.9	13.8	24.0	7.2	9.0	8.3	7.5	12.0	12.6	10.7	11.3	12.4	14.7	14.8	10.7

Parameter	Cross Section 9 Pool						Cross Section 10 Riffle						Cross Section 11 Riffle						Cross Section 12 Pool					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	18.5	19.7	19.9	18.4	18.7	21.1	16.4	15.1	16.1	16.9	16.8	17.8	9.8	11.8	11.5	12.4	12.2	11.0	19.5	19.8	18.8	20.5	19.6	21.6
BF Cross Sectional Area (ft^2)	29.3	25.9	25.0	24.0	24.4	24.8	18.4	16.5	15.8	15.1	15.5	14.8	6.8	9.0	8.7	8.3	8.1	6.9	22.2	20.4	18.5	21.2	16.9	19.6
BF Mean Depth (ft)	1.6	1.3	1.3	1.0	1.3	1.2	1.1	1.1	1.0	0.8	0.9	0.8	0.7	0.8	0.8	0.7	0.7	0.6	1.1	1.0	1.0	1.1	0.9	0.9
BF Max Depth (ft)	3.8	3.1	3.0	3.0	2.8	2.7	2.5	2.1	2.1	2.3	2.0	2.0	1.3	1.5	1.5	1.3	1.3	1.3	2.7	2.6	2.5	2.5	2.0	2.1
Width/Depth Ratio	11.8	14.9	15.8	14.1	14.4	18.0	14.6	13.7	16.3	18.8	18.3	21.5	14.0	15.4	15.1	18.4	18.5	17.6	17.2	19.2	19.7	19.7	22.7	23.9

Parameter	Cross Section 13 Pool						Cross Section 14 Riffle						Cross Section 15 Pool						Cross Section 16 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	18.3	19.4	19.5	18.2	17.3	15.3	9.0	9.2	9.9	8.9	9.6	9.0	19.7	24.2	24.3	24.6	24.5	23.8	9.9	9.0	9.1	11.2	9.3	8.5
BF Cross Sectional Area (ft^2)	15.8	15.3	16.3	15.2	10.0	9.7	5.4	4.8	5.2	4.8	4.5	4.2	18.8	23.0	22.2	23.7	19.5	20.1	5.8	4.6	4.4	4.5	5.0	4.4
BF Mean Depth (ft)	0.9	0.8	0.8	0.8	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	1.0	1.0	0.9	1.0	0.8	0.8	0.6	0.5	0.5	0.4	0.5	0.5
BF Max Depth (ft)	2.3	2.0	2.1	1.9	1.4	1.5	1.2	1.0	1.0	1.0	1.0	1.0	2.2	2.4	2.3	2.0	1.9	1.8	1.1	0.9	0.9	0.9	1.0	1.0
Width/Depth Ratio	21.3	24.6	23.2	21.8	29.9	24.2	15.1	17.4	18.7	16.5	20.4	19.3	20.7	25.4	26.5	25.6	30.8	28.2	16.9	17.5	18.8	28.1	17.6	16.5

Parameter	Cross Section 17 Pool						Cross Section 18 Riffle						Cross Section 19 Pool						Cross Section 20 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	30.6	30.7	31.3	31.4	24.3	23.4	7.6	7.4	7.1	9.1	8.4	7.5	19.2	18.5	20.5	19.5	18.6	19.5	10.5	10.4	10.4	10.7	10.5	12.1
BF Cross Sectional Area (ft^2)	46.3	45.8	44.6	43.5	33.6	32.2	9.6	7.5	7.9	8.5	8.2	7.4	28.2	28.9	27.4	28.2	24.8	24.2	9.5	9.1	8.9	9.2	8.4	9.7
BF Mean Depth (ft)	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.0	1.1	0.9	1.0	1.0	1.5	1.6	1.3	1.4	1.3	1.2	0.9	0.9	0.9	0.9	0.8	0.8
BF Max Depth (ft)	3.7	3.7	3.5	3.3	2.8	2.8	1.9	1.7	1.8	1.8	1.7	1.7	3.3	3.2	3.1	3.1	2.6	2.5	1.7	1.6	1.6	1.7	1.5	1.7
Width/Depth Ratio	19.7	20.6	22.0	22.6	17.6	17.0	6.1	7.3	6.5	9.8	8.6	7.5	13.1	11.8	15.3	13.5	13.9	15.6	11.6	11.9	12.1	12.4	13.1	15.0

Results of 2012 Vegetation Monitoring – Planted Species by Plot

Species	VP 1	VP 2	VP 3	VP 4	VP 5	VP 6	VP 7	VP 8	VP 9	VP 10	VP 11	VP 12	VP 13	VP 14
Black gum	2	12	2	3	3	6		2	1	10	4	9		
Black walnut														
Cypress	5	3	3	3					5	11	1	3		
Green ash	14	7	3	2	5	5	5	1			3	7		
Hickory			2		1			1	2		1	4		
Northern red oak							6						9	15
Overcup oak	2	4	5	3	6		8	3		6	4			3
Paw Paw									1					
River birch		3	2	10	7	8		3	4	1	3			
Slippery elm				1			2				1		13	11
Swamp chestnut oak								1	3			3		6
Tulip poplar	1			2				2			1			
Unknown								1			1			
Willow oak			2			4	4	1				1	2	1

Summary of Results

Plot Number	Stems Planted	2008 Stems	2009 Stems	2010 Stems	2011 Stems	2012 Stems	Est. Percent Cover 2012	Stem/Acre					
									2008	2009	2010	2011	2012
								As-Built	Year 1	Year 2	Year 3	Year 4	Year 5
1	31	18	27	24	26	24	97	620	360	540	480	520	480
2	32	21	29	25	29	29	100	640	420	580	500	580	580
3	30	17	21	19	19	19	98	600	340	420	380	380	380
4	32	17	26	25	26	24	98	640	340	520	500	520	480
5	31	13	25	19	12	22	80	620	260	500	380	240	440
6	33	18	19	18	21	23	99	660	360	380	360	420	460
7	31	18	30	24	24	25	80	620	360	600	480	480	500
8	33	28	27	24	18	15	95	660	560	540	480	360	300
9	20	17	17	17	16	16	70	400	340	340	340	320	320
10	23	21	30	29	32	28	95	460	420	600	580	640	560
11	38	24	22	20	18	19	85	760	480	440	400	360	380
12	35	32	32	28	24	24	100	700	640	640	560	480	480
13	34	25	27	25	27	27	90	680	500	540	500	540	540
14	33	24	24	31	36	36	90	660	480	480	620	720	720

Summary of Hydrology Monitoring Data 2008-2012

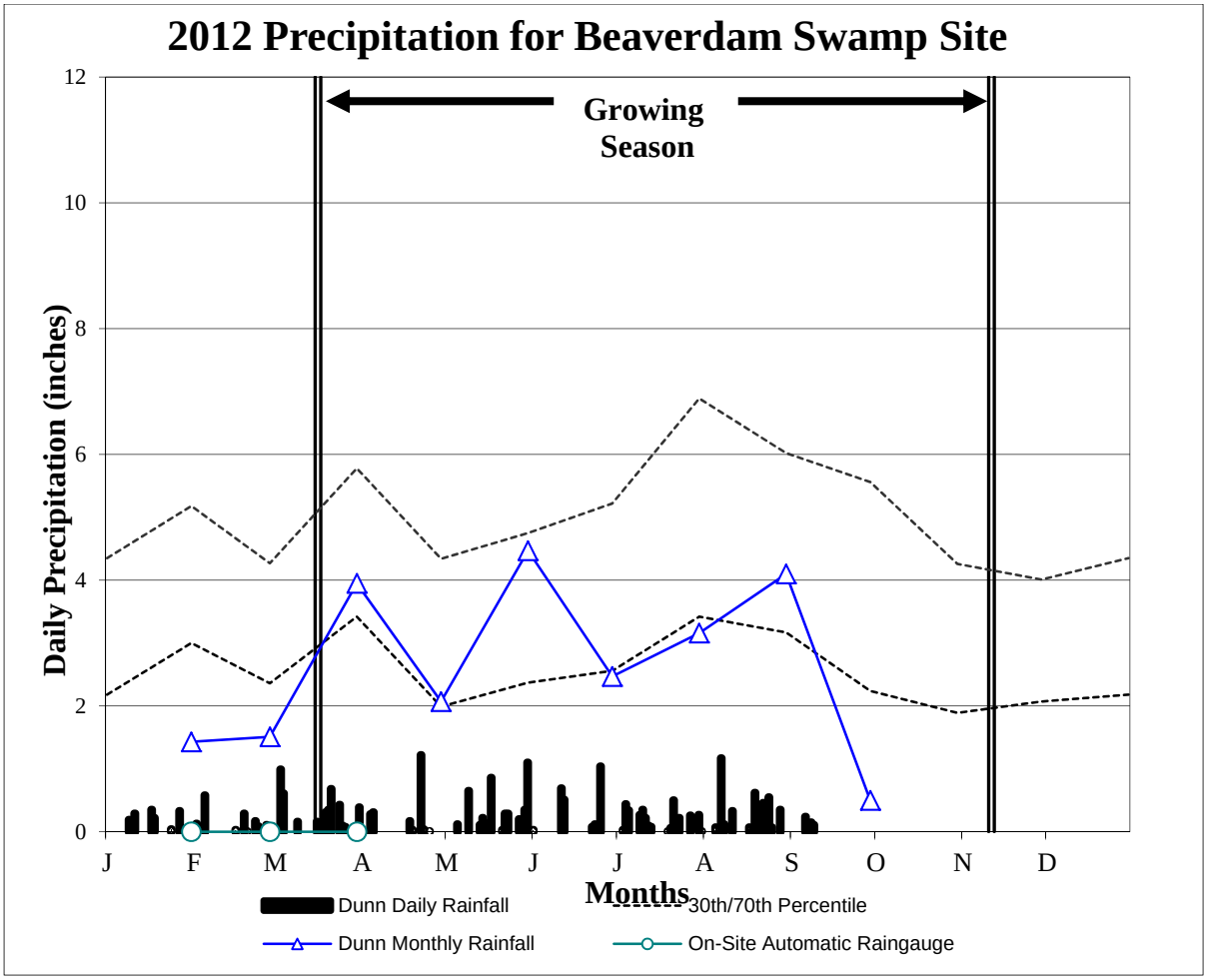
Gauge	Max Consecutive Hydroperiod (percent of growing season)				
	2008	2009	2010	2011	2012
Restoration/Enhancement Area					
AW1	23	31	20	14	10
AW2	4	10	8	4	4
AW5	7	21	13	8	12
AW6	4	10	4	5	4
AW7	7	16	13	7	10
Gauges Outside Restoration/Enhancement Area					
AW3	12	100	48	0	3
AW4	2	3	0	0	0
AW8	6	24	20	4	5
Reference Gauges					
RAW1	30	32	24	20	12
RAW2	6	14	10	8	11
RAW3	6	21	13	8	11

Comparison of Normal Rainfall to Observed Rainfall (2012)

Month	Average	Normal Limits		Dunn Precipitation				
		30 Percent	70 Percent	2008	2009	2010	2011	2012
January	4.12	3.00	5.18	1.65	1.48	3.02	0.66	1.43
February	3.59	2.36	4.27	3.29	1.83	2.56	1.73	1.51
March	4.71	3.42	5.78	3.69	3.84	1.96	2.54	3.95
April	3.25	1.99	4.34	8.88	0.56	0.63	2.13	2.07
May	3.82	2.37	4.75	2.86	2.17	2.75	2.99	4.47
June	4.50	2.56	5.22	2.69	0.43	1.28	6.31	2.47
July	5.64	3.42	6.89	4.31	2.50	2.71	1.70	3.16
August	4.86	3.17	6.02	4.72	2.65	1.38	4.74	4.10
September	4.50	2.24	5.56	5.01	1.84	0.36	2.19	
October	3.16	1.89	4.26	1.43	1.83	0.55	2.53	
November	3.08	2.07	4.01	2.18	0.90	0.82	2.42	
December	3.57	2.18	4.35	2.04	3.95	1.25	0.80	
Average	---	42.45	51.56	---	---	---	---	
Total	48.80	---	---	42.75	23.98	19.27	30.74	

Below 30 percentile

Below monthly average



EEP Recommendations and Conclusions

- Three of the five hydrology monitoring stations within the restoration/enhancement area recorded hydroperiods of at least 10 percent of the growing season and met the hydrologic success criterion for 2012. All three of the reference gauges experienced hydroperiods greater than 10 percent of the growing season. Gauges AW2 and AW6 experienced hydroperiods below 5 percent of the growing season.

- Gauges BDAW 3, BDAW4, and BDAW8 are located in potential wetland restoration areas and had hydroperiods less than the success criterion.

- Dunn weather station rainfall data indicates that the 2012 growing season rainfall amounts were below normal for most of the growing season, except for March, April, May, and August when rainfall levels were within the normal range or slightly above. Dunn weather station rainfall data indicates that 2010, 2011, and 2012 annual rainfall patterns are below normal limits.

- The restored stream channel has remained stable and is providing the intended habitat and hydrologic functions. All monitoring cross sections and longitudinal profile for 2012 showed little adjustment in stream dimension over the previous year.

- Vegetation monitoring has documented the average number of stems per acre on the site to be 473, with a stem density range of 300 to 720 stems per acre. All vegetation plots have achieved the success criterion of 260 trees per acre at monitoring year 5.

- The project has achieved success based on stated success criteria and is recommended for regulatory closure.

Contingencies

- One area along UT1-A from station 153+00 to 153+30 on both the left and right banks and one area on UT3 from 335+10 to 335+40 right bank need to be reseeded with a permanent seed. Remedial actions are underway to correct these sparsely vegetated areas.

Monitoring Phase

UT1-D looking downstream during monitoring phase.

UT1-B looking upstream during monitoring phase.

UT2 looking downstream during monitoring phase.

UT3-B looking downstream during monitoring phase.

UT3-A looking downstream during monitoring phase.