Moore Property Wetland Restoration
As-Built and Baseline Monitoring Report

Johnston County, North Carolina
SCO Project ID: 060673501A
EEP Project ID: 725

Prepared for:

NCDENR-Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, North Carolina 27699-1652

Submitted: August 2011
Revised: November 2011
Data Collection Period: 11/1/2010 – 12/30/2010, July 5, 2011

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

The Moore Property Wetland Restoration Site (Site) is located approximately 0.2 miles west of the Johnston County Airport and adjacent to Swift Creek south of Swift Creek Road near the Town of Smithfield in Johnston County, North Carolina (see **Figure 1**).

The Site is within the Upper Neuse Watershed (8-digit Hydrologic Unit Code 03020201) within the Neuse River Basin and the Rolling Coastal Plain Level IV Ecoregion. Swift Creek is classified by the North Carolina Environmental and Natural Resources, Division of Water Quality (NCDWQ) as "C, NSW". "C" indicates the stream as supporting for secondary recreational uses, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, agriculture and other uses suitable for class C. "NSW" is a special designation indicating nutrient sensitive waters.

The primary goals for the Site were to restore wetland hydrology and an appropriate water table hydroperiod of the floodplain wetland (i.e. elevated water table levels and longer duration of saturation of the upper soil surface during the growing season) through the removal of drainage ditches and field crowns; re-vegetation of species to establish the native wetland, upland, and riparian vegetation communities; provide habitat protection for federally protected species in Swift Creek through the establishment of a permanent conservation easement along the west bank of Swift Creek through the project area; generally improve water quality and flood storage capacity functions within the restoration area by providing longer residence time and filtering for runoff through the wetland area prior to entering Swift Creek; and minimize permanent open water habitat to reduce avian hazards for the adjacent airport.

Through ditching and crowning, the landscape of the Site had been altered by drainage and conveyance of surface waters off the Site. These past modifications have eliminated hydrologic conditions necessary to maintain wetlands and have led to the conversion of on-site wetlands to non-wetland agricultural fields.

The restoration project was designed and constructed to restore hydrology to re-establish riparian wetlands. To achieve this goal, the restoration design reduced the subsurface drainage and surface water conveyance by removing ditches, spot grading removing crowns, improved hydrologic input through removal of a portion of berm, and established grade control at the outlet channel to restore surface water elevations in the floodplain.

Construction of the project began in February of 2010 and was completed in July of 2011. The timing of earthwork activities required plantings to be installed in January 2011 instead of 2009-2010 as originally planned. Subsequent construction was completed in July of 2011 to modify surface flow away from an adjacent property. Stem count densities performed after the plantings were installed (January 2011) show approximately 458 stems per acre. Upon further site visits performed during construction close-out, it was observed that many of the bare roots were experiencing stress from the dry conditions over the early summer months. It is recommended that the Year 1 vegetation plot density counts be performed in April/May of 2012 to inventory live stem densities prior to the end of the contractor's warranty period (June 3, 2012).

2.0 PROJECT GOALS, BACKGROUND AND ATTRIBUTES

2.1 Location and Setting

The Moore Property Wetland Restoration Site (Site) is located in Johnston County, North Carolina within the Rolling Coastal Plain Level IV Ecoregion and Neuse River Basin (**Figure 1**). The Site is primarily within the Swift Creek floodplain in an 84.2 acre conservation easement. The conservation area for riparian buffer along Swift Creek is 200 feet wide and measures from the top of the stream bank within the project area. This delineation was determined by the North Carolina Department of Transportation (NCDOT) in 2003. The Site contains two (2) distinct areas with two different primary hydrologic inputs. The eastern area nearest to Swift Creek (WED), is a likely historic remnant of Swift Creek and is now a wetter depression in the floodplain. The primary hydrologic inputs for this area will be flooding from Swift Creek and precipitation. The western area (TOM) is located further from Swift Creek along the toe of slope of the floodplain and receives hydrologic inputs from Swift Creek and runoff from the adjacent watershed area west of the Site (approximately 0.2 square miles).

2.2 Project Goals and Objectives

The primary goals for the Moore Property Site were as follows:

- Restore wetland hydrology and a natural water table hydroperiod of the riparian floodplain wetland (i.e. provide elevated water table levels and longer duration of saturation of the upper soil surface during the growing season) through the removal of drainage ditches and field crowns.
- Revegetation of native species to establish the natural wetland, upland, and riparian vegetation communities.
- Provide habitat protection for federally protected species in Swift Creek through the establishment of a permanent conservation easement along the west bank of Swift Creek through the project area.
- Generally Improve water quality functions and flood storage capacity within the restoration area by providing longer residence time and filtering for runoff through the wetland area prior to entering Swift Creek.
- Minimize permanent open water habitat to reduce avian hazards for the adjacent airport.

The objectives taken to achieve these project goals were as follows:

- Re-graded the Site to remove the field crowns and drainage ditch system.
- Redistributed topsoil for wetland vegetation establishment.
- Planted riparian buffer and wetland vegetation to restore the area back to natural riparian floodplain and wetland communities.

2.3 Project Structure, Restoration Type and Approach

The restoration approach was to grade the floodplain adjacent to the buffer along Swift Creek to remove the field crowns and drainage ditch system, thus restoring bottomland hardwood floodplain wetlands without impacting the adjacent riparian area and in-stream habitat of Swift Creek. The wetland design incorporated microtopographic variation including small vernal pool features and small upland hummocks typical of low-piedmont/upper coastal plain floodplain wetland complexes.

The Site covers approximately 84 acres of which approximately 72 acres have been improved by the restoration design. Near the Site, Swift Creek drains approximately 145.7 square miles, however, berms along Swift Creek and the Swift Creek Road have affected the ability of the flood to access the floodplain into the Site. The 10.4-acre WED area is a floodplain depression nearer to Swift Creek that is supported by hydrologic inputs of precipitation and flooding from larger flood events. The TOM area is supported by hydrologic inputs of runoff from the adjacent watershed area west of the Site (approximately 0.2 square miles), as well as flooding from Swift Creek which enters the Site through a notch that was constructed in the berm that runs parallel to Swift Creek Road. The TOM area is 39.8 acres.

2.4 Project History, Contacts and Attribute Data

The Site was historically converted to agricultural fields through ditching and grading to establish field crowns to improve surface water runoff. In 2003, the restoration of the site was initiated by the North Carolina Department of Transportation (NCDOT), and the property owner (Michael Todd Moore) conveyed an 84.2 acre conservation easement in perpetuity to NCDOT in March 2003. NCDOT conducted a Mitigation Feasibility in May 2003, followed by a Mitigation Plan in January 2005. In preparation of the Mitigation Plan, NCDOT had eight (8) groundwater gauges and one (1) rain gauge installed in the Site (see **Figure 4**). Data provided by NCDOT from these pre-construction gauges is included in **Appendix B**.

Upon completion of the Mitigation Plan, the project was transitioned to the North Carolina Ecosystem Enhancement Program (EEP). Construction Plans were prepared by Kimley-Horn and Associates, Inc. (KHA) in March 2009, and Environmental Quality Resources, LLC (EQR) completed construction of the project in July 2011. During this time, in 2010, the property was conveyed from Mr. Moore, to Mr. Blackmon. Annual monitoring for the project will be conducted by KHA.

3.0 SUCCESS CRITERIA

3.1 Hydrology

Success of the restoration of wetland hydrology will be determined by meeting U.S. Army Corps of Engineers (USACE) criteria and providing water table at or near the surface consistent with frequency and duration of reference wetlands. For year's one (1) through three (3), successful wetland hydrology is defined as less than or equal to 50% deviation in sustained water table levels near the surface compared to the reference wetlands. For year 4 and beyond until success

criteria is met, successful wetland hydrology is defined as less than or equal to 20% deviation in sustained water table levels near the surface compared to the reference wetlands. The hydroperiod of the reference and site wetlands will be measured using groundwater gauge data loggers that record the water table elevation near the ground surface.

3.2 Vegetation

Success criteria have been established by EEP to verify that the re-established wetland and riparian buffer vegetation includes an appropriate species composition for the target wetland community type. Also success criteria include the density and growth of characteristic forest species. For wetlands, a minimum mean density of 260 characteristic trees species (planted and volunteer stems) per acre must be surviving for five (5) years after initial planting. For riparian buffers, a minimum mean density of 320 characteristic trees species (planted stems only) per acre must be surviving for five (5) years after initial planting. These minimum requirements are according to the NCDENR DWQ Administrative Code 15A NCAC 02B.0242 (Neuse Buffer Basin, Mitigation Program for Protection and Maintenance of Existing Riparian Buffers). This site was instituted prior to October 2007 and, therefore, will generate RBR credit within the conservation easement where planted hardwood stem density requirements are met AND there is a minimum of 50' and a maximum of 200' from TOB of Swift Creek. Herbaceous vegetation will be assessed visually during the initial assessment for ground cover and target species. Supplemental plantings will be performed as needed to achieve the vegetation success criteria.

4.0 MONITORING PLAN GUIDELINES

The Monitoring Plan will entail analysis of hydrology (surface and subsurface) and vegetation establishment. Monitoring of the restoration will be performed for five years or until success criteria are fulfilled.

4.1 Hydrology

After construction was completed, sixteen (16) groundwater monitoring gauges and one (1) crest gauge were installed per USACE guidelines (ERDC TN-WRAP-00-02, July 2000) (**Figures 6 and 7**). These monitoring gauges will be set to observe near-surface and surface water table fluctuations to characterize the Site's water table hydroperiod. Five (5) reference wetland gauges were also installed at selected reference wetlands that are representative of the target wetland communities of the Site (**Figure 5**).

The monitoring gauges were installed in the upper soil surface to a depth of 36-inches, or to the restrictive layer (dominated by clay) depth which was field determined (**Appendix B**). The gauges were placed in three (3) transects (two (2) running west to east, one (1) running north to south) in order to capture groundwater table data at different elevations within the wetland. These transects will also help to better evaluate hydrologic inputs on both the WED and TOM areas.

4.2 Vegetation

After planting was completed in January of 2011, an initial evaluation was performed to verify planting methods and to determine initial species composition and density. Supplemental planting and additional Site modifications will be implemented after the first year on a case by case basis based on success criteria consultation with USACE.

During the first year, vegetation will be visually assessed to ascertain the degree of overtopping and competition of planted vegetation by herbaceous competition. Subsequently, quantitative sampling of vegetation will be performed between August 1 and October 31 after each growing season until the vegetation success criteria is achieved.

Sixteen (16) Permanent 10-meter square plots were established randomly within the different planting zones for the Site (**Figure 8**). These vegetation plots were installed according to the Carolina Vegetation Survey (CVS) Levels I and II protocol and will also be monitored according to this protocol. This quantitative monitoring will determine survivorship and species composition of the planted and volunteer trees.

5.0 MAINTENANCE AND CONTINGENCY PLANS

If problem areas arise during the monitoring period, corrective action may be required and implemented per guidance from EEP. If the problem is isolated in nature it may not require remedial action; however, if the issue is determined to be systemic, corrective action may be needed. The following provides an outline for maintenance thresholds and contingency plans for the Site's wetlands and vegetation:

Wetland Hydrology Criteria:

- Hydrology does not meet USACE criteria and targeted reference values

Wetland Hydrology Remedial Actions:

- Verify climate conditions are normal
- Mobilization of equipment to either raise or lower the grade of the emergency spillways to increase flood water retention within the Site.

Planted Area Issue Thresholds:

- >15% invasives
- Not meeting stem count or diversity criteria as indicated in Section 3.2 of the report

Planted Area Remedial Actions:

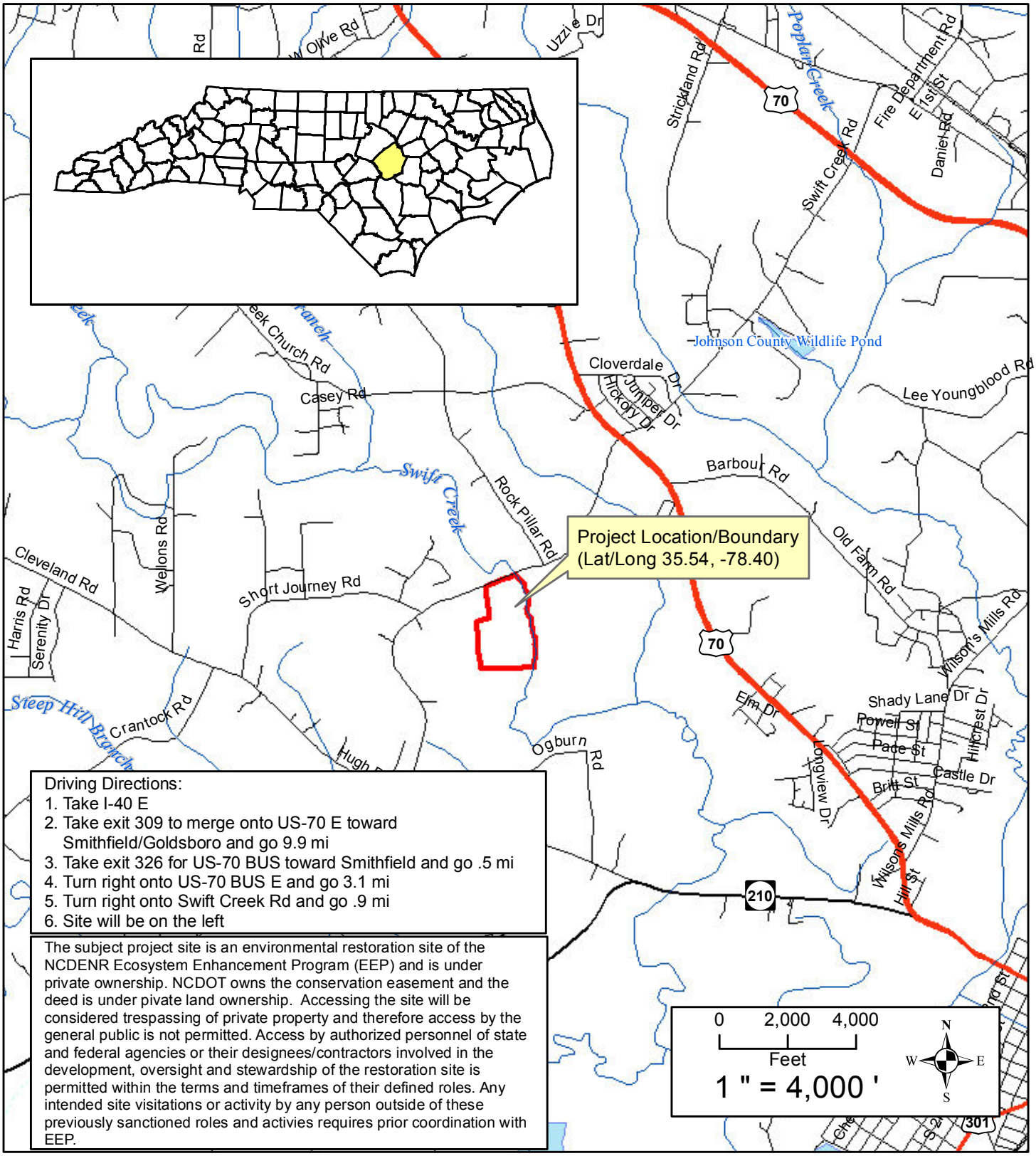
- Nuisance vegetation removal/treatment
- Supplemental plantings

6.0 AS-BUILT DOCUMENTATION

The As-built documentation for the Site can be found in **Appendix D**. The As-built Survey consists of a topographic survey completed by a licensed surveyor, and submitted by the project's contractor. The Record Drawings are a red-lined version of the Construction Drawings modified to show the restoration features as they were constructed.

APPENDIX A

General Tables and Figures



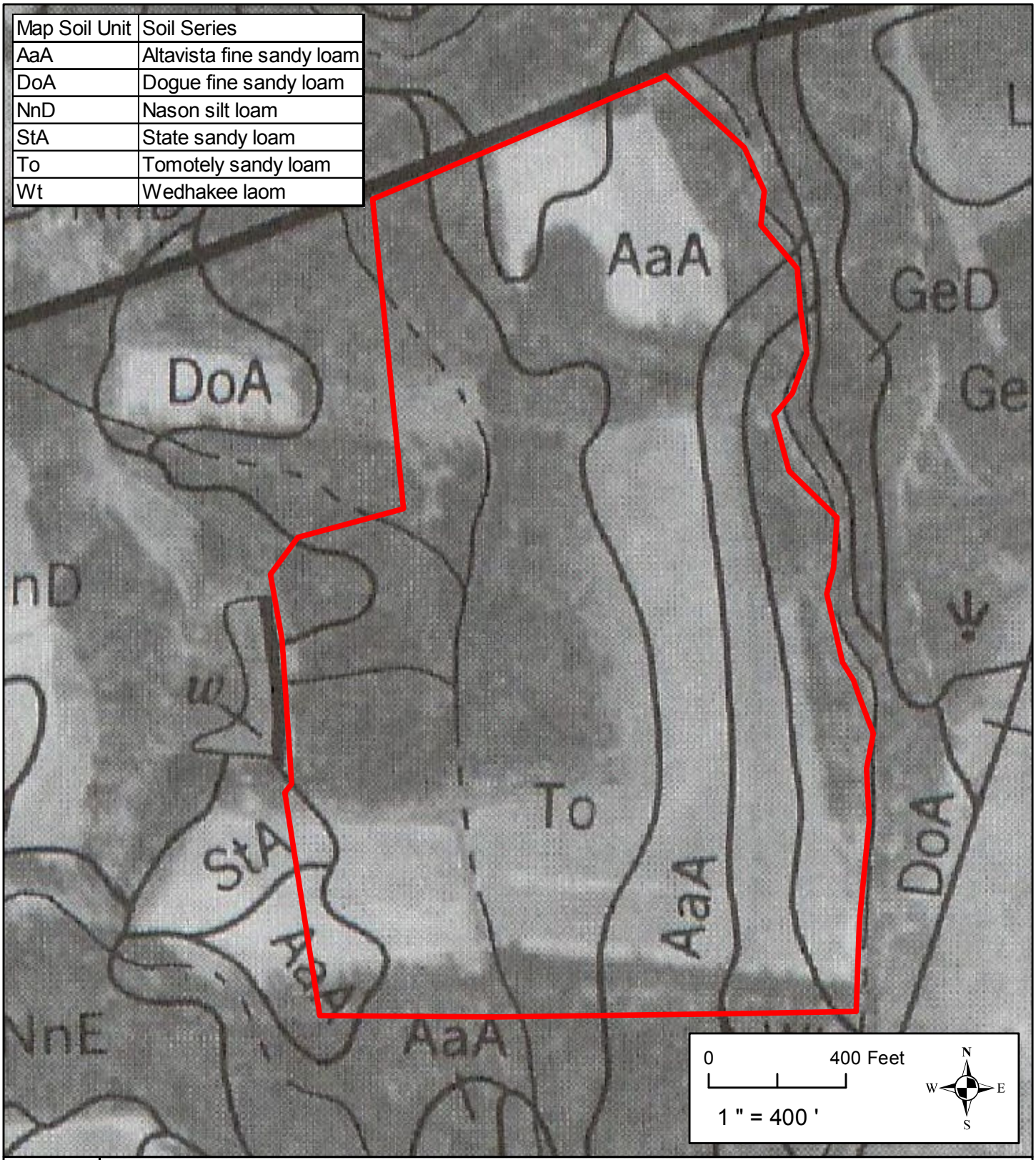
Driving Directions:
1. Take I-40 E
2. Take exit 309 to merge onto US-70 E toward Smithfield/Goldsboro and go 9.9 mi
3. Take exit 326 for US-70 BUS toward Smithfield and go .5 mi
4. Turn right onto US-70 BUS E and go 3.1 mi
5. Turn right onto Swift Creek Rd and go .9 mi
6. Site will be on the left

The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is under private ownership. NCDOT owns the conservation easement and the deed is under pivate land ownership. Accessing the site will be considered trespassing of private property and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitations or activity by any person outside of these previously sanctioned roles and activies requires prior coordination with EEP.

Title	VICINITY MAP
Prepared For: Ecosystem Enhancement Program	**Project** MOORE PROPERTY WETLAND RESTORATION Johnston County, North Carolina
Date 07/28/2011	**KHA Project Number** 011795023
Figure 1	

Kimley-Horn and Associates, Inc.

Map Soil Unit	Soil Series
AaA	Altavista fine sandy loam
DoA	Dogue fine sandy loam
NnD	Nason silt loam
StA	State sandy loam
To	Tomotely sandy loam
Wt	Wedhakee laom



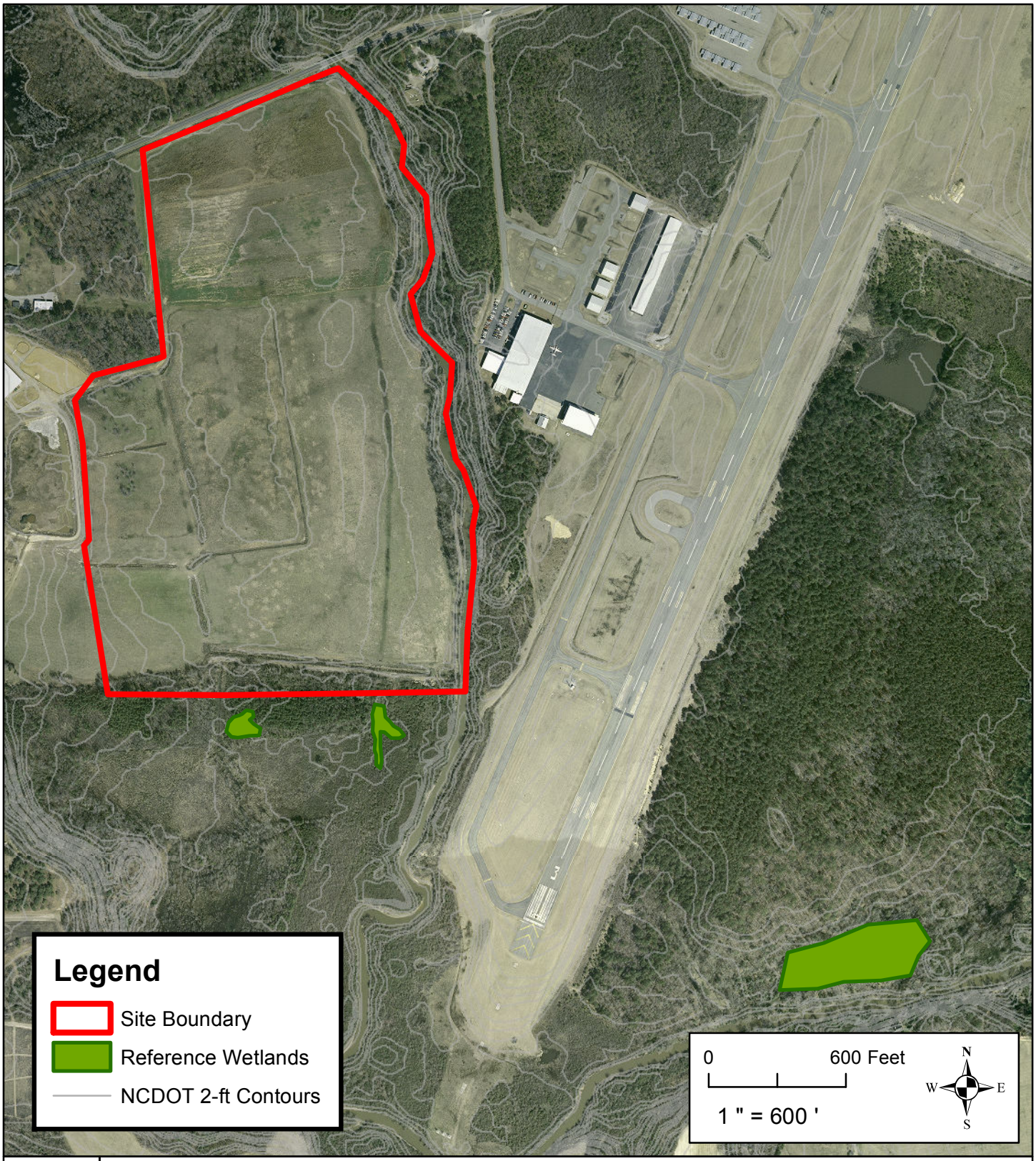
Title USDA HISTORICAL SOIL SURVEY (1980 AERIAL)

Prepared For: Ecosystem Enhancement Program

Project MOORE PROPERTY WETLAND RESTORATION
Johnston County, North Carolina

Date	KHA Project Number	Figure
07/1/2011	011795023	2

Kimley-Horn and Associates, Inc.



Title	GENERAL SITE MAP		
Prepared For: Ecosystem Enhancement Program	Project	MOORE PROPERTY WETLAND RESTORATION Johnston County, North Carolina	
	Date 7/30/2011	KHA Project Number 011795023	Figure 3

Kimley-Horn and Associates, Inc.

Table 1. Project Components and Mitigation Credits

Moore Property Wetland Restoration

Mitigation Credits

	Stream		Riparian Wetland		Non-riparian Wetland		Neuse Riparian Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals			51.5	0			248,292		

Project Components

Project Component -or- Reach ID	Stationing/Location	Existing Footage/Acreage	Approach (PI, PII, etc.)	Restoration -or- Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio
RPN				Restoration	5.7	
WED				Restoration	10.4	
TOM-A				Restoration	39.8	
TOM-B				Restoration	1.3	

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-Riverine			
Restoration		51.5	0		248,292	27
Enhancement						
Enhancement I						
Enhancement II						
Creation						
Preservation						
High Quality Preservation						

BMP Elements

Element	Location	Purpose/Function	Notes

BMP Elements

BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond;
FS = Filter Strip; Grassed Swale = S; LS = Level Spreader; NI = Natural Infiltration Area, FB = Forested Buffer

Table 2. Project Activity and Reporting History Moore Property Wetland Restoration		
Activity or Deliverable	**Data Collection Complete**	**Completion or Delivery**
Restoration Plan	NA	March 2008
Final Design – Construction Plans	NA	May 2009
Containerized, bare root and B&B plantings	NA	January 2011
Construction	NA	July 2011
As-Built & Baseline Monitoring Report	January 2011	July 2011

- Bolded items are examples of those items that are not standard, but may come up and should be included
- Non-bolded items represent events that are standard components over the course of a typical project.
- The above are obviously not the extent of potential relevant project activities, but are just provided as example as part of this exhibit.

Table 3. Project Contacts Table Moore Property Wetland Restoration	
Designer	Kimley-Horn and Associates, Inc.
	3001 Weston Parkway Cary, NC 27513
Primary project design POC	Daren Pait (757) 355-6677
Construction Contractor	Environmental Quality Resources, LLC
	1405 Benson Ct Arbutus, MD 21227
Construction contractor POC	John Talley (443) 304-3310
Survey Contractor	Turner Land Surveying, PLLC
	3201 Glenridge Dr Raleigh, NC 27604
Survey contractor POC	David Turner (919) 875-1378
Planting Contractor	Natives, Inc.
	550 E. Westinghouse Blvd Charlotte, NC 28273
Planting contractor POC	Gregg Antemann (704) 527-1177
Seeding Contractor	Natives, Inc.
	550 E. Westinghouse Blvd Charlotte, NC 28273
Contractor point of contact	Gregg Antemann (704) 527-1177
Seed Mix Sources	Natives, Inc.
	Gregg Antemann (704) 527-1177
Nursery Stock Suppliers	Natives, Inc.
	Gregg Antemann (704) 527-1177
Monitoring Performers	Kimley-Horn and Associates, Inc.
	3001 Weston Parkway Cary, NC 27513
Stream Monitoring POC	N/A
Vegetation Monitoring POC	Chad Evenhouse (919) 677-2121
Wetland Monitoring POC	Chad Evenhouse (919) 677-2121

Table 4. Project Attribute Table Moore Property Wetland Restoration	
Project County	Johnston
Physiographic Region	Coastal Plain
Ecoregion	Rolling Coastal Plain
Project River Basin	Neuse
USGS HUC for Project (14 digit)	3020201110070
NCDWQ Sub-basin for Project	03-04-02
Within extent of EEP Watershed Plan?	No
WRC Hab Class (Warm, Cool, Cold)	Warm
% of project easement fenced or demarcated	100
Beaver activity observed during design phase?	No

Restoration Component Attribute Table

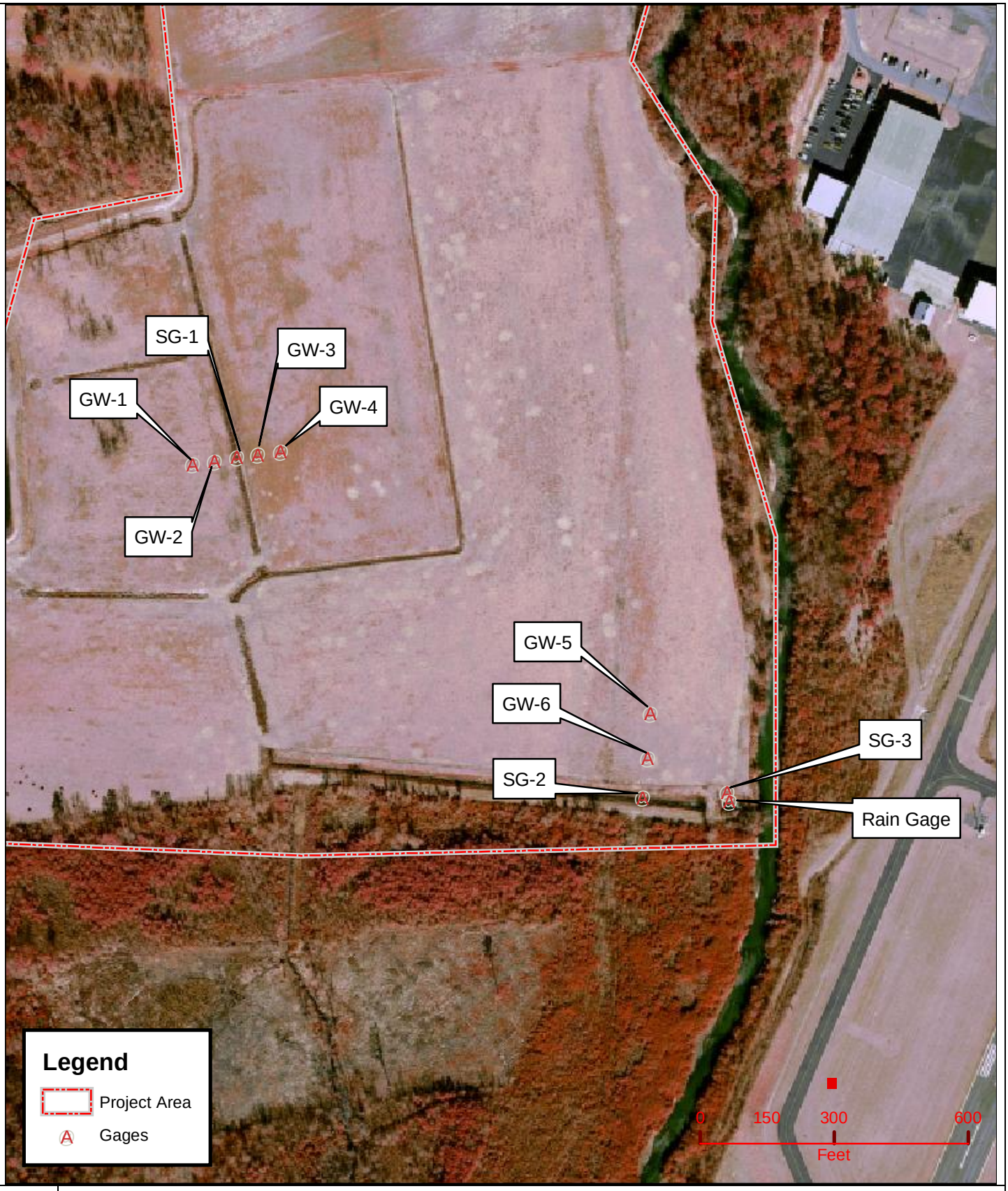
	RPN	WED	TOM	Swift Creek *
Drainage area	N/A	0.03 sq. mi.	0.2 sq. mi.	145.2 sq. mi.
Stream order	N/A	N/A	N/A	4th
Restored length (feet)	N/A	N/A	N/A	N/A
Perennial or Intermittent	N/A	N/A	N/A	Perennial
Watershed type (Rural, Urban, Developing etc.)		Rural	Rural	Developing
Watershed LULC Distribution (e.g.)				
Residential		2%	2%	20%
Ag-Row Crop		69%	69%	40%
Ag-Livestock		0%	0%	0%
Forested		29%	29%	40%
Etc.		0%	0%	0%
Watershed impervious cover (%)		0%	0%	15%
NCDWQ AU/Index number	N/A	N/A	N/A	27-43-(8)
NCDWQ classification	N/A	N/A	N/A	C; Sw; NSW
303d listed?	N/A	N/A	N/A	No
Upstream of a 303d listed segment?	N/A	N/A	N/A	Yes
Reasons for 303d listing or stressor	N/A	N/A	N/A	WS-III; NSW; CA
Total acreage of easement	84.2	84.2	84.2	N/A
Total vegetated acreage within the easement	84.2	84.2	84.2	N/A
Total planted acreage as part of the restoration	5.7	10.4	41.1	N/A
Rosgen classification of pre-existing	N/A	N/A	N/A	N/A
Rosgen classification of As-built	N/A	N/A	N/A	N/A
Valley type	N/A	N/A	N/A	N/A
Valley slope	N/A	N/A	N/A	N/A
Valley side slope range (e.g. 2-3.%)	N/A	N/A	N/A	N/A
Valley toe slope range (e.g. 2-3.%)	N/A	N/A	N/A	N/A
Cowardin classification	N/A	N/A	N/A	N/A
Trout waters designation	N/A	N/A	N/A	No
Species of concern, endangered etc.? (Y/N)	No	No	No	Yes
Dominant soil series and characteristics	Altavista	Wedhadkee	Tomotley	N/A
Series	AaA	Wt	To	N/A
Depth	60 inches	63 inches	60 inches	N/A
Clay%	10-35	5-20	5-35	N/A
K	0.24	0.24	0.2	N/A
T	5	5	5	N/A

Use N/A for items that may not apply. Use "-" for items that are unavailable and "U" for items that are unknown

*There is no restoration of Swift Creek involved with this project

APPENDIX B

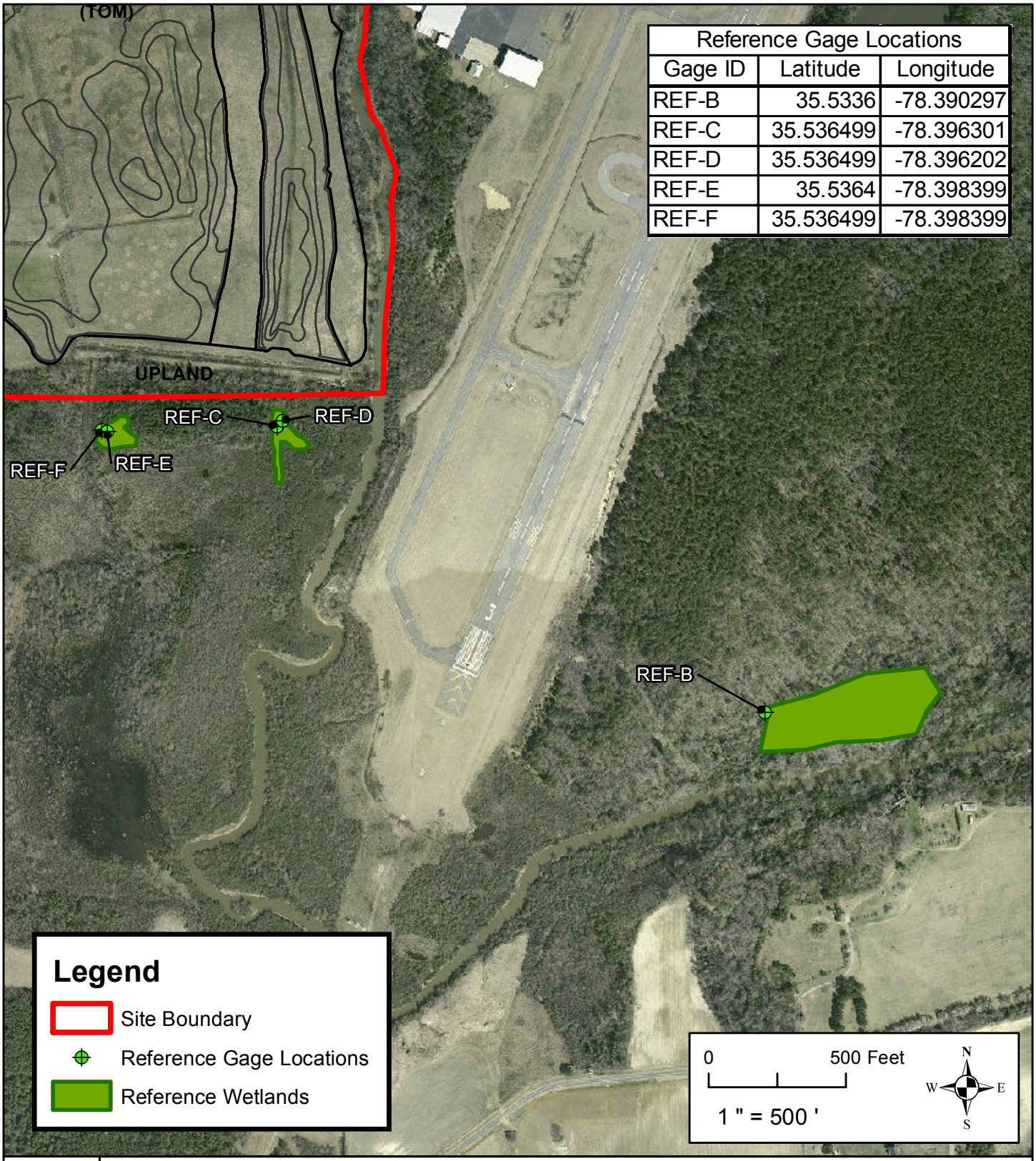
Hydrology Data



Title	PRECONSTRUCTION GROUNDWATER MONITORING LOCATIONS

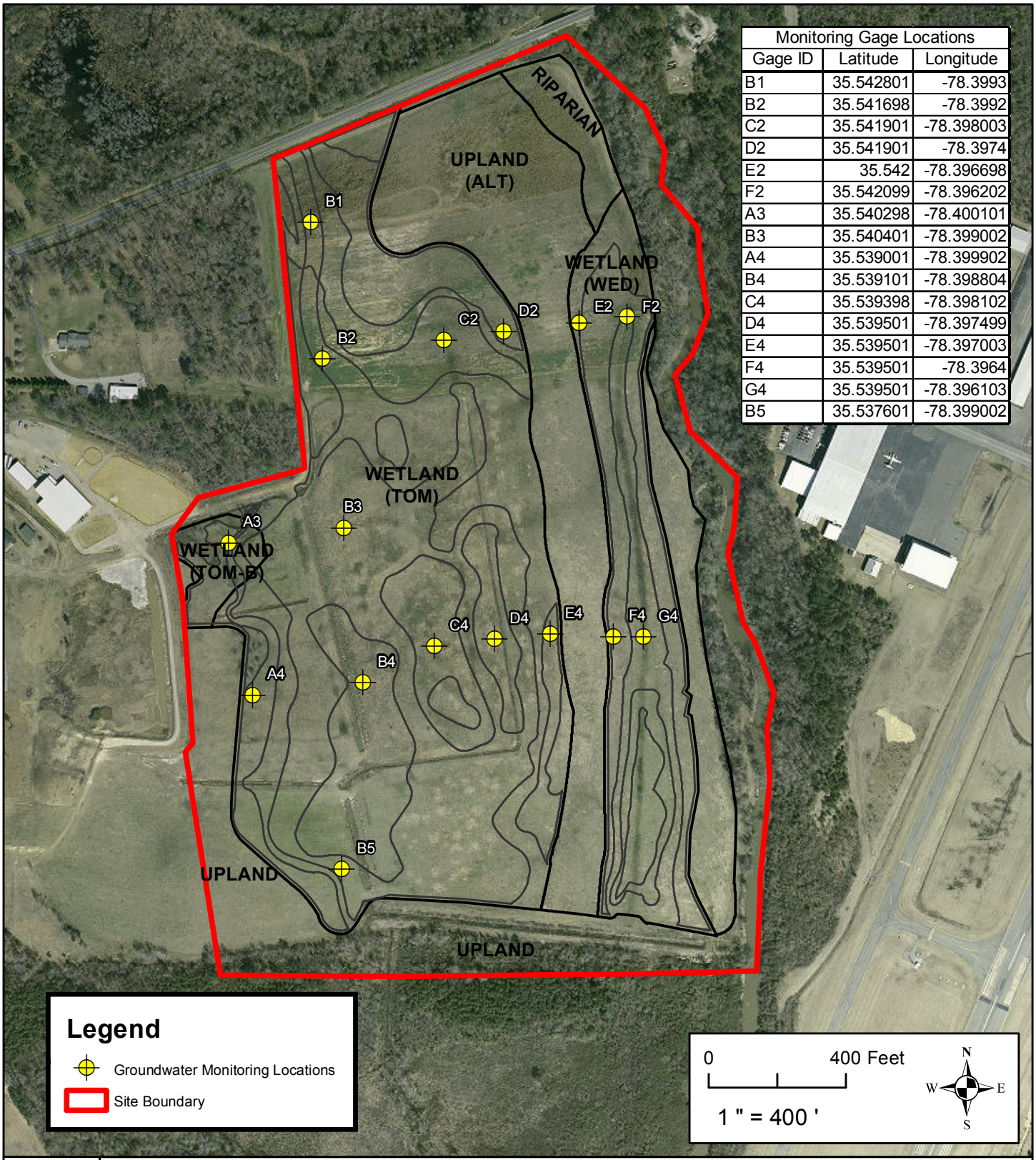
Prepared For: Ecosystem Enhancement Program	**Project**	MOORE PROPERTY WETLAND RESTORATION Johnston County, North Carolina	
	Date 11/1/11	**Project Number** 011795023	**Figure** 4

Kimley-Horn and Associates, Inc.



Title	REFERENCE GROUNDWATER MONITORING LOCATIONS
Prepared For: Ecosystem Enhancement Program	**Project** MOORE PROPERTY WETLAND RESTORATION Johnston County, North Carolina
Date 7/30/2011	**KHA Project Number** 011795023
Figure 5	

Kimley-Horn and Associates, Inc.



Monitoring Gage Locations		
Gage ID	Latitude	Longitude
B1	35.542801	-78.3993
B2	35.541698	-78.3992
C2	35.541901	-78.398003
D2	35.541901	-78.3974
E2	35.542	-78.396698
F2	35.542099	-78.396202
A3	35.540298	-78.400101
B3	35.540401	-78.399002
A4	35.539001	-78.399902
B4	35.539101	-78.398804
C4	35.539398	-78.398102
D4	35.539501	-78.397499
E4	35.539501	-78.397003
F4	35.539501	-78.3964
G4	35.539501	-78.396103
B5	35.537601	-78.399002

Title GROUNDWATER MONITORING LOCATIONS

Prepared For: Ecosystem Enhancement Program

Project MOORE PROPERTY WETLAND RESTORATION
Johnston County, North Carolina

Date	KHA Project Number	Figure
7/30/2011	011795023	6

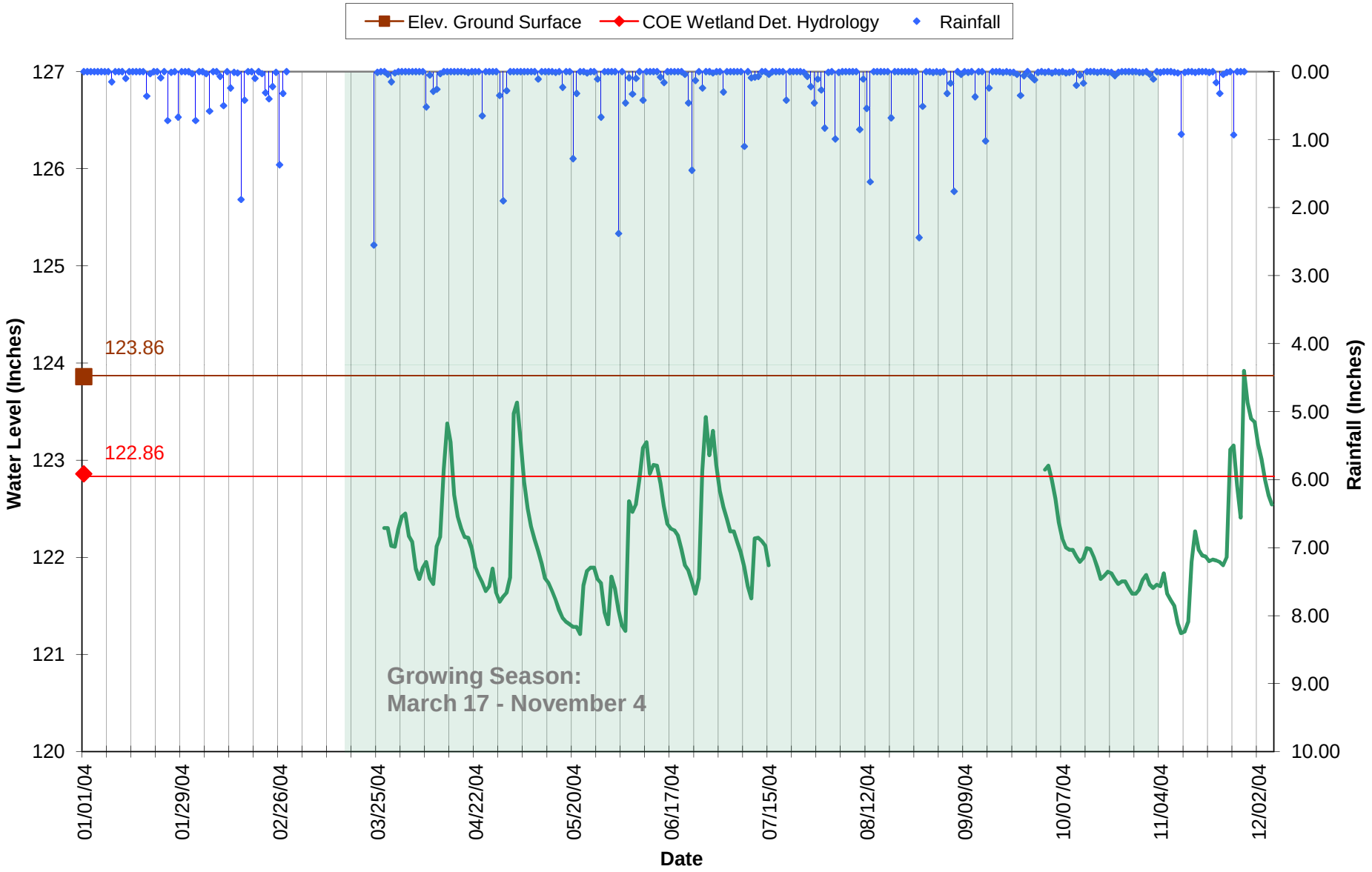
Kimley-Horn and Associates, Inc.

Title	GROUNDWATER MONITORING LOCATIONS
Prepared For: Ecosystem Enhancement Program	**Project** MOORE PROPERTY WETLAND RESTORATION Johnston County, North Carolina

Date	KHA Project Number	Figure
7/30/2011	011795023	7

Kimley-Horn and Associates, Inc.

Groundwater Monitoring Gage
ID: 9DE6D56
Location: GW-1



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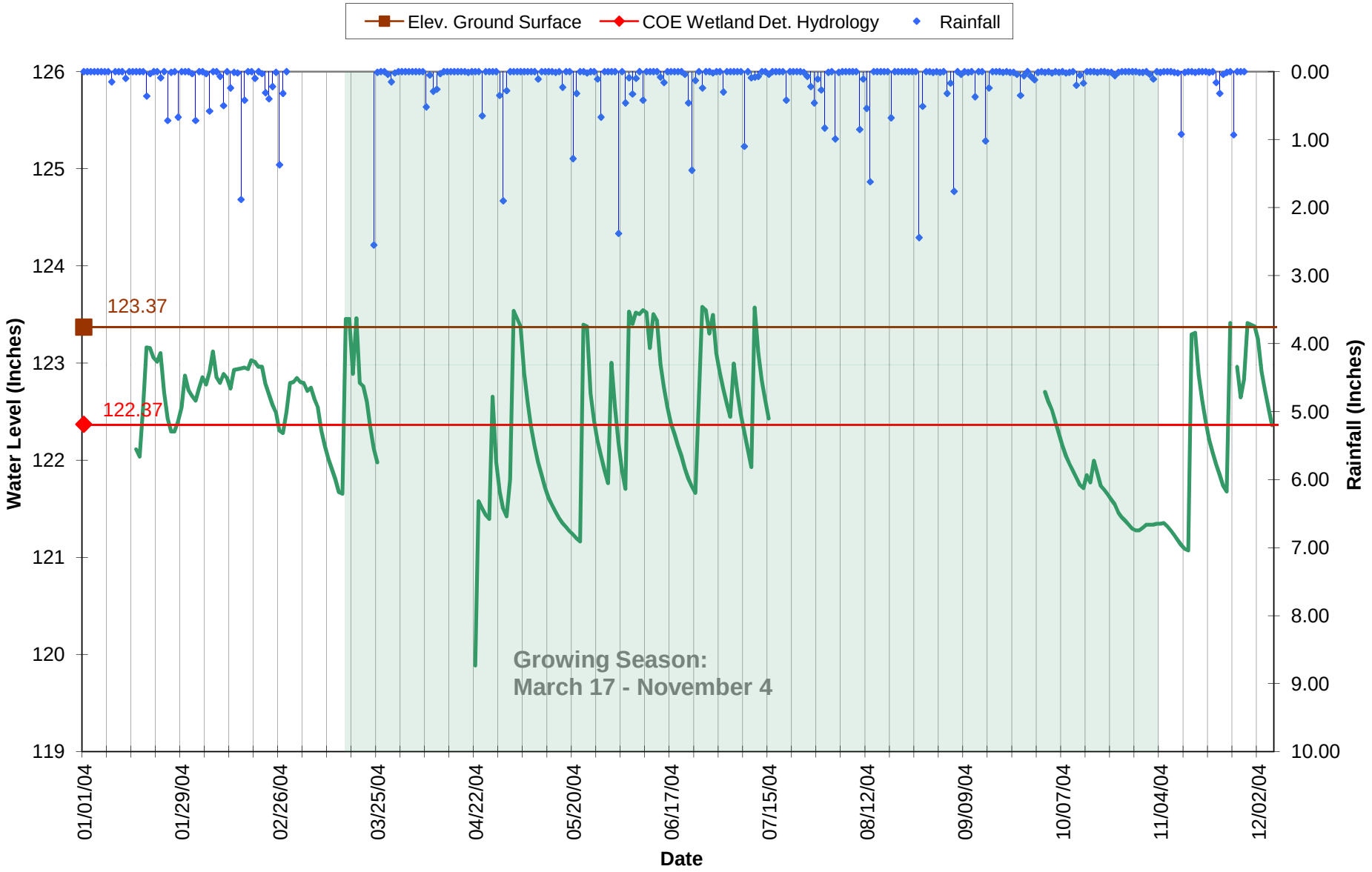
Groundwater Monitoring Gage
ID: 9BEBD1B
Location: GW-2



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Groundwater Monitoring Gage
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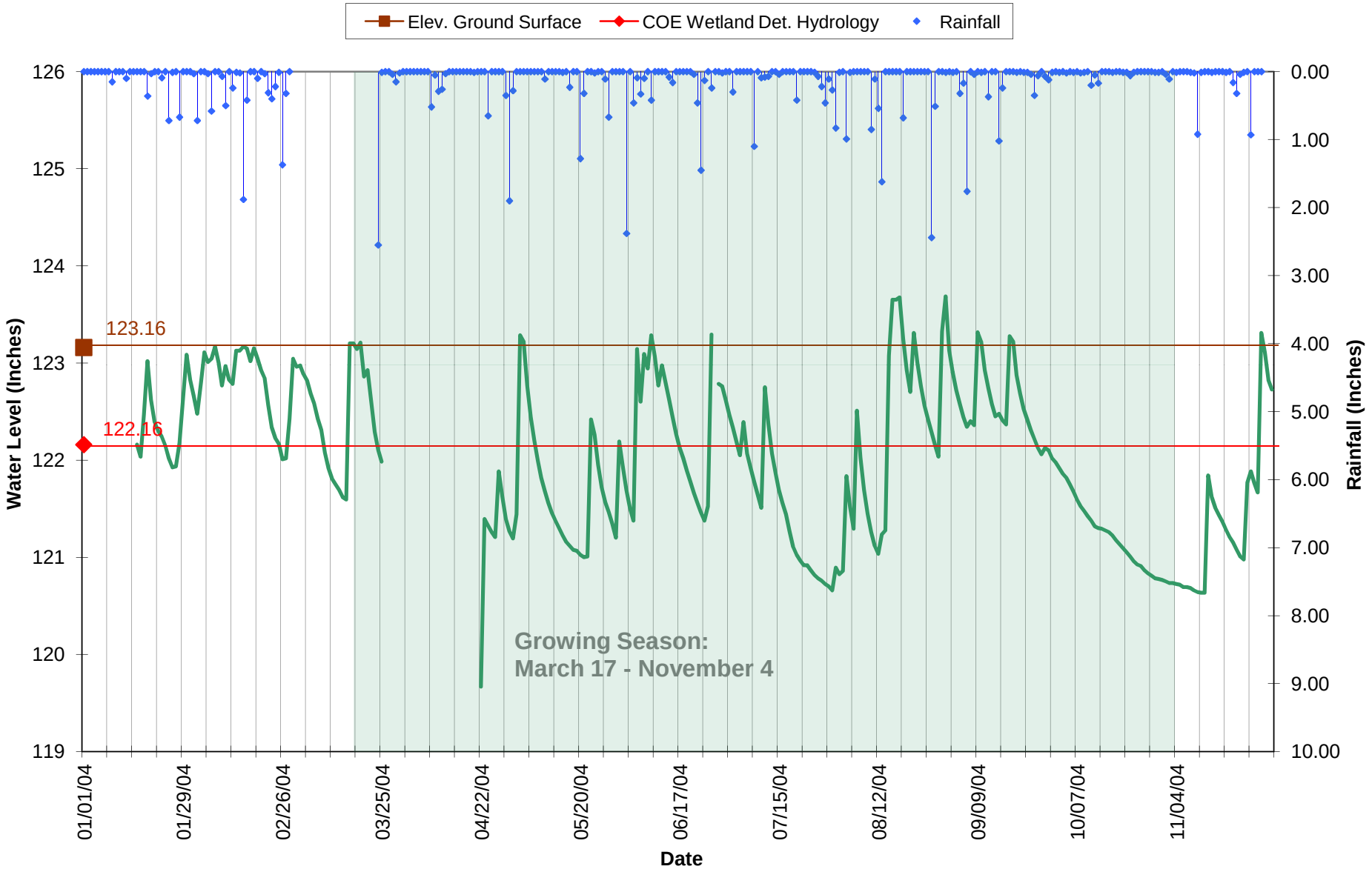
Location: GW-3



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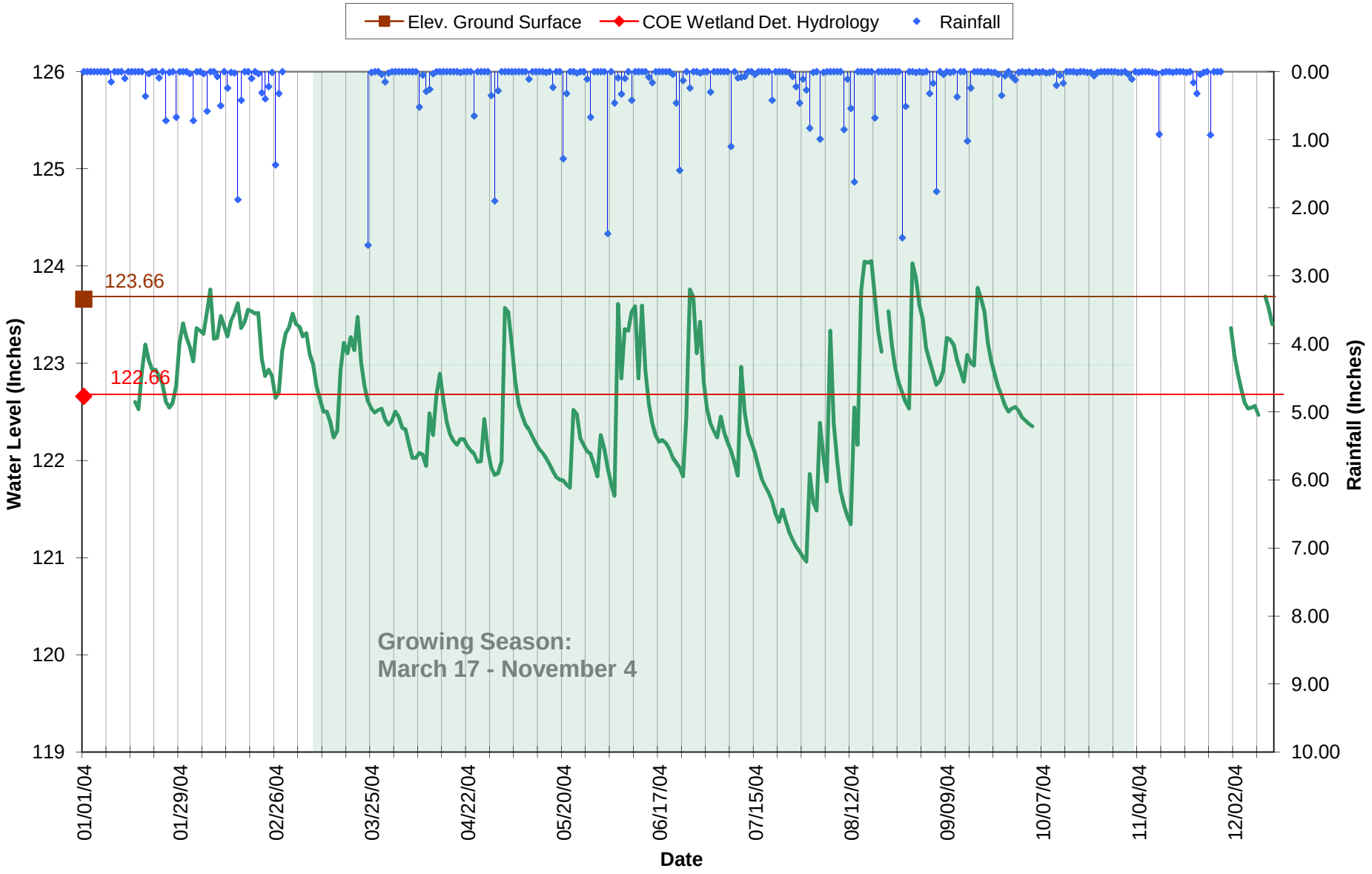
Location: GW-4



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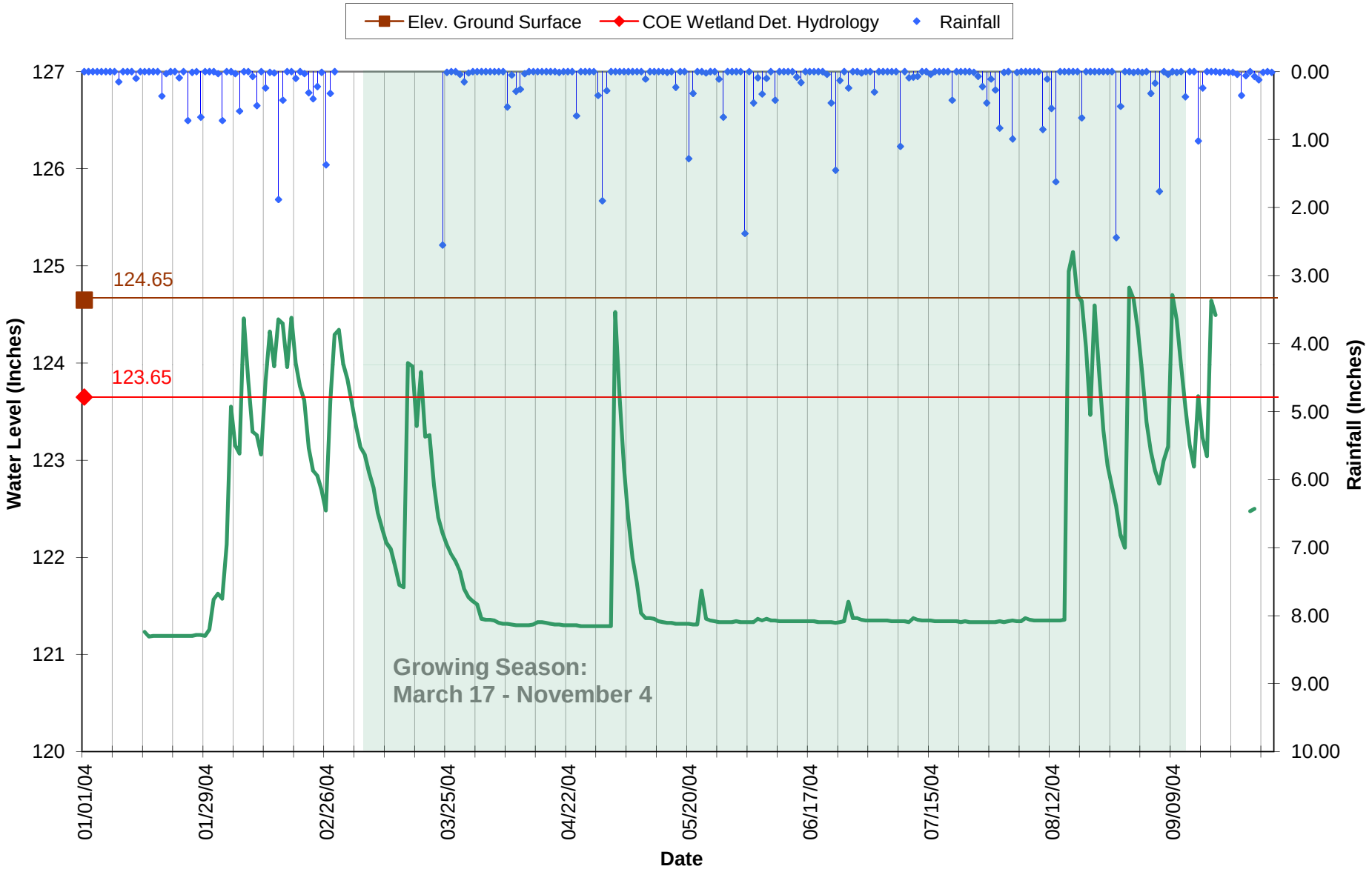
Groundwater Monitoring Gage
ID: 8E52212
Location: GW-5



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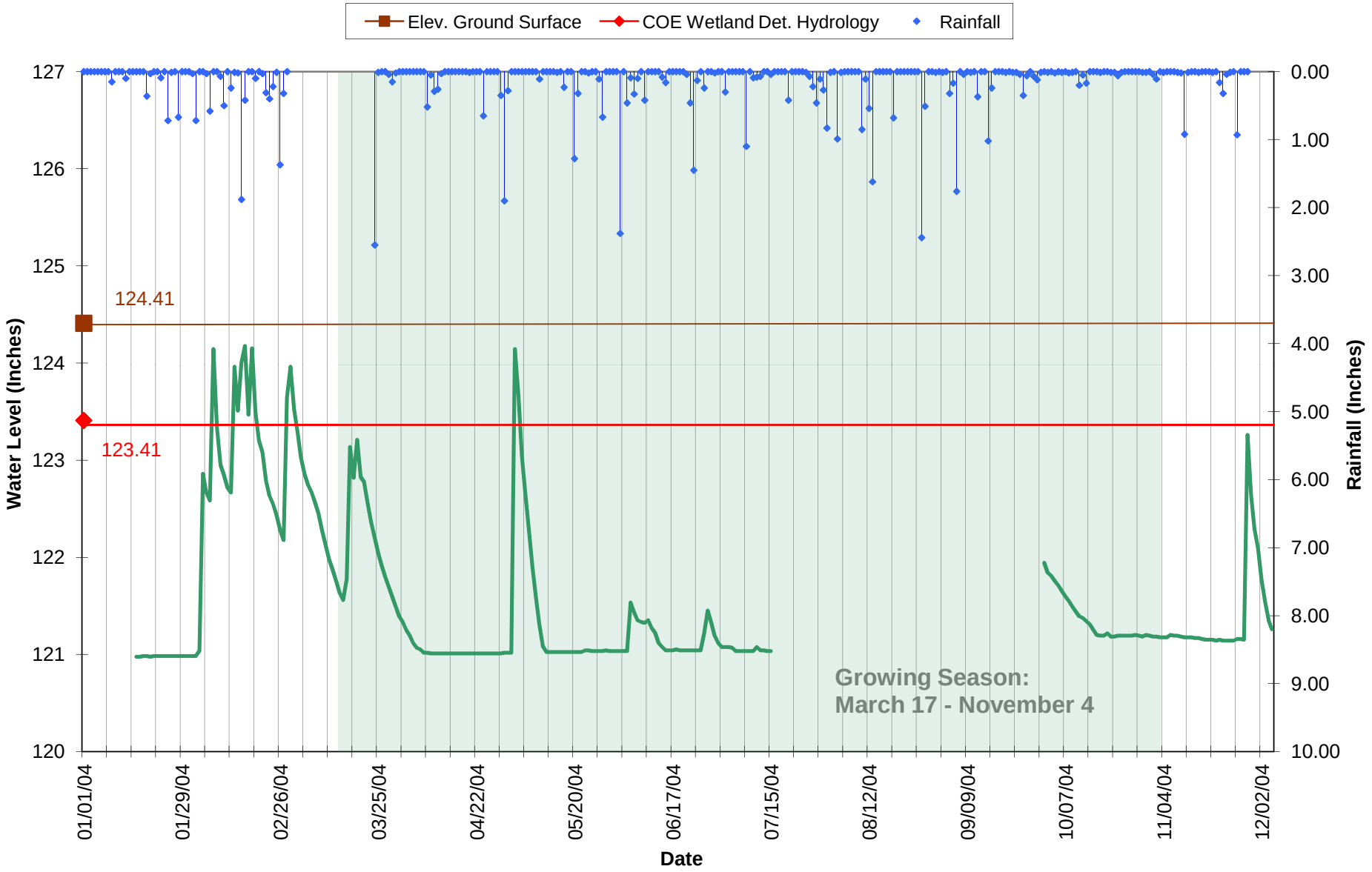
Location: GW-6



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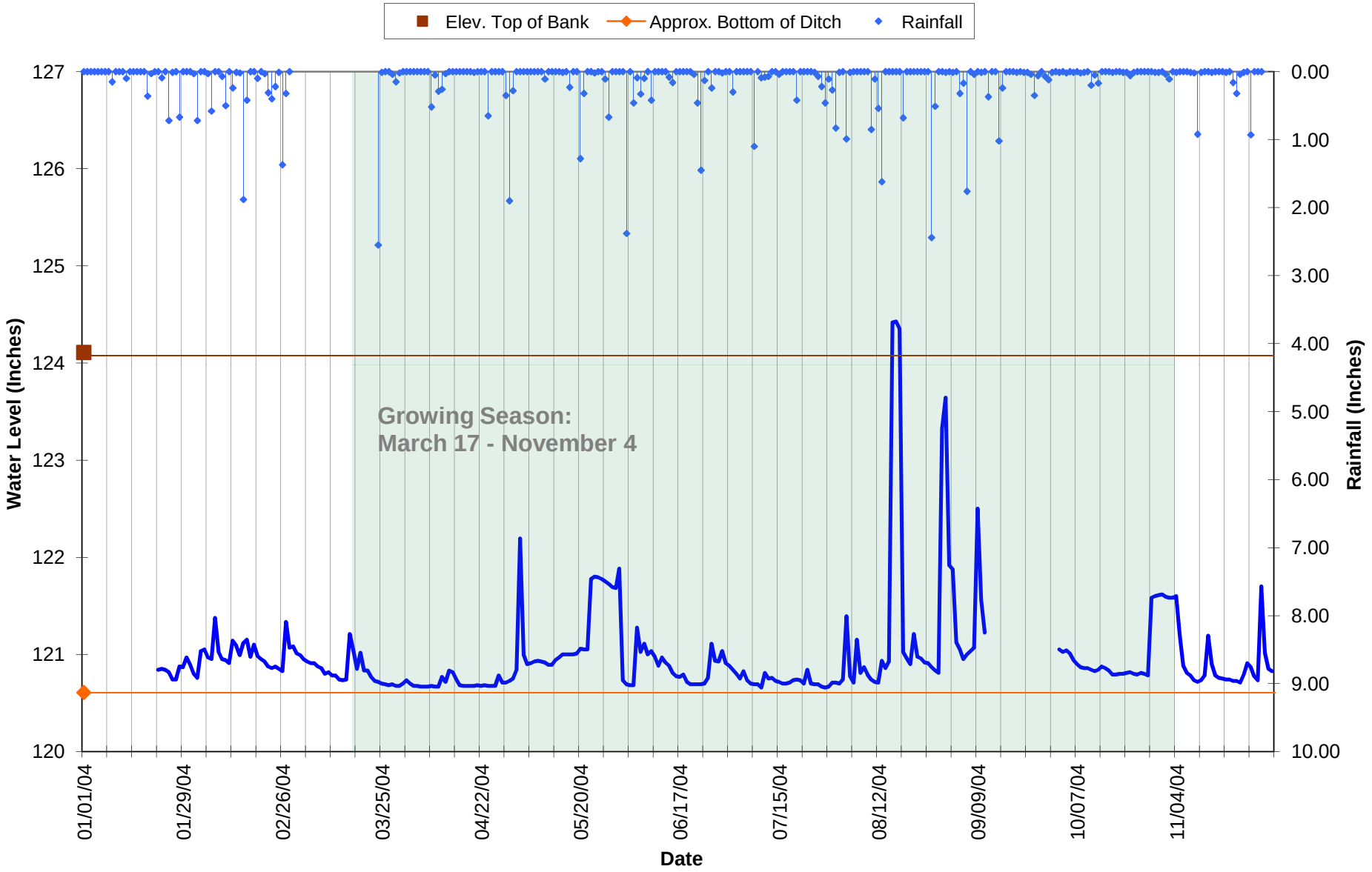
Stream Monitoring Gage
ID: 9D900E1
Location: SG-1



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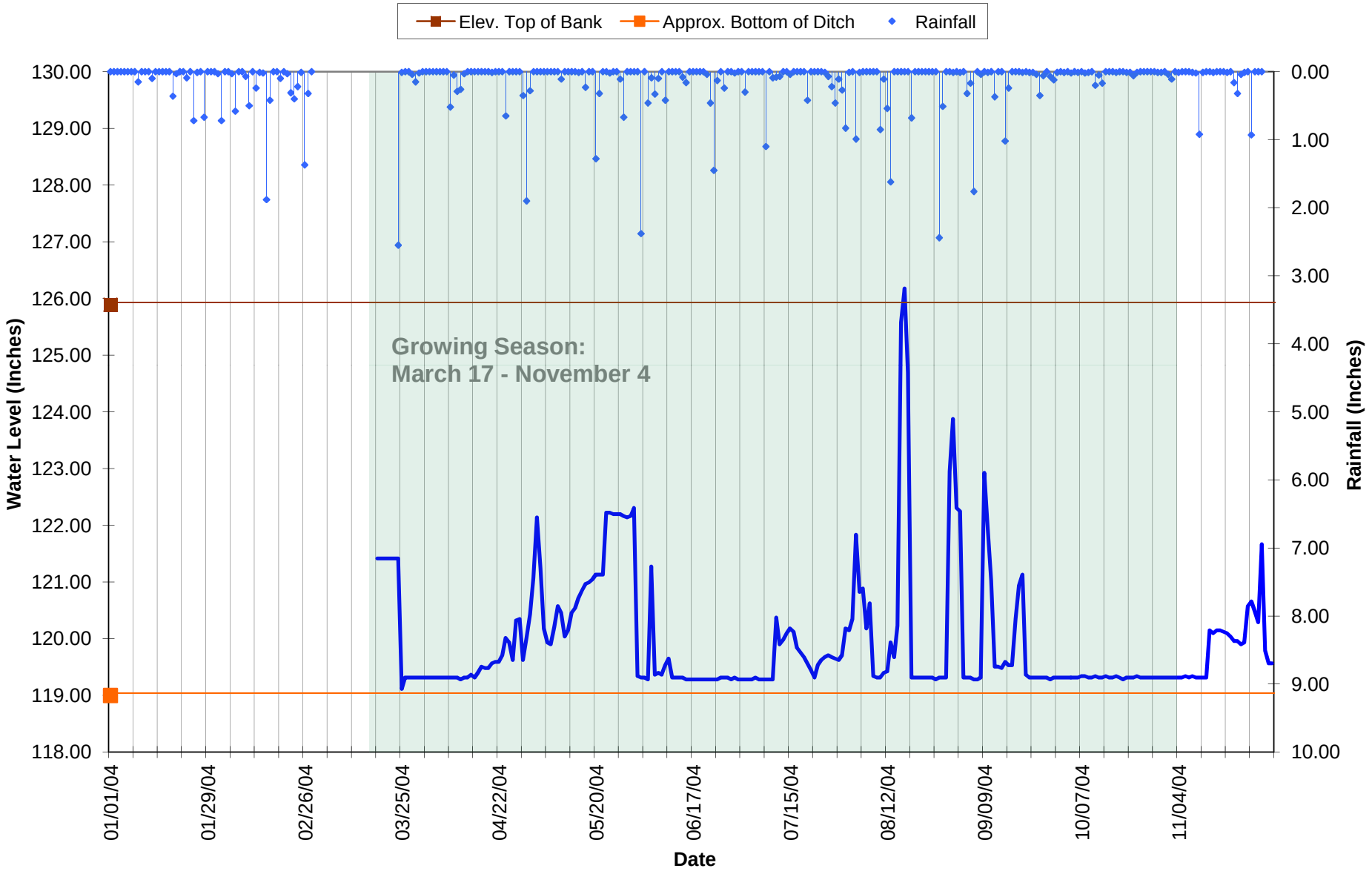
Stream Monitoring Gage
ID: S2EAAF5
Location: SG-2



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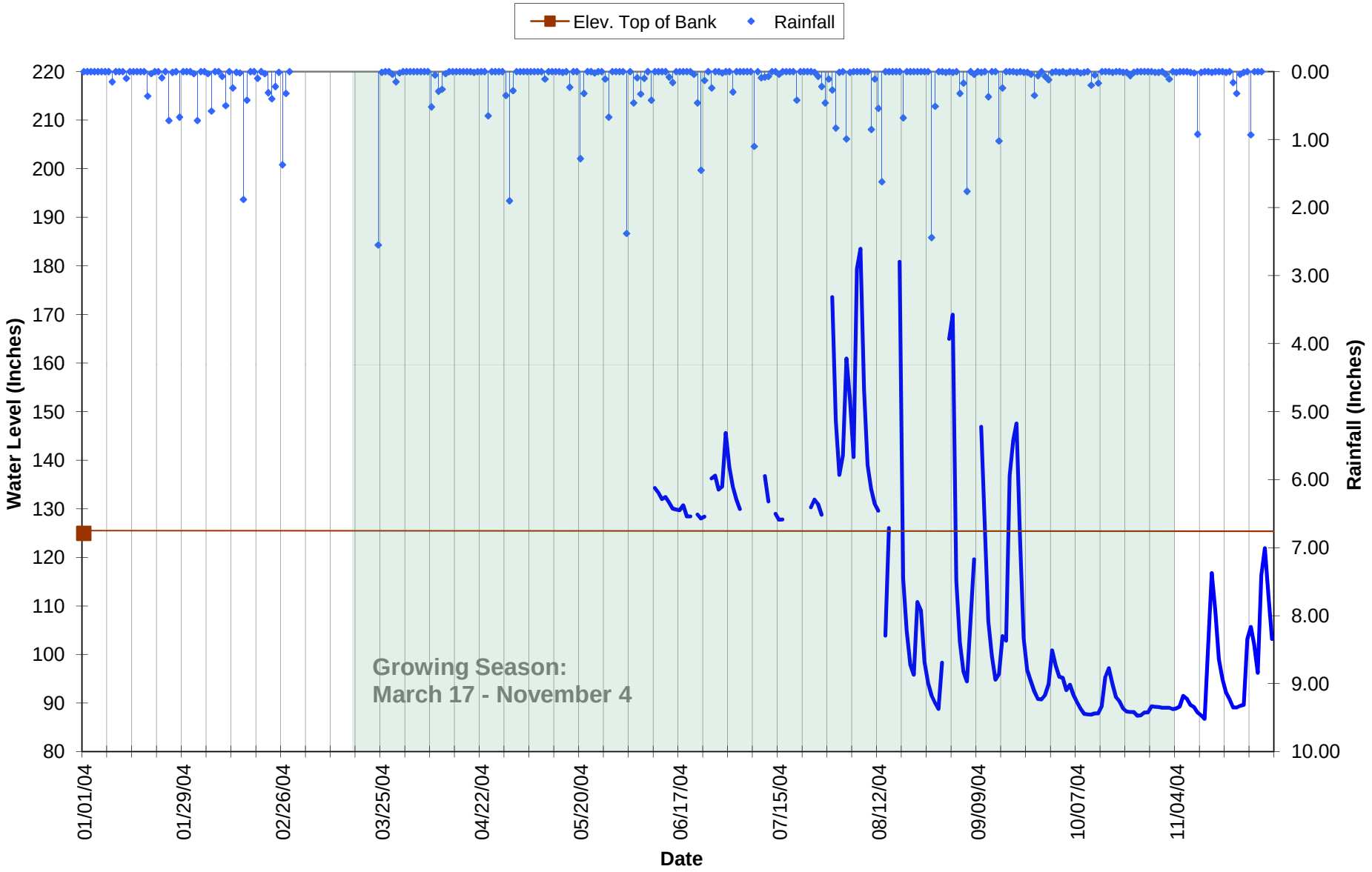
Stream Monitoring Gage
ID: N3C6933F
Location: SG-3



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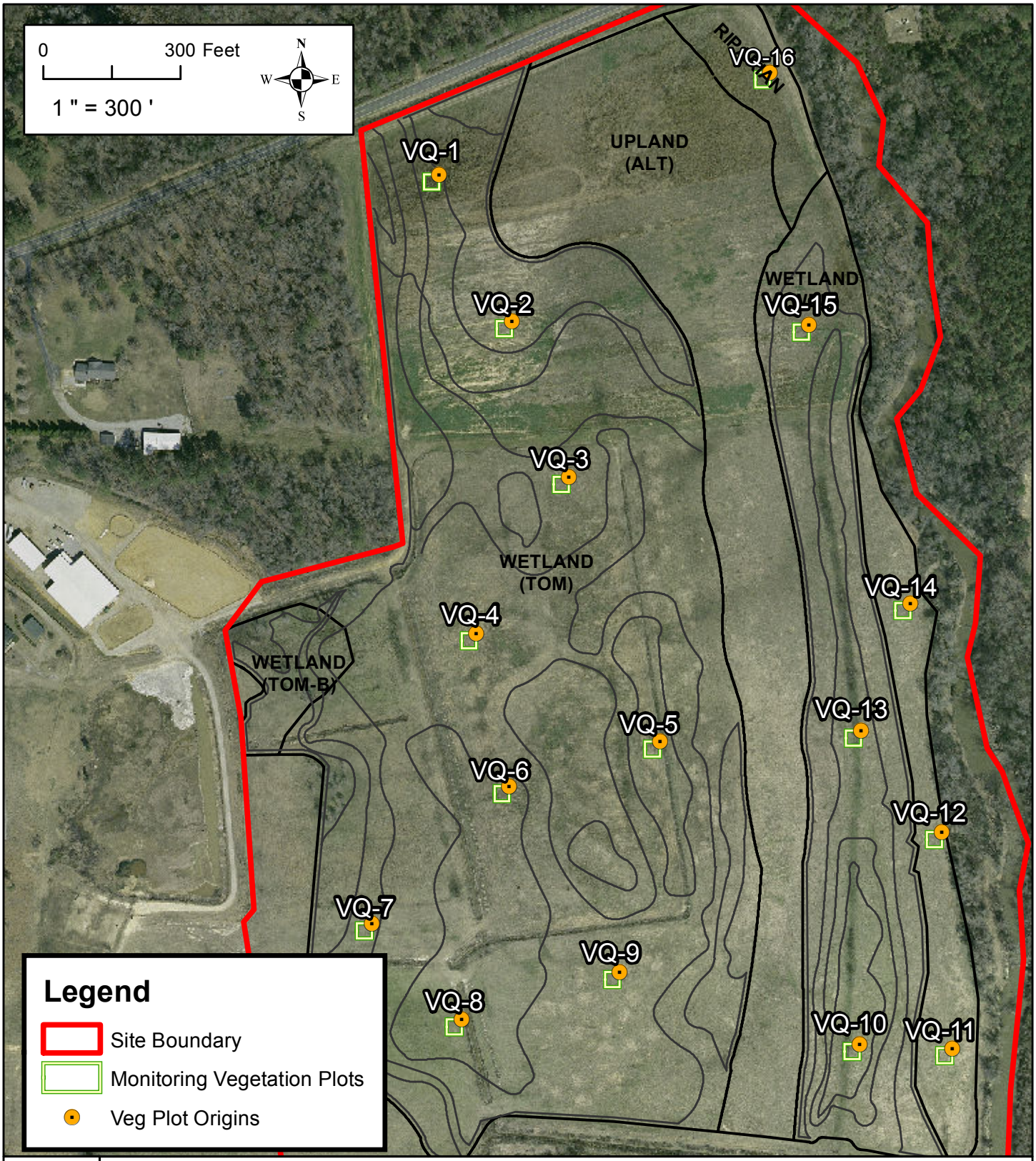
APPENDIX C

Vegetation Data



Title	VEGETATION PLOT LOCATIONS
Prepared For: Ecosystem Enhancement Program	**Project** MOORE PROPERTY WETLAND RESTORATION Johnson County, North Carolina
Date 07/1/2011	**KHA Project Number** 011795023
Figure 8	

Kimley-Horn and Associates, Inc.

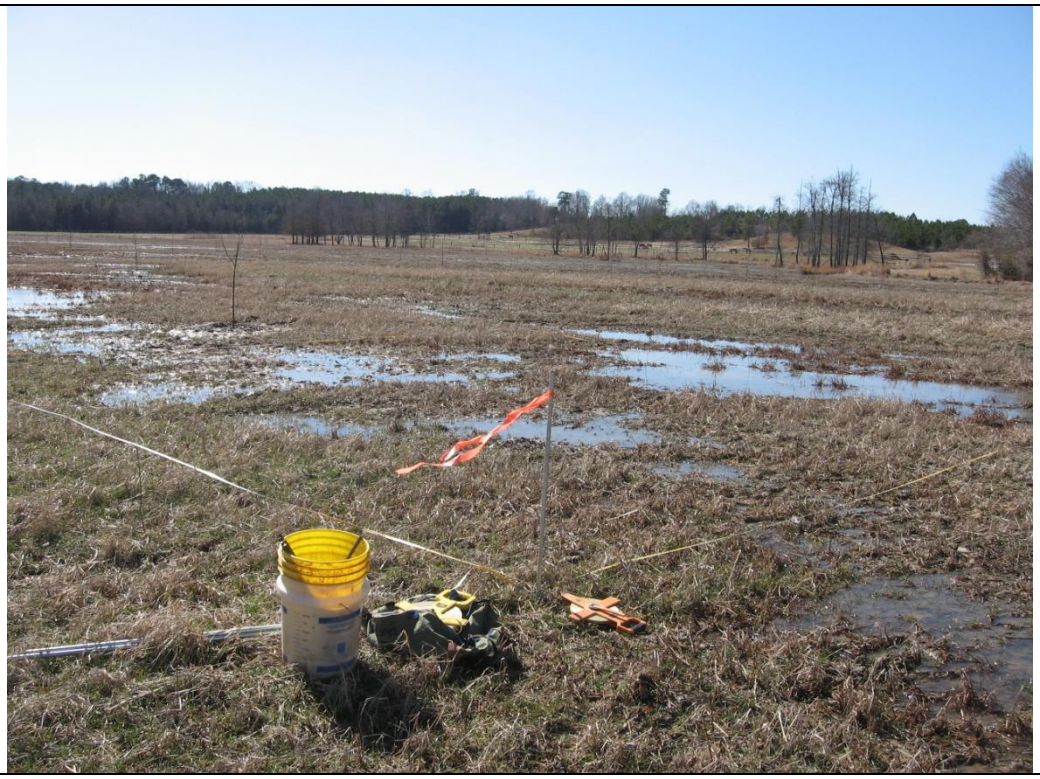
Table 7 Planted and Total Stem Counts (Species by Plot with Annual Means)

Scientific Name	Common Name	Type	Current Data (AB 2011)																	
			Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8			
			P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T		
Betula nigra	River Birch	Tree																		
Carpinus caroliniana	Ironwood	Tree	1	1	1	1			5	5										
Diospyros virginiana	Common Persimmon	Tree	6	6	3	3	4	4	3	3					10	10				
Fraxinus pennsylvanica	Green Ash	Tree																		
Nyssa aquatica	Water Tupelo	Tree											2	2						
Nyssa biflora	Swamp Blackgum	Tree									9	9	10	10			12	12		
Platanus occidentalis	American Sycamore	Tree																		
Quercus laurifolia	Laurel Oak	Tree									3	3	1	1						
Quercus lyrata	Overcup Oak	Tree	2	2	1	1	5	5	2	2					4	4				
Quercus michauxii	Swamp Chesnut Oak	Tree	1	1	3	3	1	1	2	2					3	3				
Plot area (acres)			0.02		0.02		0.02		0.02		0.02		0.02		0.02		0.02			
Species count			4	4	4	4	3	3	4	4	2	2	3	3	3	3	1	1		
Stem Count			**10**	**10**	**8**	**8**	**10**	**10**	**12**	**12**	**12**	**12**	**13**	**13**	**17**	**17**	**12**	**12**		
Stems per Acre			405	405	324	324	405	405	486	486	486	486	526	526	688	688	486	486		
Scientific Name	**Common Name**	**Type**	**Plot 9**		**Plot 10**		**Plot 11**		**Plot 12**		**Plot 13**		**Plot 14**		**Plot 15**		**Plot 16**		**Current Mean**	
			P	**T**	**P**	**T**	**P**	**T**	**P**	**T**	**P**	**T**	**P**	**T**	**P**	**T**	**P**	**T**	**P**	**T**
Betula nigra	River Birch	Tree					2	2	3	3			9	9			9	9	5.8	5.8
Carpinus caroliniana	Ironwood	Tree	3	3							5	5			2	2			2.8	2.8
Diospyros virginiana	Common Persimmon	Tree	4	4							1	1			5	5			4.5	4.5
Fraxinus pennsylvanica	Green Ash	Tree							6	6									6.0	6.0
Nyssa aquatica	Water Tupelo	Tree																	2.0	2.0
Nyssa biflora	Swamp Blackgum	Tree			10	10													10.3	10.3
Platanus occidentalis	American Sycamore	Tree					4	4	2	2			1	1			4	4	2.8	2.8
Quercus laurifolia	Laurel Oak	Tree																	2.0	2.0
Quercus lyrata	Overcup Oak	Tree	1	1											2	2			2.4	2.4
Quercus michauxii	Swamp Chesnut Oak	Tree	2	2							7	7			5	5			3.0	3.0
Plot area (acres)			0.02		0.02		0.02		0.02		0.02		0.02		0.02		0.02			
Species count			4	4	1	1	2	2	3	3	3	3	2	2	4	4	2	2	2.8	2.8
Stem Count			**10**	**10**	**10**	**10**	**6**	**6**	**11**	**11**	**13**	**13**	**10**	**10**	**14**	**14**	**13**	**13**	**11.3**	**11.3**
Stems per Acre			405	405	405	405	243	243	445	445	526	526	405	405	567	567	526	526	458	458

Type = Tree, Shrub, Livestake
P = Planted
T = Total

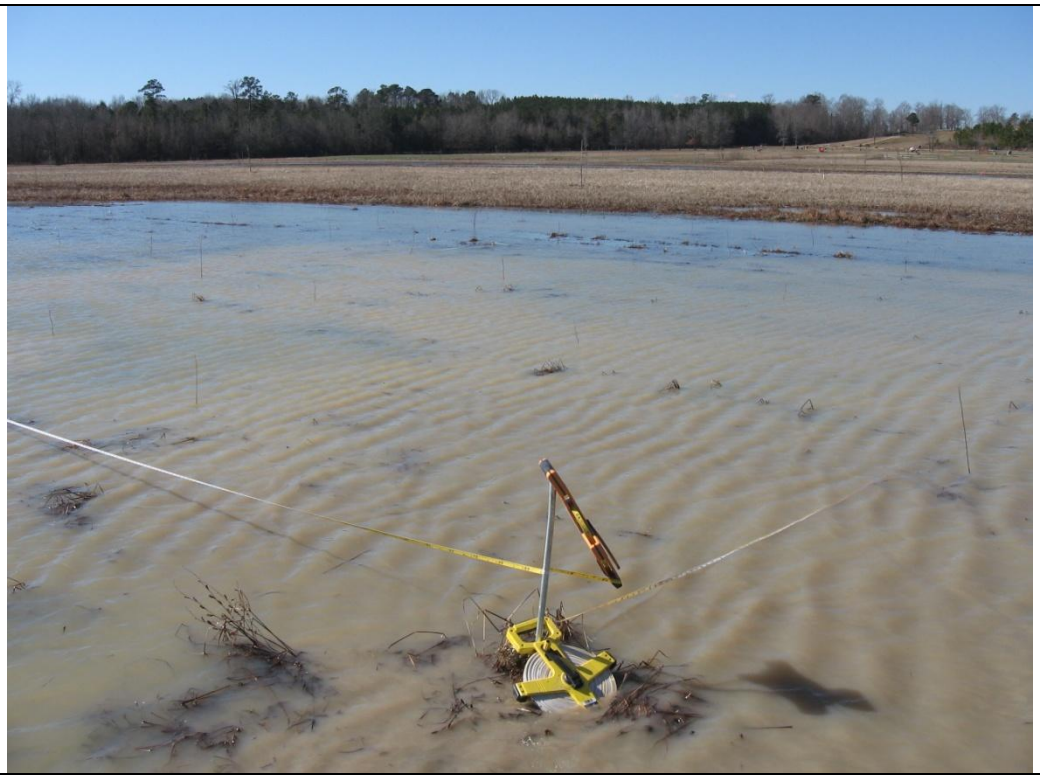
VQ1 from NE corner of plot (2/8/2011)

VQ2 from NE corner of plot (2/8/2011)



VQ3 from NE corner of plot (2/8/2011)

VQ4 from NE corner of plot (2/8/2011)



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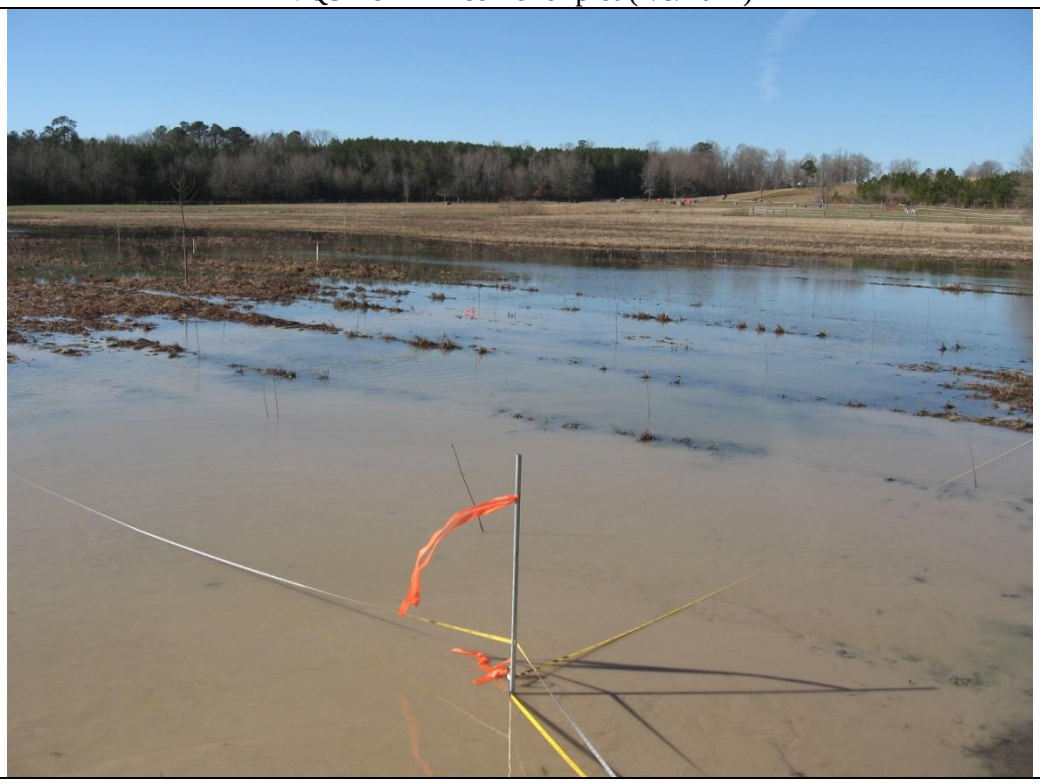
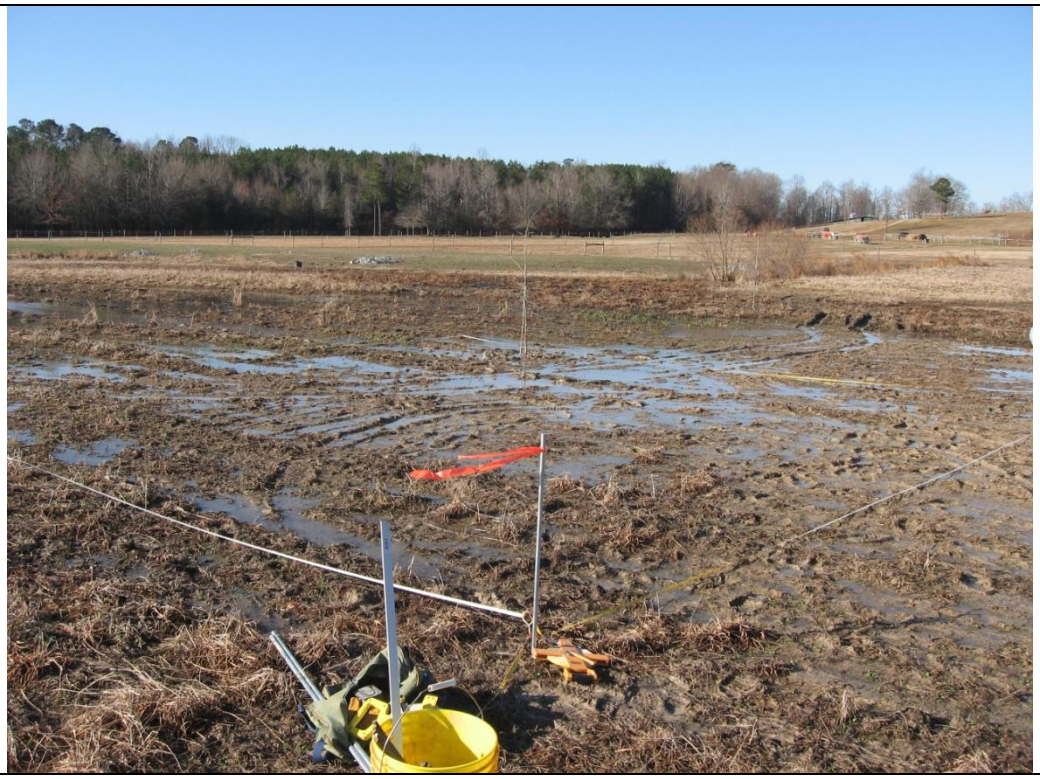
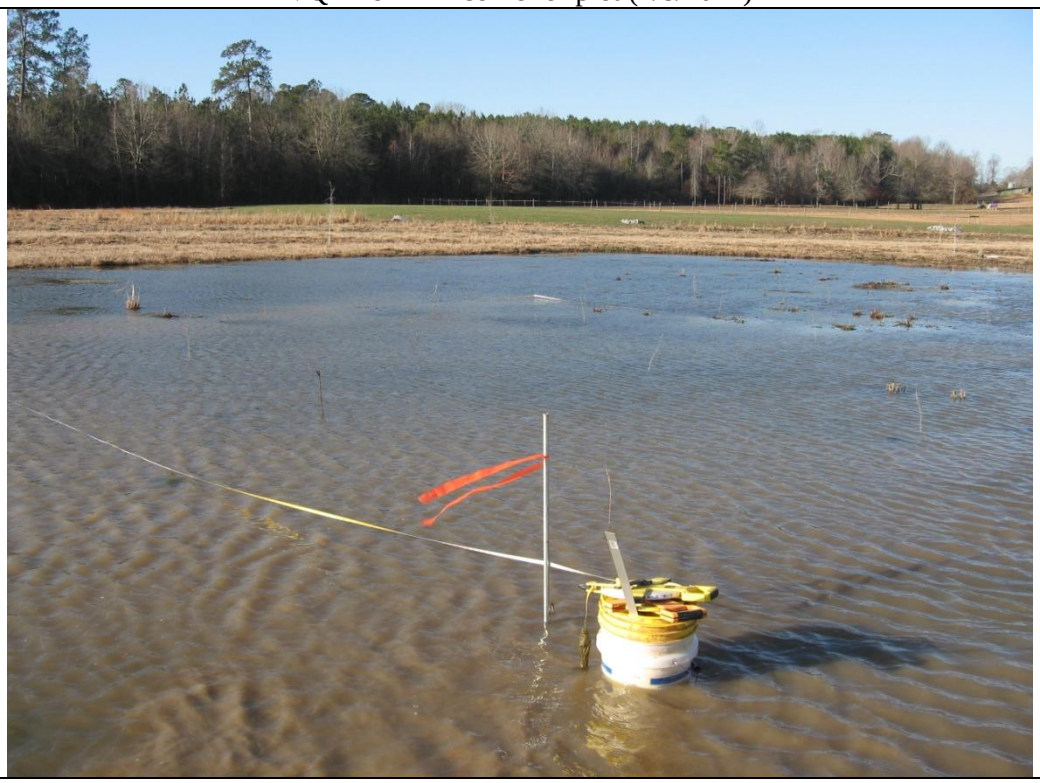


VQ6 from NE corner of plot (2/8/2011)



VQ7 from NE corner of plot (2/8/2011)

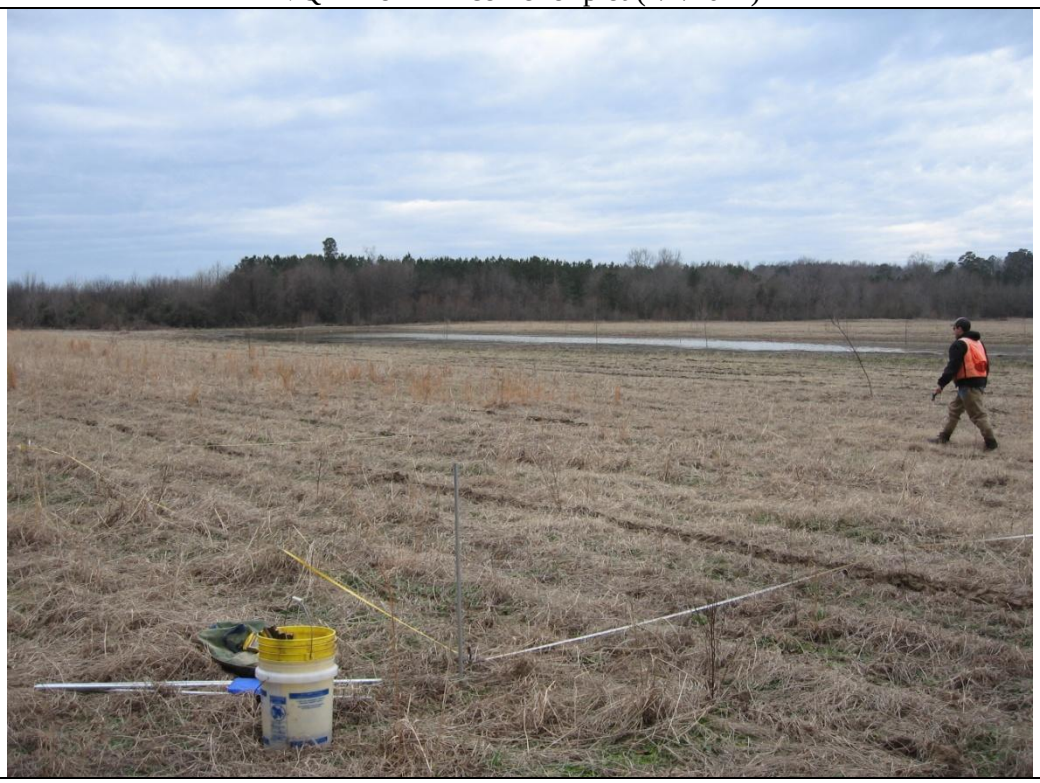


VQ8 from NE corner of plot (2/8/2011)

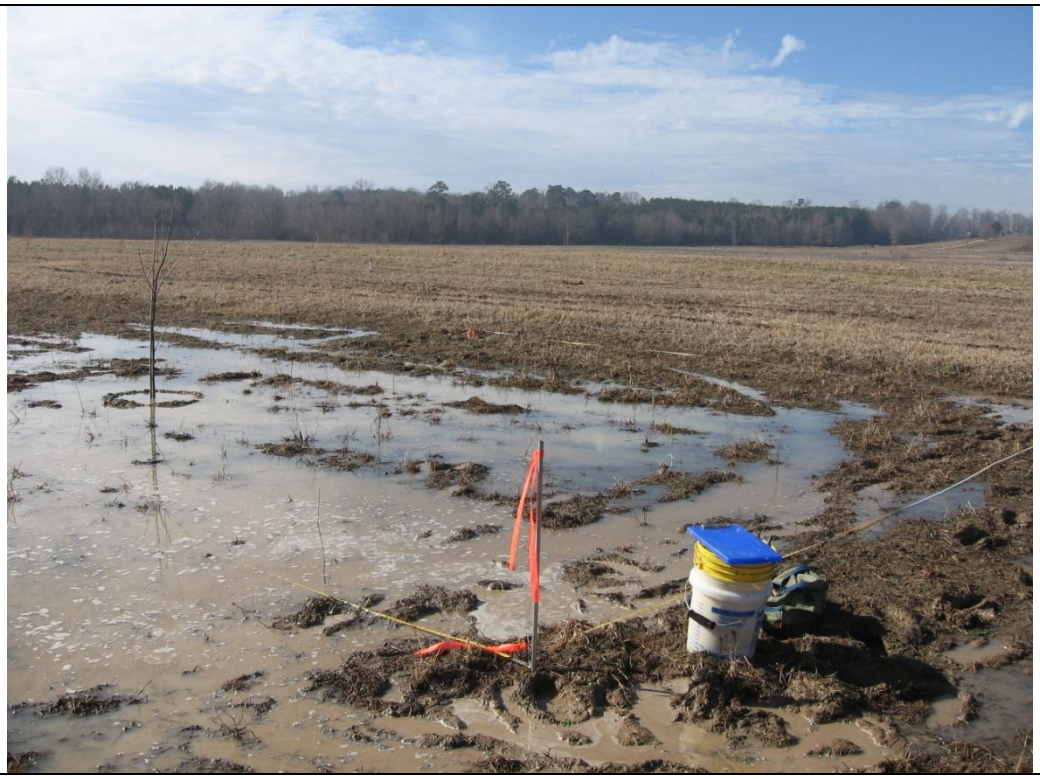
VQ9 from NE corner of plot (2/7/2011)

VQ10 from NE corner of plot (2/7/2011)

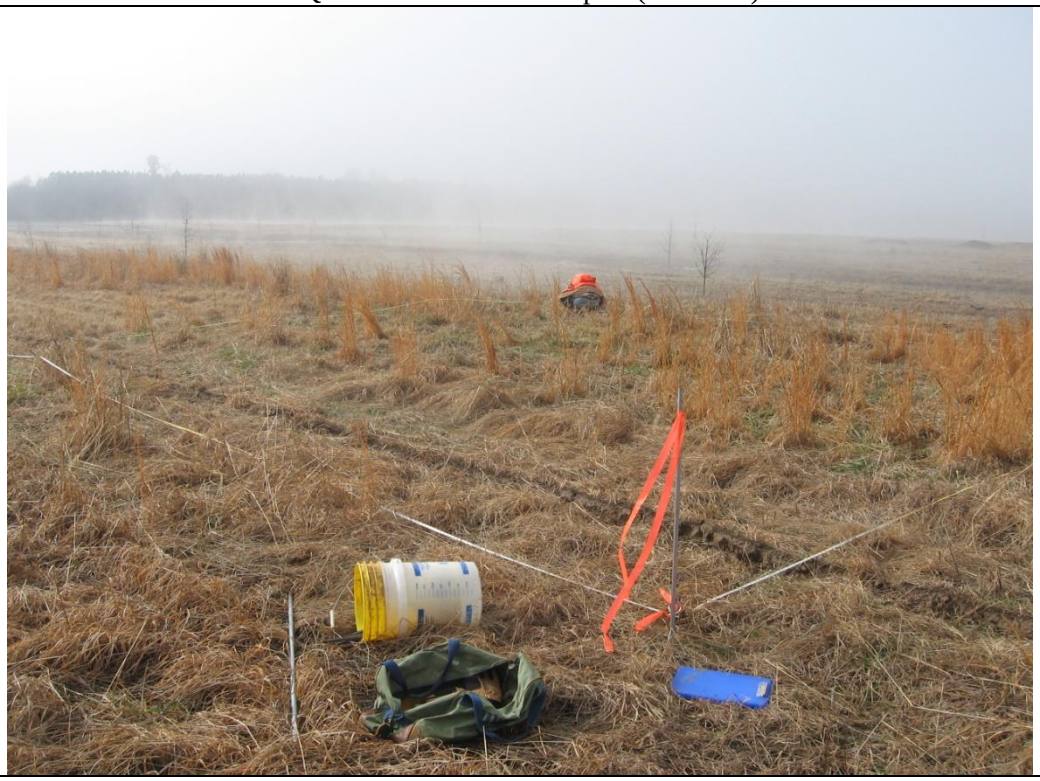
VQ11 from NE corner of plot (2/7/2011)



VQ12 from NE corner of plot (2/7/2011)

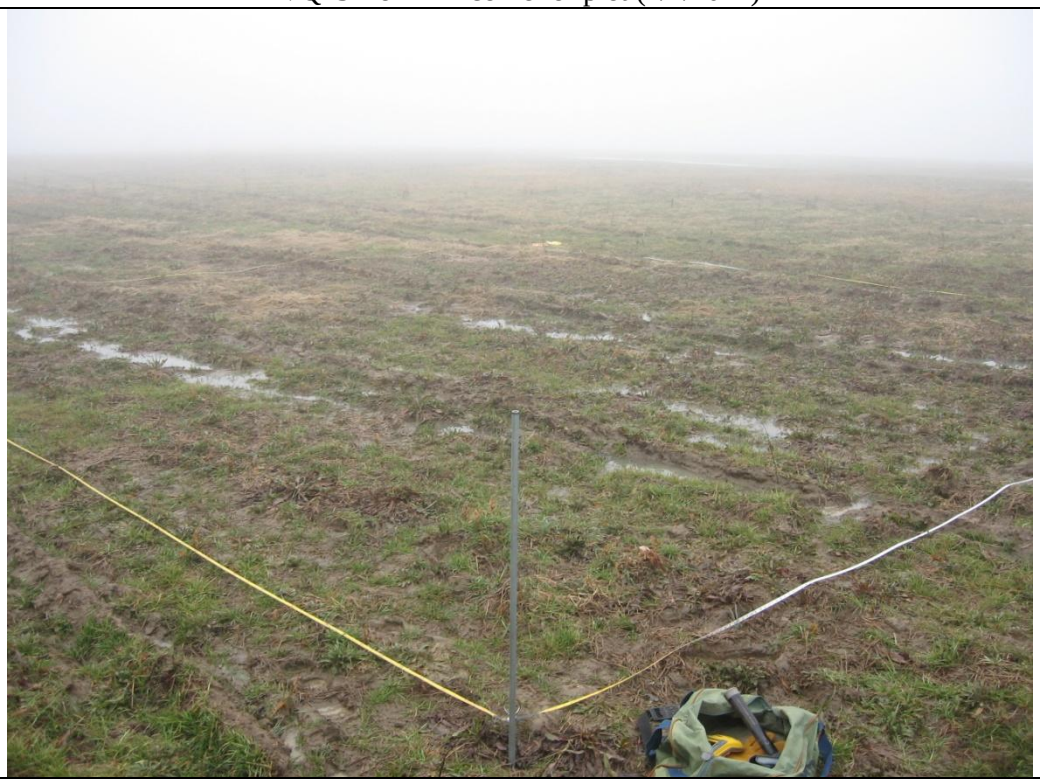


VQ13 from NE corner of plot (2/7/2011)



VQ14 from NE corner of plot (2/7/2011)

VQ15 from NE corner of plot (2/7/2011)



VQ16 from NE corner of plot (2/7/2011)

APPENDIX D

As-Built Plan Sheets