BEAVERDAM CREEK
STREAM RESTORATION PROJECT

ANNUAL MONITORING REPORT FOR 2006-2007 (YEAR 1)

Project Number: D05016-1

Submitted to:

NC Ecosystem Enhancement Program
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EXECUTIVE SUMMARY

This Annual Report details the monitoring activities during the 2007 growing season on the Beaverdam Creek Stream Restoration Site ("Site"). Construction of the Site, including planting of trees, was completed in March 2007. In order to document project success, twenty-four vegetation monitoring plots, eighteen permanent cross-sections, 9,576 linear feet (LF) of longitudinal profile survey, one rain gage, and two automated stage recorders were installed and assessed across the restoration Site. The 2007 data represents results from the first year of vegetation and hydrologic monitoring for streams.

Prior to restoration, stream and buffer functions on the Site were historically impaired as a result of heavy land timbering and subsequently farmed aggressively. Recently some areas have been reforested within the project site, but it has continued to be actively farmed and grazed or converted to medium density residential developments. After construction was finalized the project restored or enhanced 13,203 linear feet (LF) of channelized stream on two unnamed tributaries of Beaverdam Creek: UT1 and UT2, and preserved an additional 1,641 LF of Beaverdam Creek and 962 LF of UT2 to total 15,806 LF of restored, enhanced, or preserved stream.

Weather station data from the for NRCS National Climate and Water Center (Charlotte WSO AP WETS Station in Mecklenburg County – NC 1690) and the USGS Water Data for North Carolina (USGS 35090308100454 Withers Cove in Mecklenburg County, NC) were used to document precipitation amounts. For the 2007 growing season, March 2007 through October 2007 rainfall was recorded as below normal for greater than 87% of the time.

Twenty-four monitoring plots that are 10 meter by 10 meters or 0.025 of an acre in size were used to assess survivability of the woody vegetation planted on Site. They are randomly located to represent the different zones within the project. The vegetation monitoring indicated a survivability range of 440 stems per acre to 1000 stems per acre with an overall average of 572 stems per acre. Overall, the Site is on track for meeting the initial vegetation survival criteria of 320 stems per acre surviving after the third growing season and the final success criteria of 260 trees per acre by the end of year five.

In general, dimension, pattern, profile and in-stream structures remained stable during the first growing season. Minor bed scour was noted in a few isolated areas along UT1. These areas are the result of the large storm event that occurred shortly after construction was completed. One bankfull event was documented during the month of February.

1.0 PROJECT BACKGROUND

The Beaverdam Creek site is located within the extraterritorial jurisdiction (ETJ) of the City of Charlotte, Mecklenburg County, and lies within the Catawba River Basin (Figure 1). The site lies within North Carolina Department of Water Quality (NCDWQ) sub-basin 03-08-34 and U.S. Geologic Survey (USGS) hydrologic unit 03050101170040. The recent land use of the site consists of agriculture and medium density residential development.

The project involved the restoration, enhancement, and preservation of 15,806 LF of stream along Beaverdam Creek (the mainstem) and two unnamed tributaries (UT 1 and UT2).

1.1 Project Location

The Beaverdam Creek sited is located approximately 3 miles southwest of the Charlotte-Douglas International Airport. The site extends from the newly constructed Interstate 485 corridor to Brown's Cove of Lake Wylie, an impounded reservoir on the Catawba River. The site can be accessed from Dixie River Road (UT1 to the north and UT2 to the south) 1.5 miles northeast of the intersection with Steele Creek Road. See Figures 1 and 2 for an overview of the project site.

1.2 Mitigation Goals and Objectives

The specific goals for the Beaverdam Creek Restoration Project were as follows:

- Preserve/Restore/Enhance 15,806 LF of stream channel.
- Create geomorphically stable stream channel and floodplain conditions along UT1, UT2 and their associated tributaries within the Beaverdam Creek watershed.
- Improve the local hydrology through increased groundwater recharge, groundwater storage, and hydrologic connectivity between the channel and the adjacent floodplain.
- Improve water quality in the Beaverdam Creek watershed by increasing dissolved oxygen concentrations and reducing nutrient and sediment loads.
- Improve aquatic and riparian terrestrial habitat through improved hydraulic and biologic diversity.

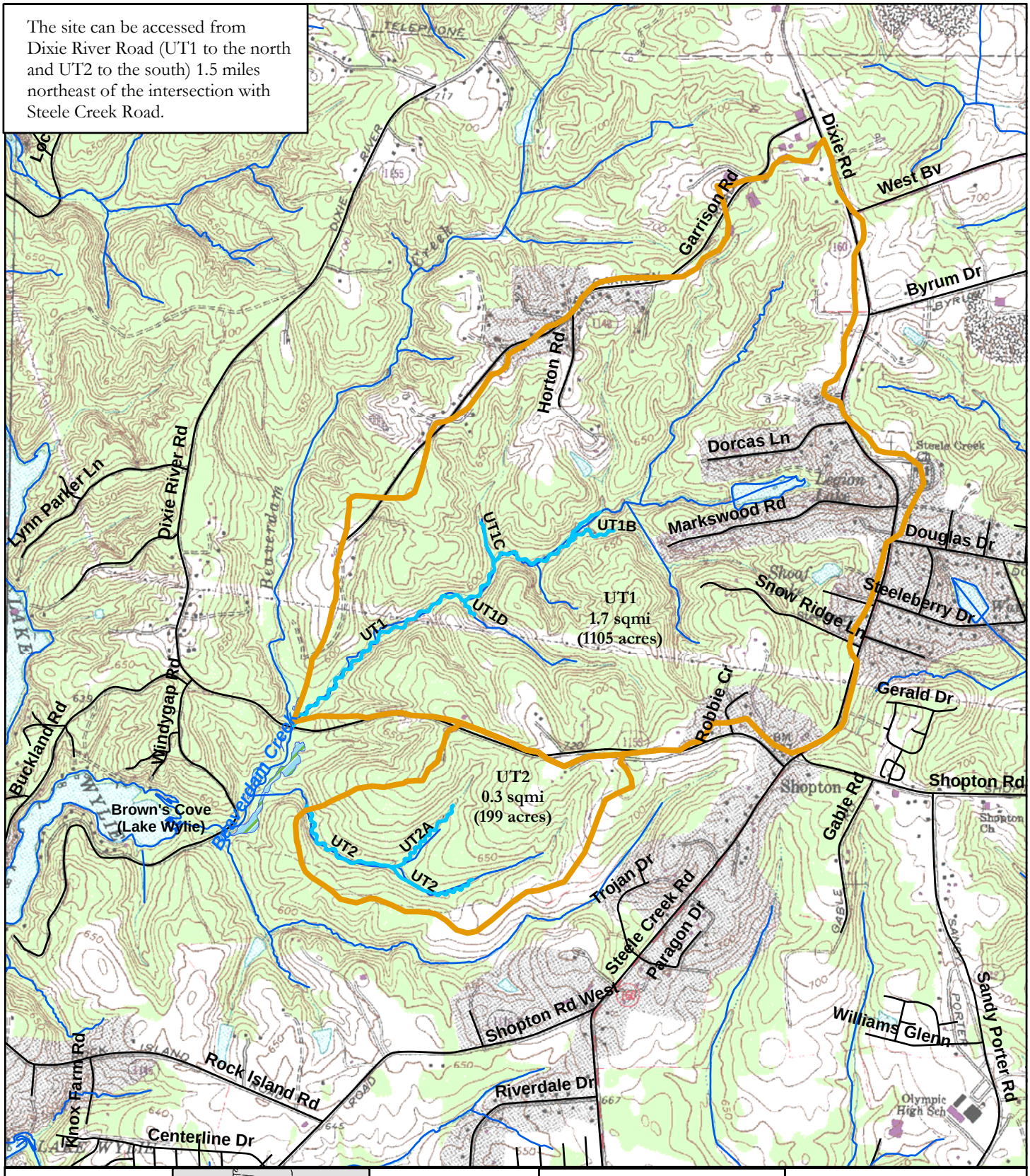
1.3 Project Description and Restoration Approach

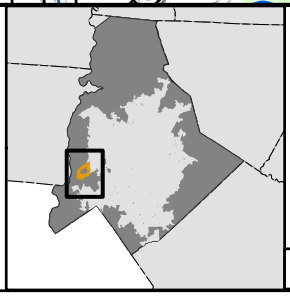
For analysis and design purposes, Beaverdam Creek and the two unnamed tributaries (UT1 and UT2) were subdivided into 15 individual reaches based on their hydrologic and geomorphic characteristics. The mainstem of Beaverdam Creek consists of only 1 of the 15 design reaches, where only preservation and no restoration activities were proposed. The remaining 14 reaches exist within UT1 (8 reaches) and UT2 (6 reaches). Among these 14 reaches, 12 were scheduled for restoration, the upstream reach of UT1 was scheduled for enhancement and the downstream reach of UT2 was scheduled for preservation. All reach locations are shown in Figure 3. The following describes the site's preconstruction conditions.

The project constraints on UT1 began at I-485 flowing from the northeast direction. UT1 was divided into 5 reaches starting in the upstream with Reach 1 and continuing downstream to Reach 5 and changing designation at tributary confluences or at significant grade breaks. The three tributary confluences were included within the design parameters on UT1 and were identified as UT1B, UT1C, and UT1D from the upstream confluence and continuing downstream.

UT2 watershed abuts the UT1 watershed to the south, is bordered by Dixie River Road, and is generally flows in the southwest direction. The mainstem of UT2 was divided into four reaches starting upstream at Reach 1 and continuing downstream to Reach 4. One tributary confluence, UT2A, was included within the design parameters of UT2. Reach UT2A, upstream of station 10+00, consisted only of a non-

The site can be accessed from Dixie River Road (UT1 to the north and UT2 to the south) 1.5 miles northeast of the intersection with Steele Creek Road.





LEGEND

Project Watershed Boundary

Project Reaches

Creeks

Roads

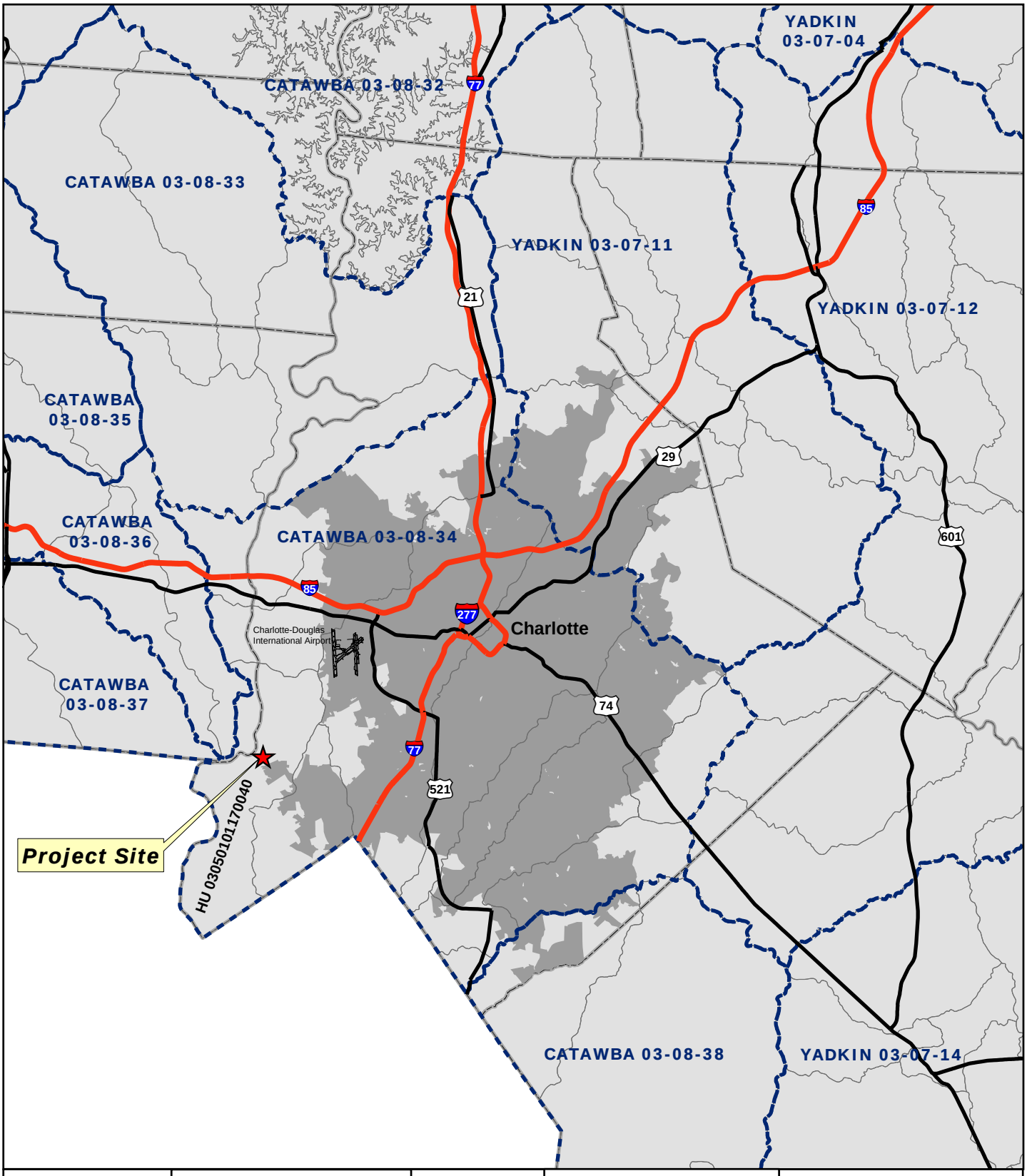
0 800 1,600 3,200 Feet

EEP Contract No.: D05016-1

December 2007

Figure 2: Site Topographic Map

Beaverdam Creek Year 1 Monitoring Mecklenburg County, NC



Map Inset

Mecklenburg County, NC

LEGEND

HUC

DWQ Sub-basin

Counties

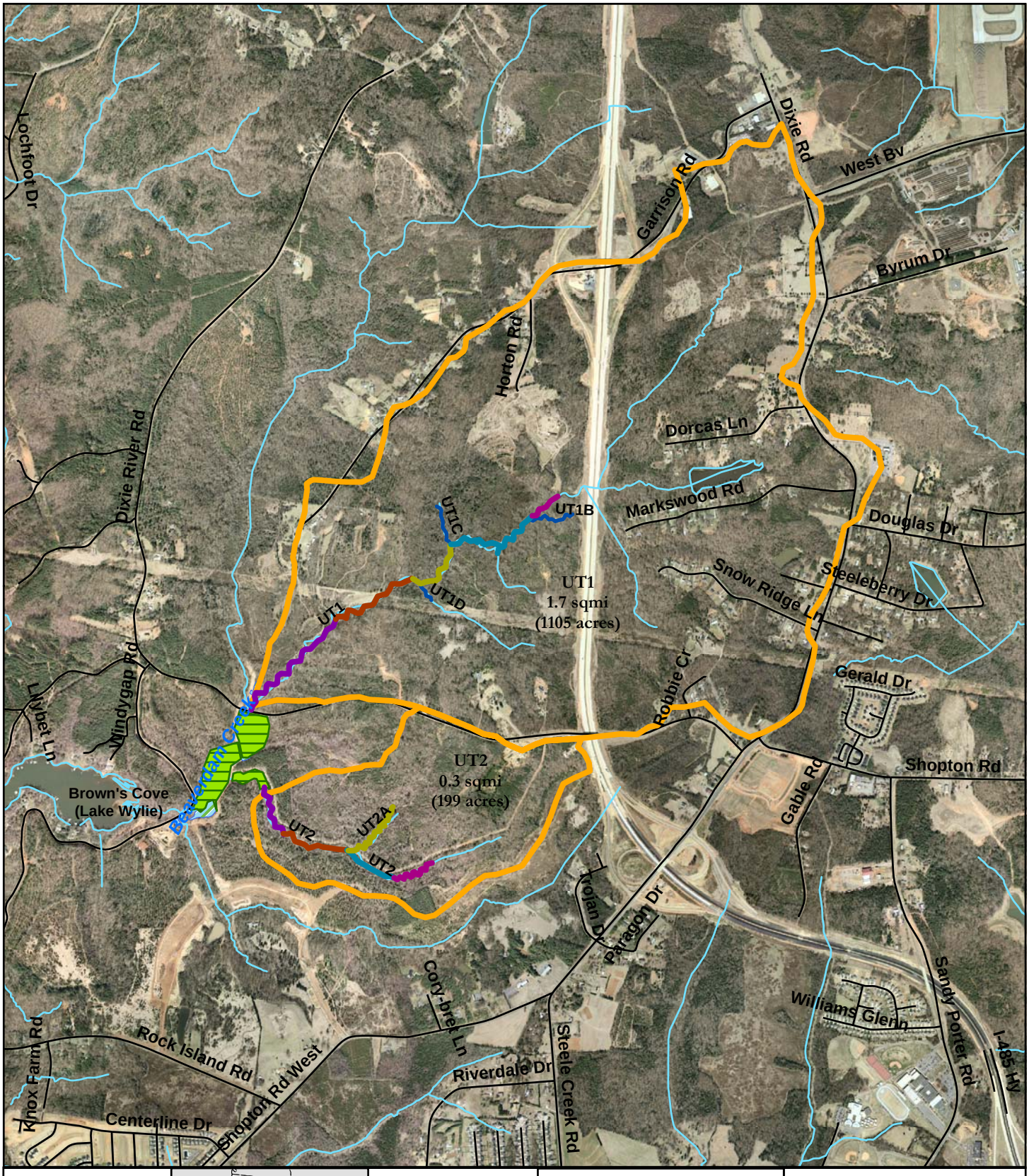
4 2 0 4 Miles

December 2007

EEP Contract No.: D05016-1

Figure 1: Project Vicinity Map

Beaverdam Creek
Year 1 Monitoring
Mecklenburg County, NC



LEGEND

Project Watershed Boundary

Preservation Easement

Creeks

Roads

0 900 1,800 3,600 Feet

EEP Contract No.: D05016-1

December 2007

Figure 3: Restoration Summary Map

Beaverdam Creek
Year 1 Monitoring
Mecklenburg County, NC

Ecosystem Enhancement Program

Baker

disturbance area (not for credit). The downstream section of UT2A, from a headcut at station 10+00 to its confluence at the terminus of Reach 2, was 1138 LF with a channel slope of 1.4 percent.

Preservation was proposed for reaches within the project area that were currently in stable, functioning condition and did not warrant restoration. The two reaches proposed for preservation were along the mainstem of Beaverdam and the downstream section of UT2. The reach along the mainstem of Beaverdam Creek proposed for preservation had reach length of 1,641 LF. It began at the confluence with UT1 and extended downstream to the confluence of UT2. The reach along the mainstem of UT2 proposed for preservation had a length of 962 LF. It began immediately downstream of UT2 Reach 4 and ended at its confluence with the mainstem of Beaverdam Creek.

Throughout most of UT1, the restoration approach identified the existing evolutionary process and established a naturally successional stable C/E-type stream channel. Additionally, soil bioengineering, structural reinforcement, and revetments were applied to promote stability immediately following construction when the stream was most vulnerable. Given the wide floodplain, relatively flat slopes, generally stable nature of the soil, and favorable growing conditions at the site, this restoration approach was an achievable goal. Removal of the majority of invasive species and planting of native vegetative species throughout the existing riparian buffer complemented the channel restoration and promoted climax successional habitat.

Similar to UT1, the restoration approach throughout UT2 entailed establishing a successional C/E-type stream channel while maintaining the ability to accommodate subsequent natural channel evolution towards an E-type channel, as warranted by future influences to the discharge and sediment regime. This was accomplished through application of a Priority 1 design throughout with short segments of Priority 2 design to tie into the incised channels.

Table 1. Project Mitigation Approach

Beaverdam Creek Restoration Site: Project No. D05016-1								
Project Segment or Reach ID	**Existing Footage/Acreage**	**Mitigation Type***	**Approach****	**Linear Footage or Acreage**	**Mitigation Ratio**	**Mitigation Units**	**Stationing**	**Comment**
UT1 (Reach 1)	542	E	EI	567	1.5:1	378	10+00 - 15+67	Low slope, minimal meander and floodplain benching.
UT1 (Reach 2-5)	5796	R	P1	6,310	1:1	6,310	15+67 - 78+77	The beginning of channel utilizes the existing wide, flat floodplain then narrows through the valley and straightens through the Duke Power easement and connects into the mainstem of Beaverdam through a wide, flat floodplain.
UT1B	743	R	P2	778	1:1	778	10+00 - 17+78	The valley is pinched so floodplain grading will create adequate benching.
UT1C	744	R	P1	624	1:1	624	10+00 - 16+24	Step-pool design dominated by log drops. The valley is narrow resulting minimal meander.
UT1D	323	R	P1	338	1:1	338	10+00 - 13+38	The channel will have the appropriate belt width throughout the ample floodplain. A series of drop structures at the end of the reach will tie into UT1.
UT2	3130	R	P1	3,448	1:1	3,448	10+00 - 44+48	Increase sinuosity, pool development, and reestablish connection with the floodplain and construct in channel step-pools in areas where the valley is confined and steep.
UT2A	886	R	P1	1,138	1:1	1,138	10+00 - 21+38	A step-pool channel will be constructed in the areas where the valley is confined and steep. Transition connections constructed between the constructed channel and the existing channels.
Beaverdam Creek	1641	P	---	1,641	1:5	328	-	-
UT2	962	P	---	962	1:5	192	-	
Total linear ft of channel restored or				15,806				
Mitigation Unit Summation for Streams:				13,534				

* R = Restoration
E = Enhancement
P = Preservation

** P1 = Priority I
P2 = Priority II
P3 = Priority III
EI = Enhancement I

1.4 Project History and Background

The chronology of the Beaverdam Creek Restoration Project is presented in Table 2. The contact information for all designers, contractors, and relevant suppliers is presented in Table 3. Relevant project background information is presented in Table 4.

Table 2. Project Activity and Reporting History

Beaverdam Creek Restoration Site: Project No. D05016-1			
Activity or Report	**Scheduled Completion**	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan Prepared	Nov-05	N/A	
Restoration Plan Amended	Dec-05	N/A	
Restoration Plan Approved	Dec-05	N/A	
Final Design – (at least 90% complete)	Dec-05	N/A	
Construction Begins	May-06	N/A	Jun-06
Temporary S&E mix applied to entire project area	N/A	N/A	Jan-07
Permanent seed mix applied to entire project area	Mar-06	N/A	Jan-07
Planting of live stakes	Nov-06	N/A	Jan-07
Planting of bare root trees	Nov-06	N/A	Jan-07
Survey of As-built conditions (Year 0 Monitoring-baseline)	Jan-07	Mar-07	Apr-07
Repair work			
Year 1 Monitoring	Dec-07	Nov-07	Dec-07
Year 2 Monitoring	Dec-08	Unknown	Unknown
Year 3 Monitoring	Dec-09	Unknown	Unknown
Year 4 Monitoring	Dec-10	Unknown	Unknown
Year 5 Monitoring	Dec-11	Unknown	Unknown

Table 3. Project Contact

Beaverdam Creek Restoration Site: Project No. D05016-1	
Full Service Delivery Contractor	
Riverworks	8000 Regency Parkway, Suite 200 Cary, NC 27518 Contact: Will Pedersen, Tel. 919-459-9001
Designer	
Baker Engineering	8000 Regency Parkway, Suite 200 Cary, NC 27518 Contact: Kevin Tweedy, Tel 919-463-5488

Table 3. Project Contact

Beaverdam Creek Restoration Site: Project No. D05016-1	
Construction Contractor	
Riverworks	8000 Regency Parkway, Suite 200 Cary, NC 27518 Contact: Will Pedersen, Tel. 919-459-9001
Planting Contractor	
Riverworks	8000 Regency Parkway, Suite 200 Cary, NC 27518 Contact: Will Pedersen, Tel. 919-459-9001
Seeding Contractor	
Riverworks	8000 Regency Parkway, Suite 200 Cary, NC 27518 Contact: Will Pedersen, Tel. 919-459-9001
Seed Mix Sources	Mellow Marsh Farm, 919-742-1200
Nursery Stock Suppliers	Mellow Marsh Farm, 919-742-1200 International Paper, 1-888-888-7159
Monitoring Performers	
Baker Engineering	1447 S. Tryon Street, Suite 200 Charlotte, NC 28203
Stream Monitoring Point of Contact:	Ian Eckardt, Tel.704-334-4454
Vegetation Monitoring Point of Contact:	Ian Eckardt, Tel. 704-334-4454

Table 4. Project Background

Beaverdam Creek Restoration Site: Project No. D05016-1	
Project County:	Mecklenburg County, NC
Drainage Area:	
UT1 (Reach 1)	0.70 mi^2
UT1 (Reach 2-5)	1.73 mi^2
UT1B	0.34 mi^2
UT1C	0.15mi^2
UT1D	0.16 mi^2
UT2	0.3 mi^2
UT2A	0.1 mi^2
Estimated Drainage % Impervious Cover:	
UT1 (Reach 1)	15%
UT1 (Reach 2-5)	12%
UT1B	10%
UT1C	5%
UT1D	21%
UT2	4%
UT2A	2%

Table 4. Project Background Table

Beaverdam Creek Restoration Site: Project No. D05016-1	
Stream Order:	
UT1 (Reach 1)	1
UT1 (Reach 2-5)	2
UT1B	1
UT1C	1
UT1D	1
UT2	1
UT2A	1
Physiographic Region	Piedmont
Ecoregion	Southern Outer Piedmont
Rosgen Classification of As-Built	
UT1 (Reach 1)	C/E
UT1 (Reach 2-5)	C/E
UT1B	C/E
UT1C	C/E
UT1D	C/E
UT2	C/E
UT2A	C/E
Cowardin Classification	Riverine, Upper Perennial, Unconsolidated Bottom, Cobble-Gravel
Dominant Soil Types	
UT1 (Reach 1)	MO
UT1 (Reach 2-5)	MO, DaD, CeD2, PaE
UT1B	MO
UT1C	MO, PaE, CeD2
UT1D	MO, PaE, CeD2
UT2	MO, CeD2
UT2A	MO
Reference site ID	Spencer Creek, UT to Spencer Creek, McDowell Park, Latta Plantation, McClintock Creek (McNair & Stockwood), UT to Cleghorn, UT to Lake Jeanette, UT to Big Lost Cove
USGS HUC for Project and Reference sites	3050101170040
NCDWQ Sub-basin for Project and Reference	03-08-34
NCDWQ classification for Project and Reference	C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor?	N/A
% of project easement fenced	10%

1.5 Project Plan

Plans depicting the as-built conditions of the major project elements, location of permanent monitoring cross-sections, and locations of permanent vegetation monitoring plots are presented in Appendix C of this report.

2.0 VEGETATION MONITORING

2.1 Soil Data

The soil data for the Site is presented in Table 5.

Table 5. Soil Data for Project

Beaverdam Creek Restoration Site: Project No. D05016-1					
Series	Max Depth (in)	% Clay on Surface	K	T	OM %
Cecil Sandy Clay Loam (CeD2)	80	20-35	0.28	5	0.5-1
Monacan Loam (MO)	80	7-27	0.43	5	2-3
Davidson sandy clay loam (DaD)	75	20-35	0.28	5	0.5-2
Pacolet sandy loam (PaE)	62	8-20	0.2	5	0.5-2
Pacolet sandy loam (PaF)	62	8-20	0.2	5	0.5-2

NRCS, USDA. Official Soil Series Descriptions (http://soils.usda.gov/soils/technical/classification/osd/index.html)

General taxonomy of soils:

Cecil: The Cecil series consists of well-drained soils with moderate permeability on and near floodplains. They formed in residuum weathered felsic igneous and metamorphic rock, such as granite. Slopes range from 8 to 15 percent.

Monacan: Soils of the Monacan series are deep, moderately well and somewhat poorly drained with moderate permeability. They formed in recent alluvial sediments of the Piedmont and Coastal Plain. Slopes are commonly less than 2 percent.

Pacolet: The Pacolet series consists of very deep, well drained, moderately permeable soils that formed in material weathered mostly from acid crystalline rocks of the Piedmont uplands. Slopes commonly are 15 to 25 percent but range up to 2 to 60 percent.

Davidson: The Davidson series consists of very deep, well drained moderately permeable soils that formed in materials weathered from dark colored rocks high in ferromagnesian minerals. These soils are on gently sloping to moderately steep uplands in the Piedmont. Slopes are commonly 2 to 15 percent but range up to 25 percent.

2.2 Description of Species and Monitoring Protocol

The Site was planted in bottomland hardwood forest species in early – mid March of 2007. There were twenty-four vegetation-monitoring plots established throughout the planting areas.
The following tree species were planted in the restoration area:

Table 6. Tree Species Planted in the Beaverdam Restoration Area

Beaverdam Creek Restoration Site: Project No. D05016-1

ID	Scientific Name	Common Name	FAC Status
1	*Alnus serrulata*	Tag Alder	FACW+
2	*Asimina triloba*	Paw paw	FAC
3	*Cercis canadensis*	Redbud	FACU
4	*Celtis laevigata*	Sugarberry	FACW
5	*Cephalanthus occidentalis*	Buttonbush	OBL
6	*Cornus amomum*	Silky Dogwood	FACW+
7	*Cornus florida*	Flowering Dogwood	FACU
8	*Diospyros virginiana*	Persimmon	FAC
9	*Fraxinus pennsylvanica*	Green Ash	FACW
10	*Juglan nigra*	Black Walnut	FACU
11	*Liriodendron tulipiferra*	Tulip poplar	FACW
12	*Platanus occidentalis*	Sycamore	FACW-
13	*Nyssa sylvatica*	Blackgum	FAC
14	*Quercus michauxii*	Swamp chestnut oak	FACW-
15	*Quercus phellos*	Willow oak	FACW-
16	*Quercus rubra*	Red oak	FACU
17	*Sambucus candensis*	Elderberry	FACW-
18	*Viburnum dentatum*	Arrow-wood viburnum	FAC

(Radford, et al., 1968 and Resource Management Group, Inc., 1999)

The following monitoring protocol was designed to predict vegetative survivability. Twenty-four plots were established throughout the Beaverdam Creek Site. The number of sites was based on the species/area curve method and their location was based on EEP monitoring guidance. The size of individual quadrants was 100 square meters for woody tree species, 25 square meters for shrubs, and 1 square meter for herbaceous vegetation. The locations of the vegetation plots are shown on the as-built plan sheets in Appendix C.

Individual quadrant data provided includes density and coverage quantities. Relative values were calculated, and importance values were determined. Individual seedlings were marked to ensure that they can be found in succeeding monitoring years. Mortality was determined from the difference between the previous year's living, planted seedlings and the current year's living, planted seedlings.

2.3 Vegetation Success Criteria

The interim measure of vegetative success for the Site will be the survival of at least 320 3-year old planted trees per acre at the end of year three of the monitoring period. The final vegetative success

criteria will be the survival of 260 5-year old planted trees per acre at the end of year five of the monitoring period.

2.4 Results of Vegetative Monitoring

The following tables present stem counts for each of the monitoring plots. Each planted tree species is identified down the left column, and each plot is identified across the top row. The numbers on the top row correlate to the ID column of the table. Trees are flagged in the field on an as-needed basis before the flags degrade. Flags are utilized, because they will not interfere with the growth of the tree. Volunteer species are also flagged during this process.

During the initial counts of species totals during the as-built monitoring report, some tree species were unidentifiable (no buds or leafs) and documented as *Unknown Quercus* in the stem plot counts or were labeled incorrectly. During Year 1 vegetative monitoring, three of the four *Unknown Quercus* have been identified as *Quercus michauxii* and updated in the Year 1 vegetative totals in Table 7. In addition, tree species that were labeled incorrectly have been updated and coded within Table 7 to represent the correction.

The average stem count per acre for Year 1 Monitoring was 572. The range of stem counts throughout the 24 vegetative monitoring plots was from 440 – 1000. The current survivability rate for Year 1 is 91.5%. The data reflects that the overall site is on trajectory for meeting the minimum success interim criteria of 320 trees per acre by the end of year three and the final success criteria of 260 trees per acre by the end of year five.

No volunteer species were noted in any of the Site's vegetation plots, or were too small to verify. If any woody volunteer species are observed in subsequent monitoring years they will be flagged and added to the overall stems per acre assessment of the Site.

Table 7. Year 1 Stem Counts for Each Species Arranged by Plot

Beaverdam Creek Restoration Site : Project No. D05016-1																												
	Plots																									Initial Totals	Year 1 Totals	% Survival
	UT1																	UT2										
Tree Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	2	3	4	5	6	7			
Alnus serrulata									2																2	2	100.0
Asimina tuiloba								4	5		4	4	1												21	18	85.7
Cercis canadensis									1						1		1								3	3	100.0
Celtis laevigata	1													2											6	3	50.0
Cephalanthus occidentalis									1																1	1	100.0
Cornus amomum																									1	0	0.0
Cornus florida					1												2								2	3	150.0
Diospyros virginiana		1													1								1		3	3	100.0
Fraxinus pennsylvanica	4			4	7	1	6	1			1	3	3	3	6	5		3	13		2	8	5	1	77	76	98.7
Juglan nigra	1	2	1	1		4	1	2		8	1	3	2			1						1			31	28	90.3
Liriodendron tulipiferra	1		1	1	1	1	3			2		4		2	1	1	2	3		1	2	1		2	36	29	80.6
Platanus occidentalis		2		2	4	5	2	7		3				1		1	1	2		7	7		1	1	54	46	85.2
Nyssa sylvatica	4	1	2	4		1		1				1	7		3	3	5	3		3	2		8	2	55	50	90.9
Quercus michauxii	1	4	7	2			2	7			1	2	3	3	2	1	4	5			3	7	2	1	55	57	103.6
Quercus phellos	1	1	2	1	1		1	3		1	4		1			3		1							20	20	100.0
Quercus rubra														1											1	1	100.0
Sambucus candensis																									1	0	0.0
Vibernum dentatum									2																2	2	100.0
Unknown Quercus													1												4	1	25.0
Stems/plot	13	11	13	15	14	12	15	25	11	14	11	17	18	12	14	15	15	17	13	11	16	17	17	7	375	343	91.5
Stems/acre	520	440	520	600	560	480	600	1000	440	560	440	680	720	480	560	600	600	680	520	440	640	680	680	280	**572**	**average**		

Tree # 3-7 was mislabeled as Platanus occidentalis in As-built Initial Counts

Tree # 3-16 was mislabeled as Liriodendron tulipifera in As-built Initial Counts

Tree # 7-10 was mislabeled as Asimina tuiloba in As-built Initial Counts

Tree # 7-2, -3, -4 were mislabeled as Fraxinus pennsylvanica in As-built Initial Counts

Tree # 14-5, -8, -10 were mislabeled as unknown in As-built Initial Counts

Tree # 7-21 was labeled as Liriodendron tulipifera in the field but was not added in the As-built Initial Counts

2.5 Vegetation Observations

Just following construction of the site, a 3.5-inch precipitation event occurred and caused minor bank destabilization and required various sections of UT1 to be reseeded. At this time, channel degradation that was caused by the storm event was repaired. During repair of the channel, large equipment accessed the site. Additional live stakes were replanted along the channel where needed for restabilization.

During the Year 1 Monitoring site visit the stream-side vegetation was noted as being successfully reestablished. In addition, the annual herbaceous plant *Bidens frondosa (tickseed sunflower)* intended as a nurse crop, to discourage aggressive weeds while the permanent seedlings become established, has been successful throughout the Site (USDA, 2007). See Project ID photos in Appendix A.

2.6 Vegetation Problem Areas

At this time, there seem to be no invasive species problem areas throughout the project site. However, though none seem to be posing any problems, invasive species can very quickly affect the survivability of the planted stems the weedy species should be maintained aggressively to prevent any major mortality issue.

2.7 Vegetation Photos

Photos of the project showing the on-site vegetation are included in Appendix A of this report.

3.0 STREAM MONITORING

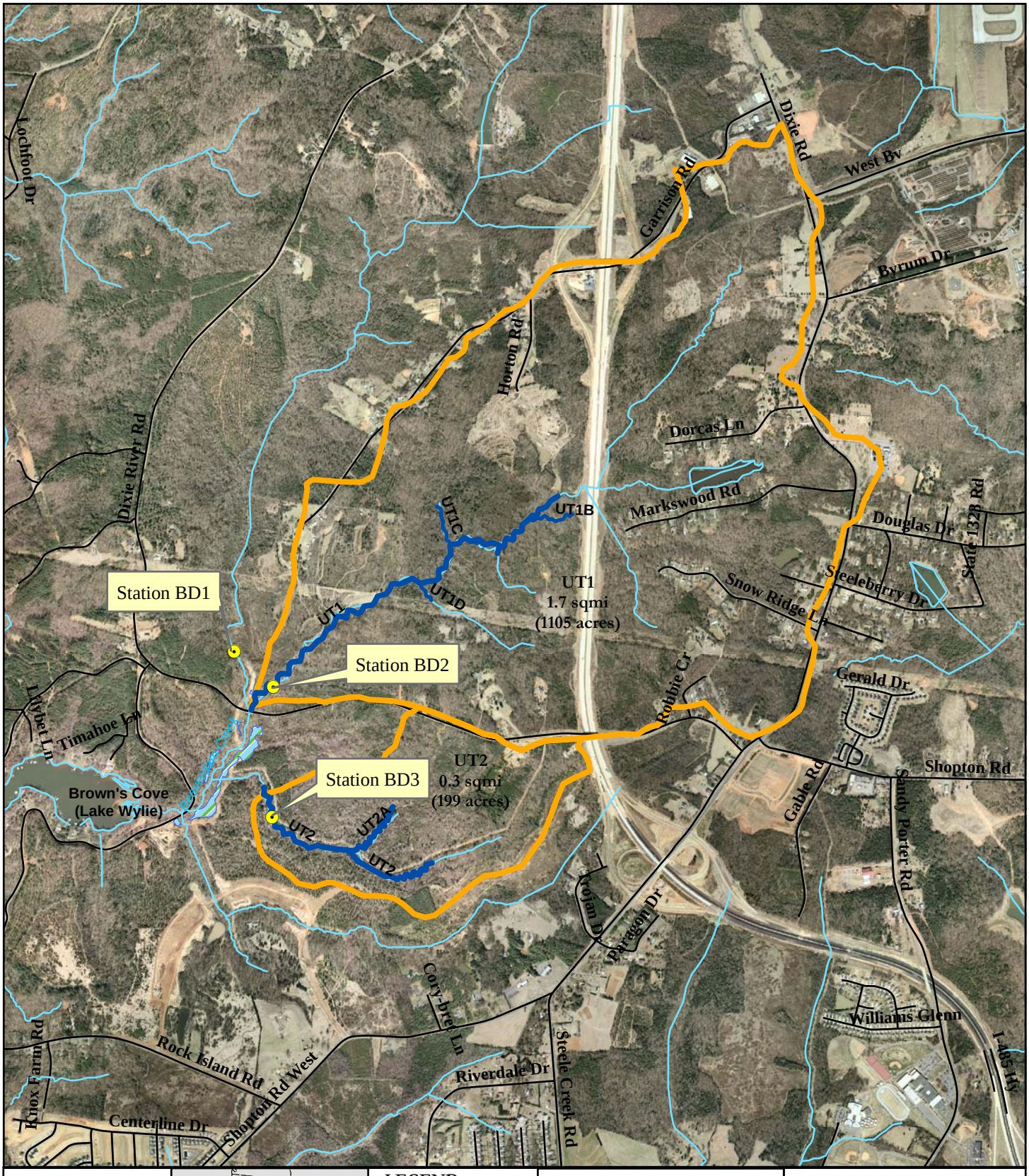
3.1 Description of Stream Monitoring

To document the stated success criteria, the following monitoring program was instituted following construction completion on the Beaverdam Creek Restoration Project:

Bankfull Events: The occurrence of bankfull events within the monitoring period was documented by the use of two automated stage recorders. The University of North Carolina (UNCC) installed and monitored the readings from both stage recorders. Gauging station BD2 was installed on UT1 and gauging station BD3 was installed on UT2. Each data logger recorded the watermark at 15 minute intervals at each Site and was checked at each Site visit to determine if a bankfull event had occurred. Data from stage recorder BD1 was used when BD2 was out of order during the monitoring year. Documentation photos of the bankfull events were not available from UNCC. Figure 4 shows the locations of the stage recorders.

Cross-Sections: Two permanent cross-sections were installed per 1,000 linear feet of stream restoration work, with one located at a riffle cross-section and one located at a pool cross-section. Twenty-four total cross-sections were established. Each cross-section was marked on both banks with permanent pins to establish the exact transect used. A common benchmark was used for cross-sections and consistently referenced to facilitate comparison of year-to-year data. The annual cross-sectional survey included 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 were classified using the Rosgen stream classification system (Rosgen, 1994). Permanent cross-sections for 2007 (Year 1) were surveyed in October 2007.

Longitudinal Profiles: A representative longitudinal profile was surveyed for 2007 (Year 1). The initial 3000 linear feet of profile was collected for the mainstem reaches of UT1and UT2. The entire lengths of UT1B, UT1C, UT1C, and UT2A were also surveyed. Measurements included thalweg, water surface, bankfull, and top of low bank. Each of these measurements was taken at the head of each feature (e.g.,



LEGEND

- Crest Gauges
- As-built Alignments
- Project Watershed Boundary
- Creeks
- Roads

0 950 1,900 3,800 Feet

EEP Contract No.: D05016-1

December 2007

Figure 4: Stage Recorder Locations

Beaverdam Creek
Year 1 Monitoring
Mecklenburg County, NC

Ecosystem Enhancement Program

Baker

riffle, pool, glide). In addition, maximum pool depth was recorded. All survey was tied to a single permanent benchmark.

Bed Material Analysis: Pebble counts were conducted for the permanent cross-sections (100 counts per cross-section) on the project reaches. Pebble count data were plotted on a semi-log graph and are included in Appendix B.

Photo Reference Stations: Photographs were used to visually document restoration success. Fifty-one (51) reference stations were established to document conditions at the constructed grade control structures across the Site. These photos are provided in Appendix A. The GPS coordinates of each photo station were noted as additional reference to ensure the same photo location was used throughout the monitoring period. These stations are included in the As-built Plan Sheets in Appendix C. Reference photos were taken once per year.

Each streambank was photographed at each permanent cross-section photo station. For each streambank photo, the photo view line followed a survey tape placed across the channel, perpendicular to flow (representing the cross-section line). The photograph was framed so that the survey tape is centered in the photo (appears as a vertical line at the center of the photograph), keeping the channel water surface line horizontal and near the lower edge of the frame. These photos are presented along with the cross-section monitoring data in Appendix B.

3.2 Stream Restoration Success Criteria

The approved Mitigation Plan requires the following criteria be met to achieve stream restoration success:

- *Bankfull Events*: Two bankfull flow events must be documented within the five-year monitoring period. The two bankfull events must occur in separate years.
- *Cross-Sections:* There should be little change in as-built cross-sections. If changes to channel cross-section take place, they should be minor changes representing an increase in stability (e.g., settling, vegetative changes, deposition along the banks, or decrease in width/depth ratio).
- *Longitudinal Profiles:* The longitudinal profiles should show that the bedform features are remaining stable (not aggrading or degrading). The pools should remain deep with flat water surface slopes and the riffles should remain steeper and shallower than the pools.
- *Bed Material Analysis*: Pebble counts should indicate maintenance of bed material.
- *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. Photos should indicate the absence of developing bars within the channel, no excessive bank erosion or increase in channel depth over time, and maturation of riparian vegetation.

3.3 Bankfull Discharge Monitoring Results

On-site data loggers documented the occurrence of one bankfull flow event during the first year (2007) of the post-construction monitoring period (Table 8). During the bankfull occurrence data logger BD2 was inoperable, so BD1 on Beaverdam Creek, upstream of the confluence with UT1, was used to document the bankfull event. UNCC inspection of the Site revealed visual evidence of out-of-bank flow, confirming the data logger reading. The largest stream flow documented by the data loggers during Year 1 monitoring were a stage height of 2.75 feet for BD1 and 0.84 feet for BD3.

Table 8. Verification of Bankfull Events

Beaverdam Creek Restoration Site: Project No. D05016-1				
Station Number	Date of Data Collection	Date of Occurence of Bankfull Event	Method of Data Collection	Gage Height (feet)
BD1	N/A	2/13/2007	Datalogger	2.75
BD3	N/A	2/14/2007	Datalogger	0.84

BD2 was out of order on the date of the bankfull event

3.4 Stream Monitoring Data and Photos

A photo log of the project showing each of the fifty-one (51) permanent photo locations is included in Appendix A of this report. Survey data and photos from each permanent cross-section are included in Appendix B of this report.

3.5 Stream Stability Assessment

Table 9 presents a summary of the results obtained from the visual inspection of in-stream structures performed during Year 1 of post-construction monitoring. The percentages noted are a general overall field evaluation of how the features were performing after the repair work had been completed at the time of the last photo point survey on November 21, 2007. These percentages are solely based on the field evaluator's visual assessment at the time of the site visit.

Visual observations of the various structures throughout Year 1 growing season indicated that structures were functioning as designed and holding their elevation grade. Root wads placed on the outside of meander bends provided bank stability and in-stream cover for fish and other aquatic organisms. Cover logs placed in meander pool areas allowed scour to keep pools deep and provide cover for fish.

The result of a large storm event that produced 3.5 inches of rain on the project site shortly after construction was completed resulted in a few minor scour areas along UT1. Scour was evident immediately underneath a few cover log and log vane structures resulting in a minor decrease in performance. This was observed at stations 41+50, 53+80, 56+00, 56+50, and 63+90. In addition, isolated pockets of bed scour, resulting in a performance score of 99%, were also observed at stations 50+15, 56+00, 56+50, and 63+90. All of the areas of scour are minor and should not result in any future problems with stream stability.

Table 9. Categorical Stream Feature Visual Stability Assessment

Beaverdam Creek Restoration Site : Project No. D05016-1						
	Performance Percentage					
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	100%				
Pools	100%	100%				
Thalweg	100%	100%				
Meanders	100%	100%				
Bed General	100%	99%				
Vanes / J Hooks etc.	100%	97%				
Wads and Boulders	100%	100%				

3.6 Cross-section, Longitudinal Profile, and Bed Material Analysis Monitoring Results

Cross Sections

Year 1 cross-section monitoring data for stream stability was collected during October 2007 and compared to as-built conditions (collected March 2007).

The twenty four permanent cross-sections along the restored channels (twelve located across riffles and twelve across pools) were re-surveyed to document stream dimension at the end of the first monitoring year (Year 1). Cross-sections are provided in Appendix B, and data from the cross-sections are summarized in Appendix E. The cross-sections show that there has been minor adjustment to stream dimension within the last year.

A few cross-sections show point bar formation along UT1 and include cross-sections 3, 10, 11, and 13, which are located across pools found at the apex of a meander bend. Flow through a meander bend possesses higher conveyance velocity along its boundary with the outer bank of the bend, and lower flow velocity along its boundary with the bend's inner bank. As flow reduces, its sediment transport capacity also reduces, causing flow to drop some of its transported sediment as it slows down. Point bar formation along the inside of a meander bend indicates flow velocity vectors occurring as designed, and is therefore expected. Cross-section 10 has slightly aggraded along the outside bank of a meander. This channel geometry reflects a plug of sediment deposited during the large storm event that occurred shortly after construction was completed. Drought conditions haven't allowed flow to correct channel geometry in this meander bend.

Longitudinal Profiles

The Year 1 longitudinal profile was conducted during November 2007. The initial 3,000 LF of channel was surveyed along the mainstem of UT1 and UT2. The entire lengths of UT1B, UT1C, UT1D, and UT2A were also collected. The longitudinal profile is included in Appendix B. A summary of parameters measured are provided in Appendix D. Please note that this summary represents only the portion of project that was surveyed.

The representative longitudinal profiles along the restored channels were resurveyed to document stream profile at the end of monitoring Year 1. Drought conditions resulted in little to no water within the restored channels and therefore profile data such as riffle slopes and pool-to-pool spacing could not be calculated. Sinuosity for all restored reaches has remained the same and there's been no measurable change in stream pattern. Though there was some minor areas of bed scour, as mentioned in Section 3.5 of this report, none of the areas need to be addressed, at this time, nor should result any future problems. Inspections of these areas will be performed in subsequent monitoring periods.

Bed Material Analysis

Year 1 bed material samples were collected at each permanent cross-section during October 2007. The pebble count data were plotted on a semi-log graph and will be compared with future monitoring data. Data should indicate a relative coarsening of the riffles (or maintenance of a coarse bed in constructed riffles) and a relative fining in the pools. All pebble count data are provided in Appendix B.

3.7 Areas of Concern

Adjacent to the Site's property boundaries are new residential developments under construction. During Year 1 Monitoring, several Best Management Practices (BMPs) were noted as areas of concern within and immediately outside the conservation easement along UT2 and UT2A of the Restoration Project. The BMPs consist of both temporary and permanent detention ponds which are discharging stormwater into the Project Site, and a retaining wall. Locations of the BMPs are shown on the as-built plans included in Appendix C.

Currently, none of the BMPs are causing any significant degradation of the restored channels; however, discharge from the BMP adjacent to Station 20+00 along UT2 has caused some minor headcutting below the riffle at the log sill. See Appendix A for photo documentation of the BMP structure and the in-stream impact.

Monitoring of these areas of concern will continue throughout the Project's monitoring period and will be discussed accordingly.

4.0 HYDROLOGY

Rainfall data were collected to document the hydrologic conditions throughout the project area in the 2007 growing season. Since no rain gauges were installed within the project boundaries, monthly rainfall totals were calculated from data downloaded from the Withers Cove USGS gauge 35090308100454 in Mecklenburg County, NC. Historical rainfall data were collected from the Charlotte WSO AP WETS Station in Mecklenburg County (NC 1690) using NRCS National Water and Climate Data Center web-site. Hydrologic monitoring results are shown in Table 10 and Figure 5.

Table 10. Comparison of Historic Rainfall to Observed Rainfall

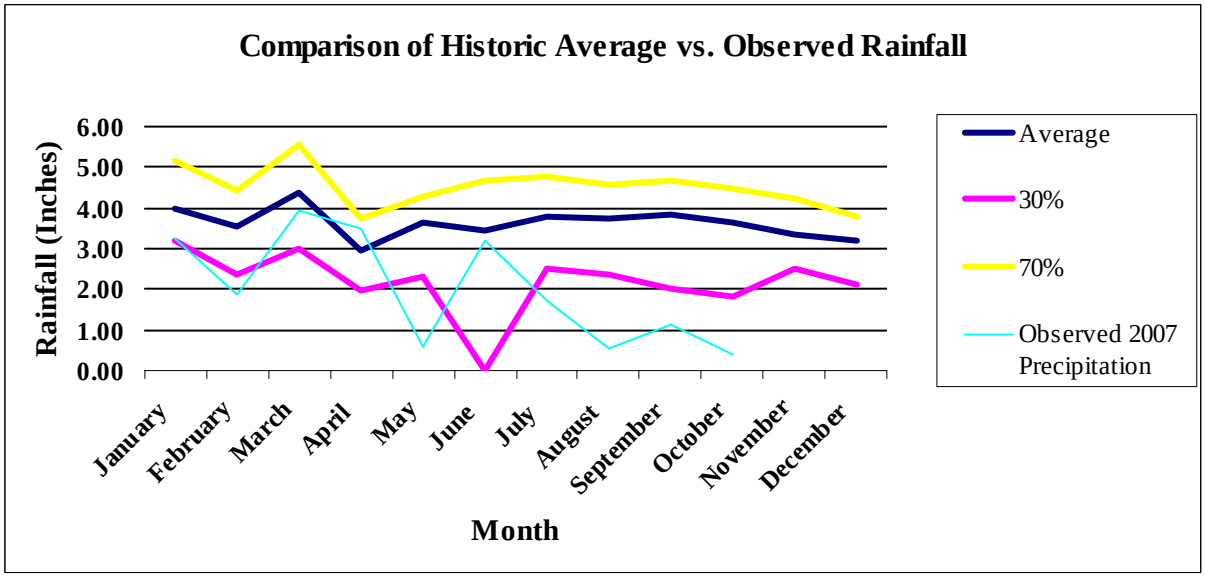
Beaverdam Creek Restoration Site: EEP Contract No. D05016-1				
Month	**Average (in.)**	**30% (in.)**	**70% (in.)**	**Observed 2007 Precipitation (in.)**
January	4.00	3.21	5.15	3.25
February	3.55	2.34	4.42	1.88
March	4.39	3.01	5.54	3.93
April	2.95	1.98	3.73	3.51
May	3.66	2.33	4.29	0.61
June	3.42	2.43	4.68	3.18
July	3.79	2.49	4.76	1.72
August	3.72	2.34	4.57	0.56
September	3.83	2.00	4.68	1.11
October	3.66	1.80	4.49	0.41[A]
November	3.36	2.51	4.24	-
December	3.18	2.11	3.81	-
Total Rainfall	43.51	28.55	54.36	20.16*

(USDA, 2003 and USGS, 2007)

[A] Monthly rainfall data was calculated based on rainfall data from 10/1/07 – 10/23/07 using the nearest USGS rain gauge data (USGS 35090308100454 Withers Cove in Mecklenburg County) to the project site. (USGS, 2007)

*Total Observed Rainfall does not include data from October 23 – 31, November, nor December of 2007.

Figure 5. Historic Average vs. Observed Rainfall



5.0 CONCLUSIONS AND RECOMMENDATIONS

Vegetation Monitoring. Vegetation monitoring efforts have calculated the range of stems per acre for each plot to be from 440 to 1000 stems per acre on the 24 vegetation plots. The average number of stems per acre is 572, which is a survival rate of greater than 91%, based on the initial planting count of 625 stems per acre. Assuming that preventative methods will be used to maintain the invasive exotics, vegetation survivability should remain excellent on the Site and vegetative success criteria will be met.

Stream Monitoring. The total length of stream channel restored and/or preserved on the Site was 15,806 linear feet. This entire length was inspected during Year 1 of the monitoring period (2007) to assess stream performance. Based on the data collected, all riffles, pools, and other constructed features along the restored channel are stable and functioning as designed. Minor bed scour was noted at isolated pockets along UT1. The lack of major problem areas along the length of the restored channels after the occurrence of a stream flow event larger than bankfull discharge further supports functionality of the design. It is expected that stability and in-stream habitat of the system will improve in the coming years as permanent vegetation becomes more established.

6.0 WILDLIFE OBSERVATIONS

Observations of deer and raccoon tracks are common on the Site. During certain times of the year, frogs, turtles, turkey, and fish have also been periodically observed.

7.0 REFERENCES

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APPENDIX A

Photo Log

PHOTO LOG – UT1

UT1 – PID 1

UT1 – PID 2

UT1 – PID 3

UT1 – PID 4

UT1 – PID 5

UT1 – PID 6

PHOTO LOG – UT1

UT1 – PID 7

UT1 – PID 8

UT1 – PID 9

UT1 – PID 10

UT1 – PID 11

UT1 – PID 12

PHOTO LOG – UT1

UT1 – PID 13

UT1 – PID 14

UT1 – PID 15

UT1 – PID 16

UT1 – PID 17

UT1 – PID 18

PHOTO LOG – UT1

UT1 – PID 19

UT1 – PID 20

UT1 – PID 21

UT1 – PID 22

UT1 – PID 23

PHOTO LOG – UT1B, UT1C, & UT1D

UT1B – PID 1

UT1B – PID 2

UT1B – PID 3

UT1B – PID 4

UT1B – PID 5

UT1C – PID 6

PHOTO LOG – UT1B, UT1C, & UT1D

UT1C – PID 7

UTIC – PID 8

UT1C – PID 9

UT1D – PID 10

UT1D – PID 11

UT1D – PID 12

PHOTO LOG – UT2 & UT2A

UT2 – PID 1

UT2 – PID 2

UT2 – PID 3

UT2 – PID 4

UT2 – PID 5

UT2 – PID 6

PHOTO LOG – UT2 & UT2A

UT2 – PID 7

UT2 – PID 8

UT2 – PID 9

UT2 – PID 10

UT2 – PID 11

UT2 – PID 12

PHOTO LOG – UT2 & UT2A

UT2A – PID 1

UT2A – PID 2

UT2A – PID 3

UT2A – PID 4

VEG PLOT PHOTOS – UT1 & UT1B – UT1D

UT1 – Veg Plot 1

UT1 – Veg Plot 2

UT1 – Veg Plot 3

UT1 – Veg Plot 4

UT1 – Veg Plot 5

UT1 – Veg Plot 6

VEG PLOT PHOTOS – UT1 & UT1B – UT1D

UT1 – Veg Plot 7

UT1 – Veg Plot 8

UT1 – Veg Plot 9

UT1 – Veg Plot 10

UT1 – Veg Plot 11

UT1 – Veg Plot 12

VEG PLOT PHOTOS – UT1 & UT1B – UT1D

UT1 – Veg Plot 13

UT1 – Veg Plot 14

UT1B – Veg Plot 15

UT1C – Veg Plot 16

UT1D – Veg Plot 17

VEG PLOT PHOTOS – UT2 & UT2A

UT2A – Veg Plot 1

UT2A – Veg Plot 2

UT2 – Veg Plot 3

UT2 – Veg Plot 4

UT2 – Veg Plot 5

UT2 – Veg Plot 6

VEG PLOT PHOTOS – UT2 & UT2A

UT2 – Veg Plot 7

AREA OF CONCERN PHOTOS

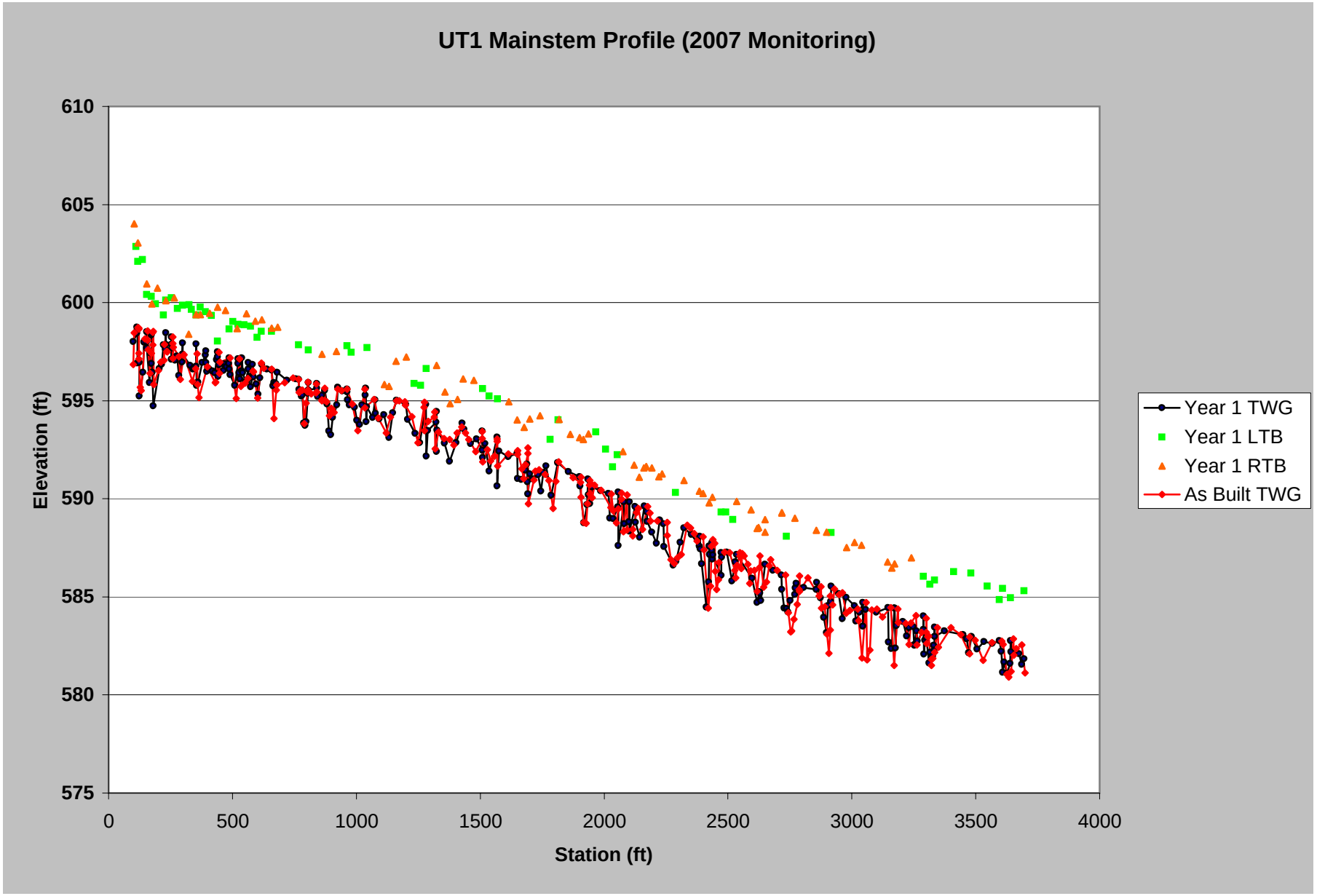
PHOTO LOG – UT2 at STATION 20+00

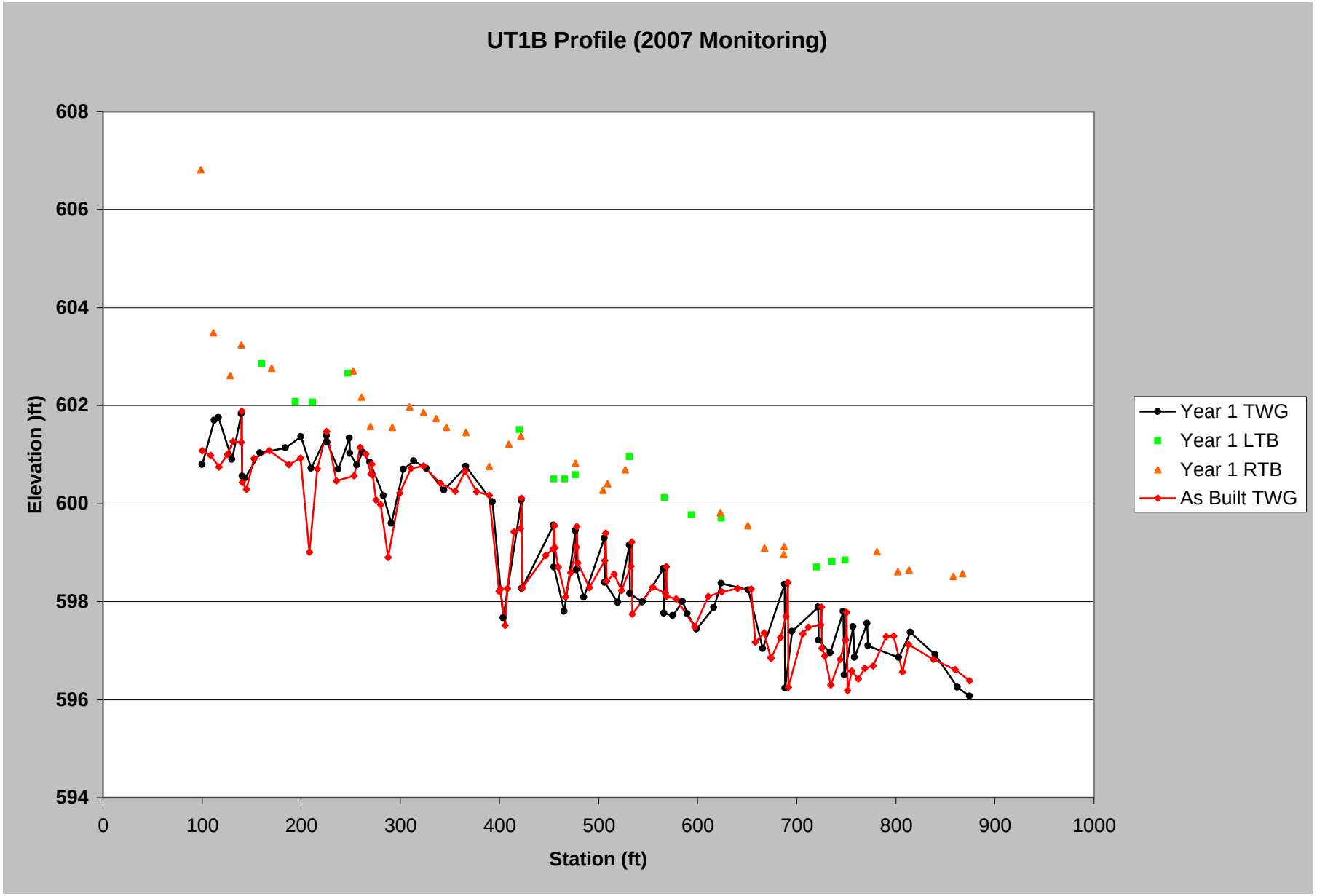
Detention Pond – Adjacent to UT2 at STA 20+00

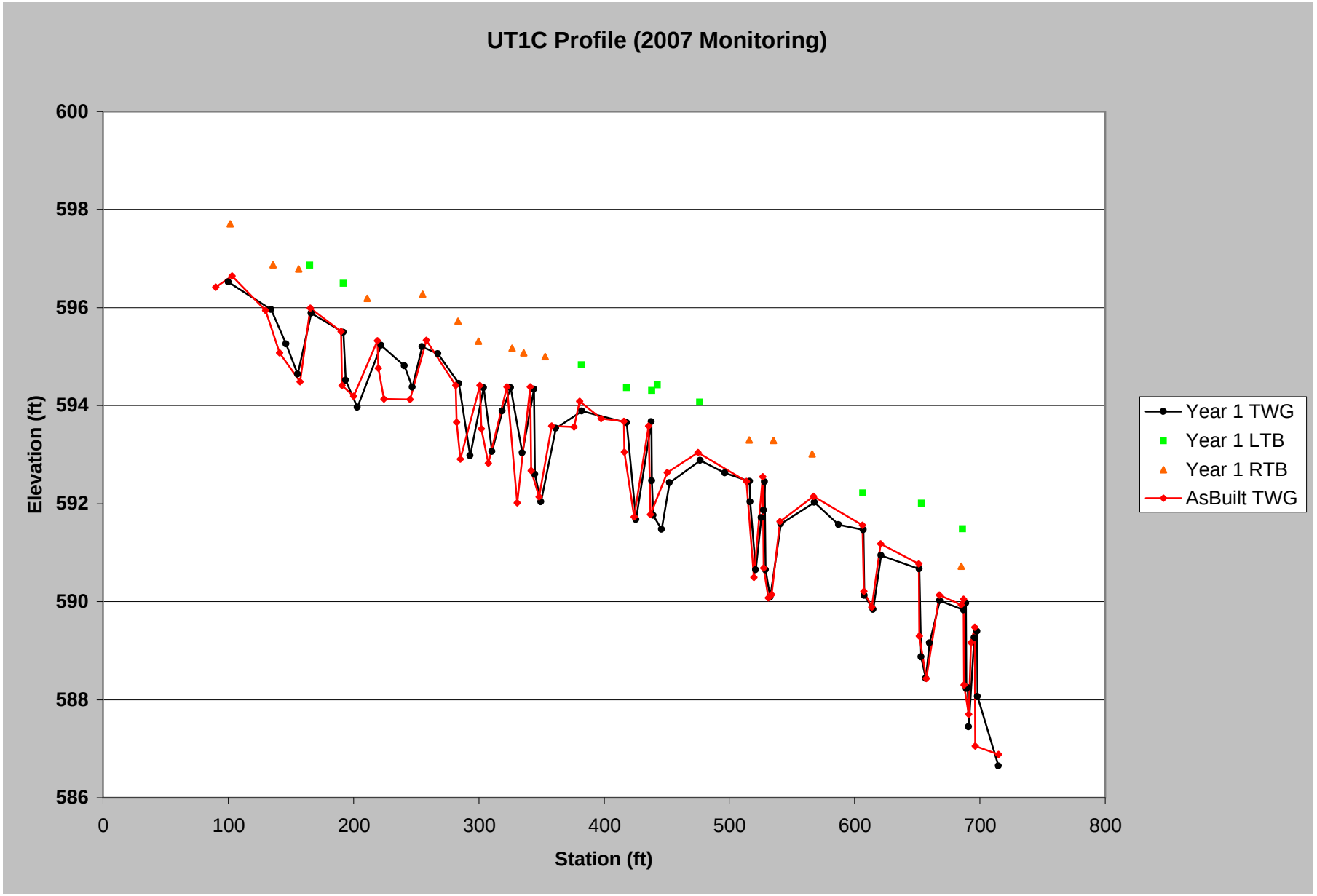
Beginning headcut below riffle at STA 20+00 on UT2

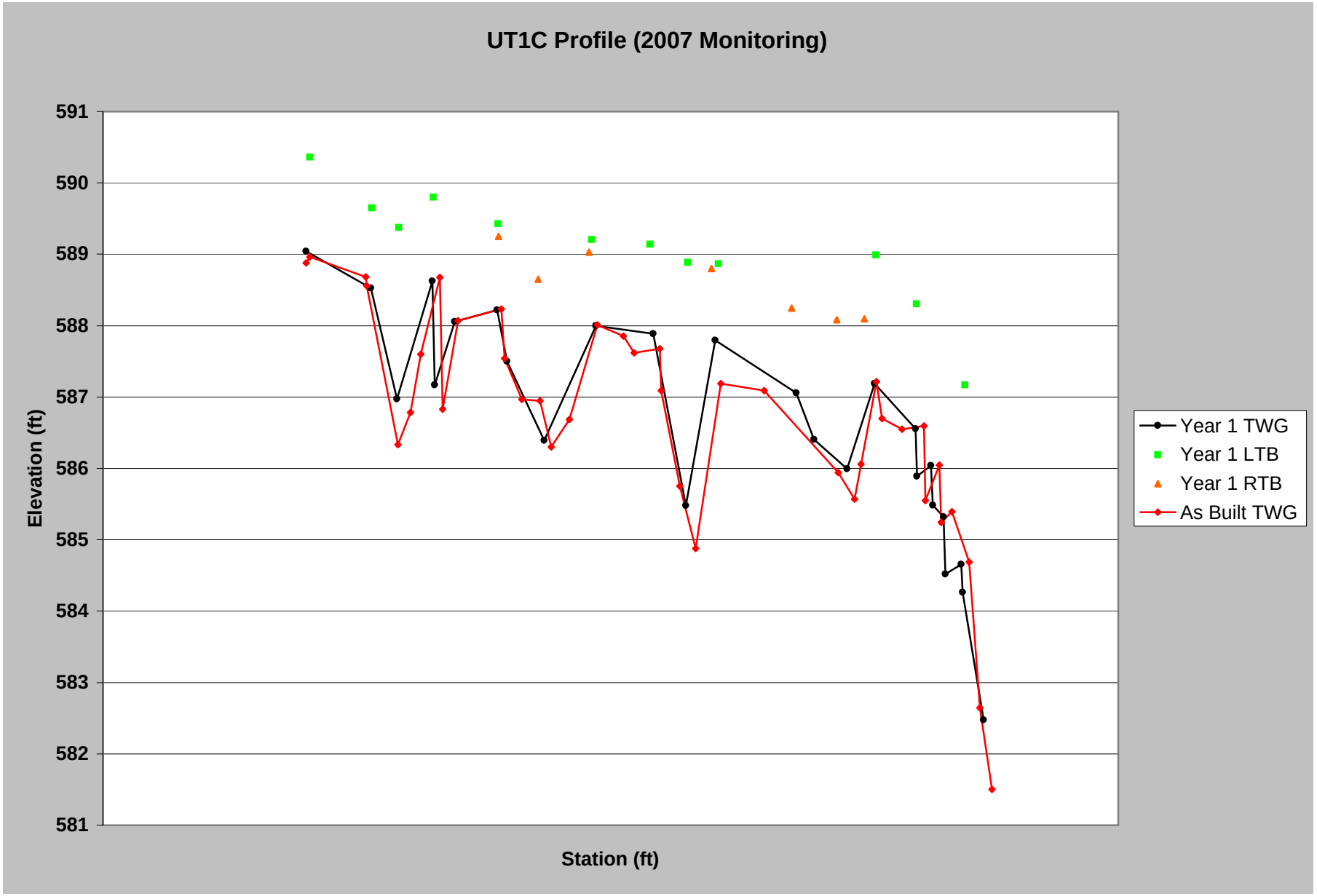
APPENDIX B

STREAM MONITORING DATA


UT1 Mainstem Profile (2007 Monitoring)
Elevation (ft)
610
605
600
595
590
585
580
575
0
500
1000
1500
2000
2500
3000
3500
4000
Station (ft)
Year 1 TWG
Year 1 LTB
Year 1 RTB
As Built TWG


UT1B Profile (2007 Monitoring)
608
606
604
602
600
598
596
594
Elevation)ft)
0
100
200
300
400
500
600
700
800
900
1000
Station (ft)
Year 1 TWG
Year 1 LTB
Year 1 RTB
As Built TWG


UT1C Profile (2007 Monitoring)
600
598
596
594
592
590
588
586
Elevation (ft)
0
100
200
300
400
500
600
700
800
Station (ft)
Year 1 TWG
Year 1 LTB
Year 1 RTB
AsBuilt TWG


UT1C Profile (2007 Monitoring)
Elevation (ft)
591
590
589
588
587
586
585
584
583
582
581
Station (ft)
Year 1 TWG
Year 1 LTB
Year 1 RTB
As Built TWG

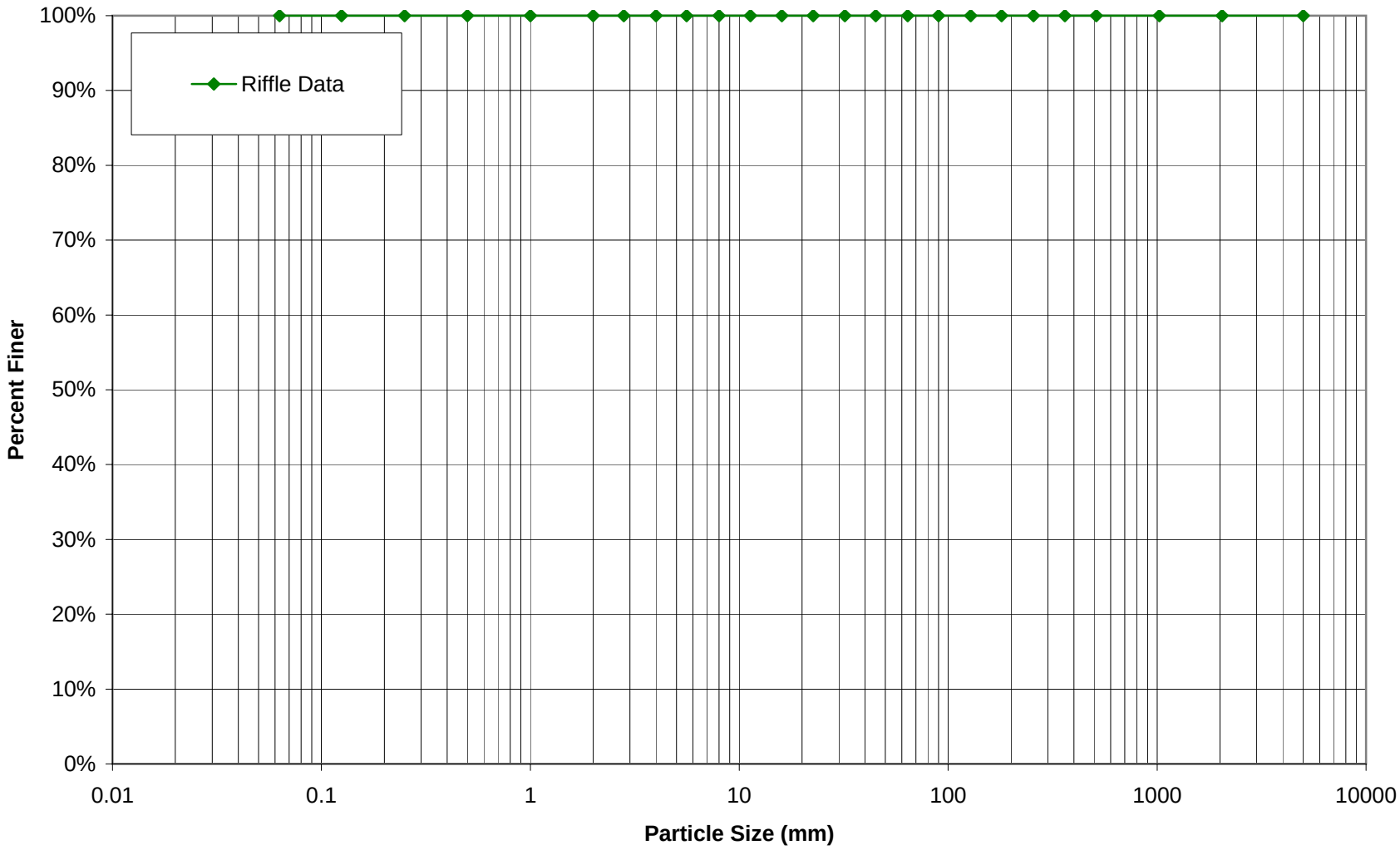
PEBBLE COUNT DATA SHEET: POOL 100-COUNT

	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1 X1-Pool (Reach 1)
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	100	100%	100%	0.063
SAND	Very Fine	.063 - .125			100%	0.125
	Fine	.125 - .25			100%	0.25
	Medium	.25 - .50			100%	0.50
	Coarse	.50 - 1.0			100%	1.0
	Very Coarse	1.0 - 2.0			100%	2.0
GRAVEL	Very Fine	2.0 - 2.8			100%	2.8
	Very Fine	2.8 - 4.0			100%	4.0
	Fine	4.0 - 5.6			100%	5.6
	Fine	5.6 - 8.0			100%	8.0
	Medium	8.0 - 11.0			100%	11.3
	Medium	11.0 - 16.0			100%	16.0
	Coarse	16.0 - 22.6			100%	22.6
	Coarse	22.6 - 32			100%	32
	Very Coarse	32 - 45			100%	45
	Very Coarse	45 - 64			100%	64
COBBLE	Small	64 - 90			100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____ **(riffle)**

Beaverdam Creek UT1 (Reach 1)
X1 Pool
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

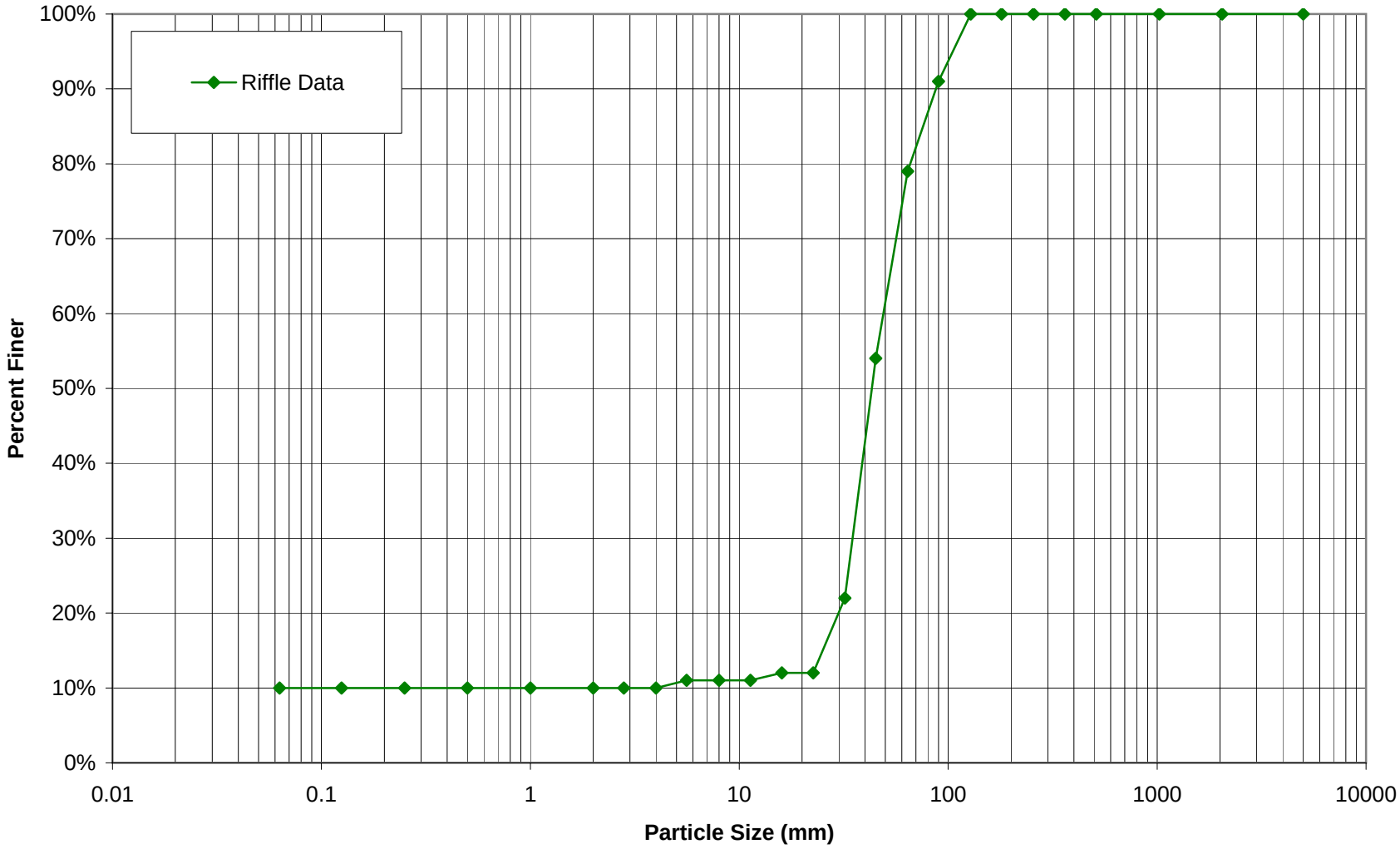
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1 X2-Riffle (Reach 1)
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	10	10%	10%	0.063
SAND	Very Fine	.063 - .125			10%	0.125
	Fine	.125 - .25			10%	0.25
	Medium	.25 - .50			10%	0.50
	Coarse	.50 - 1.0			10%	1.0
	Very Coarse	1.0 - 2.0			10%	2.0
GRAVEL	Very Fine	2.0 - 2.8			10%	2.8
	Very Fine	2.8 - 4.0			10%	4.0
	Fine	4.0 - 5.6	1	1%	11%	5.6
	Fine	5.6 - 8.0			11%	8.0
	Medium	8.0 - 11.0			11%	11.3
	Medium	11.0 - 16.0	1	1%	12%	16.0
	Coarse	16.0 - 22.6			12%	22.6
	Coarse	22.6 - 32	10	10%	22%	32
	Very Coarse	32 - 45	32	32%	54%	45
	Very Coarse	45 - 64	25	25%	79%	64
COBBLE	Small	64 - 90	12	12%	91%	90
	Small	90 - 128	9	9%	100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	**100**	**100%**		

Largest particles: _____

(riffle)

Beaverdam Creek UT1 (Reach 1)
X2 Riffle
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: POOL 100-COUNT

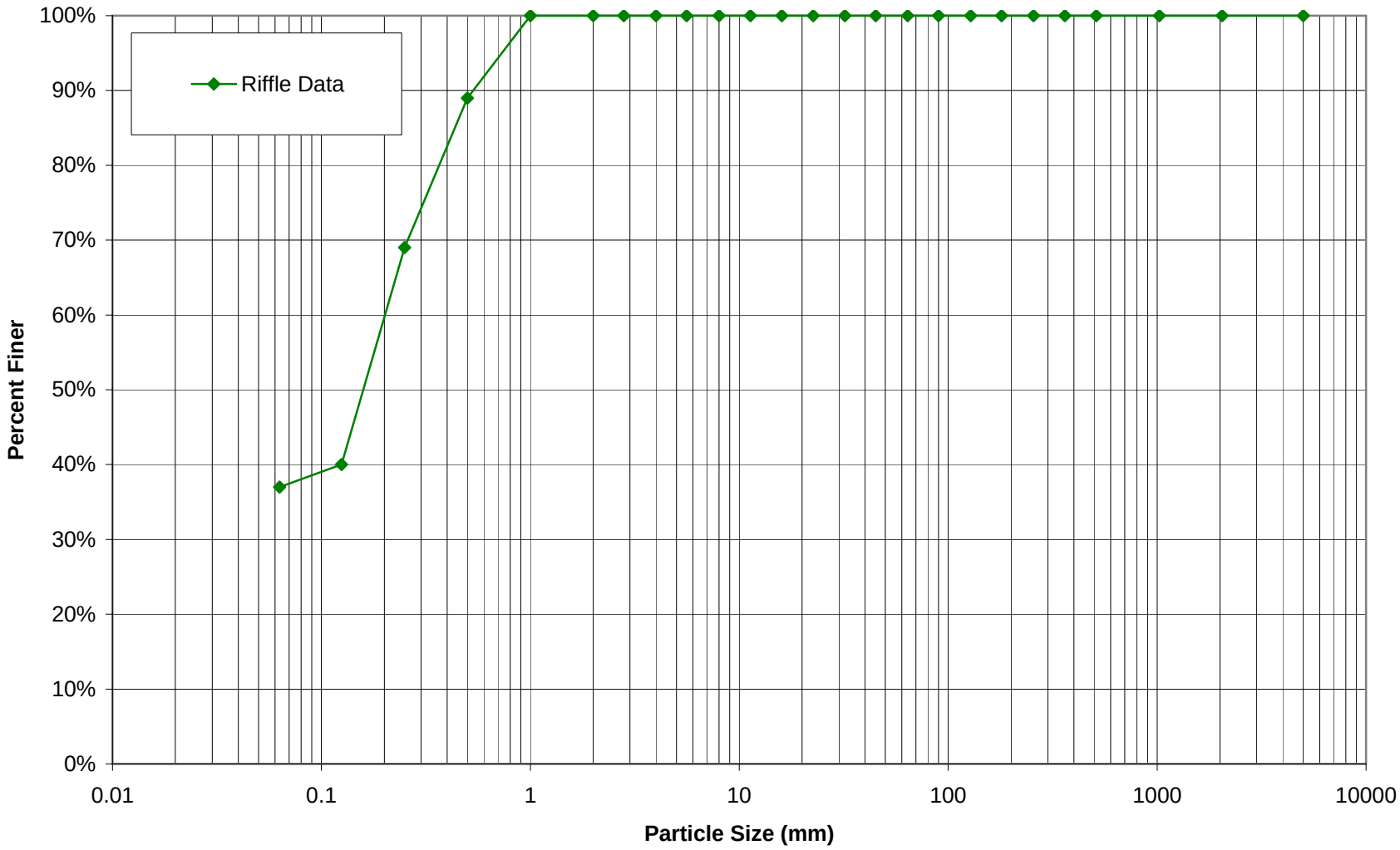
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1B X3-Pool
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	37	37%	37%	0.063
SAND	Very Fine	.063 - .125	3	3%	40%	0.125
	Fine	.125 - .25	29	29%	69%	0.25
	Medium	.25 - .50	20	20%	89%	0.50
	Coarse	.50 - 1.0	11	11%	100%	1.0
	Very Coarse	1.0 - 2.0			100%	2.0
GRAVEL	Very Fine	2.0 - 2.8			100%	2.8
	Very Fine	2.8 - 4.0			100%	4.0
	Fine	4.0 - 5.6			100%	5.6
	Fine	5.6 - 8.0			100%	8.0
	Medium	8.0 - 11.0			100%	11.3
	Medium	11.0 - 16.0			100%	16.0
	Coarse	16.0 - 22.6			100%	22.6
	Coarse	22.6 - 32			100%	32
	Very Coarse	32 - 45			100%	45
	Very Coarse	45 - 64			100%	64
COBBLE	Small	64 - 90			100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(pool)

Beaverdam Creek UT1B
X3 Pool
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

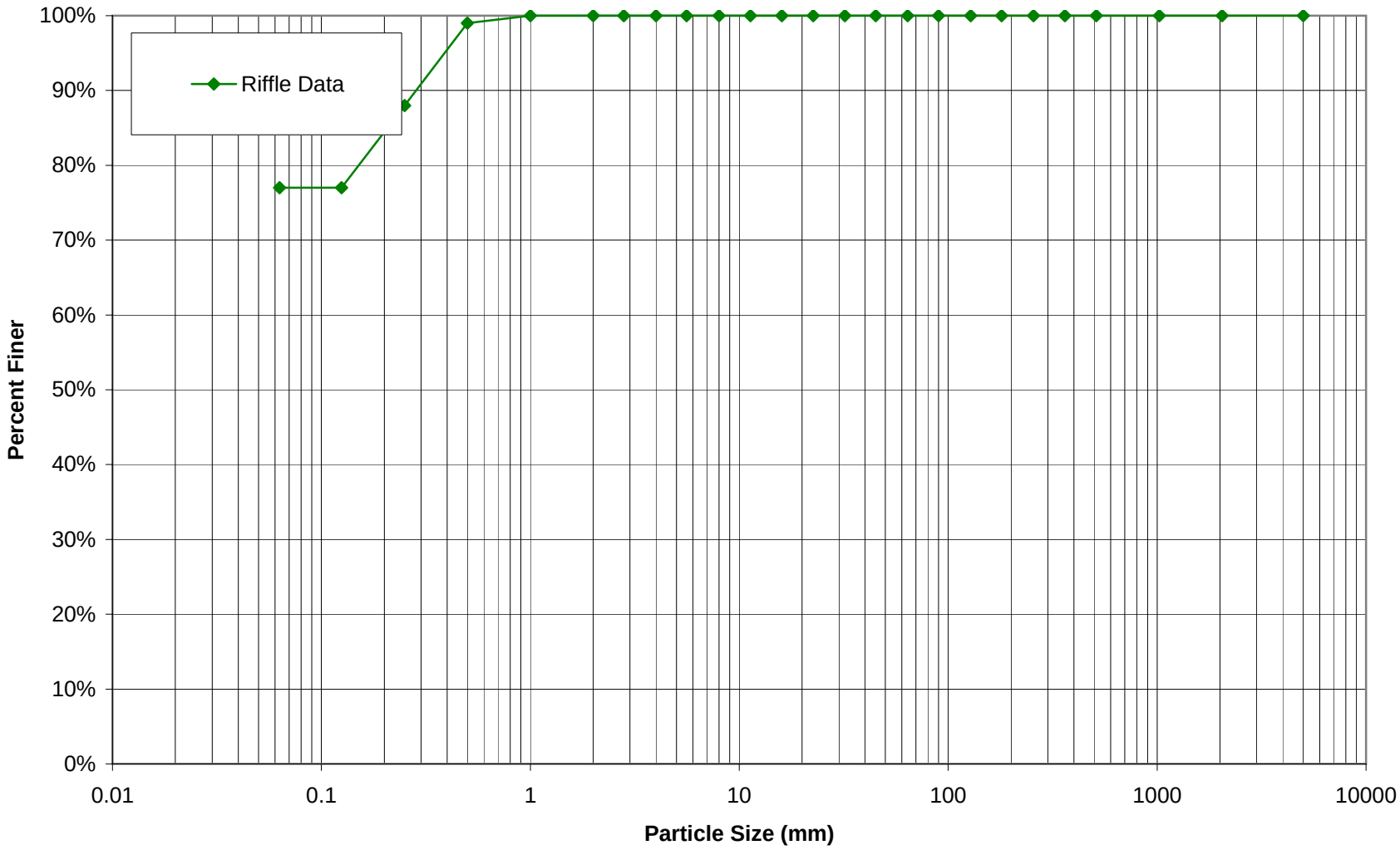
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1B X4-Riffle
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	77	77%	77%	0.063
SAND	Very Fine	.063 - .125			77%	0.125
	Fine	.125 - .25	11	11%	88%	0.25
	Medium	.25 - .50	11	11%	99%	0.50
	Coarse	.50 - 1.0	1	1%	100%	1.0
	Very Coarse	1.0 - 2.0			100%	2.0
GRAVEL	Very Fine	2.0 - 2.8			100%	2.8
	Very Fine	2.8 - 4.0			100%	4.0
	Fine	4.0 - 5.6			100%	5.6
	Fine	5.6 - 8.0			100%	8.0
	Medium	8.0 - 11.0			100%	11.3
	Medium	11.0 - 16.0			100%	16.0
	Coarse	16.0 - 22.6			100%	22.6
	Coarse	22.6 - 32			100%	32
	Very Coarse	32 - 45			100%	45
	Very Coarse	45 - 64			100%	64
COBBLE	Small	64 - 90			100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(riffle)

Beaverdam Creek UT1B
X4 Riffle
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

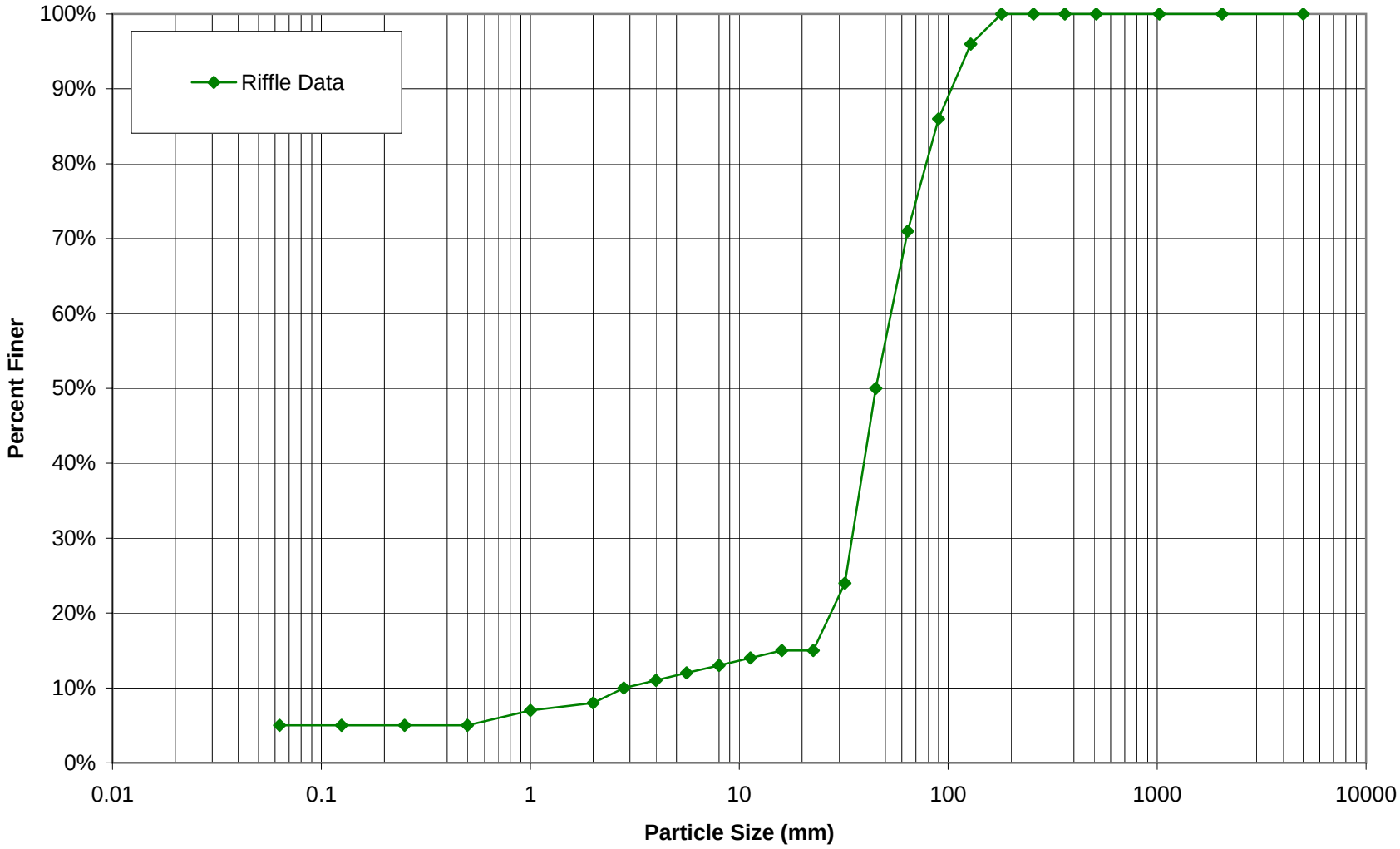
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1 X5-Riffle (Reach 2-5)
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	5	5%	5%	0.063
SAND	Very Fine	.063 - .125			5%	0.125
	Fine	.125 - .25			5%	0.25
	Medium	.25 - .50			5%	0.50
	Coarse	.50 - 1.0	2	2%	7%	1.0
	Very Coarse	1.0 - 2.0	1	1%	8%	2.0
GRAVEL	Very Fine	2.0 - 2.8	2	2%	10%	2.8
	Very Fine	2.8 - 4.0	1	1%	11%	4.0
	Fine	4.0 - 5.6	1	1%	12%	5.6
	Fine	5.6 - 8.0	1	1%	13%	8.0
	Medium	8.0 - 11.0	1	1%	14%	11.3
	Medium	11.0 - 16.0	1	1%	15%	16.0
	Coarse	16.0 - 22.6			15%	22.6
	Coarse	22.6 - 32	9	9%	24%	32
	Very Coarse	32 - 45	26	26%	50%	45
	Very Coarse	45 - 64	21	21%	71%	64
COBBLE	Small	64 - 90	15	15%	86%	90
	Small	90 - 128	10	10%	96%	128
	Large	128 - 180	4	4%	100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	**100**	**100%**		

Largest particles: _____

(riffle)

Beaverdam Creek UT1 (Reaches 2-5)
X5 Riffle
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: POOL 100-COUNT

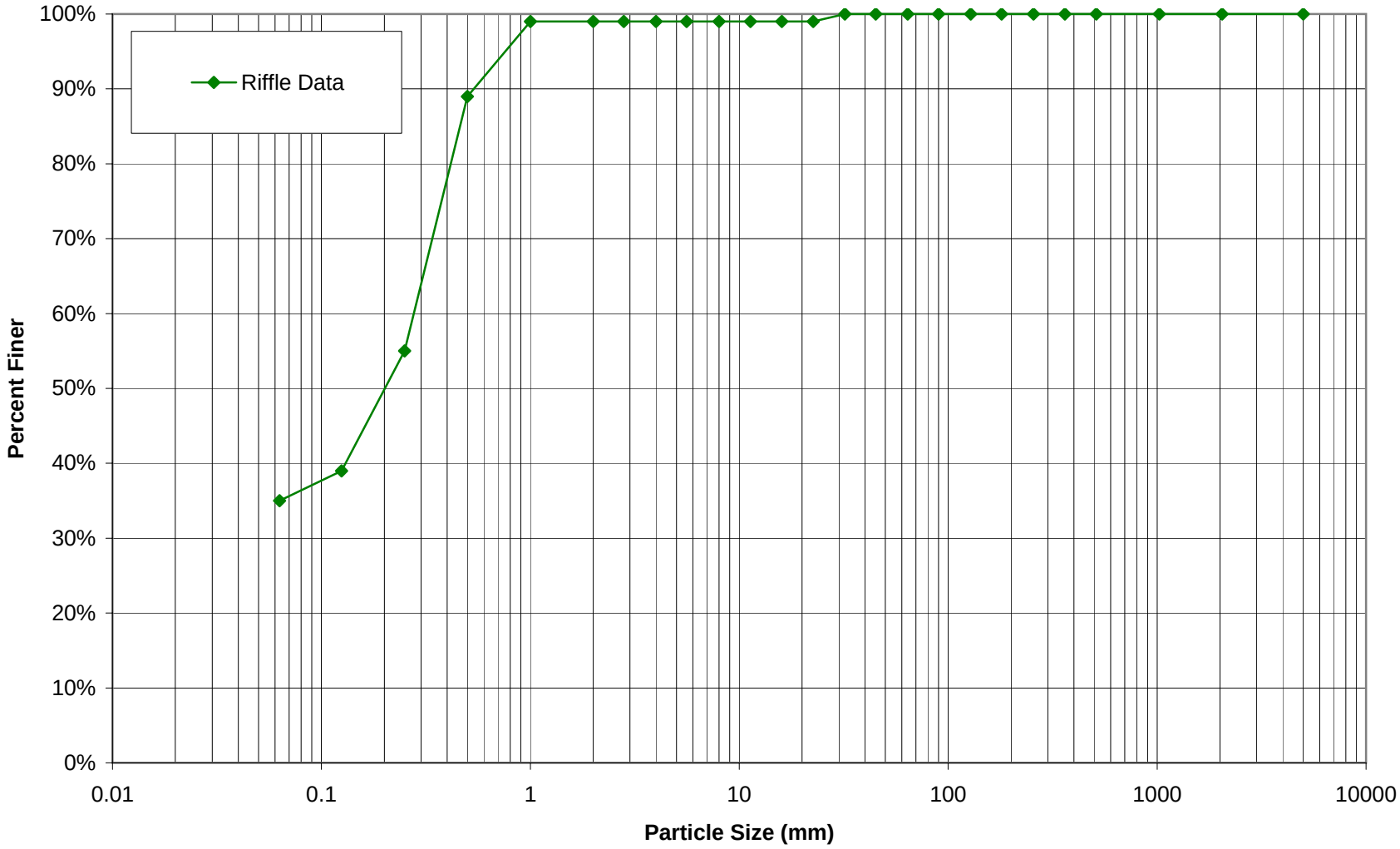
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1 X6-Pool (Reach 2-5)
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	35	35%	35%	0.063
SAND	Very Fine	.063 - .125	4	4%	39%	0.125
	Fine	.125 - .25	16	16%	55%	0.25
	Medium	.25 - .50	34	34%	89%	0.50
	Coarse	.50 - 1.0	10	10%	99%	1.0
	Very Coarse	1.0 - 2.0			99%	2.0
GRAVEL	Very Fine	2.0 - 2.8			99%	2.8
	Very Fine	2.8 - 4.0			99%	4.0
	Fine	4.0 - 5.6			99%	5.6
	Fine	5.6 - 8.0			99%	8.0
	Medium	8.0 - 11.0			99%	11.3
	Medium	11.0 - 16.0			99%	16.0
	Coarse	16.0 - 22.6			99%	22.6
	Coarse	22.6 - 32	1	1%	100%	32
	Very Coarse	32 - 45			100%	45
	Very Coarse	45 - 64			100%	64
COBBLE	Small	64 - 90			100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(riffle)

Beaverdam Creek UT1 (Reaches 2-5)
X6 Pool
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

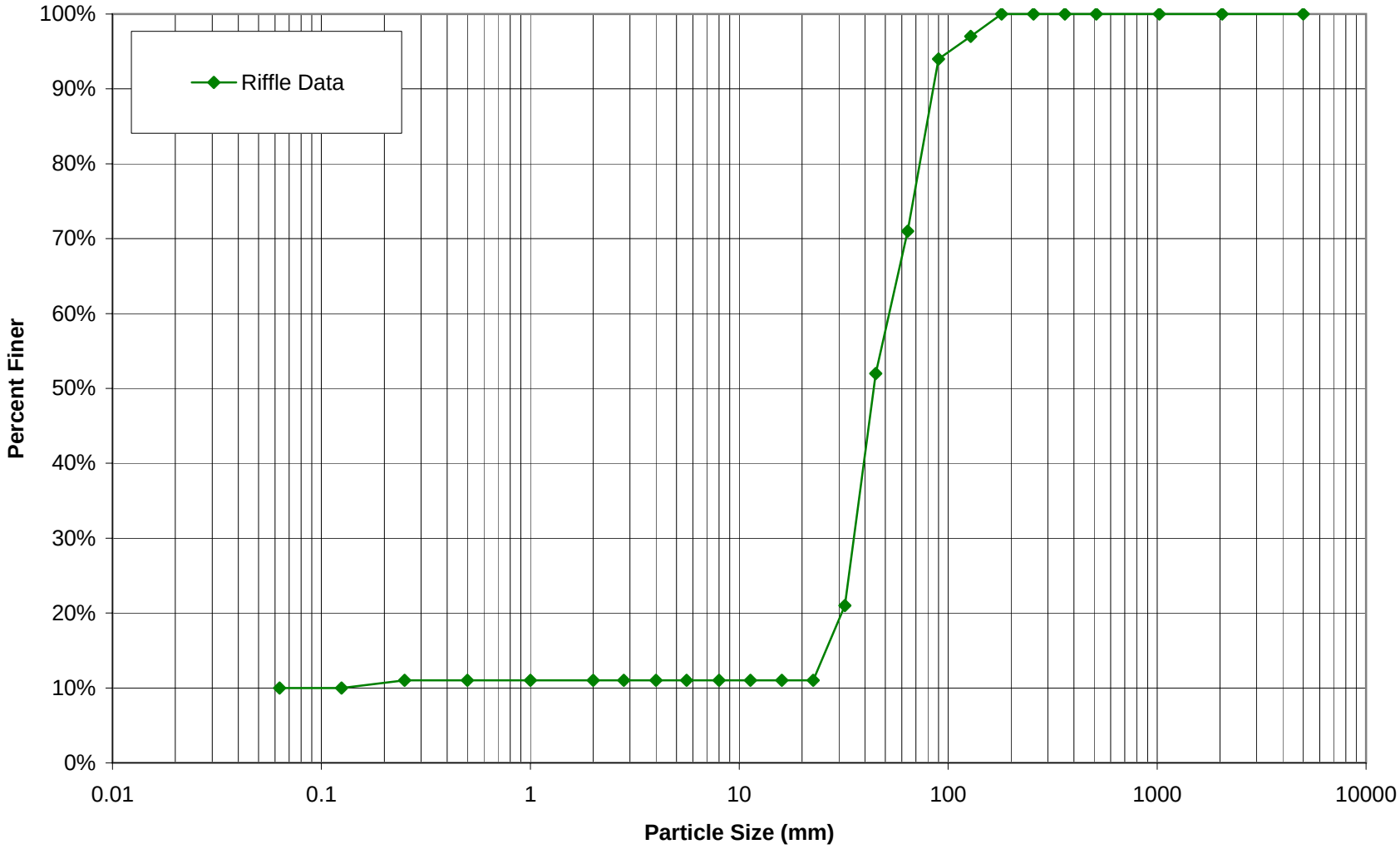
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1C X7-Riffle
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	10	10%	10%	0.063
SAND	Very Fine	.063 - .125			10%	0.125
	Fine	.125 - .25	1	1%	11%	0.25
	Medium	.25 - .50			11%	0.50
	Coarse	.50 - 1.0			11%	1.0
	Very Coarse	1.0 - 2.0			11%	2.0
GRAVEL	Very Fine	2.0 - 2.8			11%	2.8
	Very Fine	2.8 - 4.0			11%	4.0
	Fine	4.0 - 5.6			11%	5.6
	Fine	5.6 - 8.0			11%	8.0
	Medium	8.0 - 11.0			11%	11.3
	Medium	11.0 - 16.0			11%	16.0
	Coarse	16.0 - 22.6			11%	22.6
	Coarse	22.6 - 32	10	10%	21%	32
	Very Coarse	32 - 45	31	31%	52%	45
	Very Coarse	45 - 64	19	19%	71%	64
COBBLE	Small	64 - 90	23	23%	94%	90
	Small	90 - 128	3	3%	97%	128
	Large	128 - 180	3	3%	100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(riffle)

Beaverdam Creek UT1C
X7 Riffle
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: POOL 100-COUNT

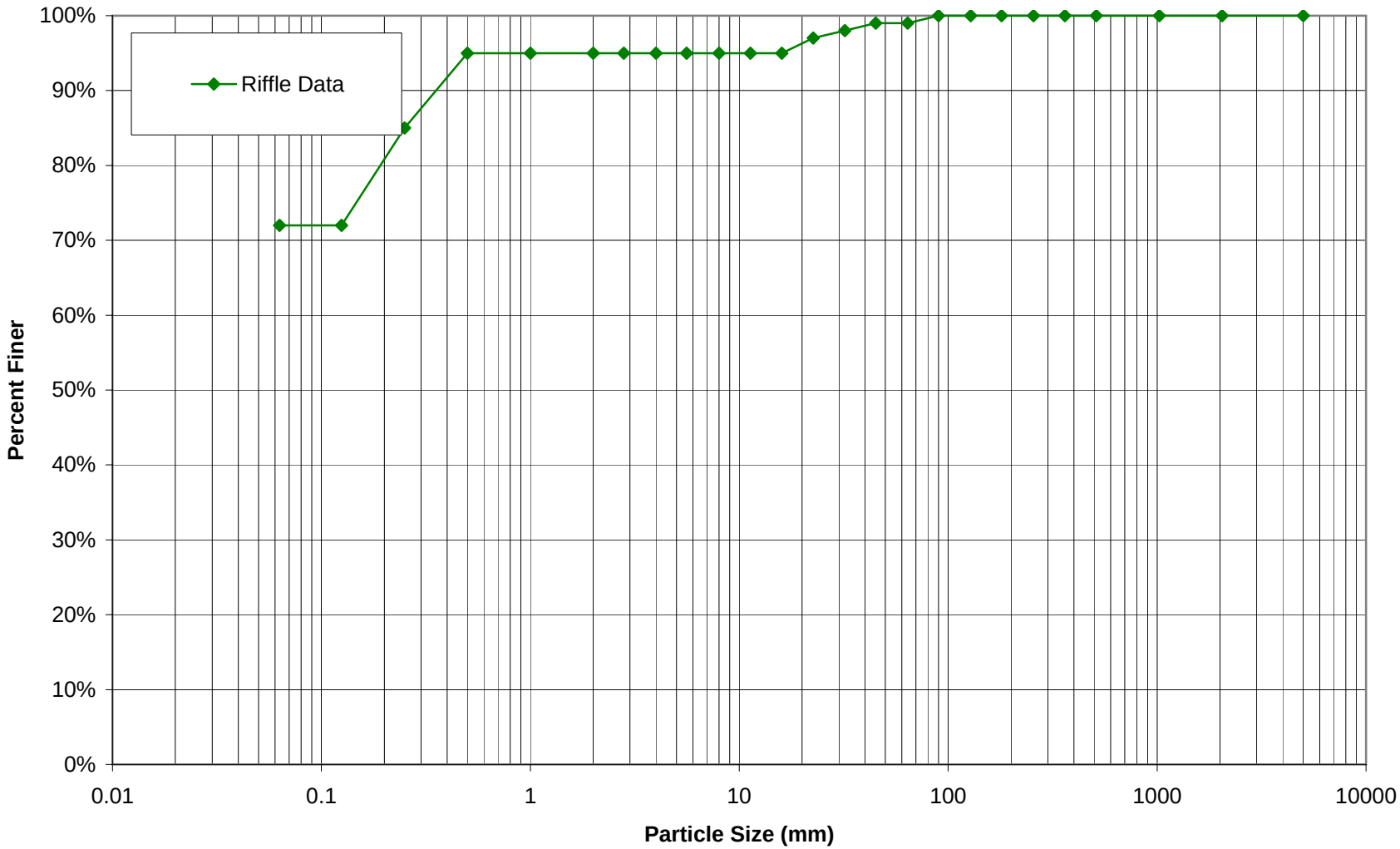
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1C X-8 Pool
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	72	72%	72%	0.063
SAND	Very Fine	.063 - .125			72%	0.125
	Fine	.125 - .25	13	13%	85%	0.25
	Medium	.25 - .50	10	10%	95%	0.50
	Coarse	.50 - 1.0			95%	1.0
	Very Coarse	1.0 - 2.0			95%	2.0
GRAVEL	Very Fine	2.0 - 2.8			95%	2.8
	Very Fine	2.8 - 4.0			95%	4.0
	Fine	4.0 - 5.6			95%	5.6
	Fine	5.6 - 8.0			95%	8.0
	Medium	8.0 - 11.0			95%	11.3
	Medium	11.0 - 16.0			95%	16.0
	Coarse	16.0 - 22.6	2	2%	97%	22.6
	Coarse	22.6 - 32	1	1%	98%	32
	Very Coarse	32 - 45	1	1%	99%	45
	Very Coarse	45 - 64			99%	64
COBBLE	Small	64 - 90	1	1%	100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(riffle)

Beaverdam Creek UT1C
X8 Pool
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

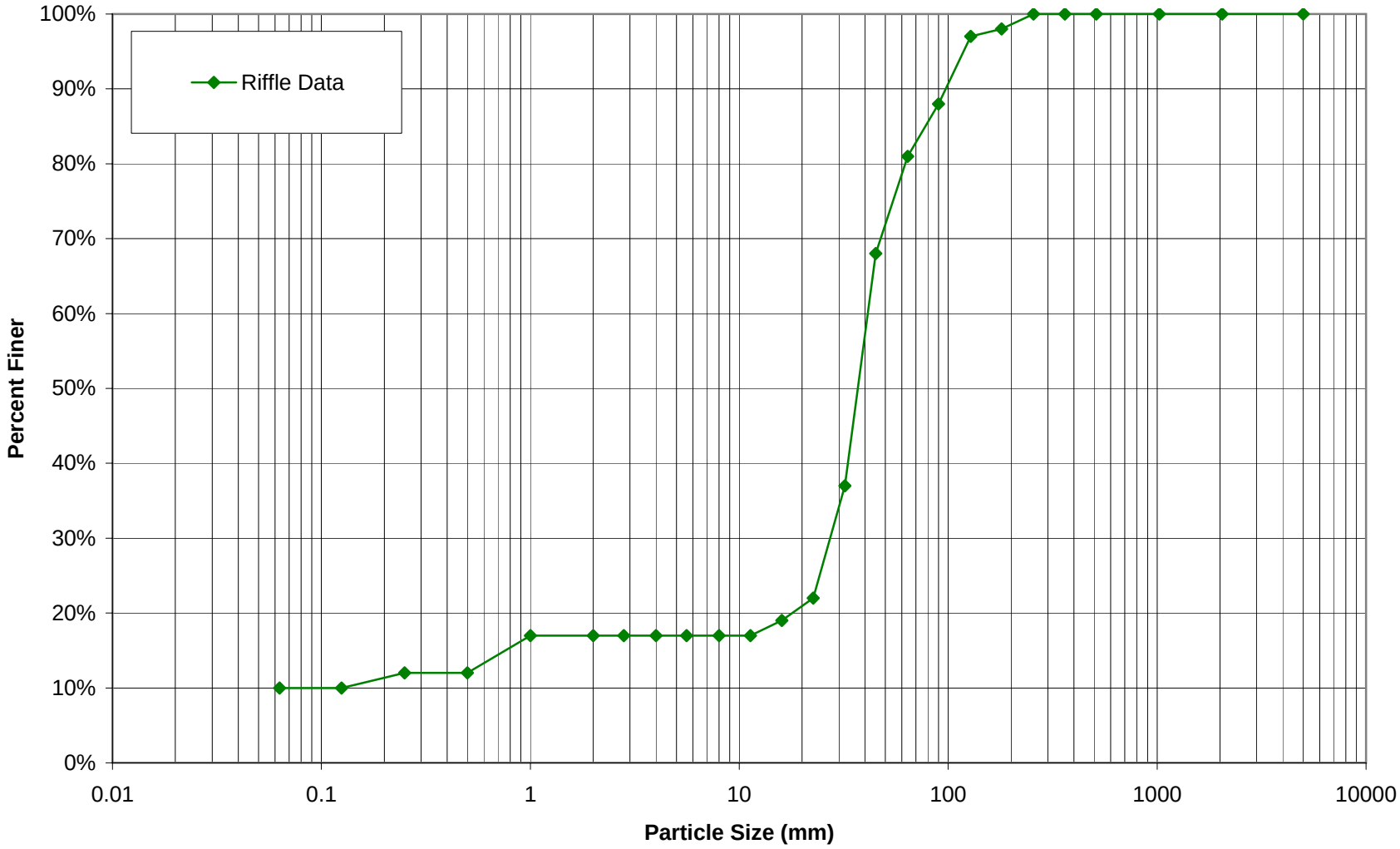
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1 X-9 Riffle (Reach 2-5)
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	10	10%	10%	0.063
SAND	Very Fine	.063 - .125			10%	0.125
	Fine	.125 - .25	2	2%	12%	0.25
	Medium	.25 - .50			12%	0.50
	Coarse	.50 - 1.0	5	5%	17%	1.0
	Very Coarse	1.0 - 2.0			17%	2.0
GRAVEL	Very Fine	2.0 - 2.8			17%	2.8
	Very Fine	2.8 - 4.0			17%	4.0
	Fine	4.0 - 5.6			17%	5.6
	Fine	5.6 - 8.0			17%	8.0
	Medium	8.0 - 11.0			17%	11.3
	Medium	11.0 - 16.0	2	2%	19%	16.0
	Coarse	16.0 - 22.6	3	3%	22%	22.6
	Coarse	22.6 - 32	15	15%	37%	32
	Very Coarse	32 - 45	31	31%	68%	45
	Very Coarse	45 - 64	13	13%	81%	64
COBBLE	Small	64 - 90	7	7%	88%	90
	Small	90 - 128	9	9%	97%	128
	Large	128 - 180	1	1%	98%	180
	Large	180 - 256	2	2%	100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(riffle)

Beaverdam Creek UT1 (Reaches 2-5)
X9 Riffle
Pebble Count Particle Size Distribution



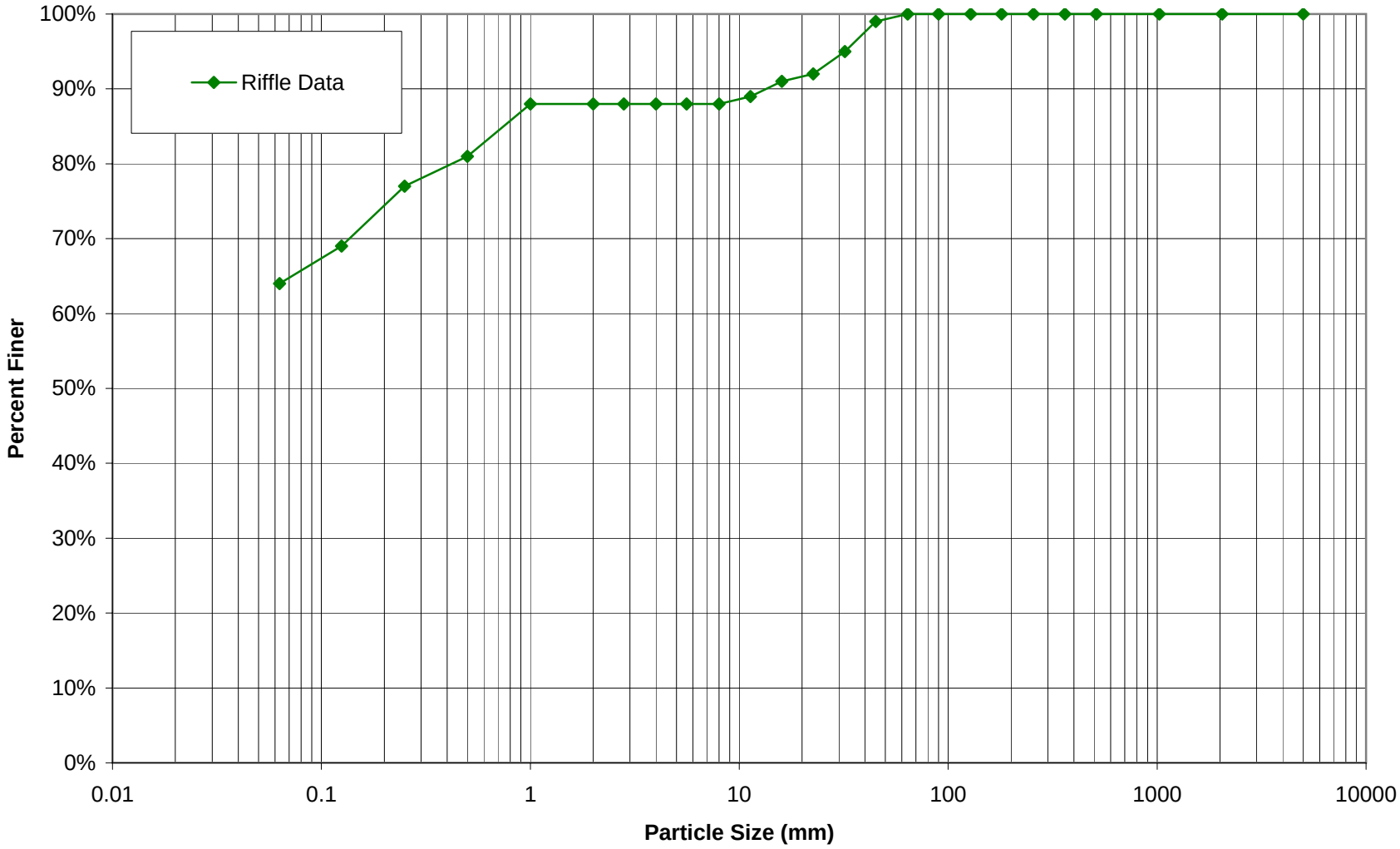
PEBBLE COUNT DATA SHEET: POOL 100-COUNT

	BUCK PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1 X-10 Pool (Reach 2-5)
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	64	64%	64%	0.063
SAND	Very Fine	.063 - .125	5	5%	69%	0.125
	Fine	.125 - .25	8	8%	77%	0.25
	Medium	.25 - .50	4	4%	81%	0.50
	Coarse	.50 - 1.0	7	7%	88%	1.0
	Very Coarse	1.0 - 2.0			88%	2.0
GRAVEL	Very Fine	2.0 - 2.8			88%	2.8
	Very Fine	2.8 - 4.0			88%	4.0
	Fine	4.0 - 5.6			88%	5.6
	Fine	5.6 - 8.0			88%	8.0
	Medium	8.0 - 11.0	1	1%	89%	11.3
	Medium	11.0 - 16.0	2	2%	91%	16.0
	Coarse	16.0 - 22.6	1	1%	92%	22.6
	Coarse	22.6 - 32	3	3%	95%	32
	Very Coarse	32 - 45	4	4%	99%	45
	Very Coarse	45 - 64	1	1%	100%	64
COBBLE	Small	64 - 90			100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____ **(riffle)**

Beaverdam Creek UT1 (Reaches 2-5)
X10 Pool
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: POOL 100-COUNT

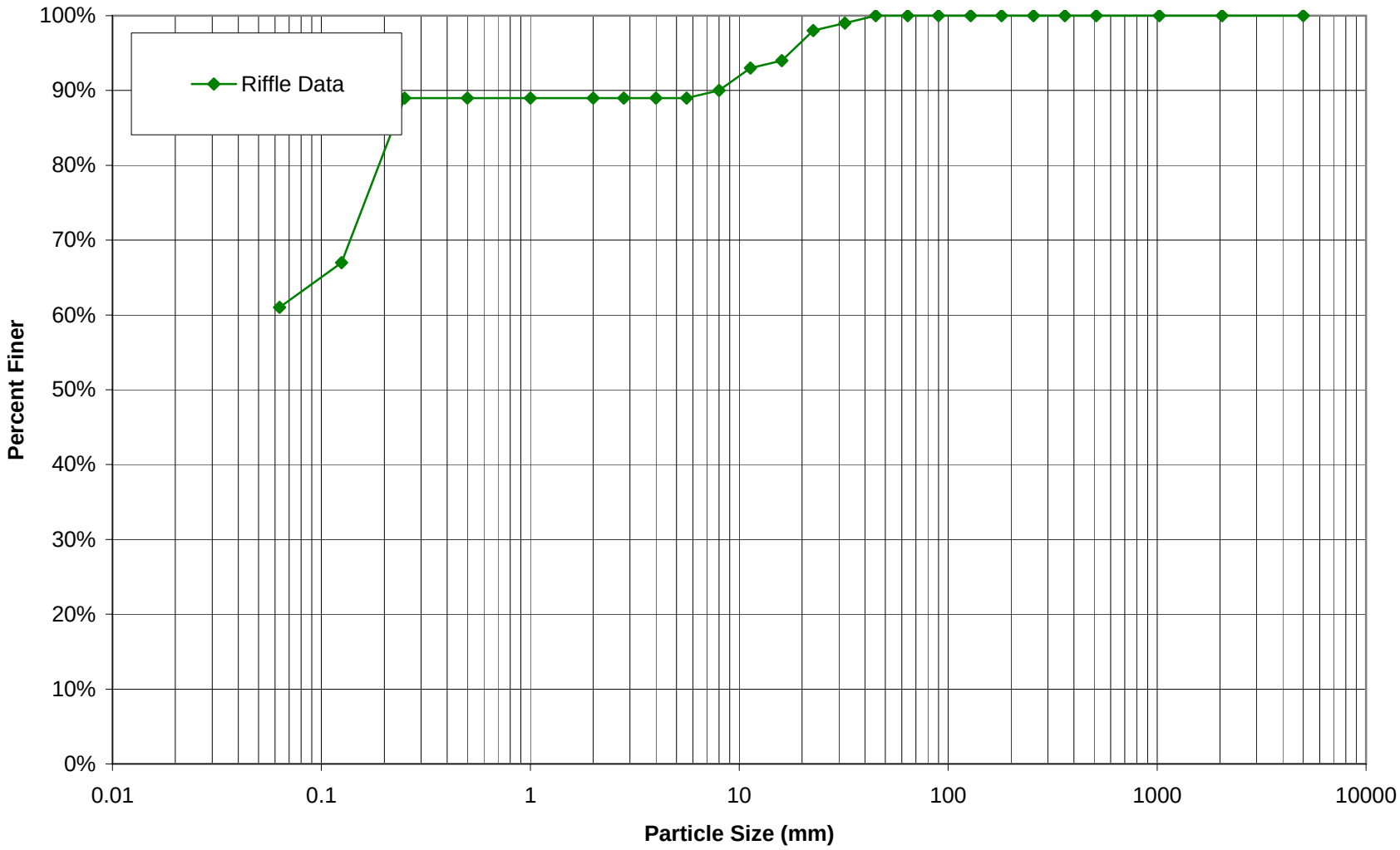
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1-D X-11 Pool
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	61	61%	61%	0.063
SAND	Very Fine	.063 - .125	6	6%	67%	0.125
	Fine	.125 - .25	22	22%	89%	0.25
	Medium	.25 - .50			89%	0.50
	Coarse	.50 - 1.0			89%	1.0
	Very Coarse	1.0 - 2.0			89%	2.0
GRAVEL	Very Fine	2.0 - 2.8			89%	2.8
	Very Fine	2.8 - 4.0			89%	4.0
	Fine	4.0 - 5.6			89%	5.6
	Fine	5.6 - 8.0	1	1%	90%	8.0
	Medium	8.0 - 11.0	3	3%	93%	11.3
	Medium	11.0 - 16.0	1	1%	94%	16.0
	Coarse	16.0 - 22.6	4	4%	98%	22.6
	Coarse	22.6 - 32	1	1%	99%	32
	Very Coarse	32 - 45	1	1%	100%	45
	Very Coarse	45 - 64			100%	64
COBBLE	Small	64 - 90			100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(riffle)

Beaverdam Creek UT1D
X11 Pool
Pebble Count Particle Size Distribution



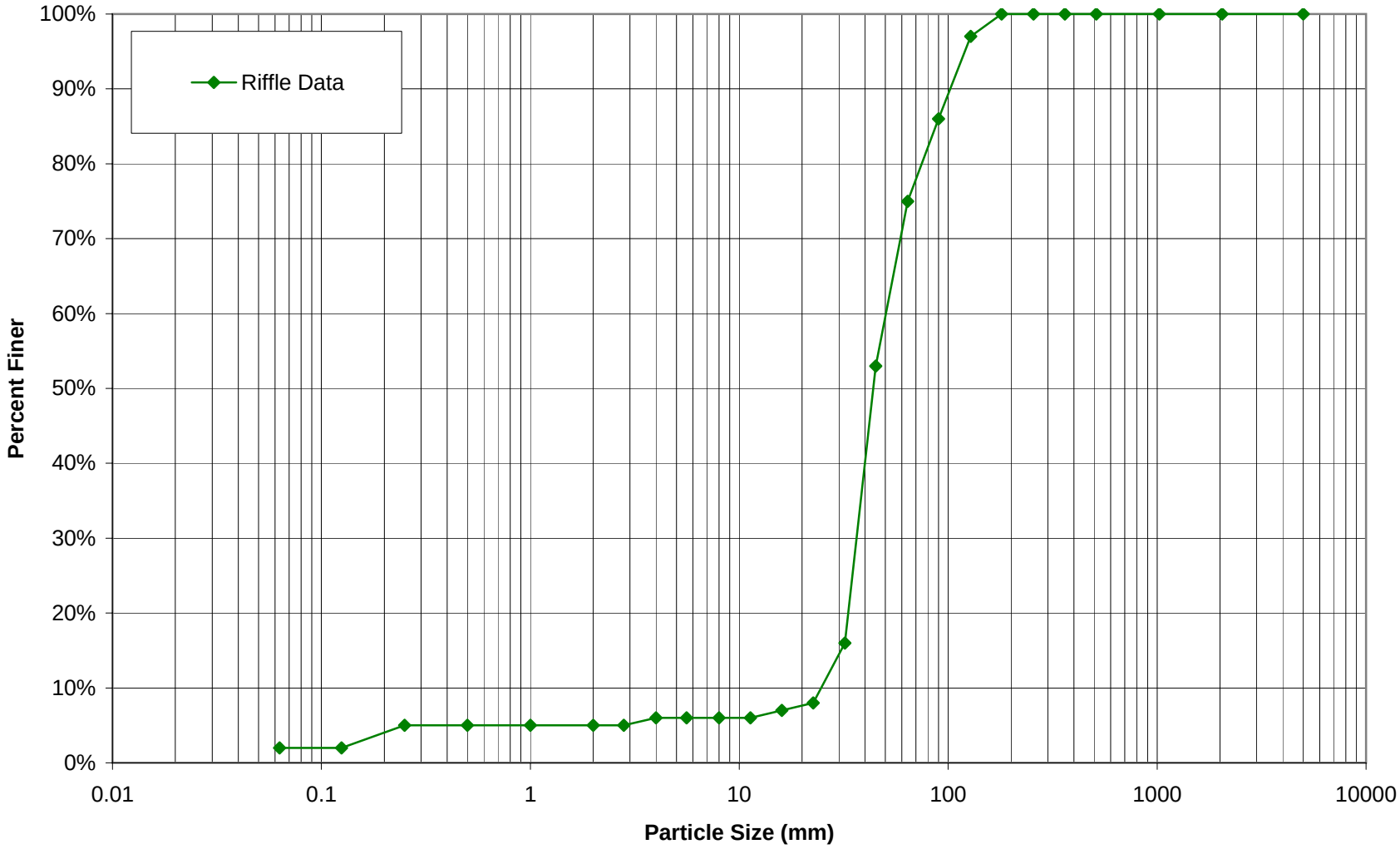
PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1-D X-12 Riffle
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	2	2%	2%	0.063
SAND	Very Fine	.063 - .125			2%	0.125
	Fine	.125 - .25	3	3%	5%	0.25
	Medium	.25 - .50			5%	0.50
	Coarse	.50 - 1.0			5%	1.0
	Very Coarse	1.0 - 2.0			5%	2.0
GRAVEL	Very Fine	2.0 - 2.8			5%	2.8
	Very Fine	2.8 - 4.0	1	1%	6%	4.0
	Fine	4.0 - 5.6			6%	5.6
	Fine	5.6 - 8.0			6%	8.0
	Medium	8.0 - 11.0			6%	11.3
	Medium	11.0 - 16.0	1	1%	7%	16.0
	Coarse	16.0 - 22.6	1	1%	8%	22.6
	Coarse	22.6 - 32	8	8%	16%	32
	Very Coarse	32 - 45	37	37%	53%	45
	Very Coarse	45 - 64	22	22%	75%	64
COBBLE	Small	64 - 90	11	11%	86%	90
	Small	90 - 128	11	11%	97%	128
	Large	128 - 180	3	3%	100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	**100**	**100%**		

Largest particles: _____
(riffle)

Beaverdam Creek UT1D
X12 Riffle
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: POOL 100-COUNT

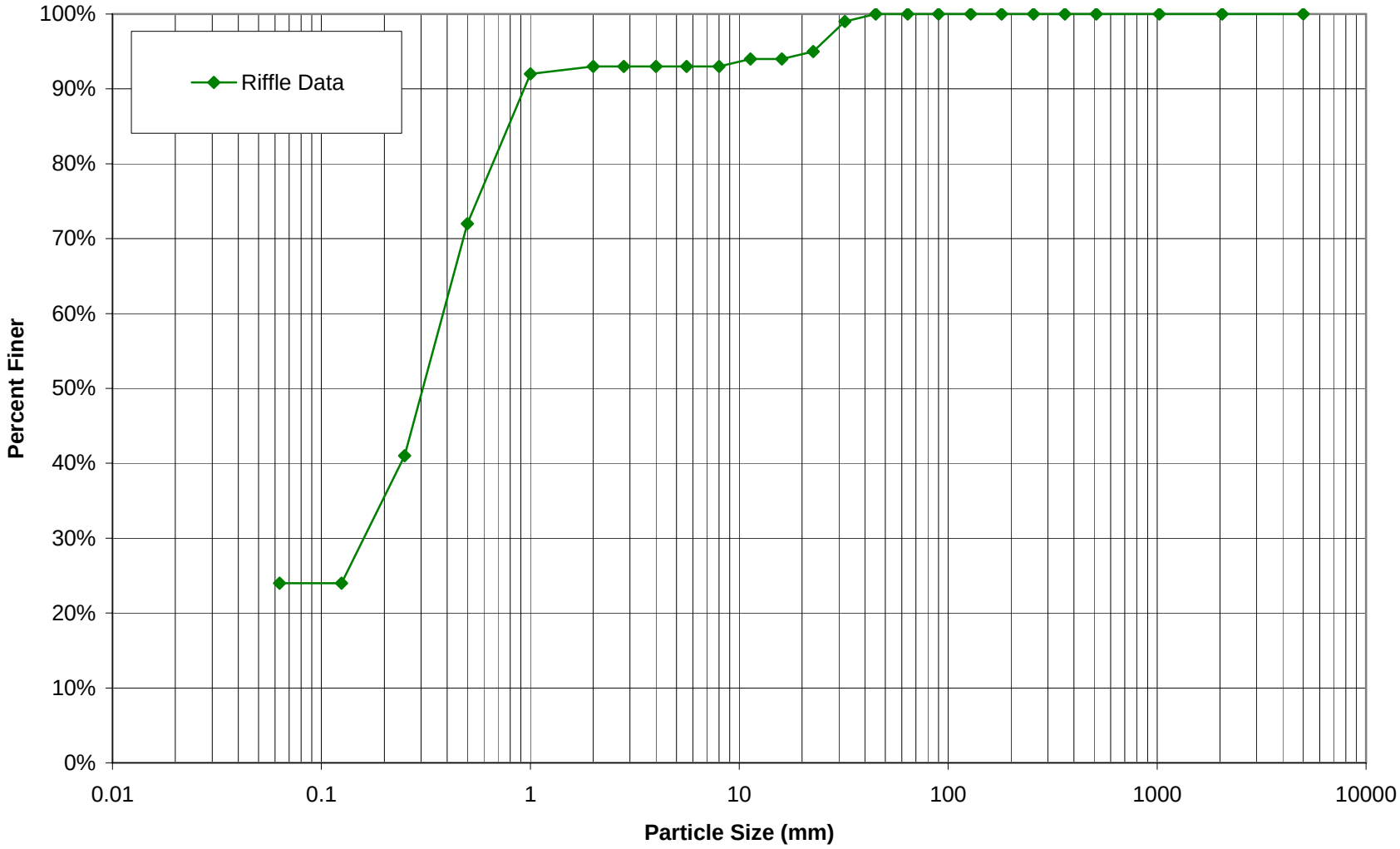
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1 X-13 Pool (Reach 2-5)
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	24	24%	24%	0.063
SAND	Very Fine	.063 - .125			24%	0.125
	Fine	.125 - .25	17	17%	41%	0.25
	Medium	.25 - .50	31	31%	72%	0.50
	Coarse	.50 - 1.0	20	20%	92%	1.0
	Very Coarse	1.0 - 2.0	1	1%	93%	2.0
GRAVEL	Very Fine	2.0 - 2.8			93%	2.8
	Very Fine	2.8 - 4.0			93%	4.0
	Fine	4.0 - 5.6			93%	5.6
	Fine	5.6 - 8.0			93%	8.0
	Medium	8.0 - 11.0	1	1%	94%	11.3
	Medium	11.0 - 16.0			94%	16.0
	Coarse	16.0 - 22.6	1	1%	95%	22.6
	Coarse	22.6 - 32	4	4%	99%	32
	Very Coarse	32 - 45	1	1%	100%	45
	Very Coarse	45 - 64			100%	64
COBBLE	Small	64 - 90			100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(riffle)

Beaverdam Creek UT1 (Reaches 2-5)
X13 Pool
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

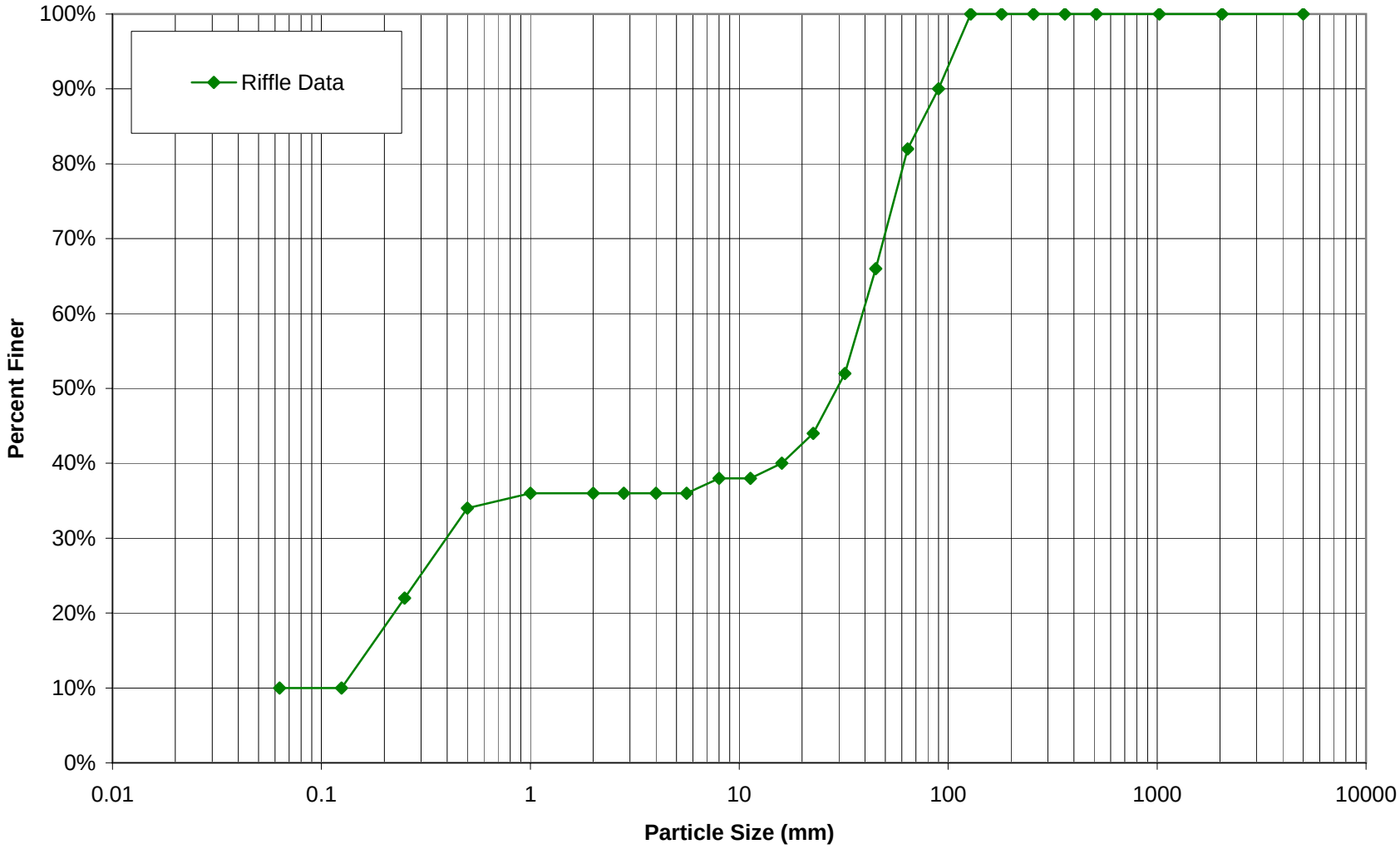
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT1 X-14 Riffle (Reach 2-5)
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	10	10%	10%	0.063
SAND	Very Fine	.063 - .125			10%	0.125
	Fine	.125 - .25	12	12%	22%	0.25
	Medium	.25 - .50	12	12%	34%	0.50
	Coarse	.50 - 1.0	2	2%	36%	1.0
	Very Coarse	1.0 - 2.0			36%	2.0
GRAVEL	Very Fine	2.0 - 2.8			36%	2.8
	Very Fine	2.8 - 4.0			36%	4.0
	Fine	4.0 - 5.6			36%	5.6
	Fine	5.6 - 8.0	2	2%	38%	8.0
	Medium	8.0 - 11.0			38%	11.3
	Medium	11.0 - 16.0	2	2%	40%	16.0
	Coarse	16.0 - 22.6	4	4%	44%	22.6
	Coarse	22.6 - 32	8	8%	52%	32
	Very Coarse	32 - 45	14	14%	66%	45
	Very Coarse	45 - 64	16	16%	82%	64
COBBLE	Small	64 - 90	8	8%	90%	90
	Small	90 - 128	10	10%	100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	**100**	**100%**		

Largest particles: _____

(riffle)

Beaverdam Creek UT1 (Reaches 2-5)
X14 Riffle
Pebble Count Particle Size Distribution



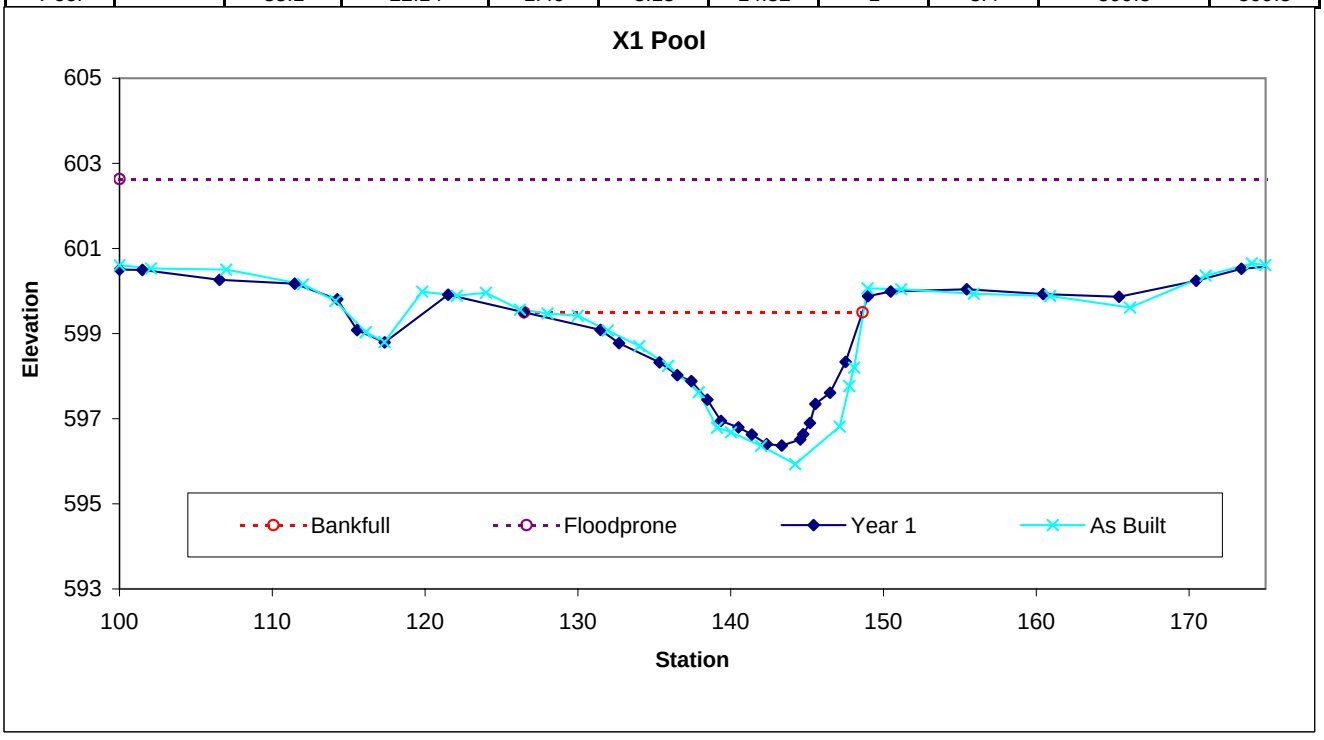
UT1 Permanent Cross Section X1

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		33.1	22.14	1.49	3.13	14.82	1	3.4	599.5	599.5



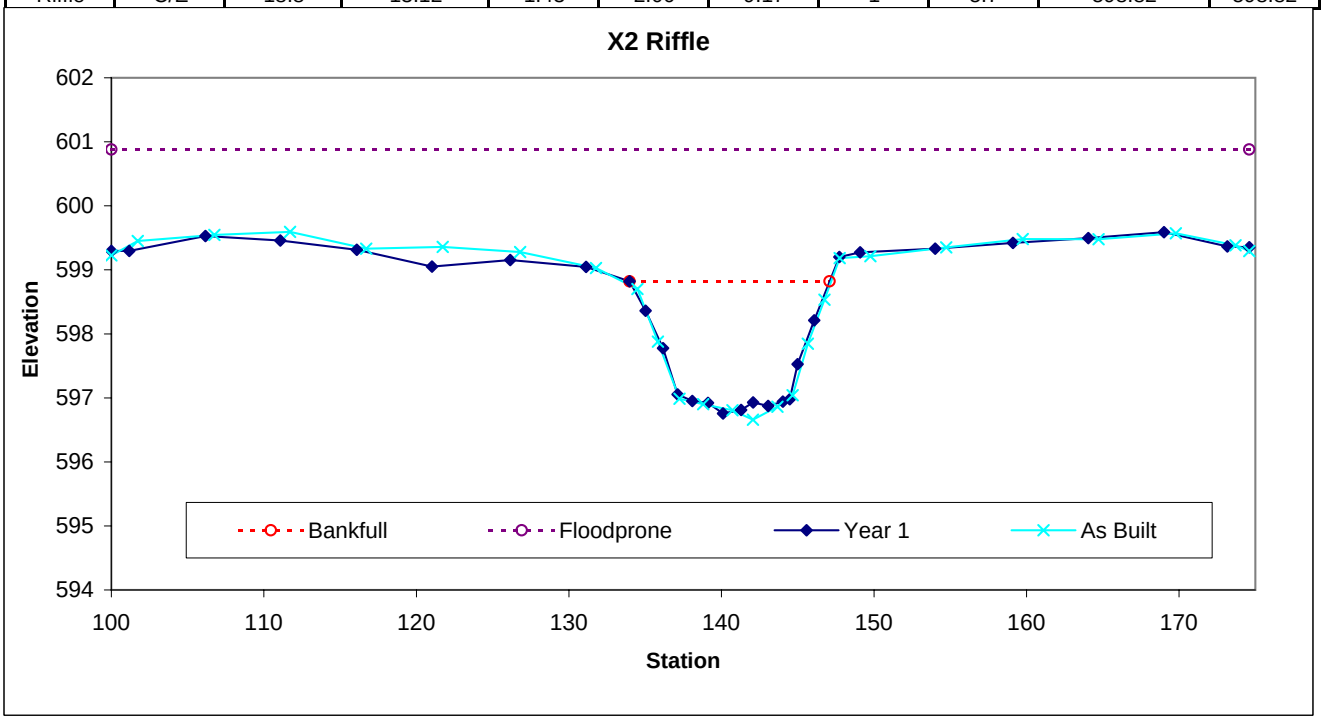
UT1 Permanent Cross Section X2

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C/E	18.8	13.12	1.43	2.06	9.17	1	5.7	598.82	598.82



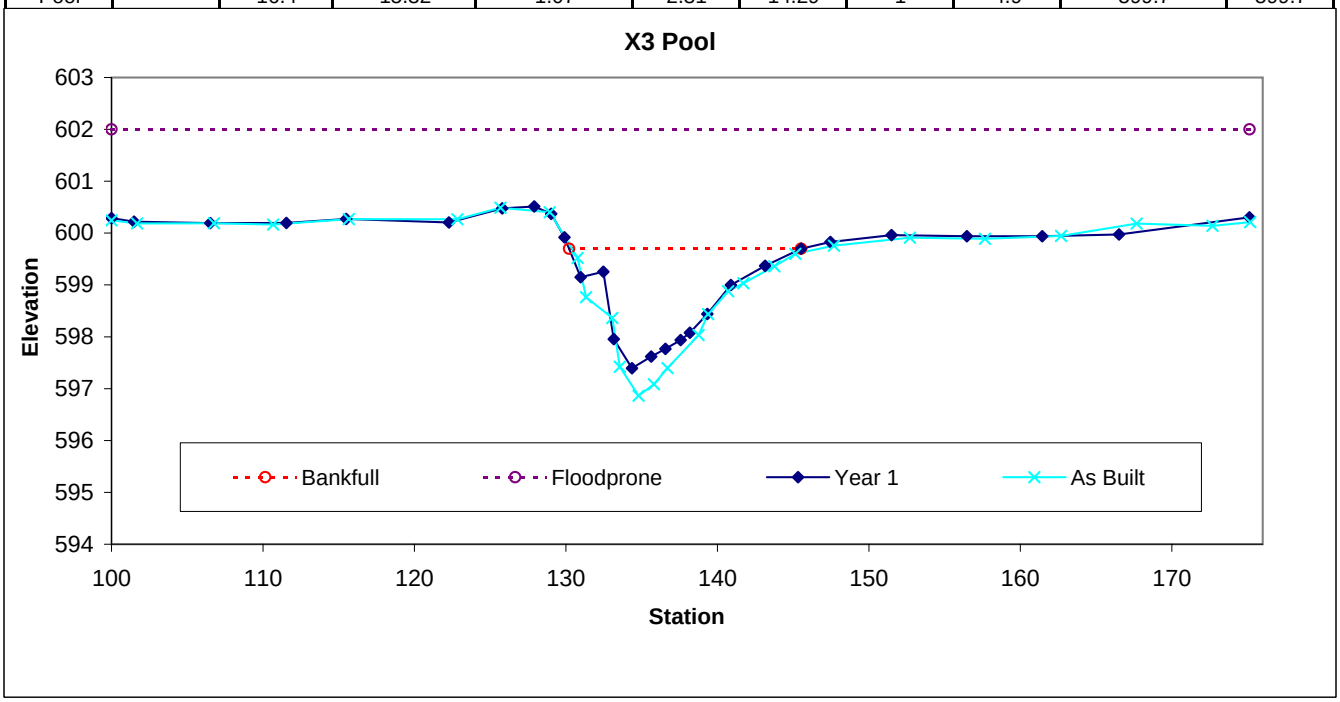
UT1 Permanent Cross Section X3

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		16.4	15.32	1.07	2.31	14.29	1	4.9	599.7	599.7



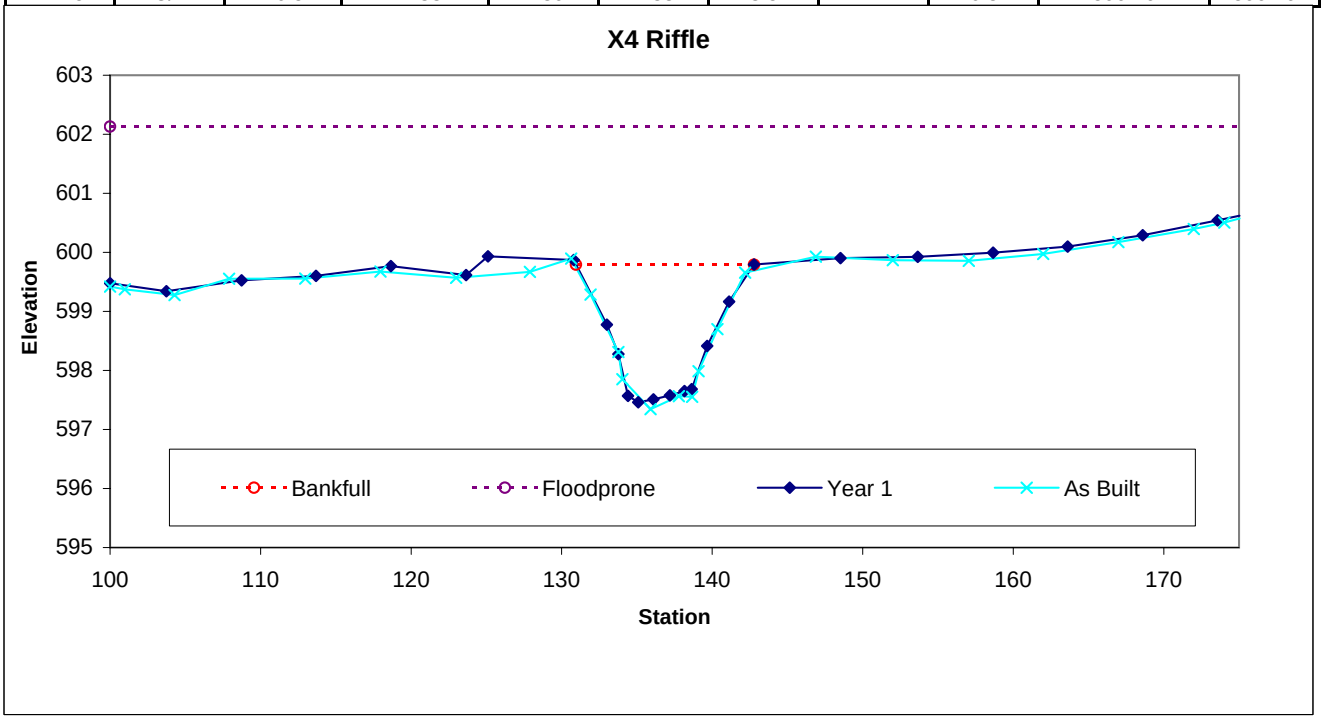
UT1 Permanent Cross Section X4

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C/E	16.5	11.83	1.39	2.33	8.5	1	6.3	599.79	599.79



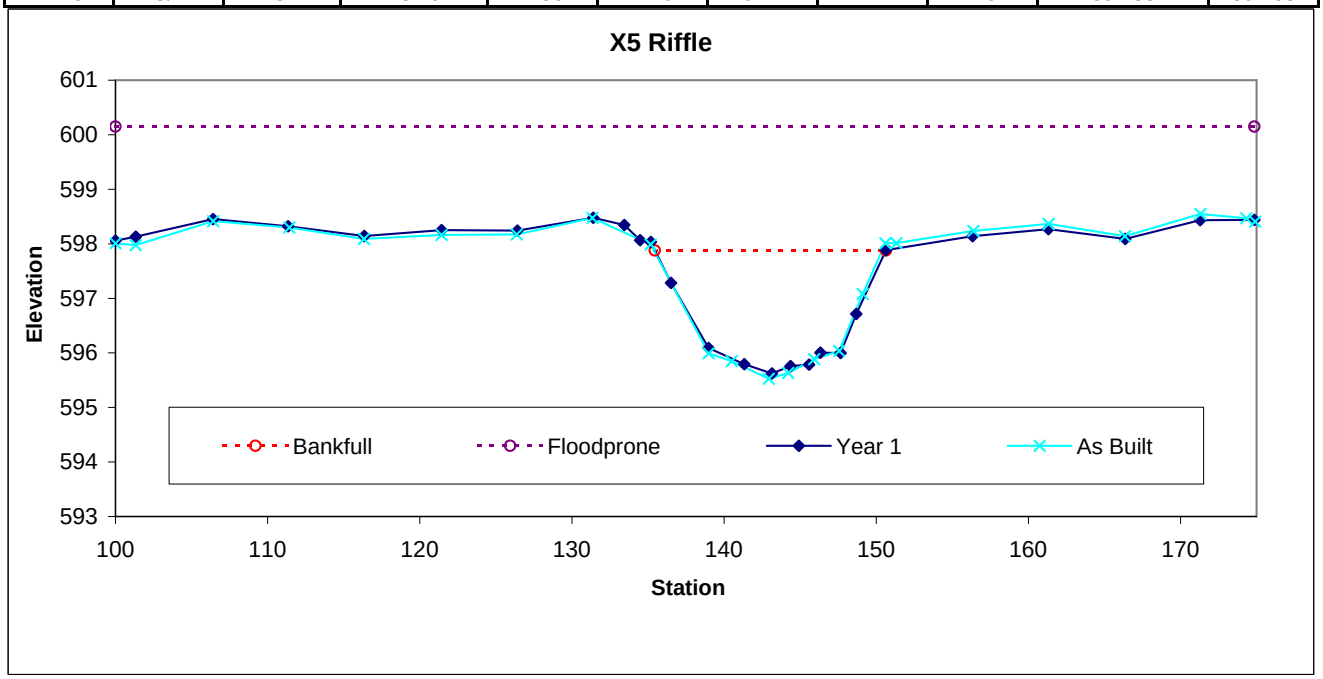
UT1 Permanent Cross Section X5

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C/E	23.7	15.19	1.56	2.26	9.72	1	4.9	597.88	597.88



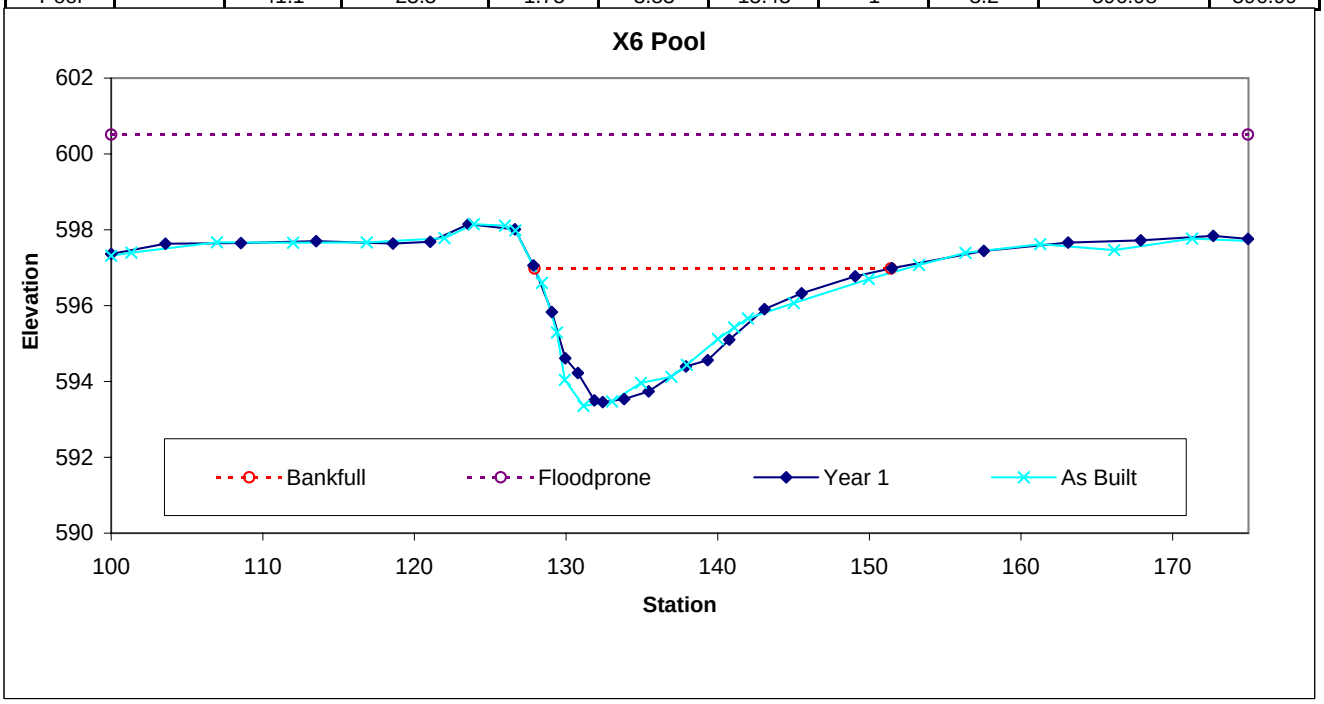
UT1 Permanent Cross Section X6

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		41.1	23.5	1.75	3.53	13.43	1	3.2	596.98	596.99



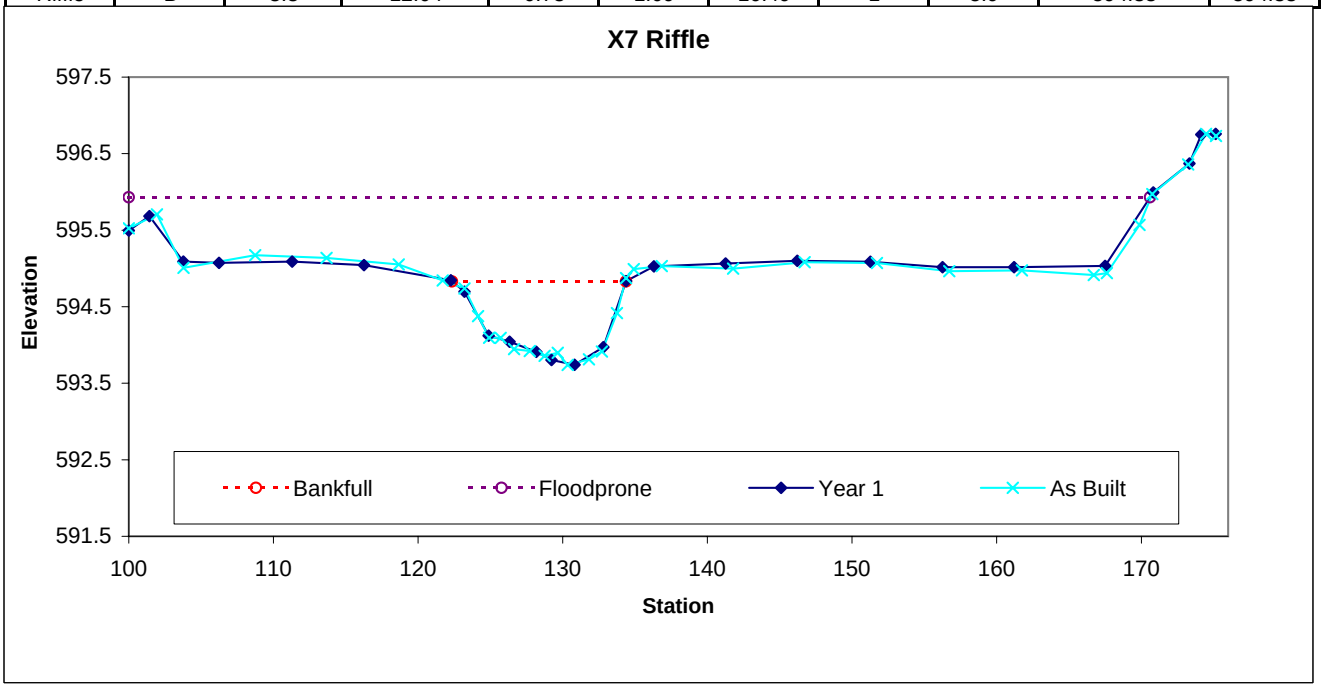
UT1 Permanent Cross Section X7

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B	8.8	12.04	0.73	1.09	16.49	1	5.9	594.83	594.83



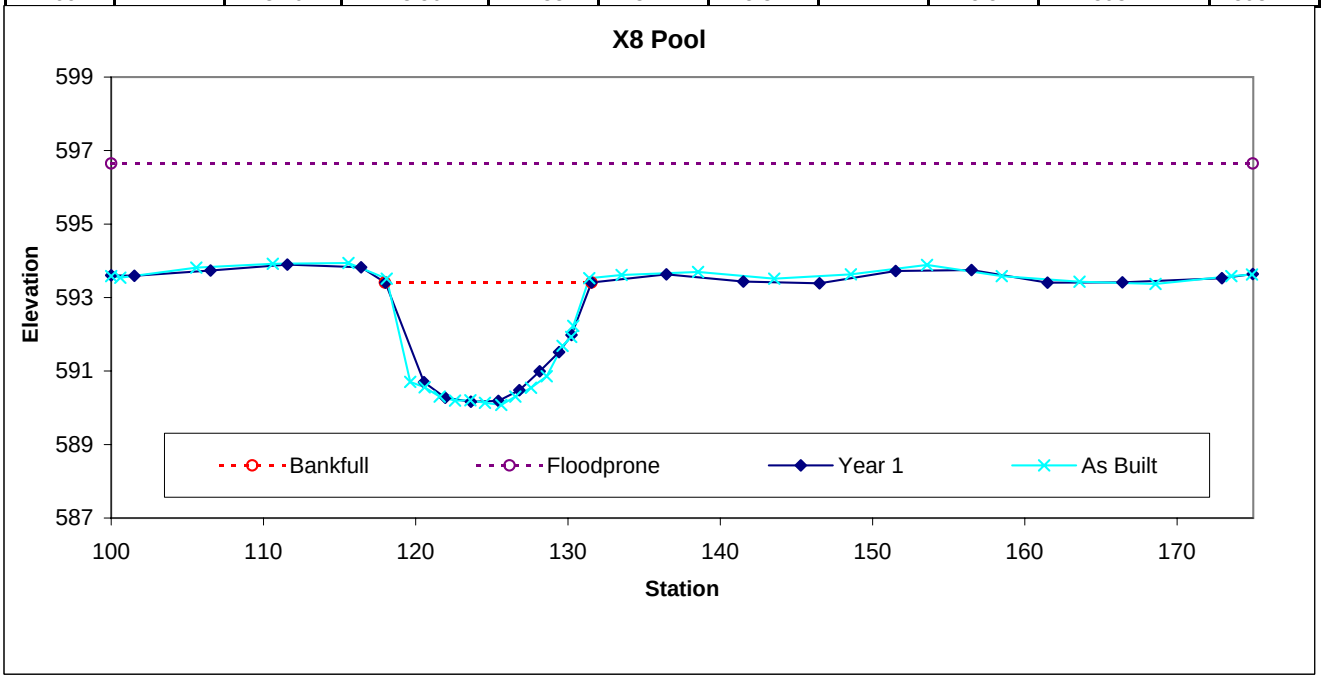
UT1 Permanent Cross Section X8

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		31.6	13.56	2.33	3.24	5.82	1	5.5	593.41	593.41



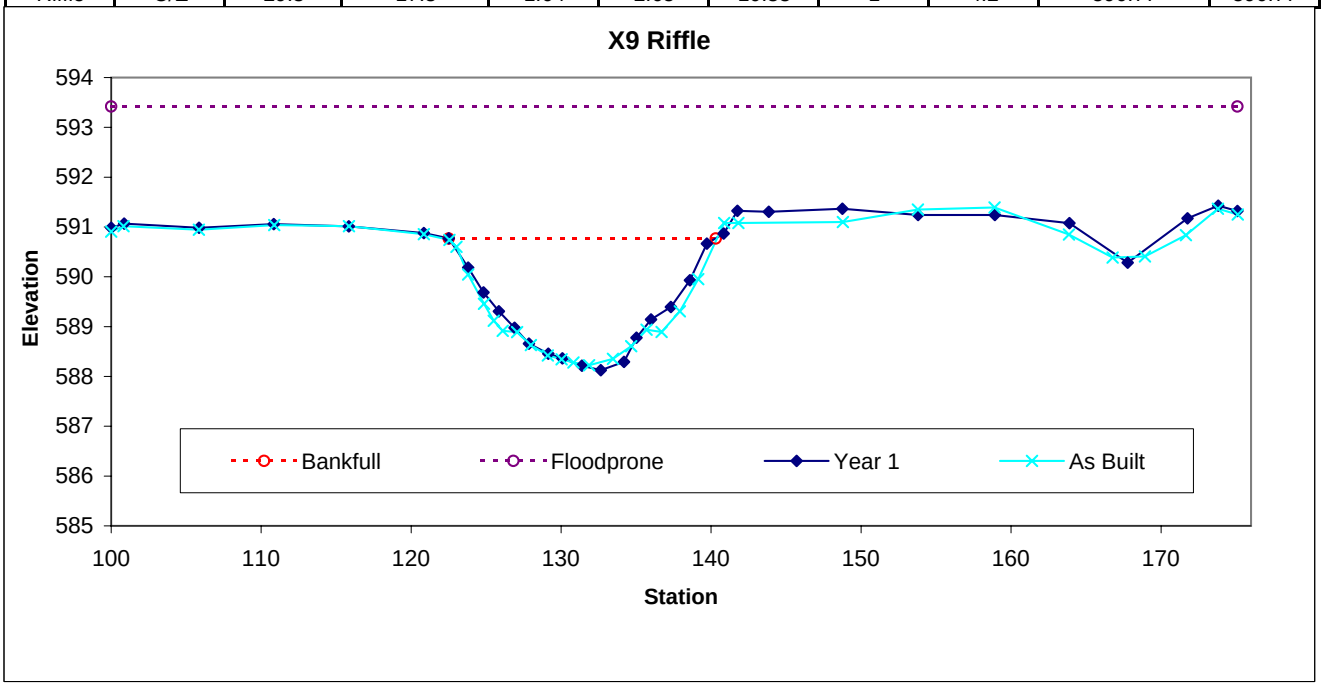
UT1 Permanent Cross Section X9

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C/E	29.3	17.8	1.64	2.65	10.83	1	4.2	590.77	590.77



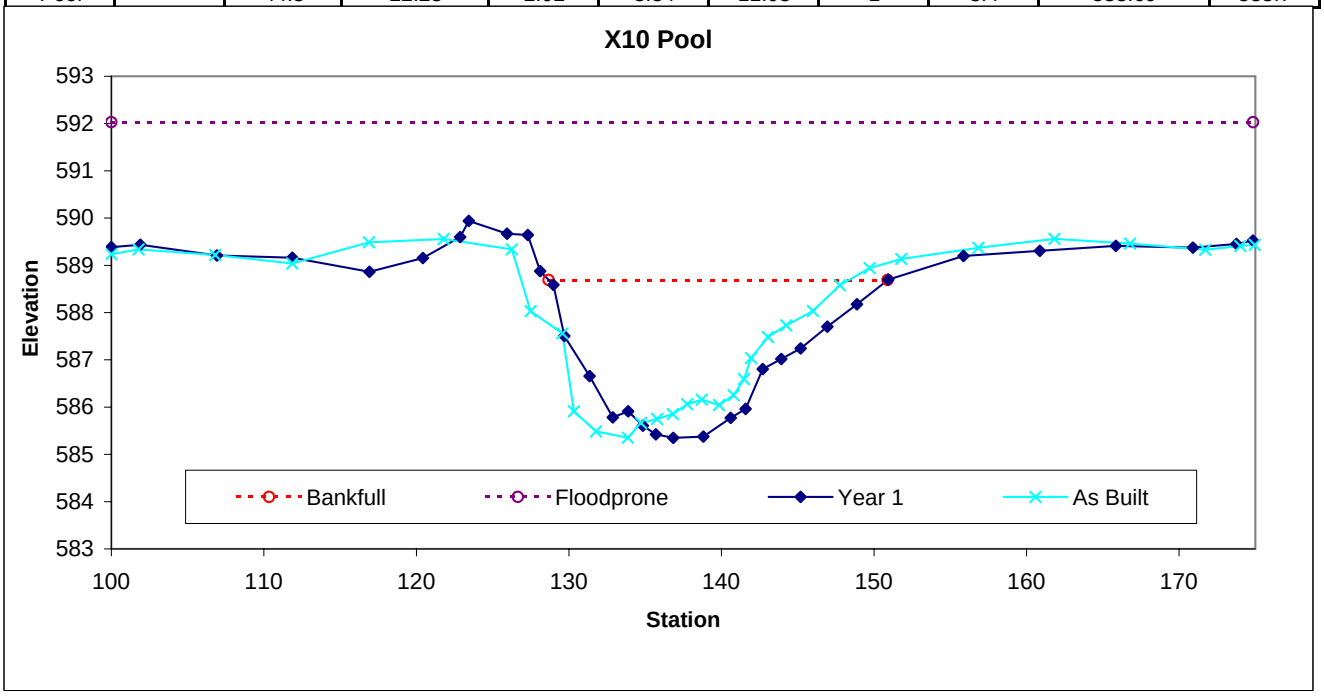
UT1 Permanent Cross Section X10

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		44.8	22.23	2.02	3.34	11.03	1	3.4	588.69	588.7



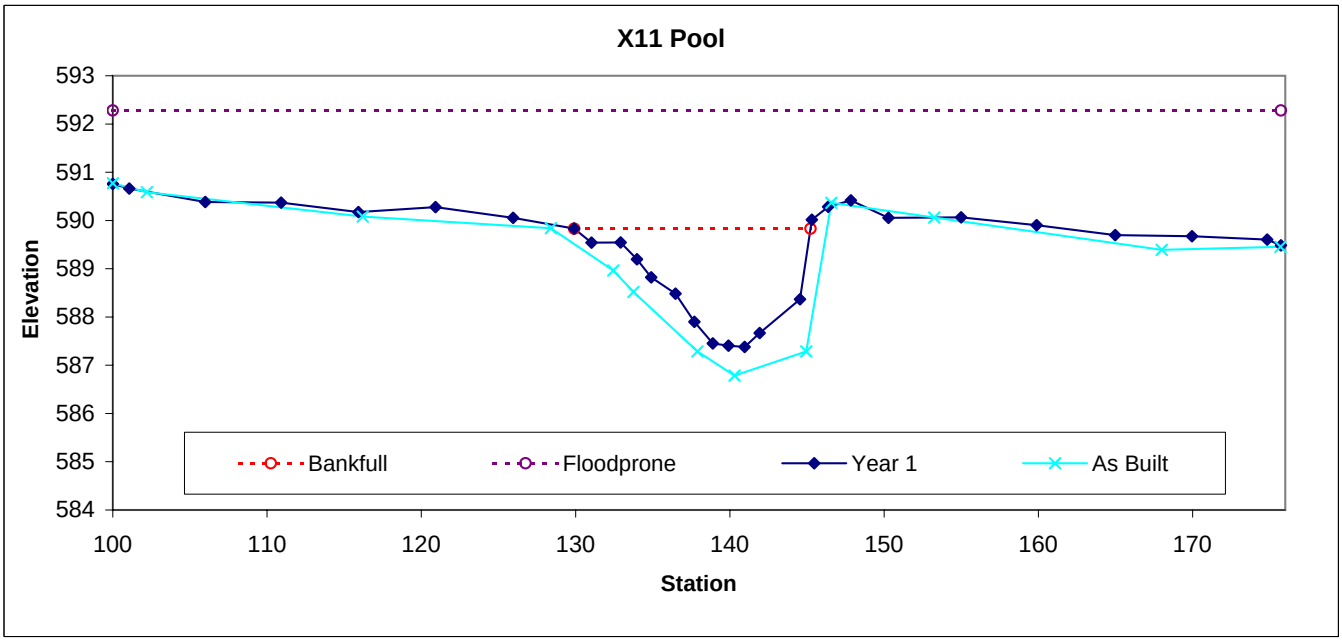
UT1 Permanent Cross Section X11

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

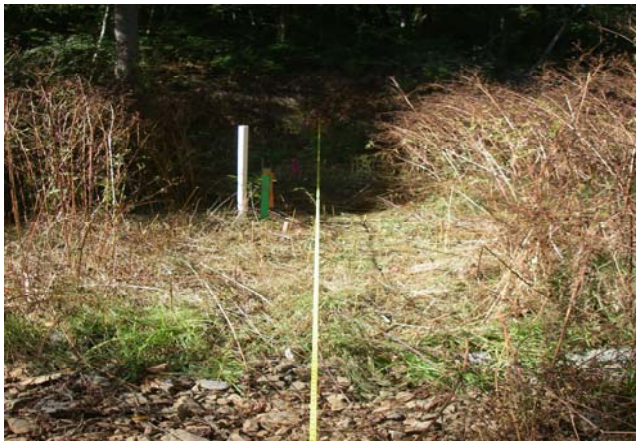
Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		20.9	15.32	1.36	2.45	11.25	1	4.9	589.83	589.83



UT1 Permanent Cross Section X12

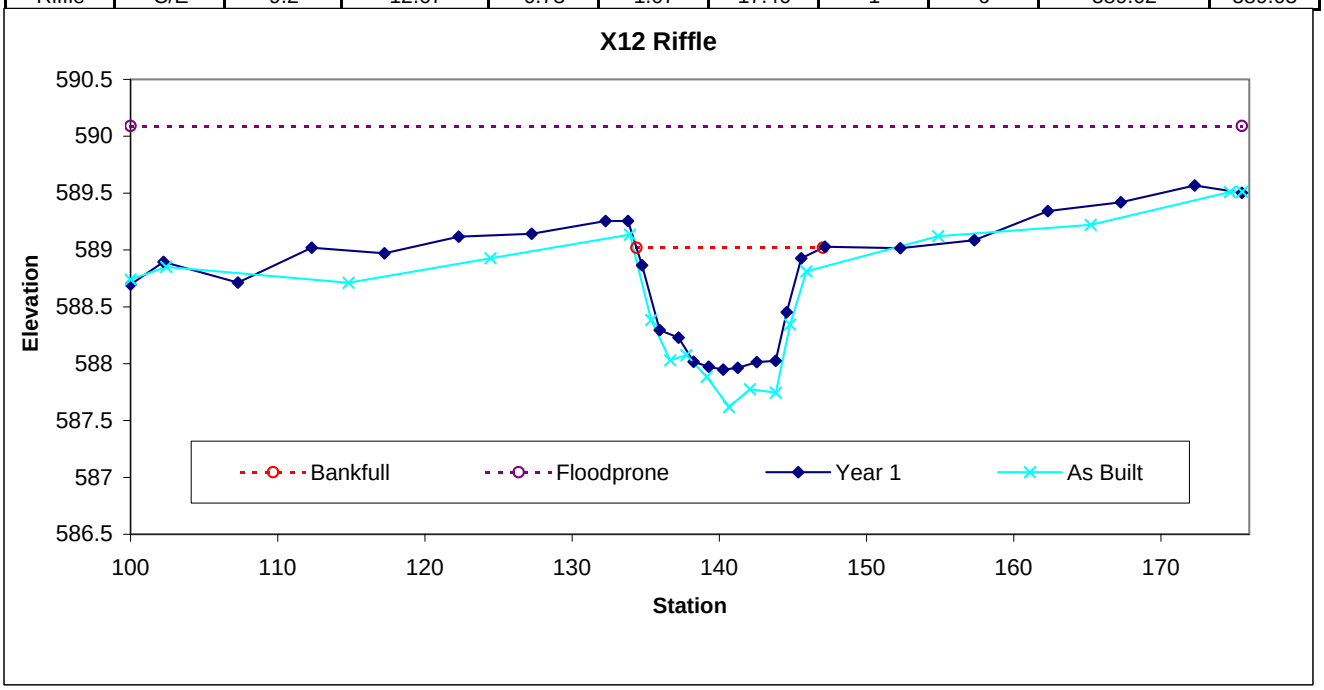
(Year 1 Monitoring Data - collected October 2007)



Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C/E	9.2	12.67	0.73	1.07	17.46	1	6	589.02	589.03



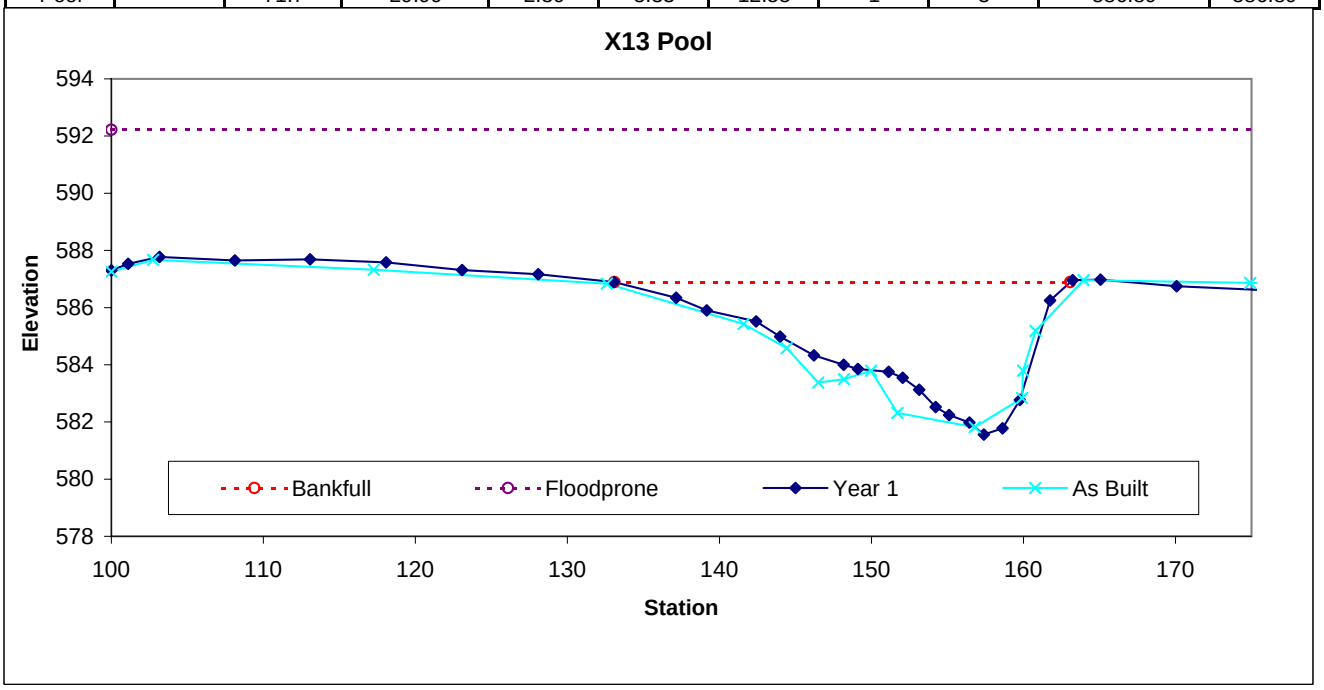
UT1 Permanent Cross Section X13

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		71.7	29.99	2.39	5.33	12.55	1	3	586.89	586.89



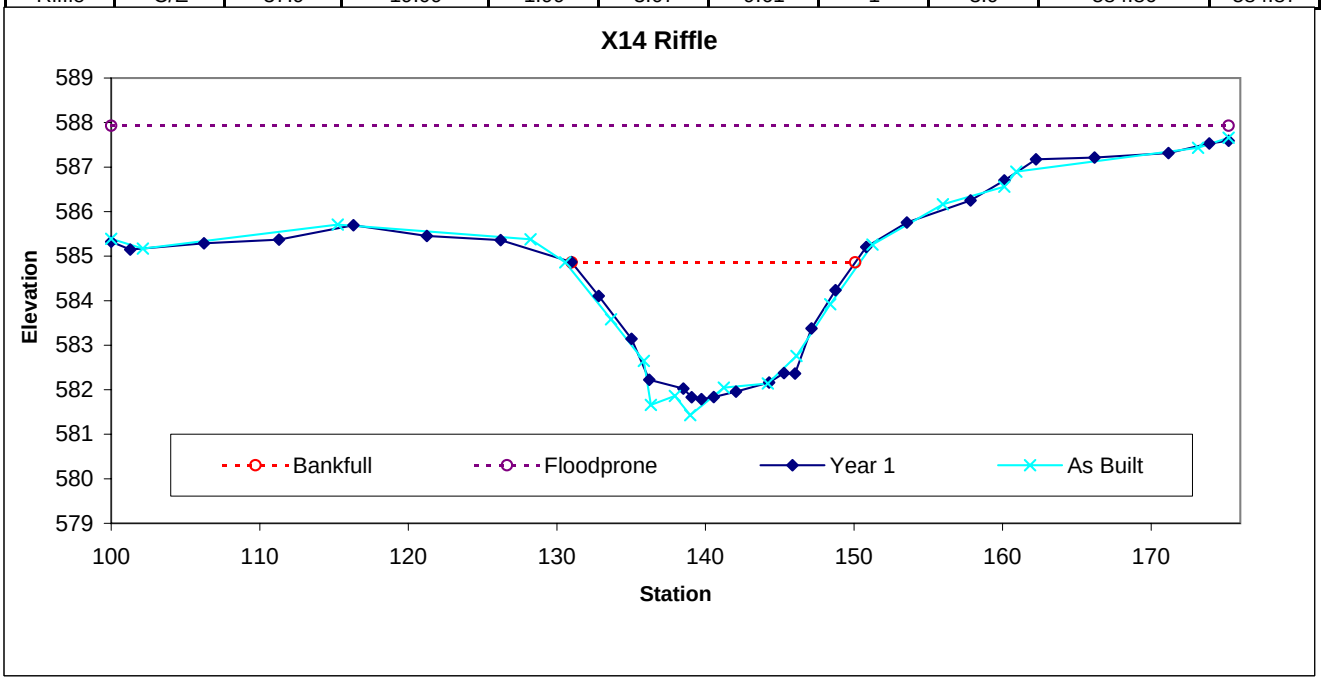
UT1 Permanent Cross Section X14

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C/E	37.9	19.09	1.99	3.07	9.61	1	3.9	584.86	584.87



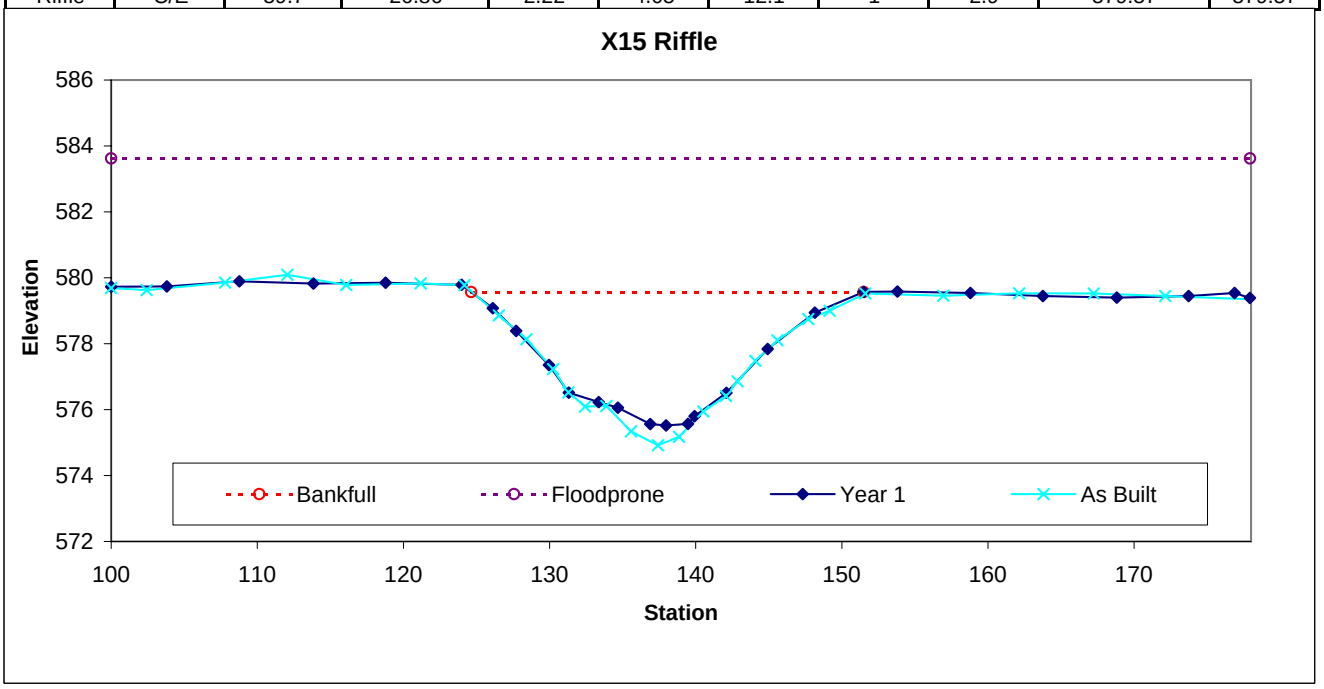
UT1 Permanent Cross Section X15

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C/E	59.7	26.86	2.22	4.05	12.1	1	2.9	579.57	579.57



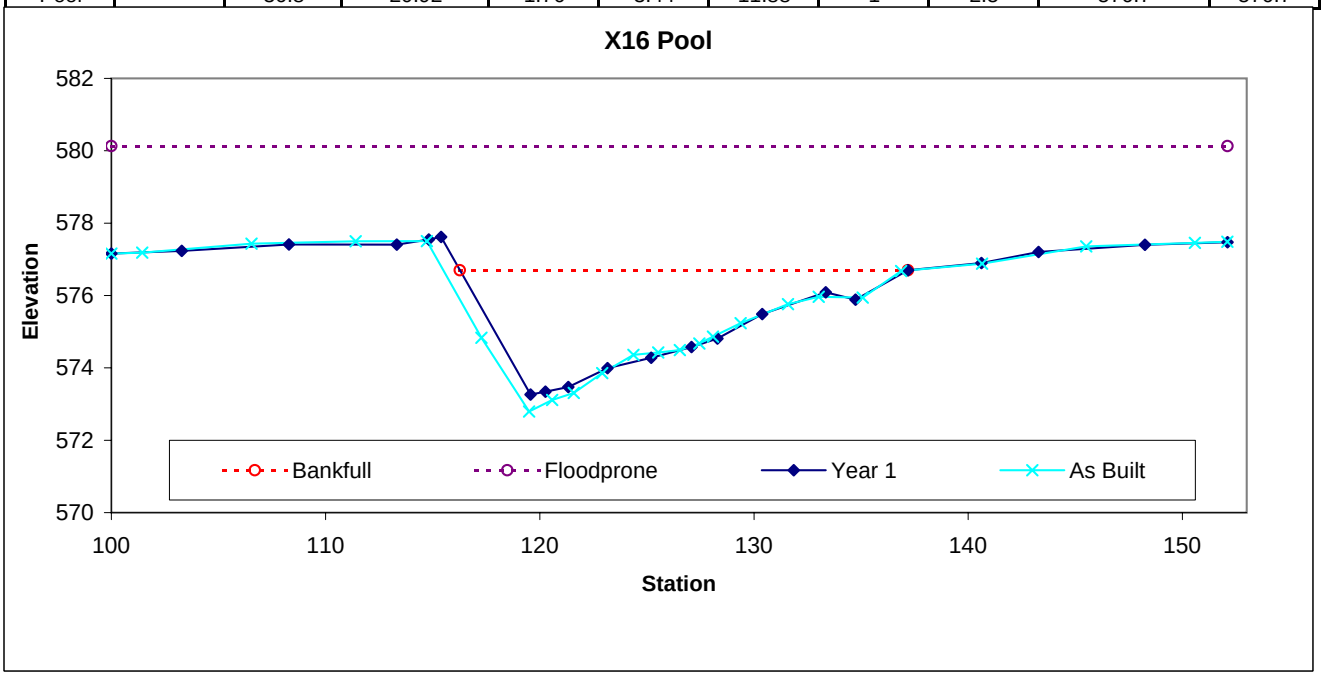
UT1 Permanent Cross Section X16

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		36.8	20.92	1.76	3.44	11.88	1	2.5	576.7	576.7



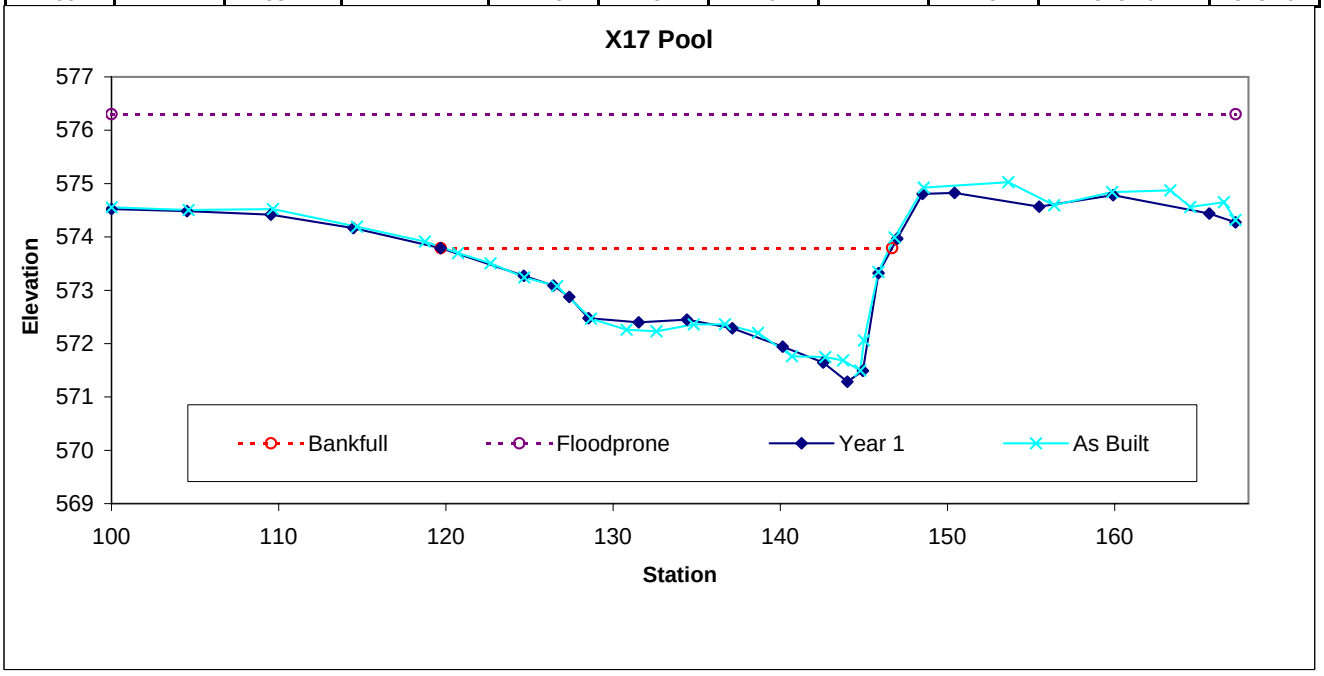
UT1 Permanent Cross Section X17

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		33.2	27	1.23	2.51	21.94	1	2.5	573.79	573.79



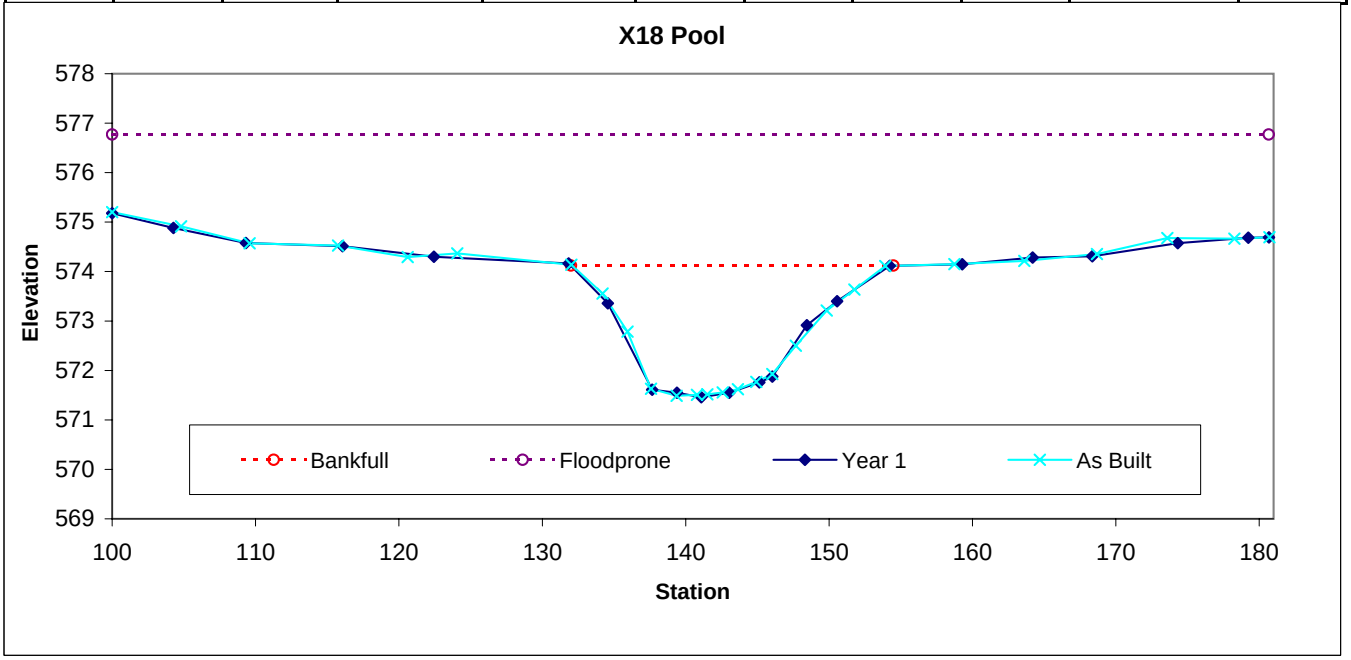
UT1 Permanent Cross Section X18

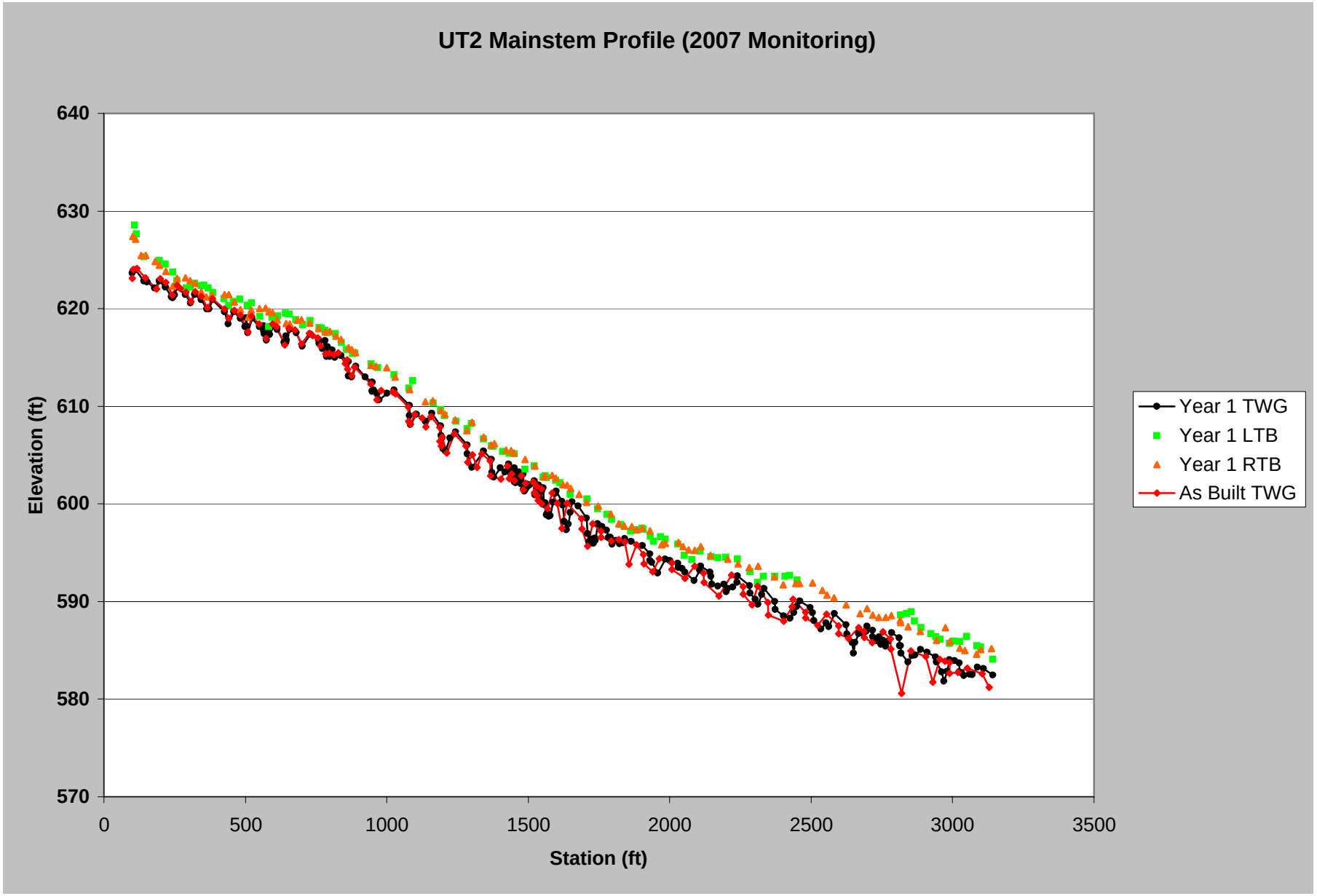
(Year 1 Monitoring Data - collected October 2007)

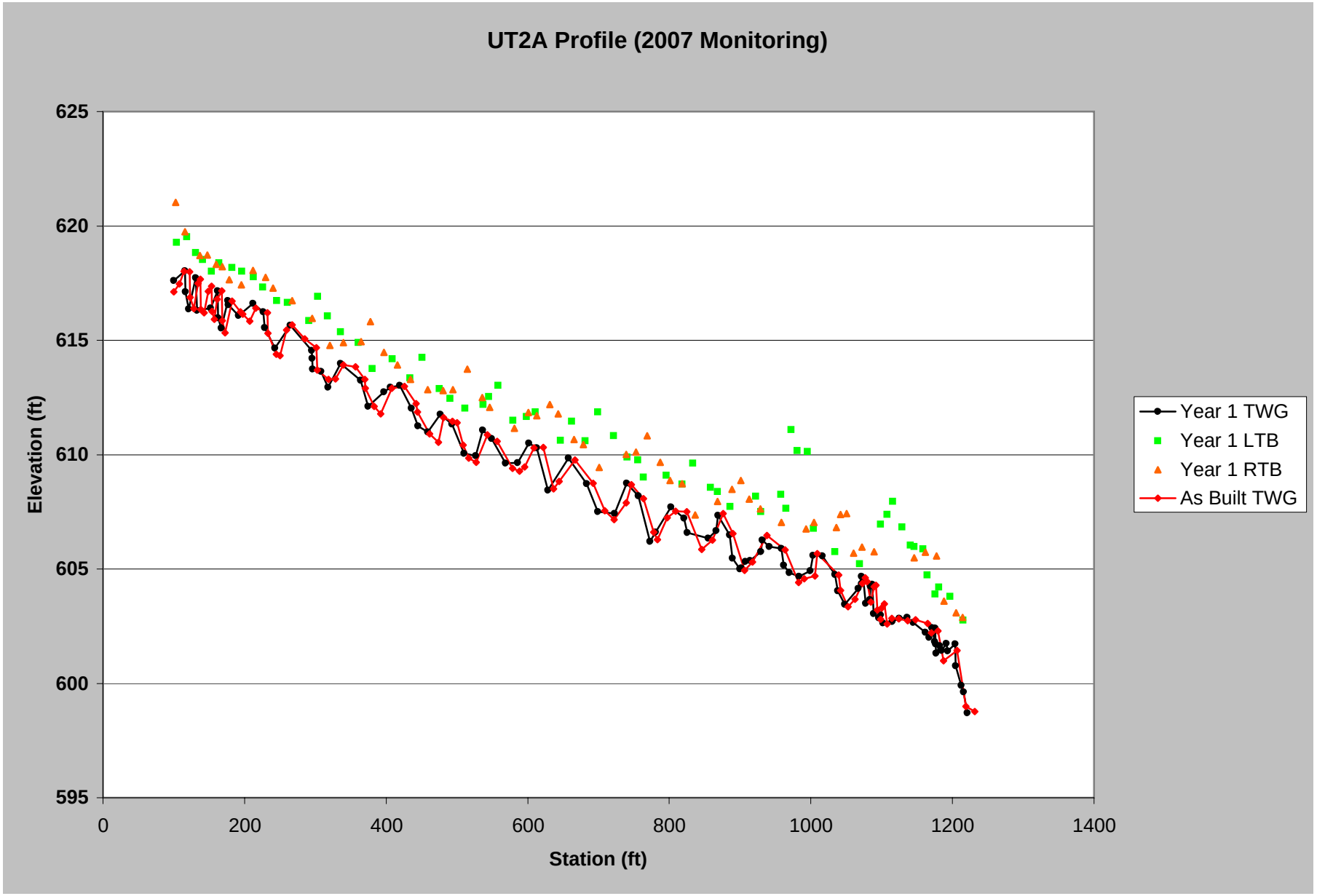
Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C/E	34.7	22.49	1.54	2.66	14.59	1	3.6	574.12	574.11




UT2 Mainstem Profile (2007 Monitoring)
Elevation (ft)
640
630
620
610
600
590
580
570
0
500
1000
1500
2000
2500
3000
3500
Station (ft)
Year 1 TWG
Year 1 LTB
Year 1 RTB
As Built TWG


UT2A Profile (2007 Monitoring)
625
620
615
610
605
600
595
Elevation (ft)
0
200
400
600
800
1000
1200
1400
Station (ft)
Year 1 TWG
Year 1 LTB
Year 1 RTB
As Built TWG

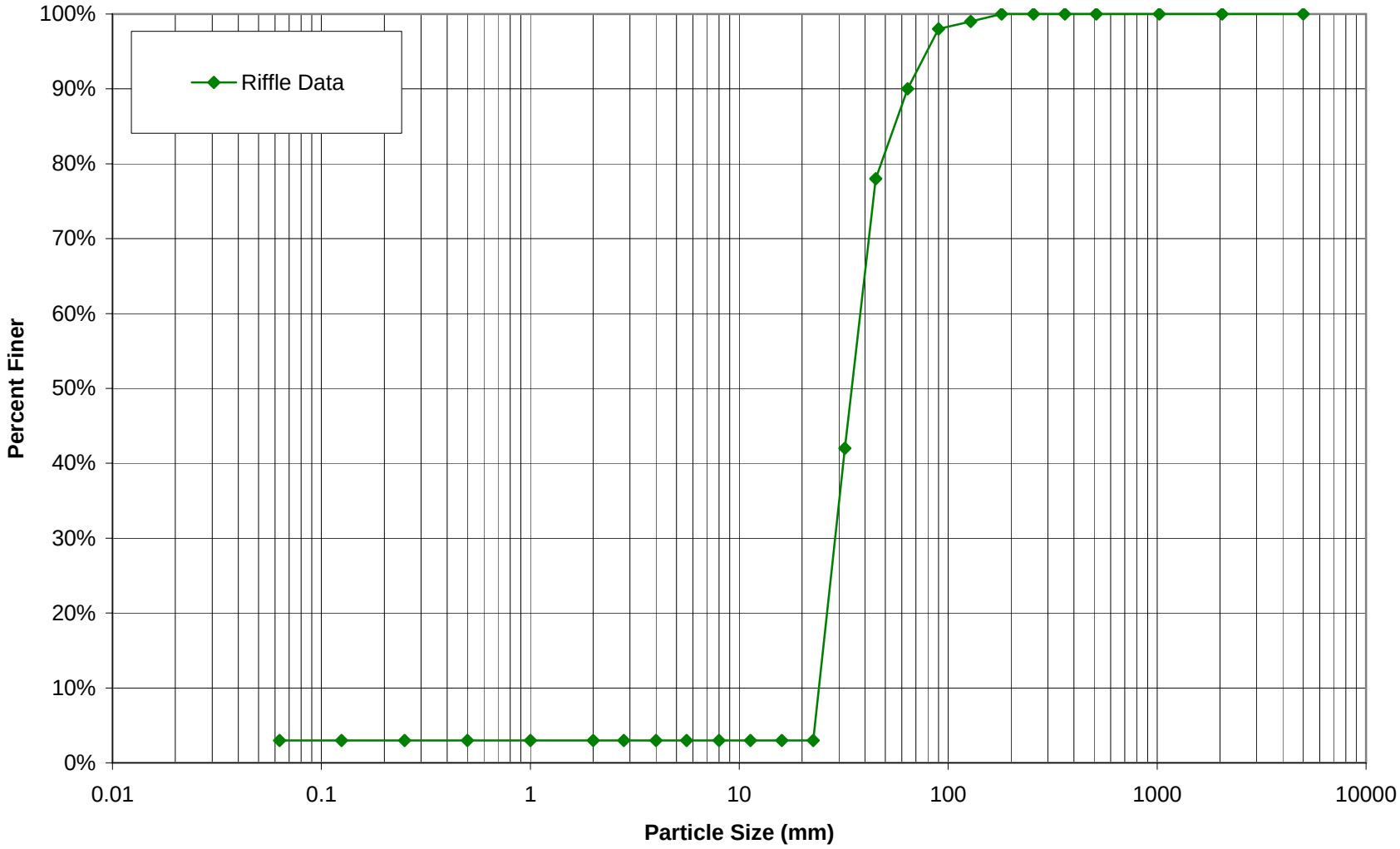
PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT2A X1-Riffle
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	3	3%	3%	0.063
SAND	Very Fine	.063 - .125			3%	0.125
	Fine	.125 - .25			3%	0.25
	Medium	.25 - .50			3%	0.50
	Coarse	.50 - 1.0			3%	1.0
	Very Coarse	1.0 - 2.0			3%	2.0
GRAVEL	Very Fine	2.0 - 2.8			3%	2.8
	Very Fine	2.8 - 4.0			3%	4.0
	Fine	4.0 - 5.6			3%	5.6
	Fine	5.6 - 8.0			3%	8.0
	Medium	8.0 - 11.0			3%	11.3
	Medium	11.0 - 16.0			3%	16.0
	Coarse	16.0 - 22.6			3%	22.6
	Coarse	22.6 - 32	39	39%	42%	32
	Very Coarse	32 - 45	36	36%	78%	45
	Very Coarse	45 - 64	12	12%	90%	64
COBBLE	Small	64 - 90	8	8%	98%	90
	Small	90 - 128	1	1%	99%	128
	Large	128 - 180	1	1%	100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____
(riffle)

Beaverdam Creek UT2A
X1 Riffle
Pebble Count Particle Size Distribution



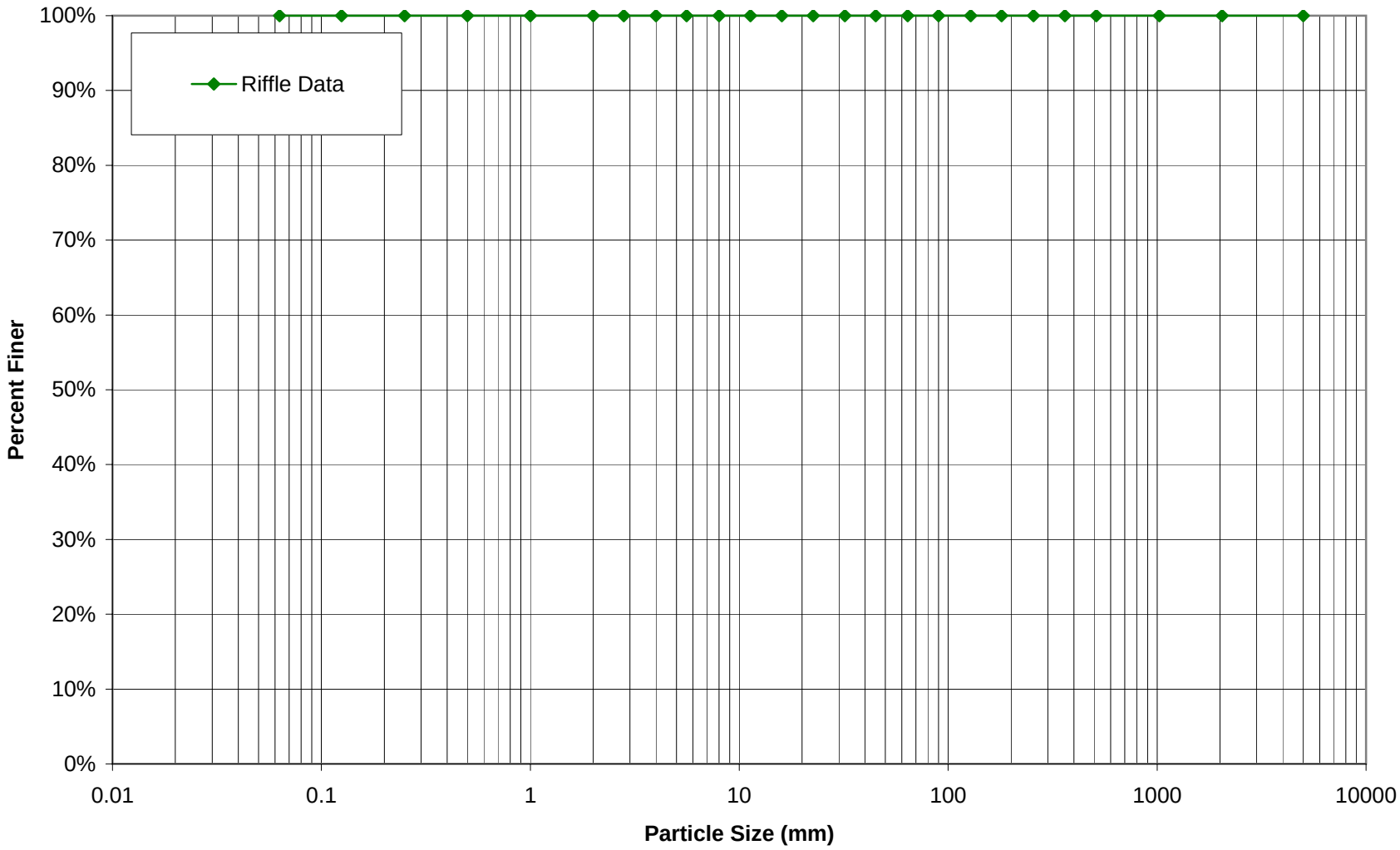
PEBBLE COUNT DATA SHEET: POOL 100-COUNT

	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT2A X2-Pool
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	100	100%	100%	0.063
SAND	Very Fine	.063 - .125			100%	0.125
	Fine	.125 - .25			100%	0.25
	Medium	.25 - .50			100%	0.50
	Coarse	.50 - 1.0			100%	1.0
	Very Coarse	1.0 - 2.0			100%	2.0
GRAVEL	Very Fine	2.0 - 2.8			100%	2.8
	Very Fine	2.8 - 4.0			100%	4.0
	Fine	4.0 - 5.6			100%	5.6
	Fine	5.6 - 8.0			100%	8.0
	Medium	8.0 - 11.0			100%	11.3
	Medium	11.0 - 16.0			100%	16.0
	Coarse	16.0 - 22.6			100%	22.6
	Coarse	22.6 - 32			100%	32
	Very Coarse	32 - 45			100%	45
	Very Coarse	45 - 64			100%	64
COBBLE	Small	64 - 90			100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____ **(riffle)**

Beaverdam Creek UT2A
X2 Pool
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

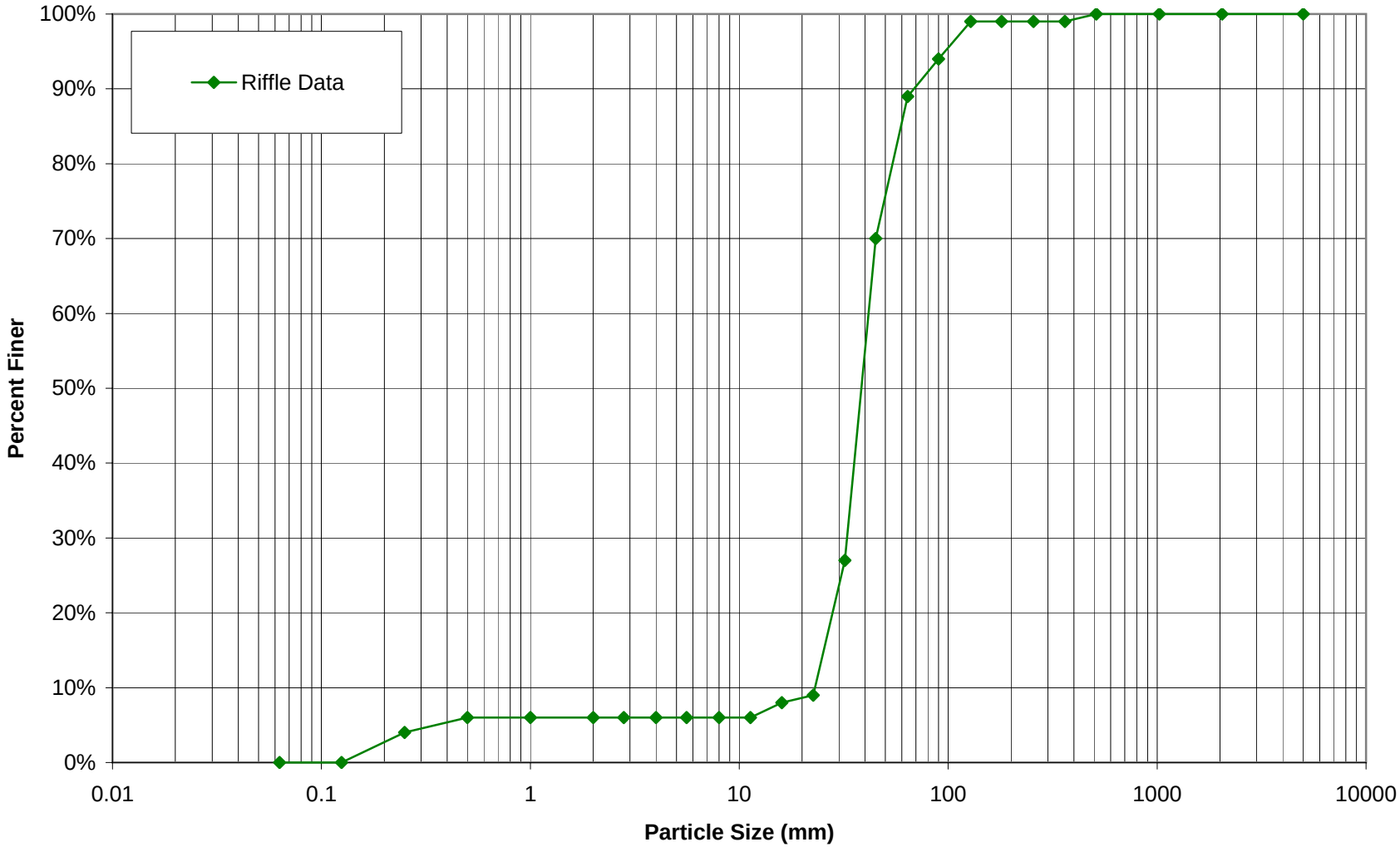
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT2 X3-Riffle
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063			0%	0.063
SAND	Very Fine	.063 - .125			0%	0.125
	Fine	.125 - .25	4	4%	4%	0.25
	Medium	.25 - .50	2	2%	6%	0.50
	Coarse	.50 - 1.0			6%	1.0
	Very Coarse	1.0 - 2.0			6%	2.0
GRAVEL	Very Fine	2.0 - 2.8			6%	2.8
	Very Fine	2.8 - 4.0			6%	4.0
	Fine	4.0 - 5.6			6%	5.6
	Fine	5.6 - 8.0			6%	8.0
	Medium	8.0 - 11.0			6%	11.3
	Medium	11.0 - 16.0	2	2%	8%	16.0
	Coarse	16.0 - 22.6	1	1%	9%	22.6
	Coarse	22.6 - 32	18	18%	27%	32
	Very Coarse	32 - 45	43	43%	70%	45
	Very Coarse	45 - 64	19	19%	89%	64
COBBLE	Small	64 - 90	5	5%	94%	90
	Small	90 - 128	5	5%	99%	128
	Large	128 - 180			99%	180
	Large	180 - 256			99%	256
BOULDER	Small	256 - 362			99%	362
	Small	362 - 512	1	1%	100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(riffle)

Beaverdam Creek UT2
X3 Riffle
Pebble Count Particle Size Distribution



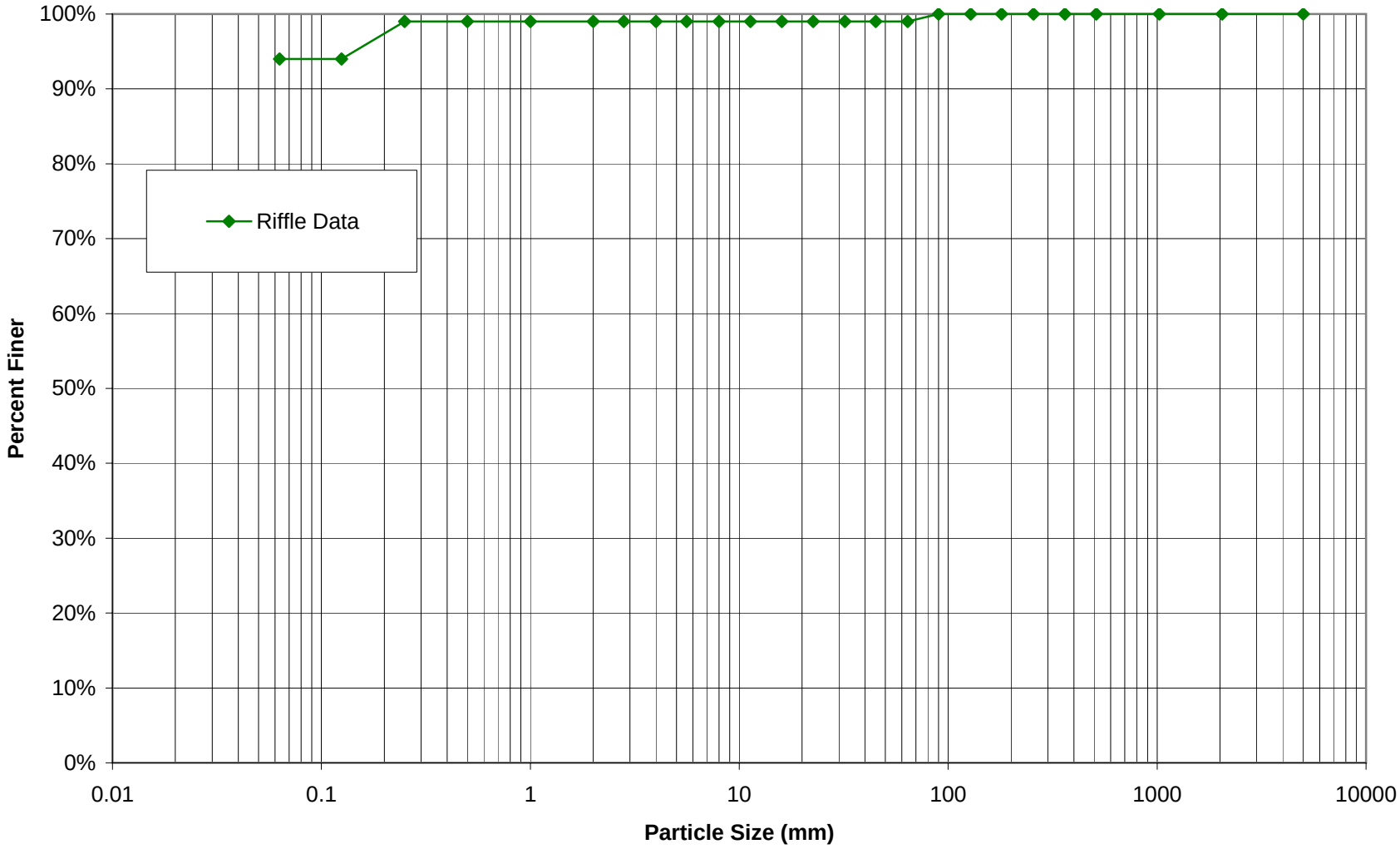
PEBBLE COUNT DATA SHEET: POOL 100-COUNT

	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT2 X4-Pool
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	94	94%	94%	0.063
SAND	Very Fine	.063 - .125			94%	0.125
	Fine	.125 - .25	5	5%	99%	0.25
	Medium	.25 - .50			99%	0.50
	Coarse	.50 - 1.0			99%	1.0
	Very Coarse	1.0 - 2.0			99%	2.0
GRAVEL	Very Fine	2.0 - 2.8			99%	2.8
	Very Fine	2.8 - 4.0			99%	4.0
	Fine	4.0 - 5.6			99%	5.6
	Fine	5.6 - 8.0			99%	8.0
	Medium	8.0 - 11.0			99%	11.3
	Medium	11.0 - 16.0			99%	16.0
	Coarse	16.0 - 22.6			99%	22.6
	Coarse	22.6 - 32			99%	32
	Very Coarse	32 - 45			99%	45
	Very Coarse	45 - 64			99%	64
COBBLE	Small	64 - 90	1	1%	100%	90
	Small	90 - 128			100%	128
	Large	128 - 180			100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	**100**	**100%**		

Largest particles: _____ **(riffle)**

Beaverdam Creek UT2
X4 Pool
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

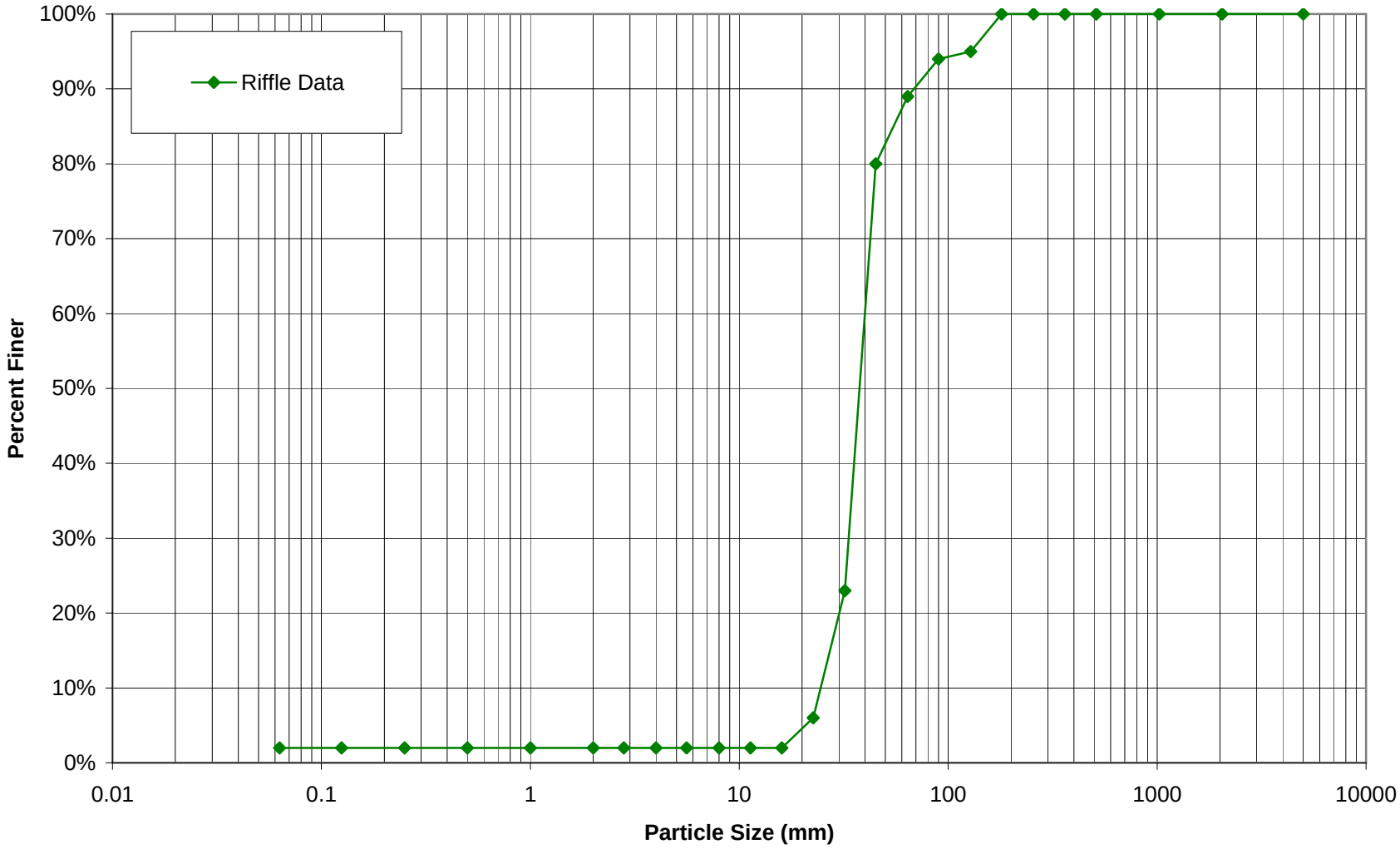
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT2 X5-Riffle
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	2	2%	2%	0.063
SAND	Very Fine	.063 - .125			2%	0.125
	Fine	.125 - .25			2%	0.25
	Medium	.25 - .50			2%	0.50
	Coarse	.50 - 1.0			2%	1.0
	Very Coarse	1.0 - 2.0			2%	2.0
GRAVEL	Very Fine	2.0 - 2.8			2%	2.8
	Very Fine	2.8 - 4.0			2%	4.0
	Fine	4.0 - 5.6			2%	5.6
	Fine	5.6 - 8.0			2%	8.0
	Medium	8.0 - 11.0			2%	11.3
	Medium	11.0 - 16.0			2%	16.0
	Coarse	16.0 - 22.6	4	4%	6%	22.6
	Coarse	22.6 - 32	17	17%	23%	32
	Very Coarse	32 - 45	57	57%	80%	45
	Very Coarse	45 - 64	9	9%	89%	64
COBBLE	Small	64 - 90	5	5%	94%	90
	Small	90 - 128	1	1%	95%	128
	Large	128 - 180	5	5%	100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(riffle)

Beaverdam Creek UT2
X5 Riffle
Pebble Count Particle Size Distribution



PEBBLE COUNT DATA SHEET: POOL 100-COUNT

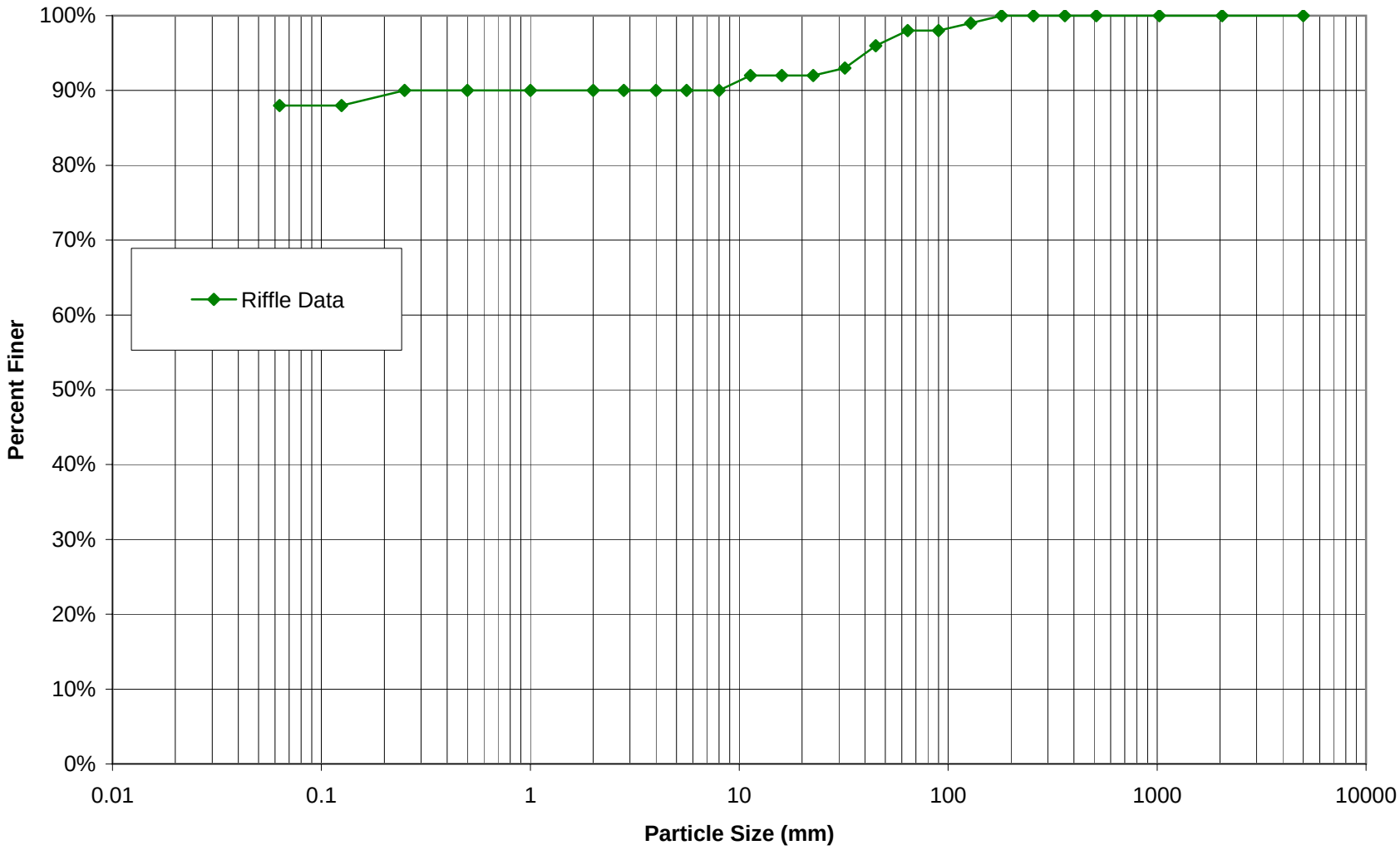
	BAKER PROJECT NO. 108528
SITE OR PROJECT:	Beaverdam Creek 1st Year Monitoring
REACH/LOCATION:	UT2 X6-Pool
DATE COLLECTED:	10/15/2007
FIELD COLLECTION BY:	RR/IE
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary		Distribution
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum	Plot Size (mm)
SILT/CLAY	Silt / Clay	< .063	88	88%	88%	0.063
SAND	Very Fine	.063 - .125			88%	0.125
	Fine	.125 - .25	2	2%	90%	0.25
	Medium	.25 - .50			90%	0.50
	Coarse	.50 - 1.0			90%	1.0
	Very Coarse	1.0 - 2.0			90%	2.0
GRAVEL	Very Fine	2.0 - 2.8			90%	2.8
	Very Fine	2.8 - 4.0			90%	4.0
	Fine	4.0 - 5.6			90%	5.6
	Fine	5.6 - 8.0			90%	8.0
	Medium	8.0 - 11.0	2	2%	92%	11.3
	Medium	11.0 - 16.0			92%	16.0
	Coarse	16.0 - 22.6			92%	22.6
	Coarse	22.6 - 32	1	1%	93%	32
	Very Coarse	32 - 45	3	3%	96%	45
	Very Coarse	45 - 64	2	2%	98%	64
COBBLE	Small	64 - 90			98%	90
	Small	90 - 128	1	1%	99%	128
	Large	128 - 180	1	1%	100%	180
	Large	180 - 256			100%	256
BOULDER	Small	256 - 362			100%	362
	Small	362 - 512			100%	512
	Medium	512 - 1024			100%	1024
	Large-Very Large	1024 - 2048			100%	2048
BEDROCK	Bedrock	> 2048			100%	5000
		Total	100	100%		

Largest particles: _____

(riffle)

Beaverdam Creek UT2
X6 Pool
Pebble Count Particle Size Distribution



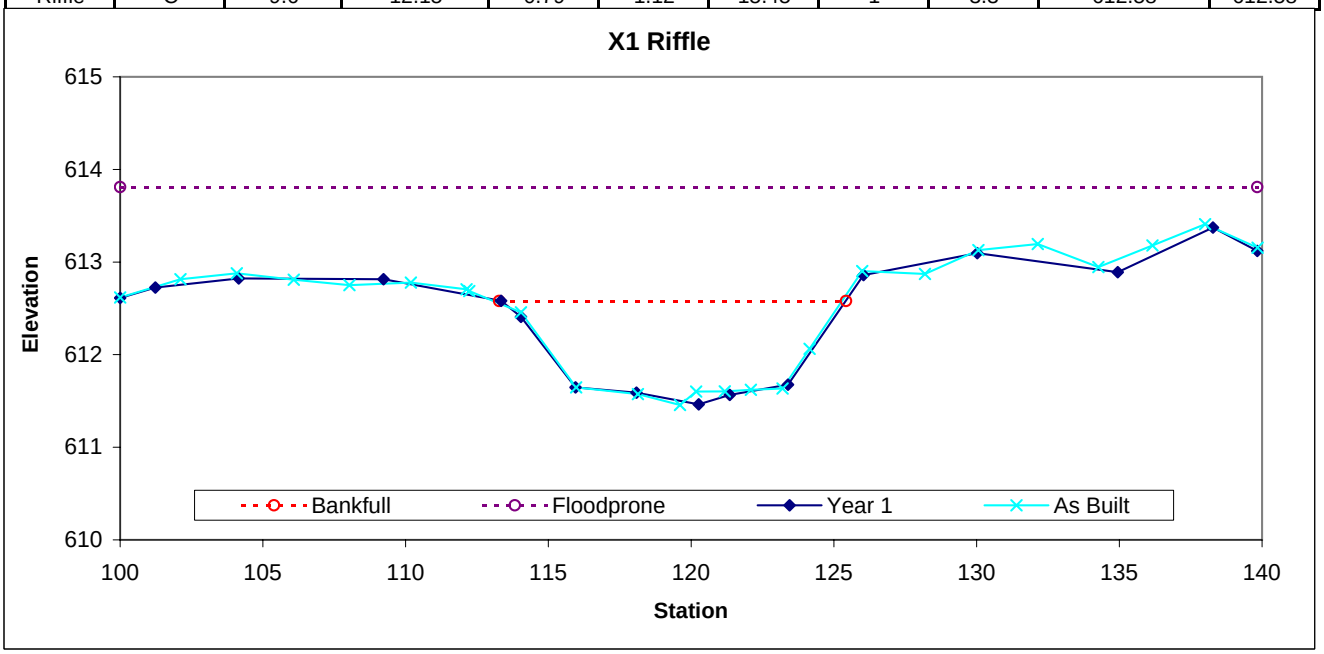
UT2 Permanent Cross Section X1

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	9.6	12.15	0.79	1.12	15.45	1	3.3	612.58	612.58



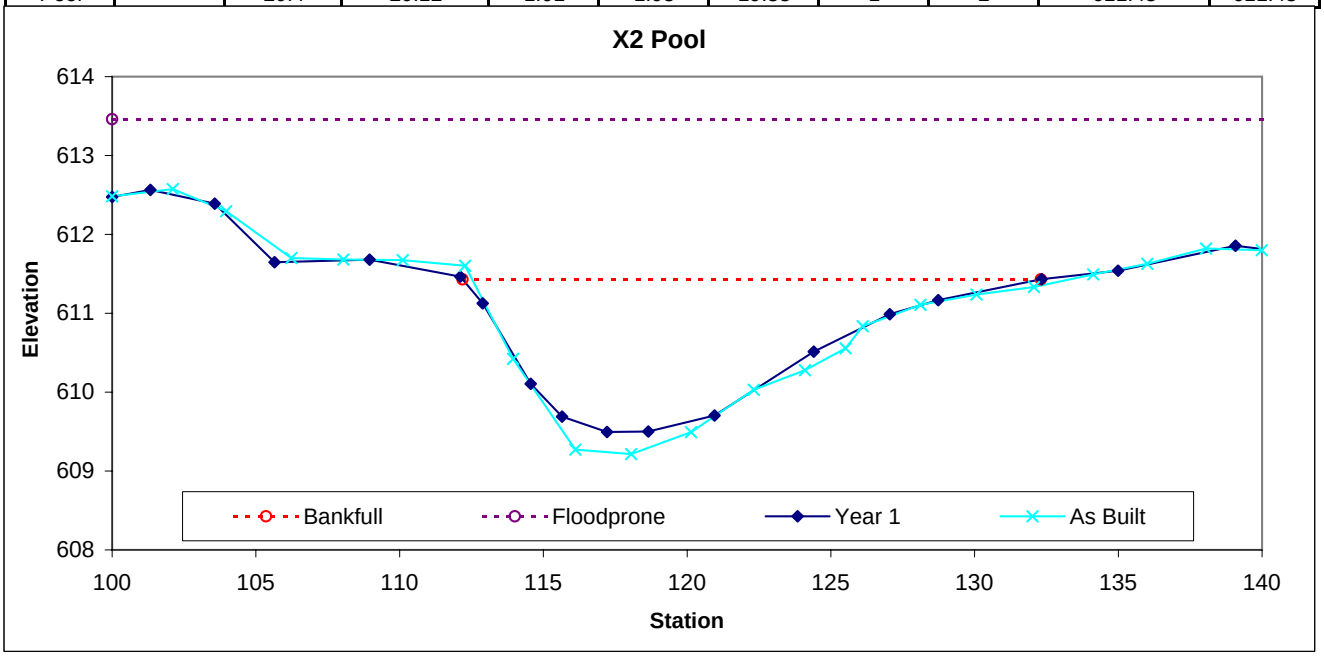
UT2 Permanent Cross Section X2

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		20.4	20.12	1.01	1.93	19.83	1	2	611.43	611.43



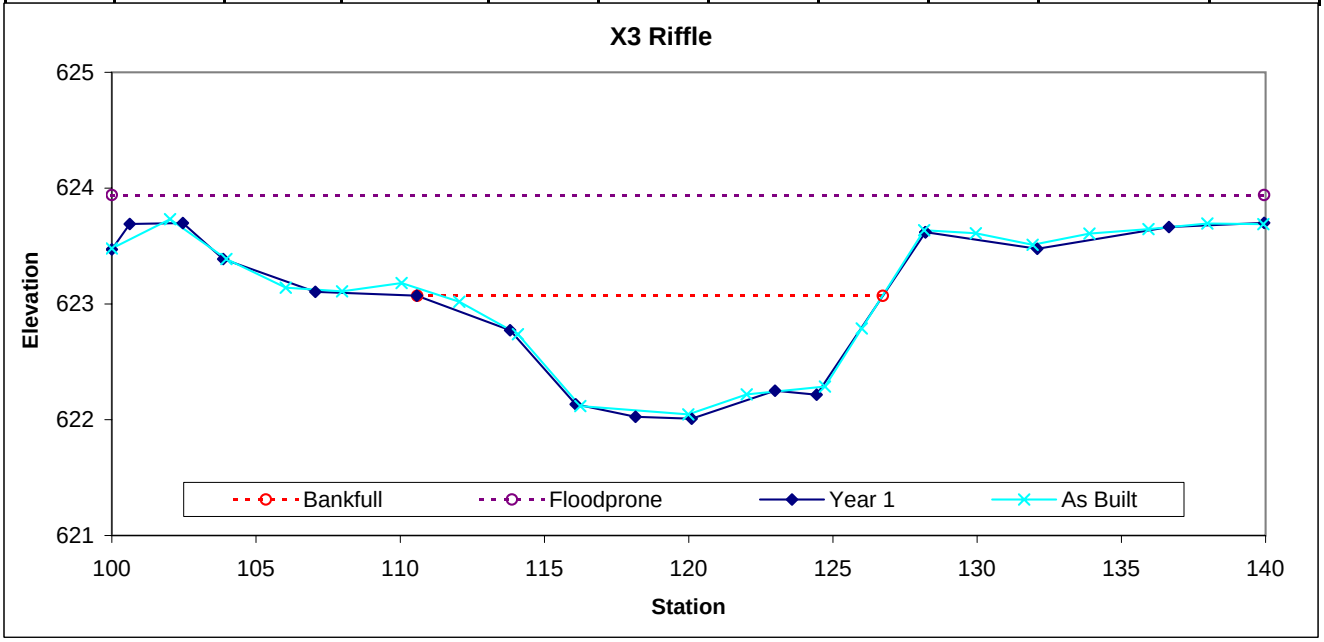
UT2 Permanent Cross Section X3

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	10.9	16.14	0.67	1.06	23.92	1	2.5	623.07	623.07



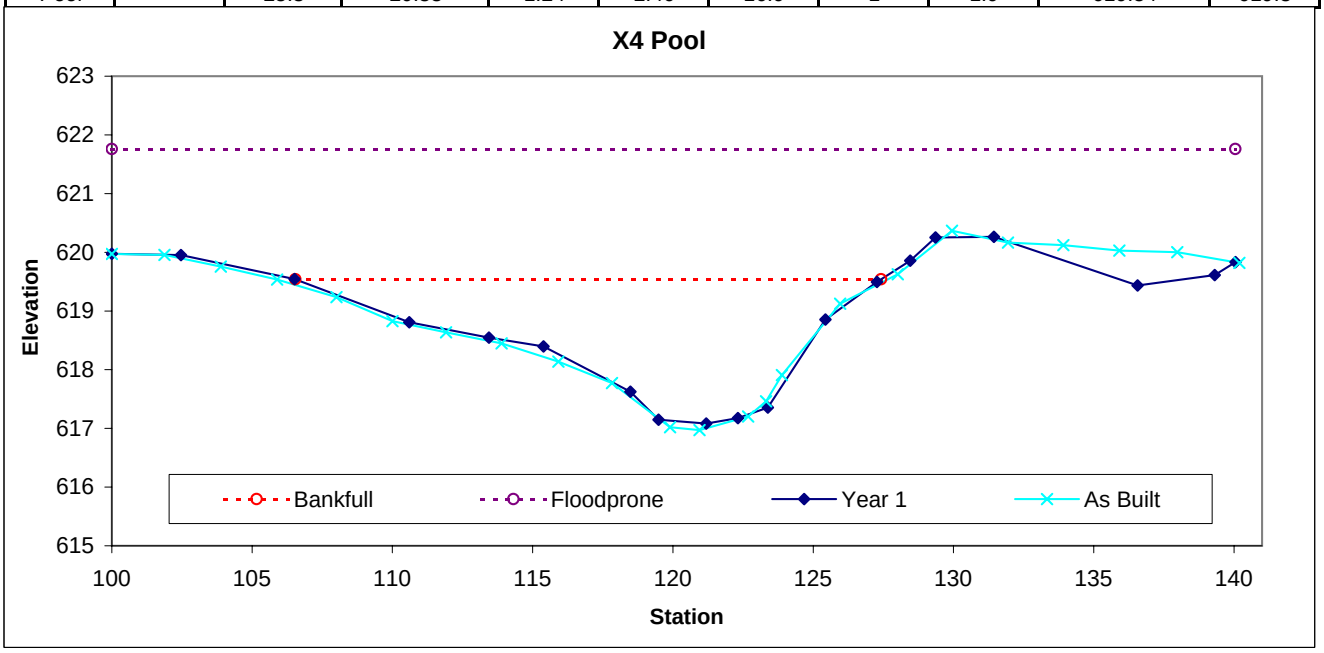
UT2 Permanent Cross Section X4

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		25.8	20.88	1.24	2.46	16.9	1	1.9	619.54	619.3



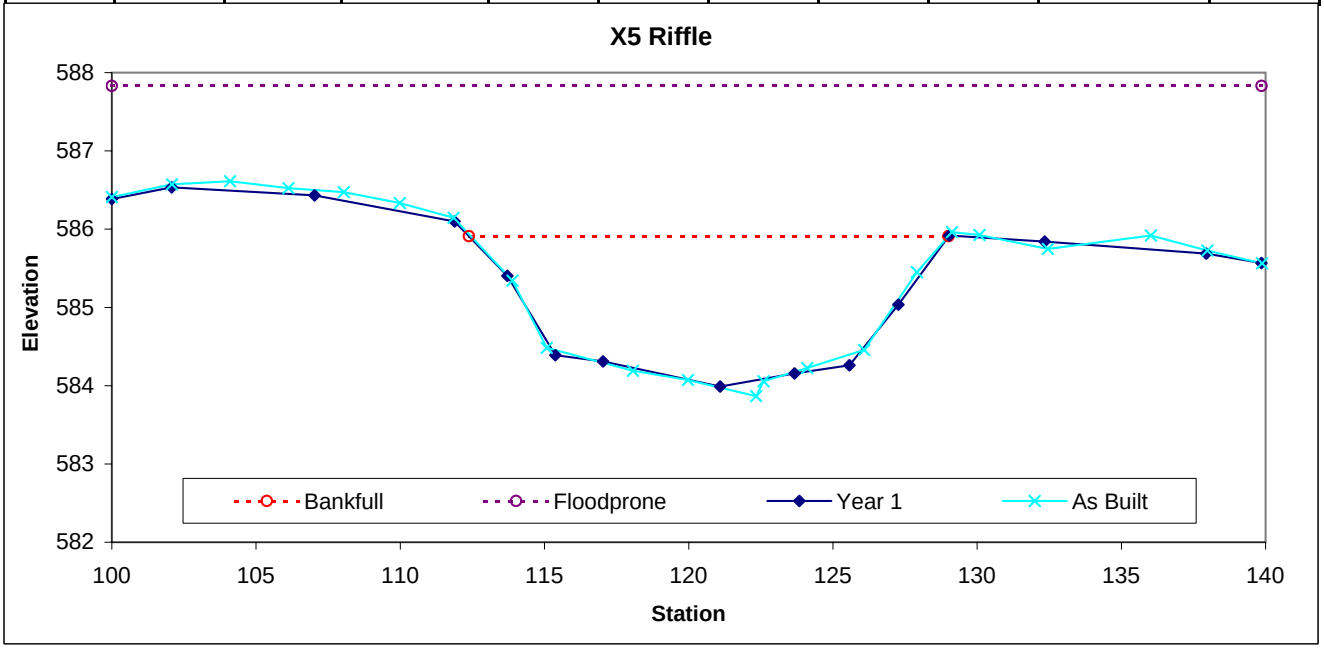
UT2 Permanent Cross Section X5

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	22.6	16.63	1.36	1.92	12.23	1	2.4	585.91	585.92



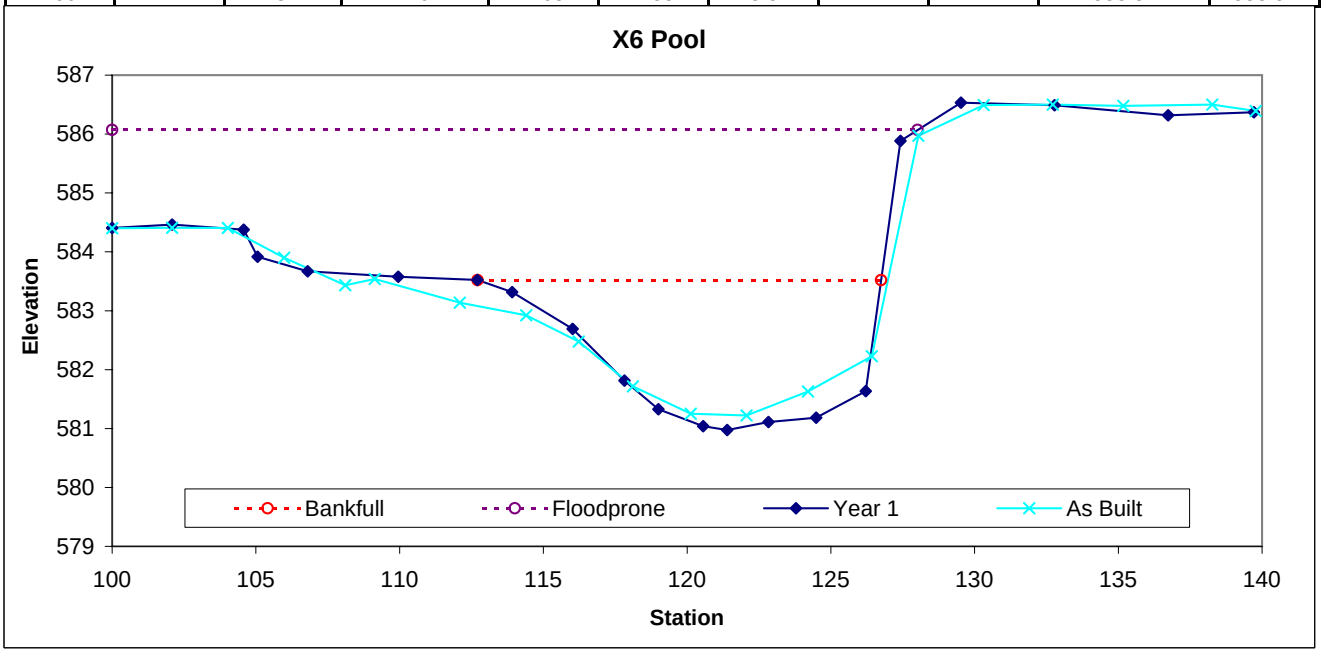
UT2 Permanent Cross Section X6

(Year 1 Monitoring Data - collected October 2007)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		23.2	14.04	1.65	2.55	8.5	1	2	583.52	583.52



APPENDIX C

AS-BUILT PLAN SHEETS

PROJECT REFERENCE NO.	SHEET NO.
108528	T1

DRAFT

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10/11/2007

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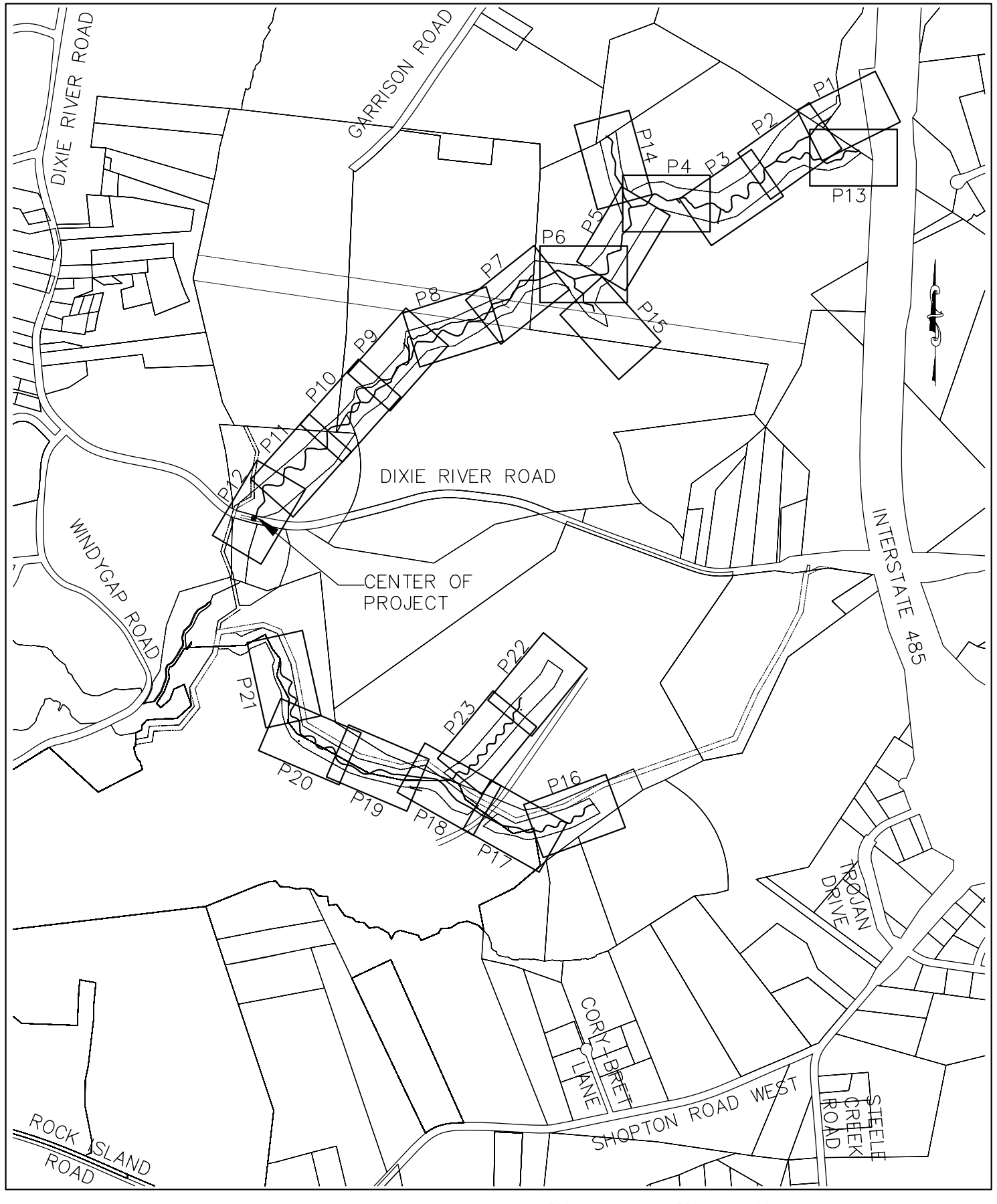
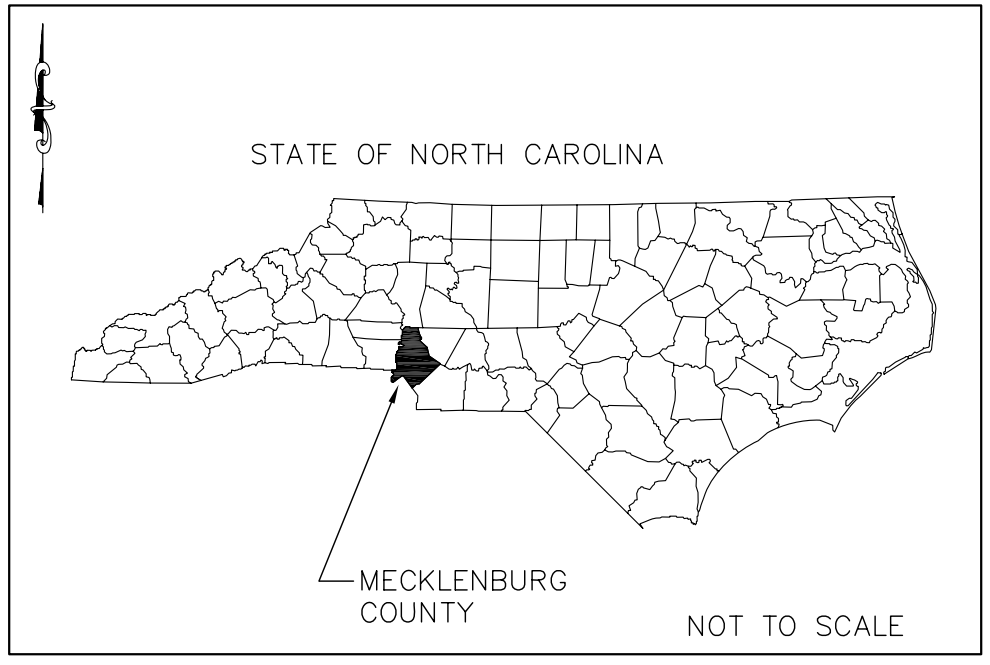
BEAVERDAM CREEK STREAM RESTORATION AS-BUILT PLANS WITH BMP LOCATIONS



VICINITY MAP



INDEX OF SHEETS

CENTER OF PROJECT:
LAT: 35–10–21.7
LONG: 80–59–08.5

UT1
PRE-PROJECT STREAM LENGTH = 8,148 LF
AS-BUILT STREAM RESTORATION LENGTH = 8,617 LF

UT2
PRE-PROJECT STREAM LENGTH = 4,016 LF
AS-BUILT STREAM RESTORATION LENGTH = 4,377 LF
PRESERVATION LENGTH = 962 LF

BEAVERDAM CREEK
PRESERVATION LENGTH = 1,641 LF

BEAVERDAM CREEK
AS-BUILT WITH BMPS

TITLE SHEET

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CONVENTIONAL SYMBOLS

10+00 — AS-BUILT THALWEG

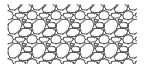
10+00 — DESIGN THALWEG

600 — EXISTING MAJOR CONTOUR

EXISTING MINOR CONTOUR

E — CONSERVATION EASEMENT

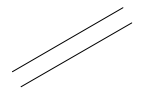
PROPERTY LINE



CONSTRUCTED RIFFLE

EXISTING TREE

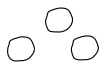
LOG SILL



LOG VANE

FLOW DIRECTION

ROCK CROSS VANE



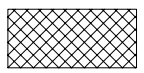
BOULDER CLUSTER

PHOTO ID POINT

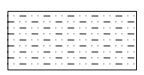
SURVEY CONTROL POINT

ROOT WAD

ROCK VANE



OFFSITE BMPS BY OTHERS (FROM MAY 2007 MECKLENBURG COUNTY AERIAL)



DISTURBANCE BY OTHERS WITHIN CONSERVATION EASEMENT BOUNDARIES (FROM MAY 2007 MECKLENBURG COUNTY AERIAL)

OFFSITE BMP OUTFALLS BY OTHERS (FROM MAY 2007 MECKELNBURG COUNTY AERIAL)

PROJECT REFERENCE NO.	SHEET NO.
108528	T2

DRAFT

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BEAVERDAM CREEK
AS-BUILT WITH BMPS

LEGEND

PROJECT REFERENCE NO.	SHEET NO.
108528	R1

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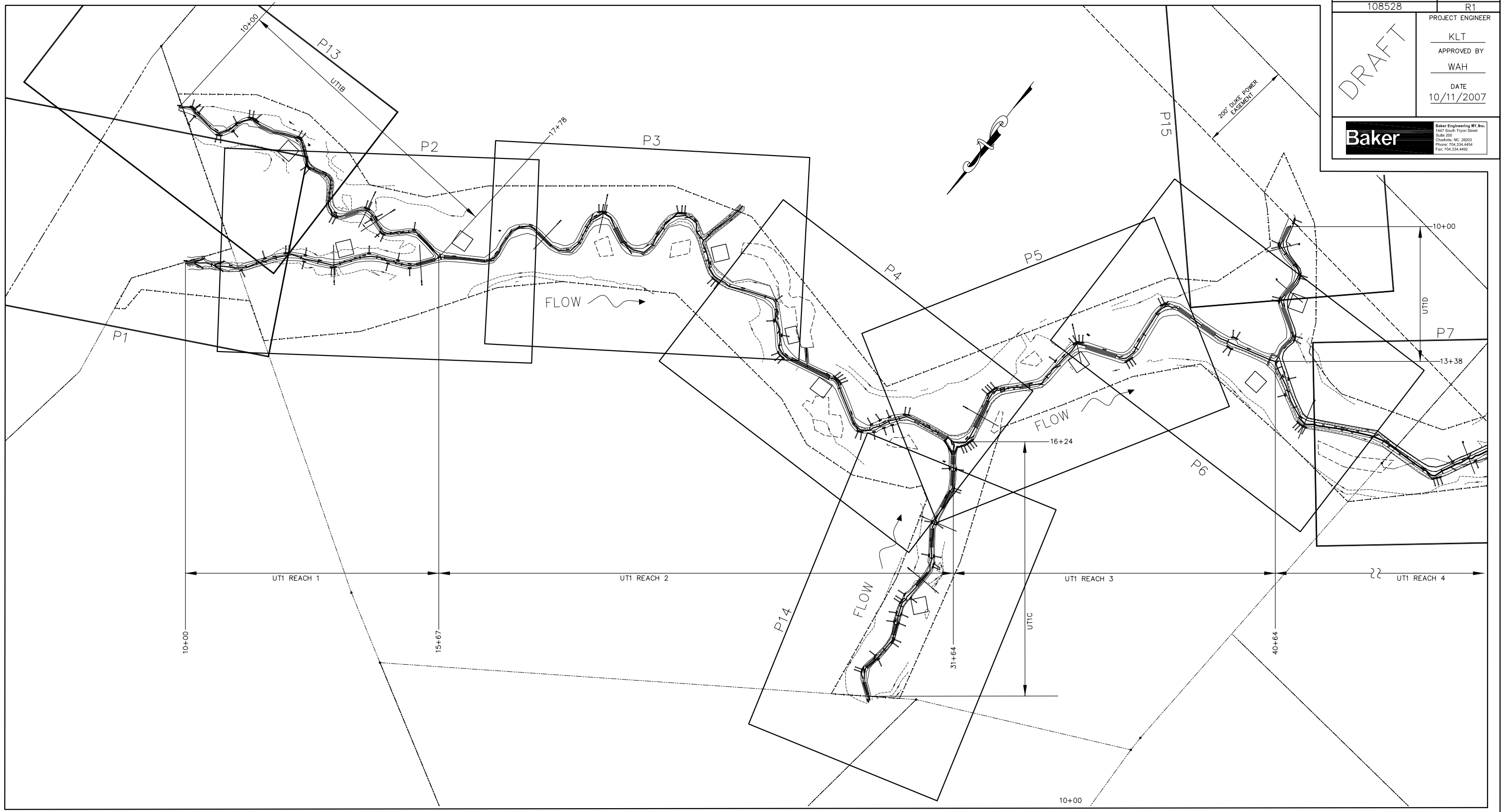

BEAVERDAM CREEK – UT1

100 0 100 200
SCALE (FT)

BEAVERDAM CREEK
AS-BUILT WITH BMPS

REFERENCE SHEET

L:\Projects\0269C\Design\Plans\AS-BUILT-PLANSHEETS-with-bmp.dwg Oct 11, 2007

PROJECT REFERENCE NO.	SHEET NO.
108528	R2

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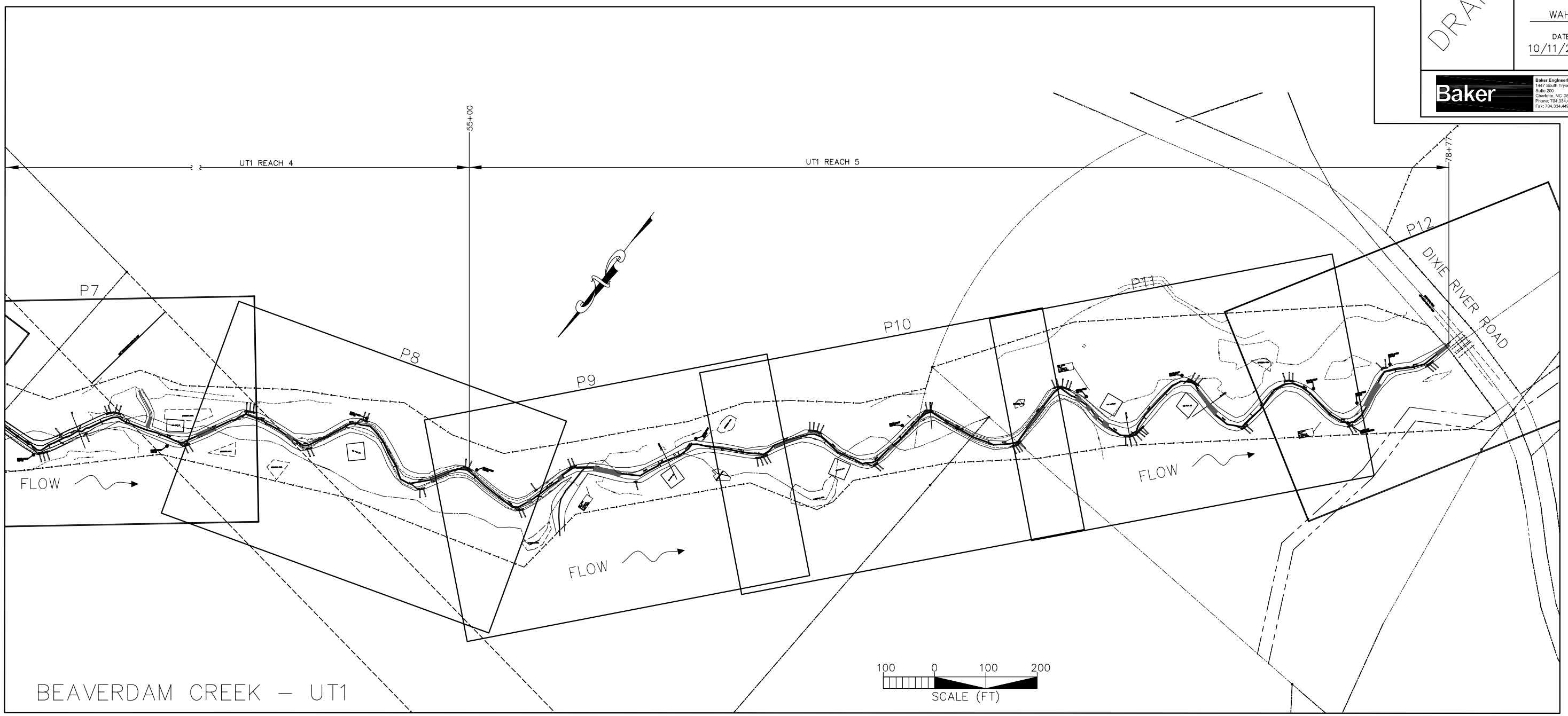

BEAVERDAM CREEK AS-BUILT WITH BMPS

REFERENCE SHEET

PROJECT REFERENCE NO.	SHEET NO.
108528	R3

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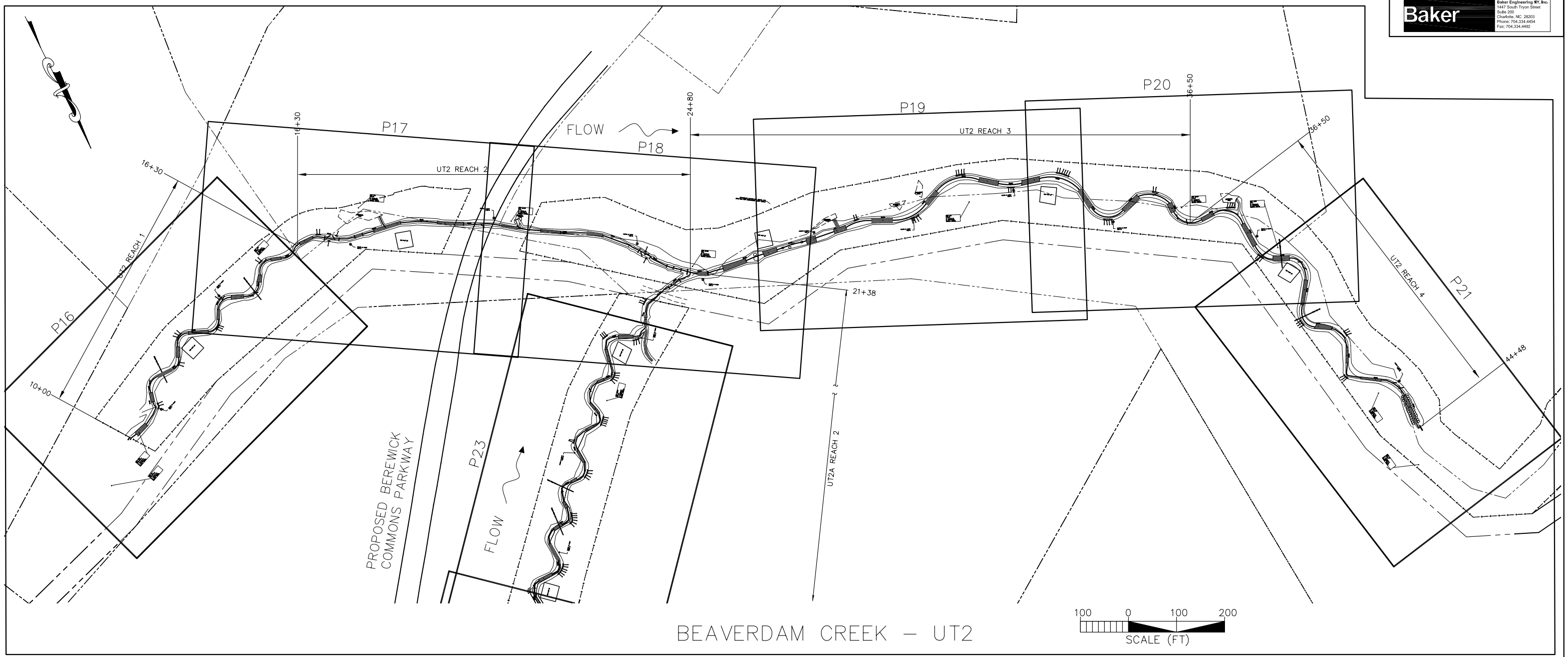

BEAVERDAM CREEK – UT2

BEAVERDAM CREEK
AS-BUILT WITH BMPS

REFERENCE SHEET

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PROJECT REFERENCE NO.	SHEET NO.
108528	R4

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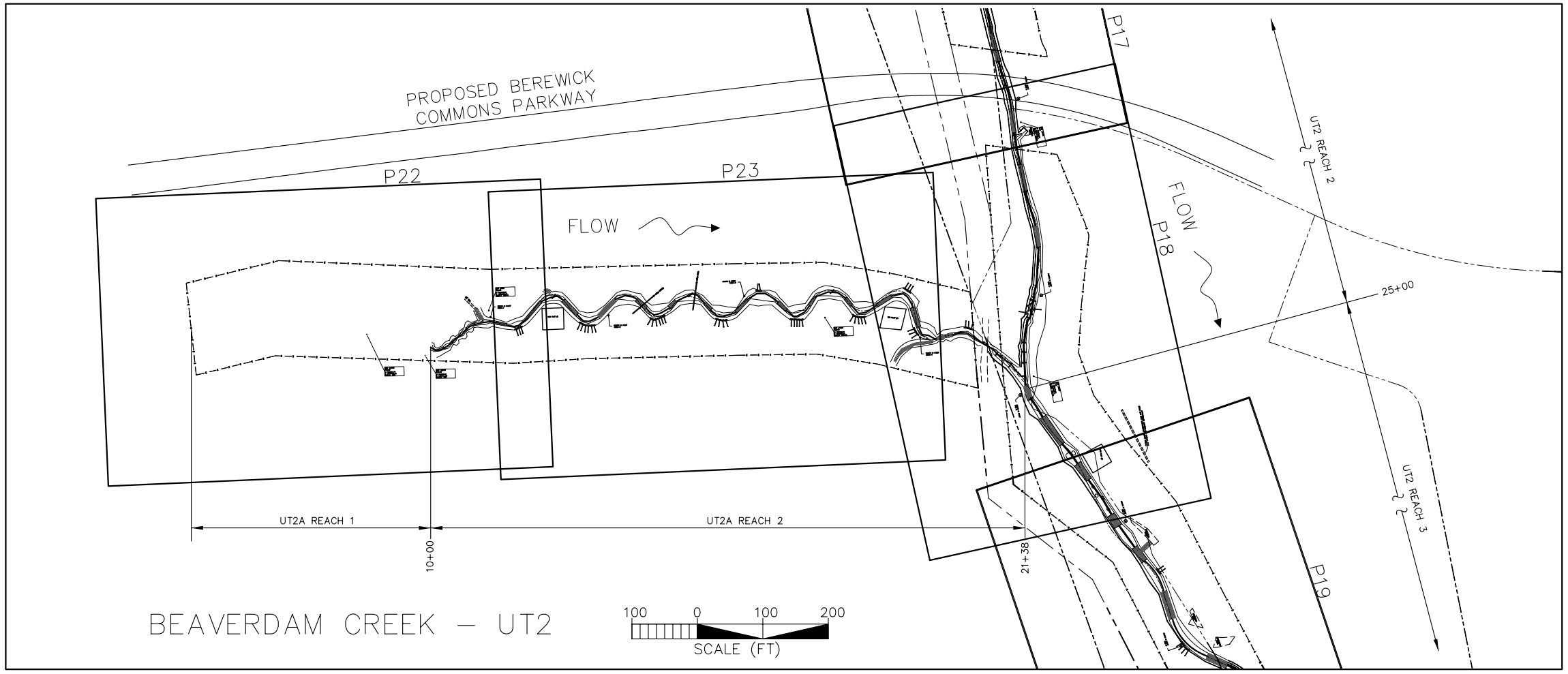

BEAVERDAM CREEK – UT2

BEAVERDAM CREEK
AS-BUILT WITH BMPS

REFERENCE SHEET

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PROJECT REFERENCE NO.	SHEET NO.
108528	P1

DRAFT

PROJECT ENGINEER

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APPROVED BY

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DATE

10/11/2007

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DEPARTMENT OF TRANSPORTATION
AND JOHN L. SHOEMAKER
TAX 14118164
DB 10219 PG 764
GARRISON ROAD

DEPARTMENT OF TRANSPORTATION
AND JOHN L. SHOEMAKER
TAX 14118164
DB 10219 PG 764
GARRISON ROAD

6
MECKLENBURG COUNTY
REAL ESTATE / FINANCE DEPT.
TAX 14117712
DB 14350 PG 408
DIXIE RIVER ROAD

5
WILLIAM H. KELLEY, III.
TAX 14118102
DB 4869 PG 301
10137 HORTON ROAD

10+00
11+00
600
609
PHOTO POINT
UT1-1

MATCHLINE - SHEET P2 - STA 11+61

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK AS-BUILT WITH BMPS

UT1 SITE PLAN

L:\Projects\0269C\Design\Plans\AS-BUILT-PLANSHEETS.dwg Nov 30, 2007

PROJECT REFERENCE NO.	SHEET NO.
108528	P2

DRAFT

PROJECT ENGINEER
KLT

APPROVED BY
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DATE
10/11/2007

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MATCHLINE – SHEET P13 – STA 14+58

MATCHLINE – SHEET P1 – STA 11+61

MATCHLINE – SHEET P3 – STA 17+78

PHOTO POINT UT1B–2

X3 POOL

X4 RIFFLE

PHOTO POINT UT1B–1

BCP # 3314
REBAR
N 526612.23
E 1410924.41
ELEV.= 601.58

VEG PLOT #1

VEG PLOT #2

PHOTO POINT UT1–2

X1 POOL

PHOTO POINT UT1–3

X2 RIFFLE

6
MECKLENBURG COUNTY
REAL ESTATE / FINANCE DEPT.
TAX 14117112
DB 14350 PG 408
DIXIE RIVER ROAD

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS–BUILT WITH BMPS

UT1/UT1–B SITE PLAN

L:\Projects\0269C\Design\Plans\AS–BUILT–PLANSHEETS.dwg Nov 30, 2007

PROJECT REFERENCE NO.	SHEET NO.
108528	P3

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PROJECT ENGINEER
KLT
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WAH
DATE
10/11/2007

Baker
Baker Engineering NY, Inc.
1447 South Tryon Street
Suite 200
Charlotte, NC 28203
Phone: 704.334.4454
Fax: 704.334.4492

MATCHLINE – SHEET P2 – STA 17+78

PHOTO POINT UT1–4

PHOTO POINT UT1–5

PHOTO POINT UT1–6

PHOTO POINT UT1–7

PHOTO POINT UT1–8

XS RIFFLE

XS POOL

BCP #2699
REBAR
N 526194.98
E 1410385.07
ELEV.= 597.30

BCP #2510
REBAR
N 526071.90
E 1410157.66
ELEV.= 596.32

EPHEMERAL POOL

EPHEMERAL POOL

EPHEMERAL POOL

VEG PLOT #4

18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00

595

MECKLENBURG COUNTY
REAL ESTATE / FINANCE DEPT.
TAX 14117712
DB 14350 PG 408
DIXIE RIVER ROAD

MATCHLINE – SHEET P4

MATCHLINE – SHEET P4 – STA 26+81

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS–BUILT WITH BMPS

UT1 SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P4

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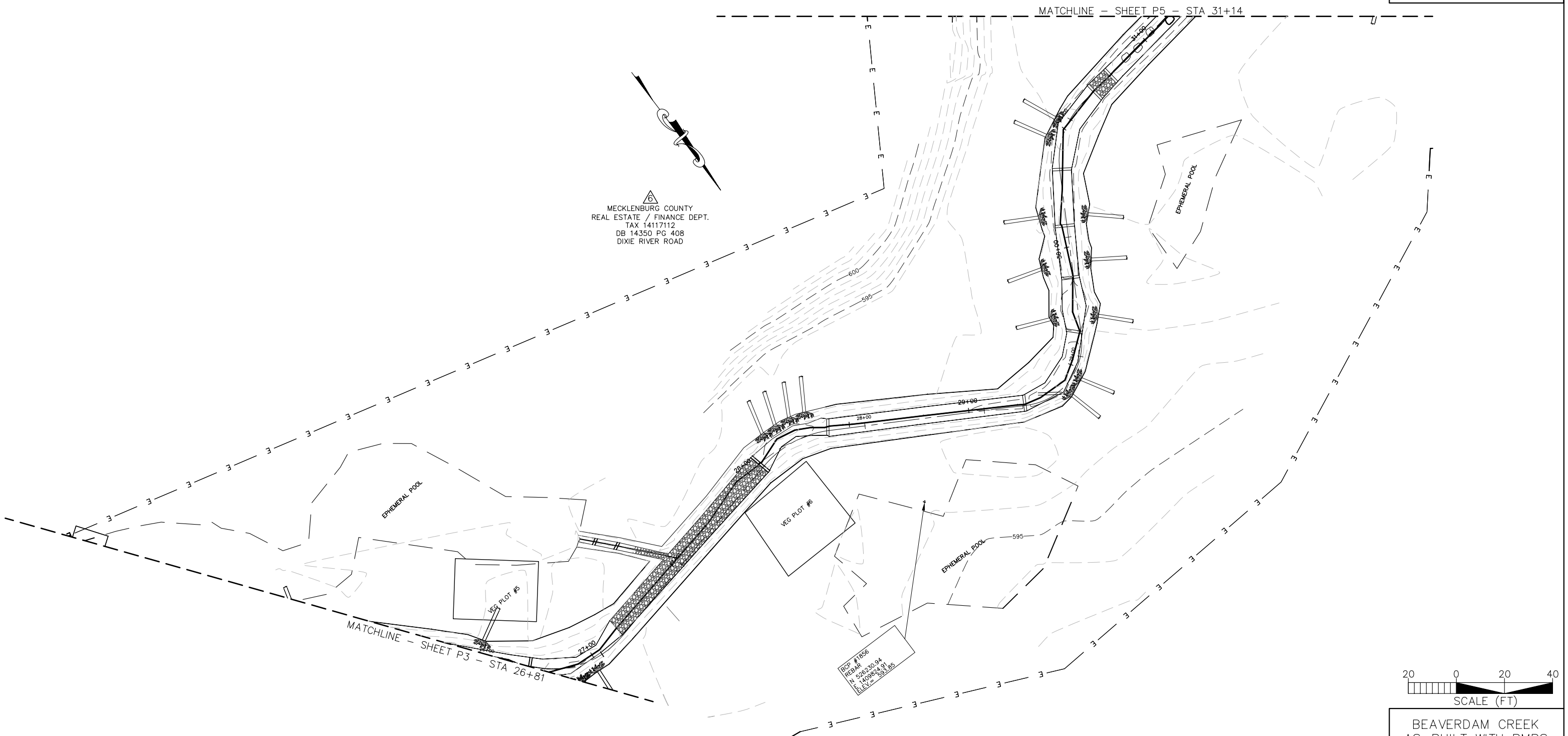

20 0 20 40

SCALE (FT)

BEAVERDAM CREEK
AS–BUILT WITH BMPS

UT1 SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P5

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MECKLENBURG COUNTY
REAL ESTATE / FINANCE DEPT.
TAX 14117112
DB 14350 PG 408
DIXIE RIVER ROAD

MATCHLINE – SHEET P4 – STA 31+14

MATCHLINE – SHEET P14– STA 15+25

MATCHLINE – SHEET P6 – STA 37+60

PHOTO POINT UT1–9

PHOTO POINT UT1–10

PHOTO POINT UT1–11

EPHEMERAL POOL

EPHEMERAL POOL

VEG PLOT #7

X9 RIFFLE

X10 POOL

595

590

585

580

32+00

33+00

34+00

35+00

36+00

37+00

16+27.64

16+23.58

16+30

15+72

20 0 20 40

SCALE (FT)

BEAVERDAM CREEK
AS–BUILT WITH BMPS

UT1/UT1–C SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P6

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MATCHLINE – SHEET P15 – STA 12+16

MATCHLINE – SHEET P5 – STA 37+60

MATCHLINE – SHEET P7 – STA 42+98

PHOTO POINT UT1D–10

PHOTO POINT UT1–12

6
MECKLENBURG COUNTY
REAL ESTATE / FINANCE DEPT.
TAX 1411711
DB 14350 PG 408
DIXIE RIVER ROAD

VEG PLOT #8

EPHEMERAL POOL

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK AS–BUILT WITH BMPS

UT1/UT1–D SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P7

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MECKLENBURG COUNTY
REAL ESTATE / FINANCE DEPT.
TAX 14117112
DB 14350 PG 408
DIXIE RIVER ROAD

MECKLENBURG COUNTY
REAL ESTATE / FINANCE DEPT.
TAX 1411711
DB 14350 PG 402
DIXIE RIVER ROAD

200' DUKE POWER RIGHT-OF-WAY

MATCHLINE - SHEET P6 - STA 42+98

MATCHLINE - SHEET P8 - STA 49+32

EPHEMERAL POOL

EPHEMERAL POOL

EPHEMERAL POOL

VEG PLOT #9

PHOTO POINT
UT1-13

PHOTO POINT
UT1-14

WILLIAM A. SHAW JR.
TAX 14129103
DB 1766 PG 186
ADDRESS

BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT1 SITE PLAN

20 0 20 40
SCALE (FT)

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PROJECT REFERENCE NO.	SHEET NO.
108528	P8

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Fax: 704.334.4492

6
MECKLENBURG COUNTY
REAL ESTATE / FINANCE DEPT.
TAX 14117111
DB 14350 PG 402
DIXIE RIVER ROAD

PHOTO POINT
UT1–15

PHOTO POINT
UT1–16

VEG PLOT #10

EPHEMERAL POOL

1
WILLIAM A. SHAW JR.
TAX 14129103
DB 1766 PG 186
ADDRESS

MATCHLINE – SHEET P7 – STA 49+32

MATCHLINE – SHEET P9 – STA 55+92

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS–BUILT WITH BMPS

UT1 SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P9

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MATCHLINE – SHEET P8 – STA 55+92

55+00
56+00
57+00
58+00
59+00
60+00

580
585

EPHEMERAL POOL

BCP #3688
REBAR
N 524957.82
E 1407814.29
ELEV.= 580.47

6
MECKLENBURG COUNTY
REAL ESTATE / FINANCE DEPT.
TAX 14117111
DB 14350 PG 402
DIXIE RIVER ROAD

1
WILLIAM A. SHAW JR.
TAX 14129103
DB 1766 PG 186
ADDRESS

NS RIFFLE

VEG PLOT #11

PHOTO POINT
UT1–17

EPHEMERAL POOL

EPHEMERAL POOL

MATCHLINE – SHEET P10 – STA 60+91

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS–BUILT WITH BMPS

UT1 SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P10

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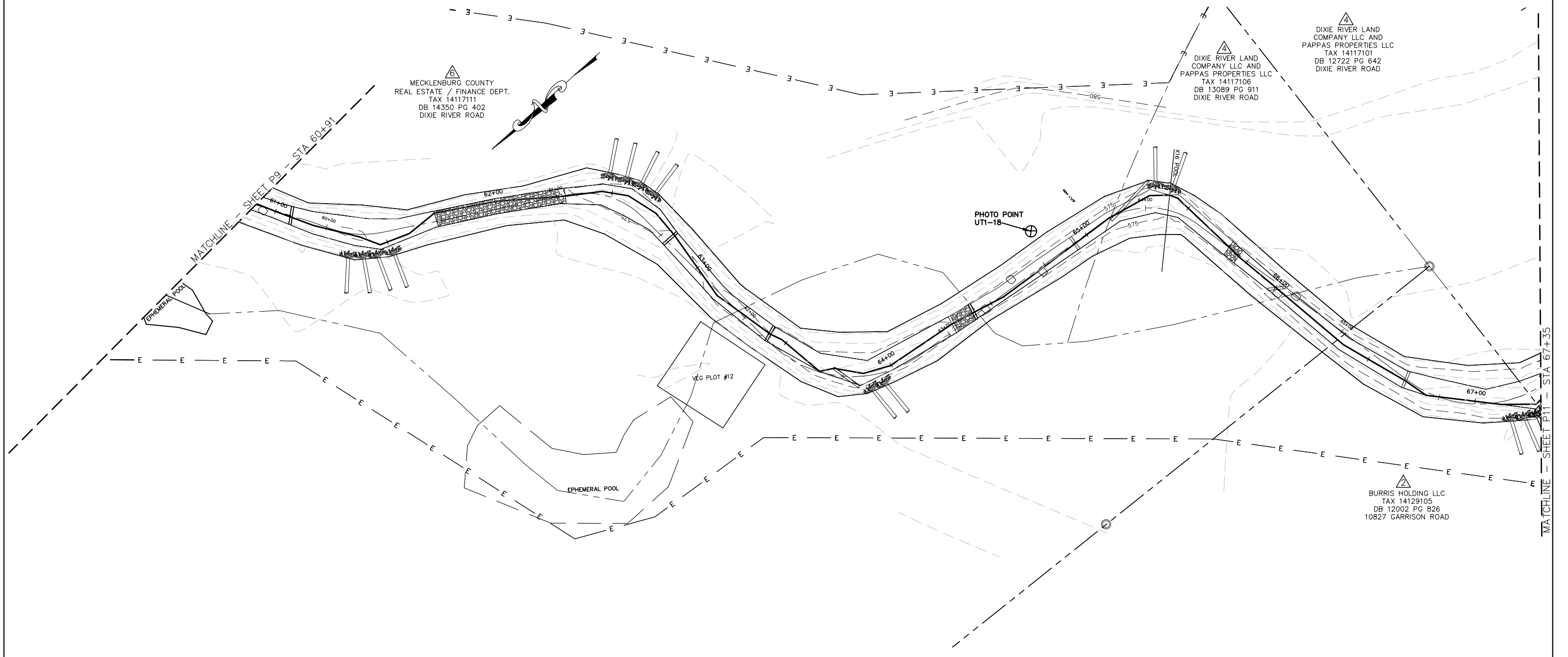

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS–BUILT WITH BMPS

UT1 SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P11

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Fax: 704.334.4492

MATCHLINE – SHEET P10 – STA 67+35

MATCHLINE – SHEET P12 – STA 76+10

4
DIXIE RIVER LAND
COMPANY LLC AND
PAPPAS PROPERTIES LLC
TAX 14117101
DB 12722 PG 642
DIXIE RIVER ROAD

2
BURRIS HOLDING LLC
TAX 14129105
DB 12002 PG 826
10827 GARRISON ROAD

BCP #3989
REBAR
N 524210.95
E 1407152.59
ELEV.= 575.93

BCP #4490
REBAR
N 523987.43
E 1406755.99
ELEV.= 573.79

PHOTO POINT
UT1–19

PHOTO POINT
UT1–20

PHOTO POINT
UT1–21

EPHEMERAL POOL

VEG PLOT #13

VEG PLOT #14

X17 POOL

X18 RIFFLE

575

585

580

68+00

69+00

70+00

71+00

72+00

73+00

74+00

75+00

76+00

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS–BUILT WITH BMPS

UT1 SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P12

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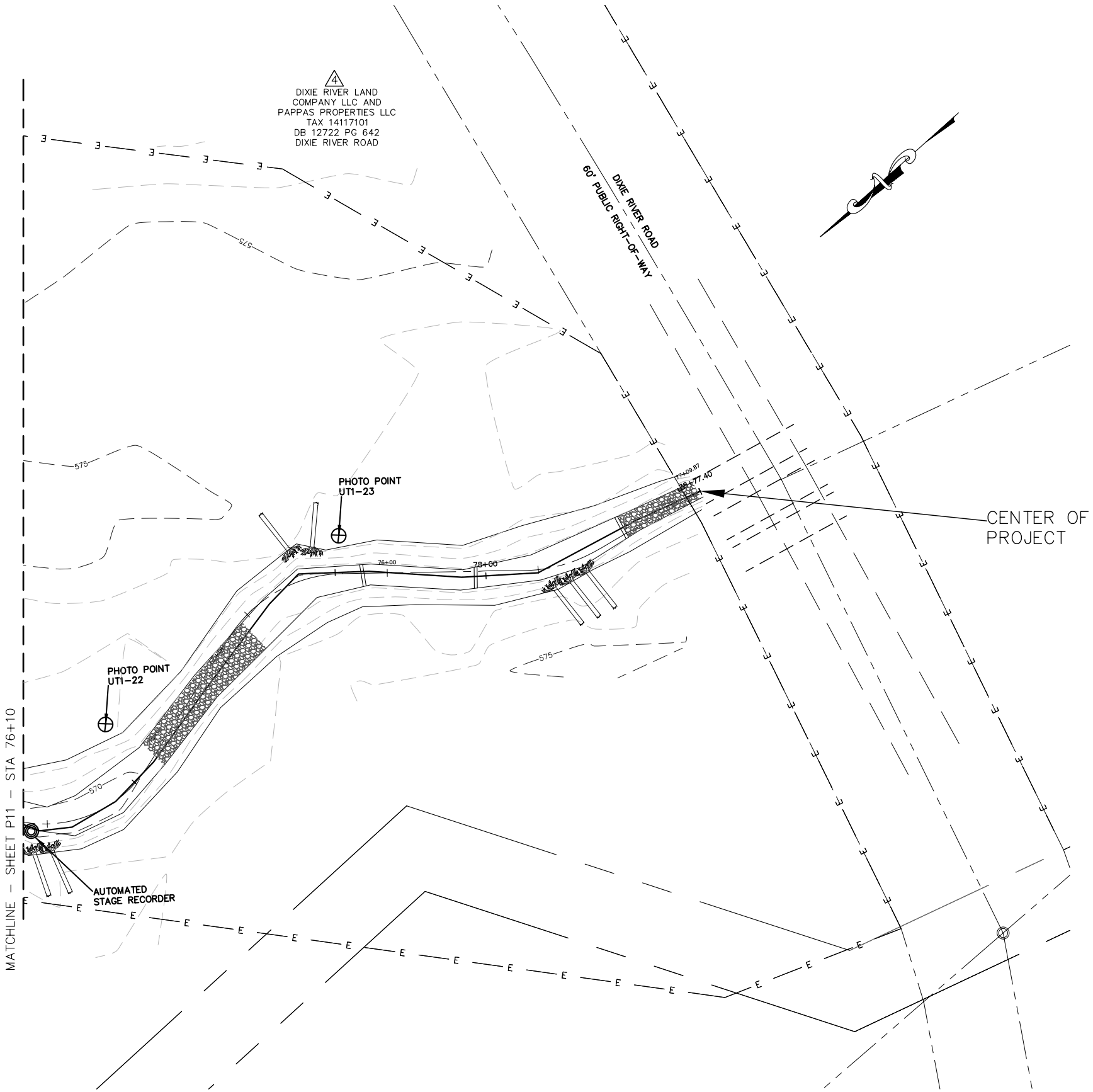

20 0 20 40

SCALE (FT)

BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT1 SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P13

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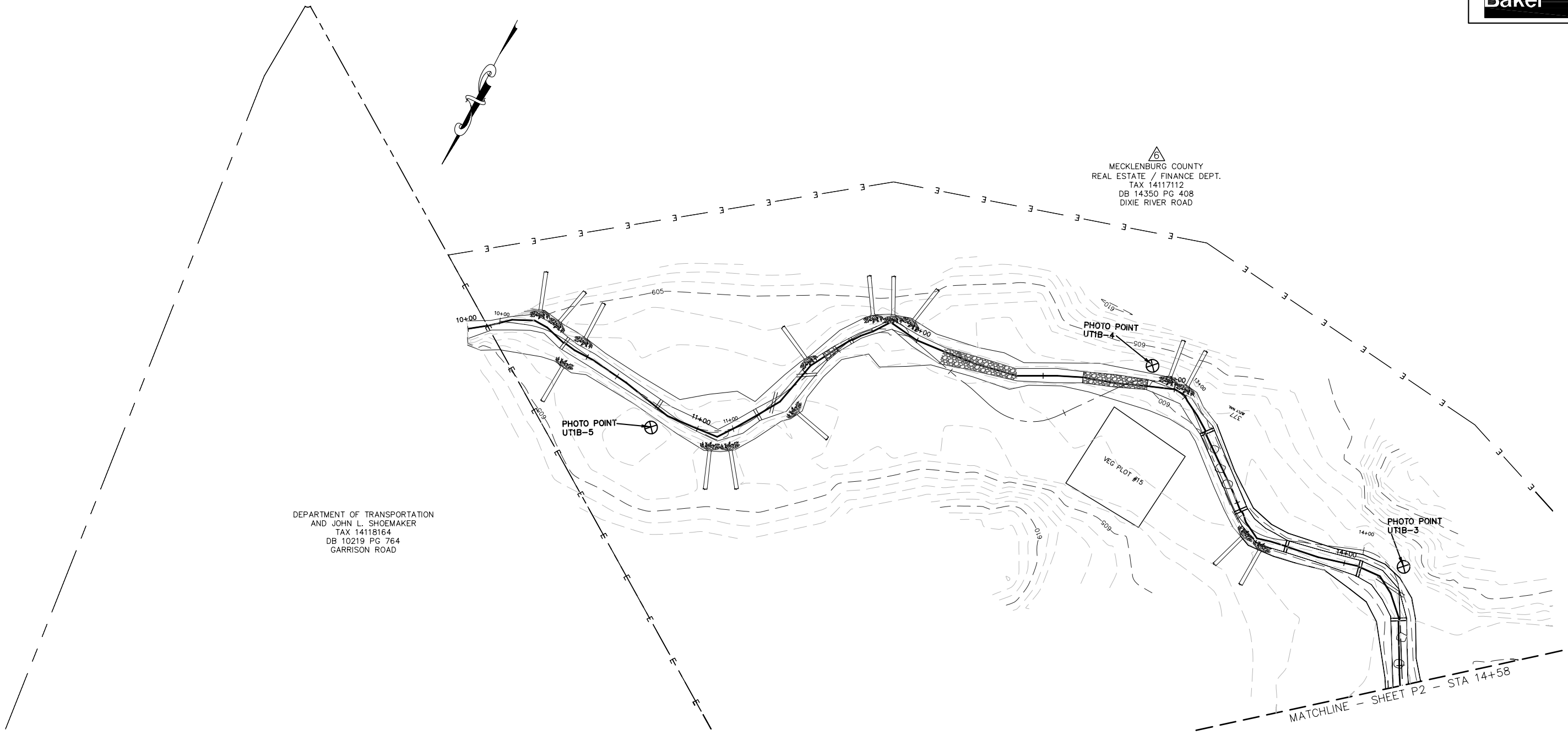

20 0 20 40

SCALE (FT)

BEAVERDAM CREEK AS-BUILT WITH BMPS

UT1-B SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P14

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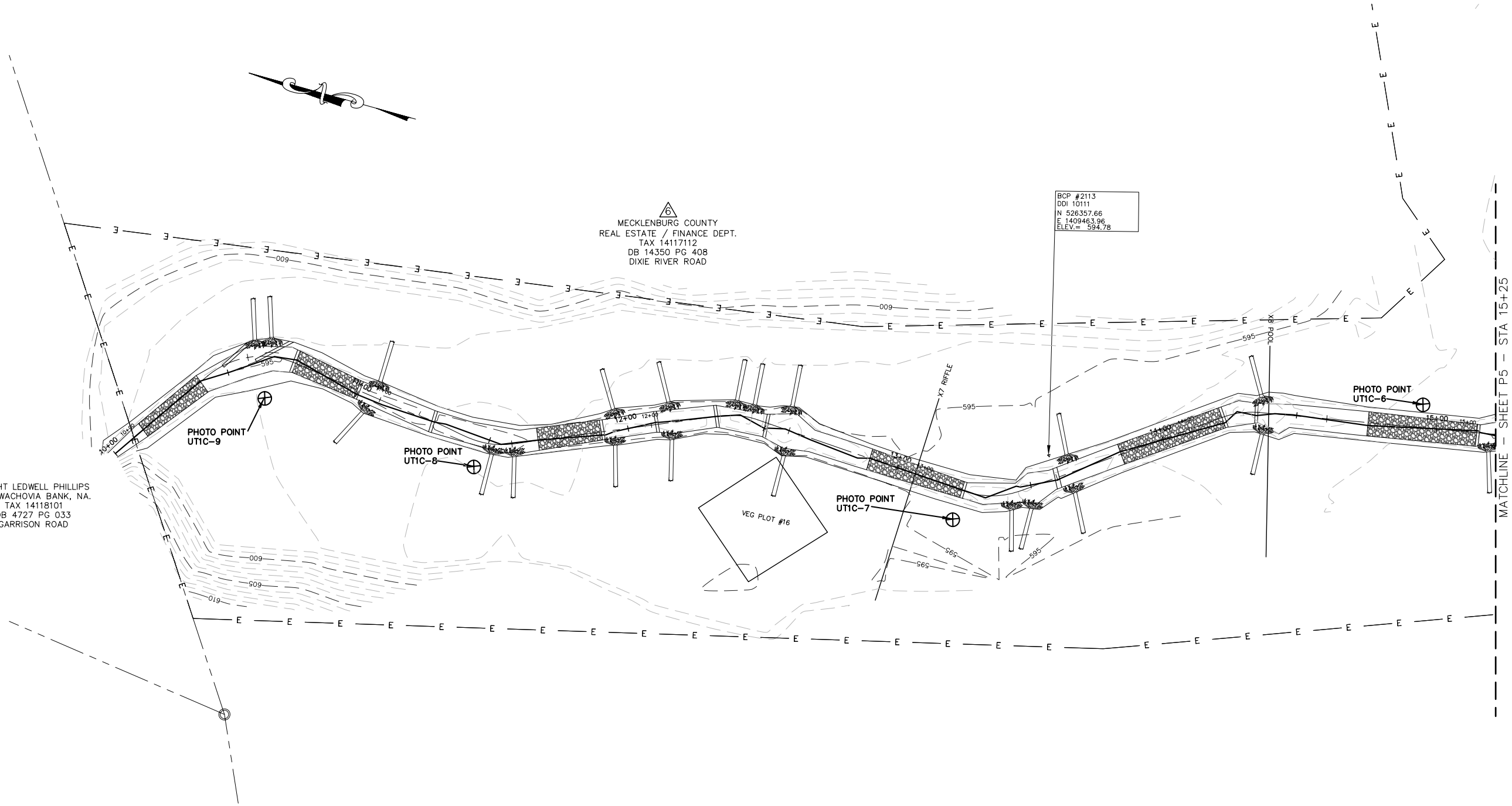

20 0 20 40

SCALE (FT)

BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT1-C SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P15

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Fax: 704.334.4492

200' DUKE POWER RIGHT-OF-WAY

6
MECKLENBURG COUNTY
REAL ESTATE / FINANCE DEPT.
TAX 14117112
DB 14350 PG 408
DIXIE RIVER ROAD

VEG PLOT #17

PHOTO POINT
UT1D-11

PHOTO POINT
UT1D-12

X1

X2

10+00

11+00

12+00

-5.00'

MATCHLINE - SHEET P6 - STA 12+20

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT1-D SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P16

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Baker
Baker Engineering NY, Inc.
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Charlotte, NC 28203
Phone: 704.334.4454
Fax: 704.334.4492

WATERS CONSTRUCTION COMPANY, INC.
TAX 19924137
DB 12943 PG 842
DIXIE RIVER ROAD

3
WATERS CONSTRUCTION COMPANY, INC.
TAX 19925107
DB 12629 PG 886
WINDY GAP ROAD

X3-UT2-RIFFLE

X4-UT2-POOL

VEG PLOT #3

PHOTO ID POINT
UT2-1

PHOTO ID POINT
UT2-2

BCP #19
REBAR
N 521216.13
E 1408829.30
ELEV.= 619.10

BCP #22
REBAR/CAP
N 521473.02
E 1409257.43
ELEV.= 624.66

BCP #2
REBAR/CAP
N 521547.53
E 1409355.66
ELEV.= 575.71

40' CMU SANITARY
SEWER EASEMENT

10+00
11+00
12+00
13+00
14+00
15+00
16+00

MATCHLINE - SHEET P17 - STA 16+32

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT2 SITE PLAN

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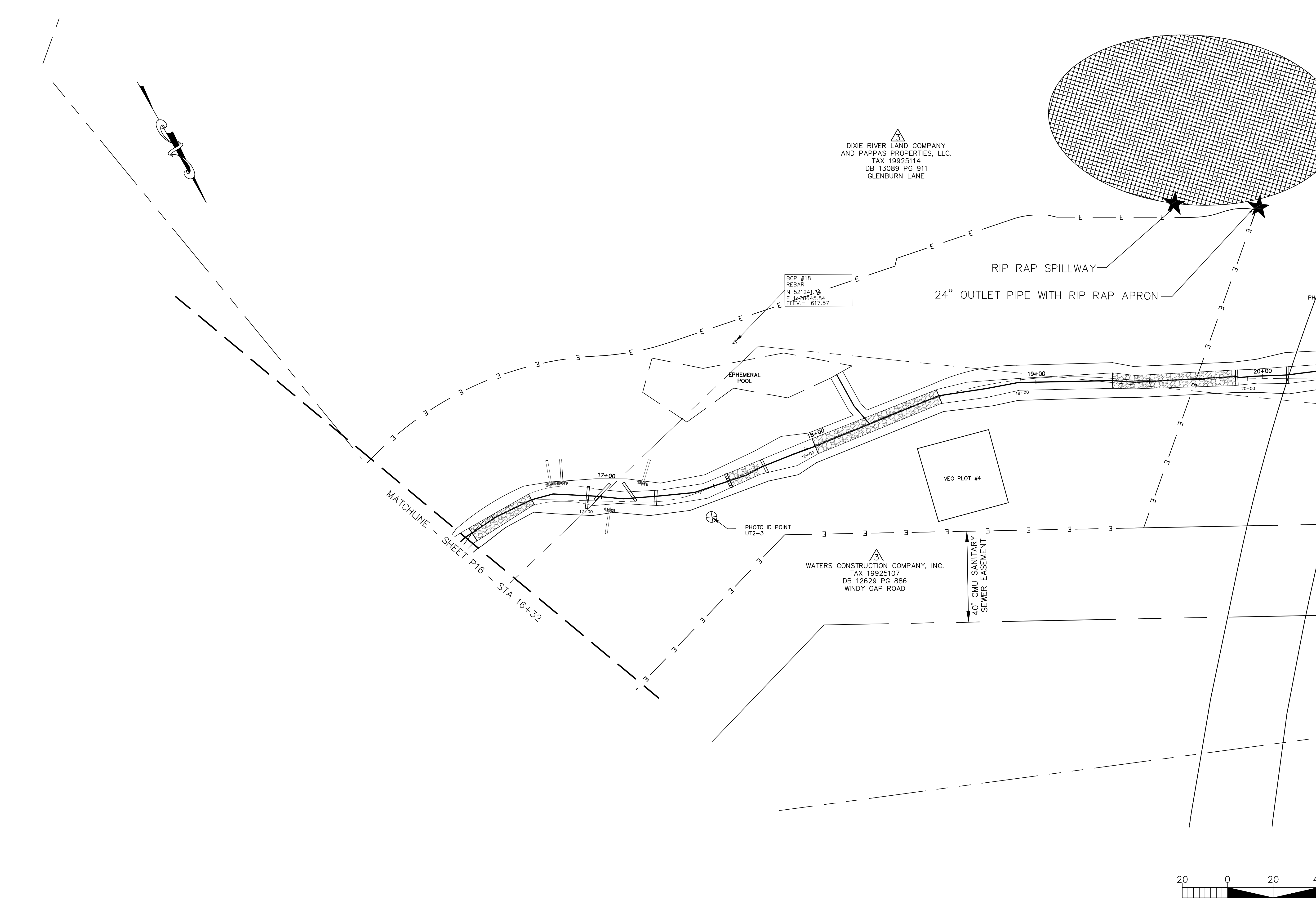

PROJECT REFERENCE NO.	SHEET NO.
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BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT2 SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P18

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Fax: 704.334.4492

BELLASERA BEREWICK, LLC.
c/o THOMAS A SAIEED JR.
TAX 19925111
DB 18271 PG 145
WINDY GAP ROAD

36" OUTLET PIPE WITH HEADWALL
(PIPE LOCATION APPROXIMATE)

RIP RAP CHECK DAM

BCP #1496
NAIL
N 521401.00
E 1408370.10
ELEV.= 609.83

EPHEMERAL POOL

DIXIE RIVER LAND COMPANY
AND PAPPAS PROPERTIES, LLC.
TAX 19925114
DB 13089 PG 911
PHOTO ID POINT
UT2-5

WATERS CONSTRUCTION COMPANY, INC.
TAX 19925107
DB 12629 PG 886
WINDY GAP ROAD

BCP #1322
NAIL
N 521645.54
E 1408067.71
ELEV.= 602.77

PHOTO ID POINT
UT2-7

VEG PLOT #5

WATERS CONSTRUCTION COMPANY, INC.
TAX 19925103
DB 12629 PG 902
DIXIE RIVER ROAD

PHOTO ID POINT
UT2-6

24" RCP

40' CMU SANITARY SEWER EASEMENT

MATCHLINE - SHEET P17 - STA 20+93

MATCHLINE - SHEET P19 - STA 27+45

MATCHLINE - SHEET P23 - STA 19+72

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT2/UT2-A
SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P19

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Fax: 704.334.4492

BELLASERA BEREWICK, LLC.
c/o THOMAS A SAIEED JR.
TAX 19925111
DB 18271 PG 145
WINDY GAP ROAD

EPHEMERAL POOL

EPHEMERAL POOL

EPHEMERAL POOL

28+00

29+00

30+00

31+00

32+00

33+00

PHOTO ID POINT
UT2-8

PHOTO ID POINT
UT2-9

BCP #10
REBAR
N 521767.32
E 1407489.66
ELEV.= 593.35

VEG PLOT #6

40' CMU SANITARY SEWER EASEMENT

MATCHLINE - SHEET P18 - STA 27+45

MATCHLINE - SHEET P20 - STA 33+29

WATERS CONSTRUCTION COMPANY, INC.
TAX 19925106
DB 12629 PG 886
MB 33 PG 515
WINDY GAP ROAD

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT2 SITE PLAN

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PROJECT REFERENCE NO.	SHEET NO.
108528	P20

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Suite 200
Charlotte, NC 28203
Phone: 704.334.4454
Fax: 704.334.4492

MATCHLINE – SHEET P19 – STA 33+29

36" OUTLET PIPE WITH RIP RAP CHECK DAM

7
BELLASERA BEREWICK, LLC.
C/O THOMAS A SAIEED JR.
TAX 19925111
DB 18271 PG 145
WINDY GAP ROAD

BCP #1052
REBAR
N 521964.77
E 1407094.05
ELEV.= 588.96

BCP #958
NAIL
N 522124.52
E 1406947.97
ELEV.= 586.29

EPHEMERAL POOL

PHOTO ID POINT
UT2–10

PHOTO ID POINT
UT2–11

8
MI HOMES OF
CHARLOTTE, LLC
TAX 19925112
DB 19186 PG 179
GLENBURN LANE

40' CMU SANITARY SEWER EASEMENT

XS–UT2–RIFFLE

VEG PLOT #7

3
WATERS CONSTRUCTION COMPANY, INC.
TAX 19925106
DB 12629 PG 886
MB 33 PG 515
WINDY GAP ROAD

MATCHLINE – SHEET P21 – STA 40+05

BEAVERDAM CREEK
AS–BUILT WITH BMPS

UT2 SITE PLAN

20 0 20 40
SCALE (FT)

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PROJECT REFERENCE NO.	SHEET NO.
108528	P21

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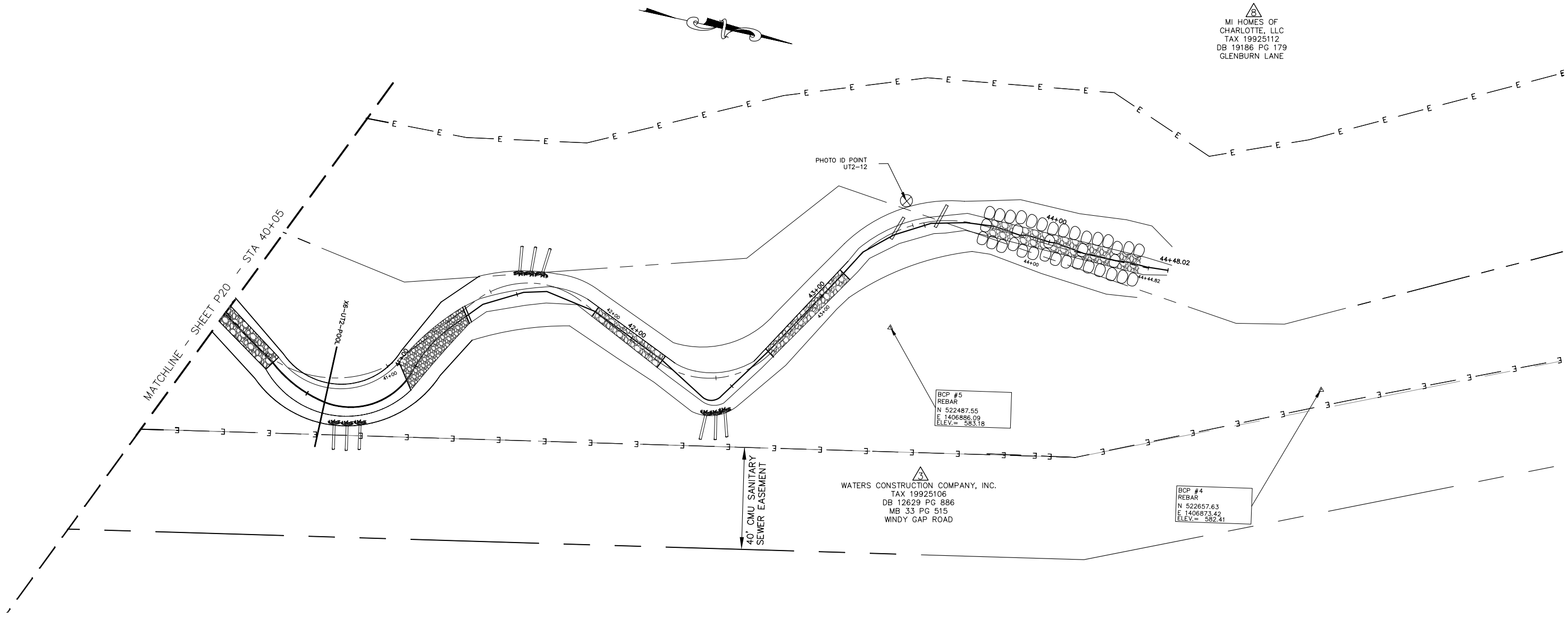

BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT2 SITE PLAN

20 0 20 40
SCALE (FT)

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PROJECT REFERENCE NO.	SHEET NO.
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Fax: 704.334.4492

WATERS CONSTRUCTION COMPANY, INC.
TAX 19925103
DB 12629 PG 902
DIXIE RIVER ROAD

EARTHEN SEDIMENT BASIN WITH OUTLET PIPE AND RIP RAP SPILLWAY

INLET

PHOTO ID POINT
UT2A-1

30" CMP OUTLET PIPE WITH RIP RAP APRON

BCP #2360
REBAR
N 522361.78
E 1408795.08
ELEV.= XXX

BCP #2273
REBAR
N 522316.91
E 1408711.70
ELEV.= XXX

11+00

10+00

MATCHLINE - SHEET P23 - STA 12+00

WATERS CONSTRUCTION COMPANY, INC.
TAX 19925103
DB 12629 PG 902
DIXIE RIVER ROAD

20 0 20 40
SCALE (FT)

BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT2-A SITE PLAN

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BEAVERDAM CREEK
AS-BUILT WITH BMPS

UT2-A SITE PLAN

SCALE (FT)
20 0 20 40

MATCHLINE - SHEET P18 - STA 19+76

VEG PLOT #2

PHOTO ID POINT
UT2A-4

18" CMP OUTLET PIPE
WITH RIP RAP APRON

BCP #1667
REBAR
N 521823.26
E 1408347.11
ELEV.= 608.53

16+00
15+00
14+00
13+00
12+00

PHOTO ID POINT
UT2A-3

X2-UT2A-POOL

X1-UT2A-RIFFLE

PHOTO ID POINT
UT2A-2

VEG PLOT #1

MATCHLINE - SHEET P22 - STA 12+00

3
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PROJECT REFERENCE NO.	SHEET NO.
108528	P23

APPENDIX D

BASELINE STREAM SUMMARY FOR RESTORATION REACHES

Beaverdam Creek Restoration Site - UT1 (Reach 1)									
Parameter	**Design**			**As-built**			**MY-1 (2007)**		
Dimension - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)		14.6		-----	12.5	-----	-----	13.1	-----
Floodprone Width (ft)	-----	45.0	-----	-----	74.6	-----	-----	74.6	-----
Bankfull Mean Depth (ft)	-----	1.5	-----	-----	1.4	-----	-----	1.4	-----
Bankfull Max Depth (ft)	-----	2.1	-----	-----	2.0	-----	-----	2.1	-----
Bankfull Cross Sectional Area (ft2)	-----	21.0	-----	-----	18.0	-----	-----	18.8	-----
Width/Depth Ratio	-----	10.0	-----	-----	8.7	-----	-----	9.2	-----
Entrenchment Ratio	-----	3.1	-----	-----	6.0	-----	-----	5.7	-----
Bank Height Ratio	-----	1.0	-----	-----	1.0	-----	-----	1.0	-----
Bankfull Velocity (fps)	-----	3.5	-----	-----	-----	-----	-----	-----	-----
Pattern									
Channel Beltwidth (ft)	-----	0	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	0	-----	15	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	0	-----	29	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	0	-----	-----	-----	-----	-----	-----	-----
Profile									
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.0067	-----	0.009	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	43.8	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters									
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	25 / 36 / 42 / 75 / 105		
Reach Shear Stress (competency) lb/f2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters									
Channel length (ft)	-----	-----	555	-----	-----	567	-----	-----	568
Drainage Area (SM)	-----	-----	0.7	-----	-----	0.7	-----	-----	0.7
Rosgen Classification	-----	Bc	-----	-----	-----	-----	-----	C	-----
Bankfull Discharge (cfs)	-----	75	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	1.02	-----	-----	-----	-----	-----	1.05	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----

Beaverdam Creek Restoration Site - UT1 (Reach 2-5)									
Parameter	**Design**			**As-built**			**MY-1 (2007)**		
Dimension - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)	16.8	-----	20.0	15.4	-----	23.0	15.2	-----	26.9
Floodprone Width (ft)	-----	100.0	-----	74.9	-----	80.7	74.9	-----	80.7
Bankfull Mean Depth (ft)	1.7	-----	2.0	1.7	-----	2.1	1.5	-----	2.2
Bankfull Max Depth (ft)	2.4	-----	2.9	2.5	-----	4.1	2.3	-----	4.1
Bankfull Cross Sectional Area (ft2)	28.0	-----	40.0	25.6	-----	26.8	23.8	-----	59.7
Width/Depth Ratio	9.8	-----	10.1	9.2	-----	13.9	9.6	-----	14.6
Entrenchment Ratio	5.0	-----	6.0	3.4	-----	4.9	2.9	-----	4.9
Bank Height Ratio	-----	1.0	-----	-----	1.0	-----	-----	1.0	-----
Bankfull Velocity (fps)	3.1	-----	3.8	-----	-----	-----	-----	-----	-----
Pattern									
Channel Beltwidth (ft)	84	-----	100	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	34	-----	60	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	134	-----	200	-----	-----	-----	-----	-----	-----
Meander Width Ratio	2	-----	10	-----	-----	-----	-----	-----	-----
Profile									
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.0048	-----	0.012	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	101	-----	120	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters									
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	0.17-25 / 0.75-37 / 30-45 / 70-85 / 110-120		
Reach Shear Stress (competency) lb/f2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters									
Channel length (ft)	-----	-----	6155	-----	-----	5897	-----	-----	3021
Drainage Area (SM)	0.7	-----	1.75	0.7	-----	1.75	0.7	-----	1.75
Rosgen Classification	-----	C/E	-----	-----	-----	-----	-----	C	-----
Bankfull Discharge (cfs)	105	-----	155	-----	-----	-----	-----	-----	-----
Sinuosity	1.1	-----	1.2	-----	-----	-----	-----	1.3	-----
BF slope (ft/ft)	0.002	-----	0.006	-----	-----	-----	-----	-----	-----

Beaverdam Creek Restoration Site - UT1B									
Parameter	**Design**			**As-built**			**MY-1 (2007)**		
Dimension - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)	-----	10.4	-----	-----	11.1	-----	-----	11.8	-----
Floodprone Width (ft)	----	100.0	-----	-----	75.0	-----	-----	75.0	-----
Bankfull Mean Depth (ft)	-----	1.1	-----	-----	1.4	-----	-----	1.4	-----
Bankfull Max Depth (ft)	-----	1.4	-----	-----	2.3	-----	-----	2.3	-----
Bankfull Cross Sectional Area (ft2)	-----	11.0	-----	-----	15.3	-----	-----	16.5	-----
Width/Depth Ratio	-----	9.7	-----	-----	8.0	-----	-----	8.5	-----
Entrenchment Ratio	-----	9.6	-----	-----	6.8	-----	-----	6.3	-----
Bank Height Ratio	-----	1.0	-----	-----	1.0	-----	-----	1.0	-----
Bankfull Velocity (fps)	-----	4.0	-----	-----	-----	-----	-----	-----	-----
Pattern									
Channel Beltwidth (ft)	-----	52	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	21	-----	31	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	83	-----	104	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	5	-----	-----	-----	-----	-----	-----	-----
Profile									
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.0104	-----	0.0138	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	52	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters									
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	<0.063 / <0.063 / <0.063 / 0.2 / 0.4		
Reach Shear Stress (competency) lb/f2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters									
Channel length (ft)	-----	-----	790	-----	-----	778	-----	-----	775
Drainage Area (SM)	-----	-----	0.34	-----	-----	0.34	-----	-----	0.34
Rosgen Classification	-----	C/E	-----	-----	C	-----	-----	C	-----
Bankfull Discharge (cfs)	-----	45	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	1.15	-----	-----	1.1	-----	-----	1.1	-----
BF slope (ft/ft)	-----	0.003	-----	-----	0.013	-----	-----	-----	-----

Beaverdam Creek Restoration Site - UT1C									
Parameter	**Design**			**As-built**			**MY-1 (2007)**		
Dimension - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)	-----	11.2	-----	-----	11.0	-----	-----	12.0	-----
Floodprone Width (ft)	----	100.0	-----	-----	70.2	-----	-----	70.6	-----
Bankfull Mean Depth (ft)	-----	0.8	-----	-----	0.7	-----	-----	0.7	-----
Bankfull Max Depth (ft)	-----	0.9	-----	-----	1.0	-----	-----	1.1	-----
Bankfull Cross Sectional Area (ft2)	-----	8.0	-----	-----	7.8	-----	-----	8.8	-----
Width/Depth Ratio	-----	14.8	-----	-----	15.6	-----	-----	16.5	-----
Entrenchment Ratio	-----	8.9	-----	-----	6.4	-----	-----	5.9	-----
Bank Height Ratio	-----	1.0	-----	-----	1.0	-----	-----	1.0	-----
Bankfull Velocity (fps)	-----	3.2	-----	-----	-----	-----	-----	-----	-----
Pattern									
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----
Profile									
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.0191	-----	0.0265	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	44.8	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters									
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	26 / 37 / 42 / 75 / 100		
Reach Shear Stress (competency) lb/f2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters									
Channel length (ft)	-----	-----	628	-----	-----	616	-----	-----	615
Drainage Area (SM)	-----	-----	0.15	-----	-----	0.15	-----	-----	0.15
Rosgen Classification	-----	B	-----	-----	C	-----	-----	C	-----
Bankfull Discharge (cfs)	-----	27	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	1.05	-----	-----	1.1	-----	-----	1.1	-----
BF slope (ft/ft)	-----	0.017	-----	-----	0.013	-----	-----	-----	-----

Beaverdam Creek Restoration Site - UT1D									
Parameter	**Design**			**As-built**			**MY-1 (2007)**		
Dimension - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)	-----	10.4	-----	-----	11.4	-----	-----	12.7	-----
Floodprone Width (ft)	----	100.0	-----	-----	75.5	-----	-----	75.5	-----
Bankfull Mean Depth (ft)	-----	0.9	-----	-----	0.8	-----	-----	0.7	-----
Bankfull Max Depth (ft)	-----	1.2	-----	-----	1.2	-----	-----	1.1	-----
Bankfull Cross Sectional Area (ft2)	-----	10.0	-----	-----	9.0	-----	-----	9.2	-----
Width/Depth Ratio	-----	11.2	-----	-----	14.4	-----	-----	17.5	-----
Entrenchment Ratio	-----	9.6	-----	-----	6.6	-----	-----	6.0	-----
Bank Height Ratio	-----	1.0	-----	-----	1.0	-----	-----	1.0	-----
Bankfull Velocity (fps)	-----	2.9	-----	-----	-----	-----	-----	-----	-----
Pattern									
Channel Beltwidth (ft)	-----	52	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	21	-----	31	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	83	-----	104	-----	-----	-----	-----	-----	-----
Meander Width Ratio	8	-----	10	-----	-----	-----	-----	-----	-----
Profile									
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	52	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters									
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	32 / 38 / 43 / 85 / 120		
Reach Shear Stress (competency) lb/f2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters									
Channel length (ft)	-----	-----	352	-----	-----	338	-----	-----	334
Drainage Area (SM)	-----	-----	0.16	-----	-----	0.16	-----	-----	0.16
Rosgen Classification	-----	C/E	-----	-----	C	-----	-----	C	-----
Bankfull Discharge (cfs)	-----	28	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	1.15	-----	-----	1.2	-----	-----	1.2	-----
BF slope (ft/ft)	-----	0.007	-----	-----	0.014	-----	-----	-----	-----

Beaverdam Creek Restoration Site - UT2									
Parameter	**Design**			**As-built**			**MY-1 (2007)**		
Dimension - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)	10.2	-----	15.6	16.8	-----	16.9	16.1	-----	16.6
Floodprone Width (ft)	30.0	-----	80	39.9	-----	39.9	39.9	-----	39.9
Bankfull Mean Depth (ft)	0.92	----	1.5	0.7	-----	1.4	0.7	-----	1.4
Bankfull Max Depth (ft)	1.3	-----	2.3	1.1	-----	2.1	1.1	-----	1.9
Bankfull Cross Sectional Area (ft2)	9.9	-----	23.9	12.2	-----	23.4	10.9	-----	22.6
Width/Depth Ratio	10.2	-----	12.6	12.1	-----	23.4	12.2	-----	23.9
Entrenchment Ratio	2.8	-----	5.9	2.4	-----	2.4	2.4	-----	2.5
Bank Height Ratio	-----	1.0	-----	-----	1.0	-----	1	-----	1.0
Bankfull Velocity (fps)	4.7	-----	5.4	-----	-----	-----	-----	-----	-----
Pattern									
Channel Beltwidth (ft)	20	-----	75	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	23	-----	100	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	100	-----	300	-----	-----	-----	-----	-----	-----
Meander Width Ratio	9.6	-----	27.8	-----	-----	-----	-----	-----	-----
Profile									
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.0122	-----	0.0279	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	40	----	105	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters									
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	26-27 / 35 / 39-39 / 53-59 / 95		
Reach Shear Stress (competency) lb/f2	----	-----	----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters									
Channel length (ft)	-----	-----	3290	-----	-----	3293	-----	-----	3142
Drainage Area (SM)	0.1	-----	0.3	0.1	-----	0.3	0.1	-----	0.3
Rosgen Classification	-----	C	-----	-----	C	-----	-----	C	-----
Bankfull Discharge (cfs)	48	-----	120	-----	-----	-----	-----	-----	-----
Sinuosity	1.03	-----	1.21	-----	1.3	-----	-----	1.3	-----
BF slope (ft/ft)	0.008	-----	0.019	-----	0.0138	-----	-----	-----	-----

Beaverdam Creek Restoration Site - UT2A									
Parameter	**Design**			**As-built**			**MY-1 (2007)**		
Dimension - Riffle	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)	-----	15.6	-----	-----	13.3	-----	-----	12.2	-----
Floodprone Width (ft)	----	80.0	-----	-----	39.8	-----	-----	39.8	-----
Bankfull Mean Depth (ft)	-----	1.0	-----	-----	0.8	-----	-----	0.8	-----
Bankfull Max Depth (ft)	-----	1.4	-----	-----	1.2	-----	-----	1.1	-----
Bankfull Cross Sectional Area (ft2)	-----	10.2	-----	-----	10.6	-----	-----	9.6	-----
Width/Depth Ratio	-----	10.2	-----	-----	16.6	-----	-----	15.5	-----
Entrenchment Ratio	-----	5.9	-----	-----	3.0	-----	-----	3.3	-----
Bank Height Ratio	-----	1.0	-----	-----	1.0	-----	-----	1	-----
Bankfull Velocity (fps)	-----	5.1	-----	-----	-----	-----	-----	-----	-----
Pattern									
Channel Beltwidth (ft)	40	-----	55	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	24	-----	30	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	100	-----	120	-----	-----	-----	-----	-----	-----
Meander Width Ratio	9.8	-----	11.8	-----	-----	-----	-----	-----	-----
Profile									
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.02	-----	0.0273	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	57	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters									
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	26 / 30 / 35 / 53 / 78		
Reach Shear Stress (competency) lb/f2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters									
Channel length (ft)	-----	-----	1099	-----	-----	1131	-----	-----	1121
Drainage Area (SM)	-----	-----	0.1	-----	-----	0.1	-----	-----	0.1
Rosgen Classification	-----	C/E	-----	-----	C	-----	-----	C	-----
Bankfull Discharge (cfs)	-----	51	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	1.21	-----	-----	1.25	-----	-----	1.22	-----
BF slope (ft/ft)	-----	0.012	-----	-----	0.015	-----	-----	-----	-----

APPENDIX E

MORHOLOGY AND HYDRAULIC MONITORING SUMMARY – YEAR 1

Beaverdam Creek Restoration Site : Project No. D05016-1										
Reach: Beaverdam Creek UT1 (Reach 1)										
I. Cross-Section Parameters	Cross Section 1 Pool					Cross Section 2 Riffle				
	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
Dimension										
BF Width (ft)	22.1					13.1				
Floodprone Width (ft)	75.1					74.6				
BF Cross Sectional Area (ft2)	33.1					18.8				
BF Mean Depth (ft)	1.5					1.4				
BF Max Depth (ft)	3.1					2.1				
Width/Depth Ratio	14.8					9.2				
Entrenchment Ratio	3.4					5.7				
Wetted Perimeter (ft)	25.1					16.0				
Hydraulic Radius (ft)	1.3					1.2				
Substrate										
d50 (mm)	<0.063					42				
d84 (mm)	<0.063					75				

II. Reachwide Parameters	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (20010)		
	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Pattern															
Channel Beltwidth (ft)	-	-	-												
Radius of Curvature (ft)	-	-	-												
Meander Wavelength (ft)	-	-	-												
Meander Width Ratio	-	-	-												
Profile															
Riffle length (ft)	-	-	-												
Riffle Slope (ft/ft)	-	-	-												
Pool Length (ft)	-	-	-												
Pool Spacing (ft)	-	-	-												
Additional Reach Parameters															
Valley Length (ft)	540	-	-												
Channel Length (ft)	568	-	-												
Sinuosity	1.1	-	-												
Water Surface Slope (ft/ft)	-	-	-												
BF Slope (ft/ft)	-	-	-												
Rosgen Classification	C	-	-												

Beaverdam Creek Restoration Site : Project No. D05016-1																				
Reach: Beaverdam Creek UT1 (Reaches 2-5)																				
I. Cross-Section Parameters	Cross Section 5 Riffle					Cross Section 6 Pool					Cross Section 9 Riffle					Cross Section 10 Pool				
	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
Dimension																				
BF Width (ft)	15.2					23.5					17.8					22.2				
Floodprone Width (ft)	74.9					75.0					75.09					74.9				
BF Cross Sectional Area (ft2)	23.8					41.1					29.26					44.8				
BF Mean Depth (ft)	1.6					1.8					1.64					2.0				
BF Max Depth (ft)	2.3					3.5					2.65					3.3				
Width/Depth Ratio	9.7					13.4					10.83					11.0				
Entrenchment Ratio	4.9					3.2					4.22					3.4				
Wetted Perimeter (ft)	18.3					27.0					21.1					26.3				
Hydraulic Radius (ft)	1.3					1.5					1.4					1.7				
Substrate																				
d50 (mm)	45					0.2					36					<0.063				
d84 (mm)	85					0.45					72					0.7				

II. Reachwide Parameters	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)		
	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Pattern															
Channel Beltwidth (ft)	-	-	-												
Radius of Curvature (ft)	-	-	-												
Meander Wavelength (ft)	-	-	-												
Meander Width Ratio	-	-	-												
Profile															
Riffle length (ft)	-	-	-												
Riffle Slope (ft/ft)	-	-	-												
Pool Length (ft)	-	-	-												
Pool Spacing (ft)	-	-	-												
Additional Reach Parameters															
Valley Length (ft)	2370	-	-												
Channel Length (ft)	3021	-	-												
Sinuosity	1.3	-	-												
Water Surface Slope (ft/ft)	-	-	-												
BF Slope (ft/ft)	-	-	-												
Rosgen Classification	C	-	-												

Beaverdam Creek Restoration Site : Project No. D05016-1																				
Reach: Beaverdam Creek UT1 (Reaches 2-5) cont'd																				
I. Cross-Section Parameters	Cross Section 13 Pool					Cross Section 14 Riffle					Cross Section 15 Riffle					Cross Section 16 Pool				
	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
Dimension																				
BF Width (ft)	30.0					19.1					26.9					20.9				
Floodprone Width (ft)	90.9					75.2					77.9					52.1				
BF Cross Sectional Area (ft2)	71.7					37.9					59.7					36.8				
BF Mean Depth (ft)	2.4					2.0					2.2					1.8				
BF Max Depth (ft)	5.3					3.1					4.1					3.4				
Width/Depth Ratio	12.6					9.6					12.1					11.8				
Entrenchment Ratio	3.0					3.9					2.9					2.5				
Wetted Perimeter (ft)	34.8					23.1					31.3					24.4				
Hydraulic Radius (ft)	101.6					81.4					86.0					59.0				
Substrate																				
d50 (mm)	0.3					30					-					-				
d84 (mm)	0.8					70					-					-				

Reach: Beaverdam Creek UT1 (Reaches 2-5) cont'd										
I. Cross-Section Parameters	Cross Section 17 Pool					Cross Section 18 Riffle				
	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
Dimension										
BF Width (ft)	27.0					22.5				
Floodprone Width (ft)	67.2					80.7				
BF Cross Sectional Area (ft2)	33.2					34.7				
BF Mean Depth (ft)	1.2					1.5				
BF Max Depth (ft)	2.5					2.7				
Width/Depth Ratio	21.9					14.6				
Entrenchment Ratio	2.5					3.6				
Wetted Perimeter (ft)	29.5					25.6				
Hydraulic Radius (ft)	72.3					86.0				
Substrate										
d50 (mm)	-					-				
d84 (mm)	-					-				

Beaverdam Creek Restoration Site : Project No. D05016-1										
Reach: Beaverdam Creek UT1B										
I. Cross-Section Parameters	Cross Section 3 Pool					Cross Section 4 Riffle				
	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
Dimension										
BF Width (ft)	15.3					11.8				
Floodprone Width (ft)	75.1					75.0				
BF Cross Sectional Area (ft2)	16.4					16.5				
BF Mean Depth (ft)	1.1					1.4				
BF Max Depth (ft)	2.3					2.3				
Width/Depth Ratio	14.3					8.5				
Entrenchment Ratio	4.9					6.3				
Wetted Perimeter (ft)	17.5					14.6				
Hydraulic Radius (ft)	0.9					1.1				
Substrate										
d50 (mm)	0.16					<0.063				
d84 (mm)	0.42					0.2				

II. Reachwide Parameters	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (20010)		
	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Pattern															
Channel Beltwidth (ft)	-	-	-												
Radius of Curvature (ft)	-	-	-												
Meander Wavelength (ft)	-	-	-												
Meander Width Ratio	-	-	-												
Profile															
Riffle length (ft)	-	-	-												
Riffle Slope (ft/ft)	-	-	-												
Pool Length (ft)	-	-	-												
Pool Spacing (ft)	-	-	-												
Additional Reach Parameters															
Valley Length (ft)	680	-	-												
Channel Length (ft)	775	-	-												
Sinuosity	1.1	-	-												
Water Surface Slope (ft/ft)	-	-	-												
BF Slope (ft/ft)	-	-	-												
Rosgen Classification	C	-	-												

Beaverdam Creek Restoration Site : Project No. D05016-1										
Reach: Beaverdam Creek UT1C										
I. Cross-Section Parameters	Cross Section 7 Riffle					Cross Section 8 Pool				
	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
Dimension										
BF Width (ft)	12.0					13.6				
Floodprone Width (ft)	70.6					75.0				
BF Cross Sectional Area (ft2)	8.8					31.6				
BF Mean Depth (ft)	0.7					2.3				
BF Max Depth (ft)	1.1					3.2				
Width/Depth Ratio	16.5					5.9				
Entrenchment Ratio	5.9					5.5				
Wetted Perimeter (ft)	13.5					18.2				
Hydraulic Radius (ft)	0.7					1.7				
Substrate										
d50 (mm)	42					<0.063				
d84 (mm)	75					0.23				

II. Reachwide Parameters	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (20010)		
	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Pattern															
Channel Beltwidth (ft)	-	-	-												
Radius of Curvature (ft)	-	-	-												
Meander Wavelength (ft)	-	-	-												
Meander Width Ratio	-	-	-												
Profile															
Riffle length (ft)	-	-	-												
Riffle Slope (ft/ft)	-	-	-												
Pool Length (ft)	-	-	-												
Pool Spacing (ft)	-	-	-												
Additional Reach Parameters															
Valley Length (ft)	544	-	-												
Channel Length (ft)	615	-	-												
Sinuosity	1.1	-	-												
Water Surface Slope (ft/ft)	-	-	-												
BF Slope (ft/ft)	-	-	-												
Rosgen Classification	C	-	-												

Beaverdam Creek Restoration Site : Project No. D05016-1										
Reach: Beaverdam Creek UT1D										
I. Cross-Section Parameters	Cross Section 11 Pool					Cross Section 12 Riffle				
	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
Dimension										
BF Width (ft)	15.3					12.7				
Floodprone Width (ft)	75.7					75.5				
BF Cross Sectional Area (ft2)	20.9					9.2				
BF Mean Depth (ft)	1.4					0.7				
BF Max Depth (ft)	2.5					1.1				
Width/Depth Ratio	11.3					17.5				
Entrenchment Ratio	3.4					6.0				
Wetted Perimeter (ft)	18.0					14.1				
Hydraulic Radius (ft)	1.2					0.7				
Substrate										
d50 (mm)	<0.063					43				
d84 (mm)	0.22					85				

II. Reachwide Parameters	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (20010)		
	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Pattern															
Channel Beltwidth (ft)	-	-	-												
Radius of Curvature (ft)	-	-	-												
Meander Wavelength (ft)	-	-	-												
Meander Width Ratio	-	-	-												
Profile															
Riffle length (ft)	-	-	-												
Riffle Slope (ft/ft)	-	-	-												
Pool Length (ft)	-	-	-												
Pool Spacing (ft)	-	-	-												
Additional Reach Parameters															
Valley Length (ft)	300	-	-												
Channel Length (ft)	334	-	-												
Sinuosity	1.1	-	-												
Water Surface Slope (ft/ft)	-	-	-												
BF Slope (ft/ft)	-	-	-												
Rosgen Classification	C	-	-												

Beaverdam Creek Restoration Site : Project No. D05016-1										
Reach: Beaverdam Creek UT2A										
I. Cross-Section Parameters	Cross Section 1 Riffle					Cross Section 2 Pool				
	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
Dimension										
BF Width (ft)	12.2					20.1				
Floodprone Width (ft)	39.8					40.0				
BF Cross Sectional Area (ft2)	9.6					20.4				
BF Mean Depth (ft)	0.8					1.0				
BF Max Depth (ft)	1.1					1.9				
Width/Depth Ratio	15.5					19.8				
Entrenchment Ratio	3.3					2.0				
Wetted Perimeter (ft)	13.7					22.1				
Hydraulic Radius (ft)	0.7					0.9				
Substrate										
d50 (mm)	35					<0.063				
d84 (mm)	53					<0.063				

II. Reachwide Parameters	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (20010)		
	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Pattern															
Channel Beltwidth (ft)	-	-	-												
Radius of Curvature (ft)	-	-	-												
Meander Wavelength (ft)	-	-	-												
Meander Width Ratio	-	-	-												
Profile															
Riffle length (ft)	-	-	-												
Riffle Slope (ft/ft)	-	-	-												
Pool Length (ft)	-	-	-												
Pool Spacing (ft)	-	-	-												
Additional Reach Parameters															
Valley Length (ft)	920	-	-												
Channel Length (ft)	1121	-	-												
Sinuosity	1.2	-	-												
Water Surface Slope (ft/ft)	-	-	-												
BF Slope (ft/ft)	-	-	-												
Rosgen Classification	C	-	-												

Beaverdam Creek Restoration Site : Project No. D05016-1																				
Reach: Beaverdam Creek UT2																				
I. Cross-Section Parameters	Cross Section 3 Riffle					Cross Section 4 Pool					Cross Section 5 Riffle					Cross Section 6 Pool				
	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
Dimension																				
BF Width (ft)	16.1					20.9					16.6					14.0				
Floodprone Width (ft)	40.0					40.1					39.9					28.0				
BF Cross Sectional Area (ft2)	10.9					25.8					22.6					23.2				
BF Mean Depth (ft)	0.7					1.2					1.4					1.7				
BF Max Depth (ft)	1.1					2.5					1.9					2.6				
Width/Depth Ratio	23.9					16.9					12.2					8.5				
Entrenchment Ratio	2.5					1.9					2.4					2.0				
Wetted Perimeter (ft)	17.5					23.4					19.4					17.3				
Hydraulic Radius (ft)	0.6					1.1					1.2					1.3				
Substrate																				
d50 (mm)	39					<0.063					38					<0.063				
d84 (mm)	59					<0.063					59					<0.063				

II. Reachwide Parameters	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)		
	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Pattern															
Channel Beltwidth (ft)	-	-	-												
Radius of Curvature (ft)	-	-	-												
Meander Wavelength (ft)	-	-	-												
Meander Width Ratio	-	-	-												
Profile															
Riffle length (ft)	-	-	-												
Riffle Slope (ft/ft)	-	-	-												
Pool Length (ft)	-	-	-												
Pool Spacing (ft)	-	-	-												
Additional Reach Parameters															
Valley Length (ft)	2470	-	-												
Channel Length (ft)	3142	-	-												
Sinuosity	1.3	-	-												
Water Surface Slope (ft/ft)	-	-	-												
BF Slope (ft/ft)	-	-	-												
Rosgen Classification	C	-	-												