Purlear Creek - Phase I
Stream Restoration
Annual Monitoring Report

Monitoring Year: 2005
Measurement Year: 1
As-built Date: 2004
NCEEP Project Number: 294

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Raleigh, NC 27699-1619

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Submitted: March, 2006

PURLEAR CREEK - PHASE 1 STREAM RESTORATION
2005 MONITORING REPORT

CONDUCTED FOR THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

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I. Executive Summary/Project Abstract

The channel has remained stable since construction. Study reaches show no significant bed profile, channel pattern or cross sectional changes. The majority of channel banks are well-covered with vegetation. Planted trees and shrubs are doing well throughout the buffer. Extrapolation from the eight plots resulted in an overall average of 984 planted woody stems per acre for this restoration site.

The primary area of concern is the grade drops at 33 of the cross vanes on the project. The grade drops of 0.5 feet or more are listed in the problem area table. No action is recommended at this time but these structures should be monitored closely in upcoming monitoring events. Other concern areas are primarily small erosional areas that appear to be localized. At four locations along the project, excess nutrients are entering the channel and bypassing the established buffer. Two locations are drain tiles recently installed and two are heavy use areas where topographic drainages exist.

No immediate action is recommended for problem areas.

II. Project Background

Project background information can be obtained from the as-built monitoring report prepared by Kimley-Horn and Associates dated 2004.

Table I and II list project structure and objectives. Figure 1 shows a map with detailed directions to the project site. Activities and reporting history for the project are listed in Table III. Table IV lists project contacts and Table V list background information for the project.

Table I. Project Structure
Project Number and Name:294 (Purlear Creek)

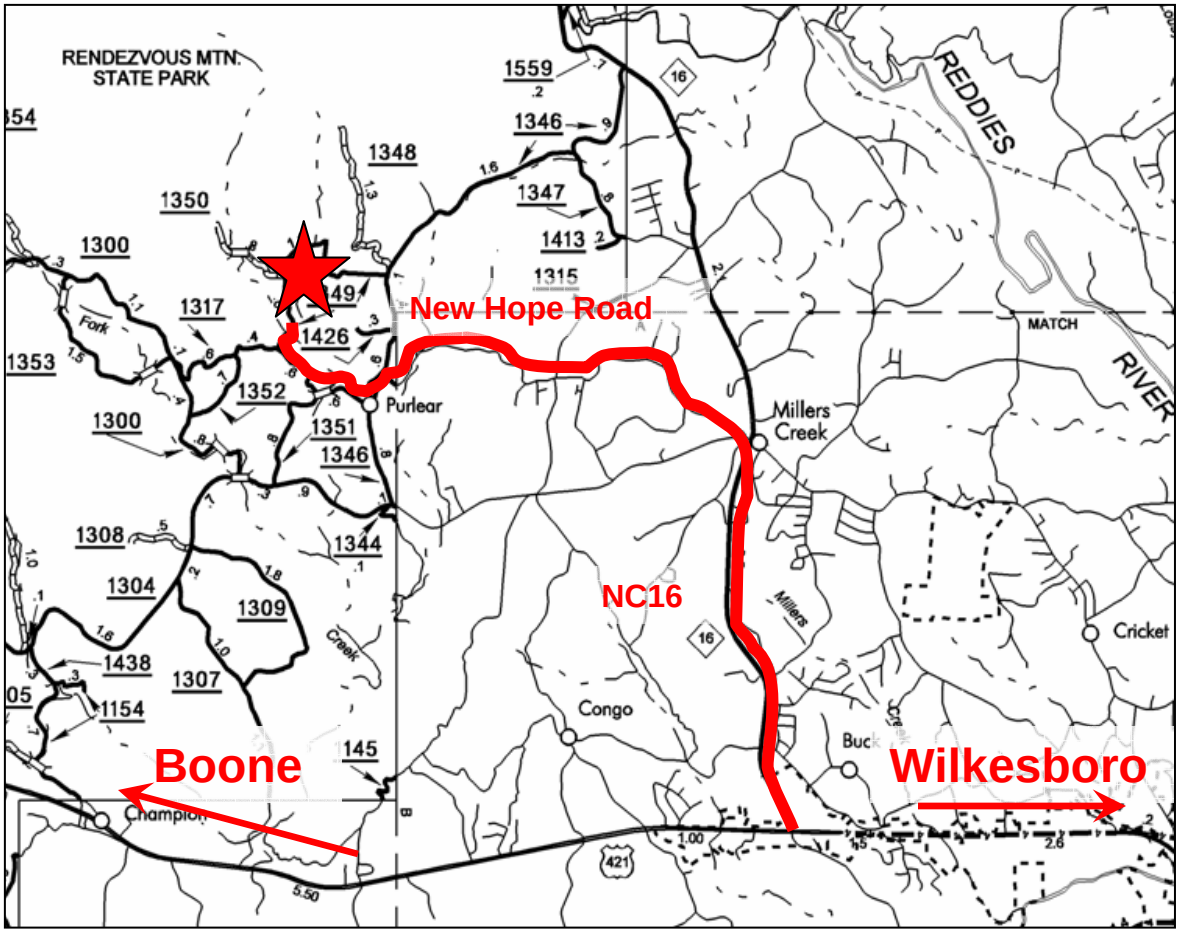
Segment/Reach ID	Linear Feet or Acreage
Purlear Creek - Phase 1	11,500 linear feet

Table II. Project Objectives Table
Project Number and Name: 294 (Purlear Creek - Phase 1)

Segment/Reach ID	Objectives	Linear Feet* or Acreage	Comment
R1 - Upper Main Reach	Full Restoration	2,260 linear feet	Priority 1 Approach, Dimension & Profile modifications, Cattle exclusion and riparian enhancement
R2 - Upper - Middle Tributary	Full Restoration	1,340 linear feet	
R3 - Middle Main Reach	Full Restoration	2,850 linear feet	
R4 - Lower - Middle Tributary (upper section)	Full Restoration	700 linear feet	
R5 - Lower - Middle Tributary (lower section)	Full Restoration	2,750 linear feet	
R6 - Lower Main Reach	Full Restoration	1,600 linear feet	

* Linear footage listed is approximate as it is based on as-built report.

Figure 1. Project Location



Directions from Hwy 421 in Wilkesboro:

From Wilkesboro on hwy-421, turn right onto NC-16. Follow NC-16 for 3.5 miles to the Millers Creek intersection. Turn Right onto SR-1304 and take the immediate right (0.05 miles) onto SR-1317. Follow SR-1317 (New Hope Road) for 4.75 miles to SR-1349 (Single Gap Road). Turn right on to SR-1349 and the midpoint of the project is located at the bridge at the bottom of the hill (0.2 miles).

Contact EEP project manager for access and landowner notification instructions. Access is not permitted to this site without prior approval.

Table III. Project Activity and Reporting History		
Project Number and Name: 294 (Purlear Creek)		
Activity or Report	**Calendar Year of Completion or Planned Completion**	**Actual Completion Date**
Restoration Plan	N/A*	Oct-02
Mitigation Plan	N/A*	N/A*
Construction	N/A*	Nov-03
Temporary S&E mix applied to entire project area	N/A*	Nov-03
As-Built report	Jan-04	Jan-04
Permanent seed mix applied to reach	N/A*	Nov-03
Structural maintenance (Structure Repair/Enhancement)	N/A*	March-05
Initial – Year 1 monitoring	Jan-05	Jan-05
Year 2 Monitoring	July-06	Pending
Year 3 Monitoring	July-07	Pending
Year 4 Monitoring	July-08	Pending
Year 5 Monitoring	July-09	Pending

* Historical project documents necessary to provide these data were unavailable at the time of report submission

Table IV. Project Contact Table Project Number and Name: 294 (Purlear Creek)	
Designer Primary project design POC	Kimley-Horn and Associates 3001 Weston Parkway Cary, NC 27513 (919)-677-2000 Will Wilhelm, PE
Construction Contractor	N/A*
Planting Contractor Planting contractor POC	N/A*
Seeding Contractor Planting contractor point of contact	N/A*
Nursery Stock Suppliers	N/A*
Monitoring Performers	Biological & Agricultural Engineering North Carolina State University Campus Box 7625 Raleigh, NC 27695
Stream Monitoring POC	Dan Clinton (919) 515-6771
Vegetation Monitoring POC	Dan Clinton (919) 515-6771

* Historical project documents necessary to provide these data were unavailable at the time of report submission

Table V. Project Background Table Project Number and Name: 294 (Purlear Creek)	
Project County	Wilkes
Drainage Area	1.3 - 2.6 mi² (Main Reach) 0.1 - 0.8mi² (Tributaries)
Drainage impervious cover estimate (%)	Estimated at <5%
Stream Order	1st and 2nd Order
Physiographic Region	Piedmont
Ecoregion	Northern Inner Piedmont (45e)
Rosgen Classification of As-built	B and E-stream types
Cowardin Classification	N/A*
Dominant soil types	N/A*
Reference site ID	Big Warrior and Basin Creek
USGS HUC for Project and Reference	3040101
NCDWQ Sub-basin for Project and Reference	03-07-01
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	100%

LEGEND
AS-BUILT THALWEG
AS-BUILT WATER
2005 BANKFULL
2005 THALWEG
CROSS SECTION
PHOTO POINT P#
VEG PLOT

FLOW MEASUREMENT & SAMPLING POINT – J-1

FLOW MEASUREMENT & SAMPLING POINT – J-2

FLOW MEASUREMENT & SAMPLING POINT – J-3

VEG PLOT #1
VEG PLOT #2
VEG PLOT #3
VEG PLOT #4
VEG PLOT #5
VEG PLOT #6
VEG PLOT #7

CROSS SECTION #1 REACH 1 POOL
CROSS SECTION #1 REACH 2 RIFFLE
CROSS SECTION #2 REACH 1 RIFFLE
CROSS SECTION #2 REACH 2 POOL

P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16

0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00
1+28.65
2+64.82
10+36.02

RIPRAP
RIPRAP
CATTLE CROSSING

SHEET 1

REACH 1
UPPER MAIN REACH

REACH 2
UPPER MIDDLE TRIB

SCALE 1" = 100'
100 0 50 100

NOTE:
ADDITIONAL VEGETATION PLOTS ARE LOCATED DOWNSTREAM. PLEASE SEE OVERALL MONITORING PLAN SHEET FOR LOCATIONS

NO	REVISIONS	DRN	CHK	DATE
1	AS-BUILT PLAN	DRC	DAB	03/01/06

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Weaver Labs Campus Box 7625
North Carolina State University
Raleigh, NC 27695

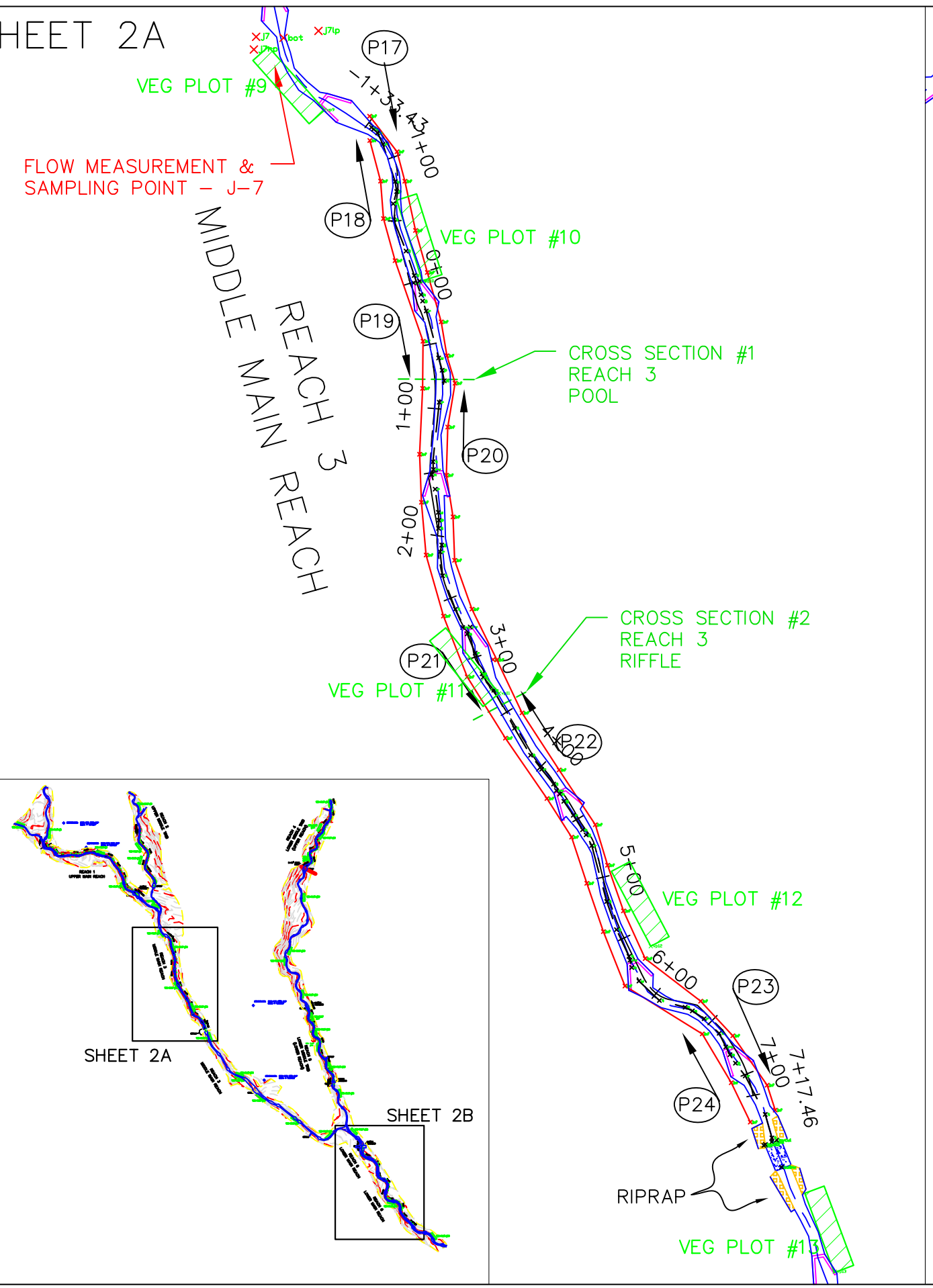
PURLEAR CREEK – PHASE 1
WILKES COUNTY, N.C.

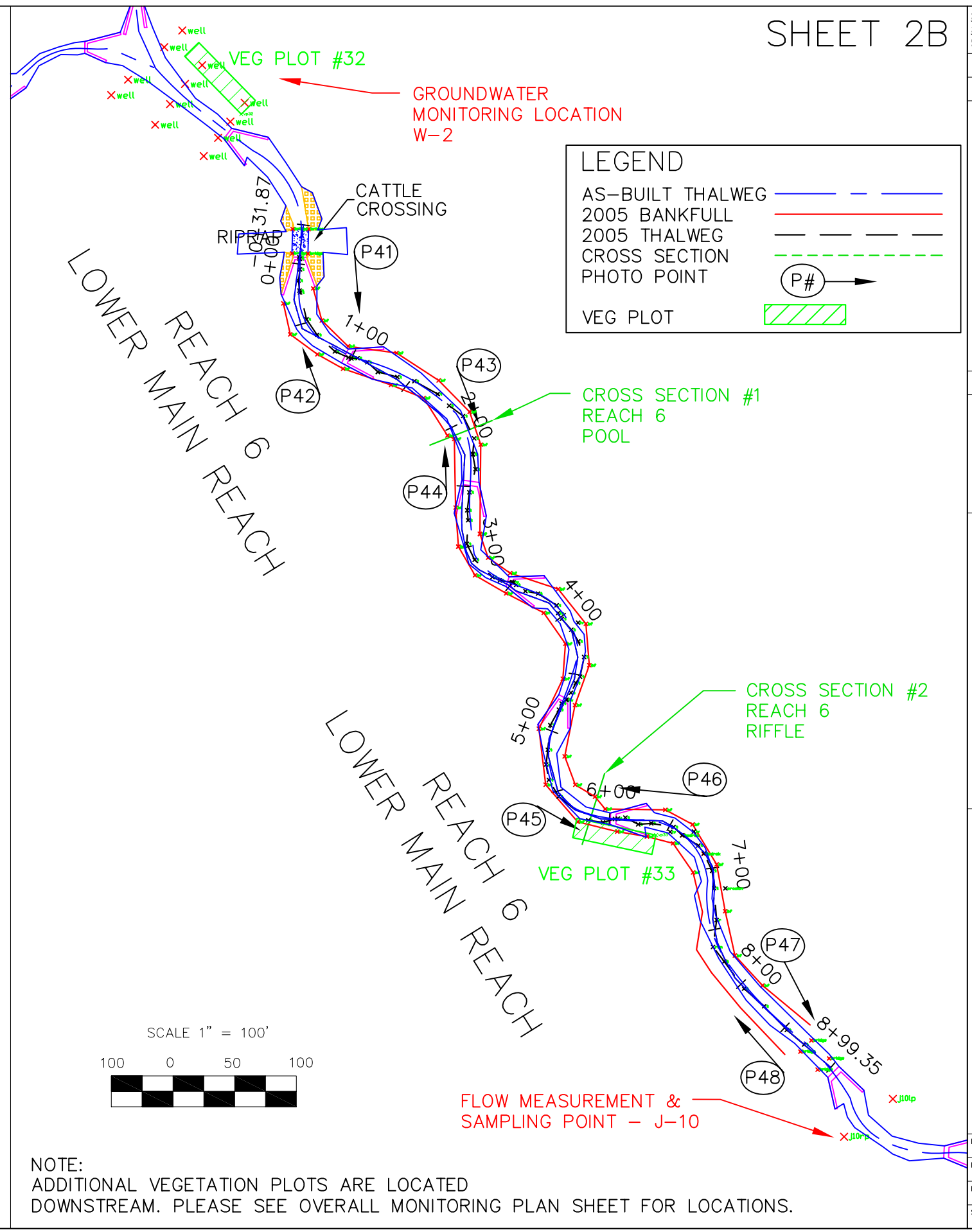
MONITORING PLAN SHEET
FIGURE 3a

DATE 03/01/2006
PROJECT NO. 294
FILENAME PULEAR ASBUILT 05.DWG
SHEET NO. MONITORING 1 of 3

SHEET 2A

SHEET 2B





LEGEND

- AS–BUILT THALWEG
- 2005 BANKFULL
- 2005 THALWEG
- CROSS SECTION
- PHOTO POINT (P#)
- VEG PLOT

SCALE 1" = 100'

100 0 50 100

NOTE:
ADDITIONAL VEGETATION PLOTS ARE LOCATED DOWNSTREAM. PLEASE SEE OVERALL MONITORING PLAN SHEET FOR LOCATIONS.

NO	REVISIONS	DRN	CHK	DAB	DRC	DATE
1	AS–BUILT PLAN					03/01/06

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PURLEAR CREEK – PHASE 1
WILKES COUNTY, N.C.

MONITORING PLAN SHEET
FIGURE 3b

DATE 03/01/2006
PROJECT NO. 294
FILENAME PULEAR ASBUILT 05.DWG
SHEET NO. MONITORING 2 of 3

LEGEND

- AS-BUILT THALWEG
- 2005 BANKFULL
- 2005 THALWEG
- CROSS SECTION
- PHOTO POINT (P#)
- VEG PLOT

REACH 4
LOWER MIDDLE TRIB
(UPPER REACH)

VEG PLOT #19
FLOW MEASUREMENT & SAMPLING POINT – J-4
CROSS SECTION #1
REACH 4
RIFFLE/GLIDE
VEG PLOT #20
VEG PLOT #21
CROSS SECTION #2
REACH 4
POOL
2-60" CPVC PIPES
VEG PLOT #22
RIPRAP
VEG PLOT #23
P25 P26 P27 P28 P29 P30 P31 P32

SCALE 1" = 100'
100 0 50 100

SHEET 3A

REACH 5
LOWER MIDDLE TRIB
(LOWER REACH)

CATTLE CROSSING
RIPRAP
VEG PLOT #27
VEG PLOT #28
CROSS SECTION #1
REACH 5
POOL
VEG PLOT #29
CROSS SECTION #2
REACH 5
RIFFLE
RIPRAP
VEG PLOT #30
CATTLE CROSSING
RIPRAP
VEG PLOT #31
P33 P34 P35 P36 P37 P38 P39 P40 P34

SHEET 3A
SHEET 3B

SHEET 3B

NOTE:
ADDITIONAL VEGETATION PLOTS ARE LOCATED DOWNSTREAM. PLEASE SEE OVERALL MONITORING PLAN SHEET FOR LOCATIONS.

NO	REVISIONS	CHK	DRN	DATE
1	MONITORING PLAN	DAB	DRC	03/01/06

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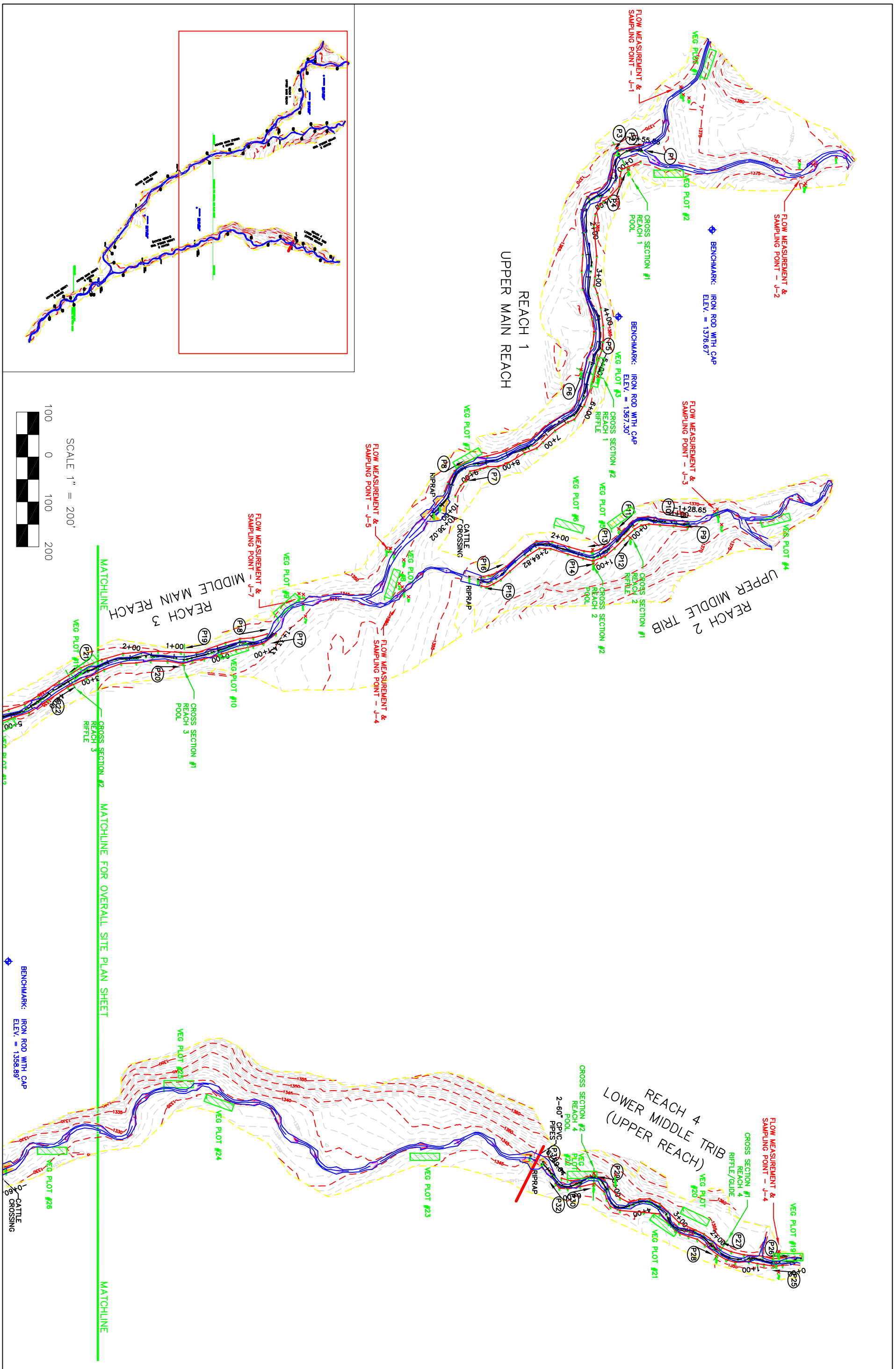
PURLEAR CREEK – PHASE 1
WILKES COUNTY, N.C.

MONITORING PLAN SHEET
FIGURE 3c

DATE 03/01/2006
PROJECT NO. 294
FILENAME PULEAR ASBUILT 05.DWG
SHEET NO. MONITORING 3 of 3



SHEET NO. MON OVERALL 1 of 2	DATE 03/01/2006	PURLEAR CREEK – PHASE 1 WILKES COUNTY, N.C. FIGURE 3d – OVERALL MONITORING PLAN SHEET	NC STATE UNIVERSITY BIOLOGICAL & AGRICULTURAL ENGINEERING Weaver Labs Campus Box 7625 North Carolina State University Raleigh, NC 27695
	PROJECT NO. 294		
	FILENAME PULEAR ASBUILT 05.DWG		

NO	REVISIONS	DRN	CHK	DATE
1	AS-BUILT PLAN	DRC	DAB	03/01/06

FIGURE 3e – OVERALL MONITORING PLAN SHEET

PURLEAR CREEK – PHASE 1

WILKES COUNTY, N.C.

NC STATE UNIVERSITY

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North Carolina State University
Raleigh, NC 27695

DATE	03/01/2006
PROJECT NO.	294
FILENAME	PULEAR ASBUILT 05.DWG
SHEET NO.	MON OVERALL 2 of 2

NO	REVISIONS	DRC	DAB	03/01/06
1	AS-BUILT PLAN			

MATCHLINE FOR OVERALL SITE PLAN SHEET

MATCHLINE

CROSS SECTION #2 REACH 6 RIFFLE

CROSS SECTION #1 REACH 6 POOL

FLOW MEASUREMENT & SAMPLING POINT – J-10

FLOW MEASUREMENT & SAMPLING POINT – J-9

VEG PLOT #34

VEG PLOT #33

VEG PLOT #32

VEG PLOT #31

VEG PLOT #30

VEG PLOT #29

VEG PLOT #28

VEG PLOT #27

VEG PLOT #26

VEG PLOT #18

VEG PLOT #17

VEG PLOT #16

VEG PLOT #15

VEG PLOT #14

VEG PLOT #12

VEG PLOT #11

GROUNDWATER MONITORING LOCATION W-2

GROUNDWATER MONITORING LOCATION W-1

CATTLE CROSSING

RIPRAP

BENCHMARK: IRON ROD WITH CAP ELEV. = 1358.89'

BENCHMARK: IRON ROD WITH CAP ELEV. = 1327.22'

REACH 6 LOWER MAIN REACH

REACH 5 LOWER MIDDLE TRIB (LOWER REACH)

REACH 3 MIDDLE MAIN REACH

SCALE 1" = 200'

100 0 100 200

III. Project Condition and Monitoring Results

Results of the 2005 monitoring are shown below. 2005 Monitoring was conducted in May, 2005.

A. Vegetation Assessment

Using the protocols specified in the Content, Format and Data Requirements for EEP Monitoring Reports, we established and surveyed 34 vegetation monitoring plots in the riparian buffer of the Purlear Phase I project during May 17-19th, 2005.

Vegetation in this first year of monitoring appeared highly successful. Herbaceous vegetation on the banks and the flood plain is dense, mostly with planted and volunteer graminoids. Early in this first year of monitoring, planted trees and shrubs were doing well along the entire buffer. Extrapolation from the 34 plots resulted in an overall average of approximately 984 planted woody stems per acre. This estimate is skewed low because some plots included the stream channel; in these plots it was impossible to establish a 5m wide plot in the narrow buffer without including the channel. Most plots were 5m x 20m due to the narrow buffer. Live stakes were densely planted and thriving in many plots, with an average of nearly 14 stems per plot, compared to the planted tree average of about 10 stems per plot. Eastern poplar (*Populus deltoides*) was used in staking, with some success.

Fescue (*Festuca* spp.) is common in the buffer. It has the potential to exclude desirable native species and to adversely affect tree growth and survival. If tree mortality appears high in subsequent monitoring years, fescue removal and replanting with less invasive species would be helpful.

The following table summarizes vegetation and soils results for 2005 monitoring. Soil samples were collected and analyzed during the 2005 monitoring period and is described in Table VI. Vegetation problem areas are summarized below in table VII. Raw vegetation data can be found in Appendix A. Vegetation plot data is summarized in Table VIII below. Photos of each vegetation plot can be found in the vegetation photo log.

Table VI. Preliminary Soil Data
Project Number and Name: 294 (Purlear Creek)

Series	Max Depth (in.)	% Clay on Surface	K	T	OM %
Braddock (BrD2)	60	27-40	0.32	3	0.5-1
Chewacla (CkA)	60	10-25	0.28	5	1-4
Evard-Cowee complex (EsE)	60	5-20	0.15	5	1-5
Masada (MaB2)	60	20-35	0.24	4	1-3
Masada (MaC2)	60	20-35	0.24	4	1-3
Pacolet (PcB2)	60	20-35	0.24	2	0.5-1
Pacolet (PcC2)	60	20-35	0.24	2	0.5-1
Rion (RnD)	60	5-20	0.24	3	0.5-2
State (StB)	72	5-20	0.28	5	<2
Tate (TaD)	60	5-20	0.24	5	1-3
Tate-Cullowhee complex (TcC)	60	5-20	0.24	5	1-3
Wehadkee (WhA)	60	7-20	0.24	5	2-5

Table VII. Vegetative Problem Areas Project Number and Name: 294 (Purlear Creek)			
Feature/Issue	**Station # / Range**	**Probable Cause**	**Photo #**
Bare side slope	8+00 / 25 feet	Poor soils and heavy shading	VPA 1

Table VIII: Stem counts for each species arranged by plot.
Project Number and Name: 294 (Purlear Creek)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Shrubs																	
Aronia arbutifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus amomum	8	0	15	27	19	9	24	2	0	7	2	7	7	0	3	27	6
Salix nigra	5	21	3	3	1	12	3	13	1	0	4	0	3	4	3	3	16
Sambucus nigra ssp. *canadensis*	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trees																	
Alnus serrulata	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Betula nigra	1	0	0	3	2	1	2	2	1	0	5	1	6	5	0	1	2
Celtis occidentalis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Diospyros virginiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Fraxinus pennsylvanica	5	1	1	7	12	2	0	0	0	4	2	0	1	1	5	2	5
Hamamelis virginiana	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0
Populus deltoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Quercus michauxii	0	4	0	3	6	3	0	1	0	2	3	1	2	3	1	2	1
Quercus phellos	2	0	0	1	3	4	7	3	4	0	0	1	0	0	0	10	2
Unknown	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Subtotal																	
Woody stem plot totals	21	29	21	46	43	31	36	22	8	14	16	11	19	13	14	45	33
Extrapolated woody stems per acre	850	1174	850	1862	1740	1255	1457	890	324	567	647	445	769	526	567	1821	1335

Species	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	**Totals**
Shrubs																		
Aronia arbutifolia	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	4	4	11
Cornus amomum	1	20	14	0	1	0	7	1	3	0	6	19	8	23	18	8	9	301
Salix nigra	1	10	2	1	2	6	2	1	1	0	2	3	0	5	0	10	16	157
Sambucus nigra ssp. *canadensis*	0	0	0	0	1	2	1	0	0	0	1	0	0	0	0	0	0	8
Trees																		
Alnus serrulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Betula nigra	6	0	1	0	2	0	0	0	3	3	0	2	2	3	7	6	6	73
Celtis occidentalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Diospyros virginiana	0	0	0	0	1	3	4	1	0	1	0	2	0	1	0	2	0	17
Fraxinus pennsylvanica	1	0	0	5	2	0	3	9	7	5	8	1	0	1	0	0	2	92
Hamamelis virginiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Populus deltoides	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	5
Quercus michauxii	1	1	0	5	0	4	4	0	1	2	0	3	5	2	7	2	0	69
Quercus phellos	0	0	0	0	2	1	3	0	1	2	0	0	0	0	0	6	5	57
Unknown 1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	5	0	11
Subtotal																		**Average**
Woody stem plot totals	10	31	17	11	11	16	25	12	16	13	17	32	16	38	32	46	42	**24**
Extrapolated woody stems per acre	405	1255	688	445	445	647	1012	486	647	526	688	1295	647	1538	1295	1862	1700	**984**

B. Stream Assessment

The stream channel is in a stable condition, with no local problem areas identified in this survey.

Area 1 – Upper Main Reach

The channel profile is similar to the as-built survey condition, with bedform features maintaining their locations and depths. This reach includes 7 cross vane grade controls with downstream elevation drops of greater than 0.5 ft. Three of these were located within the monitored reach, and four were located upstream. The 2005 survey included slope measurements for two large cross vane grade drops that were not included in the as-built condition survey. This explains the increase in water surface and bankfull slope between as-built and 2005 (MY-01).

Channel cross sections are very stable and remain similar to as-built conditions. There is a noticeable buildup on point bars at the pool locations as expected. The measured cross sectional areas and maximum depths are similar to as-built conditions.

The typical bed material particle size decreased in both cross-sections. Although the average particle size decreased in both cross sections, no aggradation or degradation has occurred in the channel, indicating the channel appears to be transporting the sediment load delivered to it by its watershed. The decrease may be temporary and will be evaluated during upcoming monitoring periods.

Channel pattern is similar to as-built conditions. Dense vegetation is establishing along the channel banks. This vegetation is providing an excellent root mass to stabilize the banks. There are no areas of visible meander migrations throughout this reach. One area of localized erosion exists at station 4+25. This erosion area appears limited on the downstream end by a tree along the streambank which is providing excellent rootmass.

Area 2 - Upper Middle Tributary

The channel profile is similar to the as-built survey condition, with bedform features maintaining their locations and depths. This reach includes 7 cross vane grade controls with downstream elevation drops of greater than 0.5 ft. Four of these were located within the monitored reach, two were located upstream and one was located downstream.

Channel cross sections are very stable and remain similar to as-built conditions. The measured cross sectional areas and maximum depths are similar to as-built conditions. Channel banks are well vegetated and appear stable.

The typical bed material particle size increased in both cross-sections. No aggradation or degradation has occurred in the channel, indicating the channel appears to be transporting the sediment load delivered to it by its watershed.

Channel pattern is similar to as-built conditions. Dense vegetation is establishing along the channel banks. This vegetation is providing an excellent root mass to stabilize the banks. There are no areas of visible meander migrations throughout this reach. No erosion areas were observed along this reach.

Area 3 – Middle Main Reach

The channel profile is similar to the as-built survey condition, with bedform features maintaining their locations and depths. This reach includes 5 cross vane grade controls with downstream elevation drops of greater than 0.5 ft. Two of these were located within the monitored reach, one was located upstream and two were located downstream. Two of the vanes along this reach had vane arms that were slumping due to footer settling.

Channel cross sections are very stable and remain similar to as-built conditions. The measured cross sectional areas and maximum depths are similar to as-built conditions. Channel banks are well vegetated and appear stable.

The typical bed material particle size increased in the riffle cross-section and decreased in the pool cross-section. No aggradation or degradation has occurred in the channel, indicating the channel appears to be transporting the sediment load delivered to it by its watershed.

Channel pattern is similar to as-built conditions. Dense vegetation is establishing along the channel banks. This vegetation is providing an excellent root mass to stabilize the banks. There are two areas of erosion along the reach. The first is located upstream and is likely the result of flow constriction from a double drop cross vane constructed directly above the bank erosion area. The second area at station 4+00 is a result of groundhog holes along the streambank. Both area appear localized and at minimal risk of expanding.

An additional area of concern is located below the study reach. A ditch has been cut from the cattle pasture through the buffer directly into the creek. It appears a significant amount of nutrients and animal waste are flowing directly through the stream buffer into the creek. It is located in a low elevation area in the pasture and likely held water prior to the restoration or was previously drained through the use of drain tiles.

Area 4 – Lower Middle Tributary (Upper Section)

The channel profile is similar to the as-built survey condition, with bedform features maintaining their locations and depths. This reach includes 4 cross vane grade controls with downstream elevation drops of greater than 0.5 ft. All vanes are within the study reach.

Channel cross sections are very stable and remain similar to as-built conditions. A small decrease in area has occurred in both sections and is likely the result of a large sediment load entering the project from upstream channel instability above this project. Channel banks are well vegetated and appear stable.

The typical bed material particle size decreased in the riffle cross-section and is similar to as-built conditions in the pool cross-section. Some aggradation is evident in the upper section this reach but appears to be minor at this point. No degradation has occurred in the channel. Overall, the channel appears to be transporting the sediment load delivered to it by its watershed with the exception of some minor aggradation occurring in the upstream areas of the reach.

Channel pattern is similar to as-built conditions. Dense vegetation is establishing along the channel banks. This vegetation is providing an excellent root mass to stabilize the banks. There are no areas of visible meander migrations throughout this reach. No erosion areas were observed along this reach.

One area of concern exists beyond the elevation drops at the cross vanes. This is a heavy use area near the beginning of the project where waste is washing directly into creek in large volume. A photo of this is located in the problem area photo log (IP24).

Area 5 - Lower Middle Tributary (Lower Section)

The channel profile is similar to the as-built survey condition, with bedform features maintaining their locations and depths. This reach includes 5 cross vane grade controls with downstream elevation drops of greater than 0.5 ft. Four of the vanes are upstream of the study reach and one is located downstream.

Channel cross sections are very stable and remain similar to as-built conditions. A small decrease in area has occurred in the riffle sections and a small increase in area occurred in the pool cross-section. The increase in pool area is the result of deepening of the pool from 2.5 to 3.3 feet. The decrease in riffle area is the result of aggradation along the right bank. Channel banks are well vegetated and appear stable.

The typical bed material particle size decreased in the riffle cross-section and increased slightly in the pool cross-section. No aggradation or degradation has occurred in the channel, indicating the channel appears to be transporting the sediment load delivered to it by its watershed.

Channel pattern is similar to as-built conditions. Dense vegetation is establishing along the channel banks. This vegetation is providing an excellent root mass to stabilize the banks. There are no areas of visible meander migrations throughout this reach. No erosion areas were observed along this reach.

Area 6 – Lower Main Reach

The channel profile is similar to the as-built survey condition, with bedform features maintaining their locations and depths. This reach includes 5 cross vane grade controls with downstream elevation drops of greater than 0.5 ft. Four of the vanes are within the study reach and one is located upstream.

Channel cross sections have decreased in area over the past year. The riffle has increased in maximum depth by 0.4 feet and appears to be transitioning into a pool feature. The left bank is building and the thalweg is becoming more established along the right bank. Both banks remain well vegetated and stable.

The left bank of the pool cross-section has migrated 3.5 feet at the bank toe and 1.5 feet at the top of bank. The left bank remains well vegetated with dense herbaceous cover and willow stakes are quickly establishing. It is expected that bank migration will slow or cease once the willows and planted trees become established. The right bank is establishing a well defined point bar and remains stable.

The typical bed material particle size increased in the riffle cross-section and decreased in the pool cross-section. No aggradation or degradation has occurred in the channel, indicating the channel appears to be transporting the sediment load delivered to it by its watershed.

Channel pattern is similar to as-built conditions. Dense vegetation is establishing along the channel banks in most areas. This vegetation is providing an excellent root mass to stabilize the banks. The only observed area of meander migration is the area along the pool cross-section although this appears to be slowing and is expected to cease once willow stakes become more established.

In addition to the elevation drops at the 5 cross vanes, two cross vanes are showing impairment. The cross vane at station 1+00 has significant erosion along the right vane arm and the arm is slumping due to the depth of scour near the arm. This appears localized and is not in need of repair at this time. The cross vane at station 3+50 also has some slumping of the left vane arm and is beginning to pipe water through the left arm. This area should continue to be observed to see if further degradation will occur. Two areas of additional bank erosion occur on this reach at stations 4+00 and 7+50. Both areas appear localized if vegetation becomes established. These areas should be observed in upcoming monitoring periods.

Two drain tiles were installed in fall 2005 through the buffer in Reach 6. The local farmer told investigators that the tiles were there prior to restoration. The drain tiles outlet directly into channel.

Stream problem areas (described above) are listed in Table IX. Baseline morphology and Summary morphology data are located in tables X and XI, respectively.

Table IX. 2005 Purlear Problem Areas				
Feature Issue	**Reach**	**Problem/ Photo Number**	**Station Numbers**	**Suspected Cause**
Bed Elevation Drop	Reach 1	IP1	Above Study Reach	Steep Channel Grade Drop Designed into Structure
		IP2	Above Study Reach	
		IP3	Above Study Reach	
		IP4	0+30	
		IP5	1+00	
		IP7	5+50	
		IP8	Below Study Reach	
	Reach 2	IP9	Above Study Reach	
		IP10	Above Study Reach	
		IP11	-1+30	
		IP12	-0+65	
		IP13	0+74	
		IP14	1+75	
		IP15	Below Study Reach	
	Reach 3	IP16	Above Study Reach	
		IP18	0+00	
		IP19	2+77	
		IP21	Below Study Reach	
		IP23	Below Study Reach	
	Reach 4	IP26	1+84	
		IP27	3+15	
		IP28	5+00	
		IP29	6+50	
	Reach 5	IP30	Above Study Reach	
		IP31	Above Study Reach	
		IP32	Above Study Reach	
		IP33	Above Study Reach	
		IP34	Below Study Reach	
	Reach 6	IP35	Above Study Reach	
		IP37	1+00	
		IP40	3+50	
		IP42	4+70	
		IP43	6+00	

2005 Purlear Problem Areas				
Reach	**Problem/ Photo Number**	**Feature Issue**	**Station Numbers**	**Suspected Cause**
Reach 1	IP6	Bank Erosion	(4+25)	High shear stress, poor vegetation
Reach 3	IP17	Double Drop Vane w/ Bank Erosion	Above Study Reach	Constriction of Flow
	IP 18	Slump Arm	(0+00)	Poor Soils, Lack of sufficient footers
	IP20	Erosion / Ground Hog Tunnels	(4+00)	Ground Hogs
	IP22	Slump Arm and Piping	Below Study Reach	Poor Soils, Lack of sufficient footers
	IP24	Excess Nutrients through Buffer	Below Study Reach	Farmer
Reach 4	IP25	Excess Nutrients through Buffer	(0+50)	Farmer
Reach 6	IP36	Tile	Above Study Reach	Farmer
	IP38	Vane Slump and Erosion	(1+00)	Poor Soils, Lack of sufficient footers
	IP39	Tile	(2+10)	Farmer
	IP40	Vane Undermine Rt. Arm	(3+50)	Poor Soils, Lack of sufficient footers
	IP41	Bank Erosion	(4+00)	High shear stress, poor vegetation
	IP44	Bank Erosion	(7+50)	High shear stress, poor vegetation

Table X. Baseline Morphology and Hydraulic Summary
Project Number and Name: 249(Purlear Creek) - Main Stem

Parameter	USGS Gage Data			Regional Curve Interval			Pre-Existing				Design				Project Reference Stream			
							Main Channel				Proposed Reach	Proposed Reach	Propsed Reach	Proposed Reach				
				Middle Main			(2A2)	(2A)	(2)[1]	(1A)[1]	(2A2)	(2A)	(2)[1]	(1A)[1]	Reach Upstream 1	Upper Big Warrior Creek	Reach Basin Creek 2	Reach Basin Creek
Dimension	Min	Max	Med	Min	Max	Med					Med	Med	Med	Med	Med	Med	Med	Med
BF Width (ft)	USGS gage data is						22	14.8	16.2	37	17.2	17.6	18	25	12.5	15.7	30.7	33.2
Floodprone Width (ft	unavailable for this project										31	31.7	30.6	70	18	30	85	329
BF Cross Sectional Area (ft2)							10.6	15.6	17.8	33.1	19	20	22.7	29	7.4	21.9	57.4	68.4
BF Mean Depth (ft)							0.5	1.1	1.1	0.9	1	1.1	1.3	1.1	0.6	1.4	1.9	2.1
BF Max Depth (ft)							1.3	1.5	1.6	2.2	1.5	1.7	1.8	1.5	1	1.8	2.5	3.1
Width/Depth Ratio							44	13.5	14.7	41.1	17.2	16	13.8	22.7	20.8	11.2	16.2	15.8
Entrenchment Ratio							1.4	2.2	4.3	2.2	1.8	1.8	1.7	2.8	1.4	1.9	2.8	9.9
Wetted Perimeter(ft)																		
Hydraulic radius (ft)																		
Pattern																		
Channel Beltwidth (ft)							N/A	N/A	N/A	N/A	29.2	29.9	30.6	67.5	21	N/A	105	64.7
Radius of Curvature (ft							N/A	N/A	N/A	N/A	27.5	28.2	28.8	62.5	20.6	N/A		51.2
Meander Wavelength (ft							N/A	N/A	N/A	N/A	172	176	180	275	100	N/A		350
Meander Width ratio							N/A	N/A	N/A	N/A	1.7	1.7	1.7	2.7	1.7	N/A		1.9
Profile																		
Riffle length (ft)																		
Riffle slope (ft/ft)															0.03	N/A	0.051	0.021
Pool length (ft)																		
Pool spacing (ft)							106	124	N/A	43	108	111	113	205	100	N/A	224	305
Substrate																		
d50 (mm)																		
d84 (mm)																		
Additional Reach Parameters																		
Valley Length (ft)																		
Channel Length (ft)																		
Valley Slope (ft)							0.022	0.016	0.015	0.01	0.013	0.013	0.011	0.01	0.017	N/A	0.014	N/A
Sinuosity							1	1	1.1	1	1.2	1.2	1.2	1.2	1.06	N/A	1.4	N/A
Water Surface Slope (ft/ft)																		
BF slope (ft/ft)																		
Rosgen Classification							F3	C4(Incised)→ G4	C4	C4(Incised)→ G4	B3c	B4c	B4c	C4c	B4c	B	C4	C4
Number of Bankfull Events																		
Extent of BF floodplain (acres)																		
Drainage Area (sq mile)							1.3	1.5	1.71	2.59	1.3	1.5	1.71	2.59	0.57	0.7	6.8	7.2
Max d(riff) / d(bkf) ratio							2.6	1.4	1.5	2.4	1.5	1.5	1.4	1.4	1.7	1.3	1.3	1.5
Low Bank Height to max Dbkf ratio							1.8	2.2	1.5	1.8	1	1	1	1	2.8	N/A	N/A	1.2
Avg Stream Slope							0.022	0.016	0.014	0.0096	0.016	0.016	0.013	0.009	0.016	N/A	0.01	0.014
Riffle Slope							0.028	0.03	0.01	0.01	0.03	0.03	0.02	0.01	0.03	N/A	0.051	0.021
Ratio of Riffle Slope to Avg. Slope							1.273	1.875	1	1	1.8	1.8	1.8	1.5	1.8	N/A	3.6	1.5
Pool Slope							0.001	0.001	0.01	0.002	0.002	0.002	0.001	0.003	0.002	N/A	0.0055	0.002
Ratio of Pool Slope to Avg. Slope							0	0.1	0.7	0.2	0.1	0.1	0.1	0.4	0.1	N/A	0.6	0.1
Maximum Pool Depth							1.9	2.3	2.2	2.1	2.2	2.4	2.9	2.2	1.3	N/A	3.1	4.8
Ratio of Pool Depth to Avg. Depth							3.8	2.1	2	2.3	2.2	2.2	2.2	2	2.2	N/A	1.6	2.3
Pool Width							21.4	13.6	30.6	20.2	17.2	17.6	18	35	12.5	N/A	40.6	50.3
Ratio of Pool Width to Bankfull Width							1	0.9	1.9	0.5	1	1	1	1.4	1	N/A	1.3	1.5
Pool Area							21.2	24.4	36.9	26.9	20.9	22	25	40.6	8	N/A	64.4	109.6
Ratio of Pool Area to Bankfull Area							2	1.6	2.1	0.8	1.1	1.1	1.1	1.4	1.1	N/A	1.1	1.6
Ratio of Pool to Pool Spacing							4.8	8.4	N/A	1.2	6.3	6.3	6.3	8.2	6.3	N/A	7.3	9.2
*BEHI																		
Bankfull Mean Velocity							N/A	N/A	5.3	4								
Bankfull Discharge, cfs							N/A	N/A	94.3	132.4								
Ratio of Meander Length to Meander Bankfull Width							N/A	N/A	N/A	N/A	10	10	10	11	8	N/A	11.4	10.5
Ratio of Radius of Curvature to Bankfull Width							N/A	N/A	N/A	N/A	1.6	1.6	1.6	2.5	1.6	N/A	3.4	1.5

Table X. Baseline Morphology and Hydraulic Summary
Project Number and Name: 249 (Purlear Creek) - Tributaries

Parameter	USGS Gage Data			Regional Curve Interval			Pre-Existing			Design			Project Reference Stream			
							Tributary			Proposed Reach	Proposed Reach	Proposed Reach	Reach	Upper Big	Reach Basin	Reach Basin
				Middle Main			2A1	2B	3	(2A1)	(2B)	-3	Upstream 1	Warrior Creek	Creek 2	Creek
Dimension	Min	Max	Med	Min	Max	Med				Med	Med	Med	Med	Med	Med	Med
BF Width (ft)	USGS gage data is unavailable for this project						5.1	8.9	10	8.9	6.5	15	12.5	15.7	30.7	33.2
Floodprone Width (ft)							19	14	16	15.1	18.2	42	18	30	85	329
BF Cross Sectional Area (ft2)							2.8	6.1	13.4	5.2	2.8	15.8	7.4	21.9	57.4	68.4
BF Mean Depth (ft)							0.5	0.7	1.3	0.6	0.4	1	0.6	1.4	1.9	2.1
BF Max Depth (ft)							1.1	1.2	2	0.8	0.6	1.5	1	1.8	2.5	3.1
Width/Depth Ratio							10.2	12.7	7.7	17.6	17.6	15	20.8	11.2	16.2	15.8
Entrenchment Ratio							3.7	1.6	1.6	1.7	2.8	2.8	1.4	1.9	2.8	9.9
Wetted Perimeter(ft)																
Hydraulic radius (ft)																
Pattern																
Channel Beltwidth (ft)								N/A		15.1	17.6	40.5	21	N/A	105	64.7
Radius of Curvature (ft)								N/A		14.2	16.3	37.5	20.6	N/A	105.3	51.2
Meander Wavelength (ft)								N/A		89	71.5	165	100	N/A	350	350
Meander Width ratio								N/A		1.7	2.7	2.7	1.7	N/A	3.4	1.9
Profile																
Riffle length (ft)																
Riffle slope (ft/ft)													0.03	N/A	0.051	0.021
Pool length (ft)																
Pool spacing (ft)							31	40	N/A	62	53	123	100	N/A	224	305
Substrate																
d50 (mm)																
d84 (mm)																
Additional Reach Parameters																
Valley Length (ft)																
Channel Length (ft)																
Valley Slope (ft)							0.018	0.023	0.014	0.015	0.007	0.012	0.017	N/A	0.014	N/A
Sinuosity							1.5	1.2	1.1	1.2	1.2	1.2	1.06	N/A	1.4	N/A
Water Surface Slope (ft/ft)																
BF slope (ft/ft)																
Rosgen Classification							E5b	B5c	G4	B4c	C4	C4	B4c	B	C4	C4
Number of Bankfull Events																
Extent of BF floodplain (acres)																
Drainage Area (sq mile)							0.2	0.08	0.72	0.2	0.08	0.8	0.57	0.7	6.8	7.2
Max d(riff) / d(bkf) ratio							2.2	1.7	1.5	1.4	1.5	1.5	1.7	1.3	1.3	1.5
Low Bank Height to max Dbkf ratio							1.1	2.6	2.4	1	1	1	2.8	N/A	N/A	1.2
Avg Stream Slope							0.012	0.019	0.013	0.018	0.008	0.014	0.016	N/A	0.01	0.014
Riffle Slope							0.017	0.028	0.02	0.03	0.01	0.02	0.03	N/A	0.051	0.021
Ratio of Riffle Slope to Avg. Slope							1.417	1.474	1.5	1.8	1.5	1.5	1.8	N/A	3.6	1.5
Pool Slope							0.001	0.001	0.01	0.002	0.003	0.005	0.002	N/A	0.0055	0.002
Ratio of Pool Slope to Avg. Slope							0.1	0.1	0.4	0.1	0.4	0.4	0.1	N/A	0.6	0.1
Maximum Pool Depth							1.4	1.5	2.2	1.3	0.8	2	1.3	N/A	3.1	4.8
Ratio of Pool Depth to Avg. Depth							2.8	2.1	1.7	2.2	2	2	2.2	N/A	1.6	2.3
Pool Width							7.7	24.3	18.5	10.7	9.1	21	12.5	N/A	40.6	50.3
Ratio of Pool Width to Bankfull Width							1.5	2.7	1.9	1.2	1.4	1.4	1	N/A	1.3	1.5
Pool Area							5.7	19.8	24.1	6.2	3.9	22.1	8	N/A	64.4	109.6
Ratio of Pool Area to Bankfull Area							2	3.2	1.8	1.2	1.4	1.4	1.1	N/A	1.1	1.6
Ratio of Pool to Pool Spacing							6.1	4.5	N/A	7	8.2	8.2	6.3	N/A	7.3	9.2
*BEHI																
Bankfull Mean Velocity							N/A	N/A	6.4							
Bankfull Discharge, cfs							N/A	N/A	85.8							
Ratio of Meander Length to Meander Bankfull Width							N/A	N/A	N/A	10	11	11	8	N/A	11.4	10.5
Ratio of Radius of Curvature to Bankfull Width							N/A	N/A	N/A	1.6	2.5	2.5	1.6	N/A	3.4	

Table XIa. Morphology and Hydraulic Monitoring Summary for Area 1
Segment/Reach: Project Number and Name:294 (Purlear I) Upper Main

Parameter	Cross Section 1 Area 1 Pool						Cross Section 2 Area 1 Riffle					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	29.9	29.6					26.7	26.4				
Floodprone Width (ft) (approx)							53	53				
BF Cross Sectional Area (ft^2)	36.7	35.5					39.6	39.6				
BF Mean Depth (ft)	1.2	1.2					1.5	1.5				
BF Max Depth (ft)	2.3	2.6					2.3	2.3				
Width/Depth Ratio							18.1	17.6				
Entrenchment Ratio (greater							2.0	2.0				
Wetted Perimeter(ft)												
Hydraulic radius (ft)												
Substrate												
d50 (mm)	13.4	0.006					17.73	0.6				
d84 (mm)	35.7	0.2					36.4	1.5				

Parameter	MY-00 (2004)			MY-01 (2005)			MY-02 (2006)			MY-03 (2007)			MY-04 (2008)			MY-05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	25	87		-	-	-												
Radius of Curvature (ft)	18	96		-	-	-												
Meander Wavelength (ft)	160	200		-	-	202												
Meander Width ratio	0.8	2.9		-	-	-												
Profile																		
Riffle length (ft)	-	-	-	30.0	116.0	43.5												
Riffle slope (ft/ft)	0.02	0.12	0.06	1.13%	3.95%	1.81%												
Pool length (ft)	29	136	58	13.0	56.0	25.0												
Pool spacing (ft)	74	193	120	28	225	64												

Additional Reach Parameters	MY-0 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)	1022					
Channel Length (ft)	1091					
Sinuosity	1.07					
Water Surface Slope (ft/ft)	0.009	0.014				
BF slope (ft/ft)	0.008	0.016				
Rosgen Classification	B4	B4				
Number of Bankfull Events		not measured				
Extent of BF floodplain (area)		n/a				
BEHI*		n/a				

Table XIb. Morphology and Hydraulic Monitoring Summary for Area 2
Segment/Reach: Project Number and Name:294 (Purlear I) Upper Middle Trib

Parameter	Cross Section 1 Area 2 Riffle						Cross Section 2 Area 2 Pool					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	17.4	16.2					19.4	19.3				
Floodprone Width (ft) (approx)	40	40										
BF Cross Sectional Area (ft^2)	11.9	12.4					12.8	13.4				
BF Mean Depth (ft)	0.7	0.8					0.7	0.7				
BF Max Depth (ft)	1.5	1.7					1.6	1.6				
Width/Depth Ratio	25.5	21.1										
Entrenchment Ratio (greater	2.3	2.5										
Wetted Perimeter(ft)												
Hydraulic radius (ft)												
Substrate												
d50 (mm)	0.06	17.42					0.16	17.42				
d84 (mm)	4.23	50.98					1	72				

Parameter	MY-00 (2004)			MY-01 (2005)			MY-02 (2006)			MY-03 (2007)			MY-04 (2008)			MY-05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	-	-	-	69	70	69												
Radius of Curvature (ft)	-	-	17	62	81	73												
Meander Wavelength (ft)	-	-	-	236	255	245												
Meander Width ratio	-	-	-	14.6	15.7	15.1												
Profile																		
Riffle length (ft)	-	-	-	15.0	73.0	35.0												
Riffle slope (ft/ft)	-	-	-	0.32%	1.69%	0.69%												
Pool length (ft)	10	18	13	5.0	25.0	11.0												
Pool spacing (ft)	42	100	71	29	93	45												

Additional Reach Parameters	MY-0 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)	358					
Channel Length (ft)	393					
Sinuosity	1.10					
Water Surface Slope (ft/ft)	0.016	0.015				
BF slope (ft/ft)	0.020	0.018				
Rosgen Classification	C4	C4				
Number of Bankfull Events		not measured				
Extent of BF floodplain (area)		n/a				
BEHI*		n/a				

Table XIc. Morphology and Hydraulic Monitoring Summary for Area 3
Segment/Reach: Project Number and Name:294 (Purlear I) Middle Main

Parameter	Cross Section 1 Area 3 Pool						Cross Section 2 Area 3 Riffle					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	26.8	26.2					24.5	24.2				
Floodprone Width (ft) (approx)							60	60				
BF Cross Sectional Area (ft^2)	45.2	44.8					28.3	28.1				
BF Mean Depth (ft)	1.7	1.7					1.2	1.2				
BF Max Depth (ft)	3.1	3.3					2.1	2.1				
Width/Depth Ratio							21.3	20.9				
Entrenchment Ratio (greater							2.4	2.5				
Wetted Perimeter(ft)												
Hydraulic radius (ft)												
Substrate												
d50 (mm)	6.1	0.19					0.56	12.32				
d84 (mm)	22.63	8.25					14.36	36.86				

Parameter	MY-00 (2004)			MY-01 (2005)			MY-02 (2006)			MY-03 (2007)			MY-04 (2008)			MY-05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	37	58		-	-	-												
Radius of Curvature (ft)	27	94		-	-	-												
Meander Wavelength (ft)	230	356		-	-	-												
Meander Width ratio	1.4	2.2		-	-	-												
Profile																		
Riffle length (ft)				16	94	35												
Riffle slope (ft/ft)	0.01	0.03	0.02	0.00341	0.0276	0.0138												
Pool length (ft)	24	74	51	9	84	20												
Pool spacing (ft)	79	132	112	29	120	65.5												

Additional Reach Parameters	MY-0 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)	821					
Channel Length (ft)	850					
Sinuosity	1.04					
Water Surface Slope (ft/ft)	0.014	0.014				
BF slope (ft/ft)	0.015	0.013				
Rosgen Classification	B4	B4				
Number of Bankfull Events		not measured				
Extent of BF floodplain (area)		n/a				
BEHI*		n/a				

Table XId. Morphology and Hydraulic Monitoring Summary for Area 4
Segment/Reach: Project Number and Name:294 (Purlear I) Lower Middle Trib (Upper Section)

Parameter	Cross Section 1 Area 4 Riffle						Cross Section 2 Area 4 Pool					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	25.1	25.1					22.6	21.2				
Floodprone Width (ft) (approx)	50	50										
BF Cross Sectional Area (ft^2)	21.8	19.1					21.5	18.1				
BF Mean Depth (ft)	0.9	0.8					1	0.9				
BF Max Depth (ft)	1.6	1.5					2.3	2.2				
Width/Depth Ratio	28.9	32.9										
Entrenchment Ratio (greater than)	2.0	2.0										
Wetted Perimeter(ft)												
Hydraulic radius (ft)												
Substrate												
d50 (mm)	10.36	0.69					3.93	3				
d84 (mm)	20.74	11.89					13.53	13.14				

Parameter	MY-00 (2004)			MY-01 (2005)			MY-02 (2006)			MY-03 (2007)			MY-04 (2008)			MY-05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	28	71		28	55	47												
Radius of Curvature (ft)	81	81		37	77	49												
Meander Wavelength (ft)	116	170		120	157	135												
Meander Width ratio	1.1	2.8		4.8	6.3	5.4												
Profile																		
Riffle length (ft)				7	60	19												
Riffle slope (ft/ft)				0.7%	1.9%	1.2%												
Pool length (ft)	54	85	70	6	45	23												
Pool spacing (ft)	88	184	131	29	115	49												

Additional Reach Parameters	MY-0 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)	599					
Channel Length (ft)	669					
Sinuosity	1.12					
Water Surface Slope (ft/ft)	0.015	0.013				
BF slope (ft/ft)	0.015	0.015				
Rosgen Classification	B4	B4				
Number of Bankfull Events		not measured				
Extent of BF floodplain (area)		n/a				
BEHI*		n/a				

Table XIe. Morphology and Hydraulic Monitoring Summary for Area 5
Segment/Reach: Project Number and Name:294 (Purlear I) Lower Middle Trib (Lower Section)

Parameter	Cross Section 1 Area 5 Pool						Cross Section 2 Area 5 Riffle					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	21.4	21.4					26.3	25				
Floodprone Width (ft) (approx)							60	60				
BF Cross Sectional Area (ft^2)	26.8	29.4					23.1	19.8				
BF Mean Depth (ft)	1.3	1.4					0.9	0.8				
BF Max Depth (ft)	2.5	3.3					1.7	1.7				
Width/Depth Ratio							30	31.7				
Entrenchment Ratio (greater than)							2.3	2.4				
Wetted Perimeter(ft)												
Hydraulic radius (ft)												
Substrate												
d50 (mm)	0.5	2.06					15.85	0.54				
d84 (mm)	8.25	13.06					29.94	3.33				

Parameter	MY-00 (2004)			MY-01 (2005)			MY-02 (2006)			MY-03 (2007)			MY-04 (2008)			MY-05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	28	71		36	50	45												
Radius of Curvature (ft)	81	81		40	87	51												
Meander Wavelength (ft)	116	170		113	187	145												
Meander Width ratio	1.3	3.3		4.5	7.5	5.8												
Profile																		
Riffle length (ft)				5.0	49.0	28.0												
Riffle slope (ft/ft)				0.5%	3.9%	1.4%												
Pool length (ft)	23	76	49	11	38	26												
Pool spacing (ft)	81	110	97	19	77	51												

Additional Reach Parameters	MY-0 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)	674					
Channel Length (ft)	778					
Sinuosity	1.15					
Water Surface Slope (ft/ft)	0.012	0.012				
BF slope (ft/ft)	0.009	0.011				
Rosgen Classification	B4	B4				
Number of Bankfull Events		not measured				
Extent of BF floodplain (area)		n/a				
BEHI*		n/a				

Table XIf. Morphology and Hydraulic Monitoring Summary for Area 6
Segment/Reach: Project Number and Name:294 (Purlear I) Lower Main

Parameter	Cross Section 1						Cross Section 2					
	Area 1 Pool						Area 1 Riffle					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	18.9	19.2					27.1	26.9				
Floodprone Width (ft) (approx)							60	60				
BF Cross Sectional Area (ft^2)	43.6	36.3					40.2	37.8				
BF Mean Depth (ft)	2.3	1.9					1.5	1.4				
BF Max Depth (ft)	3.8	3.5					2.5	2.9				
Width/Depth Ratio							18.3	19.2				
Entrenchment Ratio (greater							2.2	2.2				
Wetted Perimeter(ft)												
Hydraulic radius (ft)												
Substrate												
d50 (mm)	11.33	0.11					0.06	1.5				
d84 (mm)	24.5	14.22					11.01	65.75				

Parameter	MY-00 (2004)			MY-01 (2005)			MY-02 (2006)			MY-03 (2007)			MY-04 (2008)			MY-05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	39	87		55	71	68												
Radius of Curvature (ft)	39	75		50	139	73												
Meander Wavelength (ft)	168	240		182	238	194												
Meander Width ratio	1.4	3.2		2.0	2.6	2.5												
Profile																		
Riffle length (ft)	-	-	-	30	36	34												
Riffle slope (ft/ft)	-	-	-	1.5%	2.9%	1.9%												
Pool length (ft)	40	110	71	37	147	84												
Pool spacing (ft)	160	213	190	46.5	128	93.75												

Additional Reach Parameters	MY-0 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)	805					
Channel Length (ft)	931					
Sinuosity	1.16					
Water Surface Slope (ft/ft)	0.010	0.010				
BF slope (ft/ft)	0.009	0.010				
Rosgen Classification	B4	B4				
Number of Bankfull Events		not measured				
Extent of BF floodplain (area)		n/a				
BEHI*		n/a				

IV. Surface Water Monitoring

Background

The surface water component of the Purlear Creek study consists of 14 grab sample stations that are located throughout Phase I & II of the Purlear Creek Restoration. The monitoring stations were installed at stable riffles where a monthly grab sample is collected. When collected, sample is representative of the entire water column. Stations 1-4 & 11 represent the flow onto the restoration project and station 14 marks the last station the water will pass through prior to leaving the restoration. The exact location of each monitoring station has been located in Figure 1. The installation of a typical stage monitoring and grab sample station can be seen in Figure 2.

Permanent cross sections were monumented and surveyed at each grab sample location and a stage recorder was installed. The stage recording units record the stream stage every five minutes. HEC-RAS will be used to calculate stage-discharge relationships at each station. This information will be used in conjunction with concentration data to calculate the nutrient and sediment load that flows past each station.

Station 1 has a mostly forested watershed that flows into a relatively large recreational pasture without streamside fencing. Streambanks are well vegetated and animal traffic is very low, the most activity from four donkeys.

Station 2 comes from a larger watershed that is mostly forested. Most of the stream is entrenched with high levels of streambank erosion. This station is downstream of a restoration that is scheduled to take place in two phases that will last at least two years.

Station 3 is immediately downstream of a beef operation that does not exercise streamside fencing. High sediment loads are evident during site visits.

Station 4 is also immediately downstream of a beef operation without streamside fencing, however the stream itself is protected by mature trees and thick brush. The vegetation is thick enough that cattle avoid the stream except in a few locations that are open enough to cross and drink.

Station 11 marks the outflow of a constructed wetland that was built in Phase II of the Purlear Project. This station also marks where it flows back into an entrenched stream with exposed banks and severe streambank erosion. Station 12 is the end of the entrenched portion of stream that flows into the second portion of the Phase II restoration.

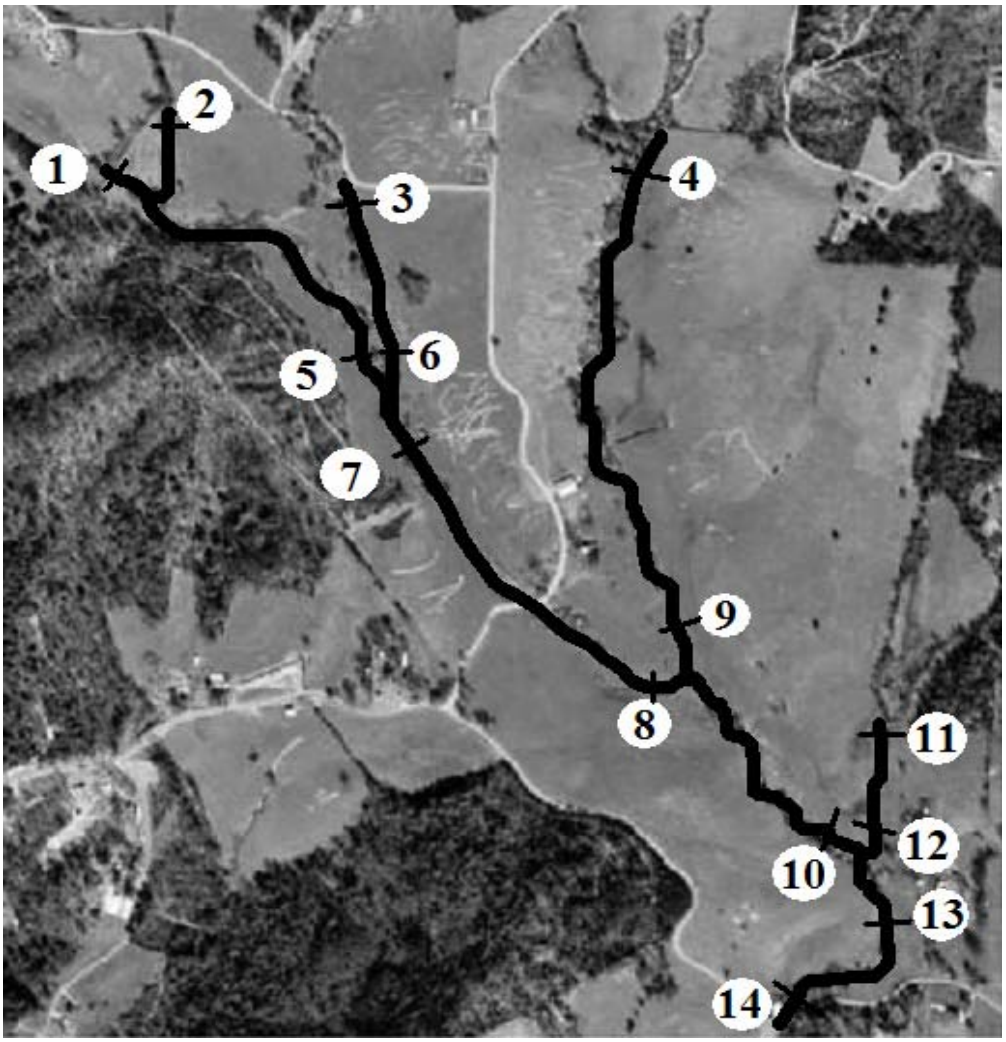

Figure 1: Surface Water Monitoring Station Locations

Figure 2: Installation of a Stage Monitoring and Grab Sample Station

Preliminary Results

The middle 50% of the data are represented by the light and dark blocks, the whiskers illustrate the maximum and minimum. The mean is plotted as a dot to illustrate the deviation from the median value.

IV. Surface Water Monitoring

Background

The buffer monitoring component of the Purlear study consists of three well nests that have been installed in topography similar to agricultural property throughout North Carolina. The three systems are categorized in the data as Upland (well series 1 through 4), Lowland (well series 5 through 7) and Dry Lowland (wells to be determined). The placement of the well nests can be seen in Figure 3. Each well nest consists of at least three well transects. The transects are composed of a well at the outer edge of the buffer (wells A & D) and a well near the edge of the stream (wells B & C). Figure 4 is a conceptual illustration of the installation details. Samples are collected monthly at the same time as the surface water samples are collected.

The Upland Well Nest features well drained soils with steeper slopes than the other two systems. The B and C series wells are currently installed, however only well 3A has been successfully installed. The data presented later under the Upland Field category is only represented by this well. It should also be noted that this well is positioned in an area that is typically saturated with seepage from a high traffic feeding area.

The Lowland Well Nest is situated in an area with very low slopes, generally wetter soils and a water table that is close to the surface. All of these wells are installed and data has been collected since December 2005. A multiple drainage tiles and swales were installed shortly after the wells were installed, effectively bypassing the buffer. The wells most significantly impacted by the drainage tile are wells in the A and B series of this well nest. Tile samples have been collected since their installation, the data are included along with the well data.

The Dry Lowland Well Nest location has yet to be determined but it will be installed in the lower reach of Phase II. This area has a wide valley that is very flat and well drained, contrasting the previous two well nests. This portion of the project has been completed late in 2005, so the vegetation is significantly different than the more mature vegetation in Phase I. These wells are scheduled to be installed in summer 2006.

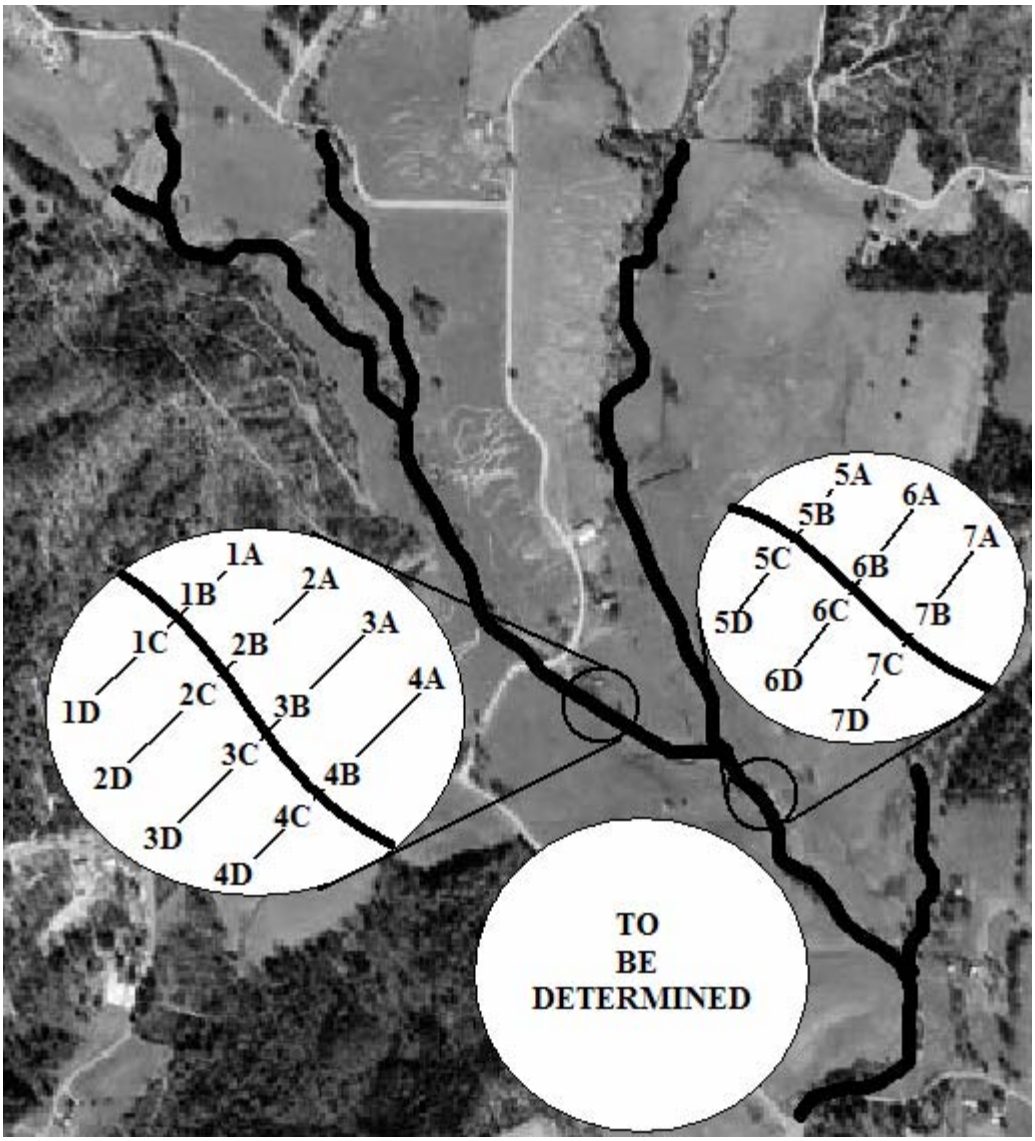

Figure 3: Placement of Wells for Buffer Groundwater Monitoring

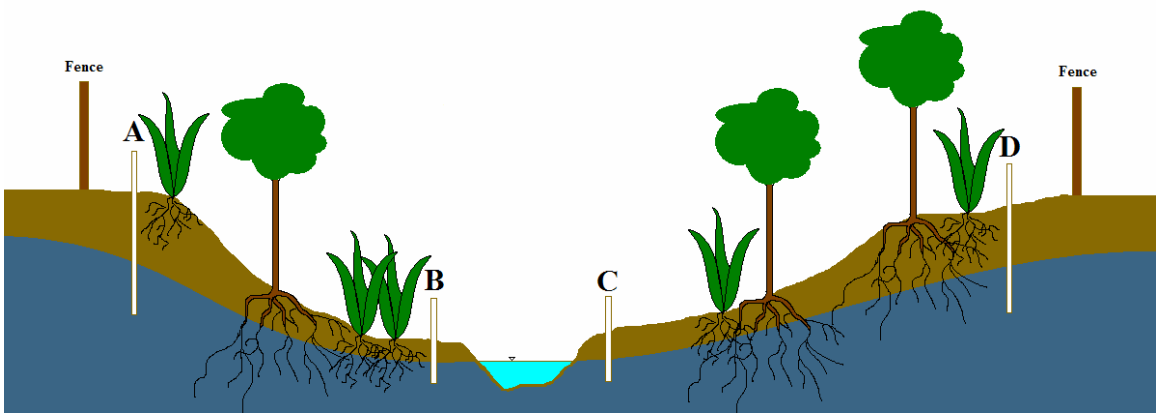

Figure 4: Conceptual Illustration of a Well Transect for Groundwater Monitoring

Preliminary Results

The graphs for the results are broken into two parts; one graph shows the statistics by well classification and the other shows the individual well statistics. The middle 50% of the data are represented by the light and dark blocks, the whiskers illustrate the maximum and minimum. The mean is plotted as a dot to illustrate the deviation from the median value. It should be noted again that the Upland Field category is only represented by one well.

VI. Methodology Section

Monitoring methods used are based on US Army Corps of Engineering and NC Division of Water Quality Guides as referenced below.

References:

USACOE (2003) *Stream Mitigation Guidelines*. USACOE, USEPA, NCWRC, NCDENR-DWQ

Rosgen, D L. (1996) *Applied River Morphology*. Wildland Hydrology Books, Pagosa Springs, CO.

APPENDIX A

Vegetation Raw Data

1. Vegetation Photo Log/Problem Photos
2. Vegetation Survey Data Tables

2005
Purlear Vegetation Photo Log

Vegetation Plot 1. Reach1

Vegetation Plot 2. Reach 1

Vegetation Plot 3 Reach 1

Vegetation Plot 4 Reach 2

Vegetation Plot 5 Reach 2

Vegetation Plot 6 Reach 2

Vegetation Plot 7 Reach 1

Vegetation Plot 8 Reach 1

Vegetation Plot 9 Reach 3

Vegetation Plot 10 Reach 3

Vegetation Plot 11 Reach 3

Vegetation Plot 12 Reach 3

Vegetation Plot 13 Reach 3

Vegetation Plot 14 Reach 3

Vegetation Plot 15 Reach 3

Vegetation Plot 16 Reach 3

Vegetation Plot 17 Reach 3

Vegetation Plot 18 Reach 3

Vegetation Plot 19 Reach 4

Vegetation Plot 20 Reach 4

Vegetation Plot 21 Reach 4

Vegetation Plot 22 Reach 4

Vegetation Plot 23 Reach 4

Vegetation Plot 24 Reach 4

Vegetation Plot 25 Reach 4

Vegetation Plot 26 Reach 4

Vegetation Plot 27 Reach 5

Vegetation Plot 28 Reach 5

Vegetation Plot 29 Reach 5

Vegetation Plot 30 Reach 5

Vegetation Plot 31 Reach 5

Vegetation Plot 32 Reach 6

Vegetation Plot 33 Reach 6

Vegetation Plot 34 Reach 6

2005 Purlear
Vegetation Problem Area

Vegetation Plot A 1. Bare Bank. Reach 6 Station (8+00)

Plot No.	**Species**	**Count**	**Notes**	GPS	photo	size
1	sa ni	4	xv	17 473162 E	47	5 x 20
	be ni	5	rif	4006049 N		
	qu mi	3	upstream of culvert			
	fr am	1				
2	sa ni	3	xv	17 473075 E	48	
	be ni	6	downstream of cow bridge	4006142 N	49	
	qu mi	2				
	fr pe	1				
	co am	7				
3	be ni	1	gps corner at xv	17 473030E	50	
	qu mi	1	under red maple and poplar	4006218N	51	
	co am	7	rif			
	qu ph	1	privet			
	ha vi	1				
4	sa ni	4	upstream corner at xv	17 472993E	52	
	be ni	5	rif	4006277N		
	qu mi	3				
	fr pe	2				
	co am	2				
5	sa ni	1	downstream corner at double xv	17 472949E	53	
	be ni	1		4006414N		
	qu mi					
	fr pe					
	co am					
	qu ph	4				
	ha vi	2				
6	sa ni	13	xv	17 472933E	54	
	be ni	2	downstream corner near pointbar	4006486N	55	
	qu mi	1	at stream fork	4		10 x 10
	fr pe					
	co am	2				
	qu ph	3				
	ha vi					
	ce oc	1				
7	sa ni	3	xv at upstream and downstrean corners	17 472787E	56	
	fr pe	1	rif	4006623N		
	co am	15	under large red maple			5 x 20
	unk 1	1	left branch of project			
	co fl	1	on permanent xc			
8	sa ni	21	downstream corner at xv	17 472640E	57	

	be ni		rif	4006663N		
	qu mi	4	under large sycamore			
	fr pe	1	alnus serrulara nat regen			
	co am					
	qu ph					
	ha vi					
	ce oc					
	unk1	1				
	co fl	2				
9	sa ni	5	left fork off left project branch	17 472576E	58	
	be ni	1	head of restoration	4006693N		
	qu mi		conduit in stream			
	fr pe	5				
	co am	8				
	qu ph	2				
	ha vi					
	ce oc					
	unk1					
	co fl					
10	sa ni	3	xv at upstream corner	17 472845E	59	
	be ni	2	rif	4006533N		
	qu mi					
	fr pe					
	co am	24				
	qu ph	7				
	ha vi					
	ce oc					
	unk1					
	co fl					
11	sa ni		xv at downstream end	17 472973E	60	
	be ni		rif at head of plot	4006374N	61	
	qu mi	2				
	fr pe	4				
	co am	7				
	qu ph					
	ha vi					
	ce oc					
	unk1	1				
	co fl					
12	sa ni	16	xv	17 473309E		
	be ni	2	xv at downstream corner	4005936N		
	qu mi	1	deep pool			
	fr pe	5	downstream of cc hayes rd.			
	co am	6				
	qu ph	2				

	ha vi					
	ce oc					
	unk1					
	co fl					
	di vi	1				
13	sa ni		xv at downstream corner	17 473461E	63	
	be ni	7	below confluence	4005903N	64	
	qu mi	7	smelly			
	fr pe					
	co am	18				
	qu ph					
	ha vi					
	ce oc					
	unk1					
	co fl					
	di vi					
14	sa ni	2	xv at dowvstream corner	17 473350E	65	10 x 10
	be ni		rif	4006158N	66	
	qu mi		emergent veg in chanel			
	fr pe	8				
	co am	6				
	qu ph					
	ha vi					
	ce oc					
	unk1					
	co fl	1				
	di vi					
15	sa ni	1	between two xv	17 473295E	67	
	be ni		rif	4006435N		
	qu mi		xv			
	fr pe	9	veg in chanel			
	co am	1	right branch of project			
	qu ph					
	ha vi					
	ce oc					
	unk1					
	co fl					
	di vi	1				
	trouble spot			17 473269E	68	
				4006343N	69	
16	sa ni	2		17s473343e	70	
	be ni	1		4006697		
	qu mi		channel in plot some			
	fr pe					

	co am	14				
	qu ph					
	ha vi					
	ce oc					
	unk1					
	co fl					
	di vi					
17	co am	20	channel in plot some	17473378e	71	
	sa ni	10		4006759n		
	qu mi	1				
18	co am	8				
	sa ni	10	xv	17s473567	72	
	qu mi	2	log vane	4005727		
	pop	3				
	unk 2	5				
	qu ph	6				
	be ni	6				
	di vi	2				
	unk 3	4				
19	sa ni	16	xv in middle	17 473674E	73	
	be ni	6	end of project	4005632N		
	qu mi		below confluence			
	fr pe	2				
	co am	9				
	qu ph	5				
	unk 3	4				
20	co am	27		17473216	74	
	qu ph	10		4005993		
	sa ni	3				
	fr pe	2				
	qu mi	2				
	be ni	1				
21	qu mi	1		17473383	75	
	be ni	6		4005889		
	fr pe	1				
	sa ni	1				
	co am	1				
22	co am	23		17473416	76	
	di vi	1		4006000		
	be ni	3	channel curves thru plot			
	qu mi	2				
	sa ni	5				
	unk 2	1				
	unk 1	1				
	pop	1				
	fr pe	1				

23	sa ni		10 x 10			
	co am	8	past fence	17473392		
	qu mi	5		4006070		
	be ni	2				
	unk 1	1			77	
					78	
24	di vi	2		17473359		
	ar ar	2		4006120		
	fr pe	1			79	
	co am	19				
	sa ni	3				
	qu mi	3				
	be ni	2				
25	be ni	3		17473340		
	di vi	1		4006199	80	
	fr pe	5				
	qu mi	2				
	qu ph	2				
	co					
26	fr pe	7		17473311		
	co am	3	leave out curved bank	4006258	81	
	qu mi	1				
	qu ph	1				
	sa ni	1				
	be ni	3				
27	qu mi	4	lined on fence	17473273	82	
	co am	7		4006372		
	qu ph	3				
	ar ar	1				
	sa ni	2				
	di vi	4				
	fr pe	3				
	sa ca	1				
28	sa ni	6	lined on fence	17473310	83	
	qu mi	4		4006511		
	di vi	3				
	co fl	2				
	qu ph	1				
29	qu ph	2	lined on fence	17473325	84	
	fr pe	2		4006618		
	be ni	2				
	di vi	1				
	sa ni	2				

	sa ca	1				
	co am	1				
30	qu mi	5		17473348	85	
	fr pe	5		4006677		
	sa ni	1				
31	fr pe	7		17472876	86	
	co am	27	channel in plot	4006740		
	sa ni	3				
	qu mi	3				
	qu ph	1				
	al se	2				
	be ni	3				
32	fr pe	12	lined on fence	17472884	87	
	qu mi	6		4006639		
	co am	19				
	sa ni	1				
	be ni	2				
	qu ph	3				
33	qu mi	3	one conduit at upstream right bank	17472882	88	
	co am	9	xv just above plot	4006600		
	sa ni	12	xv in plt			
	qu ph	4	10 x 10 fence to fence			
	fr pe	2	gps at conduit			
	be ni	1				
34	fr pe	5	fenceline	17473161	89	
	pop	1		4006046		
	co am	3				
	sa ni	3				
	qu mi	1				
	di vi	1				

APPENDIX B

Morphology Raw Data

1. Problem Area Plan View
2. Project Photo Log
3. Problem Area Photo Log
4. Cross section and Pebble Count Plots and Raw Data Tables
5. Longitudinal Plots and Raw Data Tables
6. Slope Measurement Tables
7. Pattern Measurement Tables
8. GPS Point Table

LEGEND
AS-BUILT THALWEG
AS-BUILT WATER
2005 BANKFULL
2005 THALWEG
CROSS SECTION
PROBLEM PHOTO
IP#
PROBLEM AREA

SHEET 1

REACH 1
UPPER MAIN REACH

REACH 2
UPPER MIDDLE TRIB

IP1
IP2
IP3
IP4
IP5
IP6
IP7
IP9
IP10
IP11
IP12
IP13
IP14

0+55.86
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
10+36.02
1+28.65
2+64.82

CROSS SECTION #1
REACH 1
POOL

CROSS SECTION #2
REACH 1
RIFFLE

CROSS SECTION #1
REACH 2
RIFFLE

CROSS SECTION #2
REACH 2
POOL

CATTLE CROSSING
RIPRAP
RIPRAP

SCALE 1" = 100'
100 0 50 100

NOTE:
ADDITIONAL PROBLEM LOCATIONS ARE LOCATED DOWNSTREAM. PLEASE SEE OVERALL MONITORING PLAN SHEET FOR LOCATIONS

NO	REVISIONS	CHK	DATE
1	AS-BUILT PLAN	DRN	03/01/06
		DAB	
		DRC	

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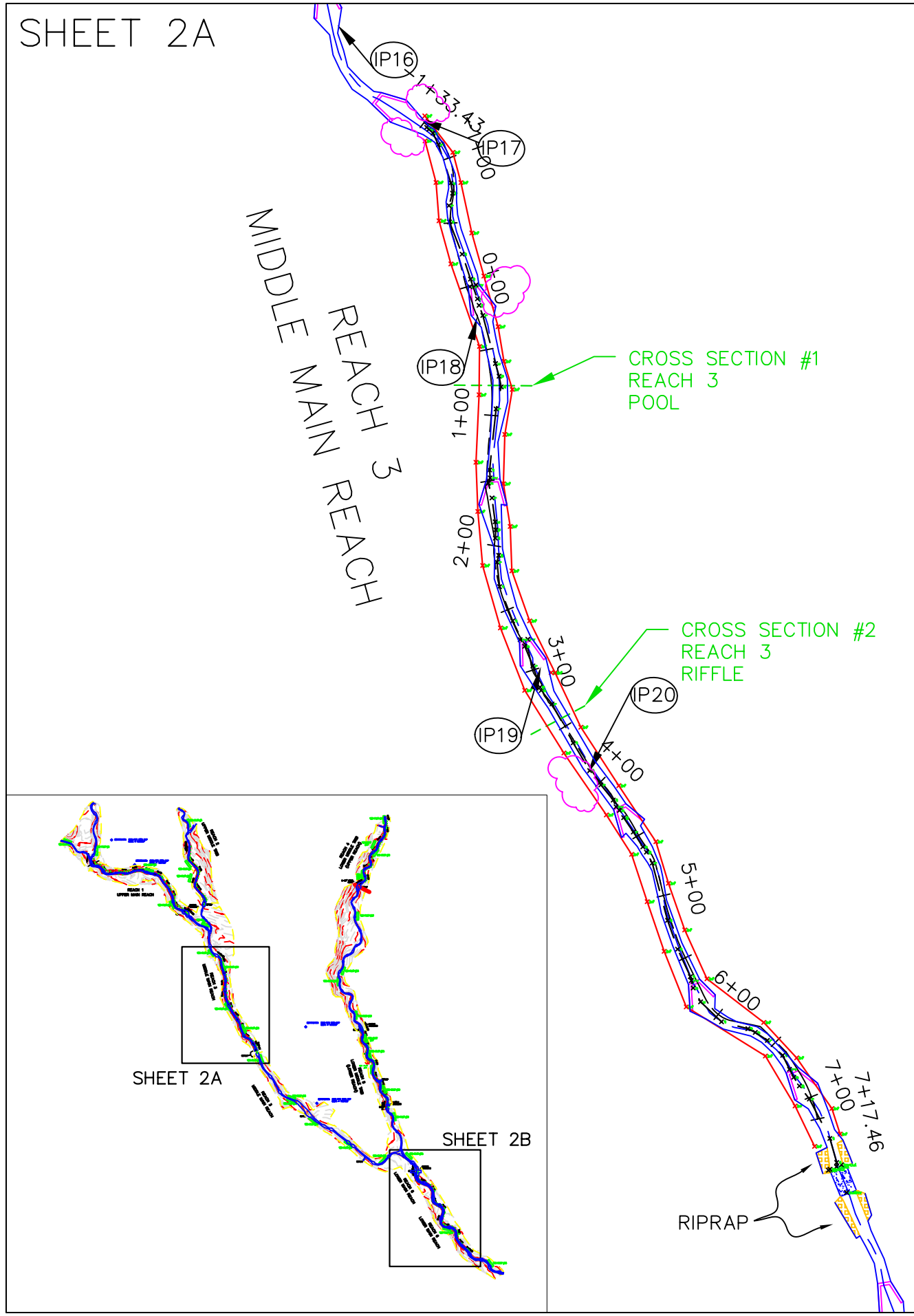
PURLEAR CREEK – PHASE 1
WILKES COUNTY, N.C.

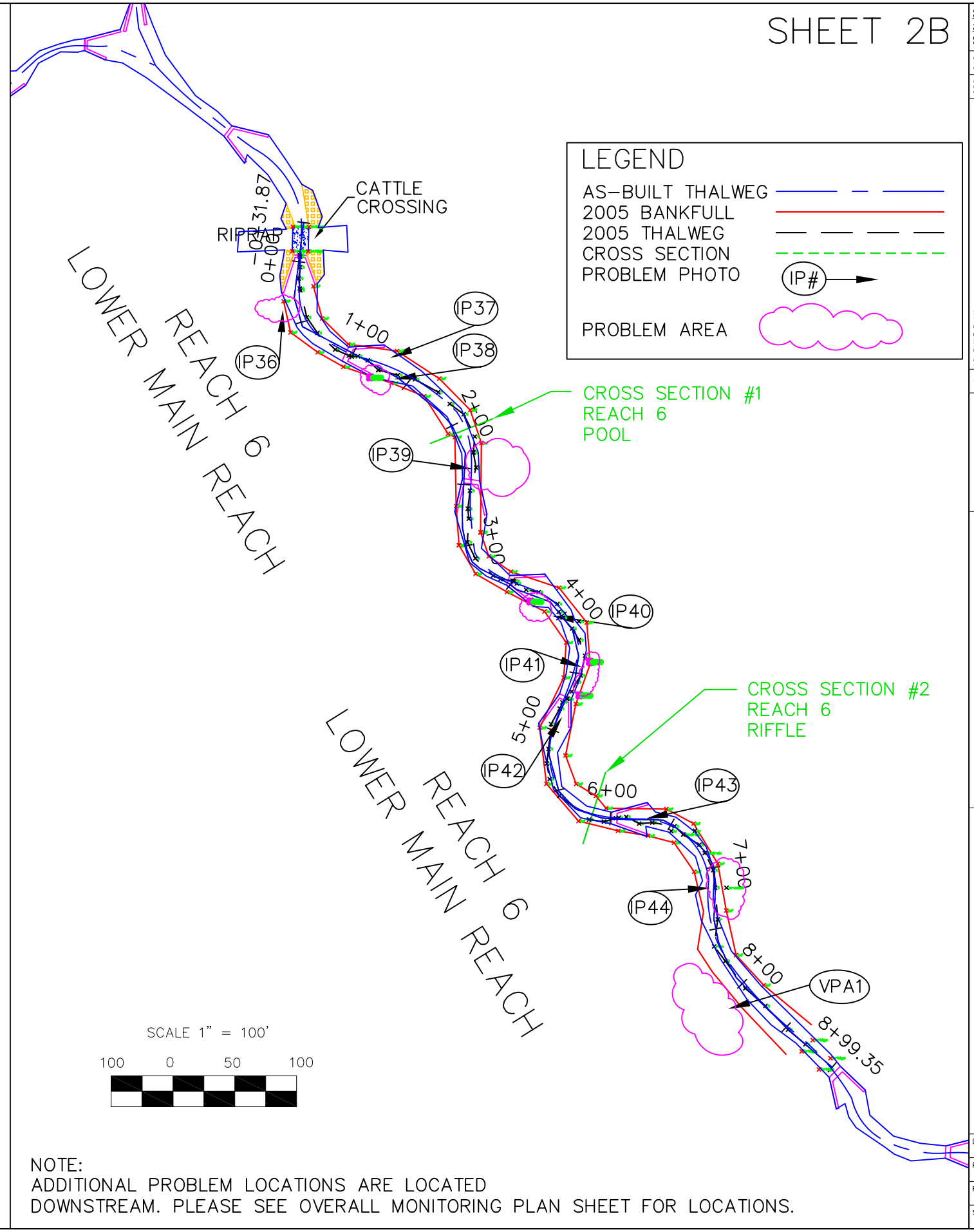
PROBLEM AREA PLAN SHEET
SHEET 1 of 3

DATE 03/01/2006
PROJECT NO. 294
FILENAME PULEAR ASBUILT 05.DWG
SHEET NO. PROBLEM 1 of 3

SHEET 2A



SHEET 2B



LEGEND

- AS-BUILT THALWEG
- 2005 BANKFULL
- 2005 THALWEG
- CROSS SECTION
- PROBLEM PHOTO (IP#)
- PROBLEM AREA

SCALE 1" = 100'

100 0 50 100

NOTE:
ADDITIONAL PROBLEM LOCATIONS ARE LOCATED DOWNSTREAM. PLEASE SEE OVERALL MONITORING PLAN SHEET FOR LOCATIONS.

NO	AS-BUILT PLAN	REVISIONS	DRN	CHK	DATE
1			DRC	DAB	03/01/06

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PURLEAR CREEK – PHASE 1
WILKES COUNTY, N.C.

PROBLEM AREA PLAN SHEET
SHEET 2 of 3

DATE 03/01/2006
PROJECT NO. 294
FILENAME PULEAR ASBUILT 05.DWG
SHEET NO. PROBLEM 2 of 3

LEGEND

- AS-BUILT THALWEG
- 2005 BANKFULL
- 2005 THALWEG
- CROSS SECTION
- PROBLEM PHOTO (IP#)
- PROBLEM AREA

REACH 4
LOWER MIDDLE TRIB
(UPPER REACH)

0+00
1+00
2+00
3+00
4+00
5+00
6+00
6+60.64

IP25
IP26
IP27
IP28
IP29
IP30
IP31

CROSS SECTION #1
REACH 4
RIFFLE/GLIDE

CROSS SECTION #2
REACH 4
POOL
2-60" CPVC
PIPES

RIPRAP

SCALE 1" = 100'
100 0 50 100

SHEET 3A

REACH 5
LOWER MIDDLE TRIB
(LOWER REACH)

0+00
-0+60.92
1+00
2+00
3+00
4+00
5+00
6+00
7+00
7+17.52

CATTLE CROSSING

RIPRAP

CROSS SECTION #1
REACH 5
POOL

CROSS SECTION #2
REACH 5
RIFFLE

IP34

SHEET 3A

SHEET 3B

NOTE:
ADDITIONAL PROBLEM LOCATIONS ARE LOCATED DOWNSTREAM. PLEASE SEE OVERALL MONITORING PLAN SHEET FOR LOCATIONS.

SHEET 3B

NO	REVISIONS	DRN	CHK	DATE
1	MONITORING PLAN	DRC	DAB	03/01/06

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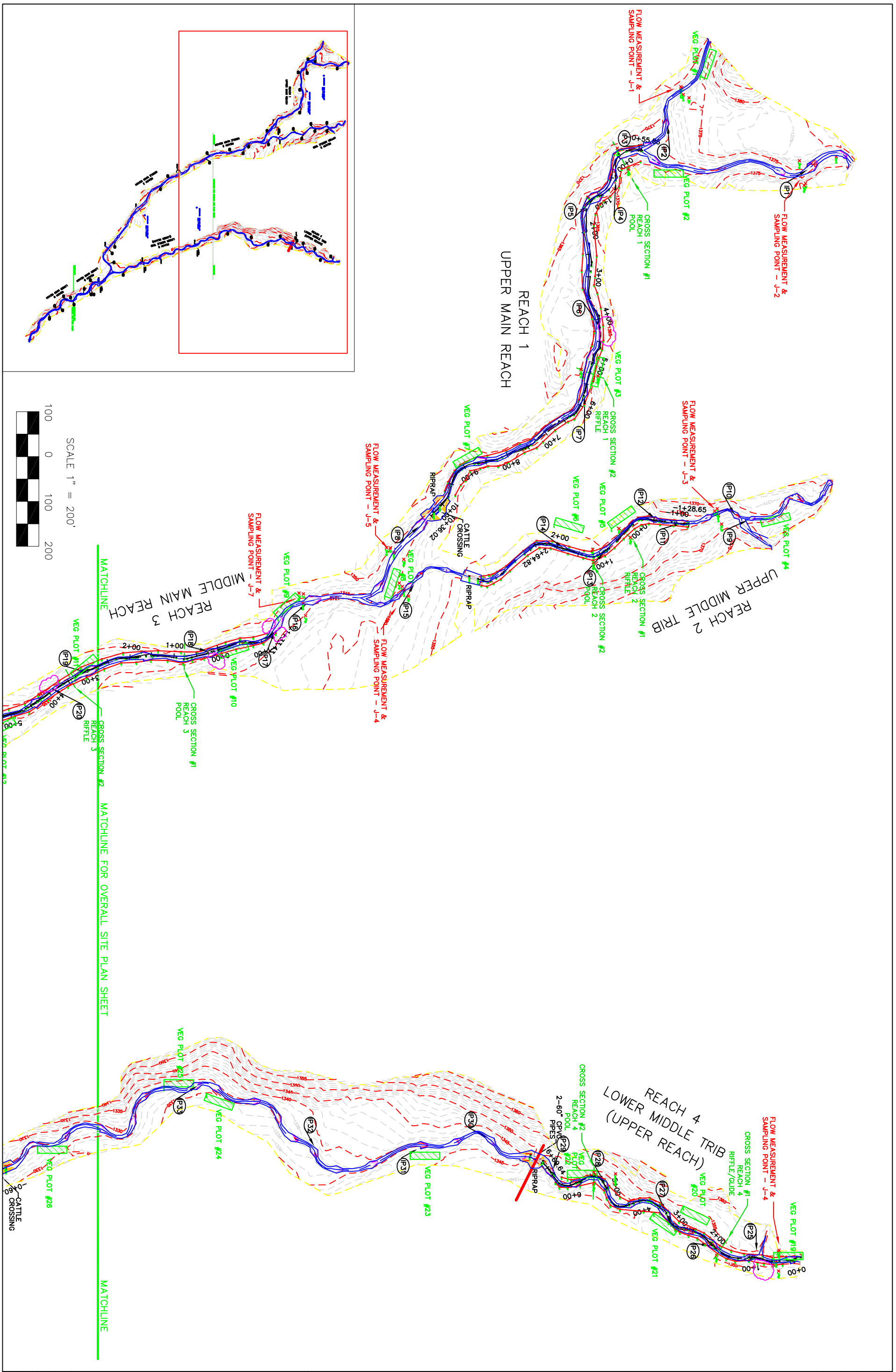
PURLEAR CREEK - PHASE 1
WILKES COUNTY, N.C.

PROBLEM AREA PLAN SHEET
SHEET 3 of 3

DATE 03/01/2006
PROJECT NO. 294
FILENAME PULEAR ASBUILT 05.DWG
SHEET NO. PROBLEM 3 of 3



PURLEAR CREEK – PHASE 1

WILKES COUNTY, N.C.

OVERALL PROBLEM AREA PLAN

SHT

SHEET 1 of 2

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NO	REVISIONS	DRN	CHK	DATE
1	AS–BUILT PLAN	DRC	DAB	03/01/06

SHEET NO. PROB OVERALL 1 of 2
FILENAME PULEAR ASBUILT 05.DWG
PROJECT NO. 294
DATE 03/01/2006

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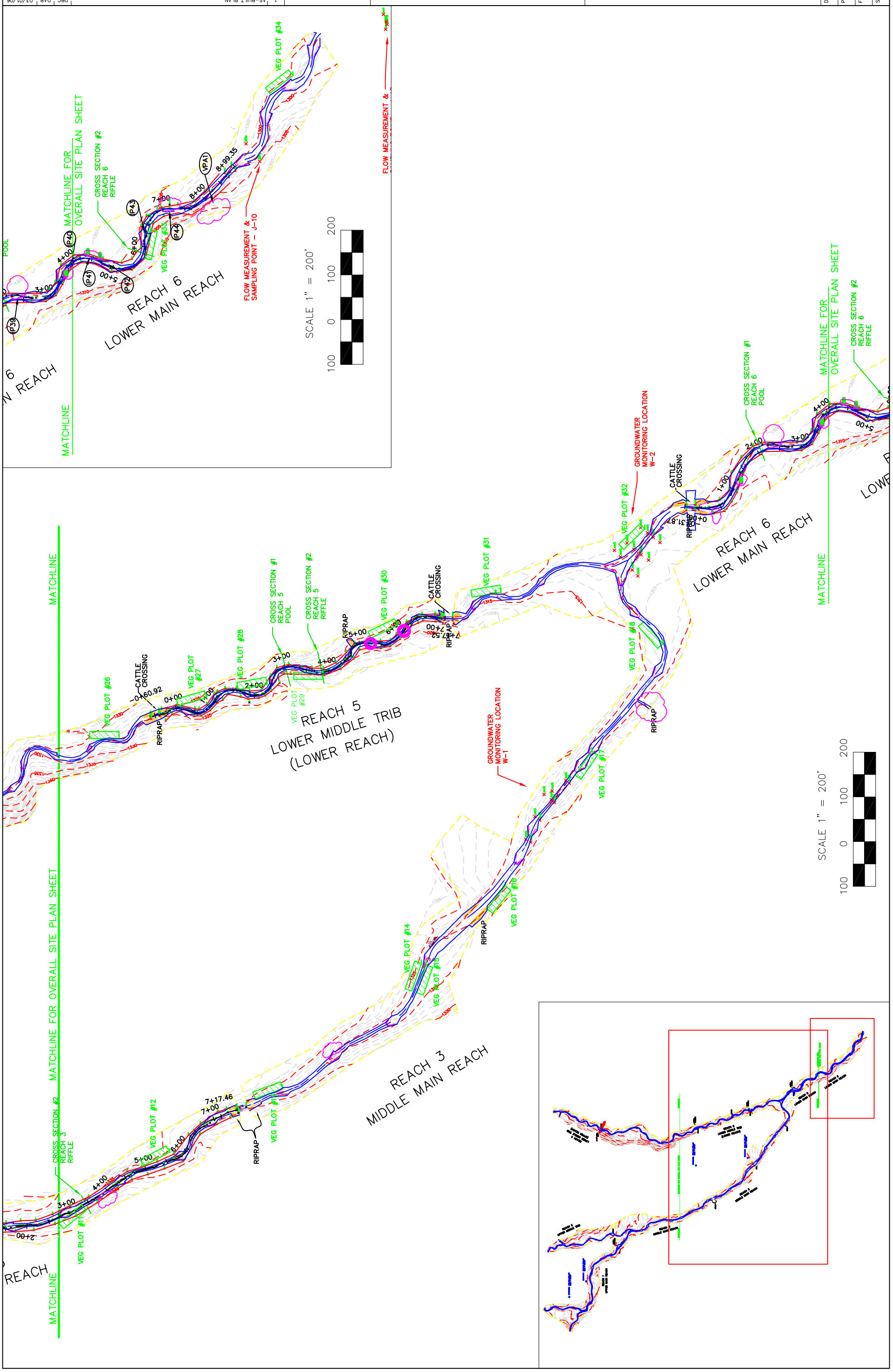
PURLEAR CREEK – PHASE 1
WILKES COUNTY, N.C.

OVERALL PROBLEM AREA PLAN SHEET

SHEET 2 of 2

DATE	03/01/2006
PROJECT NO.	294
FILENAME	PULEAR ASBUILT 05.DWG
SHEET NO.	PROB OVERALL 2 of 2

NO	REVISIONS	DRN	CHK	DATE
1	AS-BUILT PLAN	DRC	DAB	03/01/06



Purlear Creek Photo Log
2005

Reach 1

2004 **2005**

P1. Start Downstream

P2. Start Upstream

P3. X1 Downstream (Station 0+00)

P4. X1 Upstream (Station 0+00)

P5. X2 Downstream (Station 5+25)

P6. X2 Upstream (Station 5+25)

P7. End Downstream

P8. End Upstream

Reach 2

P9. Start Downstream

P10. Start Upstream

P11. X1 Downstream (Station 0+25)

P12. X1 Upstream (Station 0+25)

P13. X2 Downstream (Station 1+20)

P14. X2 Upstream (Station 1+20)

P15. End Downstream

P16. End Upstream

Reach 3

P17. Start Downstream

P18. Start Upstream

P19. X1 Downstream (Station 0+80)

P20. X1 Upstream (Station 0+80)

P21. X2 Downstream (Station 3+45)

P22. X2 Upstream (Station 3+45)

P23. End Downstream

P24. End Upstream

Reach 4

P25. Start Downstream

P26. Start Upstream

P27. X1 Downstream (Station 1+75)

P28. X1 Upstream (Station 1+75)

P29. X2 Downstream (Station 5+45)

P30. X2 Upstream (Station 5+45)

P31. End Downstream

P32. End Upstream

Reach 5

P33. Start Downstream

P34. Start Upstream

P35. X1 Downstream (Station 3+00)

P36. X1 Upstream (Station 3+00)

P37. X2 Downstream (Station 3+85)

P38. X2 Upstream (Station 3+85)

P39. End Downstream

P40. End Upstream

Reach 6

P41. Start Downstream

P42. Start Upstream

P43. X1 Downstream (Station 2+05)

P44. X1 Upstream (Station 2+05)

P45. X2 Downstream (Station 5+80)

P46. X2 Upstream (Station 5+80)

P47. End Downstream

P48. End Upstream

2005 Purlear Problem Areas

Reach 1

IP 1 Bed Elevation Drop (Upstream of Study Reach)

IP 2 Bed Elevation Drop (Upstream of Study Reach)

IP 3 Bed Elevation Drop (Upstream of Study Reach)

IP 4 Bed Elevation Drop (Station 0+30)

IP 5 Bed Elevation Drop (Station 0+89)

IP 6 Bank Erosion (Station 4+25)

IP 7 Bed Elevation Drop (Station 5+50)

IP 8 Bed Elevation Drop Below Study Reach)

Reach 2

IP 9 Bed Elevation Drop (Upstream of Study Reach)

IP 10 Bed Elevation Drop (Upstream of Study Reach)

IP 11 Bed Elevation Drop (Station -1+30)

IP 12 Bed Elevation Drop (Station -0+65)


IP 13 Bed Elevation Drop (Station 0+74)


IP 14 Bed Elevation Drop (Station 1+75)


IP 15 Bed Elevation Drop (Below Study Reach)

Reach 3


IP 16 Bed Elevation Drop (Above Study Reach)


IP 17 Double Drop Vane w/ Erosion (Above Study Reach)

IP 18 Slump Arm (Station 0+00)

IP 19 Bed Elevation Drop (Station 2+77)

IP 20 Erosion Ground Hog Tunnels (Station 4+00)

IP 21 Bed Elevation Drop (Below Study Reach)

IP 22 Slump Arm and Piping (Below Study Reach)

IP 23 Bed Elevation Drop (Below Study Reach)

IP 24 Excess Nutrients through Buffer (Below Study Reach)

Reach 4

IP 25 Excess Nutrients through Buffer (Station 0+50)

IP 26 Bed Elevation Drop (Station 1+84)

IP 27 Bed Elevation Drop (Station 3+15)

IP 28 Bed Elevation Drop (Station 5+00)

IP 29 Bed Elevation Drop (Station 6+50)

Reach 5

IP 30 Bed Elevation Drop (Above Study Reach)

IP 31 Bed Elevation Drop (Above Study Reach)

IP 32 Bed Elevation Drop (Above Study Reach)

IP 33 Bed Elevation Drop (Above Study Reach)

IP 34 Bed Elevation Drop (Below Study Reach)

Reach 6

IP 35 Bed Elevation Drop (Above Study Reach)

IP 36 Tile (Above Study Reach)

IP 37 Bed Elevation Drop (Station 1+00)

IP 38 Vane Slump and Erosion (Station 1+00)

IP 39 Tile (Station 2+10)

IP 40 Vane Undermine Rt. Arm (Station 3+50)

IP 41 Bank Erosion (Station 4+70)

IP 42 Bed Elevation Drop (Station 4+70)

IP 43 Bed Elevation Drop (Station 6+00)

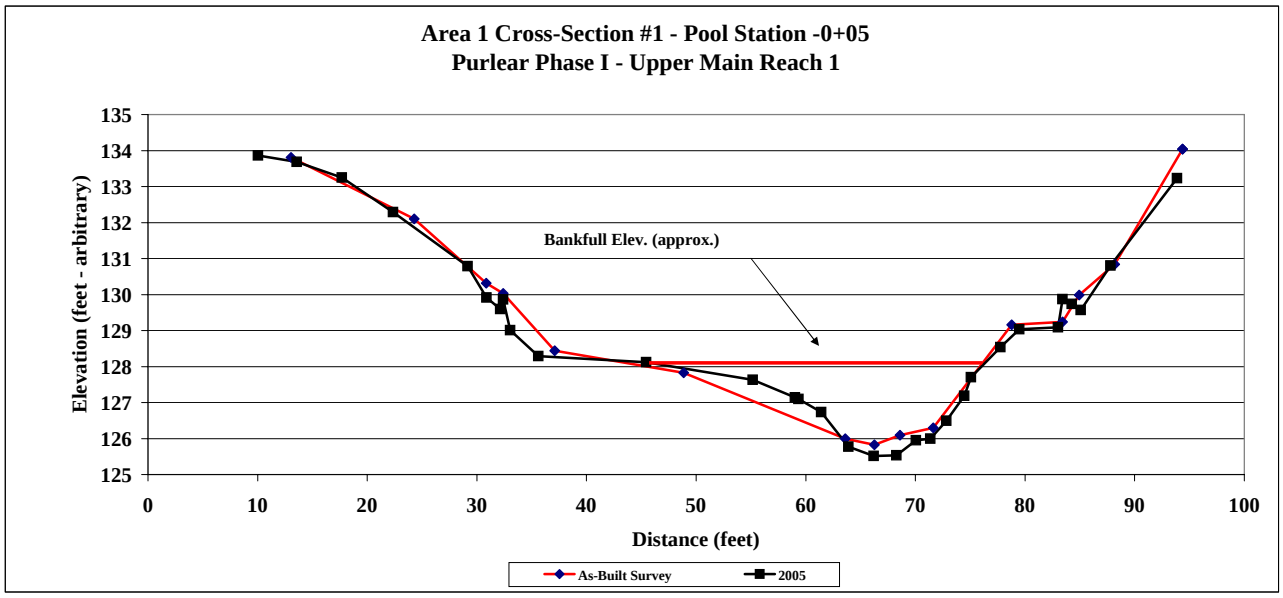
IP 44 Bank Erosion (Station 7+50)

Project Name	Purlear Phase I
Cross Section	1 - Upper Main Reach 1
Feature	Pool
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
13.04	133.81	XS4	10.03	133.86	X1
24.29	132.1	XS4	13.58	133.68	X1
30.85	130.32	XS4	17.69	133.25	X1
32.4	130.03	XS4LP	22.36	132.29	X1
37.1	128.44	BKF	29.17	130.79	X1
48.85	127.83	XS4	30.89	129.92	x1lp
63.6	126	XS4	32.14	129.6	X1
66.26	125.83	XS4	32.4	129.86	X1LP
68.6	126.09	XS4	33.04	129.01	X1
71.64	126.3	XS4	35.62	128.29	BKF
78.77	129.16	XS4BF	45.44	128.12	X1
83.42	129.24	XS4	55.17	127.63	X1
84.94	129.99	XS4LP	59.03	127.14	X1W
88.18	130.84	XS4	59.34	127.1	w
94.37	134.04	XS4	61.4	126.73	X1
94.37	134.04	XS4	63.89	125.77	X1
			66.2	125.52	X1
			68.27	125.53	X1T
			70.05	125.95	m
			71.36	126	X1
			72.82	126.49	X1
			74.47	127.19	X1W
			75.06	127.7	X1
			77.76	128.54	X1
			79.49	129.04	X1B
			83.01	129.09	X1
			83.42	129.87	x1rp
			84.28	129.74	X1RP
			85.08	129.57	X1
			87.8	130.8	X1
			93.87	133.23	X1

Photo of Area 1 Cross-Section #1 - Looking Downstream

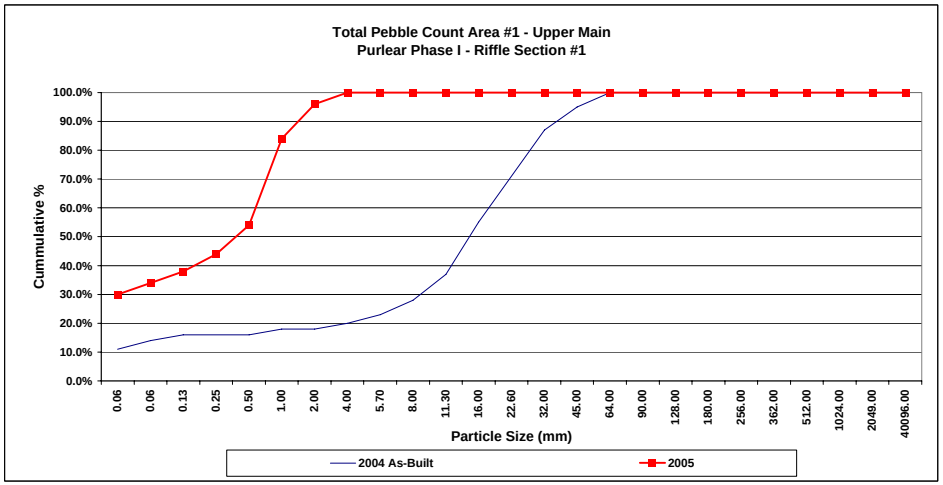
	As-Built	**2005**
Area	36.7	35.5
Width	29.9	29.6
Mean Depth	1.2	1.2
Max Depth	2.3	2.6



Project Name	Purlear Phase I
Cross Section	2 - Area #1 - Upper Main
Feature	Riffle
Date	6/10/2005
Crew	Shaffer, Bidelspach, Clinton

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Riffle**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	11	11.0%	11.0%	9	6	30.0%	30.0%
Sand	very fine sand	0.062	3	3.0%	14.0%	0	2	4.0%	34.0%
	fine sand	0.125	2	2.0%	16.0%	0	2	4.0%	38.0%
	medium sand	0.25	0	0.0%	16.0%	3	0	6.0%	44.0%
	course sand	0.50	0	0.0%	16.0%	5	0	10.0%	54.0%
	very course sand	1.0	2	2.0%	18.0%	15	0	30.0%	84.0%
G r a v e l	very fine gravel	2.0	0	0.0%	18.0%	6	0	12.0%	96.0%
	fine gravel	4.0	2	2.0%	20.0%	2	0	4.0%	100.0%
	fine gravel	5.7	3	3.0%	23.0%	0	0	0.0%	100.0%
	medium gravel	8.0	5	5.0%	28.0%	0	0	0.0%	100.0%
	medium gravel	11.3	9	9.0%	37.0%	0	0	0.0%	100.0%
	course gravel	16.0	18	18.0%	55.0%	0	0	0.0%	100.0%
	course gravel	22.6	16	16.0%	71.0%	0	0	0.0%	100.0%
	very course gravel	32	16	16.0%	87.0%	0	0	0.0%	100.0%
	very course gravel	45	8	8.0%	95.0%	0	0	0.0%	100.0%
Cobble	small cobble	64	5	5.0%	100.0%	0	0	0.0%	100.0%
	medium cobble	90	0	0.0%	100.0%	0	0	0.0%	100.0%
	large cobble	128	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large cobble	180	0	0.0%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			100	100.0%		40	10	100%	

	d16	**d35**	**d50**	**d84**	**d95**
2004 As-Built	0.38	12.76	17.73	36.40	54.50
2005	0.00	0.12	0.60	1.50	2.88
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

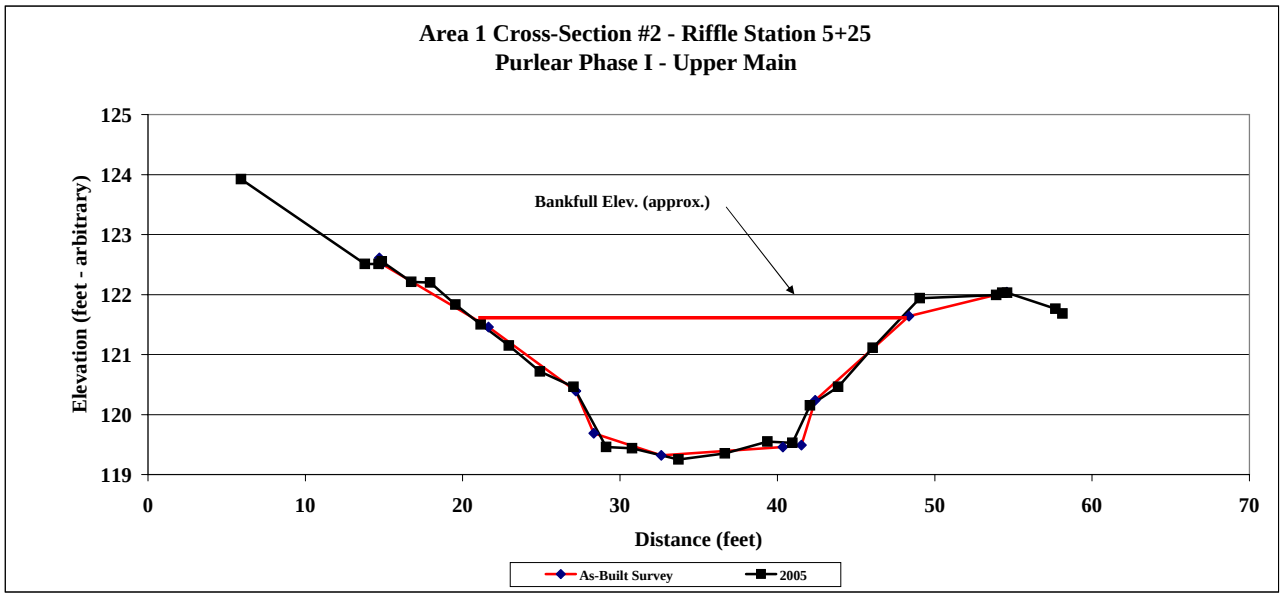


Project Name	Purlear Phase I
Cross Section	2 - Upper Main Reach 1
Feature	Riffle
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
14.71	122.61	XPR	5.91	123.92	X2
14.86	122.51	XSRPL	13.78	122.51	x2lp
21.64	121.46	XSR3	14.67	122.51	X2
27.19	120.39	XSR3	14.86	122.55	X2LP
28.33	119.69	XSR3	16.74	122.21	X2
32.62	119.32	XSR3	17.94	122.2	2lp
40.34	119.46	XSR3	19.54	121.83	X2B
41.52	119.49	XSR3	21.16	121.5	X2
42.41	120.24	XSR3	22.93	121.15	X2
48.36	121.64	XSR3	24.92	120.72	X2
54.58	122.04	XSR3	27.04	120.46	X2
			29.12	119.46	X2
			30.77	119.44	X2
			33.71	119.25	X2T
			36.67	119.35	X2
			39.37	119.55	X2
			40.95	119.53	X2
			42.08	120.15	X2
			43.86	120.46	X2
			46.07	121.11	X2
			49.05	121.94	X2B
			53.92	121.99	x2rp
			54.29	122.03	X2
			54.6	122.03	X2RP
			57.68	121.76	X2
			58.12	121.68	2rp

Photo of Area 1 Cross-Section #2 - Looking Downstream

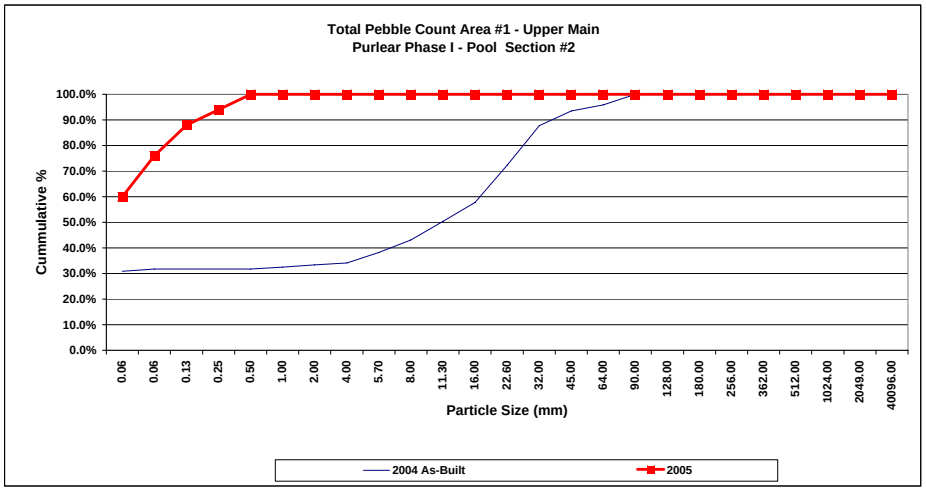
	As-Built	**2005**
Area	39.6	39.6
Width	26.7	26.4
Mean Depth	1.5	1.5
Max Depth	2.3	2.3
w/d ratio	18.1	17.6
FPW	53	53
ER (greater than)	2.0	2.0
Stream Type	C4	C4



Project Name	Purlear Phase I
Cross Section	1 - Area #1 - Upper Main
Feature	Pool
Date	6/10/05
Crew	Shaffer, Bidelspach, Clinton

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Pool**	**%**	**Cum %**	**Pool - Bed**	**Pool - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	38	30.9%	30.9%	20	10	60.0%	60.0%
Sand	very fine sand	0.062	1	0.8%	31.7%	8	0	16.0%	76.0%
	fine sand	0.125	0	0.0%	31.7%	6	0	12.0%	88.0%
	medium sand	0.25	0	0.0%	31.7%	3	0	6.0%	94.0%
	course sand	0.50	0	0.0%	31.7%	3	0	6.0%	100.0%
	very course sand	1.0	1	0.8%	32.5%	0	0	0.0%	100.0%
G r a v e l	very fine gravel	2.0	1	0.8%	33.3%	0	0	0.0%	100.0%
	fine gravel	4.0	1	0.8%	34.1%	0	0	0.0%	100.0%
	fine gravel	5.7	5	4.1%	38.2%	0	0	0.0%	100.0%
	medium gravel	8.0	6	4.9%	43.1%	0	0	0.0%	100.0%
	medium gravel	11.3	9	7.3%	50.4%	0	0	0.0%	100.0%
	course gravel	16.0	9	7.3%	57.7%	0	0	0.0%	100.0%
	course gravel	22.6	18	14.6%	72.4%	0	0	0.0%	100.0%
	very course gravel	32	19	15.4%	87.8%	0	0	0.0%	100.0%
	very course gravel	45	7	5.7%	93.5%	0	0	0.0%	100.0%
Cobble	small cobble	64	3	2.4%	95.9%	0	0	0.0%	100.0%
	medium cobble	90	5	4.1%	100.0%	0	0	0.0%	100.0%
	large cobble	128	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large cobble	180	0	0.0%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			123	100.0%		40	10	100%	

	d16	**d35**	**d50**	**d84**	**d95**
2004 As-Built	0.00	5.27	13.43	35.74	68.37
2005	0.00	0.00	0.00	0.16	0.44
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

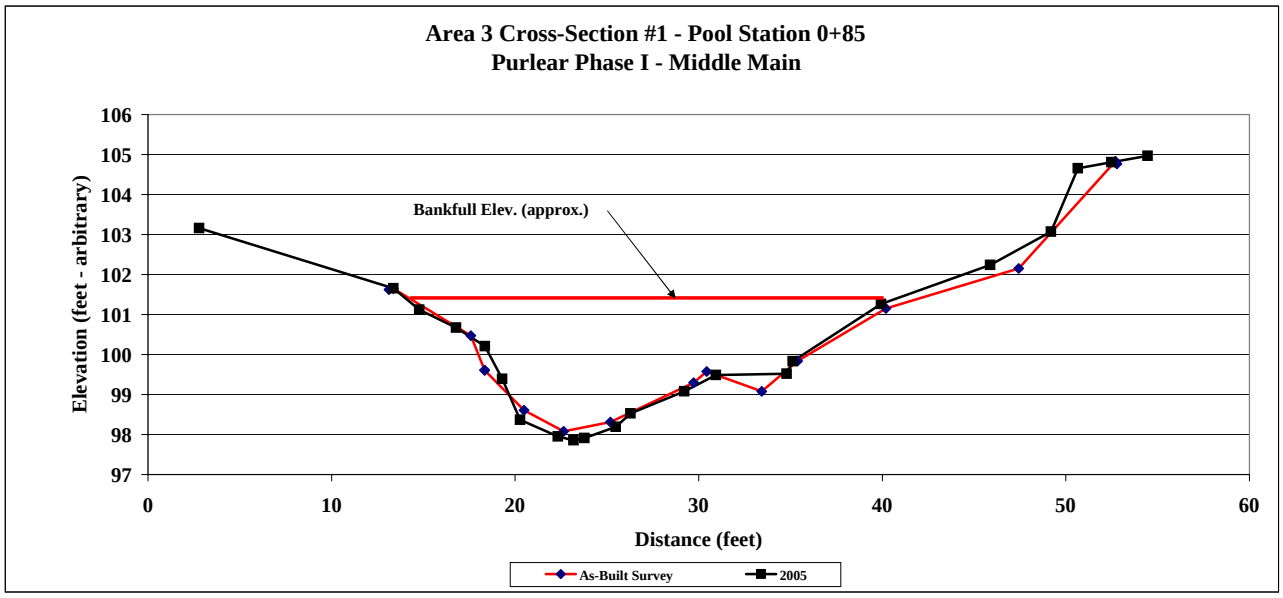


Project Name	Purlear Phase I
Cross Section	1 - Middle Main Reach 3
Feature	Pool
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
13.12	101.62	X2P	2.79	103.16	fl
13.37	101.65	X2PLP	13.37	101.66	x2lp
17.58	100.47	X2P	14.78	101.12	bf
18.33	99.61	X2P	16.79	100.67	x2
18.34	99.61	X2P	18.36	100.21	x2
20.48	98.61	X2P	19.3	99.39	x2
22.64	98.08	X2P	20.27	98.37	x2
25.19	98.31	X2P	22.33	97.95	x2
29.72	99.3	X2P	23.19	97.86	m
30.44	99.58	WS	23.77	97.91	x2
33.43	99.08	X2P	25.49	98.19	x2
35.38	99.84	X2P	26.28	98.53	x2
40.19	101.15	X2P	29.21	99.08	x2
47.43	102.15	X2P	30.95	99.49	x2
52.7	104.83	X2PRP	34.79	99.52	x2
52.79	104.77	X2P	35.13	99.83	x2
			39.94	101.26	x2
			45.88	102.24	x2
			49.19	103.07	x2
			50.66	104.66	x2
			52.49	104.81	x2rp
			54.45	104.97	fl

Photo of Area 3 Cross-Section #1 - Looking Downstream

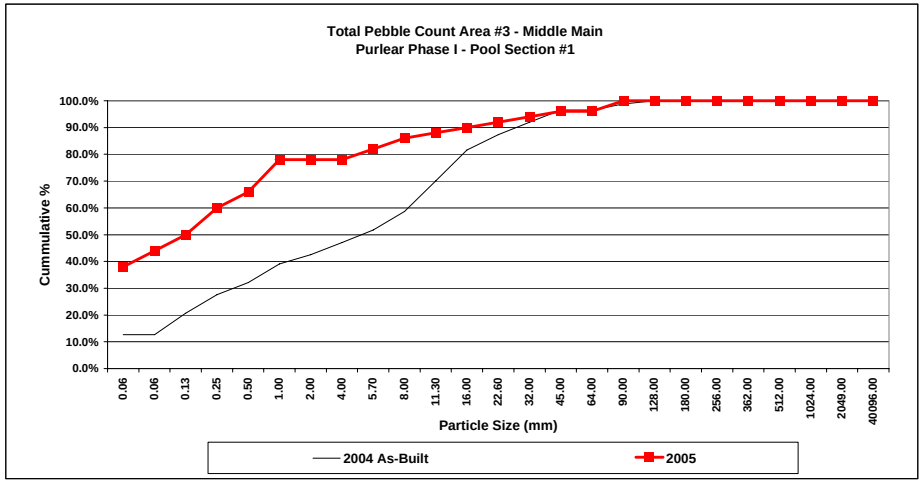
	As-Built	**2005**
Area	45.2	44.8
Width	26.8	26.2
Mean Depth	1.7	1.7
Max Depth	3.1	3.3



Project Name	Purlear Phase I
Cross Section	1 - Area #3 - Middle Main
Feature	Pool
Date	6/10/05
Crew	Shaffer, Bidelspach, Clinton

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Pool - Bed**	**%**	**Cum %**	**Pool - Bed**	**Pool - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	11	12.6%	12.6%	12	7	38.0%	38.0%
Sand	very fine sand	0.062	0	0.0%	12.6%	0	3	6.0%	44.0%
	fine sand	0.125	7	8.0%	20.7%	1	2	6.0%	50.0%
	medium sand	0.25	6	6.9%	27.6%	2	3	10.0%	60.0%
	course sand	0.50	4	4.6%	32.2%	2	1	6.0%	66.0%
	very course sand	1.0	6	6.9%	39.1%	4	2	12.0%	78.0%
G r a v e l	very fine gravel	2.0	3	3.4%	42.5%	0	0	0.0%	78.0%
	fine gravel	4.0	4	4.6%	47.1%	0	0	0.0%	78.0%
	fine gravel	5.7	4	4.6%	51.7%	2	0	4.0%	82.0%
	medium gravel	8.0	6	6.9%	58.6%	0	2	4.0%	86.0%
	medium gravel	11.3	10	11.5%	70.1%	1	0	2.0%	88.0%
	course gravel	16.0	10	11.5%	81.6%	1	0	2.0%	90.0%
	course gravel	22.6	5	5.7%	87.4%	1	0	2.0%	92.0%
	very course gravel	32	4	4.6%	92.0%	1	0	2.0%	94.0%
	very course gravel	45	4	4.6%	96.6%	1	0	2.0%	96.0%
Cobble	small cobble	64	0	0.0%	96.6%	0	0	0.0%	96.0%
	medium cobble	90	2	2.3%	98.9%	2	0	4.0%	100.0%
	large cobble	128	1	1.1%	100.0%	0	0	0.0%	100.0%
	very large cobble	180	0	0.0%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			87	100.0%		30	20	100.0%	

	d16	d35	d50	d84	d95
2004 As-Built	0.13	1.06	6.10	22.63	49.10
2005	0.00	0.00	0.19	8.25	46.50
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

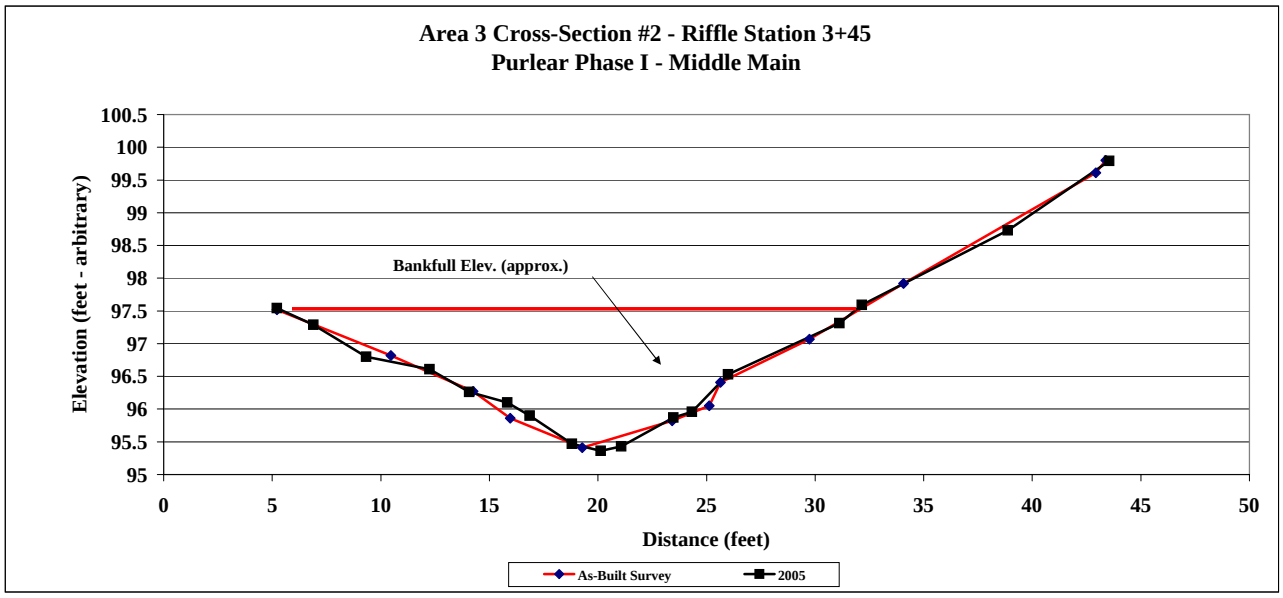


Project Name	Purlear Phase I
Cross Section	2 - Middle Main Reach 3
Feature	Riffle
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
5.22	97.52	X1L	5.22	97.54	x1lp
10.46	96.82	X1	6.89	97.29	x1
14.25	96.27	X1	9.33	96.8	x1
15.96	95.86	X1LEW	12.24	96.61	x1
19.28	95.41	X1	14.08	96.26	x1
23.42	95.82	X1REW	15.82	96.1	x1
25.12	96.05	X1	16.86	95.9	x1
25.64	96.41	X1	18.8	95.47	x1
29.74	97.07	X1	20.13	95.36	x1
34.07	97.92	X1	21.07	95.43	x1
42.92	99.61	X1	23.48	95.87	x1
43.39	99.8	X1R	24.33	95.96	x1
			25.99	96.53	x1
			31.13	97.31	x1
			32.16	97.59	x1
			38.87	98.73	x1
			43.55	99.79	x1rp

Photo of Area 3 Cross-Section #2 - Looking Downstream

	As-Built	**2005**
Area	28.3	28.1
Width	24.5	24.2
Mean Depth	1.2	1.2
Max Depth	2.1	2.1
w/d ratio	21.3	20.9
FPW	60	60
ER (greater than)	2.4	2.5
Stream Type	C4	C4

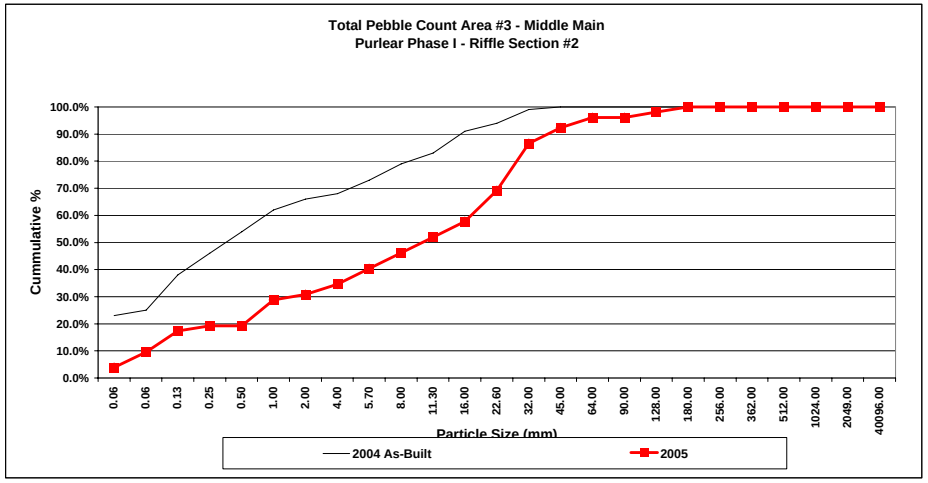


Project Name	Purlear Phase I
Cross Section	2 - Area #3 - Middle Main
Feature	Riffle
Date	6/10/05
Crew	Shaffer, Bidelspach, Clinton

Cross Section #1

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	23	23.0%	23.0%	0	2	3.8%	3.8%
Sand	very fine sand	0.062	2	2.0%	25.0%	0	3	5.8%	9.6%
	fine sand	0.125	13	13.0%	38.0%	0	4	7.7%	17.3%
	medium sand	0.25	8	8.0%	46.0%	0	1	1.9%	19.2%
	course sand	0.50	8	8.0%	54.0%	0	0	0.0%	19.2%
	very course sand	1.0	8	8.0%	62.0%	5	0	9.6%	28.8%
G r a v e l	very fine gravel	2.0	4	4.0%	66.0%	1	0	1.9%	30.8%
	fine gravel	4.0	2	2.0%	68.0%	2	0	3.8%	34.6%
	fine gravel	5.7	5	5.0%	73.0%	3	0	5.8%	40.4%
	medium gravel	8.0	6	6.0%	79.0%	3	0	5.8%	46.2%
	medium gravel	11.3	4	4.0%	83.0%	3	0	5.8%	51.9%
	course gravel	16.0	8	8.0%	91.0%	3	0	5.8%	57.7%
	course gravel	22.6	3	3.0%	94.0%	6	0	11.5%	69.2%
	very course gravel	32	5	5.0%	99.0%	9	0	17.3%	86.5%
	very course gravel	45	1	1.0%	100.0%	3	0	5.8%	92.3%
Cobble	small cobble	64	0	0.0%	100.0%	2	0	3.8%	96.2%
	medium cobble	90	0	0.0%	100.0%	0	0	0.0%	96.2%
	large cobble	128	0	0.0%	100.0%	1	0	1.9%	98.1%
	very large cobble	180	0	0.0%	100.0%	1	0	1.9%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			100	100.0%		42	10	100%	

	d16	d35	d50	d84	d95
2004 As-Built	0.00	0.17	0.56	14.36	29.54
2005	0.17	4.98	12.32	36.86	70.25
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

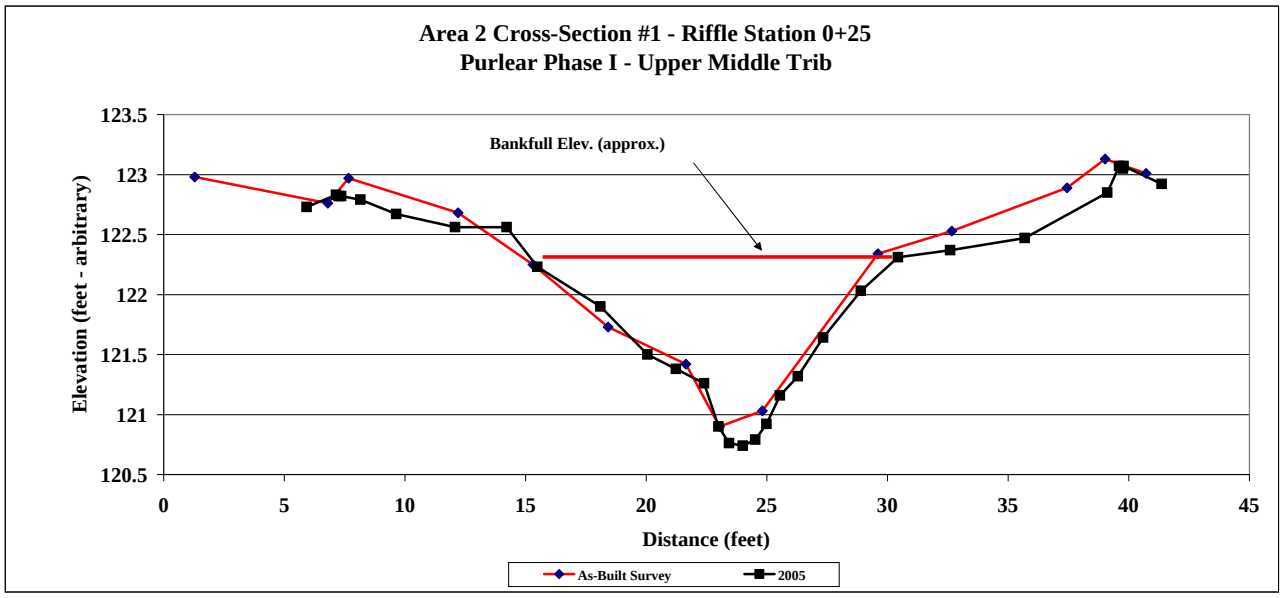


Project Name	Purlear Phase I
Cross Section	1 - Upper Middle Trib Reach 2
Feature	Riffle
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
1.28	122.98	X1	5.93	122.73	X1
6.8	122.76	X1TPL	7.15	122.83	X1LP
7.66	122.97	X1	7.25	122.82	X1LP
12.2	122.68	X1	7.36	122.82	x1lp
15.3	122.25	XB	8.16	122.79	X1
18.42	121.73	X1	9.64	122.67	X1
21.64	121.42	X1	12.08	122.56	X1
23.04	120.9	XT	14.22	122.56	X1
24.82	121.03	W	15.49	122.23	X1
29.6	122.34	XB	18.1	121.9	X1
32.67	122.53	X1	20.05	121.5	X1
37.44	122.89	X1	21.24	121.38	X1
39.02	123.13	X1TPR	22.4	121.26	X1
40.72	123.01	X1	23	120.9	X1
			23.43	120.76	X1
			24	120.74	X1
			24.52	120.79	X1
			24.99	120.92	X1
			25.54	121.16	X1
			26.28	121.32	X1
			27.34	121.64	X1
			28.9	122.03	X1
			30.44	122.31	X1
			32.6	122.37	X1
			35.69	122.47	X1
			39.11	122.85	X1
			39.6	123.07	X1rp
			39.76	123.05	x1rp
			39.79	123.07	X1RP
			41.36	122.92	X1

Photo of Area 2 Cross-Section #1 - Looking Downstream

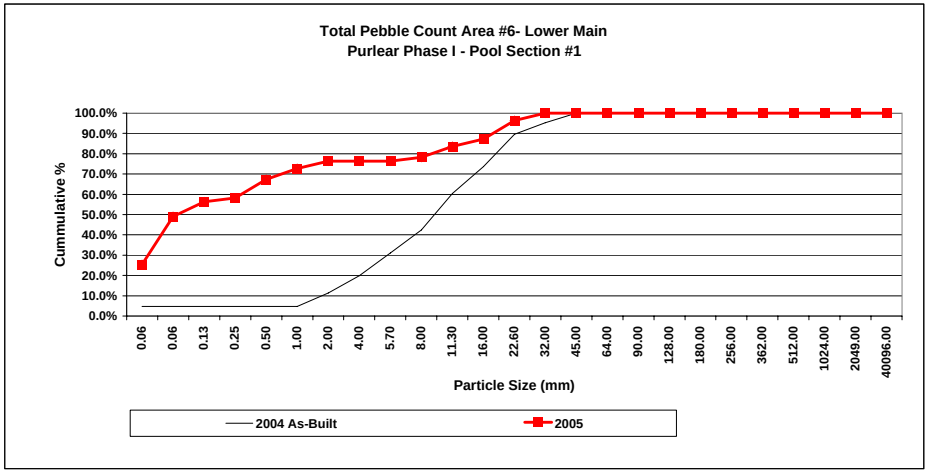
	As-Built	**2005**
Area	11.9	12.4
Width	17.4	16.2
Mean Depth	0.7	0.8
Max Depth	1.5	1.7
w/d ratio	25.5	21.1
FPW	40	40
ER (greater than)	2.3	2.5
Stream Type	C4	C4



Project Name	Purlear Phase I
Cross Section	1 - Area #6 - Lower Main
Feature	Pool
Date	6/10/05
Crew	Shaffer, Bidelspach, Clinton

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Pool - Bed**	**%**	**Cum %**	**Pool - Bed**	**Pool - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	5	4.7%	4.7%	12	2	25.5%	25.5%
Sand	very fine sand	0.062	0	0.0%	4.7%	7	6	23.6%	49.1%
	fine sand	0.125	0	0.0%	4.7%	3	1	7.3%	56.4%
	medium sand	0.25	0	0.0%	4.7%	1	0	1.8%	58.2%
	course sand	0.50	0	0.0%	4.7%	4	1	9.1%	67.3%
	very course sand	1.0	0	0.0%	4.7%	3	0	5.5%	72.7%
G r a v e l	very fine gravel	2.0	7	6.6%	11.3%	2	0	3.6%	76.4%
	fine gravel	4.0	9	8.5%	19.8%	0	0	0.0%	76.4%
	fine gravel	5.7	12	11.3%	31.1%	0	0	0.0%	76.4%
	medium gravel	8.0	12	11.3%	42.5%	1	0	1.8%	78.2%
	medium gravel	11.3	19	17.9%	60.4%	3	0	5.5%	83.6%
	course gravel	16.0	14	13.2%	73.6%	2	0	3.6%	87.3%
	course gravel	22.6	17	16.0%	89.6%	5	0	9.1%	96.4%
	very course gravel	32	6	5.7%	95.3%	2	0	3.6%	100.0%
	very course gravel	45	5	4.7%	100.0%	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium cobble	90	0	0.0%	100.0%	0	0	0.0%	100.0%
	large cobble	128	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large cobble	180	0	0.0%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			106	100.0%		45	10	100%	

	d16	d35	d50	d84	d95
2004 As-Built	4.02	7.81	11.33	24.50	37.94
2005	0.00	0.07	0.11	14.22	26.10
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

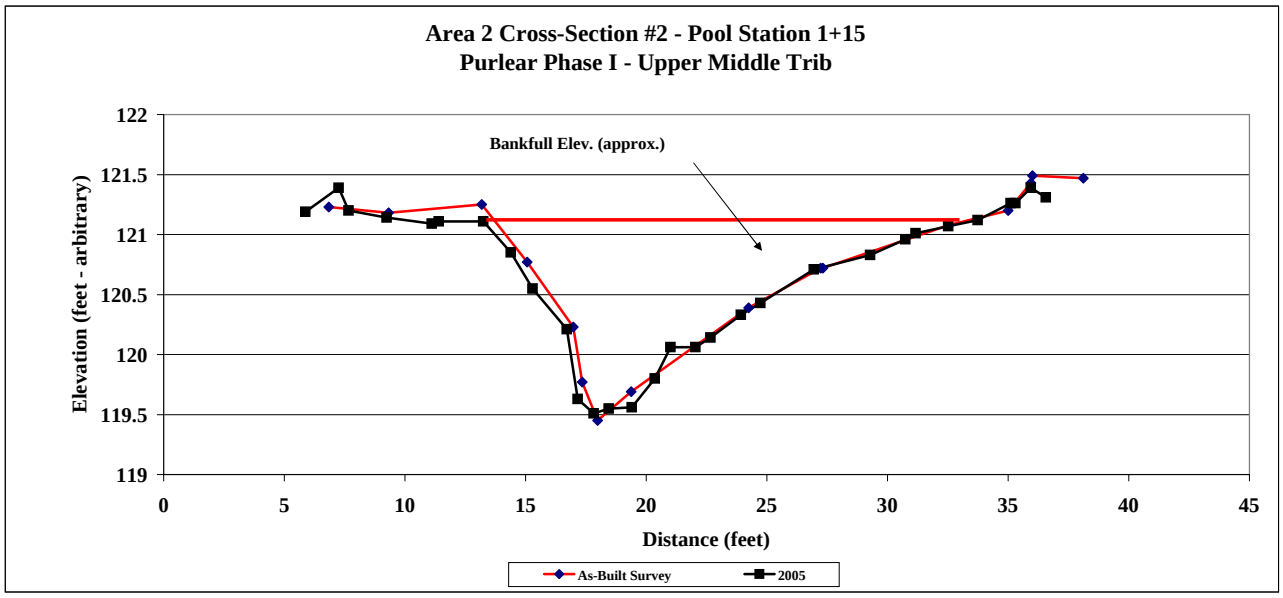


Project Name	Purlear Phase I
Cross Section	2 - Upper Middle Trib Reach 2
Feature	Pool
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
6.85	121.23	X2TPL	5.88	121.19	X2
9.32	121.18	X2	7.26	121.39	X2LP
13.18	121.25	X2	7.66	121.2	X2
15.07	120.77	XB	9.24	121.14	X2
16.97	120.23	X2	11.11	121.09	B
17.35	119.77	X2	11.4	121.11	X2
17.98	119.45	XT	13.25	121.11	X2
19.38	119.69	XW	14.39	120.85	X2
24.24	120.39	X2	15.29	120.55	X2
27.23	120.72	XB	16.71	120.21	X2
27.32	120.72	7	17.16	119.63	X2
32.56	121.08	X2	17.82	119.51	X2
35	121.2	X2	18.45	119.55	X2
35.94	121.43	X2RP	19.4	119.56	X2
36.01	121.49	X2RT	20.36	119.8	X2
38.12	121.47	X2	21.01	120.06	X2
			22.04	120.06	X2
			22.66	120.14	X2
			23.93	120.33	X2
			24.73	120.43	X2
			26.95	120.71	X2
			29.28	120.83	X2
			30.74	120.96	X2
			31.17	121.01	B
			32.52	121.07	X2
			33.74	121.12	X2
			35.11	121.26	X2
			35.31	121.26	X2
			35.94	121.39	X2RP
			36.57	121.31	X2

Photo of Area 2 Cross-Section #2 - Looking Downstream

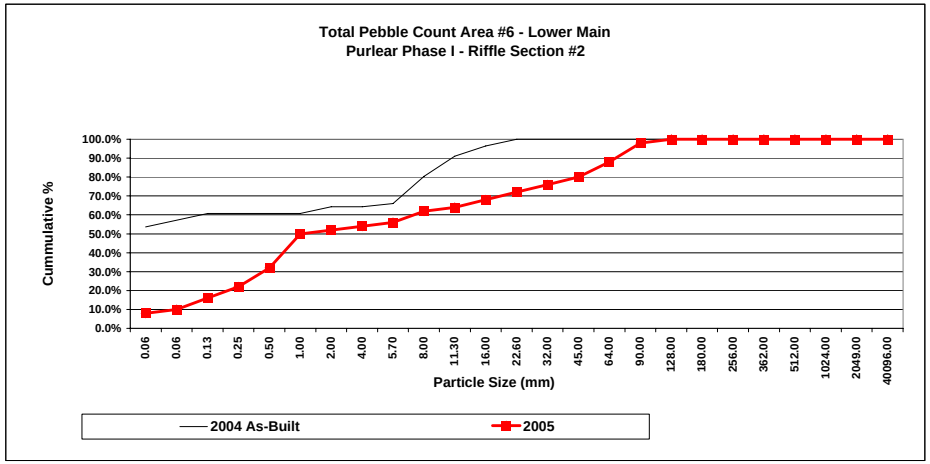
	As-Built	**2005**
Area	12.8	13.4
Width	19.4	19.3
Mean Depth	0.7	0.7
Max Depth	1.6	1.6



Project Name	Purlear Phase I
Cross Section	2 - Area #6 - Lower Main
Feature	Riffle
Date	6/10/05
Crew	Shaffer, Bidelspach, Clinton

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	30	53.6%	53.6%	2	2	8.0%	8.0%
Sand	very fine sand	0.062	2	3.6%	57.1%	0	1	2.0%	10.0%
	fine sand	0.125	2	3.6%	60.7%	3	0	6.0%	16.0%
	medium sand	0.25	0	0.0%	60.7%	2	1	6.0%	22.0%
	course sand	0.50	0	0.0%	60.7%	4	1	10.0%	32.0%
	very course sand	1.0	0	0.0%	60.7%	7	2	18.0%	50.0%
G r a v e l	very fine gravel	2.0	2	3.6%	64.3%	1	0	2.0%	52.0%
	fine gravel	4.0	0	0.0%	64.3%	1	0	2.0%	54.0%
	fine gravel	5.7	1	1.8%	66.1%	1	0	2.0%	56.0%
	medium gravel	8.0	8	14.3%	80.4%	1	2	6.0%	62.0%
	medium gravel	11.3	6	10.7%	91.1%	1	0	2.0%	64.0%
	course gravel	16.0	3	5.4%	96.4%	1	1	4.0%	68.0%
	course gravel	22.6	2	3.6%	100.0%	2	0	4.0%	72.0%
	very course gravel	32	0	0.0%	100.0%	2	0	4.0%	76.0%
	very course gravel	45	0	0.0%	100.0%	2	0	4.0%	80.0%
Cobble	small cobble	64	0	0.0%	100.0%	4	0	8.0%	88.0%
	medium cobble	90	0	0.0%	100.0%	5	0	10.0%	98.0%
	large cobble	128	0	0.0%	100.0%	1	0	2.0%	100.0%
	very large cobble	180	0	0.0%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			56	100.0%		40	10	100%	

	d16	**d35**	**d50**	**d84**	**d95**
2004 As-Built	0.00	0.00	0.00	11.01	17.79
2005	0.19	0.88	1.50	65.75	99.40
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

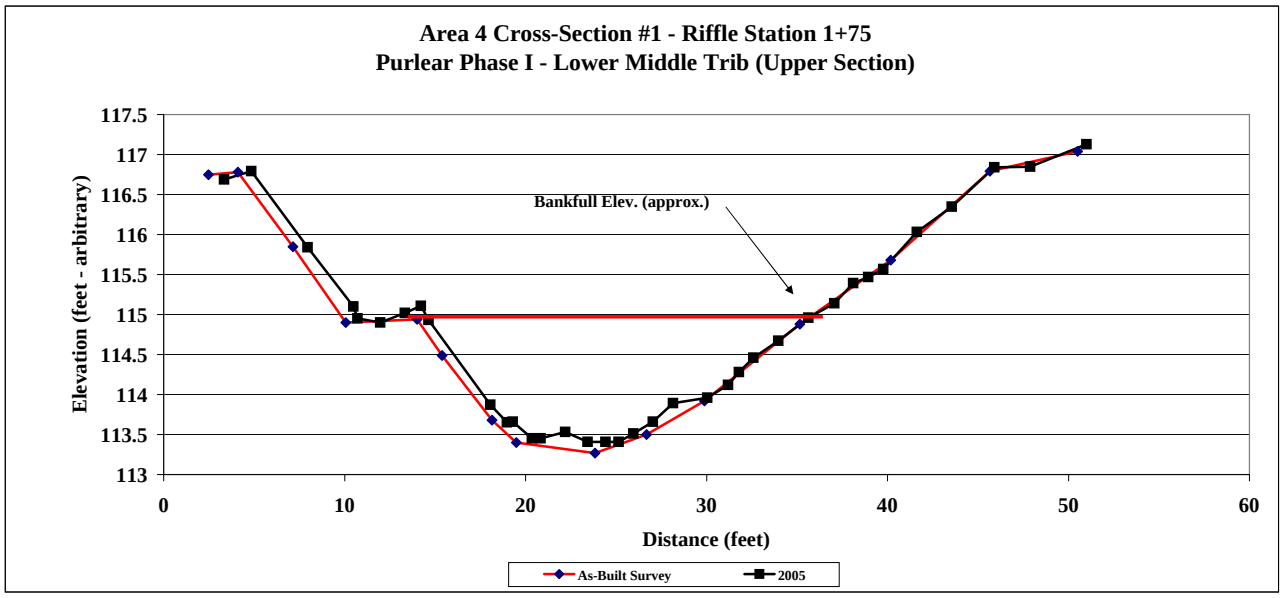


Project Name	Purlear Phase I
Cross Section	1 - Lower Middle Trib (Upper Section) Reach 4
Feature	Riffle
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
2.48	116.75	X1	3.34	116.69	x1
4.1	116.78	X1	4.85	116.79	x1
7.15	115.85	X1	7.96	115.84	x1
10.06	114.9	X1	10.49	115.1	x1lp
14	114.94	X1B	10.72	114.95	x1
15.38	114.49	X1	11.97	114.9	x1
18.15	113.68	X1EW	13.34	115.02	x1
19.48	113.4	X1	14.22	115.11	x1
23.84	113.27	X1	14.65	114.93	bf
26.69	113.5	X1EW	18.05	113.87	x1
29.89	113.92	X1	18.98	113.65	x1
35.16	114.88	X1	19.29	113.66	w
40.17	115.68	X1RP	20.35	113.45	x1
45.65	116.79	X1	20.83	113.45	x1
50.51	117.04	X1	22.2	113.53	x1
			23.43	113.41	x1
			24.42	113.41	x1
			25.14	113.41	x1
			25.96	113.51	x1
			27.03	113.66	x1
			28.16	113.89	x1
			30.04	113.96	x1
			31.19	114.12	x1
			31.8	114.28	bf
			32.59	114.46	x1
			33.97	114.67	x1
			35.63	114.96	x1
			37.06	115.14	x1
			38.11	115.39	x1rp
			38.94	115.47	x1
			39.77	115.57	x1
			41.63	116.03	x1

Photo of Area 4 Cross-Section #1 - Looking Downstream

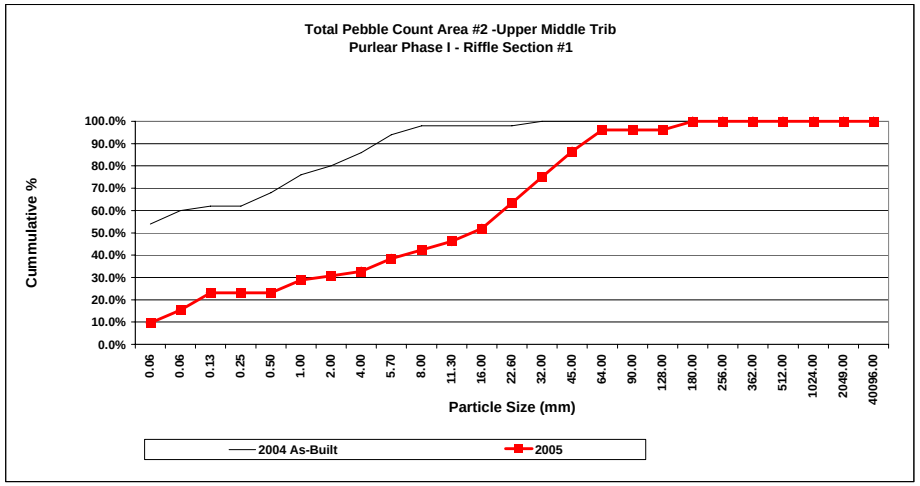
	As-Built	**2005**
Area	21.8	19.1
Width	25.1	25.1
Mean Depth	0.9	0.8
Max Depth	1.6	1.5
w/d ratio	28.9	32.9
FPW	50	50
ER (greater than)	2.0	2.0
Stream Type	C4	C4



Project Name	Purlear Phase I
Cross Section	1 - Area #2 - Upper Middle Trib
Feature	Riffle
Date	6/10/05
Crew	Shaffer, Bidelspach, Clinton

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Riffle**	**%**	**Cum %**	**Riffle**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	27	54.0%	54.0%	1	4	9.6%	9.6%
Sand	very fine sand	0.062	3	6.0%	60.0%	0	3	5.8%	15.4%
	fine sand	0.125	1	2.0%	62.0%	1	3	7.7%	23.1%
	medium sand	0.25	0	0.0%	62.0%	0	0	0.0%	23.1%
	course sand	0.50	3	6.0%	68.0%	0	0	0.0%	23.1%
	very course sand	1.0	4	8.0%	76.0%	3	0	5.8%	28.8%
G r a v e l	very fine gravel	2.0	2	4.0%	80.0%	1	0	1.9%	30.8%
	fine gravel	4.0	3	6.0%	86.0%	1	0	1.9%	32.7%
	fine gravel	5.7	4	8.0%	94.0%	3	0	5.8%	38.5%
	medium gravel	8.0	2	4.0%	98.0%	2	0	3.8%	42.3%
	medium gravel	11.3	0	0.0%	98.0%	2	0	3.8%	46.2%
	course gravel	16.0	0	0.0%	98.0%	3	0	5.8%	51.9%
	course gravel	22.6	0	0.0%	98.0%	6	0	11.5%	63.5%
	very course gravel	32	1	2.0%	100.0%	6	0	11.5%	75.0%
	very course gravel	45	0	0.0%	100.0%	6	0	11.5%	86.5%
Cobble	small cobble	64	0	0.0%	100.0%	5	0	9.6%	96.2%
	medium cobble	90	0	0.0%	100.0%	0	0	0.0%	96.2%
	large cobble	128	0	0.0%	100.0%	0	0	0.0%	96.2%
	very large cobble	180	0	0.0%	100.0%	2	0	3.8%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			50	100.0%		42	10	100%	

	d16	**d35**	**d50**	**d84**	**d95**
2004 As-Built	0.00	0.00	0.00	4.23	7.55
2005	0.10	5.65	17.42	50.98	74.30
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

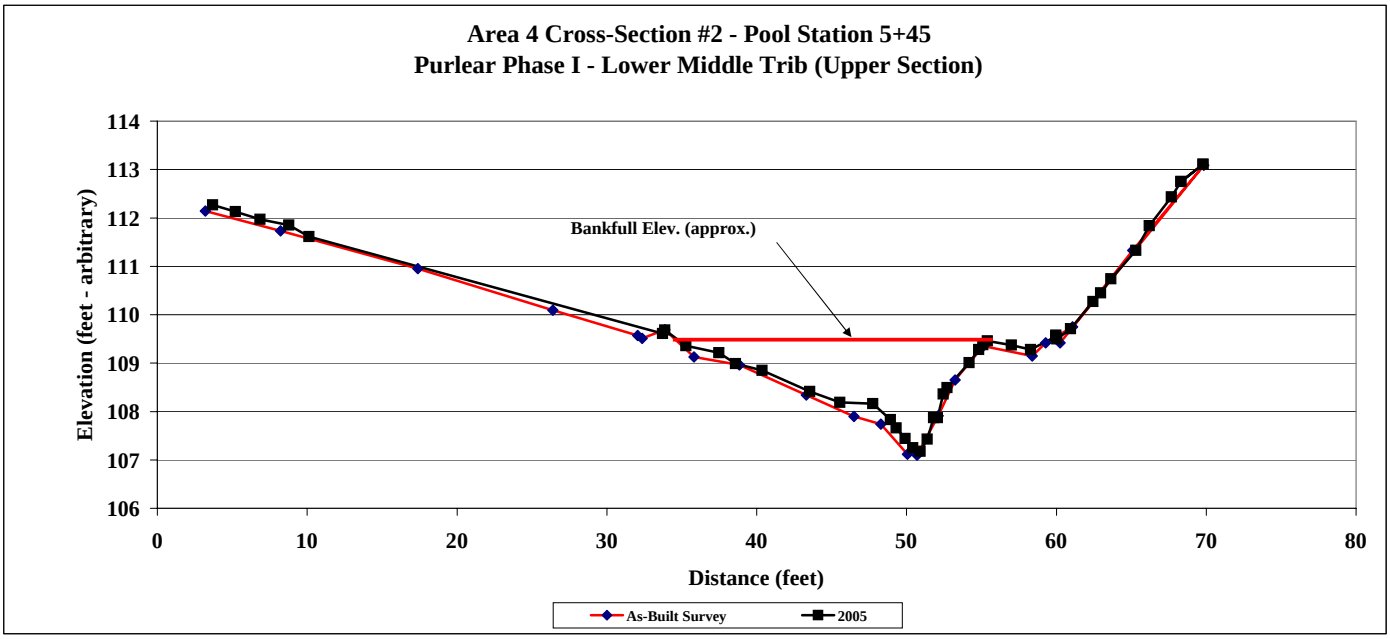


Project Name	Purlear Phase I
Cross Section	2 - Lower Middle Trib (Upper Section) Reach 4
Feature	Pool
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
3.21	112.14	X2	3.7	112.27	x2
8.23	111.73	X2	5.21	112.13	x2
17.39	110.95	X2	6.85	111.97	x2
26.4	110.09	X2	8.77	111.85	x2
32.06	109.57	VP	10.13	111.61	x2
32.36	109.51	X2	33.72	109.61	lp
33.88	109.69	X2LP	33.88	109.68	x2lp
35.81	109.13	X2	35.27	109.36	x2
38.85	108.96	X2	37.48	109.21	bf
43.32	108.34	X2	38.6	108.99	x2
46.49	107.9	X2EW	40.37	108.85	x2
48.28	107.74	X2	43.55	108.41	x2
50.05	107.12	T	45.56	108.19	x2
50.71	107.1	X2	47.76	108.16	x2
52.1	107.91	X2EW	48.93	107.83	x2
53.25	108.65	X2	49.31	107.66	x2
55.11	109.35	X2BF	49.91	107.44	x2
58.38	109.15	X2	50.42	107.25	x2
59.28	109.42	X2RP	50.91	107.18	x2
61.08	109.75	X2	51.38	107.43	x2
65.1	111.33	X2	51.81	107.87	x2
69.83	113.09	X2	52.07	107.87	x2
60.24	109.42	X2	52.46	108.36	x2
			52.7	108.49	x2
			54.19	109.01	x2
			54.82	109.28	x2
			55.09	109.38	bf
			55.4	109.46	x2
			57.01	109.37	x2
			58.28	109.28	x2
			59.96	109.55	x2rp
			59.96	109.58	rp

Photo of Area 4 Cross-Section #2 - Looking Downstream

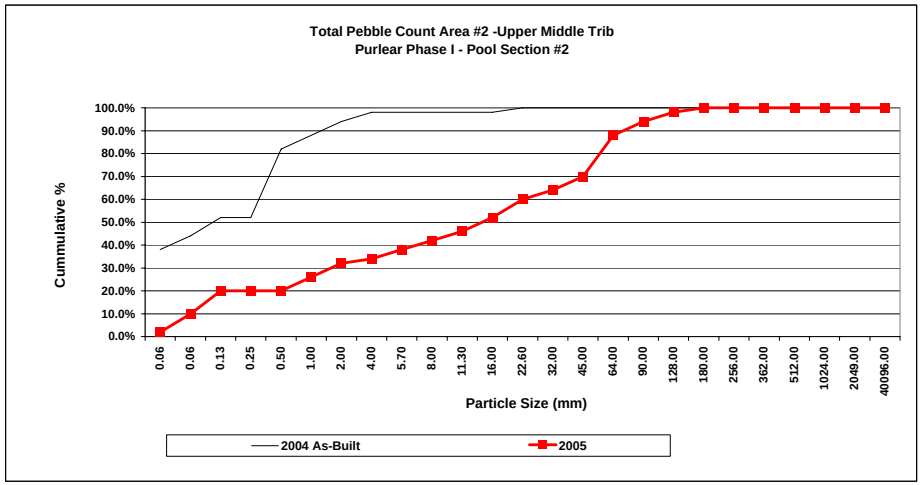
	As-Built	2005
Area	21.5	18.1
Width	22.6	21.2
Mean Depth	1.0	0.9
Max Depth	2.3	2.2



Project Name	Purlear Phase I
Cross Section	2 - Area #2 - Upper Middle Trib
Feature	Pool
Date	6/10/05
Crew	Shaffer, Bidelspach, Clinton

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Pool**	**%**	**Cum %**	**Pool**	**Pool - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	19	38.0%	38.0%	0	1	2.0%	2.0%
Sand	very fine sand	0.062	3	6.0%	44.0%	0	4	8.0%	10.0%
	fine sand	0.125	4	8.0%	52.0%	0	5	10.0%	20.0%
	medium sand	0.25	0	0.0%	52.0%	0	0	0.0%	20.0%
	course sand	0.50	15	30.0%	82.0%	0	0	0.0%	20.0%
	very course sand	1.0	3	6.0%	88.0%	3	0	6.0%	26.0%
G r a v e l	very fine gravel	2.0	3	6.0%	94.0%	3	0	6.0%	32.0%
	fine gravel	4.0	2	4.0%	98.0%	1	0	2.0%	34.0%
	fine gravel	5.7	0	0.0%	98.0%	2	0	4.0%	38.0%
	medium gravel	8.0	0	0.0%	98.0%	2	0	4.0%	42.0%
	medium gravel	11.3	0	0.0%	98.0%	2	0	4.0%	46.0%
	course gravel	16.0	0	0.0%	98.0%	3	0	6.0%	52.0%
	course gravel	22.6	1	2.0%	100.0%	4	0	8.0%	60.0%
	very course gravel	32	0	0.0%	100.0%	2	0	4.0%	64.0%
	very course gravel	45	0	0.0%	100.0%	3	0	6.0%	70.0%
Cobble	small cobble	64	0	0.0%	100.0%	9	0	18.0%	88.0%
	medium cobble	90	0	0.0%	100.0%	3	0	6.0%	94.0%
	large cobble	128	0	0.0%	100.0%	2	0	4.0%	98.0%
	very large cobble	180	0	0.0%	100.0%	1	0	2.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			50	100.0%		40	10	100%	

	d16	**d35**	**d50**	**d84**	**d95**
2004 As-Built	0.00	0.00	0.16	1.00	3.46
2005	0.15	5.35	17.42	72.00	120.25
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

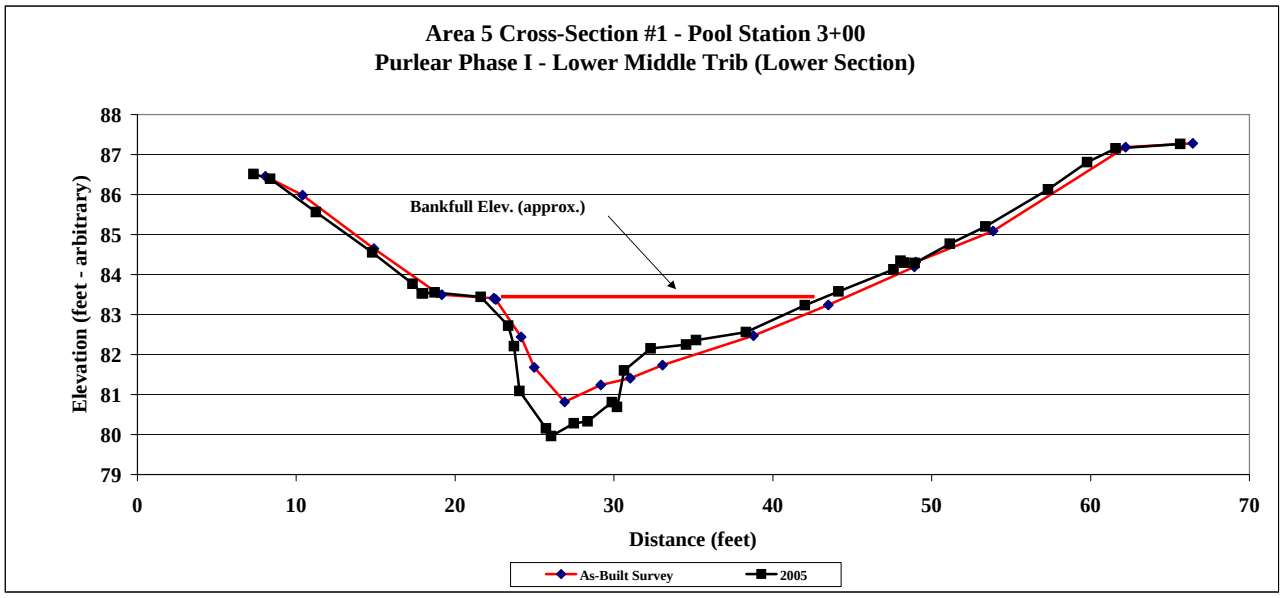


Project Name	Purlear Phase I
Cross Section	1 -Lower Middle Trib (Lower Section) Reach 5
Feature	Pool
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
8.05	86.46	X1	7.32	86.51	x1
10.4	85.98	X1	8.35	86.39	x1
14.88	84.65	X1	11.25	85.56	x1
18.86	83.54	X1LP	14.78	84.55	x1
19.15	83.5	X1	17.32	83.77	x1
22.45	83.41	X1	17.91	83.53	x1p
22.57	83.38	X1B	17.99	83.53	lp
24.16	82.44	X1	18.71	83.55	x1
24.97	81.68	X1EW	21.61	83.44	x1
26.89	80.82	X1	23.35	82.72	x1
29.17	81.24	X1	23.71	82.21	x1
31.03	81.41	X1	24.05	81.09	x1
33.05	81.74	X1EW	25.72	80.15	x1
38.78	82.47	X1	26.04	79.96	t
43.49	83.24	X1	27.48	80.28	x1
48.91	84.19	X1	28.34	80.33	x1
48.99	84.31	X1	29.87	80.81	x1
53.87	85.09	X1	30.19	80.69	x1
62.21	87.18	X1	30.63	81.6	x1
66.44	87.28	X1	32.32	82.15	x1
			34.54	82.25	x1
			35.17	82.36	x1
			38.32	82.56	x1
			42.02	83.23	x1
			44.13	83.58	x1
			47.61	84.13	x1
			48.04	84.34	rp
			48.27	84.3	x1p
			48.92	84.29	x1
			51.14	84.77	x1
			53.38	85.2	x1

Photo of Area 5 Cross-Section #1 - Looking Downstream

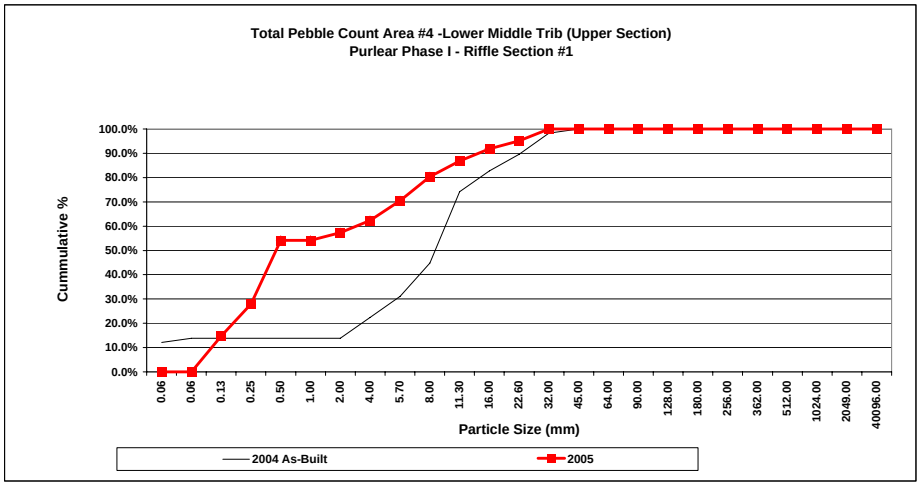
	As-Built	**2005**
Area	26.8	29.4
Width	21.4	21.4
Mean Depth	1.3	1.4
Max Depth	2.5	3.3



Project Name	Purlear Phase I
Cross Section	1 - Area #4- Lower Middle Trib (Upper section)
Feature	Riffle
Date	6/10/2005
Crew	Shaffer, Bidelspach, Clinton

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	7	12.1%	12.1%	0	0	0.0%	0.0%
Sand	very fine sand	0.062	1	1.7%	13.8%	0	0	0.0%	0.0%
	fine sand	0.125	0	0.0%	13.8%	7	2	14.8%	14.8%
	medium sand	0.25	0	0.0%	13.8%	0	8	13.1%	27.9%
	course sand	0.50	0	0.0%	13.8%	16	0	26.2%	54.1%
	very course sand	1.0	0	0.0%	13.8%	0	0	0.0%	54.1%
G r a v e l	very fine gravel	2.0	0	0.0%	13.8%	2	0	3.3%	57.4%
	fine gravel	4.0	5	8.6%	22.4%	3	0	4.9%	62.3%
	fine gravel	5.7	5	8.6%	31.0%	5	0	8.2%	70.5%
	medium gravel	8.0	8	13.8%	44.8%	6	0	9.8%	80.3%
	medium gravel	11.3	17	29.3%	74.1%	4	0	6.6%	86.9%
	course gravel	16.0	5	8.6%	82.8%	3	0	4.9%	91.8%
	course gravel	22.6	4	6.9%	89.7%	2	0	3.3%	95.1%
	very course gravel	32	5	8.6%	98.3%	3	0	4.9%	100.0%
	very course gravel	45	1	1.7%	100.0%	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium cobble	90	0	0.0%	100.0%	0	0	0.0%	100.0%
	large cobble	128	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large cobble	180	0	0.0%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			58	100.0%		51	10	100%	

	d16	**d35**	**d50**	**d84**	**d95**
2004 As-Built	3.47	7.66	10.36	20.74	34.24
2005	0.21	0.48	0.69	11.89	27.10
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

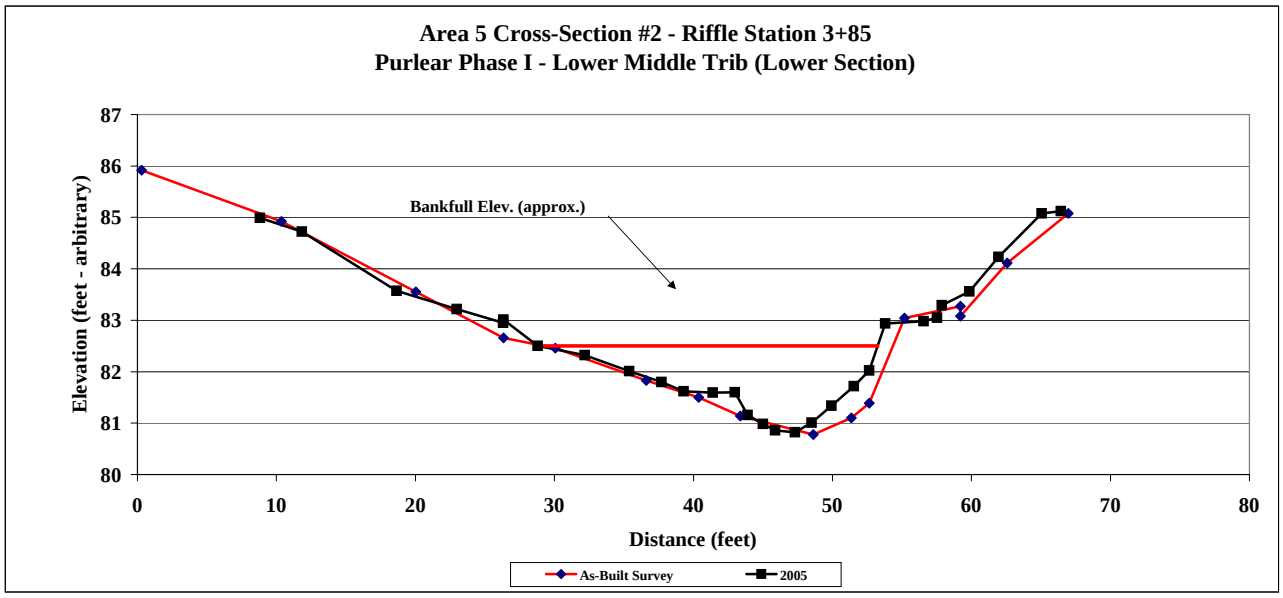


Project Name	Purlear Phase I
Cross Section	2 -Lower Middle Trib (Lower Section) Reach 5
Feature	Riffle
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0.29	85.92	X2	8.82	84.99	x2
10.35	84.92	X2	11.83	84.72	x2
20.04	83.55	X2	18.65	83.57	x2
26.33	82.66	X2LP	22.97	83.22	x2
30.06	82.46	X2	26.32	82.95	x2
36.6	81.83	2)	26.33	83.01	x2lp
40.37	81.5	X2T	28.8	82.5	x2
43.37	81.14	X2EW	32.19	82.32	x2
48.63	80.78	X2	35.39	82.01	x2
51.35	81.1	X2EW	37.71	81.8	x2
52.65	81.39	X2	39.3	81.62	x2
55.18	83.04	X2B	41.39	81.59	x2
59.21	83.27	X2RP	42.98	81.6	x2
59.22	83.08	X2	43.91	81.16	x2
62.57	84.11	X2	45	80.98	x2
66.98	85.08	X2	45.89	80.86	x2
			47.3	80.82	x2
			48.5	81.01	x2
			49.93	81.34	x2
			51.54	81.72	x2
			52.65	82.02	x2
			53.81	82.94	x2
			56.56	82.98	x2
			57.54	83.05	x2
			57.88	83.29	x2rp
			59.86	83.56	x2
			61.96	84.23	x2
			65.07	85.08	x2
			66.45	85.12	x2

Photo of Area 5 Cross-Section #2 - Looking Downstream

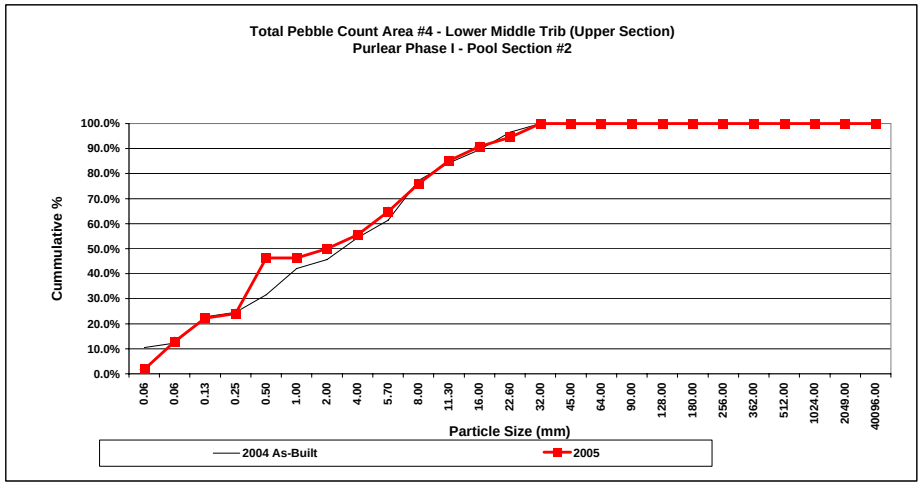
	As-Built	**2005**
Area	23.1	19.8
Width	26.3	25.0
Mean Depth	0.9	0.8
Max Depth	1.7	1.7
w/d ratio	30.0	31.7
FPW	60	60
ER (greater than)	2.3	2.4
Stream Type	C4	C4



Project Name	Purlear Phase I
Cross Section	2 -Area #4 - Lower Middle Trib (Upper Section)
Feature	Pool
Date	6/10/2005
Crew	Shaffer, Bidelspach, Clinton

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	6	10.5%	10.5%	0	1	1.9%	1.9%
Sand	very fine sand	0.062	1	1.8%	12.3%	2	4	11.1%	13.0%
	fine sand	0.125	6	10.5%	22.8%	5	0	9.3%	22.2%
	medium sand	0.25	1	1.8%	24.6%	0	1	1.9%	24.1%
	course sand	0.50	4	7.0%	31.6%	8	4	22.2%	46.3%
	very course sand	1.0	6	10.5%	42.1%	0	0	0.0%	46.3%
G r a v e l	very fine gravel	2.0	2	3.5%	45.6%	2	0	3.7%	50.0%
	fine gravel	4.0	5	8.8%	54.4%	3	0	5.6%	55.6%
	fine gravel	5.7	4	7.0%	61.4%	5	0	9.3%	64.8%
	medium gravel	8.0	9	15.8%	77.2%	6	0	11.1%	75.9%
	medium gravel	11.3	4	7.0%	84.2%	4	1	9.3%	85.2%
	course gravel	16.0	3	5.3%	89.5%	3	0	5.6%	90.7%
	course gravel	22.6	4	7.0%	96.5%	2	0	3.7%	94.4%
	very course gravel	32	2	3.5%	100.0%	3	0	5.6%	100.0%
	very course gravel	45	0	0.0%	100.0%	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium cobble	90	0	0.0%	100.0%	0	0	0.0%	100.0%
	large cobble	128	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large cobble	180	0	0.0%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			57	100.0%		43	11	100%	

	d16	**d35**	**d50**	**d84**	**d95**
2004 As-Built	0.13	0.99	3.93	13.53	25.60
2005	0.12	0.56	3.00	13.14	28.42
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

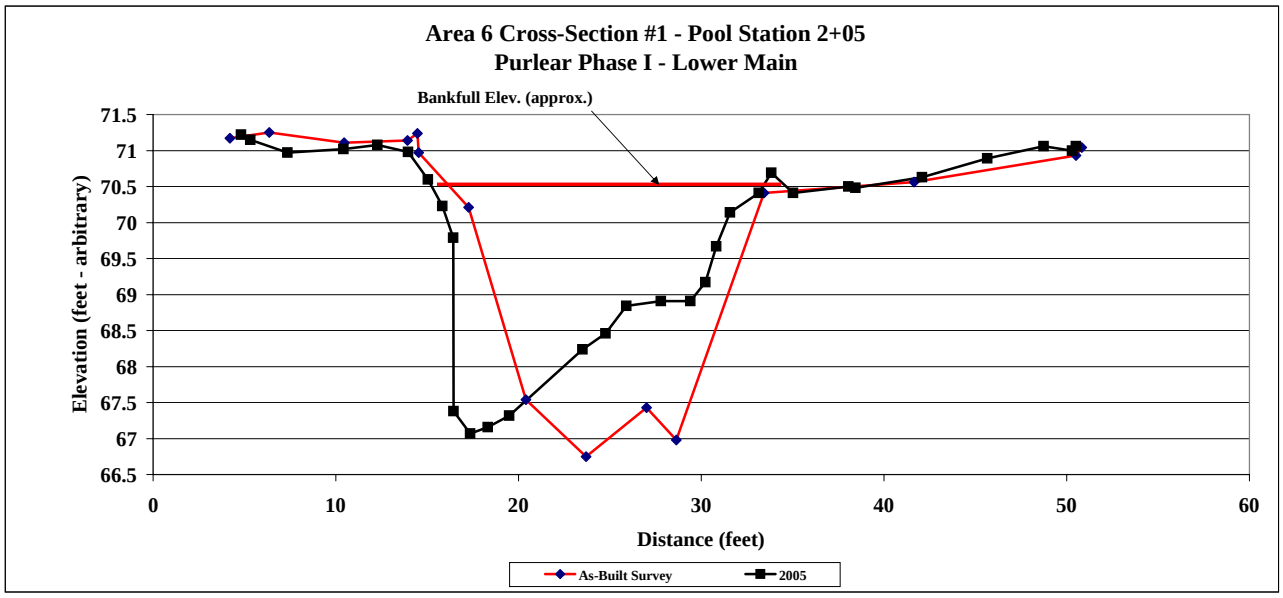


Project Name	Purlear Phase I
Cross Section	1 - Lower Main Reach 6
Feature	Pool
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
4.21	71.17	X1	4.81	71.22	xlp
6.35	71.25	X2LP	5.32	71.15	x
10.45	71.11	X1	7.36	70.97	x
13.92	71.14	X1	10.42	71.02	x
14.46	71.24	B	12.27	71.08	x
14.54	70.97	X1	13.96	70.98	x
17.27	70.21	X1	15.04	70.6	x
20.4	67.54	X1	15.83	70.23	x
23.69	66.75	X1	16.42	69.79	x
27	67.43	X1	16.45	67.38	x
28.63	66.98	X1	17.35	67.07	x
33.44	70.41	X1	18.32	67.16	x
41.64	70.56	X1	19.5	67.32	x
50.5	70.93	X1RP	23.5	68.24	x
50.82	71.04	X1	24.77	68.46	x
			25.91	68.84	x
			27.79	68.91	x
			29.4	68.91	x
			30.23	69.17	x
			30.83	69.67	x
			31.58	70.14	x
			33.16	70.41	x
			33.84	70.69	bf
			35.02	70.41	x
			38.05	70.5	bf
			38.45	70.48	x
			42.09	70.63	x
			45.65	70.89	x
			48.74	71.06	x
			50.29	71	x
			50.5	71.06	xrp

Photo of Area 6 Cross-Section #1 - Looking Downstream

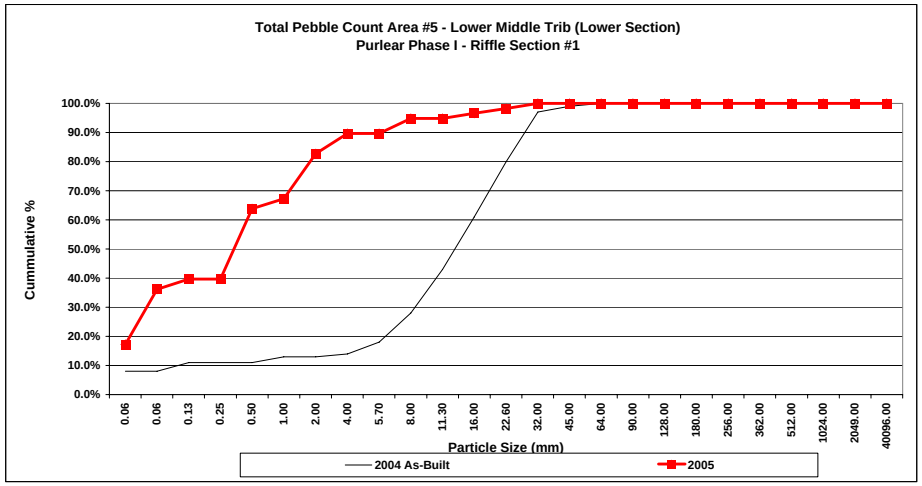
	As-Built	**2005**
Area	43.6	36.3
Width	18.9	19.2
Mean Depth	2.3	1.9
Max Depth	3.8	3.5



Project Name	Purlear Phase I
Cross Section	2 - Area #5 - Lower Middle Trib (Lower Section)
Feature	Riffle
Date	6/10/2005
Crew	Shaffer, Bidelspach, Clinton

		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	8	8.0%	8.0%	7	3	17.2%	17.2%
Sand	very fine sand	0.062	0	0.0%	8.0%	4	7	19.0%	36.2%
	fine sand	0.125	3	3.0%	11.0%	1	1	3.4%	39.7%
	medium sand	0.25	0	0.0%	11.0%	0	0	0.0%	39.7%
	course sand	0.50	0	0.0%	11.0%	14	0	24.1%	63.8%
	very course sand	1.0	2	2.0%	13.0%	2	0	3.4%	67.2%
G r a v e l	very fine gravel	2.0	0	0.0%	13.0%	9	0	15.5%	82.8%
	fine gravel	4.0	1	1.0%	14.0%	4	0	6.9%	89.7%
	fine gravel	5.7	4	4.0%	18.0%	0	0	0.0%	89.7%
	medium gravel	8.0	10	10.0%	28.0%	3	0	5.2%	94.8%
	medium gravel	11.3	15	15.0%	43.0%	0	0	0.0%	94.8%
	course gravel	16.0	18	18.0%	61.0%	1	0	1.7%	96.6%
	course gravel	22.6	19	19.0%	80.0%	1	0	1.7%	98.3%
	very course gravel	32	17	17.0%	97.0%	1	0	1.7%	100.0%
	very course gravel	45	2	2.0%	99.0%	0	0	0.0%	100.0%
Cobble	small cobble	64	1	1.0%	100.0%	0	0	0.0%	100.0%
	medium cobble	90	0	0.0%	100.0%	0	0	0.0%	100.0%
	large cobble	128	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large cobble	180	0	0.0%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			100	100.0%		47	11	100%	

	d16	**d35**	**d50**	**d84**	**d95**
2004 As-Built	5.85	11.52	15.85	29.94	37.18
2005	0.00	0.09	0.54	3.33	14.22
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00



Project Name Purlear Phase I
Task Longitudinal Profile
Section Area #5 Lower Middle Trib (Lower Section)
Date 6/10/05
Crew Shaffer, Bidelspach, Clinton

Symbol Key

T	Thalweg
R	Head of Riffle
P	Head of Pool
U	Head of Run
M	Max Pool

2004 Survey - As Built Survey

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
0	85.25	14.56	85.6	291.63	83.72	T
13.7	85.39	17.72	84.76	270.73	83.3	V
21.2	81.45	38.63	84.66	118.07	85.06	TM
38.29	84.54	59.18	84.62	324.25	83.05	TR
58.99	84.3	77.51	84.58	131.49	85.19	T
77.62	84.22	100.07	83.66	196.34	84.45	T
98.2	84.29	114.46	83.7	231.85	84.41	V
107.6	81.64	131.21	83.66	59.23	86.3	TM
121.8	83.34	155.02	83.66	219.09	84.55	TP
133.1	82.2	174.45	83.65	403.48	82.89	TM
157.7	83.18	178.93	82.79	422.38	82.86	T
174.36	83.4	179.2	83.61	369.07	82.93	V
173.7	83.51	181.61	82.72	359.55	83.08	V
179	81.27	193.55	82.79	97.81	85.58	TM
181.64	81	193.81	80.7			TM
193.72	82.41	194.95	85.63			T
195.28	82.37	194.97	85.8			T
209.19	82.49	208.82	82.83			TR
218.66	82.22	218.43	82.8			TP
226.29	81.88	226.09	82.77			TM
232.42	82.36	232.31	82.68			TR
250	82.37	251.73	82.62			V
257.8	79.51	259.21	81.75			TM
269.83	81.48	269.82	81.77			TR
289.96	81.23	290.19	81.69			TP
304.97	80.85	304.91	81.7			TM
324.96	81.3	325.09	81.73			T
339.13	81.28	339.06	81.6			V
341.9	79.99	339.31	81.39			TM
357.5	80.83	370.07	81.43			T
357.51	80.89	403.52	80.87			T
370.34	81.09	409.93	80.89			TR
403.38	80.43	425.45	80.81			TP
409.89	80.09					TM
425.7	80.63					TR

2005 Survey*

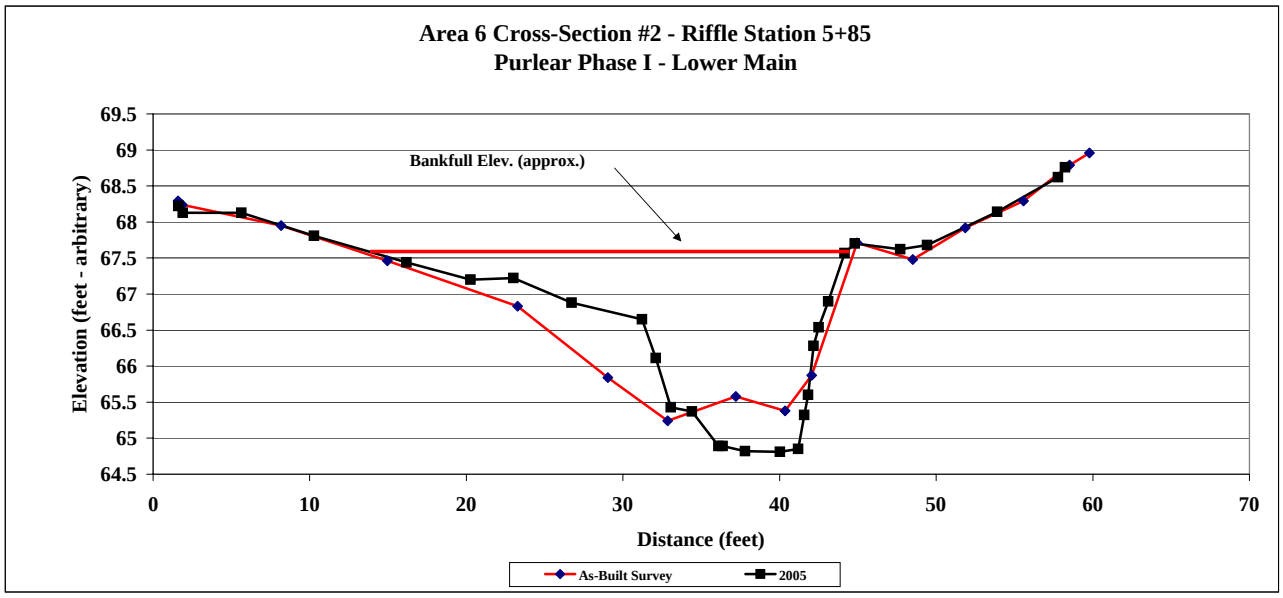
TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
-40.26	84.68	-35.82	85.74	-31.5	89.66	t
-36.06	84.7	-25.67	85.72	-31.03	88.56	t
-35.49	84.46	-16.58	85.74	-13.54	86.99	t
-30.21	83.85	-14.31	85.68	2.73	86.94	t
-22.24	85.1	2.67	85.61	8.68	86.25	t
-14.78	85.16	3.97	85.6	11.71	86.74	r
-5.55	85.14	6.56	85.57	42.14	85.43	t
3.65	84.86	12.11	85.59	43.71	86.39	t
6.98	84.74	15.34	85.03	55.35	85.38	t
12.86	85.44	26.68	85.02	57.42	86.22	rv
15.9	83.91	30.42	84.99	78.37	86.1	t
27.59	82.04	43.37	85.06	82.36	85.19	t
35.12	83.61	47.36	85.01	101.71	85.28	t
41.69	83.7	56.74	84.74	112.67	85.15	t
46.43	84.66	59.23	84.67	113.27	85.12	t
54.49	84.31	67.25	84.57	118.99	85.2	t
65.27	84.28	73.51	84.45	133.95	85.2	t
74.25	84.04	81.16	84.46	137.05	84.35	t
81.68	83.79	86.59	84.47	157.39	84.77	t
85.93	82.95	96.72	84.41	173.23	84.73	t
94.05	83.03	99.01	83.85	186.05	84.29	t
97.38	84.35	99.07	83.84	189.48	84.7	rv
99.9	82.91	113.88	83.86	208.58	84.51	t
104.34	81.91	116.38	83.84	219.19	83.35	t
111.93	80.99	130.18	83.85	222.77	84.38	t
119.89	81.39	130.65	83.85	236.51	84.83	t
131.42	83.29	135.74	83.78	265.3	83.39	t
138.12	82.92	142.81	83.77	270.85	83.1	t
147.21	82.05	155.71	83.78	285.25	83.68	t
152.47	82.27	158.55	83.77	289.55	83.05	t
159.44	82.72	172.69	83.74	309.29	83.31	t
166.69	83.14	174.61	82.97	314.22	83.34	t
173.28	83.5	178.07	83	359.95	82.11	rv
175.74	81.53	186	82.99	361.37	82.97	t
189.25	81.83	200.78	82.99	389.23	81.87	t
191.45	80.74	211.93	82.96	389.75	82.82	t
203.75	82.59	217.29	82.91	425.08	81.65	r
217.95	82.3	229.28	82.84	425.47	82.76	t
221.87	81.93	234.18	82.66	459.47	82.16	t
227.69	82.43	239.36	82.67	467.49	81.46	r
234.28	82.25	247.46	82.59	489.96	81.61	t
241.54	82.06	250.4	82.17	494.91	80.78	t
248.15	82.44	263.76	82.16	516.68	80.95	rv
251.08	80.52	266.7	82.13	521.64	80.94	t
257.47	79.21	272.49	82.11	545.83	79.95	t
264.26	79.76	277.08	81.87	548.9	80.72	t
270.89	81.01	281.65	81.72	566.97	80.9	t
273.94	81.83	284.88	81.74	574.45	79.74	r
281.79	81.27	292.07	81.7	591.97	80.6	t
284.49	80.87	297.7	81.64	594.28	79.35	t
286.88	81.19	309.48	81.61	629.14	79.05	t
295.93	81.06	316.89	81.65	630.98	79.58	t
302.69	79.96	328.11	81.62	631	79.56	t
316.63	80.4	334.46	81.62	647.1	79.15	t
324.28	80.65	338.56	81.53	647.26	79.13	t
335.11	81.04	345.09	81.52	665.86	79.46	rv
338.66	80.74	348.54	81.52	668.08	78.96	t
342.35	79.8	364.97	81.53	694.03	79.29	t
355.88	79.79	370.96	81.51	694.25	79.32	t
362.21	80.85	380.05	81.22	697.88	79.05	t
367.82	80.79	387.78	81.1	705.77	79.39	t
373.56	81.07	395.64	81.05	706.88	79.16	r
385.24	80.83	406.05	81.02			t
391.58	80.74	410.44	81.02			t
395.92	79.91	421.6	81.03			t
402.11	80.05	427.01	80.97			t
412.45	79.6	439.24	80.67			t
416.55	79.5	443.11	80.66			t
422.15	80.35	444.57	80.42			t
427.32	80.57	455.12	80.41			r
434.21	80.51	458.99	80.37			t
443.6	80.35	468.88	80.45			rv
445.56	79.34	476.37	80.3			t
452.58	77.83	478.98	80.16			t
458.51	77.56	489.27	80.15			t
461.5	77.92	493	80.12			t
466.8	79.45	504.61	80.01			t
470.94	80.14	509.31	79.95			r
475.65	79.97	512.5	79.99			t
484.73	79.77	517.79	80			t
488.01	79.32	520.53	79.68			t
495.66	79.67	529.67	79.61			r
501.61	79.53	533.63	79.65			t
509.2	79.29	547.22	79.61			t
519.09	79.67	553.73	79.4			rv
520.53	78.05	554.98	79.45			t
527	77.62	567.8	79.22			t
536.94	77.87	571.46	79.22			t
543.41	78.55	576.55	79.19			t
547.72	79.31	588.18	79.19			r
549.61	78.77	592.7	78.96			t
555.36	78.89	597.1	79.02			t
562.22	78.95	608.27	78.97			t
568.55	78.81	610.89	78.42			t
576.46	78.8	619.14	78.44			t
588.5	78.46	632.38	78.39			r
594.33	78.22	640.59	78.43			r
602.71	77.51	646.48	78.12			t
609.11	78.77	652.79	78.15			rv
611.75	76.63	655.81	78.13			t
615.9	76.52	661.96	78.09			t
627.11	77.19	674.18	77.99			t
634.41	77.82	680.97	77.96			t
640.52	78.06	682.58	78			r
647.15	77.94	697.1	77.91			t
650.74	77.78	699.19	77.31			t
659.55	77.48	705.17	77.3			t
662.72	77.81	709.93	77.28			t
671.73	77.57					t
674.87	77.44					t
686.74	77.17					t
697.42	77.75					rv
699.54	76.67					t
703.51	75.94					t
707.76	75.14					t
710.31	76.06					botculv

Project Name	Purlear Phase I
Cross Section	2 - Lower Main Reach 6
Feature	Riffle
Date	1/15/2005
Crew	Shaffer, Bidelspach, Clinton

2004 As-Built Survey			2005 MY - 01		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
1.59	68.29	X2LP	1.62	68.22	xlp
1.86	68.24	X2	1.9	68.13	x
8.17	67.95	X2	5.63	68.13	x
14.96	67.46	X2	10.28	67.81	x
23.27	66.83	X2	16.19	67.44	x
29.04	65.84	X2EW	20.27	67.2	bf
32.85	65.24	X2	23	67.22	x
37.2	65.58	X2	26.72	66.88	x
40.36	65.38	X2	31.22	66.65	x
42.05	65.87	X2EW	32.1	66.11	x
44.95	67.71	X2B	33.05	65.43	x
48.51	67.48	X2	34.4	65.37	x
51.85	67.92	X2	36.11	64.89	x
55.57	68.29	X2	36.37	64.89	x
58.52	68.79	X2RP	37.79	64.82	x
59.78	68.96	X2	40.02	64.81	x
			41.19	64.85	x
			41.57	65.32	x
			41.82	65.6	x
			42.18	66.28	x
			42.5	66.54	x
			43.12	66.9	x
			44.16	67.57	x
			44.8	67.7	x
			47.71	67.62	x
			49.42	67.68	x
			53.89	68.14	x
			57.79	68.62	x
			58.23	68.76	xrp

Photo of Area 6 Cross-Section #2 - Looking Downstream

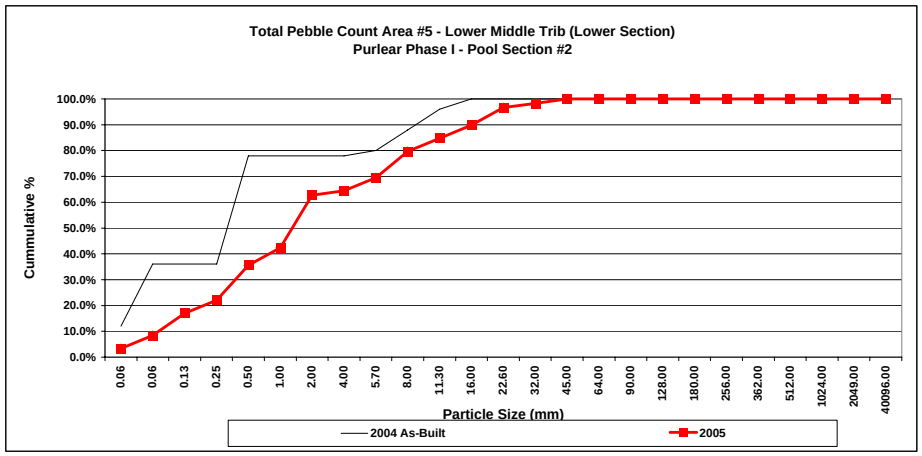
	As-Built	**2005**
Area	40.2	37.8
Width	27.1	26.9
Mean Depth	1.5	1.4
Max Depth	2.5	2.9
w/d ratio	18.3	19.2
FPW	60	60
ER (greater than)	2.2	2.2
Stream Type	C4	C4

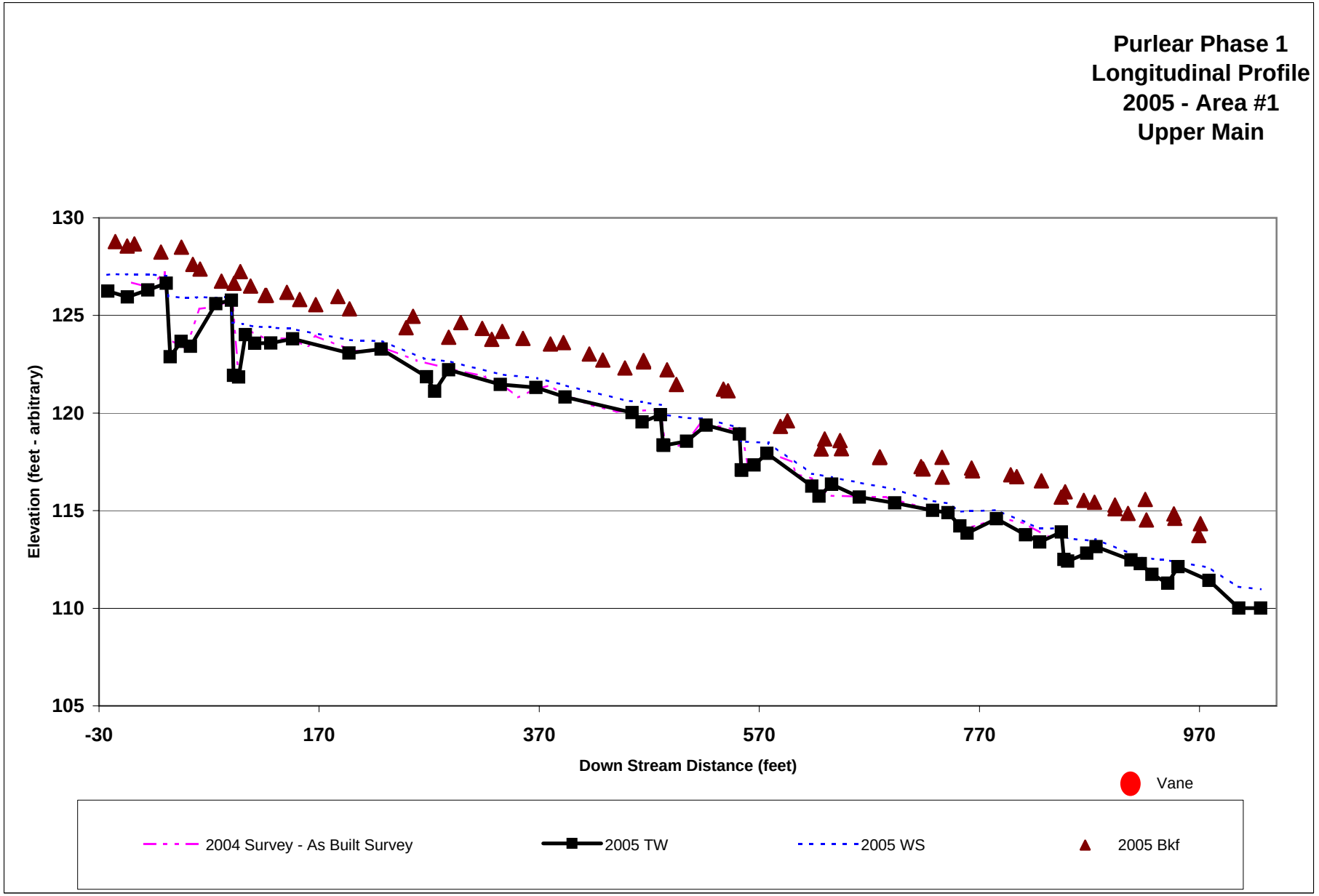


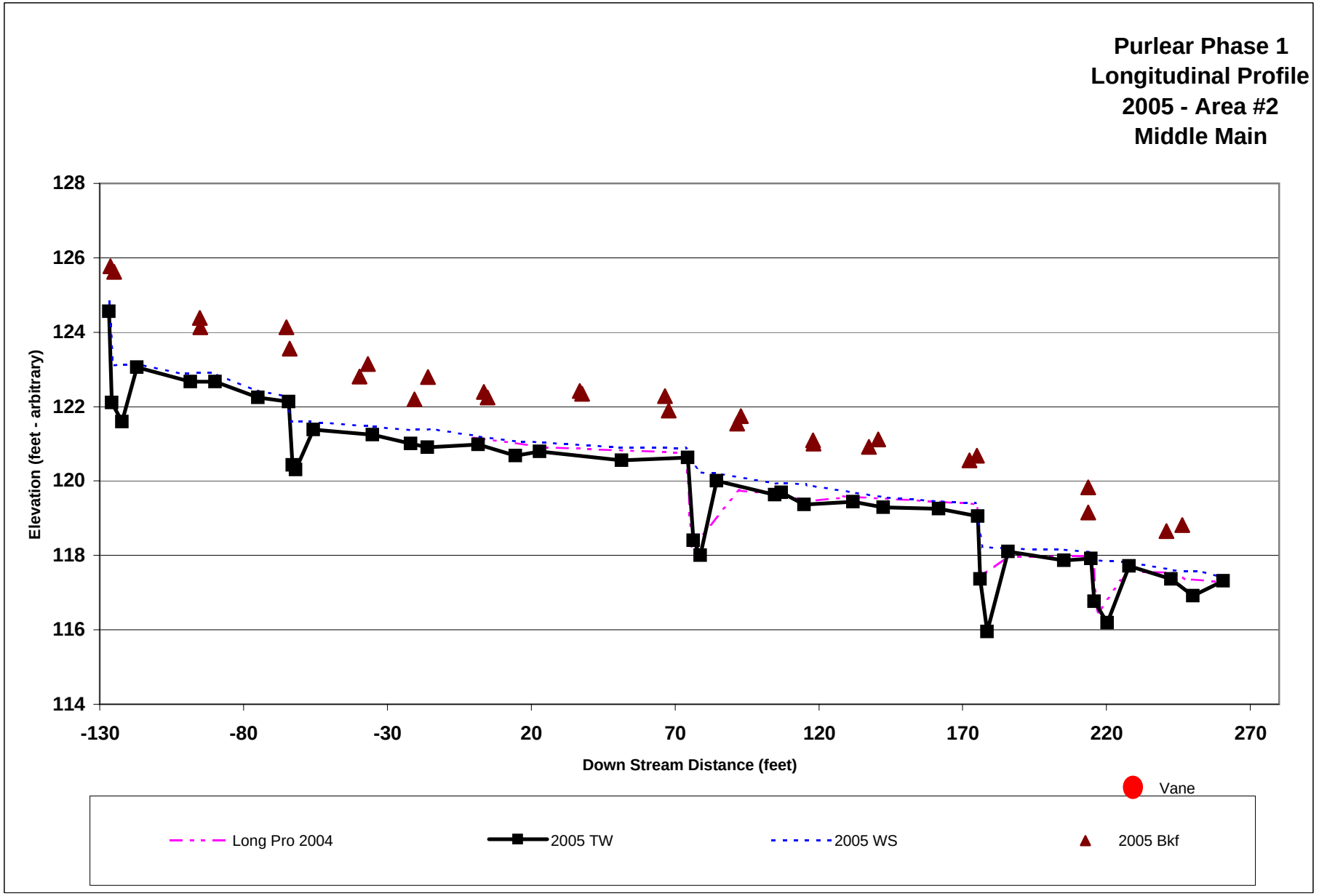
Project Name	Purlear Phase I
Cross Section	1 - Area #5 - Lower Middle Trib (Lower Section)
Feature	Pool
Date	6/10/2005
Crew	Shaffer, Bidelspach, Clinton

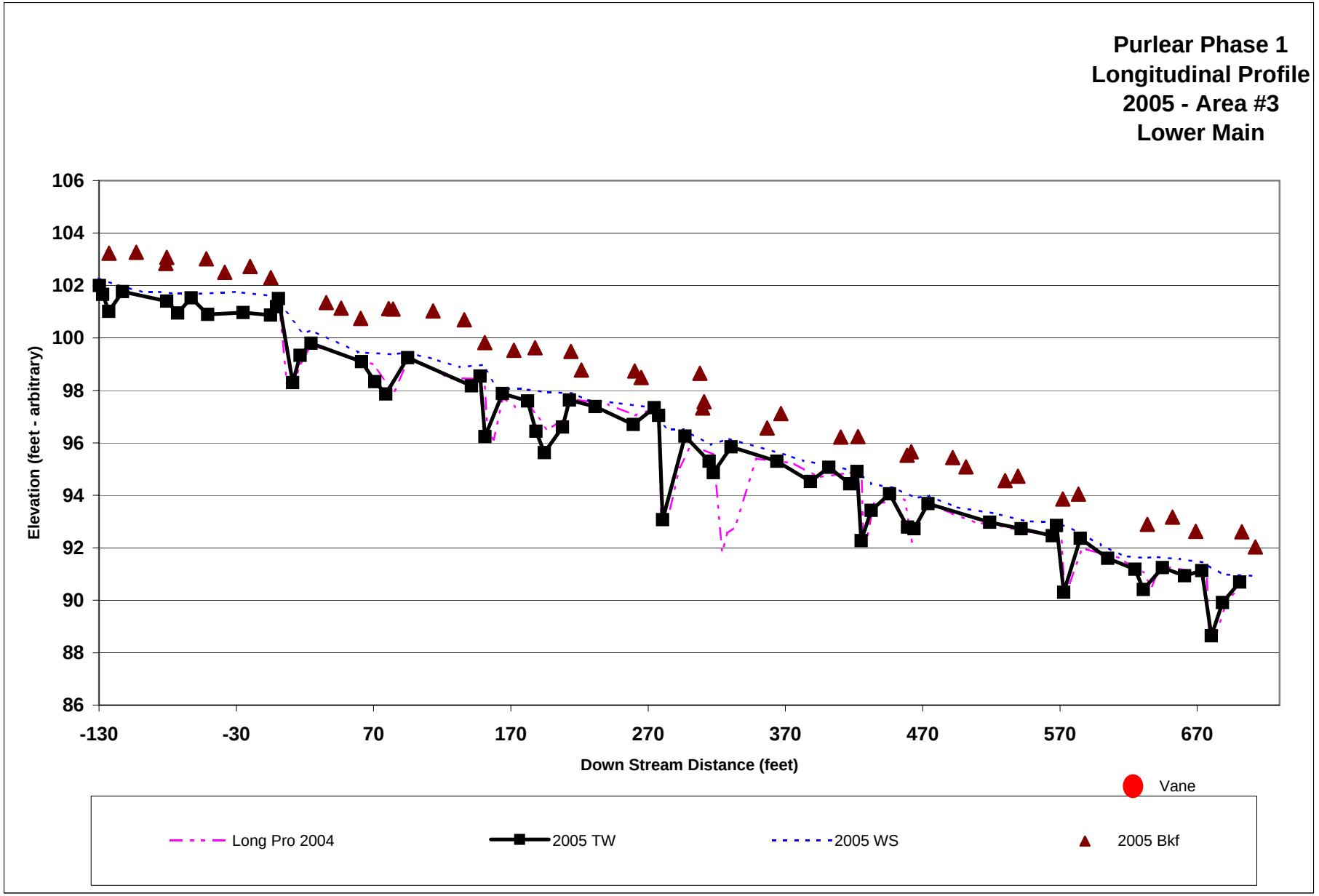
		2004 As-Built				2005			
Description	**Material**	**Size (mm)**	**Pool - Bed**	**%**	**Cum %**	**Pool - Bed**	**Pool - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	6	12.0%	12.0%	0	2	3.4%	3.4%
Sand	very fine sand	0.062	12	24.0%	36.0%	0	3	5.1%	8.5%
	fine sand	0.125	0	0.0%	36.0%	0	5	8.5%	16.9%
	medium sand	0.25	0	0.0%	36.0%	1	2	5.1%	22.0%
	course sand	0.50	21	42.0%	78.0%	8	0	13.6%	35.6%
	very course sand	1.0	0	0.0%	78.0%	4	0	6.8%	42.4%
G r a v e l	very fine gravel	2.0	0	0.0%	78.0%	12	0	20.3%	62.7%
	fine gravel	4.0	0	0.0%	78.0%	1	0	1.7%	64.4%
	fine gravel	5.7	1	2.0%	80.0%	3	0	5.1%	69.5%
	medium gravel	8.0	4	8.0%	88.0%	6	0	10.2%	79.7%
	medium gravel	11.3	4	8.0%	96.0%	3	0	5.1%	84.7%
	course gravel	16.0	2	4.0%	100.0%	3	0	5.1%	89.8%
	course gravel	22.6	0	0.0%	100.0%	4	0	6.8%	96.6%
	very course gravel	32	0	0.0%	100.0%	1	0	1.7%	98.3%
	very course gravel	45	0	0.0%	100.0%	1	0	1.7%	100.0%
Cobble	small cobble	64	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium cobble	90	0	0.0%	100.0%	0	0	0.0%	100.0%
	large cobble	128	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large cobble	180	0	0.0%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			50	100.0%		47	12	100%	

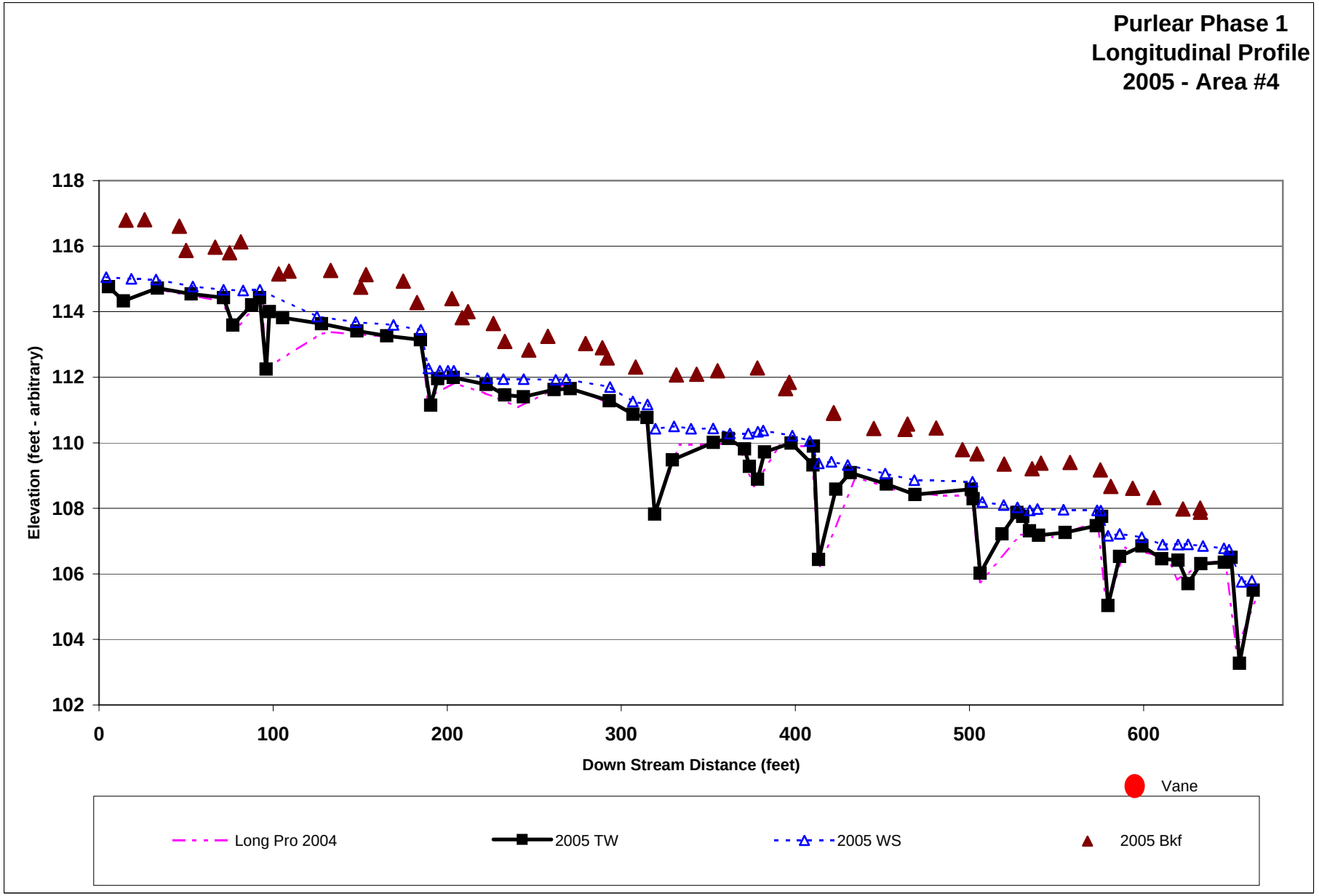
	d16	d35	d50	d84	d95
2004 As-Built	0.07	0.09	0.50	8.25	13.15
2005	0.18	0.73	2.06	13.06	25.40
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

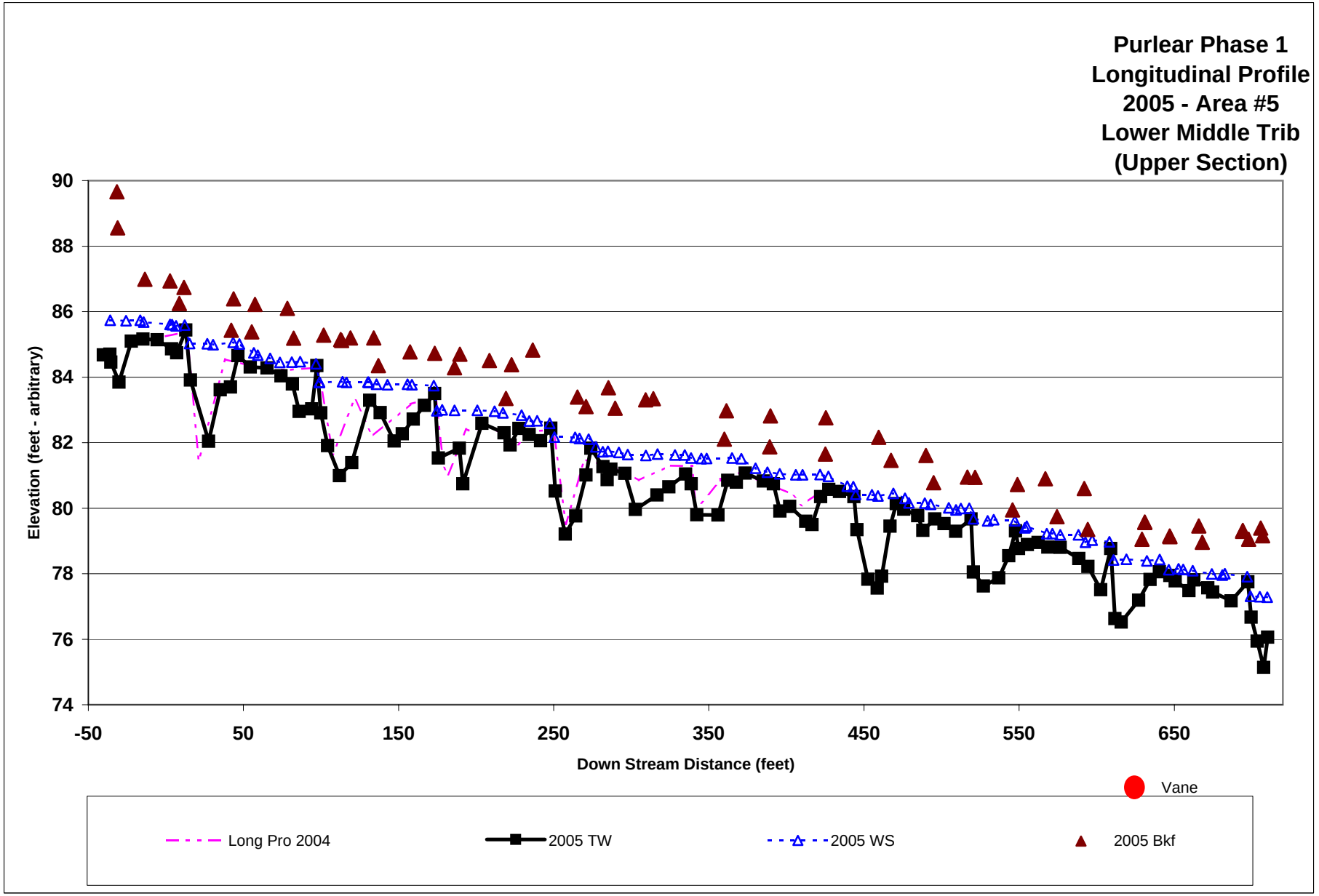


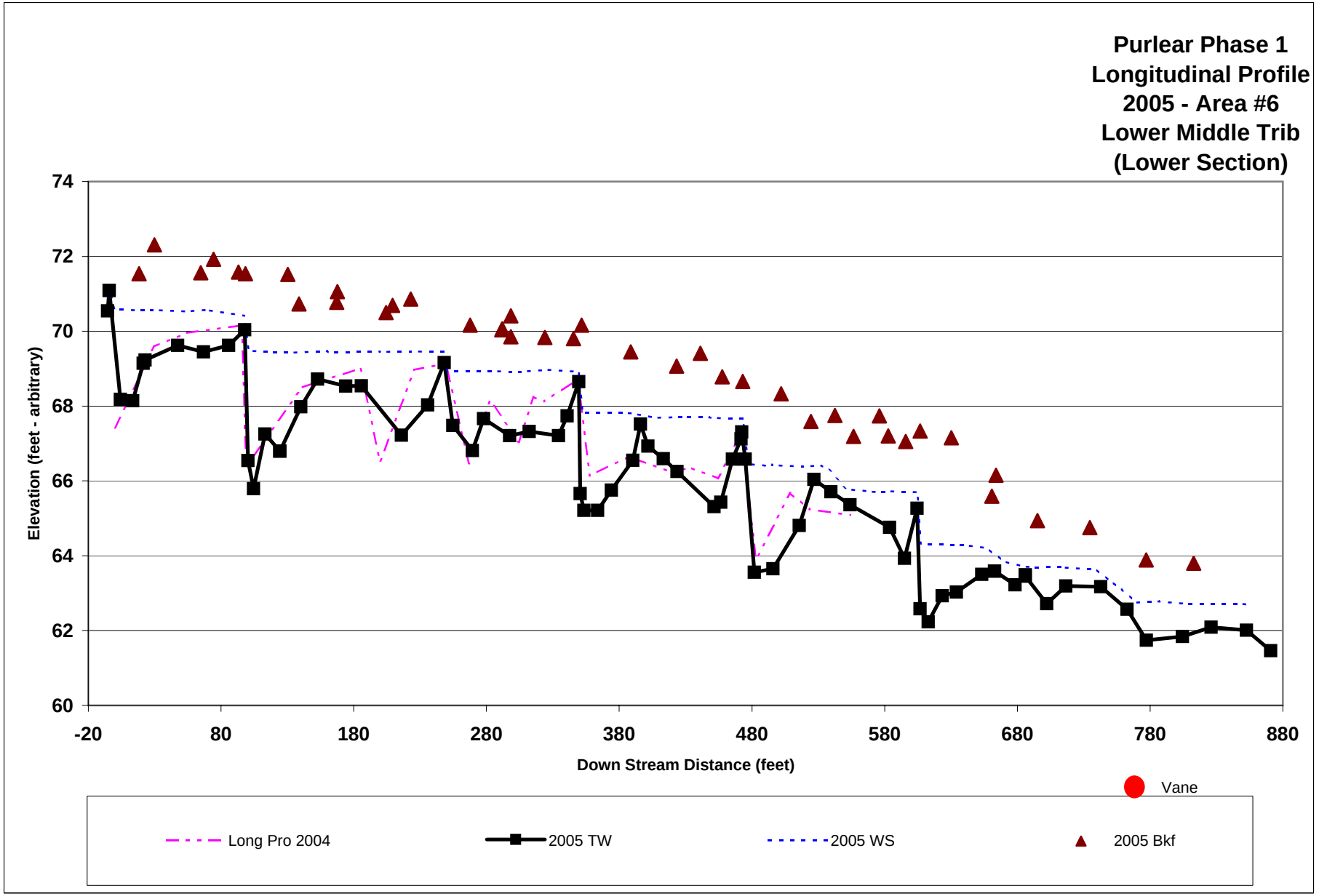

Purlear Phase 1
Longitudinal Profile
2005 - Area #1
Upper Main
130
125
120
115
110
105
Elevation (feet - arbitrary)
-30
170
370
570
770
970
Down Stream Distance (feet)
Vane
2004 Survey - As Built Survey
2005 TW
2005 WS
2005 Bkf


Purlear Phase 1
Longitudinal Profile
2005 - Area #2
Middle Main
Elevation (feet - arbitrary)
128
126
124
122
120
118
116
114
-130
-80
-30
20
70
120
170
220
270
Down Stream Distance (feet)
Vane
Long Pro 2004
2005 TW
2005 WS
2005 Bkf


Purlear Phase 1
Longitudinal Profile
2005 - Area #3
Lower Main
Elevation (feet - arbitrary)
106
104
102
100
98
96
94
92
90
88
86
-130
-30
70
170
270
370
470
570
670
Down Stream Distance (feet)
Vane
Long Pro 2004
2005 TW
2005 WS
2005 Bkf


Purlear Phase 1
Longitudinal Profile
2005 - Area #4
Elevation (feet - arbitrary)
118
116
114
112
110
108
106
104
102
0
100
200
300
400
500
600
Down Stream Distance (feet)
Vane
Long Pro 2004
2005 TW
2005 WS
2005 Bkf


Purlear Phase 1
Longitudinal Profile
2005 - Area #5
Lower Middle Trib
(Upper Section)
Elevation (feet - arbitrary)
90
88
86
84
82
80
78
76
74
-50
50
150
250
350
450
550
650
Down Stream Distance (feet)
Vane
Long Pro 2004
2005 TW
2005 WS
2005 Bkf


Purlear Phase 1
Longitudinal Profile
2005 - Area #6
Lower Middle Trib
(Lower Section)
Elevation (feet - arbitrary)
74
72
70
68
66
64
62
60
-20
80
180
280
380
480
580
680
780
880
Down Stream Distance (feet)
Vane
Long Pro 2004
2005 TW
2005 WS
2005 Bkf

Project Name Purlear Phase I
Task Longitudinal Profile
Section Area #1 Upper Main
Date 6/10/05
Crew Shaffer, Bidelspach, Clinton

Symbol Key	
T	Thalweg
R	Head of Riffle
P	Head of Pool
U	Head of Run
M	Max Pool

2004 Survey - As Built Survey

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
0	126.68	16.62	127.45	33.34	132	TM
15.17	126.44	16.82	127.42	50.74	132.66	T
29.43	127.22	37.17	126.03	174.21	126.55	V
29.45	127.05	99.85	124.58	225.57	126.75	TV
34.63	123.74	103.92	121.37	332.6	126.5	T
49	123.3	119.71	121.36	404.82	124.74	TM
61.46	125.34	143.71	121.32	452.5	126.37	T
76.02	125.45	167.06	121.23	506.32	123.89	T
91.3	125.79	200.38	120.68	581.53	122.76	TV
96.83	121.78	215.88	123.66	624.01	119.95	TM
102.97	124.03	225.2	120.65	680.87	119.31	TM
105.29	124.26	271.22	120	734.62	119.12	TR
119.53	123.85	339.54	121.79	759.69	119.61	T
143.97	123.81	378.56	121.71	780.32	117.84	T
159.24	123.41	412.29	120.9	838.7	119.72	TM
167.05	123.94	440.41	120.59	474.15	122.9	TR
200.31	123.21	460.96	119.38	184.59	126.76	TU
215.87	123.15	485.16	119.63	534.97	121.71	T
225.49	123.35	501.69	119.77	403.58	124.98	TR
226.46	123.39	517.77	119.72	23.49	128.84	TR
258.49	122.69	551.72	119.25	688.64	118.7	T
284.38	122.32	559.97	118.42	325.67	124.8	T
320.26	121.88	580.46	118.4	762.21	118.42	T
339.67	121.35	600.08	117.89	138.38	128.56	T
350.92	120.8	602.91	117.43	604.45	120.66	TM
363.7	121.16	618.06	117.23	629.29	120.62	TG
378.54	121.41	634.03	116.57	827.69	117.93	TR
412.22	120.49	658.59	116.29	789.63	121.85	T
440.27	120.07	716.37	115.69	118.41	131.2	T
480.01	120.18	755.42	115.09			TV
485.15	118.11	789.36	115.09			TM
502.15	118.43	845.51	114.25			TG
517.37	119.48	848.5	113.59			TR
553.57	119.1					TV
559.14	117.47					TM
580.25	117.93					TR
600.2	117.5					T
603	116.9					T
617.97	116.63					T
633.94	115.76					T
658.6	115.73					T
685.29	115.69					T
716.15	115.19					T
746.06	114.83					TP
755.07	114.07					TM
767.76	114.24					TG
789.29	114.63					TR
811.04	114.35					T
837.39	113.52					T
845.9	113.96					T
846.07	113.96					TV

2005 Survey

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
-22.02	126.25	-22.44	127.08	-4.3	128.56	m
-4.18	125.95	-19.25	127.11	26.24	128.25	m
14.38	126.31	-5.4	127.1	44.92	128.5	T
31.15	126.65	-4.27	127.11	61.87	127.38	Xv
34.69	122.88	17.43	127.11	81.22	126.76	T
44.65	123.67	17.71	127.1	98.31	127.25	T
53.2	123.42	31.4	127.02	107.73	126.51	T
76.17	125.6	33.11	126	152.33	125.82	T
90.43	125.78	42.93	125.92	187.07	125.97	Xv
92.19	121.93	58.1	125.92	255.35	124.96	T
96.96	121.84	60.55	125.93	298.77	124.63	m
103	124.02	76.64	125.92	318.18	124.34	R
111.44	123.57	89	125.93	336.49	124.18	U
126.1	123.59	91.27	124.64	380.14	123.54	T
146.01	123.8	100.3	124.57	415.55	123.03	R
197.12	123.07	103.51	124.52	447.95	122.31	T
226.43	123.28	111.27	124.43	464.78	122.69	T
267.59	121.86	118.36	124.41	486.21	122.22	U
275.09	121.12	125.36	124.41	541.69	121.14	T
287.64	122.22	127.8	124.36	595.52	119.6	R
334.73	121.46	143.82	124.34	629.45	118.67	T
367.01	121.31	196.85	123.74	644.63	118.17	T
393.53	120.82	227.42	123.68	679.28	117.72	T
454.5	120.02	265.92	122.77	716.99	117.25	P
463.58	119.55	275.09	122.73	736.02	117.73	m
480.25	119.92	288.84	122.65	762.82	117.19	Xv
482.56	118.37	335.07	121.98	803.87	116.74	T
483.21	118.34	368.37	121.78	826.32	116.53	m
503.87	118.55	393.84	121.42	847.86	115.97	T
521.74	119.38	449.88	120.63	864.85	115.53	R
551.86	118.92	463.45	120.57	893.28	115.1	Xv
553.69	117.09	463.92	120.56	920.66	115.58	T
554.13	117.07	480.57	120.41	946.77	114.84	T
565.3	117.34	482.25	119.9	970.92	114.34	m
577.01	117.94	486.07	119.9	-54.41	129.14	R
617.81	116.25	502.99	119.75	-15.13	128.78	P
624.35	115.74	521.54	119.71	2.09	128.67	m
635.65	116.35	552.05	119.25	55.18	127.61	R
635.74	116.35	553.36	118.53	92.71	126.65	R
660.91	115.69	558.17	118.53	121.09	126.03	T
693.02	115.39	578.2	118.47	122.05	126.03	T
727.61	115.02	618.05	116.89	140.67	126.19	T
741.42	114.89	624.49	116.84	166.85	125.55	T
752.27	114.21	636.08	116.71	197.57	125.34	P
758.82	113.85	661.23	116.43	248.98	124.37	m
785.51	114.59	692.87	116.1	287.77	123.89	R
812.05	113.76	725.95	115.51	326.87	123.78	T
824.9	113.39	741.49	115.37	355.22	123.82	U
844.44	113.9	752.48	114.96	391.98	123.61	Xv
846.8	112.5	758.76	114.97	427.85	122.71	T
850.24	112.42	785.39	115.03	464.74	122.62	m
867.68	112.82	811.22	114.42	494.73	121.46	T
876.11	113.15	825.01	114.09	537.33	121.23	R
907.87	112.47	845.72	114.1	589.22	119.32	T
916.16	112.28	850.59	113.57	626.26	118.16	T
926.91	111.74	868.86	113.48	643.42	118.59	P
941.24	111.28	875.85	113.54	679.44	117.76	m
950.61	112.13	909.32	112.76	718.82	117.14	R
978.57	111.43	916.18	112.58	736.18	116.72	T
1005.72	110.01	926.95	112.55	763.66	117.04	CULVIN
1025.63	110.01	928.21	112.52	798.39	116.84	CULVOUT
		938.63	112.49	844.42	115.69	
		979.6	112.07	874.62	115.43	
		1004	111.11	893.23	115.29	
		1025.7	110.97	905.06	114.86	
				921.77	114.53	
				947.61	114.61	
				969.26	113.73	

Project Name Purlear Phase I
Task Longitudinal Profile
Section Area #2 Upper Middle Trib
Date 6/10/05
Crew Shaffer, Bidelspach, Clinton

Symbol Key	
T	Thalweg
R	Head of Riffle
P	Head of Pool
U	Head of Run
M	Max Pool

2004 Survey - As Built Survey

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
0	121.17	0.61	121.33	92.94	121.7	TR
24.71	120.9	24.51	121.03	187.9	120.09	XT
73.88	120.75	74.25	120.91	225.89	118.77	TV
75.75	118.22	93.02	119.72	214.85	119.07	TP
92.46	119.74	106.2	119.84	72.29	122.38	TR
105.72	119.66	128.3	119.71	105.99	121.43	TP
116.34	119.45	174.23	119.54	174.68	119.47	XT
128.18	119.56	174.67	119.59	262.63	118.34	TR
128.25	119.59	175.48	118.3	259.57	118.55	TR
175	119.38	175.52	118.31	173.5	120.74	TV
176.42	117.49	187.11	118.2	187.77	120.29	T
176.83	117.48	188.39	117.98	215.4	120.01	T
187.1	118.04	214.26	118.07	174.23	120.92	T
188.51	117.97	215.02	118.15	247.18	118.9	TR
215.31	117.98	215.69	117.6	242.06	119.26	TV
215.38	118.05	216.79	117.68	227.71	119.67	TV
216.53	116.54	225.37	117.6	129.47	121.08	T
216.96	116.48	228.07	117.7			T
225.01	117.31	243.61	117.62			T
227.46	117.57	246.07	117.5			TP
243.23	117.54	258.66	117.51			TM
247.33	117.36					T
259.15	117.29					TR

2005 Survey* * 2005 elev adjusted up by 1.0 ft

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
-126.83	124.56	-126.68	124.82	-20.66	122.19	Xv
-125.84	122.11	-125.36	123.11	4.77	122.25	T
-122.24	121.59	-122.26	123.13	37.69	122.35	m
-117.1	123.06	-117.18	123.14	66.48	122.28	R
-98.36	122.67	-102.27	122.9	118.02	121.09	T
-89.83	122.67	-90.89	122.91	92.85	121.74	T
-74.94	122.24	-76.05	122.44	-39.76	122.81	T
-64.25	122.13	-65.51	122.28	172.43	120.55	Xv
-63.05	120.43	-63.26	121.6	213.63	119.16	T
-61.9	120.31	-61.73	121.59	-65.09	124.14	m
-55.73	121.38	-57.08	121.59	240.76	118.66	R
-35.15	121.24	-36.19	121.47	137.4	120.92	T
-21.86	121.01	-21.84	121.37	-126.24	125.77	P
-16	120.91	-14.32	121.4	-95.01	124.13	m
1.55	120.98	0.11	121.22	36.82	122.42	R
14.49	120.68	14.82	121.07	3.59	122.39	T
23.01	120.79	22.66	121.05	67.83	121.89	T
51.49	120.55	50.58	120.91	-15.81	122.79	T
74.37	120.63	73.61	120.88	-64.02	123.56	Xv
76.34	118.41	78.53	120.23	-95.24	124.39	T
78.85	118	85.67	120.19	174.98	120.68	M
84.46	120.01	104.89	119.93	-124.95	125.62	R
104.73	119.63	106.95	119.95	-36.79	123.15	T
106.98	119.69	115.62	119.91	213.58	119.83	P
114.91	119.37	115.7	119.89	246.37	118.82	m
131.91	119.44	131.87	119.69	140.71	121.12	R
142.49	119.29	143.47	119.55	91.61	121.55	T
161.61	119.26	161.28	119.46	118.08	121.01	T
175.23	119.05	174.44	119.4			Xv
176.16	117.37	176.86	118.23			T
178.57	115.95	186.03	118.18			m
185.72	118.1	205.55	118.15			R
205.15	117.87	214.08	118.09			T
214.62	117.91	216.47	117.87			Xv
215.74	116.76	217.07	117.87			T
220.3	116.19	228.31	117.81			m
227.83	117.72	243.44	117.6			R
242.48	117.36	250.04	117.57			P
250.04	116.91	253.12	117.57			m
260.51	117.32	260.36	117.41			R

Project Name Purlear Phase I
Task Longitudinal Profile
Section Area #3 Lower Middle Trib (Upper Section)
Date 6/10/05
Crew Shaffer, Bidelspach, Clinton

Symbol Key	
T	Thalweg
R	Head of Riffle
P	Head of Pool
U	Head of Run
M	Max Pool

2004 Survey - As Built Survey

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
0.76	101.5	3.05	100.15	11.1	104.29	RV
6.9	98.25	13.22	100.18	565.52	95.9	T
13.29	98.4	16.06	100.18	628.32	95.17	TM
16.5	99.03	24.77	100.15	542.32	98.25	TG
24.74	99.73	68.78	99.64	200.46	101.56	TR
69.24	99	81.61	99.58	478.83	98.85	TU
84.74	97.92	84.39	99.52	333.29	98.58	TM
93.92	98.98	93.97	99.57	65.76	103.18	T
99.23	99.23	98.87	99.52	435.4	99.04	TR
124.71	98.47	124.36	98.97	384.7	98.12	TU
150.75	98.44	150.94	99	649.92	94.99	TV
152.93	96.55	152.38	98.18	273.37	100.42	T
157.48	96.12	157.23	98.13	119.04	102.59	TM
164.39	97.74	163.92	98.16	694.82	93.94	T
173.05	97.37	173.11	98.2	500.64	99.14	T
180.37	97.69	180.41	98.12	624.41	96.34	TR
189.94	96.94	190.14	97.99	206.94	103.44	TP
196.54	96.5	196.02	97.99	585.55	96.45	TM
207.67	96.88	207.6	98.02	358.63	99.35	T
216.18	97.66	216.03	97.99	408.44	98.85	TR
240.95	97.47	241	97.69	31.48	104.55	T
260.75	97.05	260.81	97.66	307.16	99.82	T
277.47	97.36	277.33	97.48	159.8	103.16	TV
279.45	93.37	278.56	96.44	524.66	96.68	T
284.58	93.19	284.32	96.45	463.15	97.81	TM
292.95	95.07	292.99	96.45	684.16	94.28	T
301.4	95.92	301.44	96.44	91.99	103.99	TR
317.63	95.56	317.63	96.15	532.14	95.01	TU
324.06	91.84	324.51	93.11	245.72	101.45	TM
327.73	92.56	327.8	93.2	127.87	104.06	T
333.2	92.78	329.99	96.19			TR
349.01	95.4	348.96	95.69			T
375.84	95.23	375.65	95.52			T
394.06	94.7	393.58	95.37			T
413.93	94.84	413.81	95.23			T
425.36	94.92	425.44	95.02			TV
426.53	92.64	426.31	94.41			T
428.66	92.18	430.75	94.37			TM
434.64	93.69	434.33	94.44			T
443.27	93.73	443.27	94.46			T
448.23	94.1	448.14	94.39			TR
456.92	93.81	456.58	94.06			TP
462.24	92.25	461.61	94.14			TM
469.03	93.18	469.07	94.18			T
474.07	93.67	473.63	94.13			TR
491.43	93.31	491.16	93.68			T
507.75	92.97	507.73	93.49			T
524.54	92.86	524.58	93.39			T
545.52	92.61	545.55	93.16			T
560.66	92.57	560.94	93.14			T
570.5	92.91	570.56	93.04			TV
573.29	90.31	571.85	92.4			T
575.6	90.45	576.75	92.5			T
586.36	91.98	585.8	92.43			TR
613.56	91.61	613.09	91.97			T
631.01	91.05	631.02	91.66			TP
636.5	90.49	635.97	91.72			TM
643.23	91.31	643.15	91.65			TR
665.53	91.12	665.51	91.66			T
676.7	91.25	676.7	91.53			TV
678.36	88.84	678.01	90.95			T
684.08	88.76	685.44	91.05			T
691.86	90	692.05	90.99			T
703.7	90.64	703.6	90.98			TR

2005 Survey*

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
-129.58	102	-130.1	102.27	-102.84	103.27	r
-127.29	101.66	-120.65	102.08	-80.73	103.07	p
-122.95	101.01	-97.36	101.74	-38.49	102.5	m
-112.87	101.77	-86.29	101.76	-4.81	102.3	r
-80.64	101.4	-74.16	101.69	35.5	101.35	u
-72.74	100.95	-60.66	101.68	60.59	100.75	p
-62.88	101.53	-30.23	101.76	80.94	101.12	r
-50.78	100.9	-1.96	101.59	113.4	101.03	t
-24.95	100.97	-1.62	101.54	150.94	99.82	t
-5.08	100.87	18.56	100.19	187.61	99.63	t
-0.56	101.19	25.07	100.29	221.4	98.78	rv
0.76	101.5	59.11	99.45	264.94	98.49	rv
11.07	98.3	83.84	99.38	309.68	97.33	m
16.55	99.34	93.47	99.44	310.77	97.57	g
24.54	99.8	111.94	99.22	356.74	96.57	r
61.35	99.1	132.67	98.89	410.35	96.22	u
70.96	98.33	149.84	98.97	461.66	95.66	p
79.02	97.86	160.11	98.06	491.85	95.44	m
94.9	99.25	177.19	98.07	530.01	94.56	r
141.33	98.17	195.35	97.94	572.16	93.86	t
147.58	98.55	214.66	97.89	633.71	92.89	rv
151.24	96.24	226.23	97.63	668.97	92.63	m
163.87	97.88	249.33	97.51	712.29	92.03	r
182.16	97.6	271.67	97.35	46.45	101.14	u
188.25	96.44	284.36	96.51	-19.93	102.73	p
194.36	95.63	295.46	96.51	136.11	100.69	t
207.6	96.6	315.66	95.93	-51.87	103.02	g
212.76	97.63	328.84	96.16	172.28	99.53	r
231.47	97.38	371.85	95.52	213.8	99.49	t
259.26	96.7	383.24	95.32	84.17	101.1	t
274.49	97.34	402.29	95.14	-122.68	103.23	rv
277.68	97.05	423.02	94.9	260.22	98.74	rv
280.53	93.07	432.46	94.44	422.84	96.24	m
296.88	96.26	449.05	94.29	366.75	97.12	r
314.46	95.3	465.07	93.9	458.73	95.53	p
317.51	94.86	474.16	93.99	539.31	94.73	m
330.48	95.85	495	93.54	501.61	95.09	r
363.85	95.3	524.49	93.29	651.95	93.17	t
388.24	94.53	545.37	93.01	307.65	98.65	t
401.74	95.07	567.35	92.98	-81.33	102.84	r
416.89	94.44	582.8	92.61	702.45	92.61	t
422.22	94.91	599.92	92.11	583.51	94.05	rv
425.24	92.27	616.52	91.68			m
432.62	93.43	631.85	91.62			g
445.89	94.06	641.3	91.64			r
459	92.79	657.31	91.57			m
463.76	92.73	673.8	91.45			g
473.91	93.68	688.73	90.99			r
518.86	92.97	709.42	90.93			t
541.75	92.73					t
564.45	92.46					t
567.53	92.85					rv
572.85	90.3					m
584.88	92.36					u
604.8	91.6					t
624.6	91.18					p
630.82	90.41					m
644.64	91.24					r
660.88	90.93					t
673.4	91.13					rv
680.26	88.64					m
688.42	89.91					g
701.06	90.69					r

Project Name Purlear Phase I
Task Longitudinal Profile
Section Area #4 Middle Main
Date 6/10/05
Crew Shaffer, Bidelspach, Clinton

Symbol Key	
T	Thalweg
R	Head of Riffle
P	Head of Pool
U	Head of Run
M	Max Pool

2004 Survey - As Built Survey

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
33.68	114.68	34.8	114.99	91.23	115.9	TR
70.19	114.32	70.88	114.65	461.34	110.39	TP
78.47	113.46	93.78	114.54	266.4	112.93	TM
93.96	114.46	96.29	113.77	1.29	116.8	V
95.19	112.23	127.05	113.67	435.66	110.4	T
126.68	113.31	133.25	113.64	33.21	116.78	T
133.22	113.38	185.1	113.26	128.15	115	TR
185.09	113.16	186.16	111.97	136.04	115.19	V
188.7	111.37	203.59	112.07	492.46	109.65	T
203.98	111.83	240.95	111.87	589.12	108.27	TR
221.74	111.51	268.23	111.88	633.34	107.63	TP
227.98	111.38	319.05	110.41	529.52	109.45	TR
240.88	111.08	337.49	110.39	334.18	112.02	TM
267.91	111.8	353.89	110.35	390.8	111.85	TR
306.8	110.87	375.43	110.16	240.26	113.24	t
314.81	110.77	406.09	110.09	576.73	109.52	rv
319.16	107.82	414.36	109.12			m
333.55	109.95	434.72	109.06			TU
353.85	109.95	455.83	108.89			TR
366.67	110.01	496.96	108.7			TP
375.98	108.68	502.32	107.95			TM
391.2	109.92	529.81	107.89			TR
409.3	109.89	571.18	107.79			V
413.3	106.15	577.38	107.08			T
434.72	108.95	590.1	107.11			TR
455.88	108.58	618.65	106.84			T
481.97	108.39	634	106.81			T
501.3	108.39	646.4	106.72			V
506	105.75	654.67	105.68			TM
529.66	107.2	665.62	105.66			T
547.49	107.12					T
571.61	107.55					T
573.3	107.75					V
578.7	104.95					TM
589.58	106.8					TR
613.87	106.48					TP
619.46	105.82					TM
633.84	106.32					T
646.94	106.4					V
653.19	103.69					TM
666.05	105.42					T

2005 Survey*

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
5.49	114.76	4.15	115.05	26.22	116.81	r
14.06	114.33	18.53	115	46.1	116.61	t
33.56	114.72	32.76	114.98	66.67	115.97	r
52.89	114.54	53.89	114.77	81.39	116.13	t
71.55	114.43	71.5	114.67	103.27	115.15	u
76.85	113.59	82.8	114.65	133.02	115.26	t
87.67	114.21	92.42	114.67	153.44	115.13	t
92.24	114.43	125.15	113.85	174.77	114.93	rv
95.95	112.25	147.52	113.68	208.55	113.82	m
97.9	114	169.19	113.6	233.1	113.09	m
105.5	113.82	184.82	113.45	257.8	113.25	t
127.84	113.63	189.23	112.27	279.43	113.03	t
148.13	113.41	195.82	112.2	289.07	112.9	t
165.35	113.26	200.42	112.2	308.24	112.31	t
184.73	113.14	203.81	112.2	343.3	112.09	rv
190.56	111.15	223.11	111.97	394.3	111.65	m
194.62	111.96	232.28	111.94	445.09	110.44	t
203.53	111.99	243.86	111.94	464.49	110.57	r
222.41	111.78	262.41	111.92	480.92	110.45	u
233.1	111.46	268.33	111.94	495.99	109.79	t
243.78	111.4	293.58	111.7	535.98	109.21	t
261.46	111.62	306.57	111.26	581.13	108.67	t
270.66	111.65	315.03	111.17	605.98	108.33	r
293.14	111.28	319.55	110.43	622.59	107.98	t
306.8	110.87	330.3	110.5	632.7	107.88	t
314.81	110.77	340	110.43	541.07	109.38	rv
319.16	107.82	352.73	110.44	557.8	109.4	m
329.43	109.48	362.36	110.28	246.88	112.83	t
352.93	110.01	373.01	110.28	331.6	112.07	t
361.52	110.13	378.5	110.34	396.53	111.84	r
370.76	109.81	381.47	110.37	519.93	109.35	u
373.61	109.28	398.19	110.22	575.1	109.17	p
378.31	108.89	408.23	110.05	226.57	113.64	m
382.3	109.72	413.43	109.37	421.98	110.92	g
397.53	109.99	420.74	109.42	421.88	110.9	r
410.15	109.32	430.02	109.32	378.12	112.28	rv
410.37	109.9	451.56	109.06	504.24	109.66	brv
413.32	106.44	468.34	108.86	355.3	112.2	m
423.22	108.58	501.68	108.81	49.96	115.87	g
431.53	109.09	507.3	108.19	211.89	114	r
452.27	108.74	519.6	108.1	202.77	114.4	t
468.7	108.42	527.57	108.03	75.04	115.8	t
501.07	108.58	534.62	107.94	593.79	108.61	t
502.11	108.29	539.1	107.98	182.64	114.28	rv
506.13	106.02	554.01	107.96	109.08	115.24	m
518.76	107.22	573.23	107.94	15.57	116.79	t
527.29	107.87	575.48	107.93	632.53	108.01	r
530.67	107.75	579.58	107.16	291.95	112.59	u
534.46	107.31	586.3	107.22	150.36	114.75	p
539.75	107.18	598.92	107.12	462.99	110.41	m
554.98	107.26	610.94	106.89			g
572.85	107.47	619.86	106.89			t
575.92	107.75	625.59	106.9			rv
579.59	105.03	634.15	106.85			m
586.2	106.53	646.12	106.78			g
599.14	106.85	649.1	106.74			r
610.44	106.46	656.36	105.76			u
619.86	106.42	662.25	105.79			p
625.59	105.7					m
632.94	106.31					t
646.5	106.35					t
650.31	106.5					rv
655.19	103.27					m
663.02	105.5					t

Project Name Purlear Phase I
Task Longitudinal Profile
Section Area #6 Lower Main
Date 6/10/05
Crew Shaffer, Bidelspach, Clinton

Symbol Key	
T	Thalweg
R	Head of Riffle
P	Head of Pool
U	Head of Run
M	Max Pool

2004 Survey - As Built Survey

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
0	67.42	0.7	70.68	137.31	71.16	TM
29.57	69.59	29.68	70.65	405.21	69.65	TU
54.45	69.96	54.38	70.69	477.94	68.78	T
91.83	70.14	91.29	70.59	188.92	71.31	V
95.79	70.16	103.16	69.51	211.81	71.24	V
98.99	66.41	141.82	69.49	441.2	69.53	TM
141.6	68.5	184.95	69.51	225.45	70.82	T
185.07	69.01	200.41	69.49	225.45	70.82	T
199.79	66.52	225.87	69.53	554.58	67.69	TM
225.79	68.97	251.76	69.46	510.93	67.41	T
249.3	69.14	268.55	69.01	285.5	70.16	V
266.8	66.47	286.47	68.99	314.34	70.66	TM
282.8	68.14	304.53	69.03	20.22	72.43	T
304.31	67.04	323.98	69.04	354.52	70.29	T
315.52	68.24	350.57	69.02			T
323.69	68.12	358.56	67.94			T
348.9	68.72	387.42	67.89			T
357.88	66.14	395.85	67.94			TN
387.16	66.65	417.02	67.8			T
416.88	66.26	438.41	67.84			T
434.8	66.34	456.51	67.8			T
454.2	66.07	476.21	67.74			T
472.1	67.27	486.69	66.08			V
483	63.91	509.02	66.04			TM
509.09	65.67	523.69	65.99			TR
523.46	65.24	554.23	65.93			TP
554.12	65.09					TM

2005 Survey*

TW Station	TW Elevation	WS Station	WS Elevation	BKF Station	BKF Elevation	Feature
-5.52	70.54	-4.86	71.24	18.29	71.54	t
-4.19	71.09	-0.19	70.58	64.67	71.56	rv
-4.13	71.09	14.58	70.56	93.14	71.58	t
4.28	68.18	27.34	70.56	130.3	71.52	t
13.45	68.14	33.98	70.56	167.1	70.77	t
21.42	69.14	54.21	70.53	167.74	71.06	t
22.83	69.23	70.81	70.57	222.96	70.86	t
47.32	69.62	71.06	70.56	291.45	70.04	t
66.79	69.45	97.5	70.41	291.8	70.06	t
85.75	69.62	100.88	69.48	323.99	69.83	t
97.81	70.04	116.6	69.45	345.51	69.8	rv
100.3	66.54	134.41	69.43	441.12	69.41	t
104.6	65.79	159.83	69.47	473.11	68.66	t
113.07	67.25	161.61	69.43	524.39	67.59	t
124.31	66.8	199.5	69.46	556.5	67.19	t
124.43	66.79	201.15	69.45	582.68	67.2	t
140.23	67.98	222.89	69.46	595.9	67.05	t
152.79	68.72	247.58	69.45	663.95	66.15	t
173.95	68.53	250.48	68.93	734.56	64.75	t
185.67	68.54	285.92	68.93	777	63.89	t
215.97	67.22	298.36	68.92	812.84	63.8	t
235.76	68.03	305.56	68.92	29.76	72.31	t
248.15	69.16	325.8	68.97	74.31	71.92	rv
254.75	67.48	349.4	68.92	98.39	71.54	t
269.41	66.81	352.57	67.82	138.76	70.73	t
277.83	67.66	382.6	67.83	204.39	70.5	t
297.4	67.21	390.39	67.8	209.27	70.69	t
312.25	67.32	407.38	67.69	267.72	70.16	t
334.24	67.21	423.14	67.7	298.33	69.85	t
340.84	67.74	427.83	67.7	298.38	70.41	t
349.51	68.65	448.01	67.7	351.62	70.16	rv
350.63	65.66	449.97	67.68	388.61	69.45	t
353.51	65.21	473.18	67.67	423.25	69.07	t
363.81	65.21	477.28	66.45	457.58	68.78	t
374.05	65.75	493.14	66.4	502.07	68.33	t
390.35	66.55	495.15	66.43	542.54	67.75	t
396.02	67.52	495.41	66.42	576.05	67.74	lv
401.63	66.93	518.19	66.38	606.8	67.33	t
413.33	66.59	532.3	66.41	630.19	67.15	t
423.59	66.25	536.9	66.33	660.66	65.59	t
451.48	65.31	551.51	65.78	695.13	64.94	t
456.49	65.43	567.97	65.72			t
465.31	66.58	573.45	65.7			t
471.82	67.12	584.45	65.72			t
472.3	67.31	604.81	65.7			rv
475	66.58	607.21	64.32			t
481.81	63.56	634.16	64.28			t
495.94	63.65	642.37	64.28			t
515.62	64.81	657.64	64.2			t
526.75	66.04	669.74	63.85			r
539.46	65.71	683.58	63.72			t
553.91	65.36	692.19	63.69			t
583.76	64.76	713.39	63.7			t
594.98	63.93	715.46	63.68			t
604.44	65.27	739.74	63.63			rv
606.76	62.58	748.38	63.36			t
612.83	62.23	758.87	63.11			t
623.31	62.93	769.59	62.75			t
634.03	63.03	786.37	62.78			t
653.25	63.5	805.46	62.72			t
662.81	63.59	849.38	62.72			bedrock
662.83	63.59	853.67	62.69			t
678.21	63.22					t
686	63.49					bedrock
686.03	63.45					t
702.2	62.72					t
716.53	63.19					t
742.82	63.17					r
762.73	62.57					run
777.13	61.74					t
804.34	61.84					t
826	62.09					t
852.57	62.01					t
870.8	61.46					t

Project Name	Purlear Creek
Task	Feature Slope and Length Calculations
Date	2/1/05
Crew	Shaffer, Bidelspach, Clinton

Area 1 - 2005

Riffle Station	Change	Water Elev	change	slope
144		124.34		
197	53	123.74	0.6	1.13%
227		123.68		
265	38	122.77	0.91	2.39%
289		122.65		
335	46	121.98	0.67	1.46%
368		121.78		
481	113	120.41	1.37	1.21%
522		119.71		
552	30	119.25	0.46	1.53%
578		118.47		
618	40	116.89	1.58	3.95%
636		116.71		
752	116	114.96	1.75	1.51%
785		115.03		
825	40	114.09	0.94	2.35%
875		113.54		
916	41	112.58	0.96	2.34%
938		112.49		
1004	66	111.11	1.38	2.09%

Pool Station	length	p-p spacing
-22		
31	53	
33		
89	56	56.5
91		
104	13	36.5
266		
289	23	180
482		
522	40	224.5
553		
578	25	63.5
618		
636	18	61.5
752		
785	33	141.5
825		
846	21	67
851		
876	25	28
916		
939	23	64

	min	max	median
Length	30.0	116.0	43.5
Slope	1.13%	3.95%	1.81%
Length	13.0	56.0	25.0
Spacing	28	225	64

Area 2 - 2005

Riffle Station	Change	Water Elev	change	slope
-117		123.14		
-66	51	122.28	0.86	1.69%
-57		121.59		
-22	35	121.37	0.22	0.63%
1		121.22		
74	73	120.88	0.34	0.47%
86		120.19		
107	21	119.95	0.24	1.14%
132		119.69		
174	42	119.4	0.29	0.69%
186		118.18		
214	28	118.09	0.09	0.32%
228		117.81		
243	15	117.6	0.21	1.40%

Pool Station	length	p-p spacing
-62		
-57	5	
-22		
1	23	49
79		
86	7	93
107		
132	25	37
177		
186	9	62
217		
228	11	41
243		
260	17	29

	min	max	median
Length	15.0	73.0	35.0
Slope	0.32%	1.69%	0.69%
Length	5.0	25.0	11.0
Spacing	29	93	45

Area 3 - 2005

Riffle Station	Change	Water Elev	change	slope
-121		102.08		
-86	35	101.76	0.32	0.91%
25		100.29		
59	34	99.45	0.84	2.47%
93		99.44		
133	39.2	98.89	0.55	1.40%
160		98.06		
195	35.24	97.94	0.120	0.34%
215		97.89		
249	34	97.51	0.380	1.12%
295		96.51		
316	21	95.93	0.580	2.76%
329		96.16		
423	94	94.9	1.260	1.34%
449		94.29		
465	16	93.9	0.390	2.44%
474		93.99		
545	71	93.01	0.980	1.38%
582		92.61		
617	35	91.68	0.930	2.66%
641		91.64		
674	33	91.45	0.190	0.58%

Pool Station	length	p-p spacing
-86		
-2	84	
59		
93	34	120
133		
150	17	65.5
195		
215	20	63.5
249		
272	23	55.5
284		
295	11	29
316		
329	13	33
432		
449	17	118
465		
474	9	29
545		
567	22	86.5
617		
641	24	73
689		
709	20	70

	min	max	median
Length	16.0	94.0	35.0
Slope	0.34%	2.76%	1.38%
Length	9.0	84.0	20.0
Spacing	29	120	66

Area 4 - 2005

Riffle Station	Change	Water Elev	change	slope
33		114.98		
71	38	114.67	0.31	0.82%
125		113.85		
185	60	113.45	0.4	0.67%
204		112.2		
223	19	111.97	0.23	1.21%
268		111.94		
315	47	111.17	0.77	1.64%
353		110.44		
373	20	110.28	0.16	0.80%
398		110.22		
408	10	110.05	0.17	1.70%
430		109.32		
468	38	108.86	0.46	1.21%
528		108.03		
535	7	107.94	0.09	1.29%
599		107.12		
611	12	106.89	0.23	1.92%

Pool Station	length	p-p spacing
4		
33	29	
71		
92	21	63
189		
204	15	115
223		
268	45	49
320		
353	33	91
373		
398	25	49
413		
430	17	36
507		
527	20	95.5
534		
575	41	37.5
579		
599	20	34.5
611		
649	38	41
656		
662	6	29

	min	max	median
Length	7.0	60.0	19.0
Slope	0.67%	1.92%	1.21%
Length	6.0	45.0	23.0
Spacing	29	115	49

Area 5 - 2005

Riffle Station	Change	Water Elev	change	slope
-16		85.74		
12	28	85.59	0.15	0.54%
43		85.06		
74	31	84.45	0.61	1.97%
130		83.85		
136	6	83.78	0.07	1.17%
201		82.99		
247	46	82.59	0.4	0.87%
272		82.11		
282	10	81.72	0.39	3.90%
334		81.62		
339	5	81.53	0.09	1.80%
371		81.51		
396	25	81.05	0.46	1.84%
422		81.03		
445	23	80.42	0.61	2.65%
469		80.45		
518	49	80	0.45	0.92%
547		79.61		
593	46	78.96	0.65	1.41%
641		78.43		
674	33	77.99	0.44	1.33%

Pool Station	length	p-p spacing
15		
43	28	
73		
97	24	56
99		
130	31	29.5
135		
173	38	39.5
175		
201	26	34
250		
272	22	73
298		
334	36	55
338		
371	33	38.5
396		
422	26	54.5
445		
469	24	48
521		
547	26	77
593		
608	15	66.5
610		
641	31	25
674		
697	23	60
699		
710	11	19

	min	max	median
Length	5.0	49.0	28.0
Slope	0.54%	3.90%	1.41%
Length	11.0	38.0	26.0
Spacing	19	77	51

Area 6 - 2005

Riffle Station	Change	Water Elev	change	slope
532		66.41		
568	36	65.72	0.69	1.92%
658		64.2		
692	34	63.69	0.51	1.50%
740		63.63		
770	30	62.75	0.88	2.93%

Pool Station	length	p-p spacing
-5		
98	103	
101		
248	147	128
250		
349	99	125
353		
473	120	113.5
477		
532	55	91.5
568		
605	37	82
608		
658	50	46.5
692		
740	48	83
770		
854	84	96

	min	max	median
Length	30.0	36.0	34.0
Slope	1.50%	2.93%	1.92%
Length	37.0	147.0	84.0
Spacing	47	128	94

Project Name	Purlear Phase 1
Task	Channel Pattern Measurements
Date	
Crew	Shaffer, Bidelspach, Clinton

Area 1
2005

Radius of Curvature	Meander Wavelength	Channel Beltwidth
		202
Straight Channel No Pattern Measements Necessary		
0	0	202
0	0	202
-	-	202

Area 2
2005

Radius of Curvature	Meander Wavelength	Channel Beltwidth	
77	255	69	
69	245	69	
81	236	70	
62			
62	236	69	***min***
81	255	70	***max***
73	245	69	***median***

Area 3
2005

Radius of Curvature	Meander Wavelength	Channel Beltwidth
Straight Channel No Pattern Measements Necessary		
0	0	0
0	0	0
-	-	-

Area 4
2005

Radius of Curvature	Meander Wavelength	Channel Beltwidth	
77	138	28	
49	132	32	
49	120	47	
37	153	50	
	157	55	
	132		
37	120	28	***min***
77	157	55	***max***
49	135	47	***median***

Area 5
2005

Radius of Curvature	Meander Wavelength	Channel Beltwidth	
41	113	40	
40	134	42	
49	134	48	
47	174	50	
87	187	49	
56	145	36	
52	149		
70			
40	113	36	***min***
87	187	50	***max***
51	145	45	***median***

Area 6
2005

Radius of Curvature	Meander Wavelength	Channel Beltwidth
79	238	71
139	182	55
77	188	68
73	195	67
69	194	
66		
50		
50	182	55
139	238	71
73	194	68

GPS Coordinates

Project Number and Name: 294 (Purlear Creek)

NAD 1983 State Plane North Carolina FIPS 3200 GCS_North_American_1983

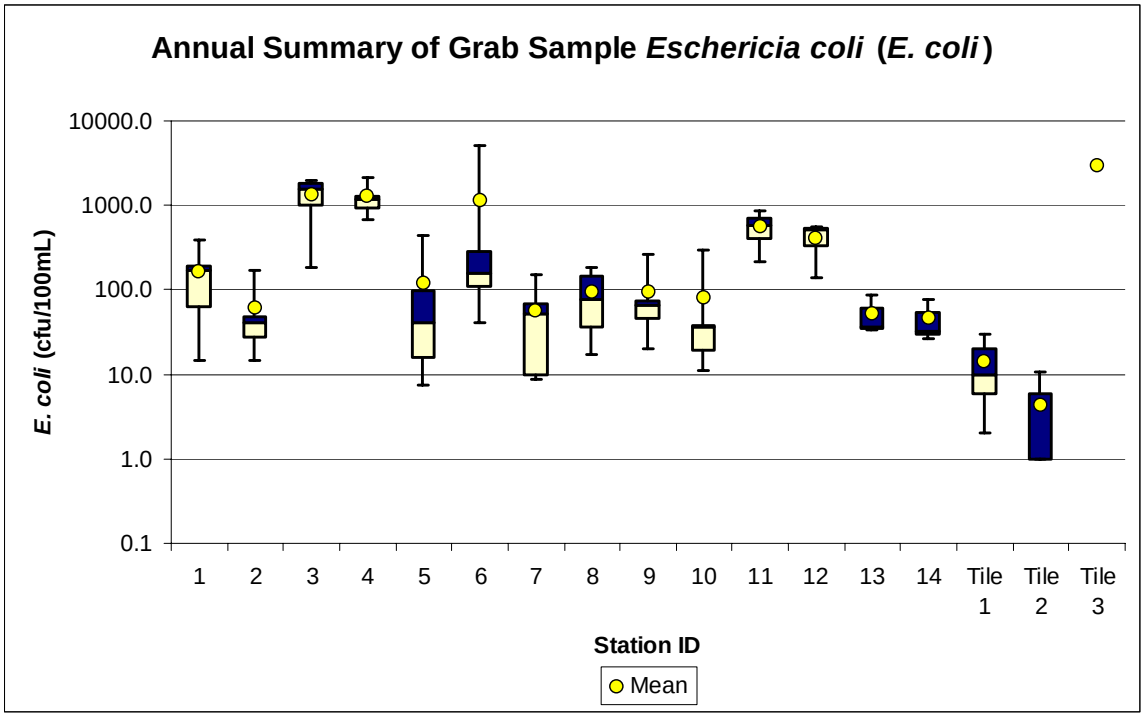
Description	Northing	Easting	EASTING	NORTHING	LONGITUDE	LATITUDE
Purlear plot 1	4006693	472576	402322.68	274716.68	-81.30507	36.20466
Purlear plot 2	4006663	472640	402386.09	274685.39	-81.30435	36.20440
Purlear plot 3	4006623	472787	402532.32	274642.43	-81.30272	36.20404
Purlear plot 4	4006740	472876	402623.69	274757.67	-81.30173	36.20510
Purlear plot 5	4006639	472884	402629.66	274656.48	-81.30164	36.20419
Purlear plot 6	4006600	472882	402626.87	274617.52	-81.30166	36.20383
Purlear plot7	4006533	472845	402588.52	274551.25	-81.30207	36.20323
Purlear plot 8	4006486	472933	402675.60	274502.47	-81.30109	36.20281
Purlear plot 9	4006414	472949	402690.15	274430.13	-81.30091	36.20216
Purlear plot 10	4006374	472973	402713.35	274389.64	-81.30064	36.20180
Purlear plot 11	4006277	472993	402731.41	274292.22	-81.30041	36.20093
Purlear plot 12	4006218	473030	402767.23	274232.47	-81.30000	36.20039
Purlear plot 13	4006142	473075	402810.72	274155.55	-81.29950	36.19971
Purlear plot 14	4006049	473162	402895.86	274060.78	-81.29853	36.19887
Purlear plot 15	4006046	473161	402894.80	274057.80	-81.29854	36.19885
Purlear plot 16	4005993	473216	402948.75	274003.69	-81.29792	36.19837
Purlear plot 17	4005936	473309	403040.62	273944.81	-81.29689	36.19786
Purlear plot 18	4005889	473383	403113.70	273896.31	-81.29606	36.19744
Purlear plot 19	4006759	473378	403126.17	274766.59	-81.29615	36.20528
Purlear plot 20	4006697	473343	403089.92	274705.28	-81.29653	36.20472
Purlear plot 21	4006677	473348	403094.51	274685.17	-81.29648	36.20454
Purlear plot 22	4006618	473325	403070.33	274626.62	-81.29673	36.20401
Purlear plot 23	4006511	473310	403053.17	274519.90	-81.29689	36.20304
Purlear plot 24	4006372	473273	403013.37	274381.62	-81.29730	36.20179
Purlear plot 25	4006343	473269	403008.79	274352.69	-81.29735	36.20153
Purlear plot 26	4006258	473311	403049.09	274266.83	-81.29688	36.20076
Purlear plot 27	4006199	473340	403076.91	274207.24	-81.29655	36.20023
Purlear plot 28	4006158	473350	403086.09	274166.03	-81.29644	36.19986
Purlear plot 29	4006120	473359	403094.33	274127.84	-81.29634	36.19952
Purlear plot 30	4006070	473392	403126.33	274077.17	-81.29597	36.19907
Purlear plot 31	4006000	473416	403148.93	274006.67	-81.29570	36.19844
Purlear plot 32	4005903	473461	403191.99	273908.75	-81.29519	36.19757
Purlear plot 33	4005727	473567	403294.48	273730.59	-81.29401	36.19598
Purlear plot 34	4005632	473674	403399.59	273633.42	-81.29282	36.19513

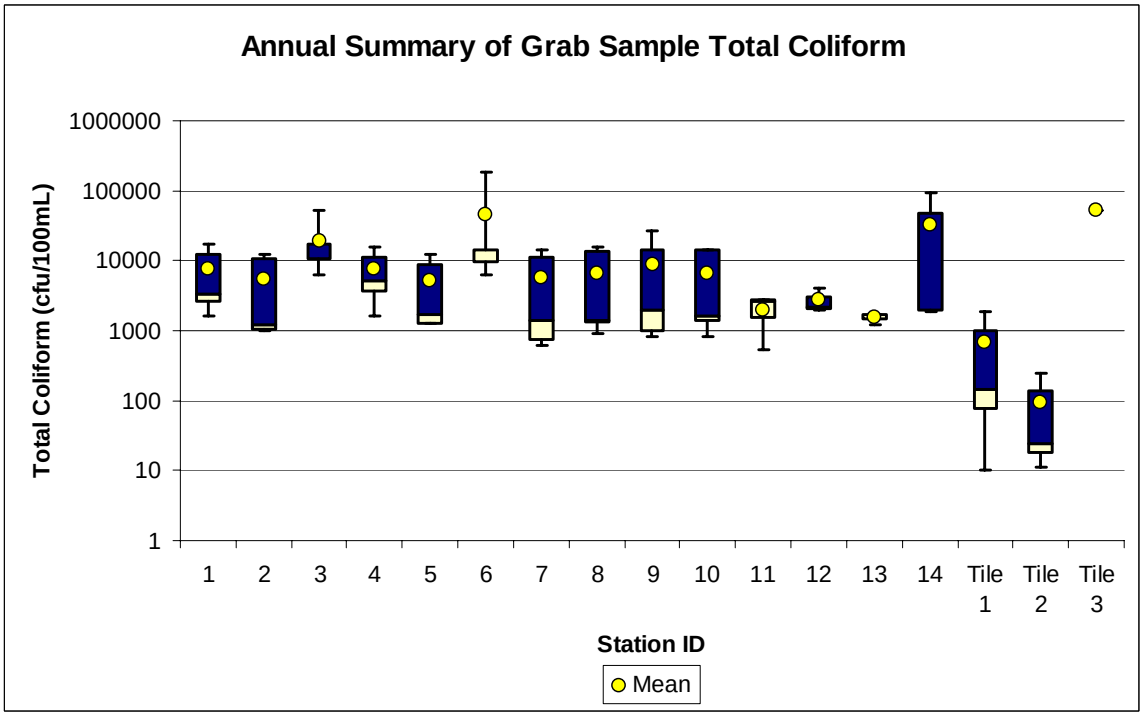
Reach - Field number	Location	Northern	Westing
R1	X1LP	361215.5	811805.7
	X1RP	361215.3	811806.1
	X2LP	361214.6	811804.9
	X2RP	361214.6	811805.3
R2	X1LP	361205.8	811801.9
	X1RP	361205.7	811802.4
	X2LP	361203.2	811801.3
	X2RP	361203.2	811801.7
R3	X1LP	361215.2	811815.5
	X1RP	361215.1	811816.3
	X2LP	361214.9	811810.3
	X2RP	361214.3	811810.4
R4	X1LP	351217.9	811746.3
	X1RP	361217.9	811746.4
	X2LP	361215	811748.1
	X2RP	361215.1	811748.4
R5	X1LP	361159.2	811746.5
	X1RP	361159.1	811746.9
	X2LP	361158.5	811746.6
	X2RP	361158.4	811746.9
R6	X1LP	361148.9	811740.2
	X1RP	361148.7	811740.8
	X2LP	361146	811738.9
	X2RP	361143.4	811739.1

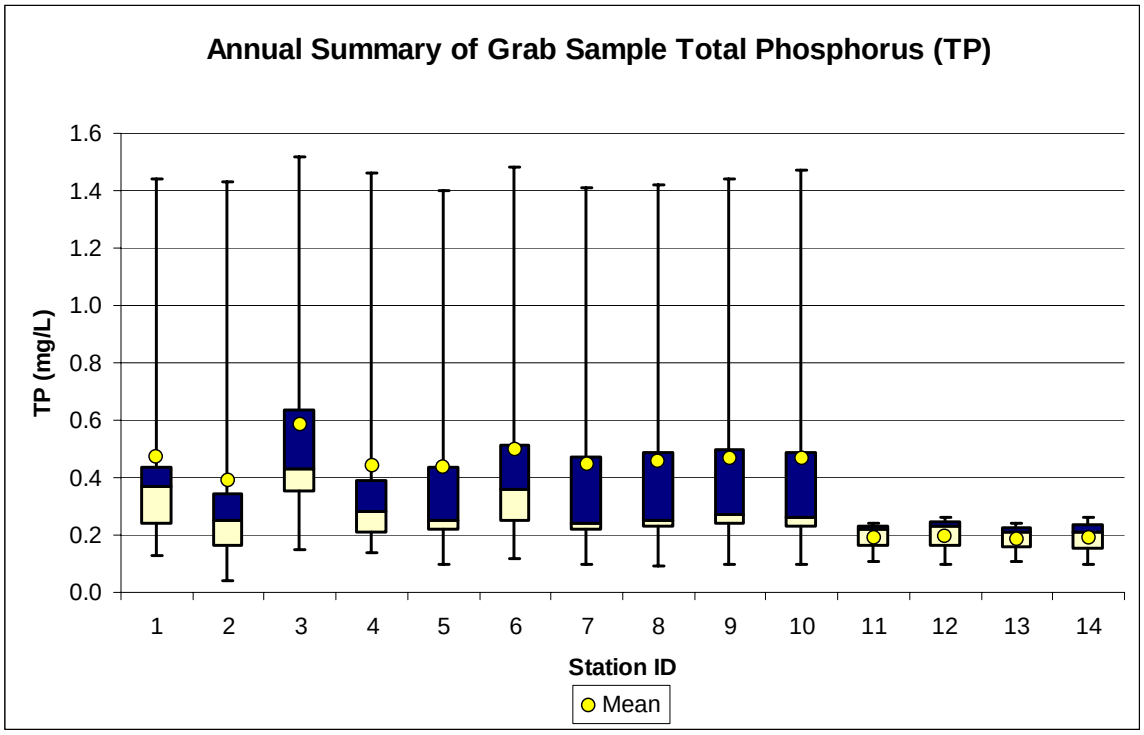
APPENDIX C

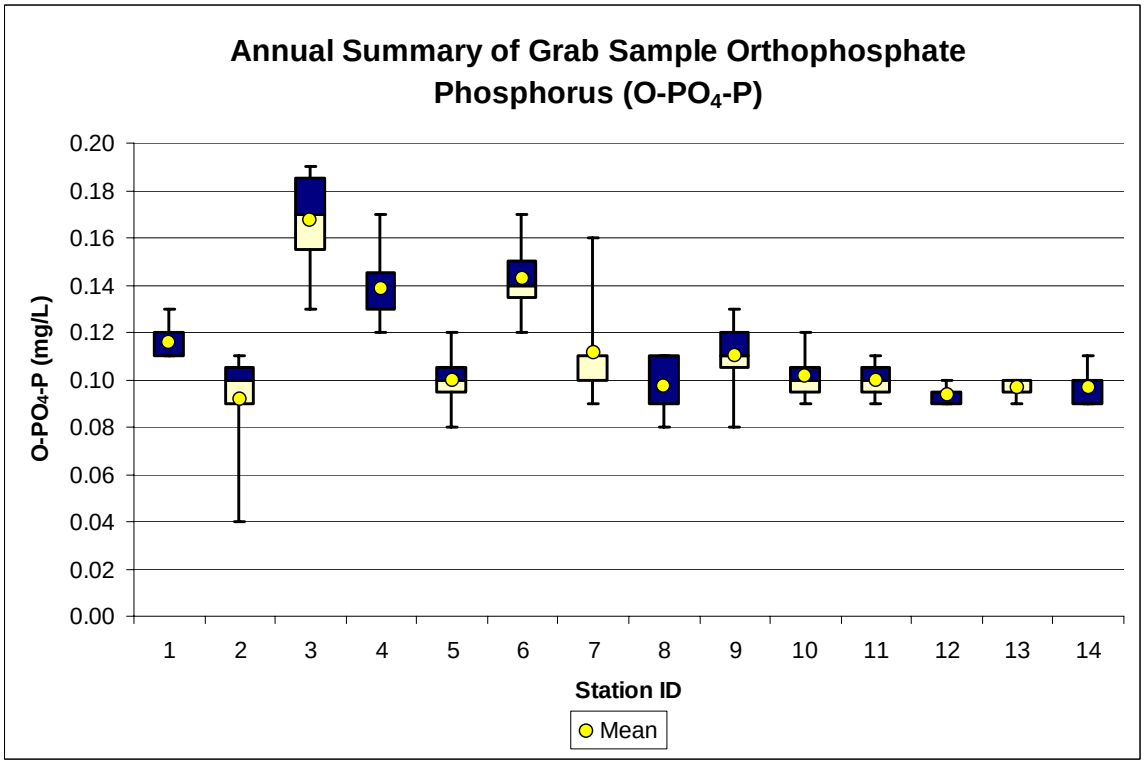
Surface Water and Ground Water Graphs

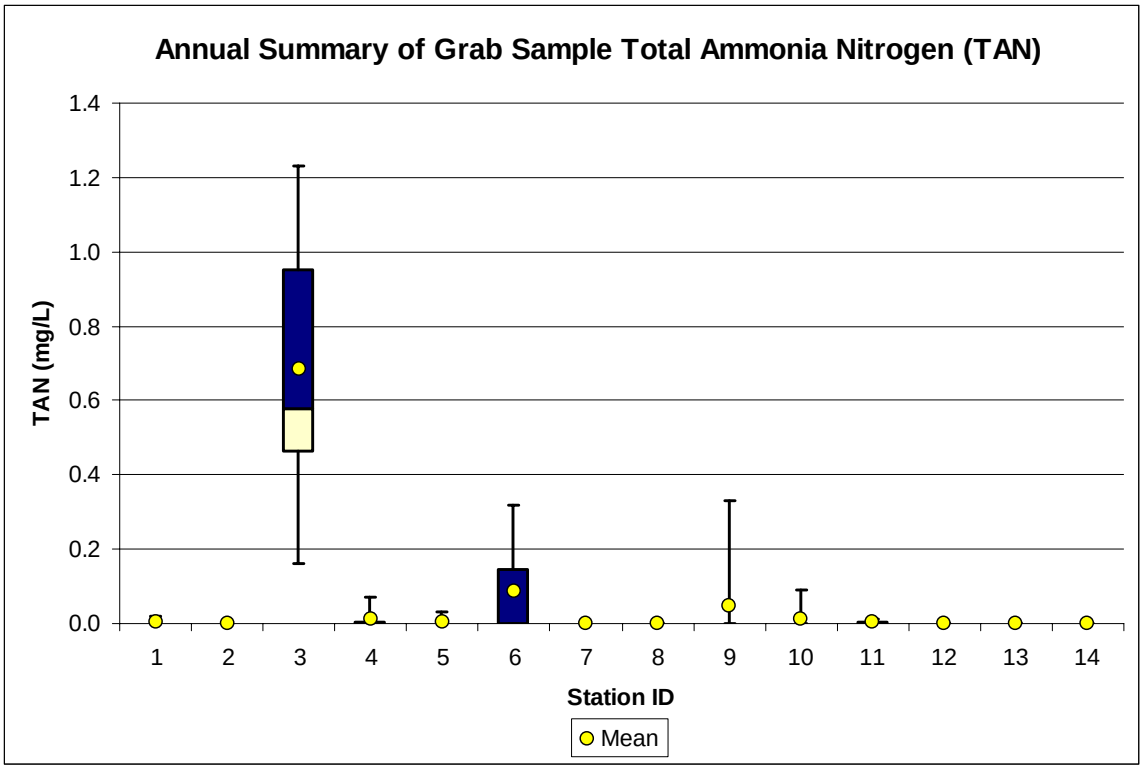
1. Surface Water Graphs
2. Ground Water Graphs

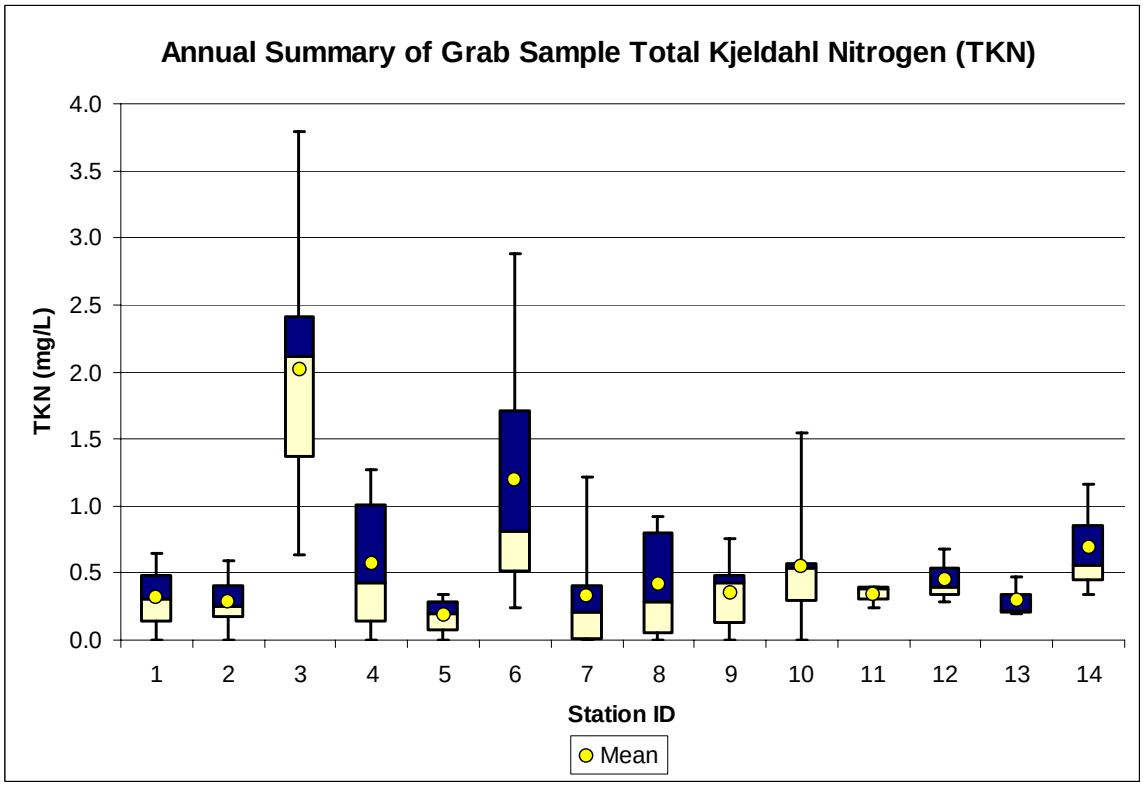

Annual Summary of Grab Sample *Eschericia coli* (*E. coli*)
10000.0
1000.0
100.0
10.0
1.0
0.1
E. coli (cfu/100mL)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Tile 1
Tile 2
Tile 3
Station ID
Mean

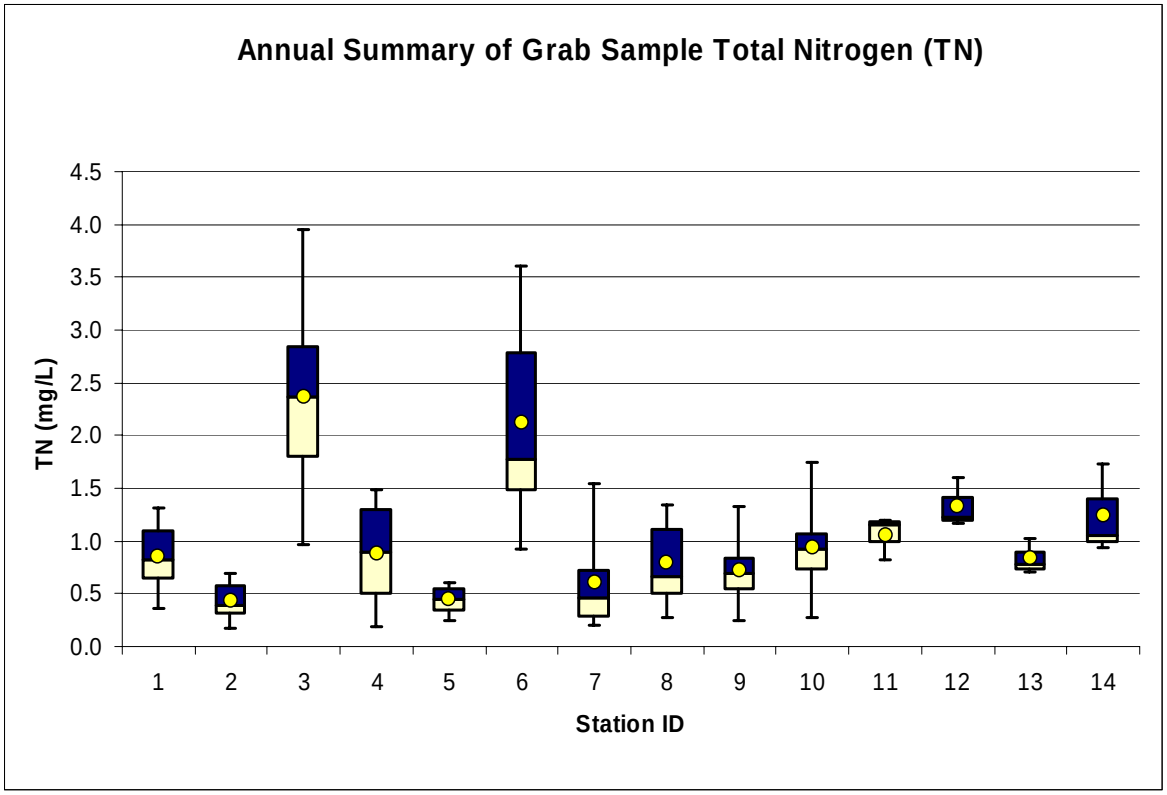

Annual Summary of Grab Sample Total Coliform
1000000
100000
10000
1000
100
10
1
Total Coliform (cfu/100mL)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Tile 1
Tile 2
Tile 3
Station ID
Mean

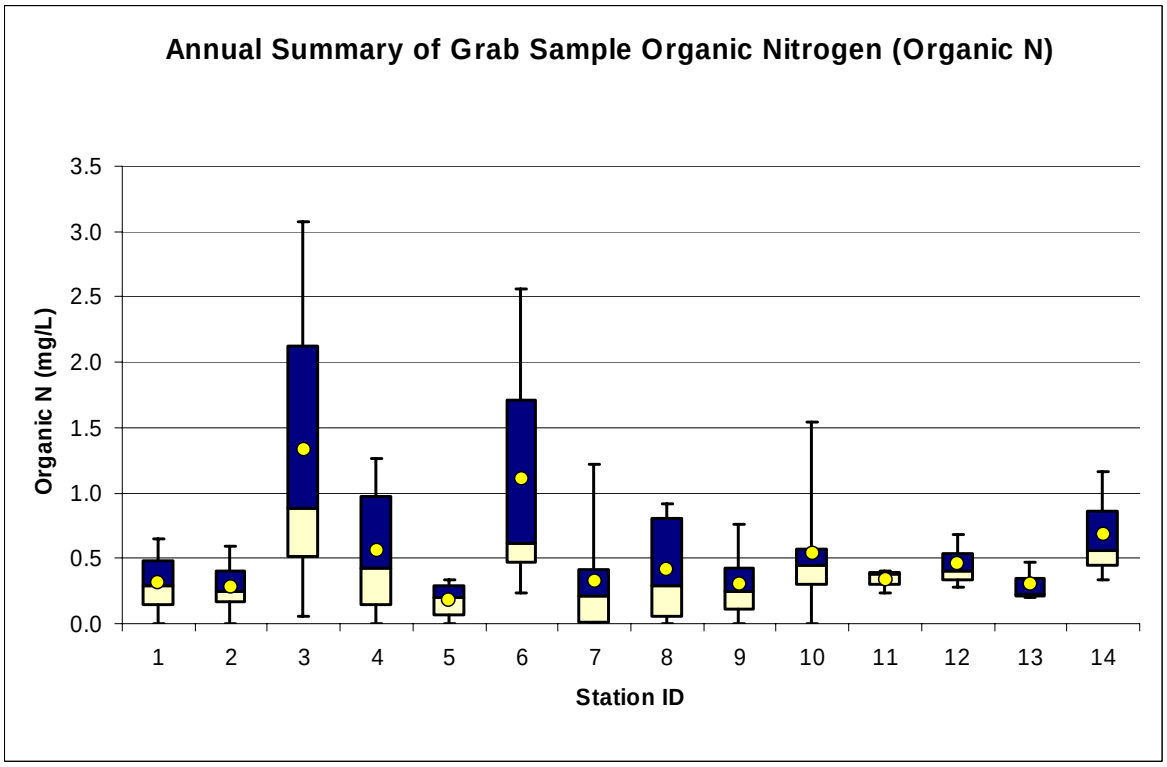

Annual Summary of Grab Sample Total Phosphorus (TP)
TP (mg/L)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Station ID
Mean

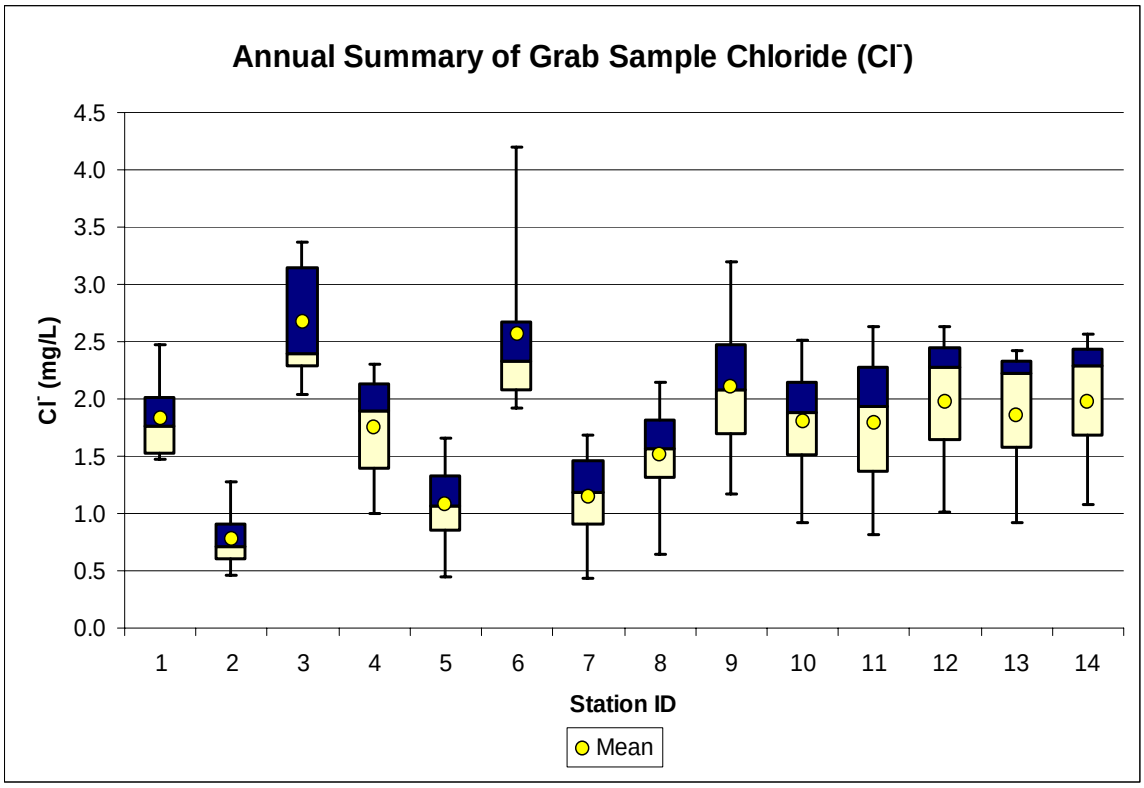

Annual Summary of Grab Sample Orthophosphate Phosphorus (O-PO4-P)
O-PO4-P (mg/L)
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Station ID
Mean

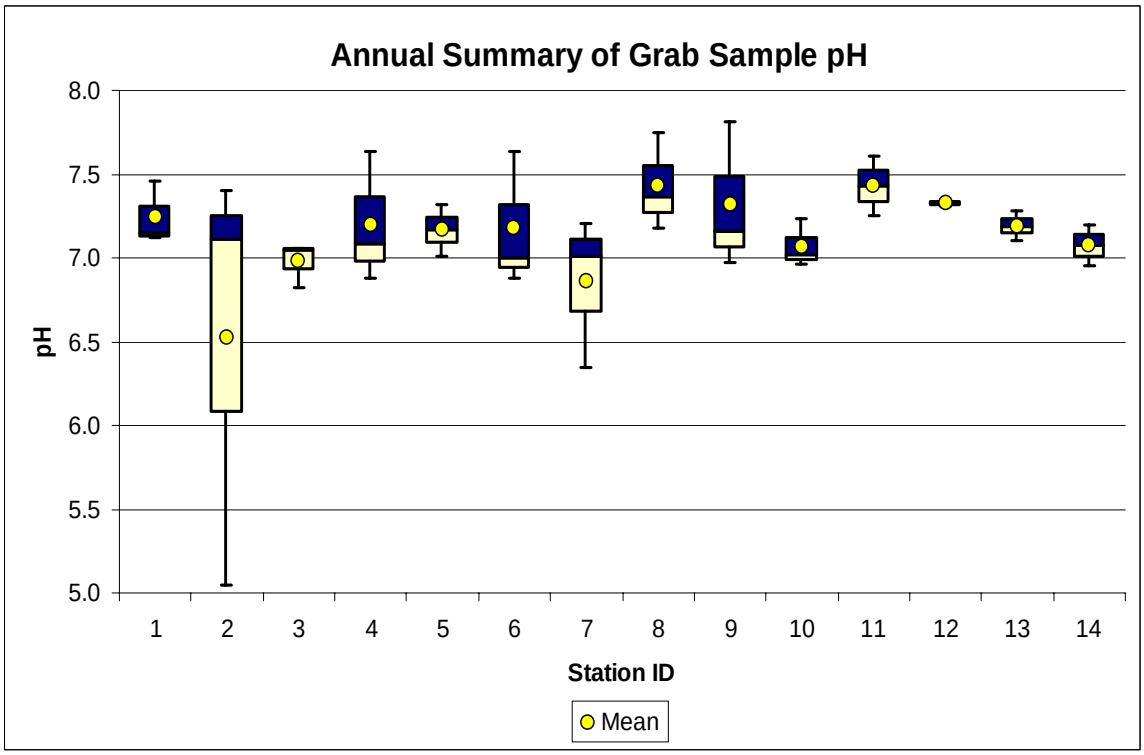

Annual Summary of Grab Sample Total Ammonia Nitrogen (TAN)
TAN (mg/L)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Station ID
Mean

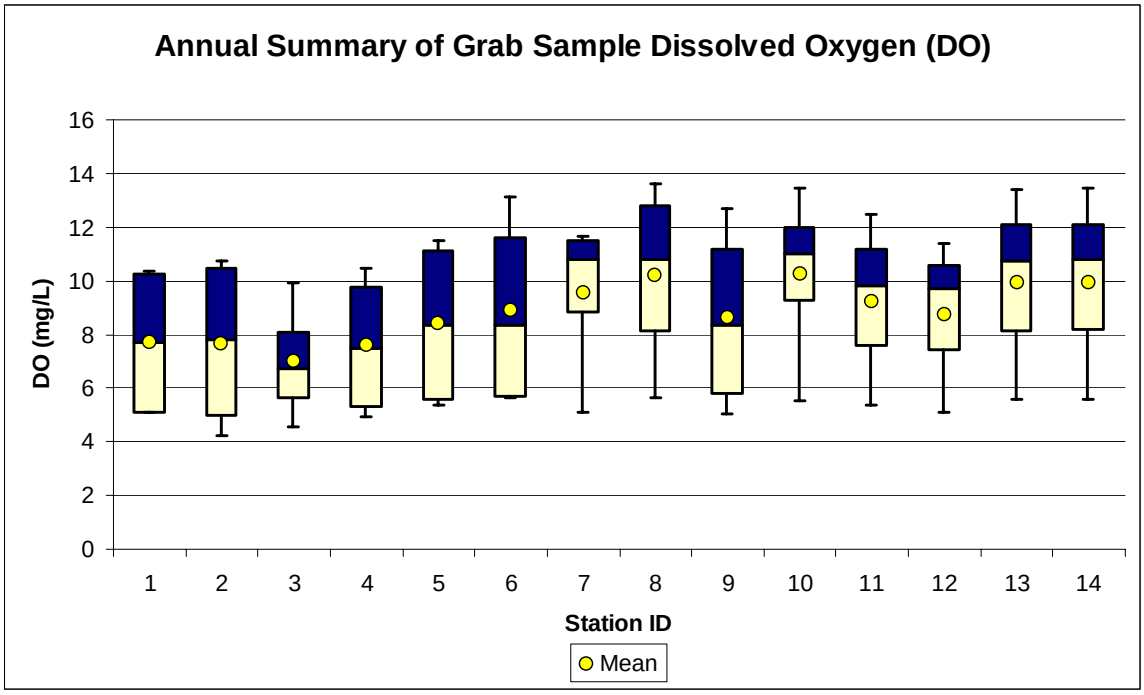

Annual Summary of Grab Sample Total Kjeldahl Nitrogen (TKN)
TKN (mg/L)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Station ID
Mean

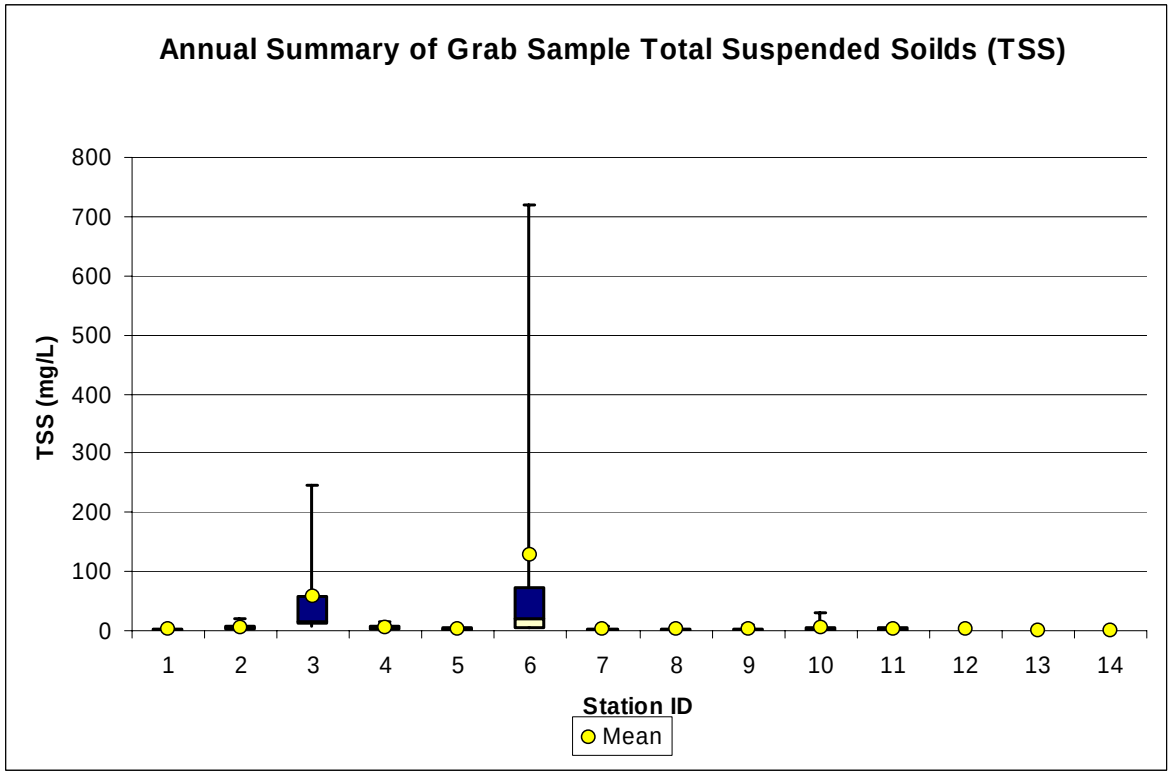

Annual Summary of Grab Sample Total Nitrogen (TN)
TN (mg/L)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Station ID


Annual Summary of Grab Sample Organic Nitrogen (Organic N)
Organic N (mg/L)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Station ID

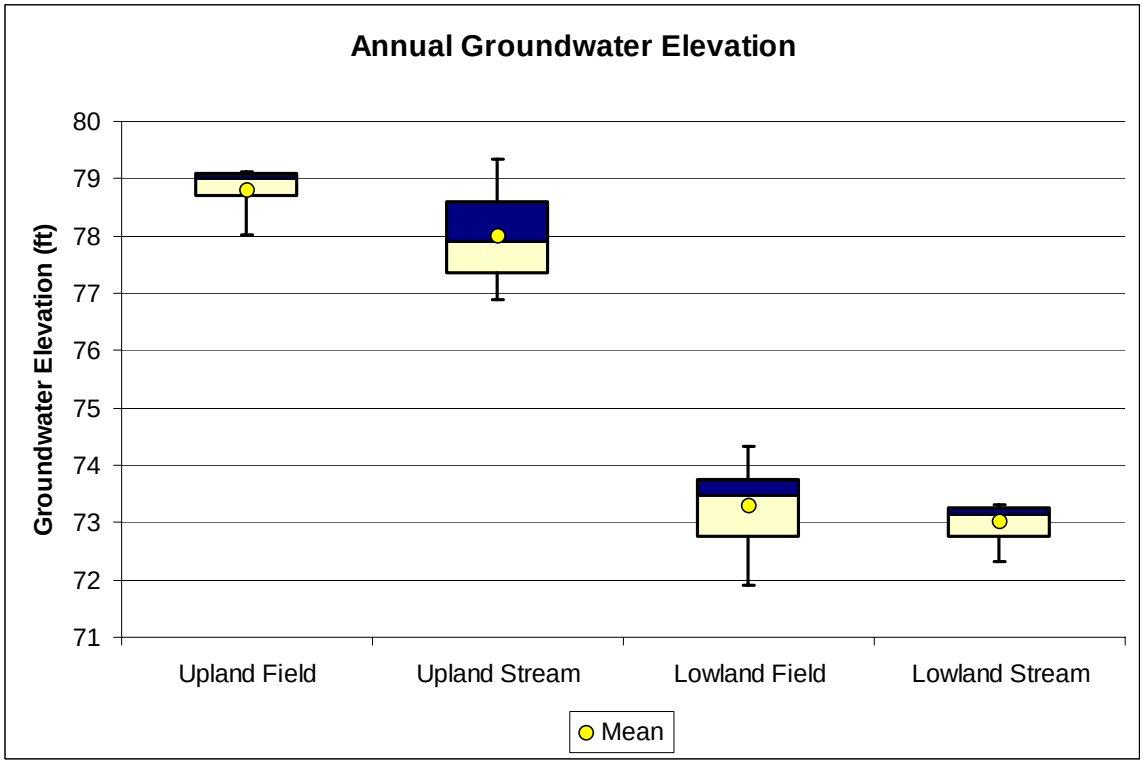

Annual Summary of Grab Sample Chloride (Cl-)
Cl- (mg/L)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Station ID
Mean

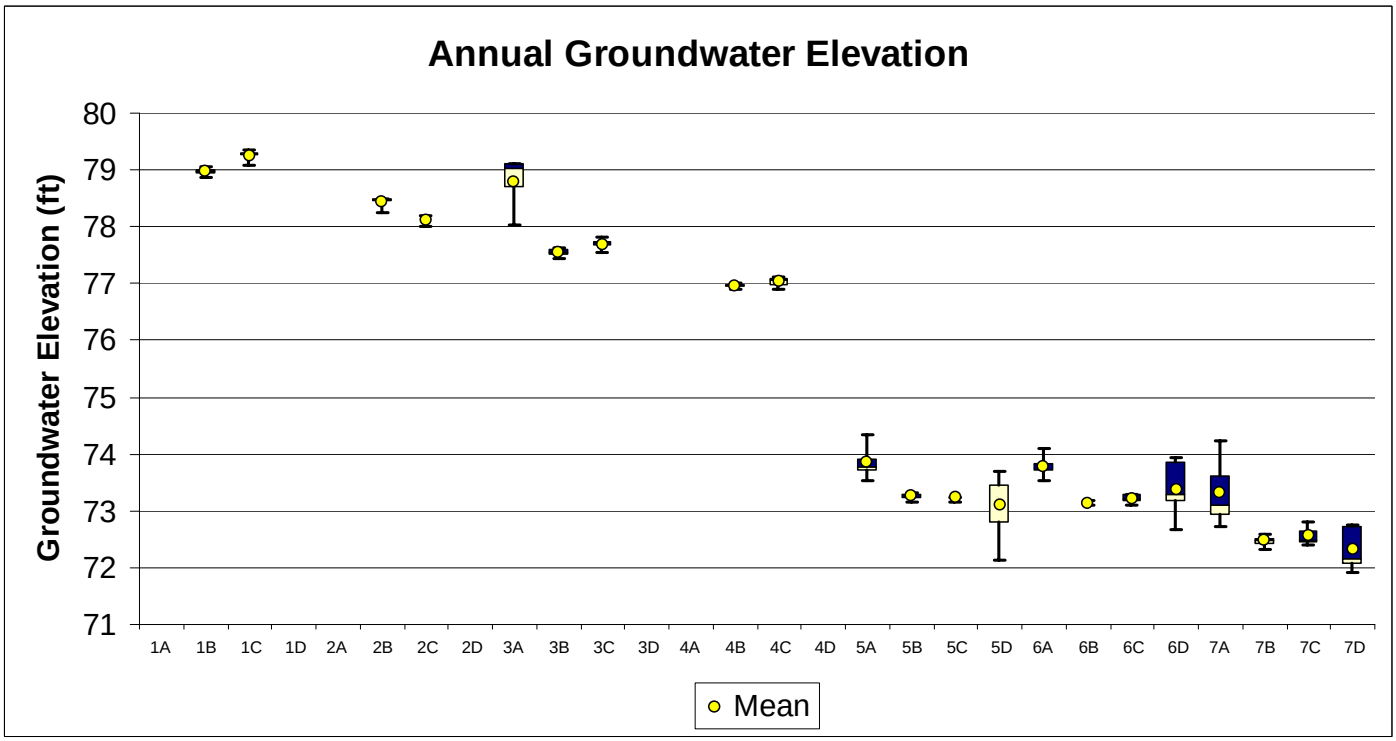

Annual Summary of Grab Sample pH
pH
8.0
7.5
7.0
6.5
6.0
5.5
5.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Station ID
Mean

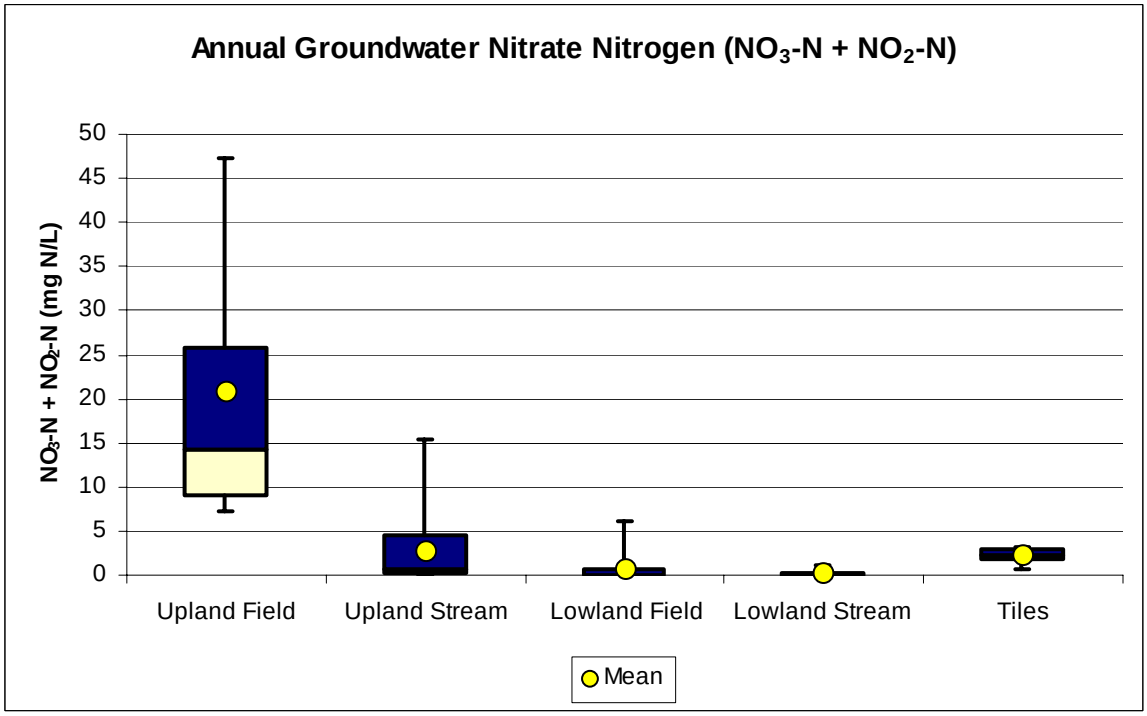

Annual Summary of Grab Sample Dissolved Oxygen (DO)
DO (mg/L)
16
14
12
10
8
6
4
2
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Station ID
Mean

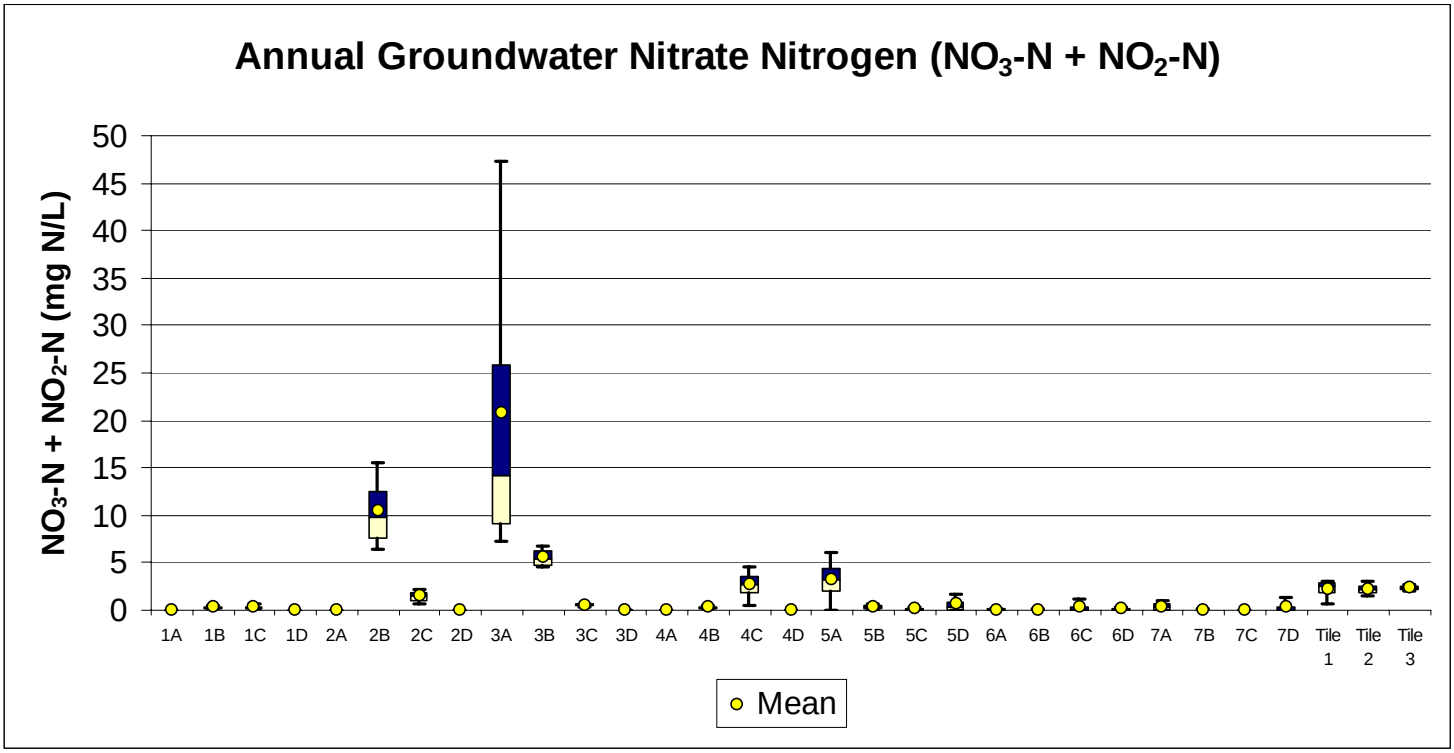

Annual Summary of Grab Sample Total Suspended Soilds (TSS)
TSS (mg/L)
800
700
600
500
400
300
200
100
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Station ID
Mean

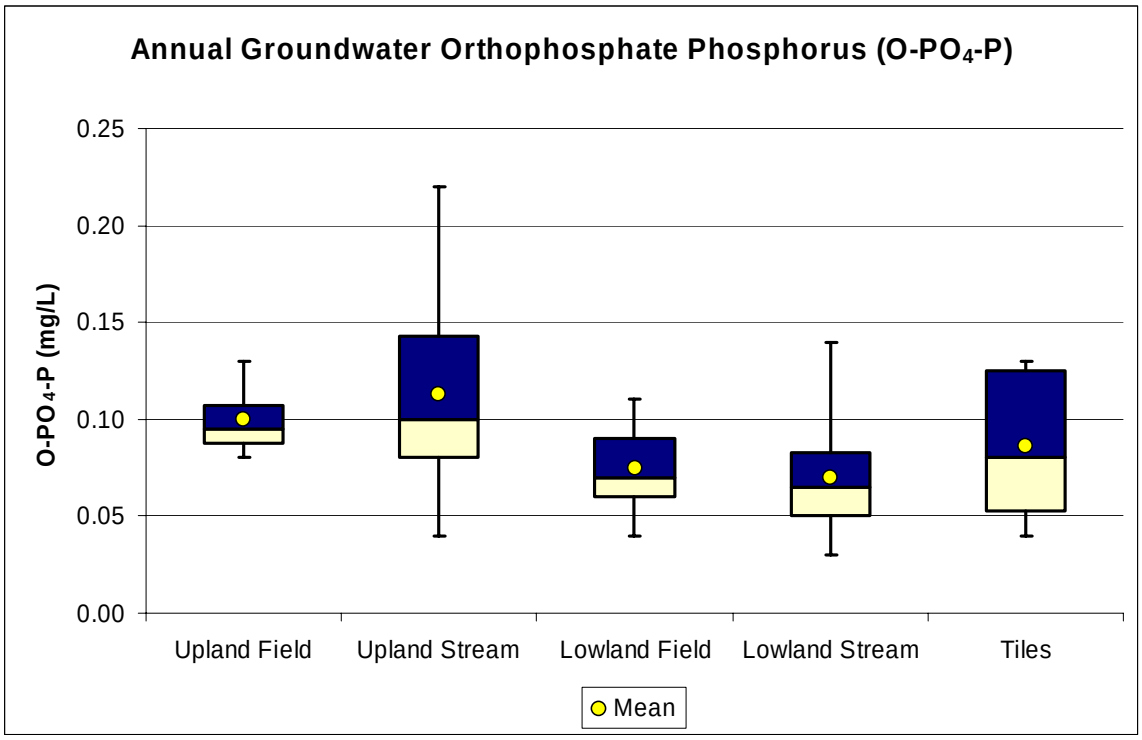
I.

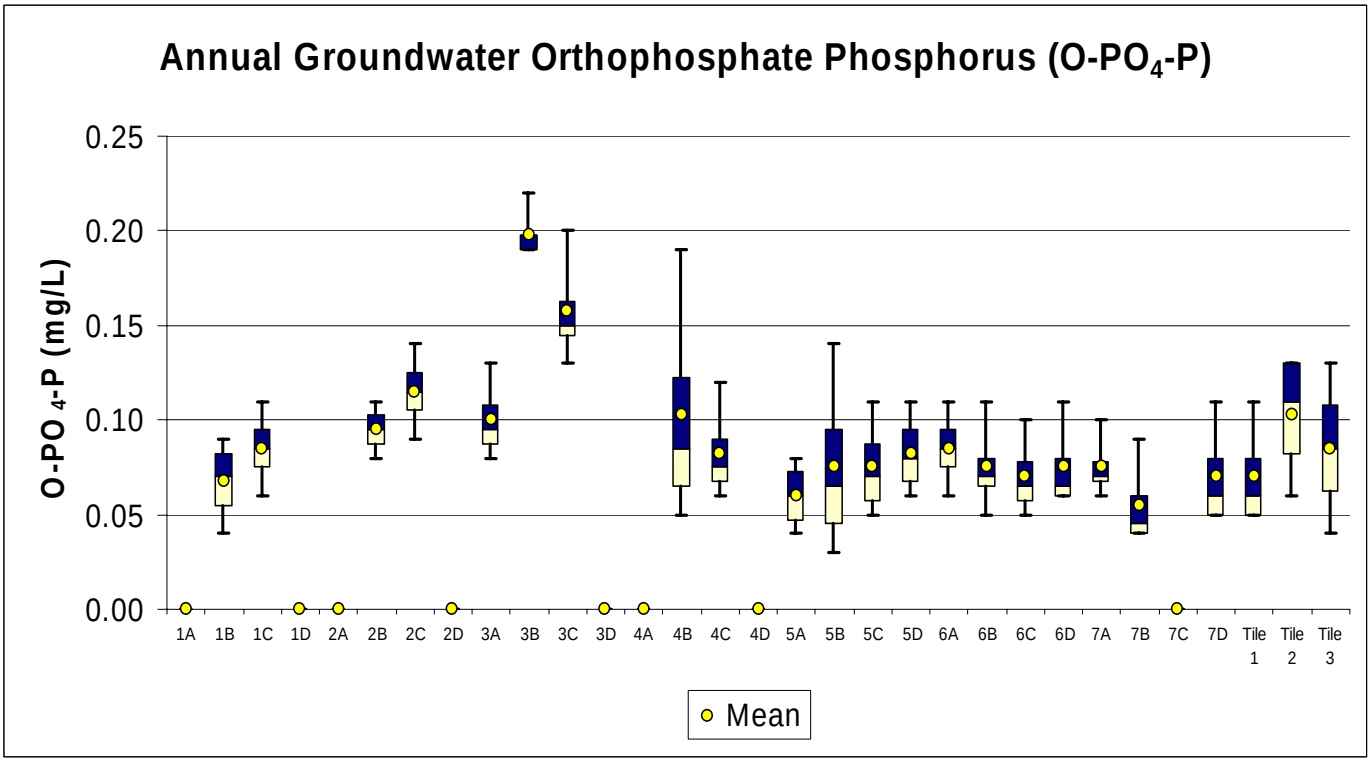

Annual Groundwater Elevation
Groundwater Elevation (ft)
80
79
78
77
76
75
74
73
72
71
Upland Field
Upland Stream
Lowland Field
Lowland Stream
Mean

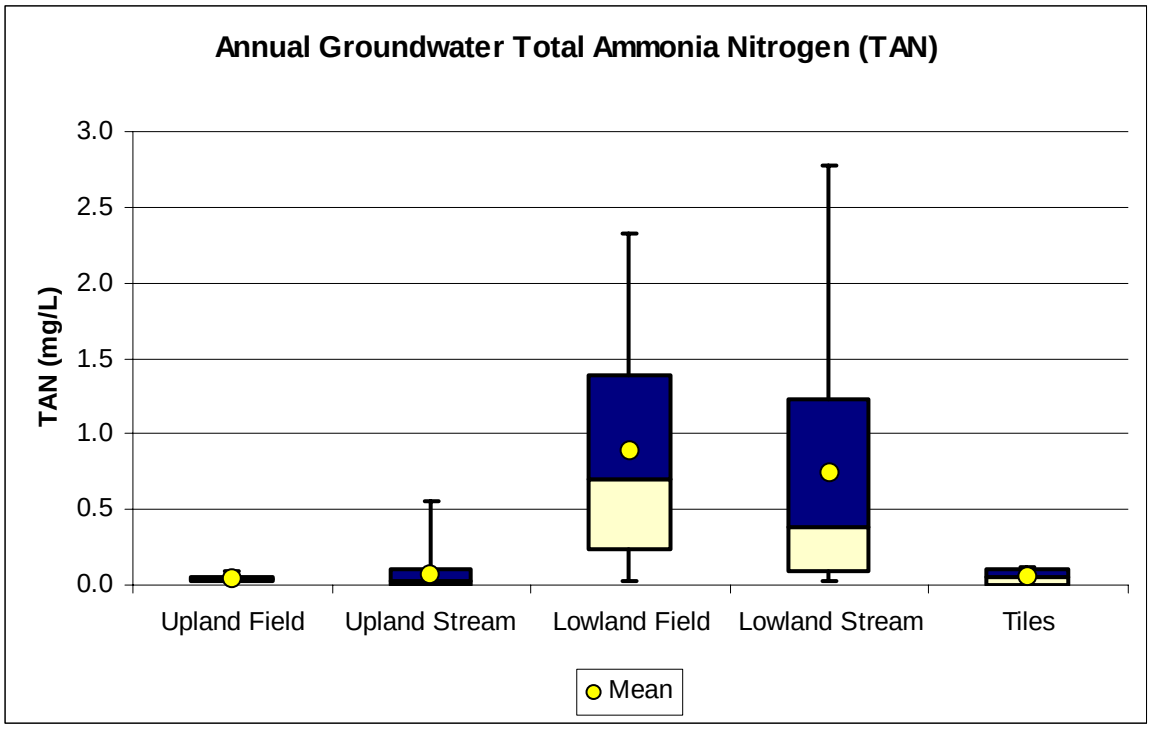

Annual Groundwater Elevation
Groundwater Elevation (ft)
80
79
78
77
76
75
74
73
72
71
1A
1B
1C
1D
2A
2B
2C
2D
3A
3B
3C
3D
4A
4B
4C
4D
5A
5B
5C
5D
6A
6B
6C
6D
7A
7B
7C
7D
Mean

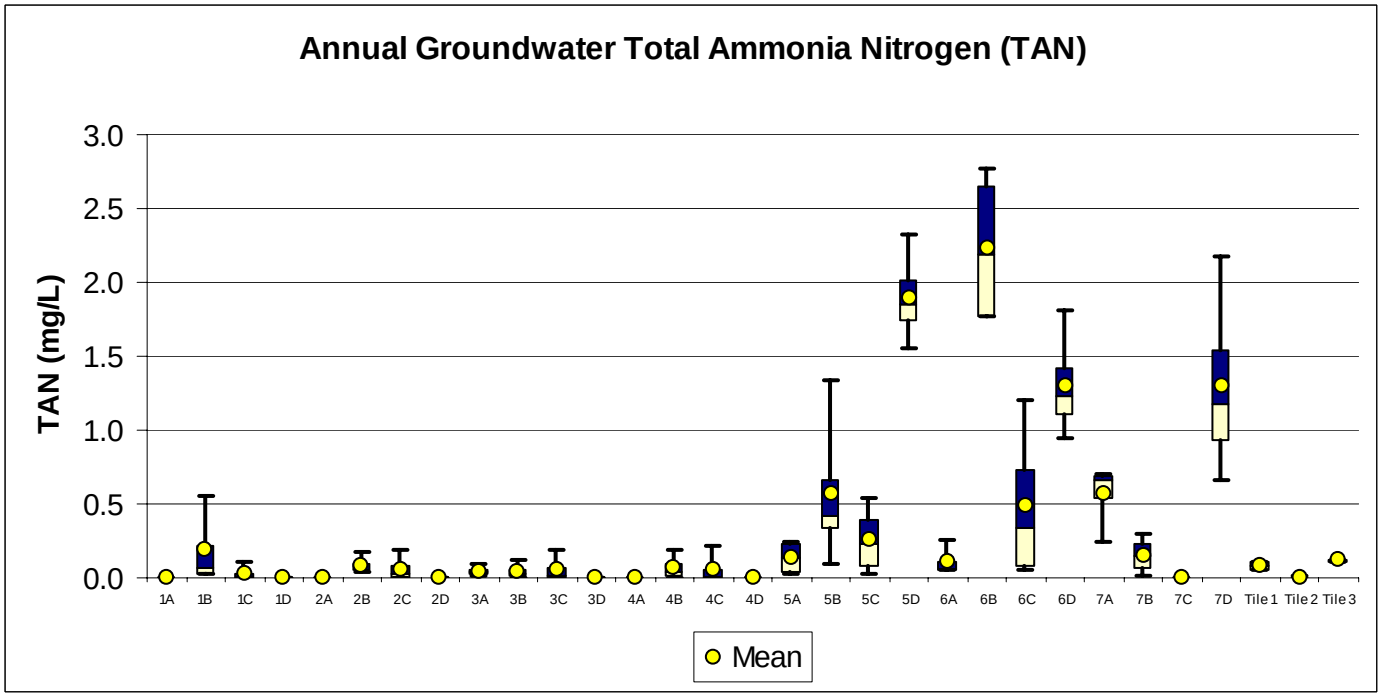

Annual Groundwater Nitrate Nitrogen (NO_3-N + NO_2-N)
NO_3-N + NO_2-N (mg N/L)
50
45
40
35
30
25
20
15
10
5
0
Upland Field
Upland Stream
Lowland Field
Lowland Stream
Tiles
Mean

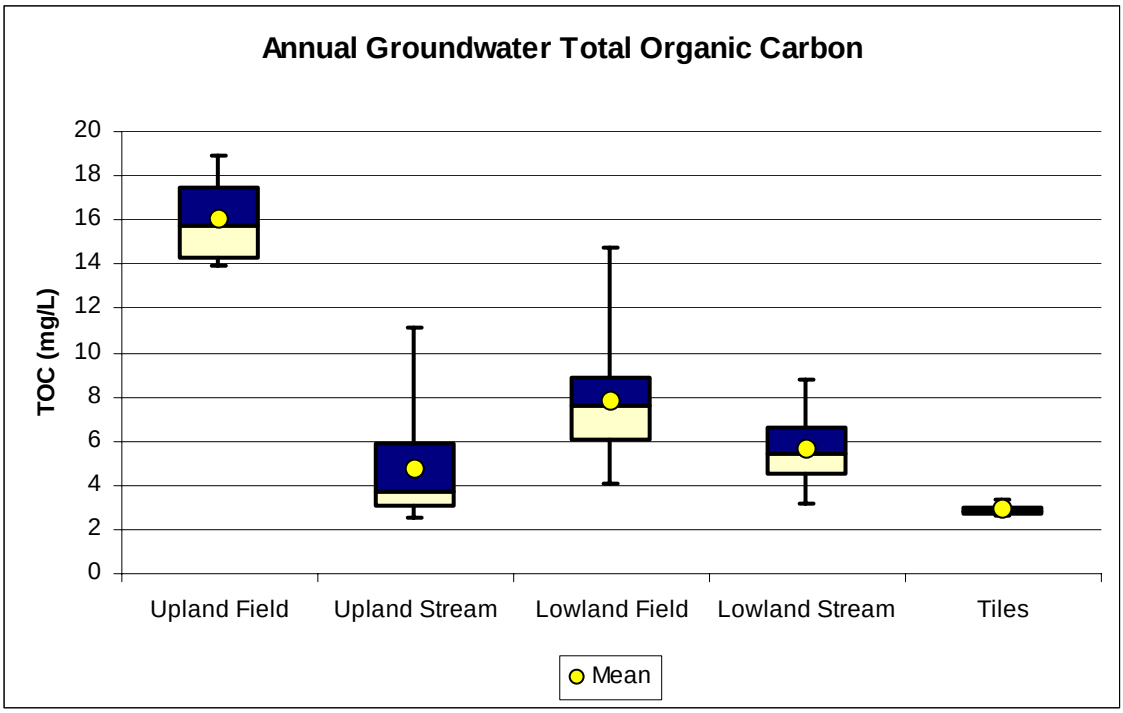

Annual Groundwater Nitrate Nitrogen (NO_3-N + NO_2-N)
NO_3-N + NO_2-N (mg N/L)
50
45
40
35
30
25
20
15
10
5
0
1A
1B
1C
1D
2A
2B
2C
2D
3A
3B
3C
3D
4A
4B
4C
4D
5A
5B
5C
5D
6A
6B
6C
6D
7A
7B
7C
7D
Tile 1
Tile 2
Tile 3
Mean

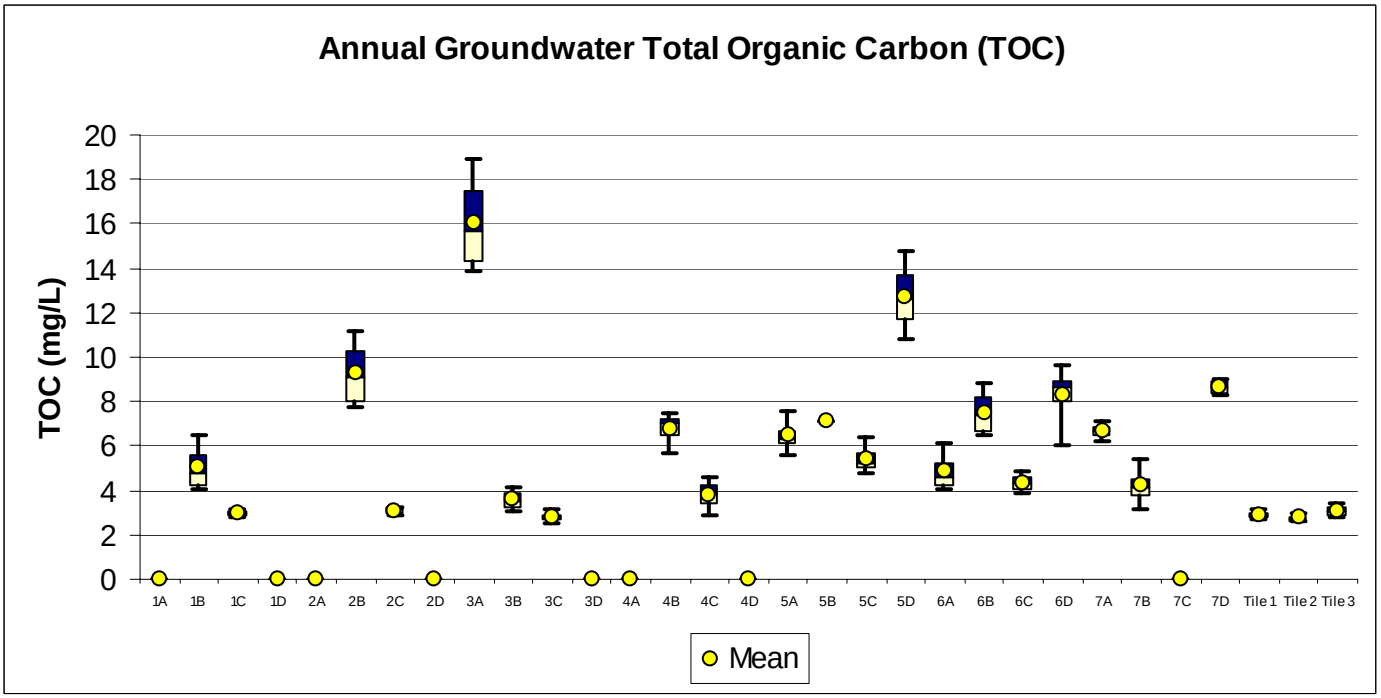

Annual Groundwater Orthophosphate Phosphorus (O-PO4-P)
O-PO4-P (mg/L)
0.25
0.20
0.15
0.10
0.05
0.00
Upland Field
Upland Stream
Lowland Field
Lowland Stream
Tiles
Mean


Annual Groundwater Orthophosphate Phosphorus (O-PO4-P)
O-PO4-P (mg/L)
0.25
0.20
0.15
0.10
0.05
0.00
1A 1B 1C 1D 2A 2B 2C 2D 3A 3B 3C 3D 4A 4B 4C 4D 5A 5B 5C 5D 6A 6B 6C 6D 7A 7B 7C 7D Tile 1 Tile 2 Tile 3
Mean


Annual Groundwater Total Ammonia Nitrogen (TAN)
TAN (mg/L)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Upland Field
Upland Stream
Lowland Field
Lowland Stream
Tiles
Mean


Annual Groundwater Total Ammonia Nitrogen (TAN)
TAN (mg/L)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1A 1B 1C 1D 2A 2B 2C 2D 3A 3B 3C 3D 4A 4B 4C 4D 5A 5B 5C 5D 6A 6B 6C 6D 7A 7B 7C 7D Tile 1 Tile 2 Tile 3
Mean


Annual Groundwater Total Organic Carbon
TOC (mg/L)
20
18
16
14
12
10
8
6
4
2
0
Upland Field
Upland Stream
Lowland Field
Lowland Stream
Tiles
Mean


Annual Groundwater Total Organic Carbon (TOC)
TOC (mg/L)
20
18
16
14
12
10
8
6
4
2
0
1A
1B
1C
1D
2A
2B
2C
2D
3A
3B
3C
3D
4A
4B
4C
4D
5A
5B
5C
5D
6A
6B
6C
6D
7A
7B
7C
7D
Tile 1
Tile 2
Tile 3
Mean