Spring Valley Park Stream Restoration Site
Greensboro, North Carolina
EEP Project No. 354

FINAL 2008 Annual Monitoring Report
Monitoring Year 5

Submitted to:

NCDENR EEP
1619 Mail Service Center
Raleigh, NC 27699-1619

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Submitted by:

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SPRING VALLEY STREAM RESTORATION
2008 FINAL MONITIORING REPORT

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I. EXECUTIVE SUMMARY/PROJECT ABSTRACT

The Spring Valley Park Stream Restoration Site includes 1,409 linear feet of Piedmont Creek within the City of Greensboro, Guilford County, North Carolina. This site was constructed in 2004. Monitoring activities in 2008 represent the fifth year of monitoring following construction. The site must demonstrate a stable channel condition for a minimum of five years or until the project is deemed successful. The following report summarizes the monitoring activities that have occurred in the past year at the Spring Valley Park Stream Restoration Site.

The Spring Valley Park Stream Restoration site is monitored using a visual assessment and six permanent photo points. The monitoring does not include any groundwater gauges, rain gauge, cross section monuments, or vegetation plots.

The project has several areas of bank erosion totaling a modest 3% of project bank footage with little advancement or increase over the monitoring period. Several structures exhibited some level of piping and some sill rocks appeared to be set a little high, but there has been no systemic loss of grade even when challenged with overbank events. While several structures are stressed, their density over the longitudinal extent appears to provide sufficient redundancy to maintain project grade.

Prior observations led to concerns over the exposed sewer line which was assumed to be related to downcutting at station 14+00, but WK Dickson was subsequently informed by NCDOT via EEP that this pipe was already exposed prior to construction. The pipe is in contact with the bed as was the case pre-construction and at the termination of construction.

II. PROJECT BACKGROUND

A. PROJECT OBJECTIVES

The Spring Valley Park Stream Restoration Site is located in the City of Greensboro, North Carolina near the intersection of Interstate 40 and Freeman Mill Road (**Figure 1**). The site is along Piedmont Creek, a tributary to Buffalo Creek, in the Haw River Drainage Sub-basin of the Cape Fear River Basin (Hydrologic Unit 03030002). It includes 1,409 linear feet of Piedmont Creek. The drainage area for this project is approximately 550 acres (0.86 square miles). The drainage area is highly developed (>20% impervious) and surrounding landscape is urban. The site is surrounded by single family and multifamily homes. The project lies completely within the park boundaries.

To access the site, take exit 218B (Freeman Mill Road) off I-40 near Greensboro. Travel north on Freeman Mill Road to Meadowview Road. Turn right onto Meadowview Road and follow to Spring Valley Park.

B. PROJECT RESTORATION COMPONENTS

Based on the 2005 Annual Monitoring Report and a draft Mitigation Plan of this project, the objectives and goals of the restoration of Piedmont Creek are:

- Restore an unstable stream channel to its natural stable form by modifying dimension, pattern, and/or profile based on reference reach parameters,
- Increase long-term stability and create a more functional riparian community,
- Vegetated buffers were designed to match local natural riparian communities,

Ecosystem Enhancement PROGRAM

FIGURE 01
VICINITY MAP
Spring Valley Park Stream Restoration Site
Greensboro, North Carolina
Guilford County

- Improve the natural aesthetics of the stream corridor,
- Addresses the needs of local agencies, public safety, and physical constraints within Spring Valley Park, and
- Obtain mitigation credits for unavoidable impacts to streams within the same Hydrologic Unit Code (HUC).

The mitigation plan consisted of a Priority II restoration of Piedmont Creek along with establishment of a vegetated buffer. The construction of Piedmont Creek was completed in 2004, and Year 1 monitoring was conducted in 2004. This report details the fifth monitoring year. **Table I** shows the project restoration components and **Table II** discusses project history and activities.

Per the draft planning document dated September 2001, photographs taken throughout the monitoring period will be used to subjectively evaluate channel aggradation or degradation, bank erosion, growth of riparian vegetation, and the effectiveness of erosion control measures.

No documentation of cross-sections, profiles, or vegetation stem counts are required, and none have been performed for this annual monitoring report or for the 2005, 2006, and 2007 annual monitoring reports.

Table I. Project Restoration Components
Spring Valley Park Stream Mitigation/Project No. 354

Project Segment or Reach ID	Existing Feet/Acres	Type	Approach	Footage or Acreage	Mitigation Ratio	Mitigation Units	Stationing	Comment
Reach I		R	PII	619 ft			10+00 to 16+19	
Reach II		R	PII	790 ft			16+19 to 24+09	

Mitigation Unit Summations

Stream (lf)	Riparian Wetland	Nonriparian Wetland (Ac)	Total Wetland (AC)	Buffer (Ac)	Comment
1409	0.0	0.0	0.0		

R = Restoration EII = Enhancement II P1 = Priority I P3 = Priority III
EI = Enhancement I S = Stabilization P2 = Priority II SS =Stream Bank Stabilization

Table II. Project Activity and Reporting History Spring Valley Park Stream Mitigation/Project No. 354		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan	NA	NA
Final Design – 90%	NA	October 2002
Construction	NA	January 2004
Temporary S&E mix applied to entier project area*	NA	NA
Permanent seed mix applied to entire project area	NA	NA
Woody plantings for each reach/segment	NA	February 2004
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	NA	NA
Year 1 Monitoring	December 2004	December 2004
Remediation and Partial Replant	NA	February 2005
Year 2 Monitoring	November 2005	December 2005
Structural maintenance	NA	2006
Year 3 Monitoring	September 2006	December 2006
Year 4 Monitoring	September 2007	November 2007
Year 5 Monitoring	October 2008	November 2008
Year 5 + Monitoring		
Bolded items represent those events or deliverables that are variable. Non-bolded items represent events that are standard components over the course of a typical project. *Seed and mulch is added as each section of construction is completed		

C. PROJECT HISTORY AND BACKGROUND

The project was designed by Kimley-Horn & Associates. Initial monitoring in 2004 (Year 1) was performed by the North Carolina Department of Transportation (NCDOT) Roadside Environmental Unit. Year 2 monitoring was performed by Earth Tech. Monitoring activities for Years 3, 4, and 5 were performed by WK Dickson and Co., Inc. Additional contact information is provided in **Table III**.

Table III. Project Contacts Table Spring Valley Park Stream Mitigation/Project No. 354	
Designer	Kimley-Horn & Associates Raleigh, NC
Monitoring Performers-2004	NCDOT Roadside Environmental Unit 1425 Rock Quarry Road Raleigh, NC 27610
Monitoring POC	M. Green and J. Wait
Monitoring Performers-2005	Earth Tech of North Carolina 701 Corporate Center Drive, Suite 475 Raleigh, NC 27607
Monitoring POC	Mr. Ron Johnson (919) 854-6210
Monitoring Performers-2006 to 2008	WK Dickson and Co., Inc. 720 Corporate Center Drive Raleigh, NC 27607
Monitoring POC	Mr. Daniel Ingram (919) 782-0495

The project is located within Guilford County, within the ecoregion of the Southern Outer Piedmont in the Piedmont physiographic province of North Carolina. The site is located within a

highly urbanized area. Additional information summarizing project specific parameters are provided in **Table IV.**

Table IV. Project Background Table Spring Valley Park Stream Mitigation/Project No. 354	
Project County	Guilford
Drainage Area	523 acres
Drainage impervious cover estimate (%)	> 20%
Stream Order	2nd order
Physiographic Region	Piedmont
Ecoregion	Southern Outer Piedmont (45b)
Rosgen Classification of As-built	C
Cowardin Classification	N/A
Dominant soil types	Chewacla loam Mecklenburg-Urban land complex
Reference site ID	Piedmont Creek (~200 feet upstream from project site) Reddicks Creek
USGS HUC for Project and Reference	Deep River - HUC 03030003
NCDWQ Sub-basin for Project and Reference	16-11-14-2
NCDWQ classification for Project and Reference	C, NSW
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	None - in city park

D. MONITORING PLAN VIEW

Photographs were taken throughout the monitoring season to document the evolution of the restored stream channel (see **Appendix B**). Pools have maintained a variety of depths and habitat qualities, depending on the location and type of scour features (logs, root wads, transplants, etc.). A base flow was present near the end of the growing season. The Current Conditions Plan View depicts all structures and problem areas in the stream (see **Appendix B**).

III. PROJECT CONDITION AND MONITORING RESULTS

Monitoring results are discussed below. An initial visual survey was conducted on April 7, 2008 with a more detailed monitoring survey conducted in October 2008.

A. VEGETATION ASSESSMENT

Woody vegetation is moderately dense along the banks of Reach I of the restored stream and consists of shrubs with more mature trees scattered throughout the buffer.

Vegetation in the upper portion of Reach 1 (Station 10+00 to 14+20) is stable and functioning as designed. The woody buffer in this reach is narrow on the right bank along a maintained sewer easement, but sufficiently wide on the left bank. It consists of alder (*Alnus* sp.), black willow (*Salix nigra*), and silky dogwood (*Cornus amomum*) along the stream banks with larger trees of sycamore (*Platanus occidentalis*), black willow, and northern red oak (*Quercus rubra*) present in the extended buffer. Natural regeneration includes black cherry (*Prunus serotina*), smooth sumac (*Rhus glabra*), and muscadine grape (*Vitis rotundifolia*). Exotic invasive species are present, but are not dominant. Exotic species include mimosa (*Albizia julibrissin*), multiflora rose (*Rosa multiflora*), porcelain berry/Amur peppervine (*Ampelopsis brevipedunculata*), and Chinese privet (*Ligustrum sinensis*).

1. Soil Data

Table V. Preliminary Soil Data
Spring Valley Park Stream Mitigation/Project No. 354

Series	Max Depth (in)	% Clay on surface	K	T	OM %
Chewacla loam	65	10-35	0.28	5	1-4

Data from the Soil Survey of Guilford County (NRCS 1977).

Vegetation in Reach 2 is divided into two distinct segments, an upper and lower segment, having different vegetation characteristics. The upper segment (Station 16+20 to 21+00) has a narrow woody buffer on the right bank. The narrow woody buffer consists primarily of alder and black willow. The left bank is maintained grass to the top of bank with limited woody shrubs present. Bank erosion appears to be more prevalent along this segment also. The lower segment of Reach 2 has a good woody buffer that extends approximately 40 feet from top of bank. Species include black willow, alder, sycamore, and green ash (*Fraxinus pennsylvanica*). The woody vegetation is not dense and an understory of natural herbaceous vegetation is present. A few invasive species are present including mimosa and Chinese privet.

2. Vegetative Problem Areas

Table VI. Vegetative Problem Areas
Spring Valley Park Stream Mitigation/Project No. 354

Feature/Issue	Station # / Range	Probable Cause	Photo #
Invasive/Exotic Populations	13+90	Porcelainberry dense	PA #1

From observation, a large portion of the stream banks from station 16+50 through 21+50 lack woody cover vegetation and the banks appear to have localized erosion. NCDOT indicates this area lacking woody vegetation was by design because of line of sight requirements imposed by the city related to security concerns in recreational areas. The only vegetation problem area observed was an area of dense porcelainberry at station 13+90. This problem area does not

currently pose a threat to the success of the site, but the area should be monitored and treated to make sure porcelainberry and other invasive species do not continue to spread across the site.

B. STREAM ASSESSMENT

WK Dickson personnel performed an initial site visit at Spring Valley Park on April 7, 2008. During the field visit notes were made regarding the condition of the stream restoration project, and photos were taken. The site was visited again on October 1, 2008 at which time photographs were taken at all permanent photo points and all problem areas. Vegetative problem areas are described in **Table VI**.

During the October visit, photographs were taken at all permanent photo points, and problem areas were located and photographed. At permanent photo points, one photo is taken upstream and one downstream. **Appendix A** contains photographs of the annual photo points. **Appendix B** contains problem areas photographs. Wrack lines were observed during the October 2008 site visit, indicating the presence of out-of-bank flow at least once during this monitoring season.

A total of 18 previously identified problem areas were investigated. Of the previously identified problem areas, only #6 was observed to be a current problem area during this monitoring year. Coir matting failures (2007 problem areas 1, 2, and 9) were not considered problems this year since coir matting is expected to degrade over time, and woody vegetation has stabilized the banks. The remaining 2007 problem areas that were not observed this year were bank erosion issues that may have been resolved by vegetation taking root and stabilizing the banks, or structure issues that were determined not to significantly threaten project success. Several new problem areas were identified in 2008. These include six areas of minor bank erosion and undercut banks, and four structures that have lost some of their intended function. All of the problem areas identified in 2008 are independent, localized issues that do not pose a systemic threat to project success.

Overall, the project is stable and functioning as designed. While a few of the rock structures show some issues, they retain most of their intended functions. For example, a few cross vanes exhibit piping or a displaced header rock; however, they are still providing adequate grade control, hydraulic diversion, and habitat. The areas of bank erosion are localized and do not indicate a systemic problem. Descriptions and photographs of the observed problem areas are included in **Appendix B**.

1. Current Conditions Plan View

Several minor areas of concern were observed and documented, including localized bank scour, and minor issues with a few of the engineered structures. The locations of these problem areas are shown in **Appendix B**, **Section B-1**.

2. Problem Areas Table

The Problem Areas Table is located in **Appendix B** as **Table B.1**.

3. Representative Stream Problem Areas Photos Section

Representative photos of each category of stream problem area were taken and are shown in **Appendix B, Section B-3**.

4. Fixed Photo Station Photos

Photos from established photo stations were collected on October 1, 2008 during the stream survey. These photos are included in **Appendix A**.

IV. RECOMMENDATIONS

Several issue areas were noted, but cumulatively do not appear to pose a systemic risk or threat at this time, and as such remedial action is not warranted. In general, given the nature of urban projects and watersheds in terms so their high flows, physical constraints and plentiful seed sources for invasive plants, urban projects should be periodically inspected during long term stewardship for potential future impacts of these watershed characteristics.

References:

Radford, A.E., H.E. Ahles and F.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. The University of North Carolina Press, Chapel Hill, North Carolina.

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

USACOE (1987). *Corps of Engineers Wetlands Delineation Manual*. Tech report Y-87-1. AD/A176.

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

APPENDIX A-VEGETATION RAW DATA

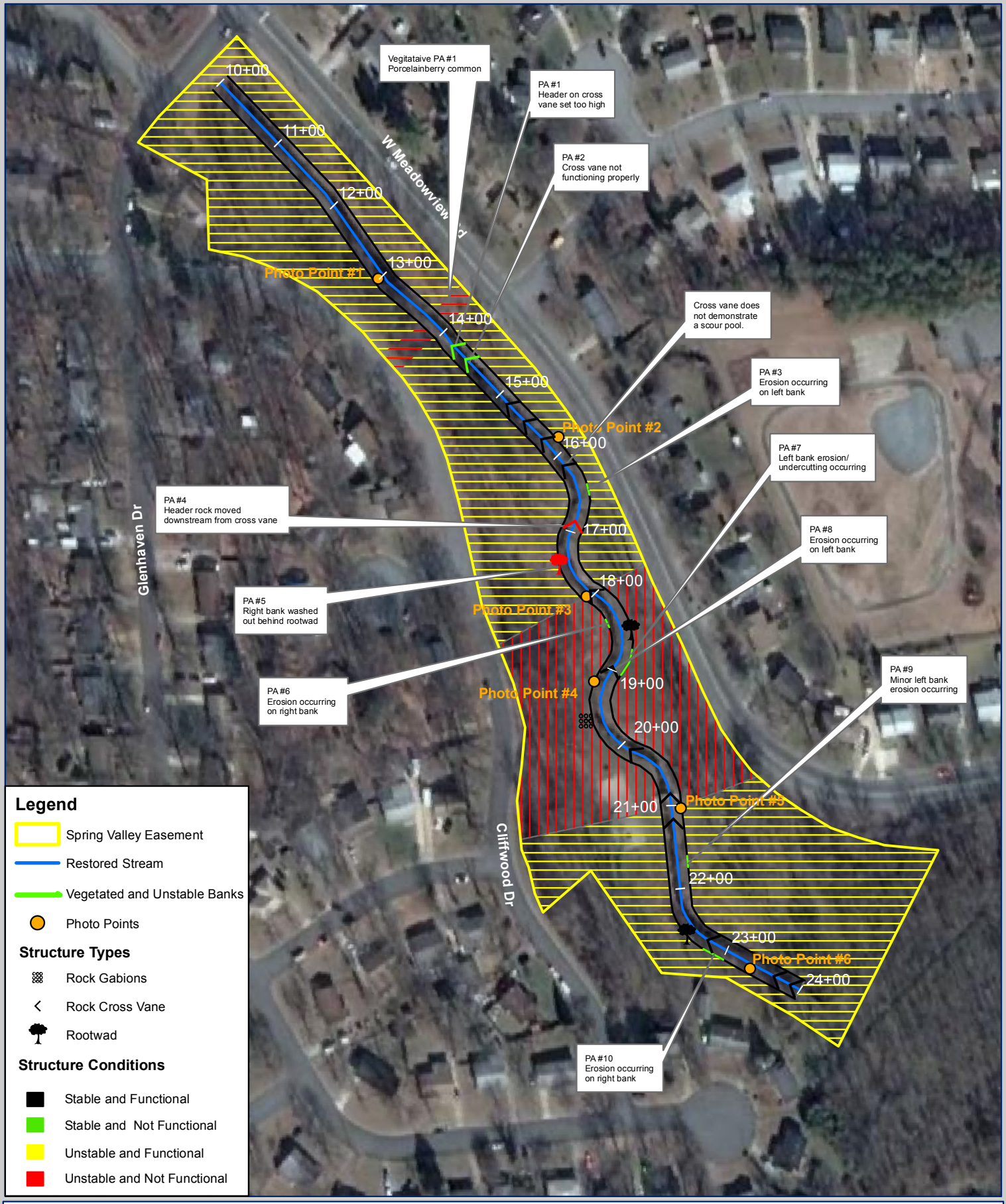
A-1 TABLE A.1 VEGETATION PROBLEM AREAS SUMMARY TABLE

Appendix A, Section A-1. Table A.1 Vegetation Problem Areas Summary Table

Table A.1. Vegetative Problem Areas Spring Valley Park Stream Mitigation/Project No. 354			
Feature/Issue	**Station # / Range**	**Probable Cause**	**Photo #**
Invasive/Exotic Populations	13+90	Porcelainberry dense	PA #1

APPENDIX B-GEOMORPHOLOGIC RAW DATA

B-1 CURRENT CONDITIONS PLAN VIEW
B-2 TABLE B.1 STREAM PROBLEM AREAS SUMMARY TABLE
B-3 REPRESENTATIVE STREAM PROBLEM AREA PHOTOS
B-4 STREAM PHOTO STATION PHOTOS



Appendix B, Section B-1
Spring Valley Current Conditions Plan View
Year 5 Monitoring
October 2008

0 75 150 300 Feet

1 inch equals 150 feet

N

Appendix B, Section B-2. Stream Problem Areas Summary Table (B.1)

Table B.1. Stream Problem Areas Spring Valley Park Stream Mitigation/Project No. 354				
Feature Issue	**Station Numbers**	**Suspected Cause**	**Photo Number**	**Structure Status**
Header on cross vane set too high	14+15	Water flowing around due to improper installation	PA #1	SF
Cross vane issue	14+40	Cross vane not functioning as intended	PA #2	SF
Left bank erosion	16+50	Lack of rooted vegetation	PA #3	--
Header rock moved downstream from cross vane	16+90	Improper installation	PA #4	UF
Right bank washed out behind root wad	17+40	Improper installation; lack of rooted vegetation	PA #5	UF
Right bank erosion	18+40	Lack of rooted vegetation	PA #6	--
Left bank erosion/undercut	18+80	Lack of rooted vegetation	PA #7	--
Left bank erosion	19+00	Lack of rooted vegetation	PA #8	--
Minor left bank erosion	21+80	Lack of rooted vegetation	PA #9	--
Right bank erosion	22+80 to 23+00	Lack of rooted vegetation	PA #10	--

Appendix B, Section B-3. Representative Stream Problem Areas Photos

PA #1 – Header on cross vane set too high, water flowing around due to improper installation. Sta. 14+15

PA# 2 – Cross vane not functioning as intended. Sta. 14+40

PA #3 – Left bank erosion; lack of rooted vegetation. Sta. 16+50

PA #4 – Header rock moved downstream from cross vane; improper installation. Sta. 16+90

PA #5 – Right bank washed out behind root wad; improper installation. Sta. 17+40

PA #6 – Right bank erosion; lack of rooted vegetation. Sta. 18+40

PA #7 – Left bank erosion/undercut; lack of rooted vegetation. Sta. 18+80

PA #8 – Left bank erosion; lack of rooted vegetation. Sta. 19+00

PA #9 – Minor left bank erosion; lack of rooted vegetation. Sta. 21+80

PA #10 – Right bank erosion; lack of rooted vegetation. Sta. 22+80 to 23+00

Appendix B, Section B-4. Stream Photo Station Photos

Photo Point 1 – Facing upstream. Sta. 13+00

Photo Point 1 – Facing downstream. Sta. 13+00

Photo Point 2 – Facing upstream. Sta. 16+10

Photo Point 2 – Facing downstream. Sta. 16+10

Photo Point 3 – Facing upstream. Sta. 18+40

Photo Point 3 – Facing downstream. Sta. 18+40

Photo Point 4 – Facing upstream. Sta. 19+30

Photo Point 4 – Facing downstream. Sta. 19+30

Photo Point 5 – Facing upstream. Sta. 21+10

Photo Point 5 – Facing downstream. Sta. 21+10

Photo Point 6 – Facing upstream. Sta. 23+25

Photo Point 6 – Facing downstream. Sta. 23+25