ANNUAL MONITORING REPORT
YEAR 5 (2012) ANNUAL MONITORING

BROWN MARSH SWAMP STREAM AND WETLAND RESTORATION SITE

Contract No. 16-D06038, EEP IMS No. 92517
USACE Action ID No. SAW-2007-2585, DWQ No. 07-1212

CLOSEOUT REPORT

Stream and Wetland

Project Setting & Classifications

County	Robeson
General Location	Lumberton
Basin:	Lumber
Physiographic Region:	Coastal Plain
Ecoregion:	Southeastern Plains
USGS Hydro Unit:	03040204037010
NCDWQ Sub-basin:	03-07-55
Wetland Classification	PF01A
Thermal Regime:	Warm
Trout Water:	N/A
Project Performers	
Source Agency:	EEP
Provider:	Restoration Systems, LLC
Designer:	Florence & Hutcheson
Monitoring Firm	Florence & Hutcheson
Channel Remediation	Land Mechanics Designs
Plant remediation	Carolina Silvics
Property Interest Holder	Stewardship

Overall Project Activities and Timeline

Milestone	**Month-Year**
Project Instituted	
Permitted	
Construction Completed	November 2007
As-built survey	April 2008
Monitoring Year-1	November 2008
Supplemental Planting	Early 2009
Monitoring Year-2	November 2009
Monitoring Year 3	November 2010
Monitoring Year 4	November 2011
Monitoring Year 5	October 2012
Supplemental Planting	December 2012
Closeout Submission	November 2012

Project Setting and Background Summary

A 20.25-acre conservation easement has been placed on the Site to incorporate all restoration activities. The Site contains 5.0 acres of hydric soils, two first-order unnamed tributaries (UTs) to Contrary Swamp (Northern UT and Southern UT), associated floodplain, and upland slopes. The purpose of this project was to restore stable pattern, dimension, and profile to the UTs; restore hydrology to drained nonriverine wetlands; and revegetate streams, floodplains, wetlands, and upland slopes within the Site. The contributing watershed is characterized primarily by agricultural row crop production and pine plantation/forest land. Preproject Site conditions consisted of agricultural row crop production. Land use modifications including the removal of riparian vegetation, straightening and dredging of stream channels, and ditching of floodplain wetlands resulted in degraded water quality and unstable channel characteristics (stream entrenchment, erosion, and bank collapse).

Seventeen vegetation plots (10-10 meters by 10 meters and 7-20 meters by 5 meters in size) were established and permanently monumented. Overall, vegetative performance has been relatively successful through the monitoring period. Site vegetation plots were surveyed in June 2012 for the Year 5 (2012) monitoring season. Based on the number of stems counted, average densities were measured at 790 planted stems per acre surviving in Year 5 (2012). In addition, each individual plot met success criteria. The dominant species identified at the Site were planted stems of silky dogwood (*Cornus amomum*), American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), overcup oak (*Quercus lyrata*), cherrybark oak (*Quercus pagoda*), and swamp chestnut oak (*Quercus michauxii*), and natural recruits of red maple (*Acer rubrum*). One vegetation problem area was noted during Year 5 monitoring along the southern perimeter of the Site (see Figure 1). It appears that someone encroached into the easement and cleared some of the vegetation within this area. Carolina Silvics replanted the area on December 11, 2012 with 40, 3-gallon sweetbay magnolias (*Magnolia virginiana*).

Twenty cross-sections and longitudinal profiles within five 600-foot reaches were measured throughout the monitoring period. As a whole, monitoring measurements indicate minimal changes in both the longitudinal profile and cross-sections as compared to as-built data. The channel geometry compares favorably with the emulated, stable E/C type stream reach as set forth in the detailed mitigation plan and as constructed. Current monitoring has demonstrated dimension, pattern, and profile were stable over the course of the monitoring period. No stream problem areas were noted during Year 5 (2012) monitoring.

Two onsite groundwater gauges and one reference groundwater gauge were maintained throughout the monitoring period. Groundwater gauge 1 was inundated/saturated within 12 inches of the surface for greater than 12.5 percent of the growing season for three out of the five monitoring years, despite severe drought during the majority of the monitoring period. Groundwater gauge 2 made success criteria all five years. The reference gauge exhibited a downward trend throughout the 5 year monitoring period ranging from 17.1 percent of the growing season in year two to 3.7 percent of the growing season in year 4 and appears to have malfunctioned measuring 0 days of saturation for the Year 5 (2012) monitoring season. No onsite wetland problem areas were noted.

Goals and Objectives

The primary goals of this stream and wetland restoration project focused on improving water quality, decreasing floodwater levels, and restoring aquatic and riparian habitat. These goals were accomplished by:

- Reducing nonpoint sources of pollution associated with agricultural land uses by providing a forested buffer adjacent to streams to treat surface runoff.
- Reestablishing stream stability and the capacity to transport watershed flows and sediment loads by restoring stable dimension, pattern, and profile.

- Promoting floodwater attenuation by;excavating a floodplain at a new bankfull elevation; restoring a secondary, entrenched tributary thereby reducing floodwater velocities within smaller catchment basins; increasing storage capacity for floodwaters within the Site limits; and revegetating floodplains to increase frictional resistance on floodwaters.
- Improving aquatic habitat by enhancing stream bed variability, restoring a riffle-pool complex, and by incorporating grade control/habitat structures.
- Providing wildlife habitat including a forested riparian corridor within an area highly dissected by agricultural land uses.

Primary activities at the Site included 1) stream restoration, 2) wetland restoration, 3) soil scarification, and 4) plant community restoration. Table 1 describes the Site restoration structures and objectives, which have provided 5004 Stream Mitigation Units (SMUs) and 5.0 Nonriverine Wetland Mitigation Units (WMUs).

- Restored 5004 linear feet of two unnamed tributaries to Contrary Swamp (Northern UT and Southern UT) by constructing moderately sinuous, E-type channels on new location.
- Restored 5.0 acres of nonriverine wetland within the interstream flat filling ditches, removing elevated spoil, thereby reestablishing historic water table elevations.
- Reforested approximately 20.05 acres of floodplain, stream bank, upland slopes, and nonriverine wetlands with native forest species.

Success Criteria

Vegetation: Success criteria have been established to verify that the vegetation component supports community elements necessary for forest development. Success criteria are dependent upon the density and growth of characteristic forest species. Additional success criteria are dependent upon density and growth of "Characteristic Tree Species." Characteristic Tree Species include planted species, species identified through inventory of a reference (relatively undisturbed) forest community used to orient the planting plan, and appropriate Schafale and Weakley (1990) community descriptions (Coastal Plain Small Stream Swamp and Nonriverine Wet Hardwoods Forest). All canopy tree species planted and identified in the reference forest will be utilized to define “Characteristic Tree Species” as termed in the success criteria. Success criteria dictate that an average density of 320 stems per acre of Character Tree Species must be surviving in the first three monitoring years. Subsequently, 290 Character Tree Species per acre must be surviving in year 4 and 260 Character Tree Species per acre in year 5.

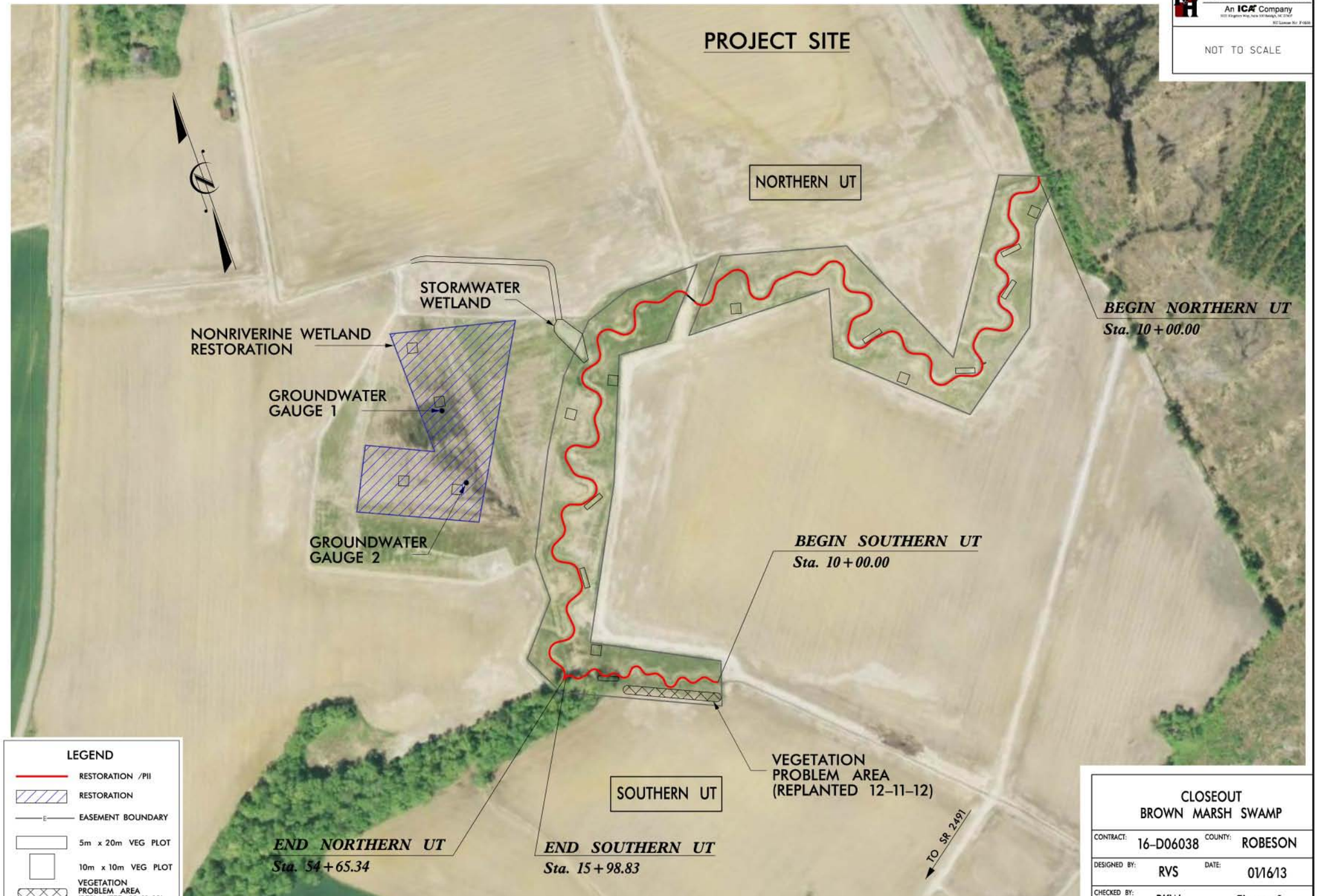
Stream: Success criteria for stream restoration will include 1) successful classification of the reach as a functioning stream system (Rosgen 1996) and 2) channel variables indicative of a stable stream system. The channel configuration will be measured on an annual basis in order to track changes in channel geometry and profile. These data will be utilized to determine the success in restoring stream channel stability. Specifically, the width-to-depth ratio should characterize an E-type or borderline E-/C-type channel, bank-height ratios indicative of a stable or moderately unstable channel, and minimal changes in cross-sectional area, channel width, and/or bank erosion along the monitoring reach. In addition, channel abandonment and/or shoot cutoffs must not occur and sinuosity values must remain relatively constant. The field indicator of bankfull will be described in each monitoring year and indicated on a representative channel cross-section figure. If the stream channel is down-cutting or the channel width is enlarging due to bank erosion, additional bank or slope stabilization methods will be employed. Stream substrate is not expected to coarsen over time; therefore, pebble counts are not proposed as part of the stream success criteria. Visual assessment of in-stream structures will be conducted to determine if failure has occurred. Failure of a structure may be indicated by collapse of the structure, undermining of the structure, abandonment of the channel around the structure, and/or stream flow beneath the structure.

Hydrology: Target hydrological characteristics include saturation or inundation for at least 12.5 percent of the growing season within Trebloc soils (nonriverine wetlands), during average climatic conditions. This value is based on DRAINMOD simulations for 62 years of rainfall data in an old field stage. These areas are expected to support hydrophytic vegetation. If wetland parameters are marginal a jurisdictional determination will be performed for vegetation and soils in these areas.

Table 1. Site Restoration Structures and Objectives

Restoration Segment/ Reach ID	Station Range	Restoration Type/Approach*	Existing Linear Footage/ Acreage	Designed Linear Footage/Acreage	SMU/WMUs
Northern UT	10+00 – 54+65	Restoration/PII	2700	4,465	4465
Southern UT	10+00 – 15+39	Restoration/PII	442	539	539
Nonriverine Wetlands	--	Restoration	5.0	5.0	5.0
Mitigation Unit Summations					
Stream	**Nonriverine Wetland**				
5004 SMUs	5.0 WMUs				

*PII=Priority 2

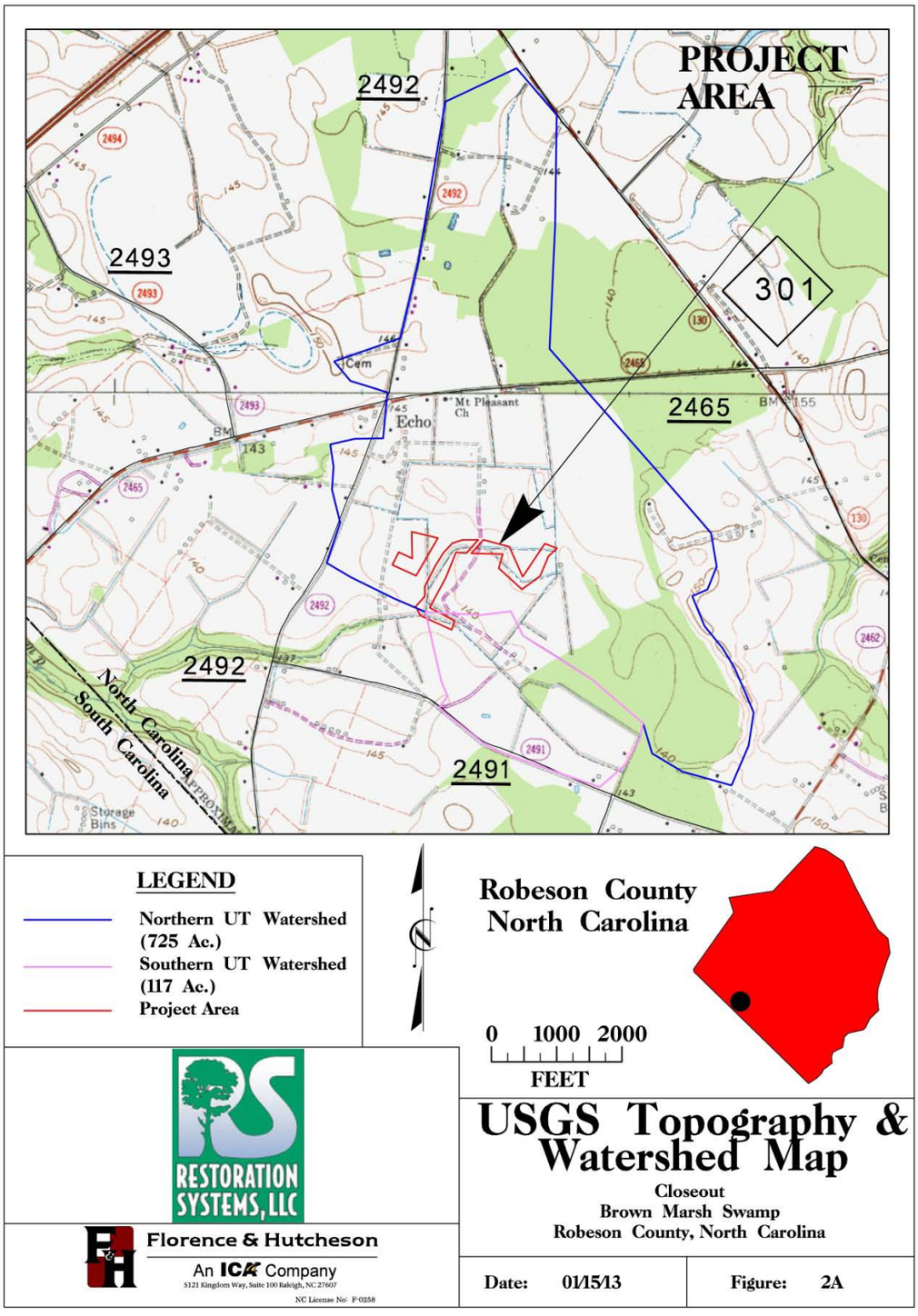


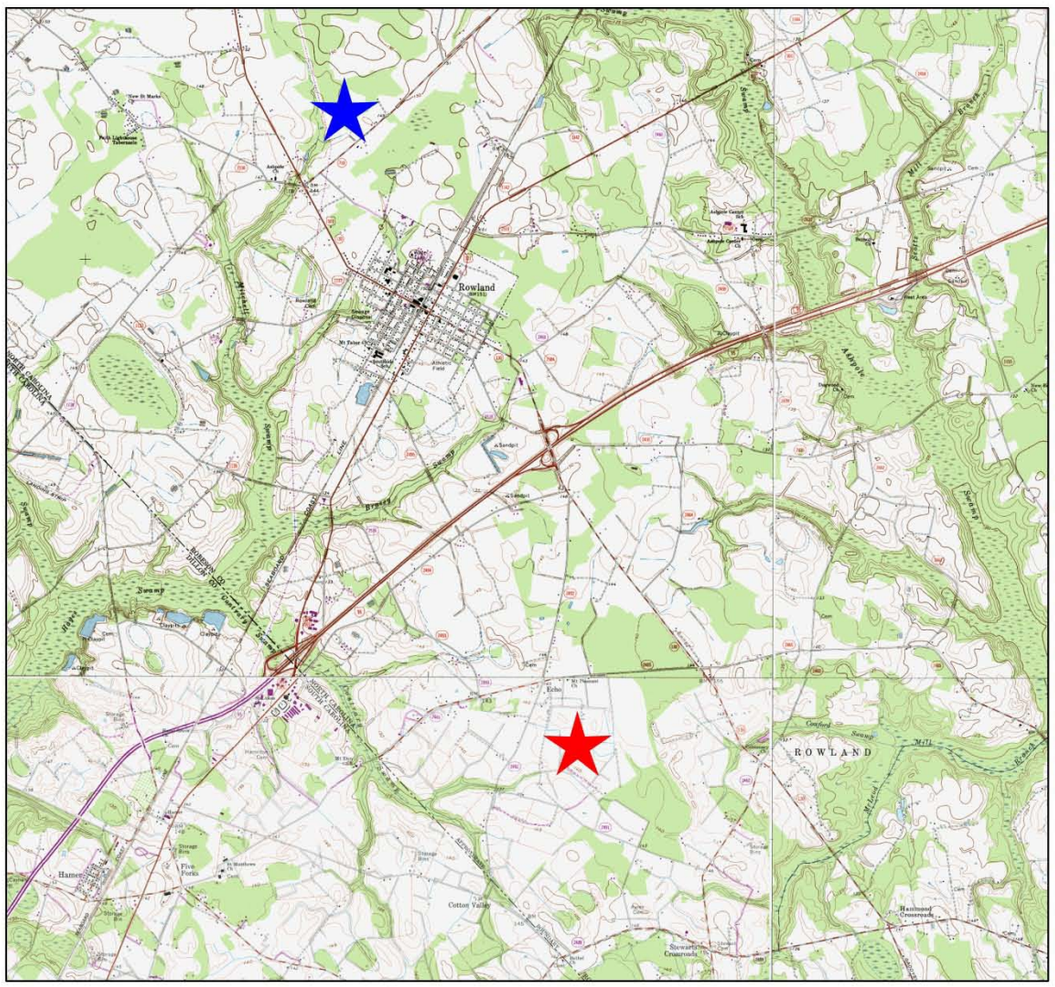
Florence & Hutcheson
An ICA Company

NOT TO SCALE

CLOSEOUT
BROWN MARSH SWAMP

CONTRACT:	16-D06038	COUNTY:	ROBESON
DESIGNED BY:	RVS	DATE:	01/16/13
CHECKED BY:	RKW		Figure: 1


PROJECT AREA
2492
2493
2465
2491
301
Mt Pleasant Ch
Echo
Cem
BM 143
BM 155
North Carolina
South Carolina
Storage Bins
LEGEND
Northern UT Watershed (725 Ac.)
Southern UT Watershed (117 Ac.)
Project Area
Robeson County
North Carolina
0 1000 2000
FEET
RESTORATION SYSTEMS, LLC
Florence & Hutcheson
An ICA Company
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258
USGS Topography & Watershed Map
Closeout
Brown Marsh Swamp
Robeson County, North Carolina
Date: 01/15/13
Figure: 2A



LEGEND

Project Site

Wetland Reference Gauge

0 5000 10000

FEET

Robeson County
North Carolina

RESTORATION SYSTEMS, LLC

Florence & Hutcheson

An ICA Company

5121 Kingdom Way, Suite 100 Raleigh, NC 27607

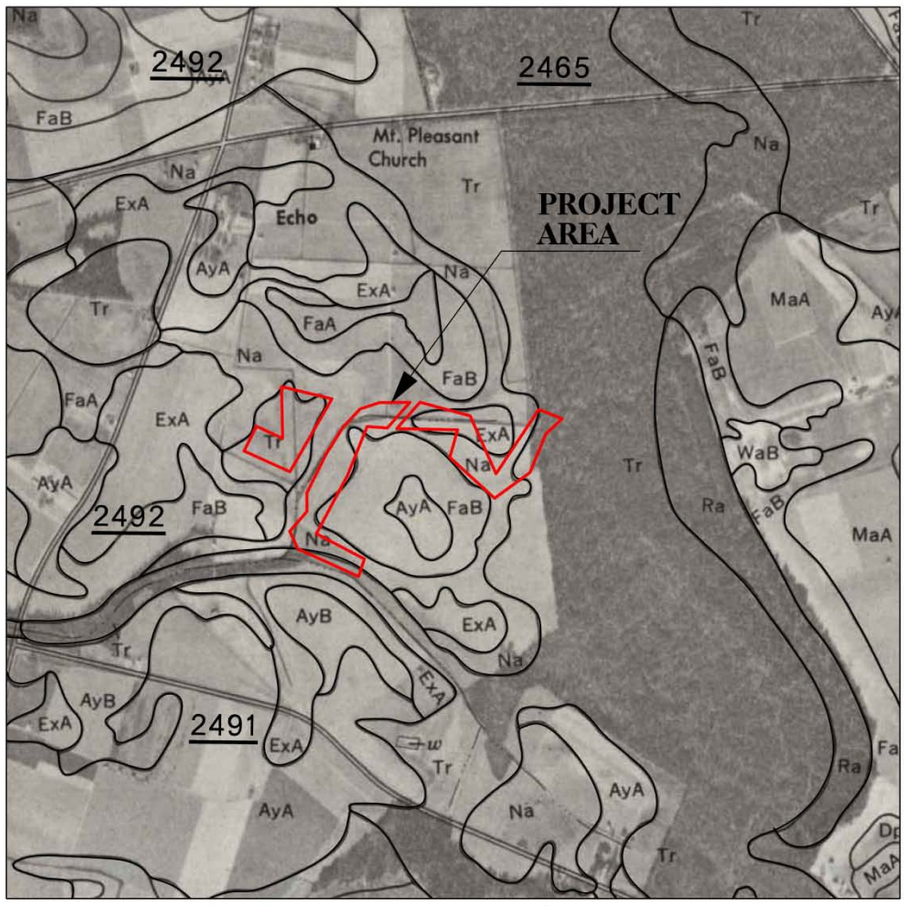
NC License No: F-0258

Project and Reference Site Vicinity Map

Closeout
Brown Marsh Swamp
Robeson County, North Carolina

Date: 01/15/13

Figure: 2B



RESTORATION SYSTEMS, LLC

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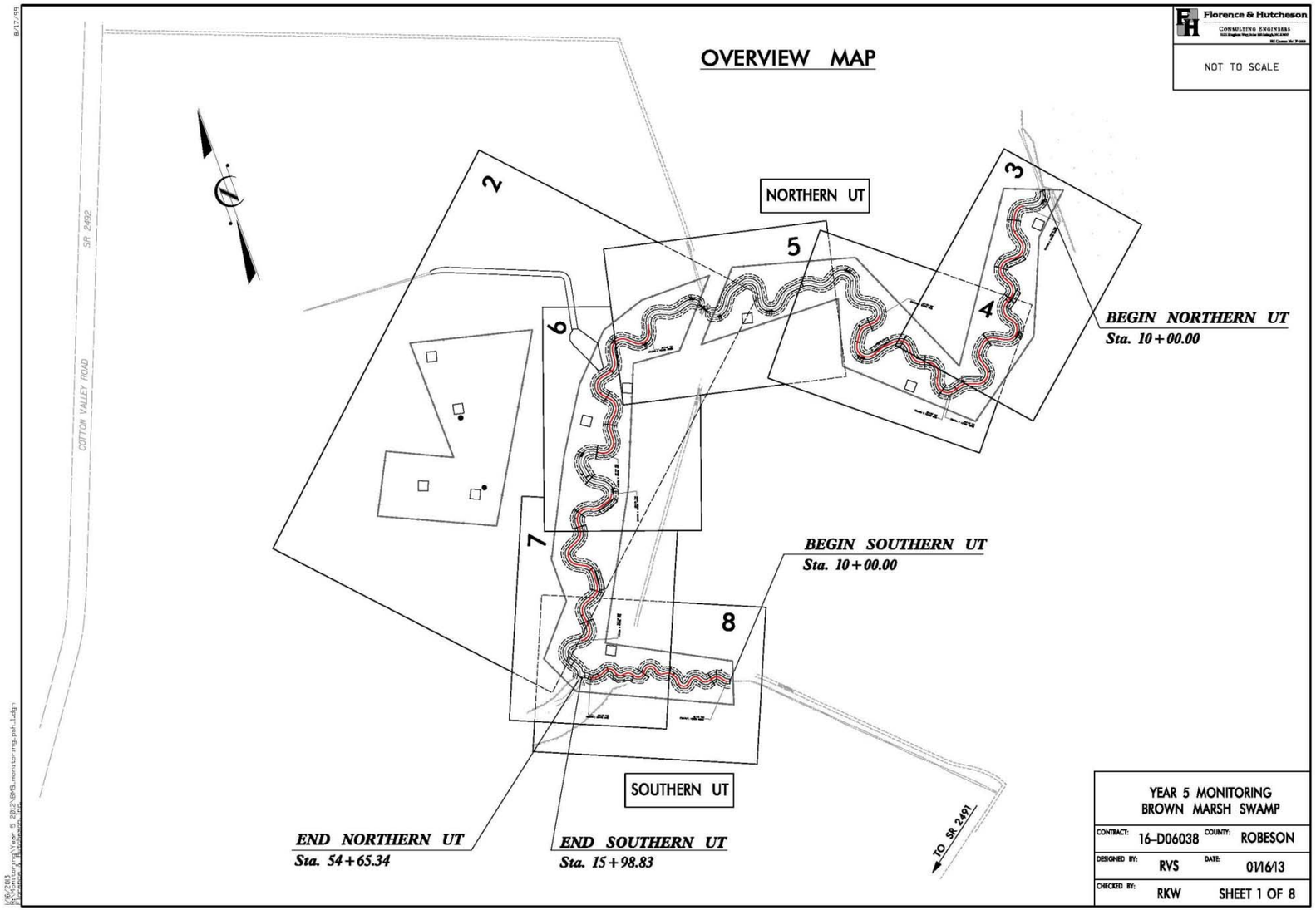
An ICF Company
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: P-0258

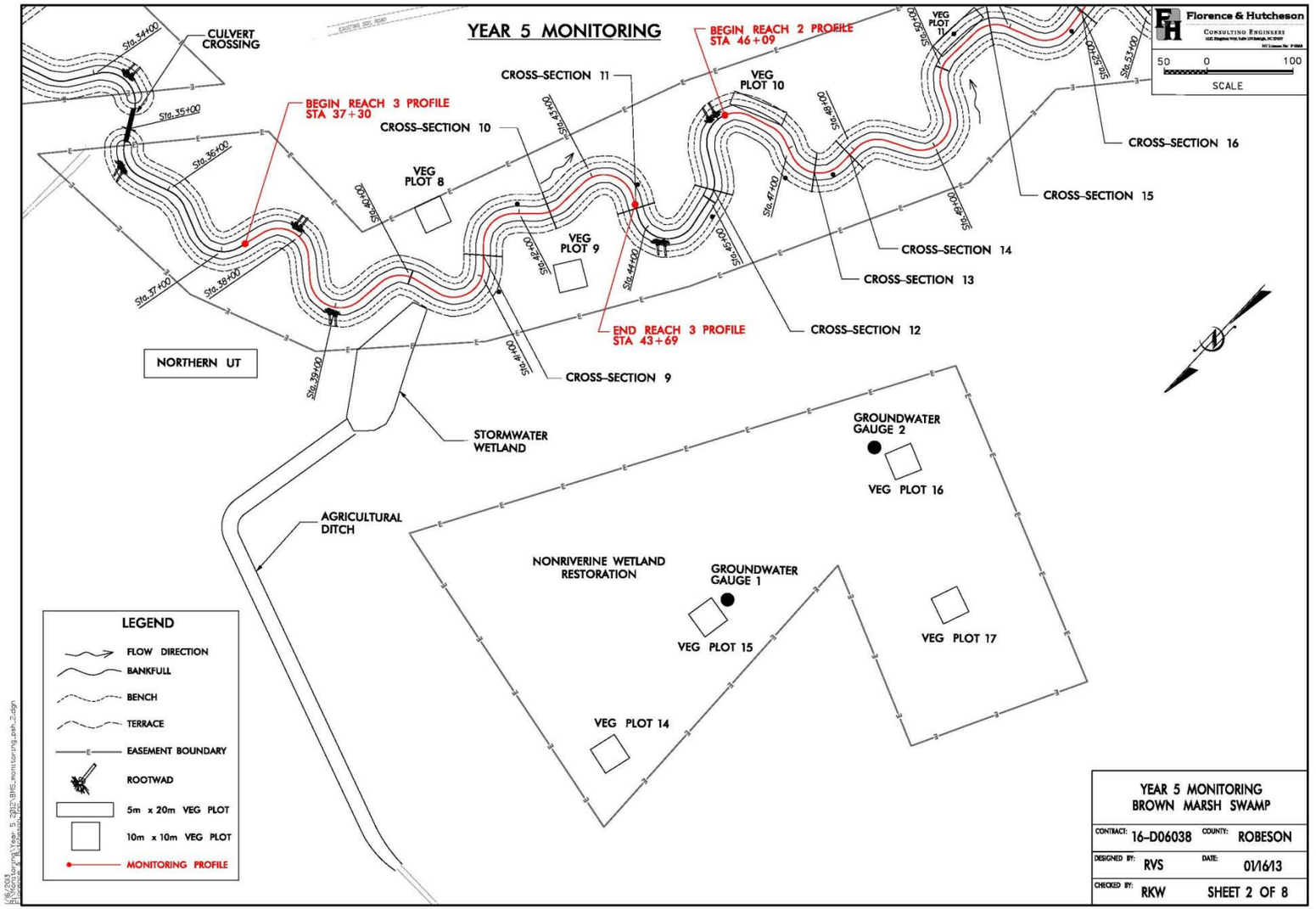
Soil Survey Map

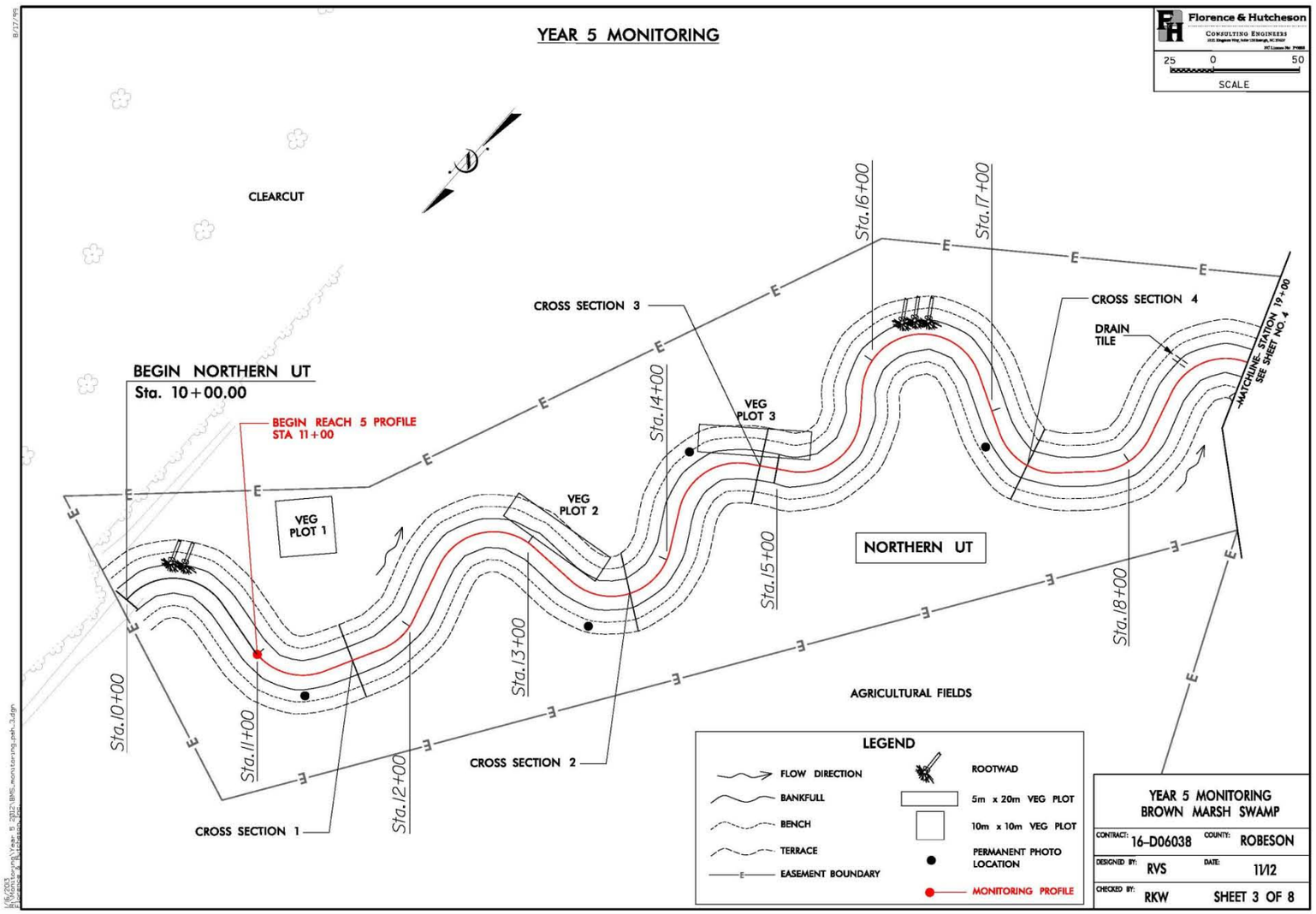
Closeout
Brown Marsh Swamp
Robeson County, North Carolina

Date: 11/06/12

Figure: 3


OVERVIEW MAP
NOT TO SCALE
Florence & Hutcheson
CONSULTING ENGINEERS
NORTHERN UT
SOUTHERN UT
BEGIN NORTHERN UT
Sta. 10+00.00
BEGIN SOUTHERN UT
Sta. 10+00.00
END NORTHERN UT
Sta. 54+65.34
END SOUTHERN UT
Sta. 15+98.83
SR 2492
COTTON VALLEY ROAD
TO SR 2491
2
3
4
5
6
7
8
YEAR 5 MONITORING
BROWN MARSH SWAMP
CONTRACT: 16-D06038
COUNTY: ROBESON
DESIGNED BY: RVS
DATE: 01/16/13
CHECKED BY: RKW
SHEET 1 OF 8


YEAR 5 MONITORING
Florence & Hutcheson
CONSULTING ENGINEERS
50 0 100
SCALE
CULVERT CROSSING
BEGIN REACH 3 PROFILE STA 37+30
BEGIN REACH 2 PROFILE STA 46+09
END REACH 3 PROFILE STA 43+69
CROSS-SECTION 9
CROSS-SECTION 10
CROSS-SECTION 11
CROSS-SECTION 12
CROSS-SECTION 13
CROSS-SECTION 14
CROSS-SECTION 15
CROSS-SECTION 16
VEG PLOT 8
VEG PLOT 9
VEG PLOT 10
VEG PLOT 11
VEG PLOT 14
VEG PLOT 15
VEG PLOT 16
VEG PLOT 17
Sta. 34+00
Sta. 35+00
Sta. 36+00
Sta. 37+00
Sta. 38+00
Sta. 39+00
Sta. 40+00
Sta. 41+00
Sta. 42+00
Sta. 43+00
Sta. 44+00
Sta. 45+00
Sta. 46+00
Sta. 47+00
Sta. 48+00
Sta. 49+00
Sta. 50+00
Sta. 51+00
Sta. 52+00
Sta. 53+00
NORTHERN UT
STORMWATER WETLAND
AGRICULTURAL DITCH
NONRIVERINE WETLAND RESTORATION
GROUNDWATER GAUGE 1
GROUNDWATER GAUGE 2
LEGEND
FLOW DIRECTION
BANKFULL
BENCH
TERRACE
EASEMENT BOUNDARY
ROOTWAD
5m x 20m VEG PLOT
10m x 10m VEG PLOT
MONITORING PROFILE
YEAR 5 MONITORING
BROWN MARSH SWAMP
CONTRACT: 16-D06038
COUNTY: ROBESON
DESIGNED BY: RVS
DATE: 01/16/13
CHECKED BY: RKW
SHEET 2 OF 8


YEAR 5 MONITORING
Florence & Hutcheson
CONSULTING ENGINEERS
25 0 50
SCALE
CLEARCUT
CROSS SECTION 3
CROSS SECTION 4
DRAIN TILE
MATCHLINE- STATION 19+00 SEE SHEET NO. 4
BEGIN NORTHERN UT
Sta. 10+00.00
BEGIN REACH 5 PROFILE STA 11+00
VEG PLOT 1
VEG PLOT 2
VEG PLOT 3
NORTHERN UT
AGRICULTURAL FIELDS
CROSS SECTION 1
CROSS SECTION 2
Sta.10+00
Sta.11+00
Sta.12+00
Sta.13+00
Sta.14+00
Sta.15+00
Sta.16+00
Sta.17+00
Sta.18+00
LEGEND
FLOW DIRECTION
BANKFULL
BENCH
TERRACE
EASEMENT BOUNDARY
ROOTWAD
5m x 20m VEG PLOT
10m x 10m VEG PLOT
PERMANENT PHOTO LOCATION
MONITORING PROFILE
YEAR 5 MONITORING
BROWN MARSH SWAMP
CONTRACT: 16-D06038
COUNTY: ROBESON
DESIGNED BY: RVS
DATE: 11/12
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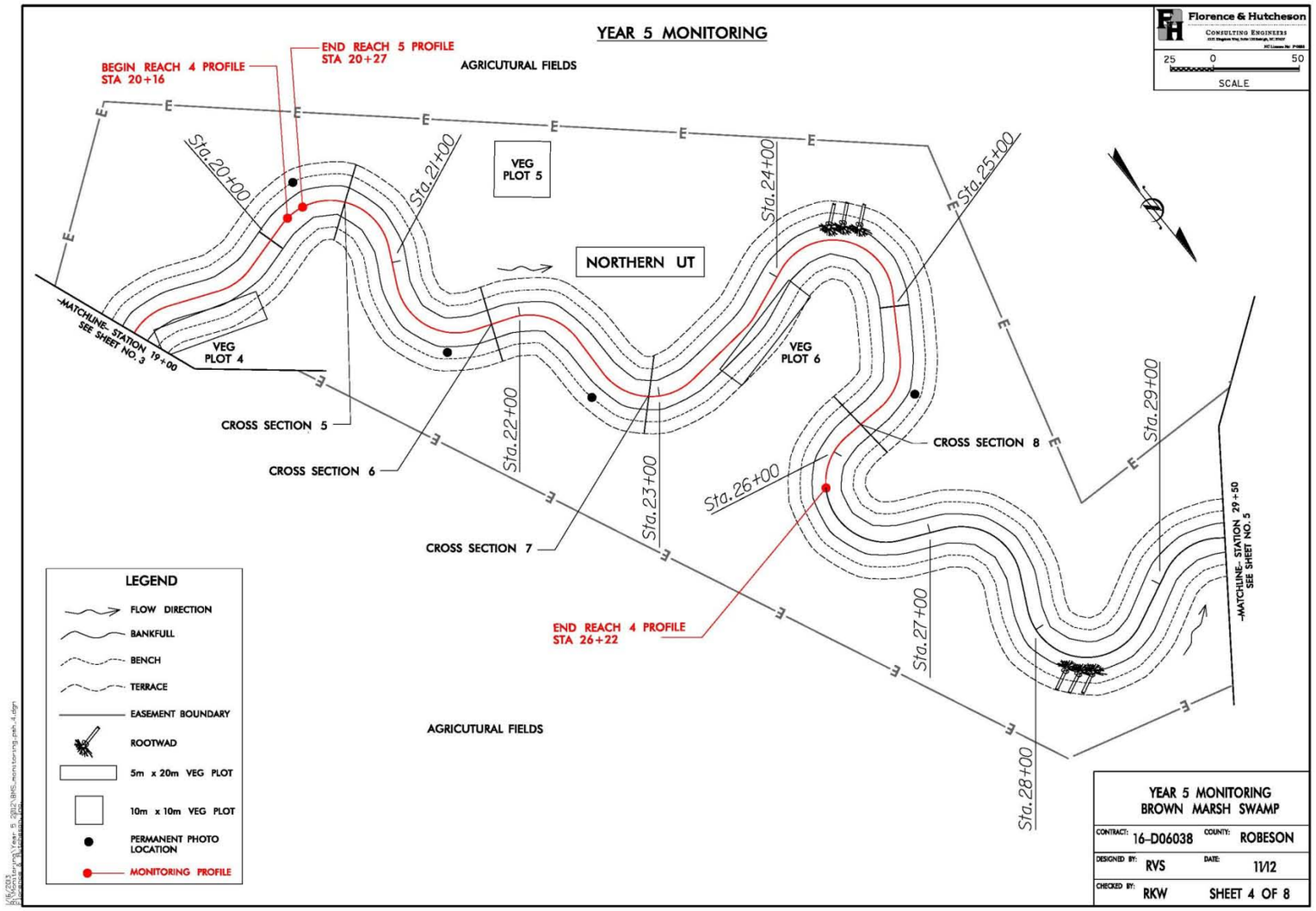
SHEET 3 OF 8


YEAR 5 MONITORING
Florence & Hutcheson
CONSULTING ENGINEERS
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SCALE
BEGIN REACH 4 PROFILE
STA 20+16
END REACH 5 PROFILE
STA 20+27
AGRICUTURAL FIELDS
Sta.20+00
Sta.21+00
VEG PLOT 5
Sta.24+00
Sta.25+00
NORTHERN UT
MATCHLINE- STATION 19+00
SEE SHEET NO. 3
VEG PLOT 4
VEG PLOT 6
CROSS SECTION 5
CROSS SECTION 6
CROSS SECTION 7
CROSS SECTION 8
Sta.22+00
Sta.23+00
Sta.26+00
Sta.29+00
MATCHLINE- STATION 29+50
SEE SHEET NO. 5
END REACH 4 PROFILE
STA 26+22
Sta.27+00
Sta.28+00
AGRICUTURAL FIELDS
LEGEND
FLOW DIRECTION
BANKFULL
BENCH
TERRACE
EASEMENT BOUNDARY
ROOTWAD
5m x 20m VEG PLOT
10m x 10m VEG PLOT
PERMANENT PHOTO LOCATION
MONITORING PROFILE
YEAR 5 MONITORING
BROWN MARSH SWAMP
CONTRACT: 16-D06038
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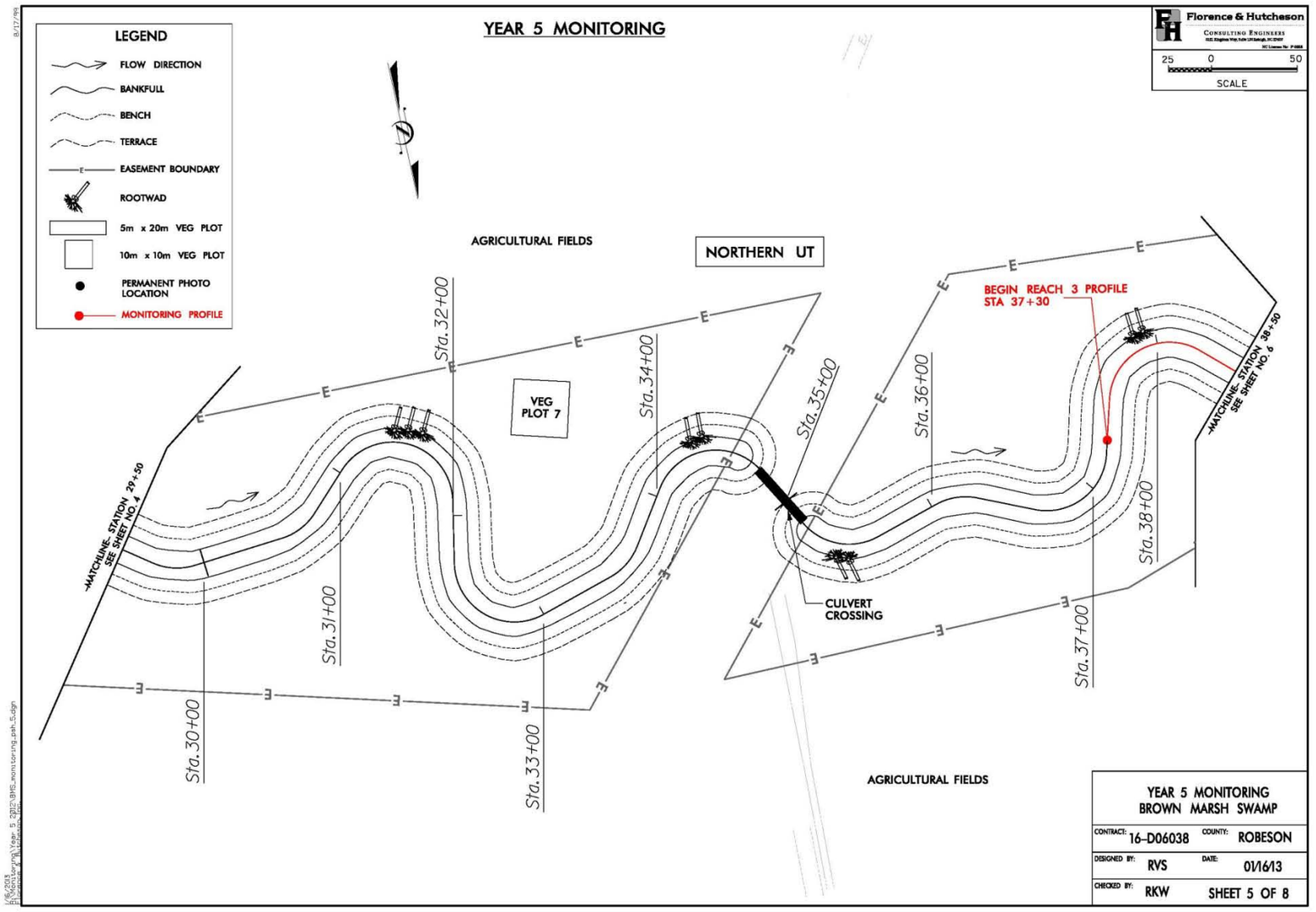
SHEET 4 OF 8


YEAR 5 MONITORING
LEGEND
FLOW DIRECTION
BANKFULL
BENCH
TERRACE
EASEMENT BOUNDARY
ROOTWAD
5m x 20m VEG PLOT
10m x 10m VEG PLOT
PERMANENT PHOTO LOCATION
MONITORING PROFILE
Florence & Hutcheson
CONSULTING ENGINEERS
25 0 50
SCALE
AGRICULTURAL FIELDS
NORTHERN UT
VEG PLOT 7
BEGIN REACH 3 PROFILE
STA 37+30
MATCHLINE STATION 39+50
SEE SHEET NO. 4
MATCHLINE STATION 39+50
SEE SHEET NO. 6
Sta.30+00
Sta.31+00
Sta.32+00
Sta.33+00
Sta.34+00
Sta.35+00
Sta.36+00
Sta.37+00
Sta.38+00
CULVERT CROSSING
AGRICULTURAL FIELDS
YEAR 5 MONITORING
BROWN MARSH SWAMP
CONTRACT: 16-D06038
COUNTY: ROBESON
DESIGNED BY: RVS
DATE: 01/16/13
CHECKED BY: RKW
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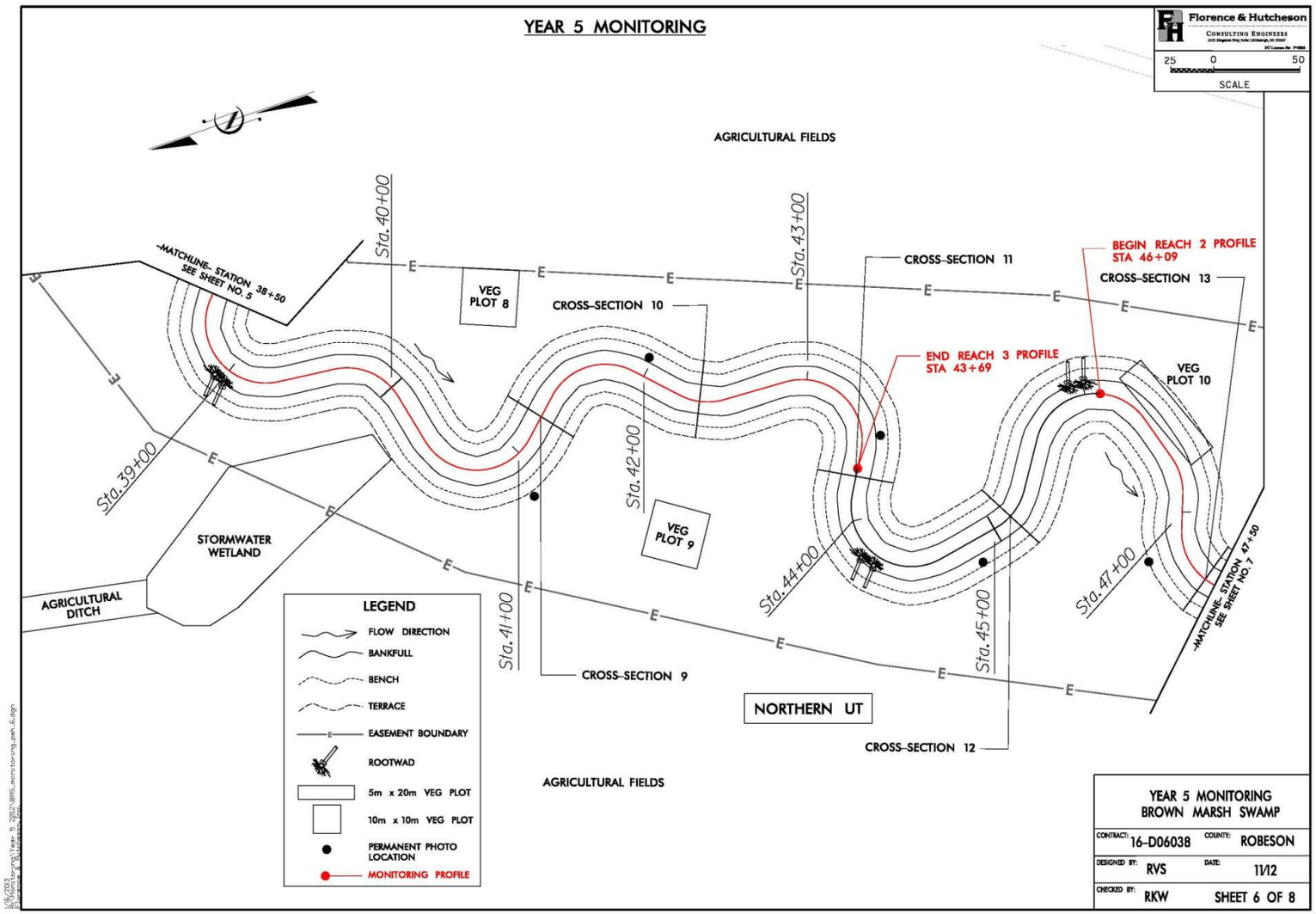
YEAR 5 MONITORING
Florence & Hutcheson
CONSULTING ENGINEERS
25 0 50
SCALE
AGRICULTURAL FIELDS
-MATCHLINE- STATION 38+50
SEE SHEET NO. 5
Sta. 40+00
Sta. 43+00
VEG PLOT 8
CROSS-SECTION 10
CROSS-SECTION 11
BEGIN REACH 2 PROFILE
STA 46+09
CROSS-SECTION 13
END REACH 3 PROFILE
STA 43+69
VEG PLOT 10
Sta. 39+00
Sta. 42+00
VEG PLOT 9
STORMWATER WETLAND
AGRICULTURAL DITCH
Sta. 44+00
Sta. 47+00
-MATCHLINE- STATION 47+50
SEE SHEET NO. 7
Sta. 41+00
CROSS-SECTION 9
NORTHERN UT
Sta. 45+00
CROSS-SECTION 12
AGRICULTURAL FIELDS
LEGEND
FLOW DIRECTION
BANKFULL
BENCH
TERRACE
EASEMENT BOUNDARY
ROOTWAD
5m x 20m VEG PLOT
10m x 10m VEG PLOT
PERMANENT PHOTO LOCATION
MONITORING PROFILE
YEAR 5 MONITORING
BROWN MARSH SWAMP
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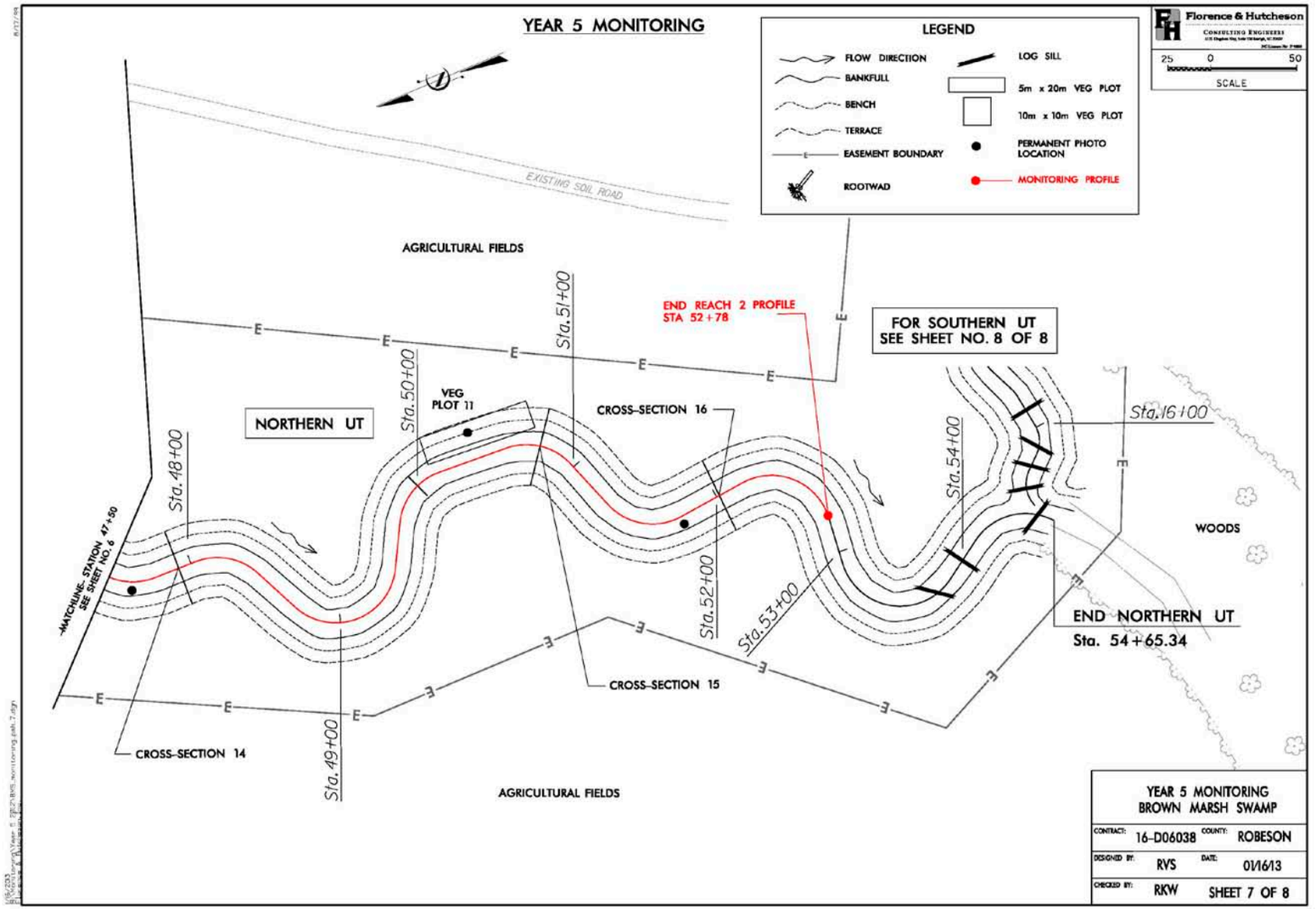
SHEET 6 OF 8


YEAR 5 MONITORING
LEGEND
FLOW DIRECTION
BANKFULL
BENCH
TERRACE
EASEMENT BOUNDARY
ROOTWAD
LOG SILL
5m x 20m VEG PLOT
10m x 10m VEG PLOT
PERMANENT PHOTO LOCATION
MONITORING PROFILE
Florence & Hutcheson
CONSULTING ENGINEERS
25 0 50
SCALE
EXISTING SOIL ROAD
AGRICULTURAL FIELDS
END REACH 2 PROFILE
STA 52+78
FOR SOUTHERN UT
SEE SHEET NO. 8 OF 8
NORTHERN UT
VEG PLOT 11
CROSS-SECTION 16
Sta.48+00
Sta.49+00
Sta.50+00
Sta.51+00
Sta.52+00
Sta.53+00
Sta.54+00
Sta.16+00
MATCHLINE, STATION 47+50
SEE SHEET NO. 6
CROSS-SECTION 14
CROSS-SECTION 15
WOODS
END NORTHERN UT
Sta. 54+65.34
AGRICULTURAL FIELDS
YEAR 5 MONITORING
BROWN MARSH SWAMP
CONTRACT: 16-D06038
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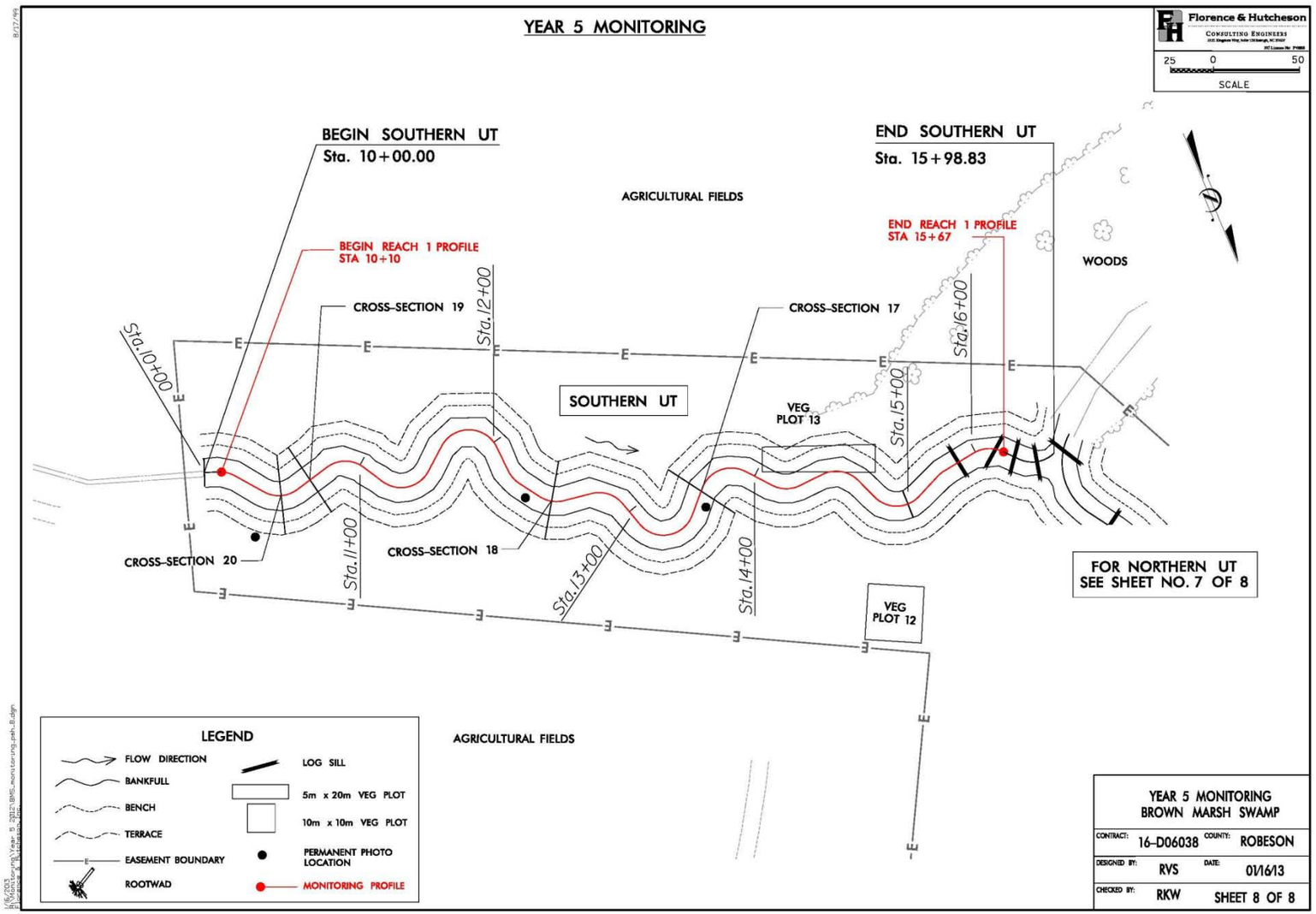
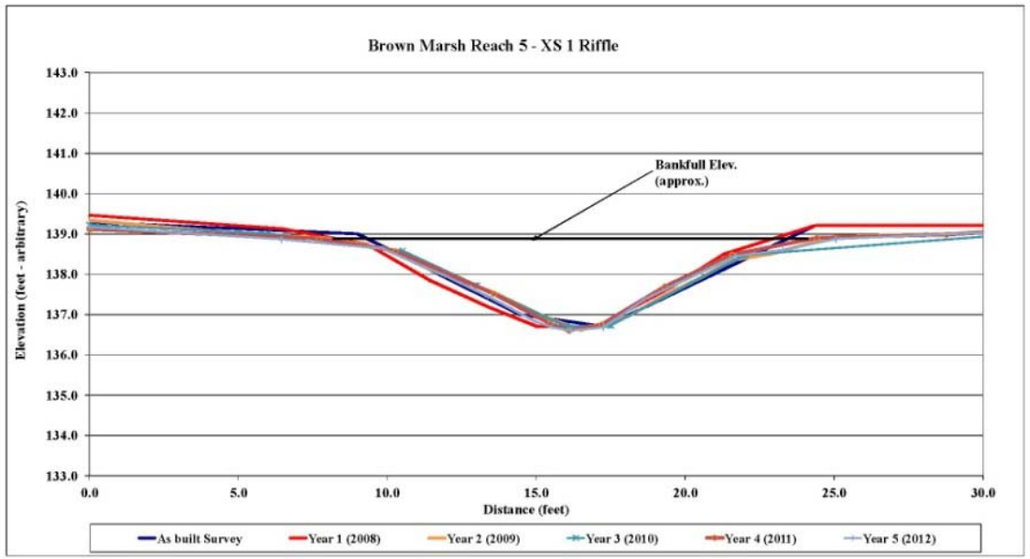
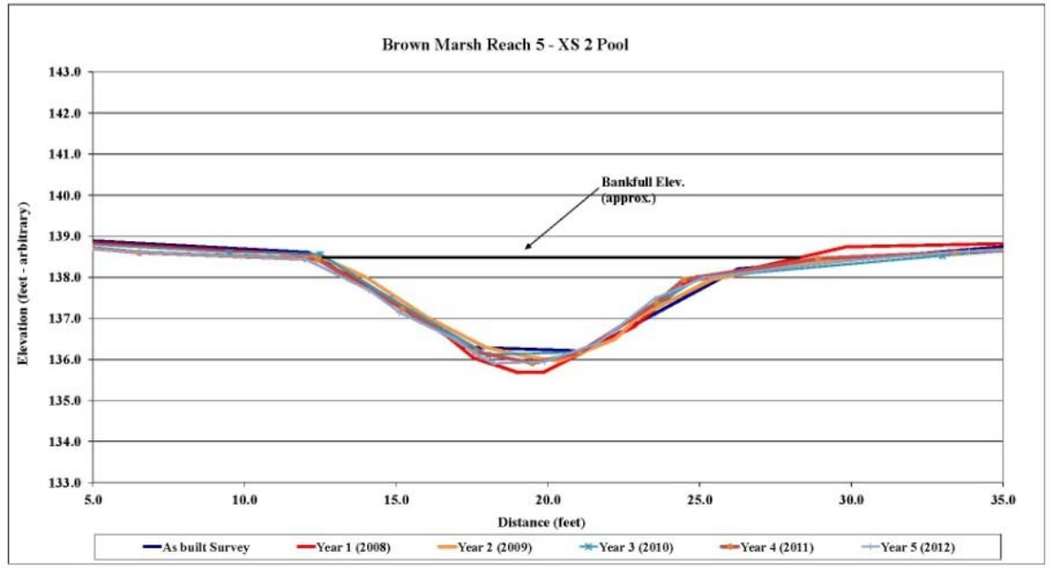
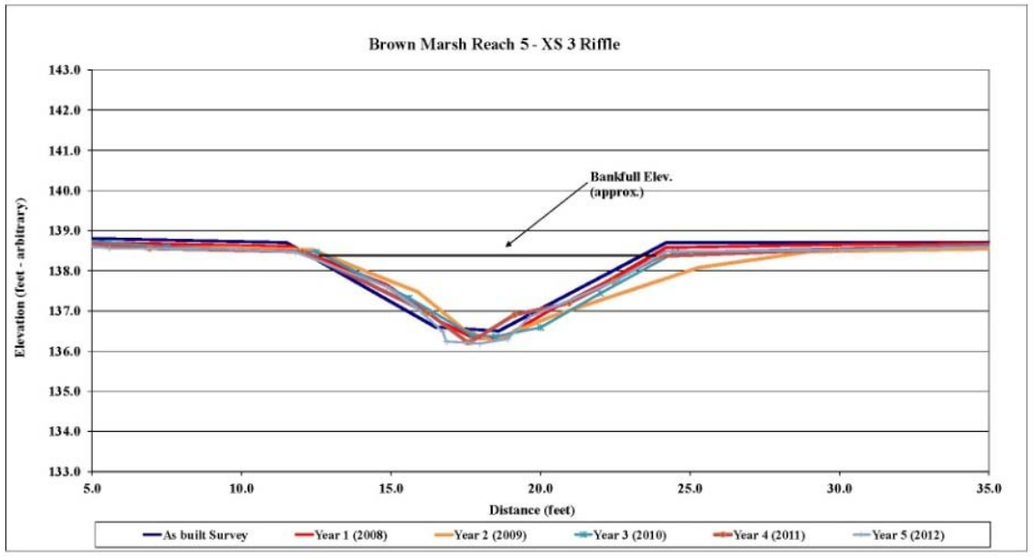
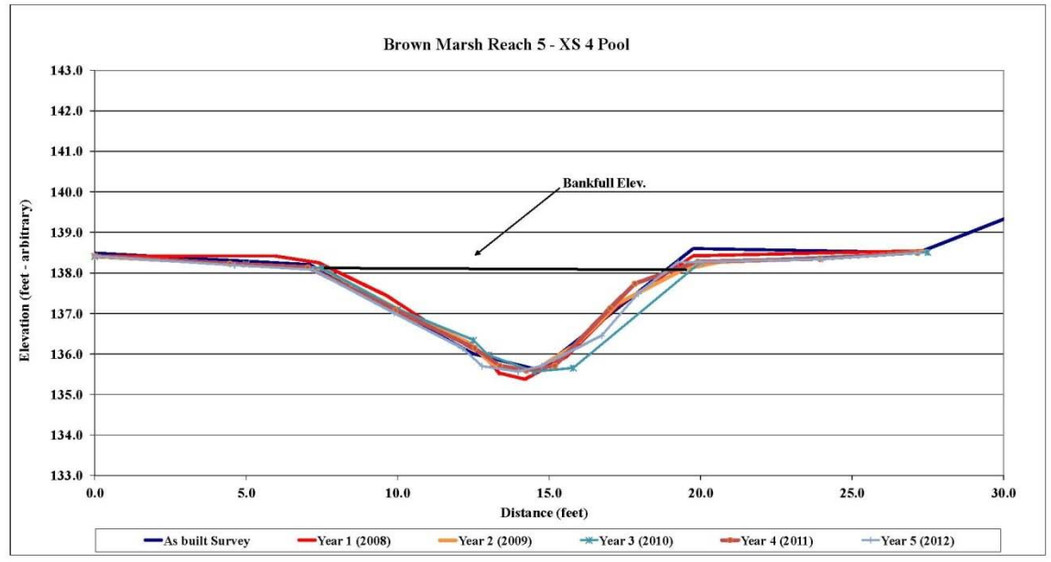
SHEET 7 OF 8

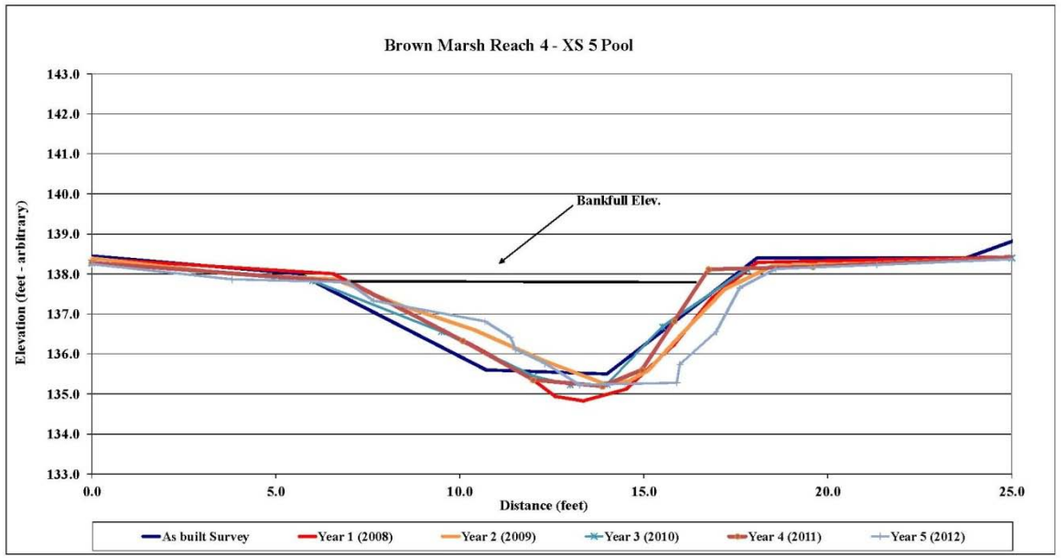

YEAR 5 MONITORING
Florence & Hutcheson
CONSULTING ENGINEERS
25 0 50
SCALE
BEGIN SOUTHERN UT
Sta. 10+00.00
END SOUTHERN UT
Sta. 15+98.83
AGRICULTURAL FIELDS
BEGIN REACH 1 PROFILE
STA 10+10
END REACH 1 PROFILE
STA 15+67
WOODS
CROSS-SECTION 19
CROSS-SECTION 17
Sta.10+00
Sta.12+00
Sta.16+00
SOUTHERN UT
VEG
PLOT 13
Sta.15+00
CROSS-SECTION 20
CROSS-SECTION 18
Sta.11+00
Sta.13+00
Sta.14+00
FOR NORTHERN UT
SEE SHEET NO. 7 OF 8
VEG
PLOT 12
LEGEND
FLOW DIRECTION
BANKFULL
BENCH
TERRACE
EASEMENT BOUNDARY
ROOTWAD
LOG SILL
5m x 20m VEG PLOT
10m x 10m VEG PLOT
PERMANENT PHOTO LOCATION
MONITORING PROFILE
AGRICULTURAL FIELDS
YEAR 5 MONITORING
BROWN MARSH SWAMP
CONTRACT: 16-D06038
COUNTY: ROBESON
DESIGNED BY: RVS
DATE: 01/16/13
CHECKED BY: RKW
SHEET 8 OF 8

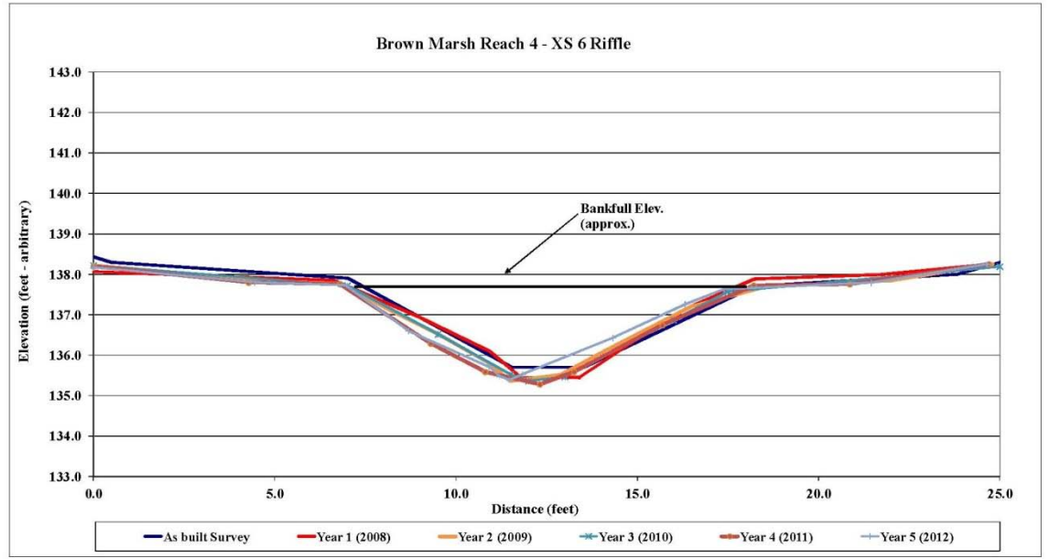

Brown Marsh Reach 5 - XS 1 Riffle
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

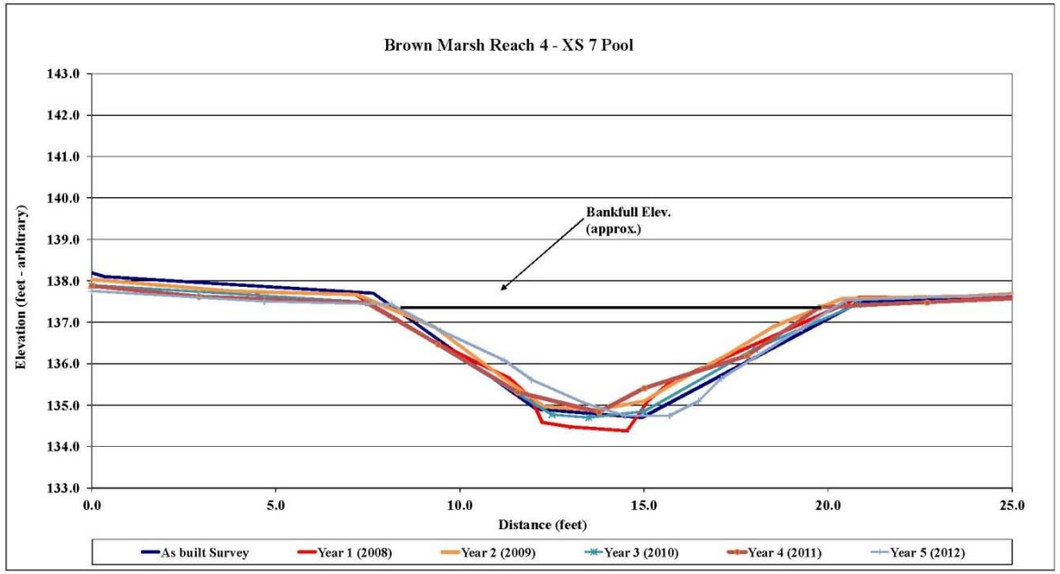

Brown Marsh Reach 5 - XS 2 Pool
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

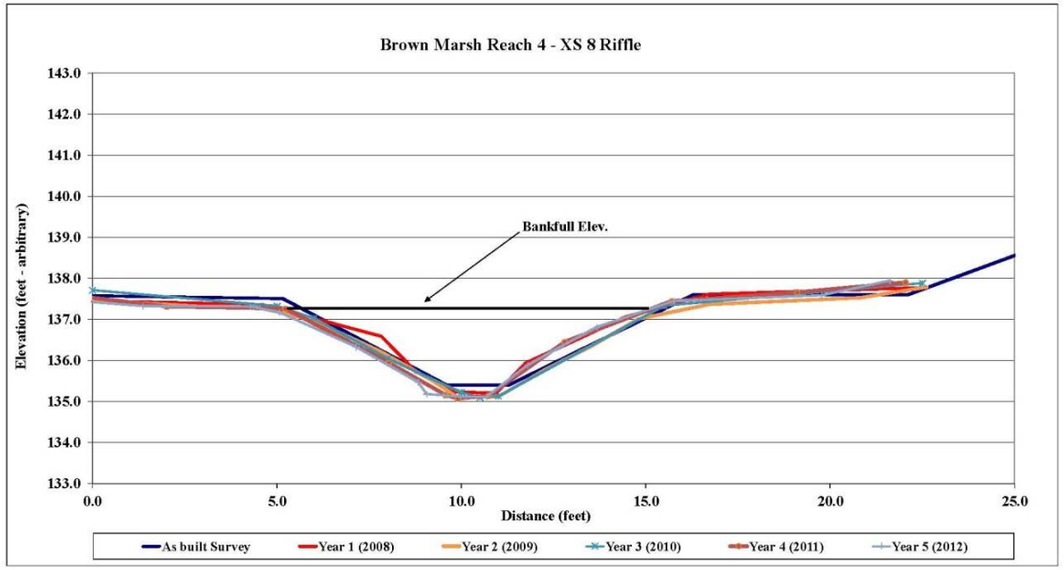

Brown Marsh Reach 5 - XS 3 Riffle
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

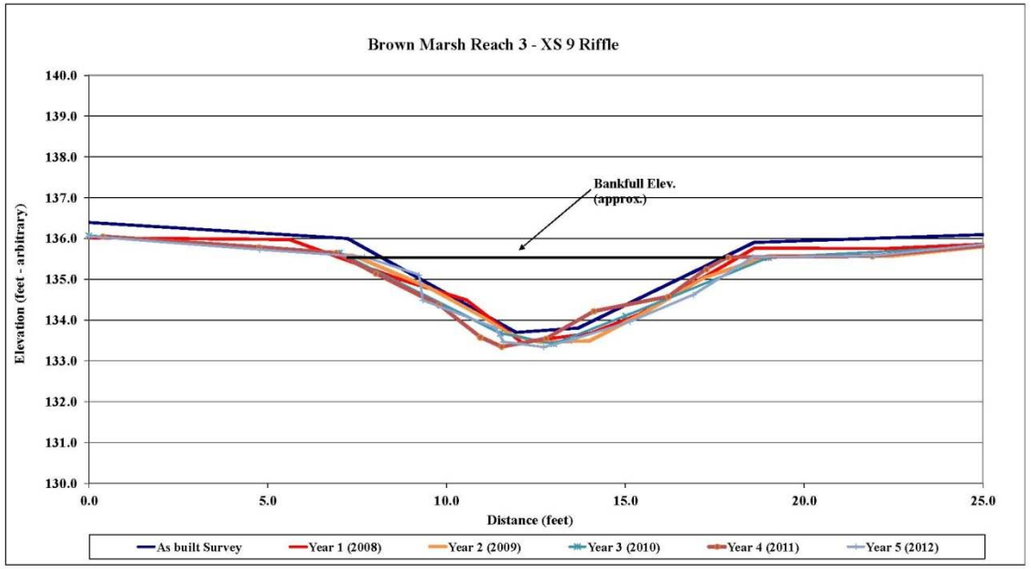

Brown Marsh Reach 5 - XS 4 Pool
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev.
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

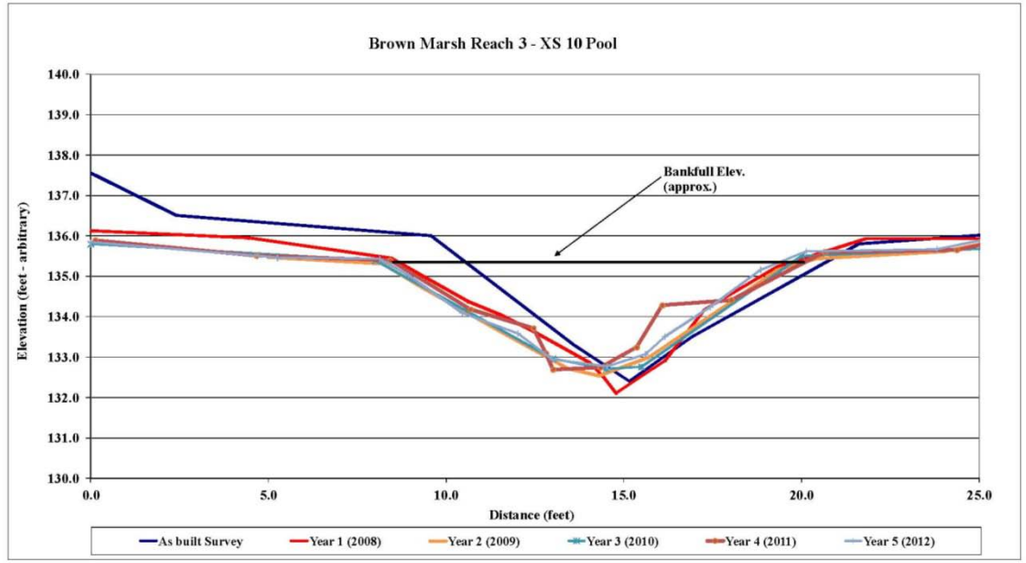

Brown Marsh Reach 4 - XS 5 Pool
Elevation (feet - arbitrary)
143.0
142.0
141.0
140.0
139.0
138.0
137.0
136.0
135.0
134.0
133.0
Bankfull Elev.
0.0
5.0
10.0
15.0
20.0
25.0
Distance (feet)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

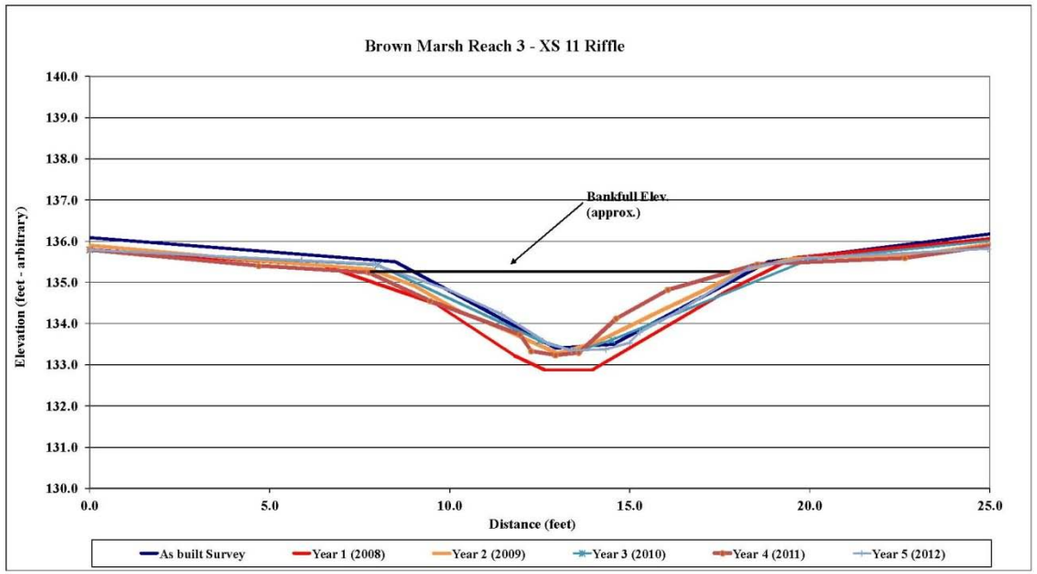

Brown Marsh Reach 4 - XS 6 Riffle
Elevation (feet - arbitrary)
143.0
142.0
141.0
140.0
139.0
138.0
137.0
136.0
135.0
134.0
133.0
Bankfull Elev.
(approx.)
0.0
5.0
10.0
15.0
20.0
25.0
Distance (feet)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

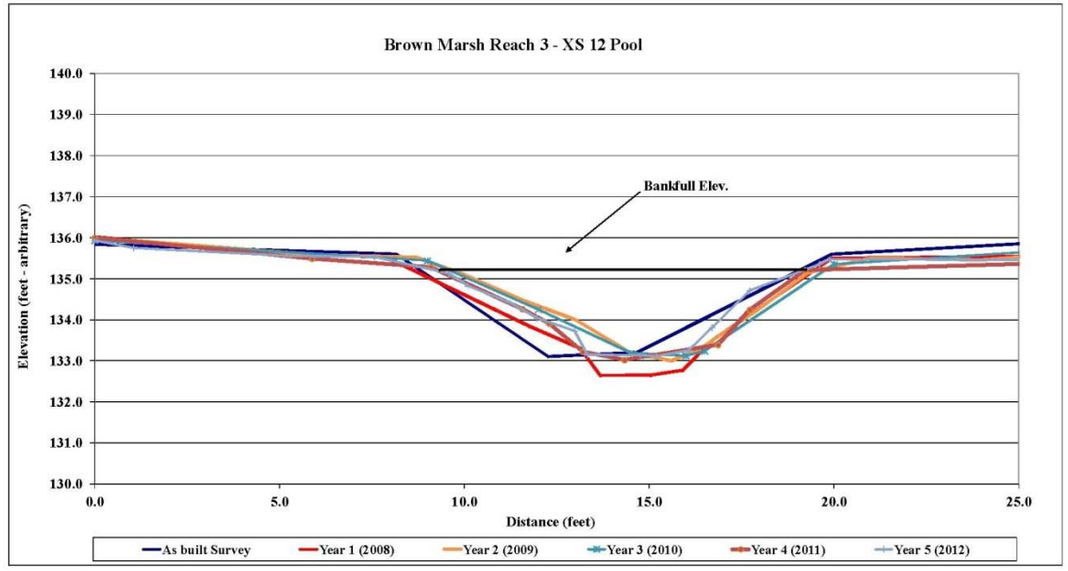

Brown Marsh Reach 4 - XS 7 Pool
Elevation (feet - arbitrary)
143.0
142.0
141.0
140.0
139.0
138.0
137.0
136.0
135.0
134.0
133.0
Bankfull Elev.
(approx.)
0.0
5.0
10.0
15.0
20.0
25.0
Distance (feet)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

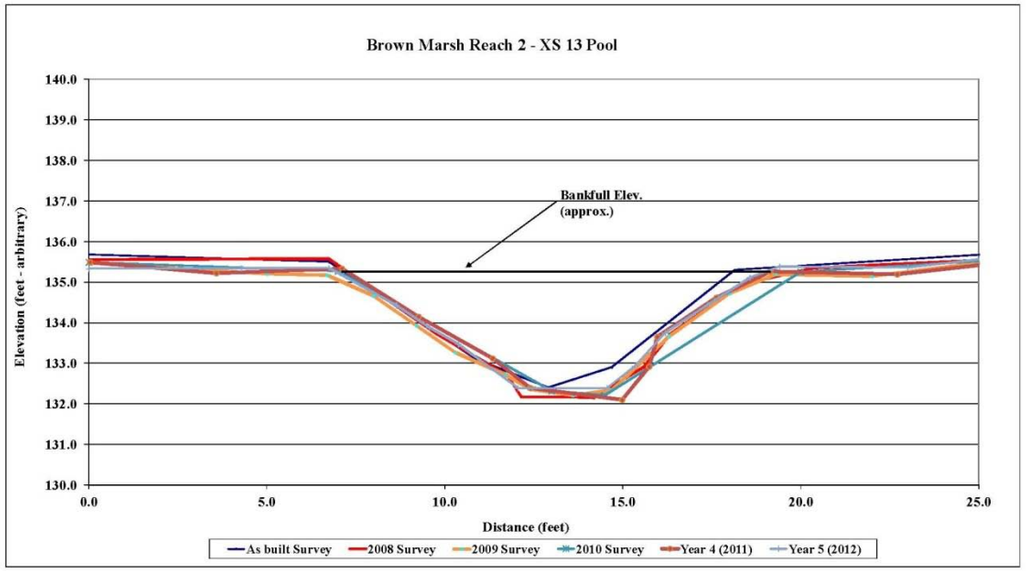

Brown Marsh Reach 4 - XS 8 Riffle
Elevation (feet - arbitrary)
143.0
142.0
141.0
140.0
139.0
138.0
137.0
136.0
135.0
134.0
133.0
Bankfull Elev.
0.0
5.0
10.0
15.0
20.0
25.0
Distance (feet)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

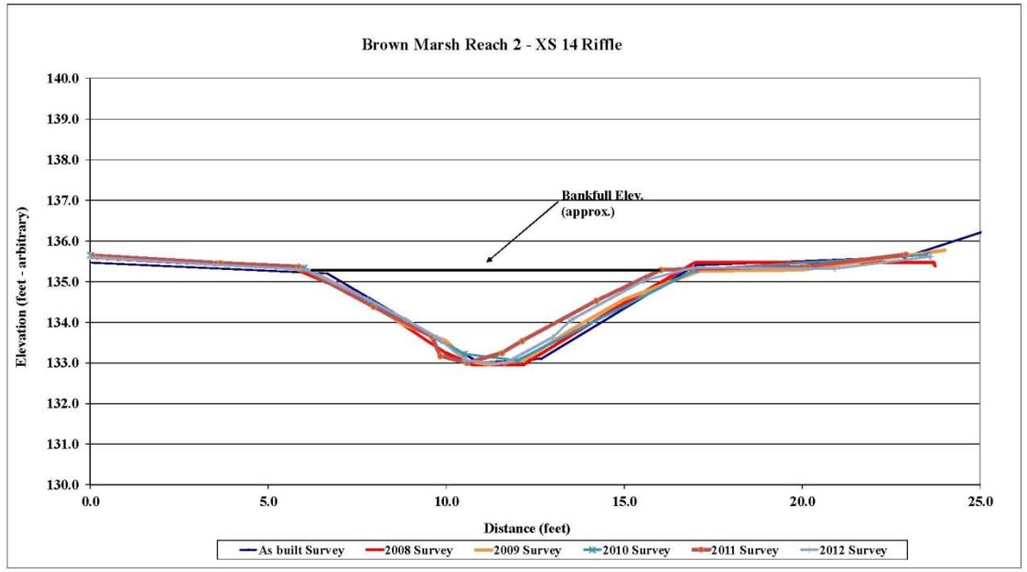

Brown Marsh Reach 3 - XS 9 Riffle
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

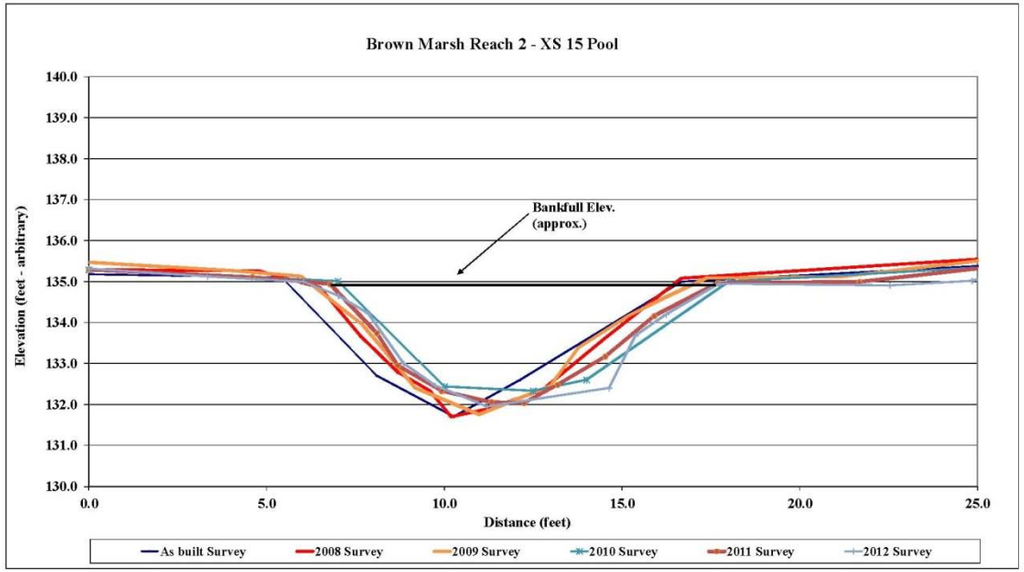

Brown Marsh Reach 3 - XS 10 Pool
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

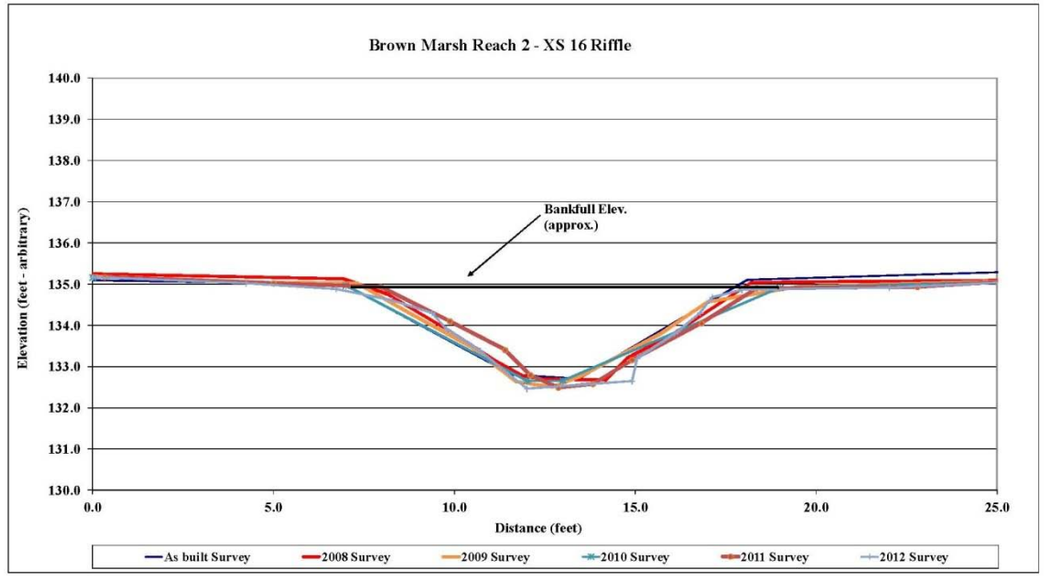

Brown Marsh Reach 3 - XS 11 Riffle
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

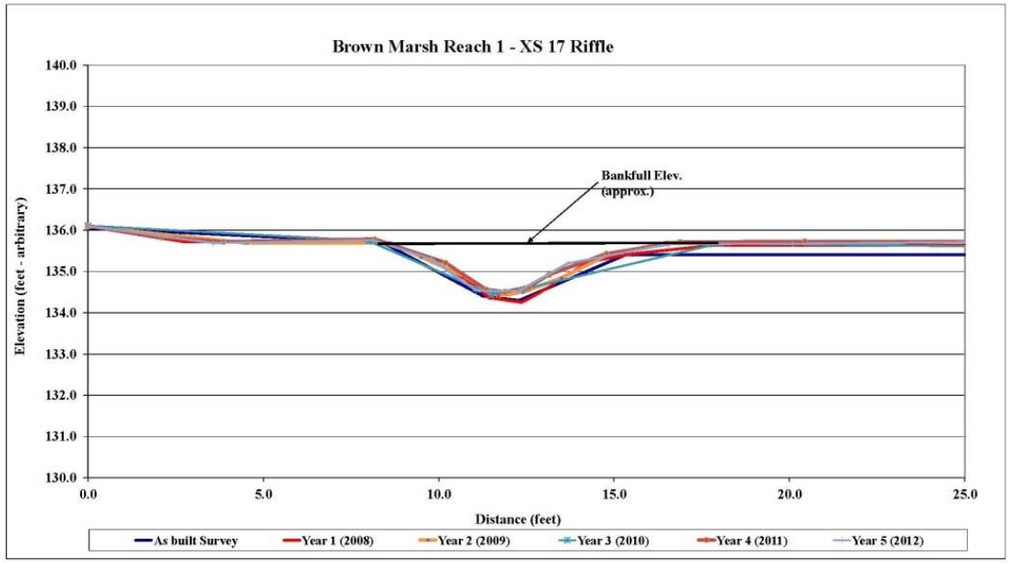

Brown Marsh Reach 3 - XS 12 Pool
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev.
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

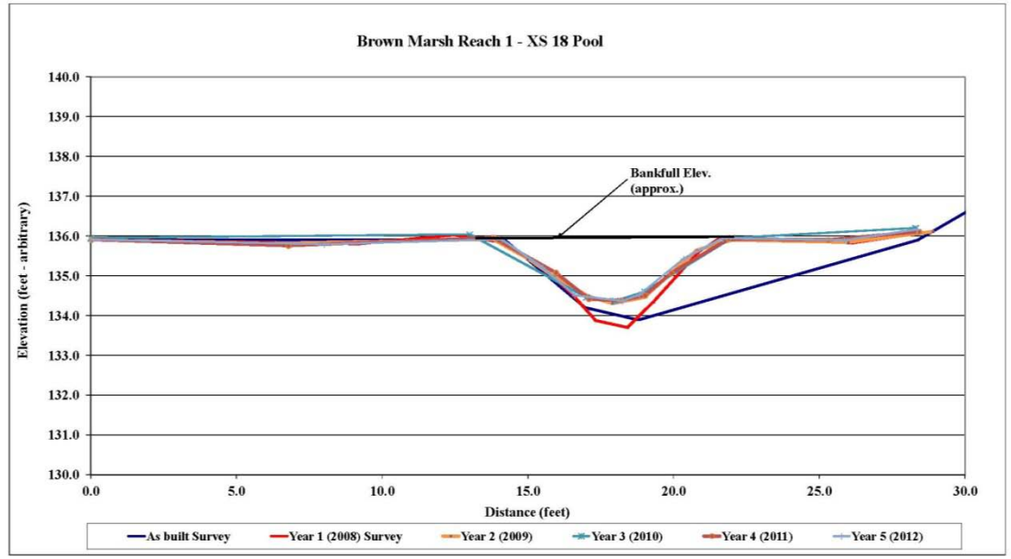

Brown Marsh Reach 2 - XS 13 Pool
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
2008 Survey
2009 Survey
2010 Survey
Year 4 (2011)
Year 5 (2012)

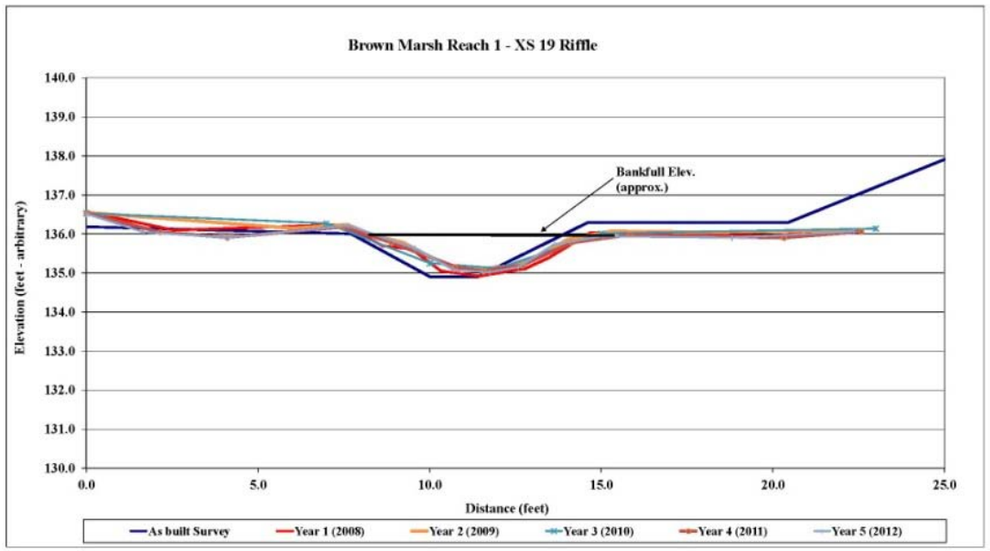

Brown Marsh Reach 2 - XS 14 Riffle
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
2008 Survey
2009 Survey
2010 Survey
2011 Survey
2012 Survey

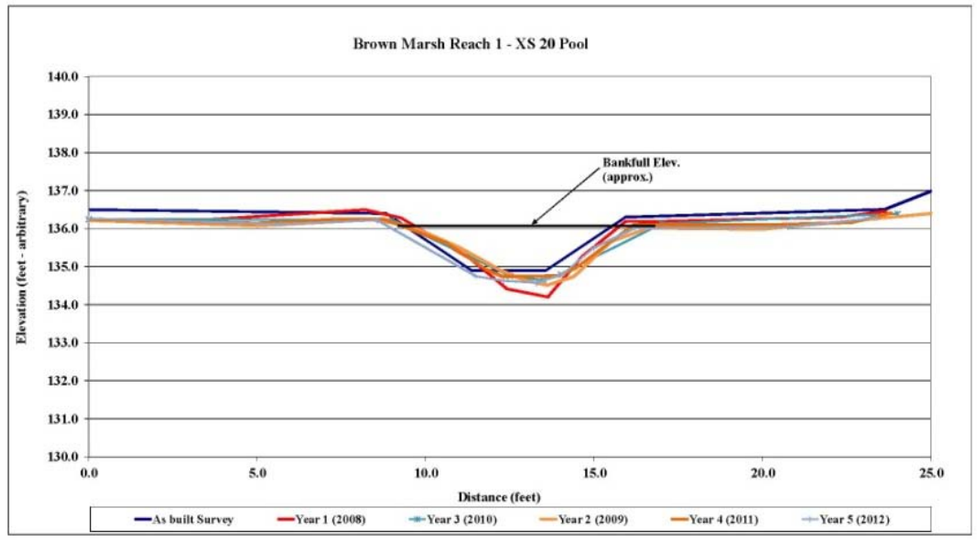

Brown Marsh Reach 2 - XS 15 Pool
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
2008 Survey
2009 Survey
2010 Survey
2011 Survey
2012 Survey

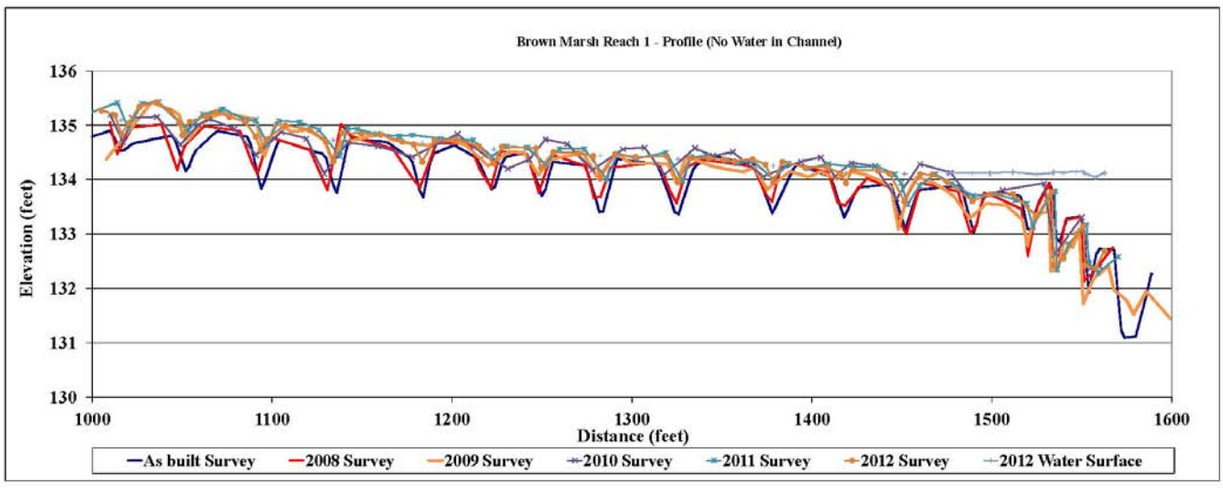

Brown Marsh Reach 2 - XS 16 Riffle
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
2008 Survey
2009 Survey
2010 Survey
2011 Survey
2012 Survey

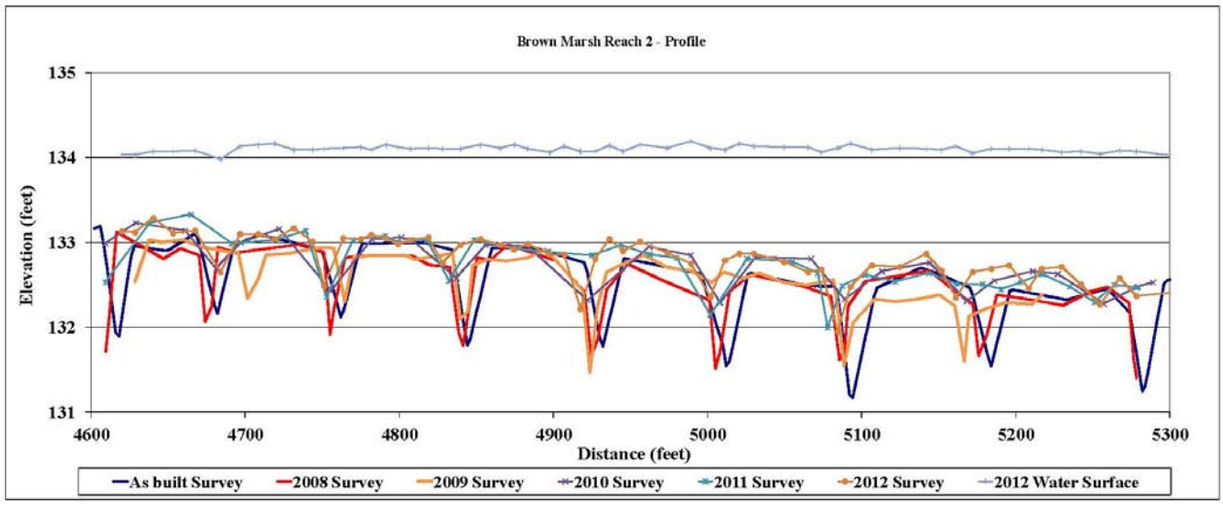

Brown Marsh Reach 1 - XS 17 Riffle
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

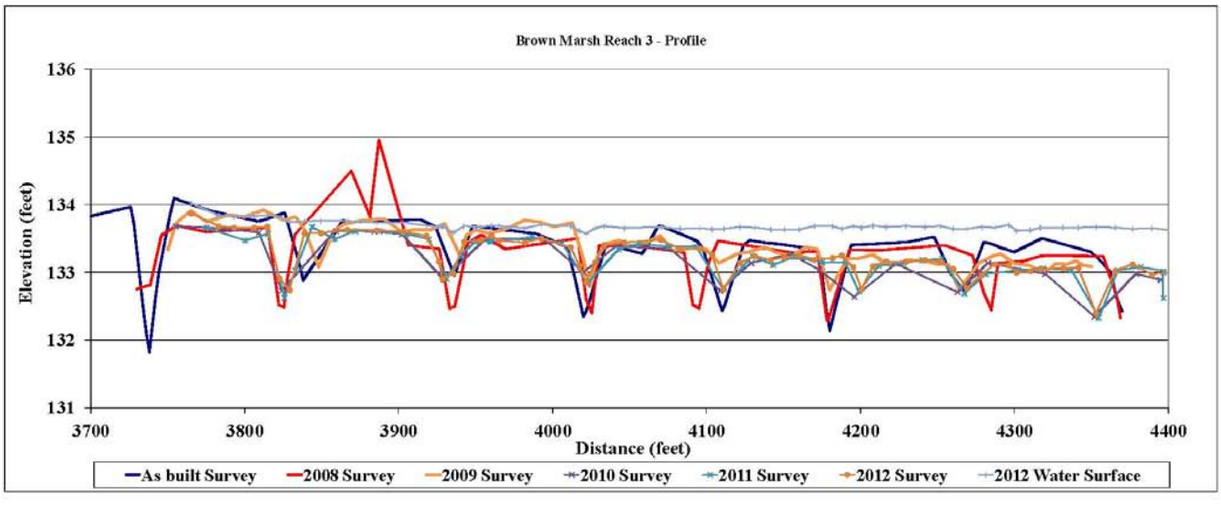

Brown Marsh Reach 1 - XS 18 Pool
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
Year 1 (2008) Survey
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)

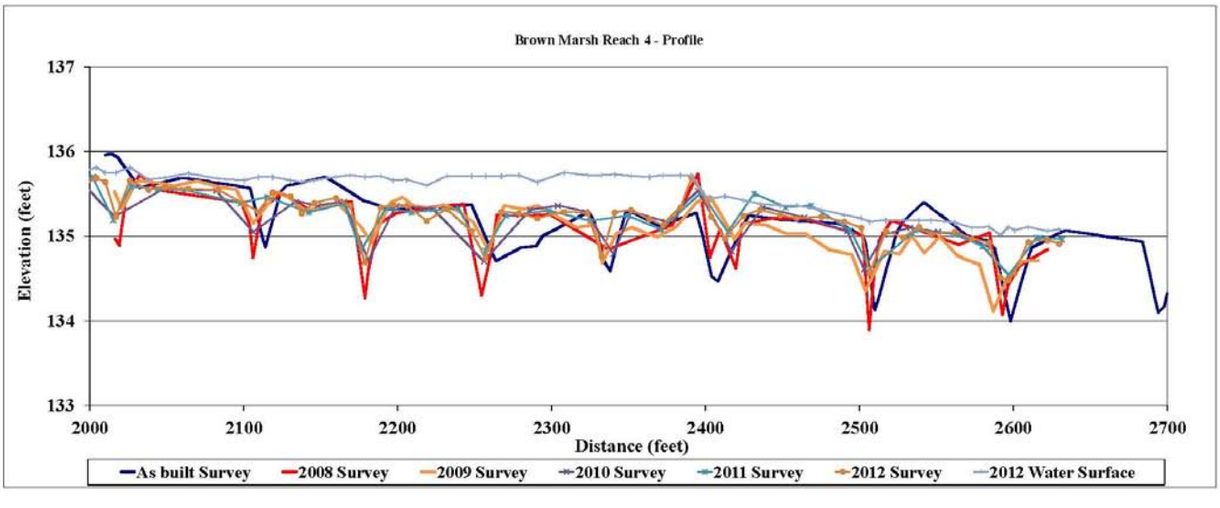

Brown Marsh Reach 1 - XS 19 Riffle
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
Year 1 (2008)
Year 2 (2009)
Year 3 (2010)
Year 4 (2011)
Year 5 (2012)


Brown Marsh Reach 1 - XS 20 Pool
Elevation (feet - arbitrary)
Distance (feet)
Bankfull Elev. (approx.)
As built Survey
Year 1 (2008)
Year 3 (2010)
Year 2 (2009)
Year 4 (2011)
Year 5 (2012)


Brown Marsh Reach 1 - Profile (No Water in Channel)
Elevation (feet)
136
135
134
133
132
131
130
1000
1100
1200
1300
1400
1500
1600
Distance (feet)
As built Survey
2008 Survey
2009 Survey
2010 Survey
2011 Survey
2012 Survey
2012 Water Surface


Brown Marsh Reach 2 - Profile
Elevation (feet)
135
134
133
132
131
4600
4700
4800
4900
5000
5100
5200
5300
Distance (feet)
As built Survey
2008 Survey
2009 Survey
2010 Survey
2011 Survey
2012 Survey
2012 Water Surface


Brown Marsh Reach 3 - Profile
Elevation (feet)
136
135
134
133
132
131
3700
3800
3900
4000
4100
4200
4300
4400
Distance (feet)
As built Survey
2008 Survey
2009 Survey
2010 Survey
2011 Survey
2012 Survey
2012 Water Surface


Brown Marsh Reach 4 - Profile
Elevation (feet)
137
136
135
134
133
2000
2100
2200
2300
2400
2500
2600
2700
Distance (feet)
As built Survey
2008 Survey
2009 Survey
2010 Survey
2011 Survey
2012 Survey
2012 Water Surface

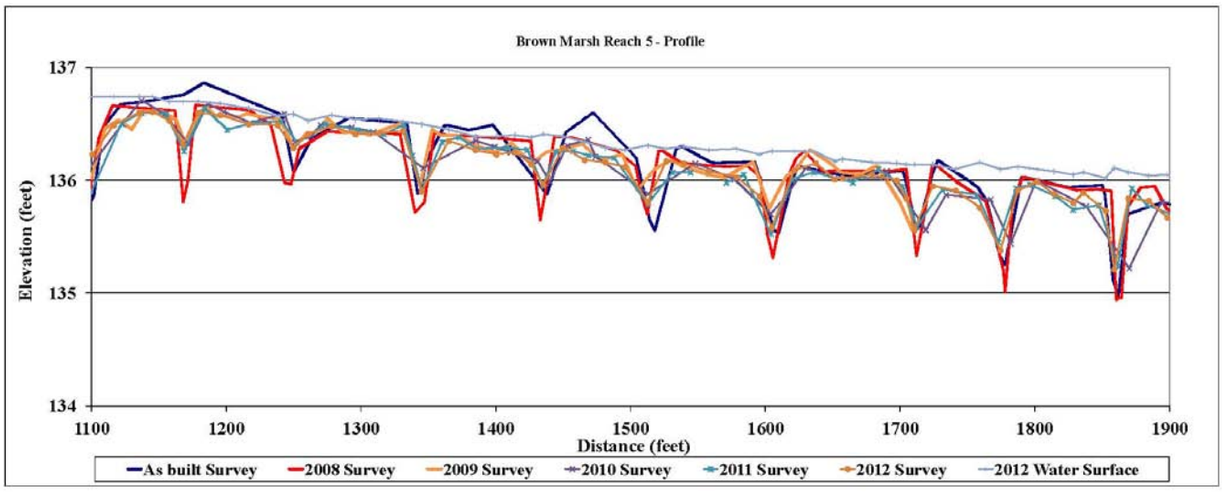

Brown Marsh Reach 5 - Profile
Elevation (feet)
137
136
135
134
1100
1200
1300
1400
1500
1600
1700
1800
1900
Distance (feet)
As built Survey
2008 Survey
2009 Survey
2010 Survey
2011 Survey
2012 Survey
2012 Water Surface

Table 2a. Dimensional Morphology Summary - Reach 5 (Sta. 14+25 to 20+27)

Parameter	Cross Section 1						Cross Section 2						Cross Section 3						Cross Section 4					
	Station 11+60 Riffle						Station 13+70 Pool						Station 14+90 Riffle						Station 17+40 Pool					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	17.2	13.7	11.2	16.6	11.3		16.2	17.5	11.3	16.3	11.8		12.0	16.4	12.0	11.6	12.4		13.6	11.9	12.3	12.3	11.7	
Floodprone Width (ft) (approx)	45.0						45.0						45.0						45.0					
BF Cross Sectional Area (ft^2)	21.0	13.5	11.1	16.1	11.2		22.2	20.9	13.3	20.0	14.1		13.6	15.4	13.9	12.1	14.1		19.1	15.4	17.5	15.9	16.6	
BF Mean Depth (ft)	1.2	1.0	1.0	1.0	1.0		1.4	1.2	1.2	1.2	1.2		1.1	0.9	1.2	1.0	1.1		1.4	1.3	1.4	1.3	1.4	
BF Max Depth (ft)	2.4	2.0	1.8	2.3	1.8		2.8	2.5	1.9	2.5	2.1		2.2	2.2	2.1	2.1	2.3		3.0	2.5	2.6	2.5	2.5	
Width/Depth Ratio	14.2	13.9	11.2	17.1	11.4		NA	NA	NA	NA	NA		10.6	17.6	10.3	11.2	10.9		NA	NA	NA	NA	NA	
Entrenchment Ratio	2.6	3.3	4.0	2.7	4.0		NA	NA	NA	NA	NA		3.7	2.7	3.8	3.9	3.6		NA	NA	NA	NA	NA	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA	
Wetted Perimeter(ft)	18.1	14.3	11.8	17.3	11.9		17.4	18.4	12.1	17.3	12.7		12.9	17.1	12.8	12.5	13.4		15.1	13.0	13.5	13.5	13.0	
Hydraulic radius (ft)	1.2	0.9	0.9	0.9	0.9		1.3	1.1	1.1	1.2	1.1		1.1	0.9	1.1	1.0	1.1		1.3	1.2	1.3	1.2	1.3	

Table 2b. Dimensional Morphology Summary - Reach 4 (Sta. 20+16 to 26+22)

Parameter	Cross Section 5						Cross Section 6						Cross Section 7						Cross Section 8					
	Station 20+55 Pool						Station 21+80 Riffle						Station 22+95 Pool						Station 25+80 Riffle					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	11.1	11.2	11.3	9.5	10.9		11.3	11.5	10.2	11.4	10.3		13.6	12.9	13.2	12.1	12.2		11.2	12.0	10.5	10.0	11.0	
Floodprone Width (ft) (approx)	45.0						45.0						45.0						45.0					
BF Cross Sectional Area (ft^2)	19.0	15.1	15.7	15.0	16.0		13.9	13.2	12.2	15.0	11.9		21.8	18.9	20.2	17.3	18.5		11.2	12.3	12.2	11.0	11.8	
BF Mean Depth (ft)	1.7	1.4	1.4	1.6	1.5		1.2	1.1	1.2	1.3	1.2		1.6	1.5	1.5	1.4	1.5		1.0	1.0	1.2	1.1	1.1	
BF Max Depth (ft)	3.2	2.6	2.6	2.6	2.6		2.4	2.3	2.2	2.4	2.2		3.2	2.7	2.7	2.5	2.7		2.2	2.2	2.2	2.2	2.2	
Width/Depth Ratio	NA	NA	NA	NA	NA		9.1	10.1	8.5	8.6	8.9		NA	NA	NA	NA	NA		11.3	11.7	9.0	9.0	10.3	
Entrenchment Ratio	NA	NA	NA	NA	NA		4.0	3.9	4.4	3.9	4.4		NA	NA	NA	NA	NA		4.0	3.8	4.3	4.5	4.1	
Bank Height Ratio	NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0	
Wetted Perimeter(ft)	13.0	12.6	12.7	11.3	13.0		12.4	12.5	11.2	12.4	11.3		15.5	14.2	14.4	13.2	13.5		12.3	12.9	11.4	11.0	12.1	
Hydraulic radius (ft)	1.5	1.2	1.2	1.3	1.2		1.1	1.1	1.1	1.2	1.1		1.4	1.3	1.4	1.3	1.4		0.9	1.0	1.1	1.0	1.0	

Table 2c. Dimensional Morphology Summary - Reach 3 (Sta. 37+30 to 43+69)

Parameter	Cross Section 9						Cross Section 10						Cross Section 11						Cross Section 12					
	Station 41+25 Riffle						Station 42+30 Pool						Station 43+75 Riffle						Station 45+05 Pool					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	12.3	11.6	11.7	10.7	10.8		14.6	11.7	11.8	11.8	11.5		12.6	10.4	11.6	10.0	10.1		12.0	9.3	10.8	10.0	12.0	
Floodprone Width (ft) (approx)	45.0						45.0						45.0						45.0					
BF Cross Sectional Area (ft^2)	14.8	13.1	13.3	12.5	13.6		20.3	17.4	18.2	15.4	17.1		16.4	11.1	12.7	9.5	10.9		18.6	10.5	13.7	12.8	14.4	
BF Mean Depth (ft)	1.2	1.1	1.1	1.2	1.3		1.4	1.5	1.5	1.3	1.5		1.3	1.1	1.1	1.0	1.1		1.6	1.1	1.3	1.3	1.2	
BF Max Depth (ft)	2.3	2.1	2.1	2.2	2.2		3.6	2.8	2.7	2.7	2.7		2.5	2.1	2.1	2.0	2.0		2.9	2.1	2.2	2.2	2.4	
Width/Depth Ratio	10.2	10.2	10.4	9.1	8.6		NA	NA	NA	NA	NA		9.7	9.8	10.6	10.5	9.4		NA	NA	NA	NA	NA	
Entrenchment Ratio	3.7	3.9	3.8	4.2	4.2		NA	NA	NA	NA	NA		3.6	4.3	3.9	4.5	4.5		NA	NA	NA	NA	NA	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA	
Wetted Perimeter(ft)	13.2	12.4	12.5	11.7	12.2		16.6	13.1	13.1	13.6	12.8		13.7	11.2	12.4	11.0	11.0		13.6	10.3	11.8	11.1	13.4	
Hydraulic radius (ft)	1.1	1.1	1.1	1.1	1.1		1.2	1.3	1.4	1.1	1.3		1.2	1.0	1.0	0.9	1.0		1.4	1.0	1.2	1.1	1.1	

Table 2d. Dimensional Morphology Summary - Reach 2 (Sta. 46+10 to 52+78)

Parameter	Cross Section 13						Cross Section 14						Cross Section 15						Cross Section 16					
	Station 47+45 Pool						Station 47+48 Riffle						Station 50+75 Pool						Station 52+02 Riffle					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	12.9	12.5	13.0	11.9	10.6		10.9	10.9	10.9	10.0	10.7		10.9	11.4	11.0	10.9	11.6		10.8	12.0	11.9	10.3	11.1	
Floodprone Width (ft) (approx)	45.0						45.0						45.0						45.0					
BF Cross Sectional Area (ft^2)	21.3	20.1	21.6	19.8	20.1		14.1	12.8	13.3	11.6	12.2		20.0	20.1	19.0	18.9	20.2		14.4	13.9	14.5	13.1	13.7	
BF Mean Depth (ft)	1.7	1.6	1.7	1.7	1.9		1.3	1.2	1.2	1.2	1.1		1.8	1.8	1.7	1.7	1.7		1.3	1.2	1.2	1.3	1.2	
BF Max Depth (ft)	3.1	3.0	3.0	3.2	3.0		2.1	2.3	2.2	2.3	2.3		3.3	3.4	2.7	2.9	3.0		2.3	2.4	2.3	2.4	2.4	
Width/Depth Ratio	NA	NA	NA	NA	NA		8.4	9.2	8.9	8.7	9.4		NA	NA	NA	NA	NA		8.1	10.4	9.7	8.1	9.0	
Entrenchment Ratio	NA	NA	NA	NA	NA		4.1	4.1	4.1	4.5	4.2		NA	NA	NA	NA	NA		4.2	3.8	3.8	4.4	4.1	
Bank Height Ratio	NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0	
Wetted Perimeter(ft)	14.8	14.1	14.4	14.0	12.1		12.0	11.9	11.8	11.2	11.8		13.1	13.4	12.6	12.6	13.6		12.0	13.2	12.8	11.5	12.7	
Hydraulic radius (ft)	1.4	1.4	1.5	1.4	1.7		1.2	1.1	1.1	1.0	1.0		1.5	1.5	1.5	1.5	1.5		1.2	1.1	1.1	1.1	1.1	

Table 2e. Dimensional Morphology Summary - Reach 1 (Sta. 10+10 to 15+67)

Parameter	Cross Section 17						Cross Section 18						Cross Section 19						Cross Section 20					
	Station 13+60 Riffle						Station 12+45 Pool						Station 10+72 Riffle						Station 10+52 Pool					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	8.8	7.8	9.8	8.5	8.1		7.0	8.2	8.8	8.0	7.5		6.7	7.2	7.2	7.7	6.5		6.2	6.9	7.8	7.0	7.2	
Floodprone Width (ft) (approx)	35.0						35.0						35.0						35.0					
BF Cross Sectional Area (ft^2)	4.7	4.9	6.2	4.5	4.4		7.7	6.9	7.8	7.0	6.7		4.3	3.8	3.8	3.6	3.1		6.2	5.4	6.4	5.8	6.2	
BF Mean Depth (ft)	0.5	0.6	0.6	0.5	0.5		1.1	0.8	0.9	0.9	0.9		0.6	0.5	0.5	0.5	0.5		1.0	0.8	0.8	0.8	0.9	
BF Max Depth (ft)	1.3	1.3	1.2	1.2	1.1		2.1	1.6	1.6	1.6	1.6		1.1	1.0	0.9	0.9	0.9		1.9	1.5	1.5	1.4	1.4	
Width/Depth Ratio	16.2	12.6	15.5	15.9	14.9		NA	NA	NA	NA	NA		10.4	13.6	13.7	16.3	13.5		NA	NA	NA	NA	NA	
Entrenchment Ratio	3.4	4.5	3.6	4.1	4.3		NA	NA	NA	NA	NA		4.5	4.9	4.8	4.5	5.4		NA	NA	NA	NA	NA	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA	
Wetted Perimeter(ft)	9.3	8.3	10.2	8.9	8.5		8.3	8.9	9.4	8.7	8.3		7.1	7.6	7.5	7.9	6.9		7.4	7.6	8.4	7.6	7.9	
Hydraulic radius (ft)	0.5	0.6	0.6	0.5	0.5		0.9	0.8	0.8	0.8	0.8		0.6	0.5	0.5	0.5	0.5		0.8	0.7	0.8	0.8	0.8	

Table 3. Verification of Bankfull Events

Date of Occurrence	Method	Photo (if available)
April 5, 2008	A total of 3.73 inches of rain fell on April 5, 2008*.	--
September 6, 2008	A total of 4.6 inches of rain fell on September 5-6, 2008*	Photos 1-2
March 1, 2009	A total of 2.0 inches of rain fell on February 28-March 1, 2009 *. In addition wrack was documented within the floodplain during a Site visit.	--
November 11, 2009	A total of 3.3 inches of rain fell on November 10-12, 2009* resulting from Tropical Storm Ida	--
May 23, 2010	A total of 2.7 inches of rain fell on May 22-24, 2010*.	--
July 27, 2010	A total of 2.9 inches of rain fell on July 27, 2010*.	--
September 27, 2010	A 7.7-inch* rainfall event occurring between September 26-30, 201 *.	--
February 5, 2011	A 2.5-inch* rainfall event occurring between February 2-5, 2011*.	--
July 5, 2011	A 3.1-inch* rainfall event occurring between July 4-6, 2011*.	--
August 12, 2011	A 3.5-inch* rainfall event occurring between August 12-14, 2011*.	--
August 19, 2011	A total of 4.4 inches* of rainfall occurring between August 19-22, 2011* one week after a total of 3.5 inches of rain.	--
August 26, 2011	A total of 2.0 inches* of rainfall occurring between August 26-27, 2011* after a total of 7.9 inches of rain the previous two weeks.	--
June 28, 2012	A total of 3.19 inches* of rainfall occurring between June 22-24, 2012*.	Photos 3-4
August 24, 2012	A total of 2.8 inches* of rainfall occurring between August 18-24, 2012*.	Photos 5-6

*as recorded at a nearby station in Lumberton (Weather Underground 2012)

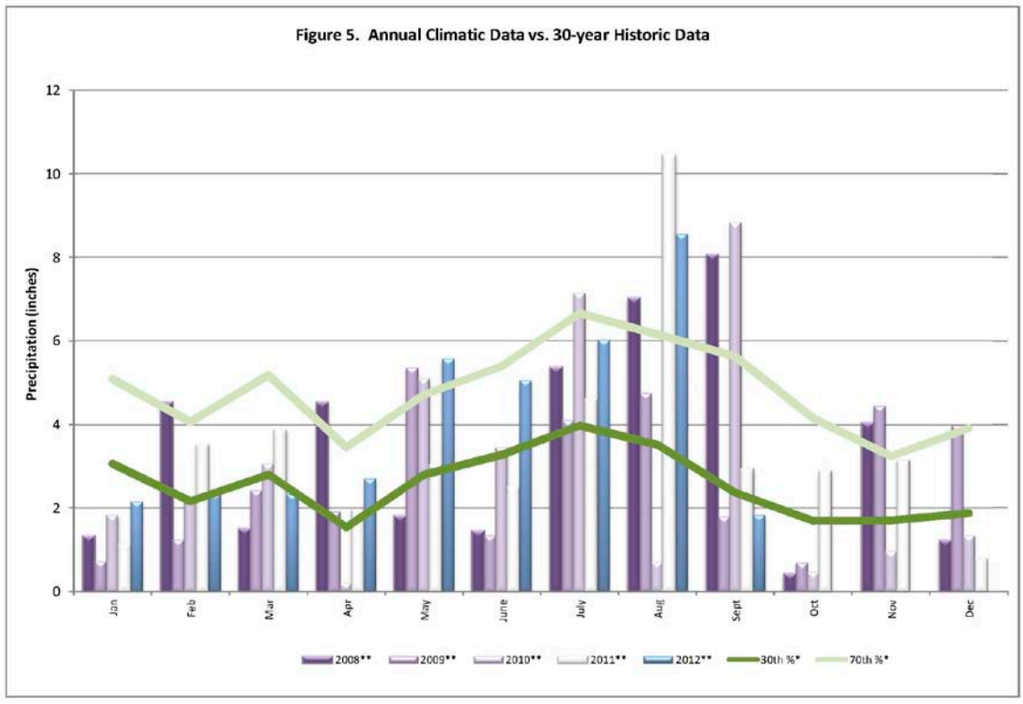


Table 4. Summary of Groundwater Gauge Results

Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)				
	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)	Year 4 (2011)*	Year 5 (2012)
1	Yes/68 days (28 percent)	Yes/53 days (21.5 percent)	No/29 days (11.8 percent)	No/25 days (10.2 percent)	Yes/34 days (13.3 percent)
2	Yes/35 days (23 percent)	Yes/55 days (22.4 percent)	Yes/35 days (14.2 percent)	Yes/53 days (21.5 percent)	Yes/41 days (16.6 percent)
Ref 1	34 days (14 percent)	42 days (17.1 percent)	13 days (5.3 percent)	9 days (3.7 percent)	0 days (0 percent)

*Data was collected through October 4, 2012; data will continue to be collected for the remainder of the Year 5 (2012) growing season (through November 14, 2012).

Table 5. Summary of Planted Vegetation Plot Results

Plot	Planted Stems/Acre Counting Towards Success Criteria				
	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)	Year 4 (2011)	Year 5 (2012)
1	526	809	850	890	850
2	486	567	607	607	607
3	445	526	526	1012	526
4	243	850	728	688	890
5	971	1214	1214	647	1093
6	445	607	607	324	647
7	405	850	1012	486	1012
8	809	1214	1335	850	1335
9	931	1052	1012	1335	1052
10	1093	1012	971	1012	728
11	405	486	486	1174	405
12	40	162	202	526	364
13	567	607	647	607	647
14	162	647	890	850	890
15	40	526	971	1052	1012
16	202	445	526	607	607
17	81	647	890	728	971
Average of All Plots (1-17)	**476**	**705**	**793**	**788**	**790**

Table 6. Planted Species

Vegetation Association (Planting Area)	**Coastal Plain Small Stream Swamp**	
Area (acres)	**20.05**	
SPECIES	**Total Number Planted**	**Percentage of Total**
Green ash (*Fraxinus pennsylvanica*)	2,000	7.4%
Laurel oak (*Quercus laurifolia*)	5,400	19.9%
Cherrybark oak (*Quercus pagoda*)	5,400	19.9%
Swamp chestnut oak (*Quercus phellos*)	5,400	19.9%
American elm (*Ulmus americana*)	5,400	19.9%
Silky dogwood (*Cornus amomum*)	1,600	5.9%
Sweetbay magnolia (*Magnolia virginiana*)	2,000	7.4%
TOTAL	**27,200**	**100.0%**

EEP Recommendation and Conclusion

The Brown Marsh Site has completed 5 years of vegetative, hydrologic, and stream morphologic monitoring. Stream morphology and vegetative growth appear to have met success criteria.

Wetland hydrologic monitoring has shown a trend towards success even in several years of drought conditions. Gauge 1 was slightly below success criteria in Year 2010 and 2011 with 11.8 and 10.2 percent of the growing season. These years were characterized by excessive drought, during which the reference gauge also did not meet success. Given the drought conditions, the relatively high percentage of the growing season the gauge did make success, along with three successful years out of five, it would appear that this gauge is located in a jurisdictional setting.

Contingencies

No contingencies are recommended for this Site.

Pre-Construction Photos

Northern UT looking downstream at recently mowed banks.

View of algal blooms growing in Northern UT from nutrient loading.

Southern UT looking downstream at recently mowed banks.

Northern UT looking downstream from crossing. Notice stream has been channelized and regularly maintained.

Northern UT looking downstream at maintained banks, algal blooms, and agricultural practices adjacent to stream banks

Southern UT looking upstream. Notice stream has been channelized and regularly maintained.

Post-Construction Photo

Northern Tributary

Southern Tributary

APPENDIX A - Watershed Planning Summary

EEP TO ADD

APPENDIX B – Land Ownership and Protection

EEP TO ADD

APPENDIX C – Jurisdictional Determinations and Permits

Preconstruction hydric soil limits were mapped in the field by a licensed soil scientist during January 2006. Based on field surveys and groundwater models, jurisdictional wetlands did not currently occur within the Site with the exception of approximately 0.5 acre located near the Site outfall.

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. SAW-2007-2585 County: Robeson U.S.G.S. Quad: Dillon East

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner/Agent: John W. Ward, Jr. ESTATE
Address: PO Box 3493
North Myrtle Beach, SC 29582-0493

Telephone No.:

Property description:
Size (acres) 5.82 Nearest Town Rowland
Nearest Waterway Contrary Swamp River Basin Lumber
USGS HUC 03040203 Coordinates N 34.4922 W 79.2741
Location description The property is located on Butler Road (off NC 130) approximately three miles south of I-95, near Roland, Robeson County, North Carolina. Parcel ID number is 1916-01-020.

Indicate Which of the Following Apply:

A. Preliminary Determination

_ Based on preliminary information, there may be wetlands on the above described property. We strongly suggest you have this property inspected to determine the extent of Department of the Army (DA) jurisdiction. To be considered final, a jurisdictional determination must be verified by the Corps. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).

B. Approved Determination

_ There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

X There are wetlands on the above described property subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ We strongly suggest you have the wetlands on your property delineated. Due to the size of your property and/or our present workload, the Corps may not be able to accomplish this wetland delineation in a timely manner. For a more timely delineation, you may wish to obtain a consultant. To be considered final, any delineation must be verified by the Corps.

X The wetland on your property have been delineated and the delineation has been verified by the Corps. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

_ The wetlands have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on _____. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ There are no waters of the U.S., to include wetlands, present on the above described property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in Wilmington, NC, at (910) 395-3900 to determine their requirements.

Page 1 of 2

Action ID: SAW-2007-2585

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Ms. Kimberly Garvey** at **(910) 251-4482**.

C. Basis For Determination

The site exhibits water bodies that have ordinary high water marks. This determination is based on information submitted by Restoration Systems, LLC on 7/13/2007.

D. Remarks

The purpose of this JD is for a NC EEP full delivery project. The area that has been delineated is under easement for the mitigation area.

E. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B. above)

This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

District Engineer, Wilmington Regulatory Division
Attn: Ms. Kimberly Garvey, Project Manager
Wilmington Regulatory Field Office
PO Box 1890
Wilmington, North Carolina 28402-1890

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the District Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **9 October 2007**.

It is not necessary to submit an RFA form to the District Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: _____

Date **9 August 2007** Expiration Date **9 August 2012**

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the attached customer Satisfaction Survey or visit http://www.saw.usace.army.mil/WETLANDS/index.html to complete the survey online.

Copy furnished:
John Preyer, Restoration Systems, LLC., 1101 Haynes Street, Suite 107, Raleigh, NC 27604
M. Randall Turner, Restoration Systems, LLC., 1101 Haynes Street, Suite 107, Raleigh, NC 27604
Eric Kulz, NC DWQ, 401 Oversight/Express Review Permitting Unit, 1650 Mail Service Center, Raleigh, NC 27699-1650
Guy C. Pearce, NC EEP, 2728 Capital Boulevard, Suite 1H 103, Raleigh, NC 27604
Ken Averitte, DWQ, 225 Green Street, Suite 714/Systel Bldg., Fayetteville, NC 28301-5043

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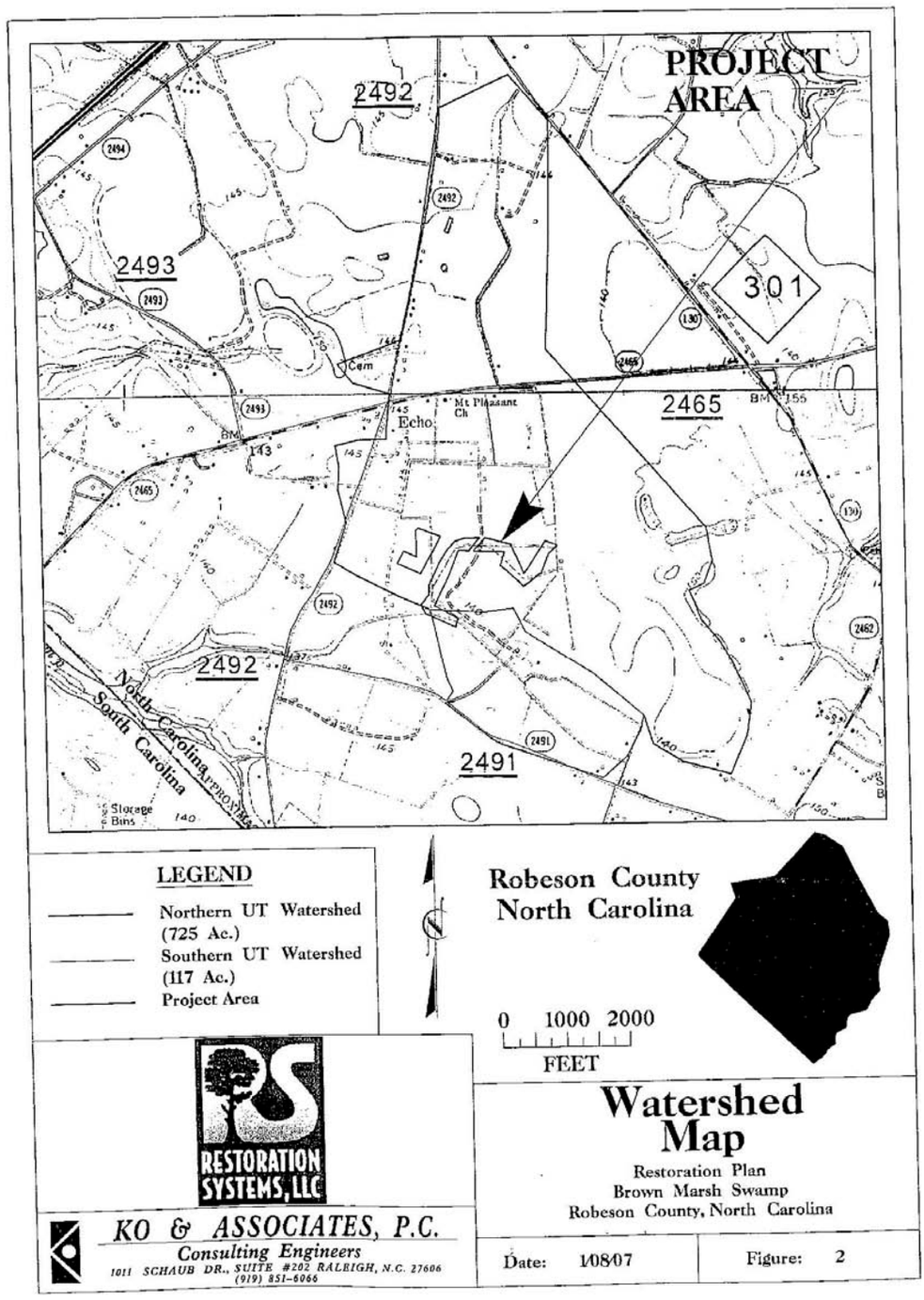
APPENDIX C – Jurisdictional Determinations and Permits



APPENDIX C – Jurisdictional Determinations and Permits

APPENDIX C – Jurisdictional Determinations and Permits

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID. **SAW-2007-2585** County: **Robeson** USGS Quad: **Dillon East**

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

Authorized Agent: **John Preyer**
Address: **Restoration Systems, LLC**
1101 Haynes Street, Suite 107
Raleigh, NC 27604
Telephone No.: **(919) 755-9490**

Size and location of property (water body, road name/number, town, etc.): **The property is located on Butler Road (off NC 130) approximately three miles south of I-95, near Roland, Robeson County, North Carolina. Parcel ID number is 191601020. This is an NC EEP full delivery project, the state of North Carolina has an easement on the 5.82 acres to be restored.**

Description of projects area and activity: **The proposal includes 2,700 linear feet of impact to Northern UT to Contrary Swamp and 442 linear feet of impact to Southern UT to Contrary Swamp for wetland and stream restoration. Project will restore natural stream design to the northern and southern UT's which have been channelized. The project will also restore wetland hydrology to five acres within the easement.**

Applicable Law: ☒ Section 404 (Clean Water Act, 33 USC 1344)
☐ Section 10 (Rivers and Harbors Act, 33 USC 403)
Authorization: Regional General Permit Number: ____
Nationwide Permit Number: **27**

Special conditions

1. **The permittee must notify our office when restoration construction work is to start**
2. **Authorization of this work in no way obligates the US Corps of Engineers to recognize this project as a mitigation bank or as compensation for any past or future permitted impacts, and**
3. **Our office does not recognize as valid any reference to mitigation "credits", or any other issues associated with a mitigation bank or mitigation for any past or future permitted impacts.**
4. **The permittee will be responsible for the maintenance of this project after all work is completed. If, at any time, erosion occurs as the result of this project, the permittee will be responsible, at our discretion, for the removal of the sediment.**

Your work is authorized by the above referenced permit provided it is accomplished in strict accordance with the attached conditions and your submitted plans. Any violation of the attached conditions or deviation from your submitted plans may subject the permittee to a stop work order, a restoration order and/or appropriate legal action.

This verification will remain valid until the expiration date identified below unless the nationwide authorization is modified, suspended or revoked. If, prior to the expiration date identified below, the nationwide permit authorization is reissued and/or modified, this verification will remain valid until the expiration date identified below, provided it complies with all requirements of the modified nationwide permit. If the nationwide permit authorization expires or is suspended, revoked, or is modified, such that the activity would no longer comply with the terms and conditions of the nationwide permit, activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon the nationwide permit, will remain authorized provided the activity is completed within twelve months of the date of the nationwide permit's expiration, modification or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend or revoke the authorization.

Activities subject to Section 404 (as indicated above) may also require an individual Section 401 Water Quality Certification. You should contact the NC Division of Water Quality (telephone (919) 733-1786) to determine Section 401 requirements.

For activities occurring within the twenty coastal counties subject to regulation under the Coastal Area Management Act (CAMA), prior to beginning work you must contact the N.C. Division of Coastal Management in Wilmington, NC, at (910) 395-3900.

This Department of the Army verification does not relieve the permittee of the responsibility to obtain any other required Federal, State or local approvals/permits.

If there are any questions regarding this verification, any of the conditions of the Permit, or the Corps of Engineers regulatory program, please contact Kimberly Garvey at (910)251-4482 or kimberly.l.garvey@usace.army.mil.

Page 1 of 2

Corps Regulatory Official _____ Date: **August 13, 2007**

Expiration Date of Verification: **August 13, 2010**

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the attached customer Satisfaction Survey or visit http://www.saw.usace.army.mil/WETLANDS/index.html to complete the survey online.

Page 2 of 2

APPENDIX C – Jurisdictional Determinations and Permits

Determination of Jurisdiction:

☐ Based on preliminary information, there appear to be waters of the US including wetlands within the above described project area. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).

☐ There are Navigable Waters of the United States within the above described project area subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ There are waters of the US and/or wetlands within the above described project area subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☒ The jurisdictional areas within the above described project area have been identified under a previous action. Please reference jurisdictional determination issued **August 9, 2007**. Action ID **SAW-2007-2585**

Basis of Jurisdictional Determination: **The site exhibits water bodies that have ordinary high water marks and is hyrdologically connected to Contrary Swamp which drains to Hayes Swamp and then to the Little Pee Dee River, a Traditionally Navigable Water.**

Corps Regulatory Official:

Date **August 13, 2007**

SURVEY PLATS, FIELD SKETCH, WETLAND DELINEATION FORMS, PROJECT PLANS, ETC., MUST BE ATTACHED TO THE FILE COPY OF THIS FORM, IF REQUIRED OR AVAILABLE.

Copy Furnished:
M. Randall Turner, Restoration Systems, LLC., 1101 Haynes Street, Suite 107, Raleigh, NC 27604
Eric Kulz, NC DWQ, 401 Oversight/Express Review Permitting Unit, 1650 Mail Service Center, Raleigh, NC 27699-1650
Guy C. Pearce, NC EEP, 2728 Capital Boulevard, Suite 1H 103, Raleigh, NC 27604
Ken Averitte, DWQ, 225 Green Street, Suite 714/Systel Bldg., Fayetteville, NC 28301-5043
RG-L: Mickey Sugg and Scott McLendon

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APPENDIX C – Jurisdictional Determinations and Permits

Action ID Number: SAW-2007-2585 **County:** Robeson

Permittee: Restoration Systems, LLC (c/o John Preyer)

Date Permit Issued: August 13, 2007

Project Manager: Kimberly Garvey

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

US ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT
WILMINGTON REGULATORY FIELD OFFICE
POST OFFICE BOX 1890
WILMINGTON, NORTH CAROLINA 28402-1890

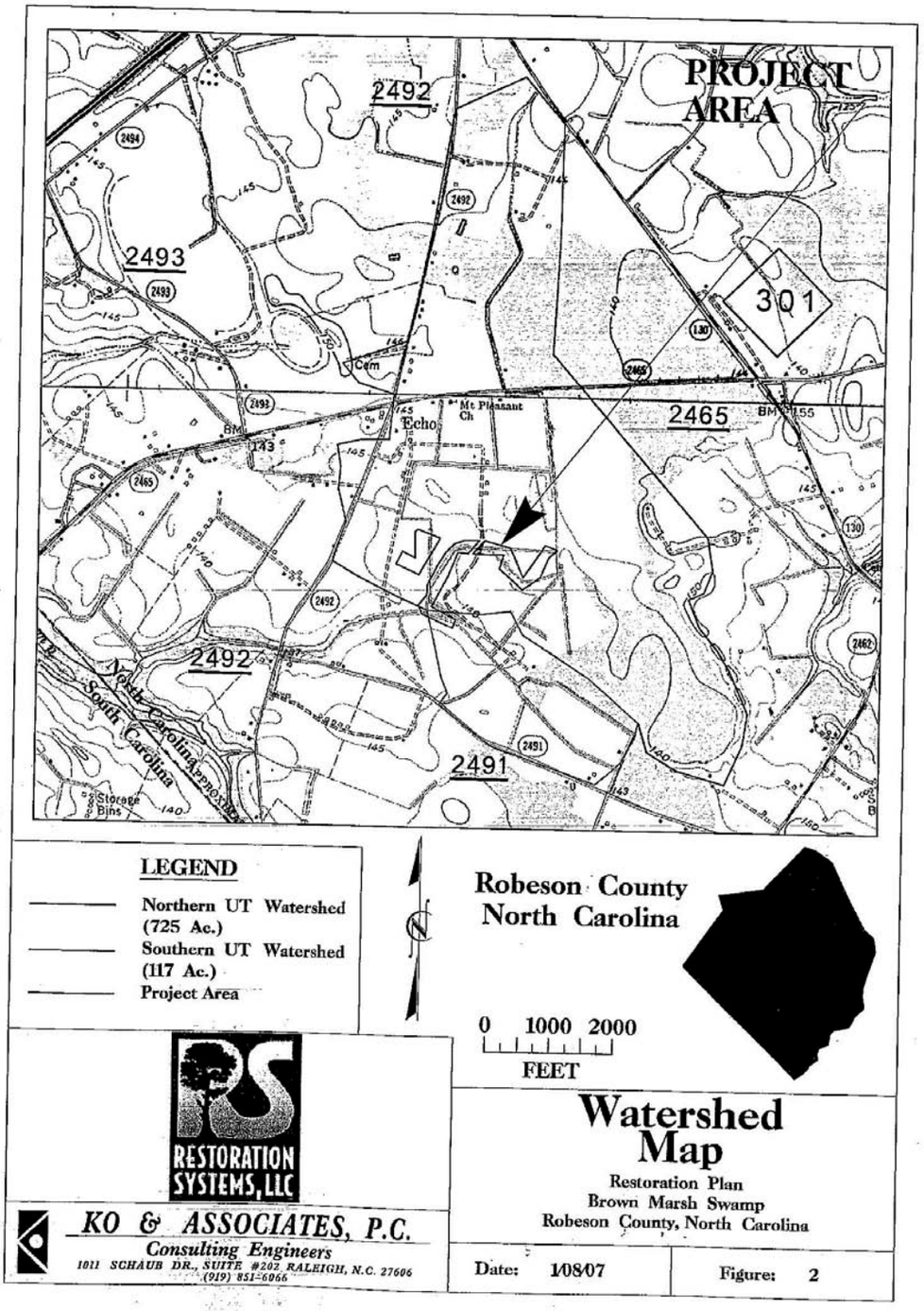
Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and condition of the said permit, and required mitigation was completed in accordance with the permit conditions.

_____ _____

Signature of Permittee **Date**

APPENDIX C – Jurisdictional Determinations and Permits



APPENDIX C – Jurisdictional Determinations and Permits

APPENDIX C – Jurisdictional Determinations and Permits

Michael F. Easley, Governor

William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Coleen H. Sullins, Director
Division of Water Quality

August 15, 2007

DWQ Project # 07-1212
Robeson County

Mr. John Preyer
Restoration Systems, LLC
1101 Haynes Street, Suite 107
Raleigh, NC 27604

Subject Property: **Brown Marsh Swamp Stream Wetland and Stream Restoration**
Ut to Contrary Swamp [030755, 14-35-2, C, NSW]

Approval of 401 Water Quality Certification with Additional Conditions

Dear Mr. Preyer:

You have our approval, in accordance with the attached conditions and those listed below, to place fill within or otherwise impact 3,142 linear feet of perennial stream as described in your application dated July 12, 2007, and received by the Division of Water Quality (DWQ) on July 12, 2007, to construct the proposed stream and wetland restoration at the site. After reviewing your application, we have decided that the impacts are covered by General Water Quality Certification Number(s) 3626 (GC3626). The Certification(s) allows you to use Nationwide Permit(s) NW27 when issued by the US Army Corps of Engineers (USACE). In addition, you should obtain or otherwise comply with any other required federal, state or local permits before you go ahead with your project including (but not limited to) Erosion and Sediment Control, and Non-discharge regulations. **Also, this approval to proceed with your proposed impacts or to conduct impacts to waters as depicted in your application shall expire upon expiration of the 404 or CAMA Permit.**

This approval is for the purpose and design that you described in your application. If you change your project, you must notify us and you may be required to send us a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter and is thereby responsible for complying with all conditions. If total fills for this project (now or in the future) exceed one acre of wetland or 150 linear feet of stream, compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h). **This approval requires you to follow the conditions listed in the attached certification and any additional conditions listed below.**

The Additional Conditions of the Certification are:

1. Impacts Approved
   The following impacts are hereby approved as long as all of the other specific and general conditions of this Certification (or Isolated Wetland Permit) are met. No other impacts are approved including incidental impacts:

Type of Impact	Amount Approved (Units)	Plan Location or Reference
Stream - perennial	3,142 (linear feet)	PCN page 4 of 8

401 Oversight/Express Review Permitting Unit
1650 Mail Service Center, Raleigh, North Carolina 27699-1650
2321 Crabtree Boulevard, Suite 250, Raleigh, North Carolina 27604
Phone: 919-733-1786 / FAX 919-733-6893 / Internet: http://h2o.enr.state.nc.us/ncwetlands

7. Certificate of Completion

Upon completion of all work approved within the 401 Water Quality Certification or applicable Buffer Rules, and any subsequent modifications, the applicant is required to return the attached certificate of completion to the 401 Oversight/Express Review Permitting Unit, North Carolina Division of Water Quality, 1650 Mail Service Center, Raleigh, NC, 27699-1650.

Violations of any condition herein set forth may result in revocation of this Certification and may result in criminal and/or civil penalties. The authorization to proceed with your proposed impacts or to conduct impacts to waters as depicted in your application and as authorized by this Certification, shall expire upon expiration of the 404 or CAMA Permit.

If you do not accept any of the conditions of this Certification (associated with the approved wetland or stream impacts), you may ask for an adjudicatory hearing. You must act within 60 days of the date that you receive this letter. To ask for a hearing, send a written petition, which conforms to Chapter 150B of the North Carolina General Statutes to the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699-6714. This certification and its conditions are final and binding unless you ask for a hearing.

Any disputes over determinations regarding this Authorization Certificate (associated with the approved buffer impacts) shall be referred in writing to the Director for a decision. The Director's decision is subject to review as provided in Articles 3 and 4 of G.S. 150B.

This letter completes the review of the Division of Water Quality under Section 401 of the Clean Water Act. If you have any questions, please telephone Cyndi Karoly or Ian McMillan at 919-733-1786.

Sincerely,

Coleen H. Sullins, Director
Division of Water Quality

CHS/*ijm*

Enclosures: GC3626
Certificate of Completion

cc: USACE Wilmington Regulatory Field Office
Ken Averitte, DWQ Fayetteville Regional Office
DLR Fayetteville Regional Office
File Copy
Central Files

Filename: 071212BrownMarshSwampStreamWetlandRestoration(Roberson)401

Certification of Completion

DWQ Project No.: _____ County: _____

Applicant: _____

Project Name: _____

Date of Issuance of Certification or Authorization: _____

Certificate of Completion

Upon completion of all work approved within the **401 Water Quality Certification and Buffer Rules,** and any subsequent modifications, the applicant is required to return this certificate to the 401 Oversight/Express Permitting Unit, North Carolina Division of Water Quality, 1650 Mail Service Center, Raleigh, NC, 27699-1650. This form may be returned to DWQ by the applicant, the applicant's authorized agent, or the project engineer. It is not necessary to send certificates from all of these.

Applicant's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the **401 Water Quality Certification and Buffer Rules**, the approved plans and specifications, and other supporting materials.

Signature: _____ Date: _____

Agent's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the **401 Water Quality Certification and Buffer Rules,** the approved plans and specifications, and other supporting materials.

Signature: _____ Date: _____

If this project was designed by a Certified Professional

I, _____, as a duly registered Professional _____ (i.e., Engineer, Landscape Architect, Surveyor, etc.) in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project, for the Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the **401 Water Quality Certification and Buffer Rules,** the approved plans and specifications, and other supporting materials.

Signature: _____ Registration No. _____ Date _____

WQC #3626

GENERAL CERTIFICATION FOR STREAM RESTORATION, ENHANCEMENT AND STABILIZATION PROJECTS AND WETLAND AND RIPARIAN RESTORATION AND CREATION ACTIVITIES INCLUDING THOSE ELIGIBLE FOR CORPS OF ENGINEERS NATIONWIDE PERMIT NUMBERS 13 (BANK STABILIZATION) AND 27 (AQUATIC HABITAT RESTORATION, ESTABLISHMENT AND ENHANCEMENT ACTIVITIES) AND REGIONAL PERMIT 197800080 (CONSTRUCTION AND MAINTENANCE OF BULKHEADS)

This General Certification is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Quality Regulations in 15A NCAC 2H .0500 and 15A NCAC 2B .0200 for the discharge of fill material to waters as described in 33 CFR 330 Appendix A (B) (13) and (27) of the Corps of Engineers regulations (i.e. Nationwide Permit Numbers 13 and 27) and Regional Permit 197800080. The category of activities shall include stream bank stabilization or stream restoration activity as long as impacts to waters or significant wetlands are minimized. This Certification replaces Water Quality Certification (WQC) Number 3399 issued March 2003 and WQC Number 3495 issued March 28, 2003. This WQC is rescinded when the Corps of Engineers reauthorize Nationwide Permits 13 or 27 or Regional Permit 197800080 or when deemed appropriate by the Director of the Division of Water Quality (DWQ).

The State of North Carolina certifies that the specified category of activity will not violate applicable portions of Sections 301, 302, 303, 306 and 307 of the Public Laws 92-500 and 95-217 if conducted in accordance with the conditions set forth.

Conditions of Certification:

1. Wetland and/or riparian area restoration and creation projects which are for compensatory mitigation or compensatory mitigation credit (and not including projects that only involve stream restoration or enhancement work described in condition nos. 2 and 3 below) that are proposed under this General Certification require written application to and approval from the Division of Water Quality. All applications for written DWQ approval will be reviewed and a response will be prepared within 30 days of stamped receipt of the application in the Division of Water Quality's Central Office in Raleigh. This 30-day period does not include time spent by the application or DWQ's response within US Postal Service or North Carolina's Mail Service Center mail systems;

   Wetland and riparian area restoration and creation projects (not including projects that involve work in or impacts to streams) which are not for compensatory mitigation or compensatory mitigation credit proposed under this General Certification do not require written application to and approval from the Division of Water Quality. In these cases, the applicant is required to notify the Division in writing with three copies of project specifications before the impact occurs. If the Division determines that the project would not result in an ecologically viable wetland and riparian area, then the Division shall prepare a response to notify the applicant in writing within 30 days of DWQ's receipt of the notification. In such cases, the applicant will be required to submit a formal application and pay of the appropriate fee, and DWQ will be required to process the application through normal procedures;

2. Proposed stream restoration projects (as defined and limited below), that do not disturb wetlands and that are not being conducted for compensatory mitigation or compensatory mitigation credit do not require written application to and approval from the Division of Water Quality, and, therefore, do not require payment of an

Stream stabilization is defined as the in-place stabilization of an eroding stream bank using measures that consist primarily of "hard" engineering, such as but not limited to concrete lining, rip rap or other rock, and gabions. The use of "hard" engineering will not be considered as stream restoration or enhancement;

6. Impacts to any stream length in the Neuse, Tar-Pamlico or Randleman River Basins (or any other major river basins with Riparian Area Protection Rules [Buffer Rules] in effect at the time of application) requires written concurrence for this Certification from DWQ in accordance with 15A NCAC 2B.0200. Activities listed as "exempt" from these rules do not need to apply for written concurrence under this Certification. New development activities located in the protected 50-foot wide riparian areas (whether jurisdictional wetlands or not) within the Neuse and Tar-Pamlico River Basins shall be limited to "uses" identified within and constructed in accordance with 15A NCAC 2B .0200. All new development shall be located, designed, constructed, and maintained to have minimal disturbance to protect water quality to the maximum extent practicable through the use of best management practices;

7. In order for the above conditions to be valid, any plans not requiring written concurrence to use this Certification must be built according to the plans provided to the Division of Water Quality. If written concurrence is required, then the project must be built and maintained according to the plans approved by the written concurrence and Certification from the Division of Water Quality;

8. Appropriate sediment and erosion control practices which equal or exceed those outlined in the most recent version of the "North Carolina Erosion and Sediment Control Planning and Design Manual" or "North Carolina Surface Mining Manual" whichever is more appropriate (available from the Division of Land Resources at the DENR Regional and Central Offices) shall be designed, installed and maintained properly to assure compliance with the appropriate turbidity water quality standard (50 NTUs in streams and rivers not designated as trout waters by DWQ; 25 NTUs in all saltwater classes and all lakes and reservoirs; 10 NTUs in DWQ-classified trout waters);

9. All sediment and erosion control measures placed in wetlands or waters shall be removed and the original grade restored after the Division of Land Resources or delegated program has released the project;

10. Any rip-rap shall be of such a size and density so as not to be able to be carried off by wave or current action and consist of clean rock or masonry material free of debris or toxic pollutants. Rip-rap shall not be installed in the streambed except in specific areas required for velocity control and to ensure structural integrity of bank stabilization measures. If rip-rap is to be installed within the streambed, the amount and location must be approved in writing by the Division of Land Resources and Division of Water Quality. However rock vanes, wing deflectors, and similar structures for grade control and bank protection are acceptable;

11. Measures shall be taken to prevent live or fresh concrete from coming into contact with freshwaters of the state until the concrete has hardened;

12. If an environmental document is required, this Certification is not valid until a Finding of No Significant Impact or Record of Decision is issued by the State Clearinghouse;

WQC #3626

Non-compliance with or violation of the conditions herein set forth by a specific project shall result in revocation of this Certification for the project and may also result in criminal and/or civil penalties.

The Director of the North Carolina Division of Water Quality may require submission of a formal application for Individual Certification for any project in this category of activity if it is determined that the project is likely to have a significant adverse effect upon water quality including state or federally listed endangered or threatened aquatic species or degrade the waters so that existing uses of the wetland or downstream waters are precluded.

Public hearings may be held for specific applications or group of applications prior to a Certification decision if deemed in the public's best interest by the Director of the North Carolina Division of Water Quality.

Effective date: 19 March 2007

DIVISION OF WATER QUALITY

By

Alan W. Klimek, P.E.

Director

WQC # 3626

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APPENDIX D – Debit Ledger

EEP TO ADD