

**Buffalo Flats Restoration Site
Monitoring Report MY04
DMS Project # 94647
DMS Contract # 003273**



Submitted to:

NCDMS, 1652 Mail Service Center, Raleigh, NC 27699-1652

Construction Completed: October 2011

Data Collection: July 2015

Submitted: December 2015

Monitoring and Design Firm



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1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

The Buffalo Flats Restoration Site (BFRS) is a full-delivery project that was developed for the North Carolina Division of Mitigation Services (DMS). Construction was completed in October 2011. The site is within the 03040105 Watershed Cataloging Unit (8-digit HUC) and the Local Watershed Unit (14-digit HUC) 03040105020050. In DMS's most recent publication of excluded and Targeted Local Watersheds/Hydrologic Units, this 14-digit HUC has been identified as a Targeted Local Watershed.

The project goals and objectives are listed below.

Project Goals

- Create diverse bottomland hardwood and low elevation seep communities that are integrated into the Dutch Buffalo Creek Corridor.
- Buffer nutrient and sediment impacts to Dutch Buffalo Creek from adjacent grazing practices.

Project Objectives

- Fill field ditches and ponds to slow the removal of hydrology from the site.
- Redevelop wetland microtopography to capture surface hydrology and slow subsurface drainage.
- Plant the mitigation area with species native to bottomland riparian forest and low elevation seep communities.
- Install livestock exclusion fencing.

The project site, which is protected by a 20.2-acre permanent conservation easement held by the State of North Carolina, is situated in Cabarrus County in the Southern Outer Piedmont ecoregion of the Piedmont physiographic province. The site is located on a single parcel located off of Gold Hill Road approximately six miles northeast of Concord, North Carolina.

An additional 2.6 acre permanent conservation easement located adjacent and contiguous with the project site is held by KCI Technologies and contains 1.6 acres of restored riparian wetlands. This site is monitored as an additional, non-creditable component of the site that is available to make up for any portions of the BFRS that do not achieve the target success criteria.

The BFRS provided mitigation for wetland impacts within Hydrologic Unit 03040105 by restoring, preserving, and creating 20.2 acres of wetland, generating 11.6 riparian wetland mitigation units (WMU's) and 3.4 non-riparian WMU's.

The BFRS will be monitored to determine if the project is on-track to meeting jurisdictional wetland status. In the restoration areas, the wetland site will be deemed successful once hydrology is established and vegetation success criteria are met. In the creation area, success will be achieved if wetland hydrology and vegetation are present along with indicators of hydric soils.

1.1 Vegetation Success Criteria

The wetland mitigation is comprised of four areas that combine preservation, creation, and restoration. The site will be monitored for at least seven years or until the success criteria are achieved. The success criteria for the planted species in mitigation areas will be based on density measured from monitoring plots. The site will demonstrate the re-establishment of targeted vegetative communities based on survival of planted species and volunteer colonization, with an average stem density of 320 stems/acre after three years, 288 stems/acre after four years, 260 stems/acre after five years, and 210 stems/acre after 7 years. To determine the success of the planted mitigation area, thirteen permanent vegetation monitoring plots

(10 by 10 meters) have been established in the wetland restoration and creation areas at a density that statistically represents the total mitigation acreage. Three of these plots are located in Wetland Area 1, nine of these plots are located in Wetland Area 2, and one plot is located in Wetland Area 3. The average density of these plots will determine whether the site meets the success criterion. Non-target species must not constitute more than 20% of the woody vegetation based on permanent monitoring plots.

The fourth-year vegetation monitoring was based on the Level 2 CVS-EEP vegetation monitoring protocol. The site's average density for this monitoring period was 588 planted stems/acre. Eleven of the thirteen plots had greater than 288 planted stems/acre. Including volunteers, the site averaged 2,490 total stems/acre. The site received supplemental planting in January 2013. During the second-year vegetation monitoring, some of the supplemental planted species may have been recorded as volunteers. During the 2014 monitoring season, KCI mapped the location of these species and recorded them as planted stems. Additionally an extra vegetation monitoring plot was installed in an adjacent restored wetland, which is described in Section 1.2. This vegetation plot was found to have a planted and total stem density of 1,052 total stems/acre.

1.2 Hydrology Success Criteria

Due to the inherent variability in the site's features and its geomorphic position, it is unlikely that the project will homogeneously exhibit common hydrologic conditions across the site, making a single hydrologic performance criterion unrepresentative of the sites performance. As such, the gauge data will be evaluated as a spatial average with each gauge representing the area half the distance to adjacent gauges or wetland type boundaries. The spatial average by wetland type will be the calculated value for comparison with the performance standard for credit validation. Gauges not achieving a minimum of 5% saturation will be considered non-attaining even if the spatial average exceeds the credit validation performance standard (5% for non-riparian and 10% for riparian).

The water table of the restored wetlands must be within 12" of the soils surface continuously for at least 5% (12 days) in the non-riparian wetland area (3.4 acres) and 10% (25 days) in the riparian wetland area (11.6 acres), (50% probability of reoccurrence) of the growing season during normal weather conditions. A "normal" year is based on NRCS climatological data for Cabarrus County, and using the 30th to 70th percentile thresholds as the range of normal, as documented in the USACE Technical Report "Assessing and Using Meteorological Data to Evaluate Wetland Hydrology" (Sprecher, 2000).

The growing season for Cabarrus County extends from March 23 to November 11 for a total of 233 days (NRCS 1995). An automatic recording gauge was installed on the site on May 23, 2013 to record the soil temperature at 30 cm below the ground surface. If these data demonstrate the soil temperature is above biological zero (43°F) beyond the 233 day range, it can be used to document the extended growing season (Skaggs, 2012). In the interest of being conservative, this data was used to define the beginning of the growing season and the Cabarrus County Soil Survey was used to define the end of it. For 2015 this resulted in a growing season of 234 days, beginning on March 23 and ending on November 11.

The daily rainfall data was obtained from a local weather station in Kannapolis, NC; provided by the NC State Climate Office. For the 2015-year, November experienced above average rainfall, while February, April, July, August, September, and October experienced average rainfall. The months of January, March, May, and June recorded below average rainfall for the site. Overall, the area experienced average rainfall during the 2015 growing season.

In addition to the wetlands that have been monitored at this site so far, there is also a small 1.2 acre riparian wetland that is contiguous to and was restored at the same time as this site. This additional wetland area is within an adjacent 2.6 acre conservation easement held by KCI Technologies, but is not included in the creditable assets for this site. One additional wetland gauge was installed in this restored riparian wetland on March 20, 2014. This wetland will be monitored as an additional component of the site that is not creditable, but is considered an ancillary benefit/feature of the site. During the site's fourth growing season, all eight wells in the riparian areas met the success criterion of having saturated soil conditions occurring within 12 inches of the ground surface for a minimum continuous period of 10% (23 days) of the growing season during average climatic conditions. All three wells in the non-riparian areas met the success criterion of 5% (12 days) of the growing season. Additionally, the extra well met the hydrology success criteria with 46 consecutive days of saturated soil conditions. Overall, wetland hydrology was achieved at all eleven groundwater monitoring gauges in the riparian and non-riparian restoration areas.

1.3 Soil Success Criteria

Beginning in Monitoring Year 2, soils were monitored within the 1.2 acre wetland creation area on site. Two permanent monitoring plots were established adjacent to Well 6 and Well 7 and soil profiles will be monitored yearly for evidence of the development of redoximorphic features by a licensed soil scientist. Soil profiles will be compared from year to year and changes will be documented in the yearly monitoring reports. Although several studies exist in the scientific literature that investigate temporal changes in soils resulting from wetland creation projects, there are no studies that suggest that jurisdictional hydric soils will develop under the appropriate hydrology conditions within the seven-year monitoring period. As such, KCI will monitor the soils for changes in chroma, organic matter content and document other indications that the soil is subject to low oxygen conditions. These indicators would include oxidized root channels, concretions, mottles and other observations that suggest the soil is subject to low oxygen conditions etc.

A detailed soils profile description was conducted at two permanent monitoring plots by a licensed soil scientist (# 187) on June 1, 2015. Both soil plots met the hydric soil criteria with an indicator of depleted matrix (F3) and redox depressions (F8). The upper 12 inches of both soil plots also had positive reactions to alpha, alpha-dipyridyl, providing further evidence that the soil is hydric. Additionally, evidence that the seasonal high water table has continued to develop more fully can be seen in the increased mottling present in the soil this year. No mottles were reported within either soil profile during MY-02, and during the MY-03, mottles ranging from 5 – 10% of their respective soil horizons were reported within the upper 12 inches of the soil. This year, mottling accounted for 10 – 30% of the upper 12 inches in each soil plot. This indicates the continuation of anaerobic conditions in the soil caused by surface saturation from precipitation, overbank flooding and inundation and is maintained due to the very slow permeability of the compacted, angular structured subsurface horizons. See Appendix E for both soil profile descriptions.

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report and in the Mitigation Plan documents available on the DMS website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

2.0 METHODOLOGY

The CVS-EEP protocol, Level 2 (<http://cvs.bio.unc.edu/methods.htm>) was used to collect vegetation data from the site. The vegetation monitoring was completed on July 8, 2015.

3.0 REFERENCES

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation, Version 4.0 (<http://cvs.bio.unc.edu/methods.htm>)

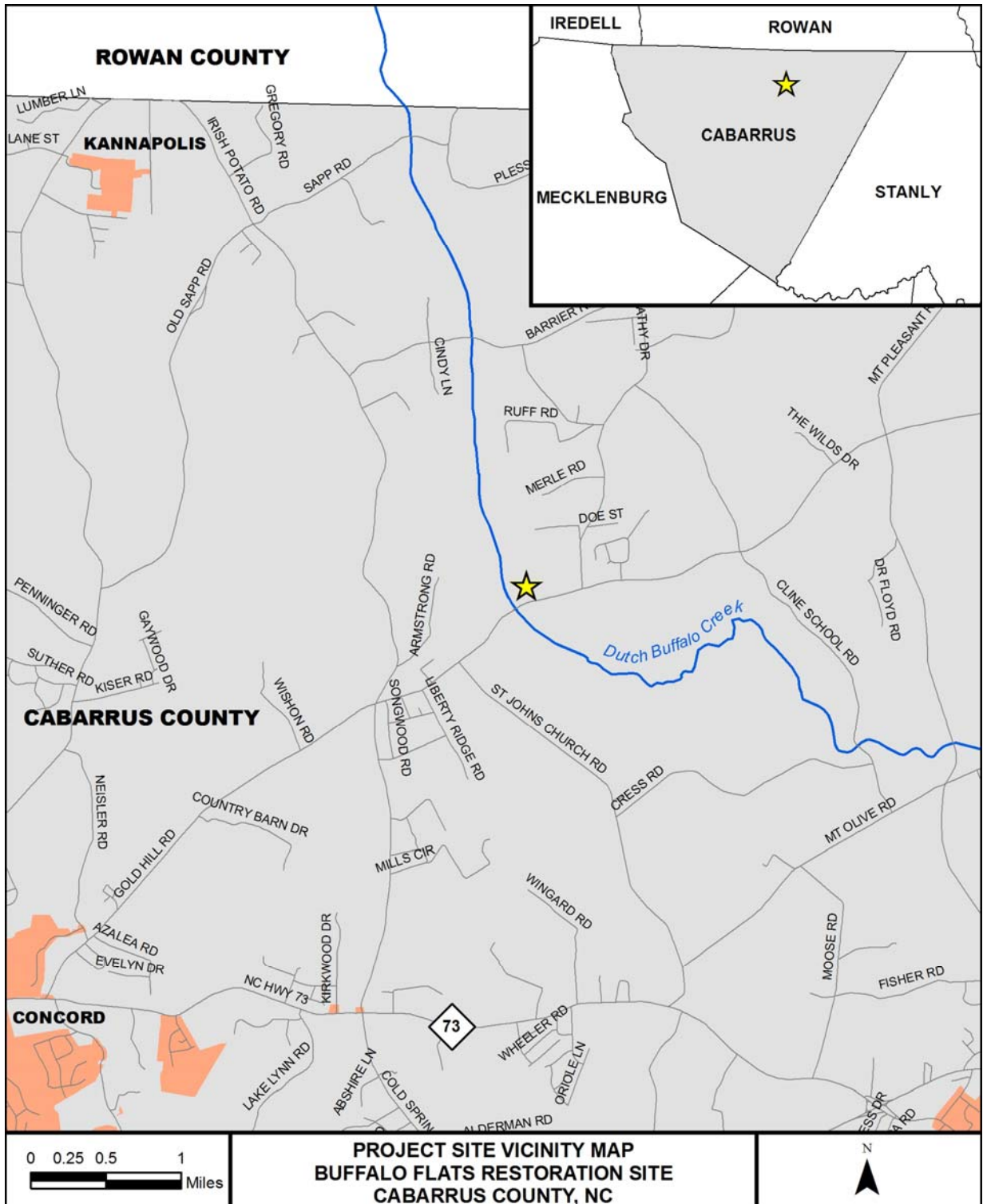
USACE. 2003. Stream Mitigation Guidelines. USACE, NCDENR-DWQ, USEPA, NCWRC.

Skaggs, R. Wayne. 2012. Effect of Growing Season on the Criterion for Wetland Hydrology. Society of Wetland Scientists. Wetlands 32:1135–1147

Sprecher, S. W. and Warne, A. G. 2000. "Accessing and Using Meteorological Data to Evaluate Wetland Hydrology," ERDC/EL TR-WRAP-00-01, U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Appendix A

Project Vicinity Map and Background Tables



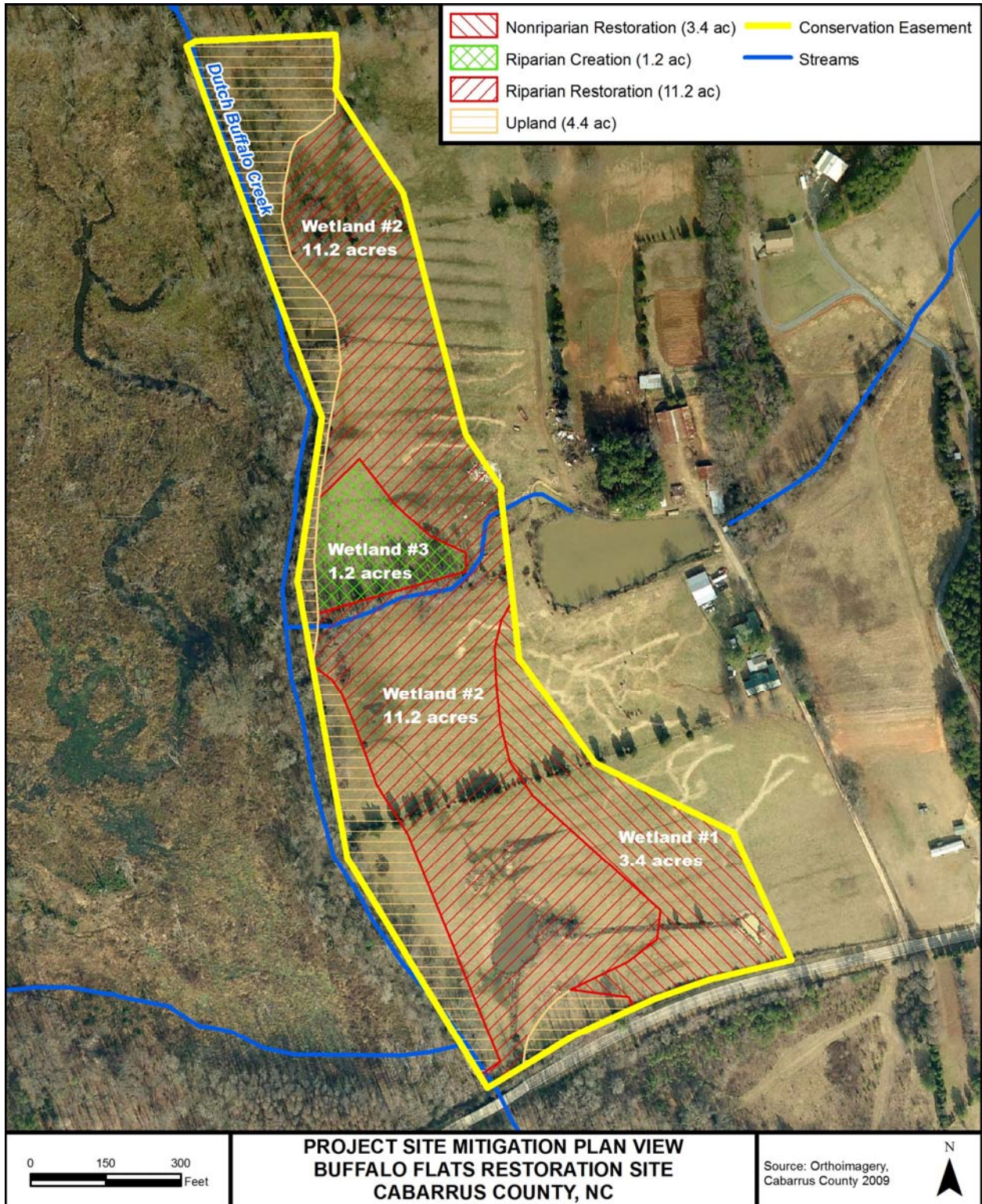


Table 1. Project Components									
Project Number and Name: 94647 - Buffalo Flats Restoration Site									
Mitigation Credits									
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Acres	-	-	11.2	1.2	3.4	-			
Credits	-	-	11.2	0.4	3.4	-	-	-	-
TOTAL CREDITS			11.6		3.4				
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
Wetland Area 1	Southeastern corner of project		3.4 acres		-		Restoration	3.4 acres	1:1
Wetland Area 2	North to south throughout the center of project		11.2 acres		-		Restoration	11.2 acres	1:1
Wetland Area 3	West-central portion of the project		1.2 acres		-		Creation	1.2 acres	3:1
Component Summation									
Restoration Level	Stream (linear feet)		Riparian Wetland (acres)		Non-riparian Wetland (acres)		Buffer (square feet)	Upland (acres)	
			Riverine	Non-Riverine					
Restoration	-		11.2 acres	-	3.4 acres		-	-	
Enhancement			-	-			-	-	
Enhancement I	-								
Enhancement II	-								
Creation			1.2 acres	-	-			-	
Preservation	-		-	-	-			4.4 acres	
High Quality Preservation	-		-	-	-			-	
TOTAL			12.4 acres	-	3.4 acres			4.4 acres	

Table 2. Project Activity & Reporting History		
Project Number and Name: 94647 - Buffalo Flats Restoration Site		
Elapsed Time Since Grading Complete: 4 yr 2 months		
Elapsed Time Since Planting Complete: 3 yr 9 months		
Number of Reporting Years: 4		
Activity or Report	Data Collection Complete	Actual Completion or Delivery
Mitigation Plan		Dec 10
Final Design - Construction Plans		Dec 10
Construction		Oct 11
Planting		Feb 12
Baseline Monitoring/Report	Feb/March 12	July 12
Year 1 Monitoring	Oct 12	Dec 12
Supplemental Planting		Jan 13
Soil temperature gauge installed		May 13
Invasive Species Maintenance		Aug13
Year 2 Monitoring	Oct 13	Dec 13
Year 3 Monitoring	June 14	Nov 14
Year 4 Monitoring	July 15	Dec 15

Table 3. Project Contacts Project Number and Name: 94647 - Buffalo Flats Restoration Site	
Design Firm	KCI Associates of North Carolina, PA Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 278-2512 Fax: (919) 783-9266
Construction Contractor	KCI Environmental Technologies and Construction, Inc. Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 278-2512 Fax: (919) 783-9266
Planting Contractor	Bruton Nurseries and Landscapes PO Box 1197 Freemont, NC 27830 Contact: Mr. Charlie Bruton Phone: (919) 242-6555
Monitoring Performers	
MY00-MY04	KCI Associates of North Carolina, PA Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

Table 4. Project Attribute Table
Project Number and Name: 94647 – Buffalo Flats Restoration Site

County	Cabarrus County		
Project Area (acres)	20.20 acres		
Project Coordinates (lat. and long.)	35.456988 N , -80.496325 W		
Project Watershed Summary Information			
Physiographic Province	Piedmont		
River Basin	Yadkin-Pee Dee		
USGS Hydrologic Unit 8-digit	03040105	USGS Hydrologic Unit 14-digit	03040105020050
DWQ Sub-basin	03-07-12		
Project Drainage Area (acres)	106 acres		
Project Drainage Area Percentage of Impervious Area	1%		
CGIA Land Use Classification	3.6% Cultivated, 54.1% Managed Herbaceous Cover, 32.5% Mixed Upland Hardwoods, 5.2% Southern Yellow Pine, and 4.6% Water Bodies		
Wetland Summary Information			
Parameters	Wetland Area 1	Wetland Area 2	Wetland Area 3
Size of Wetland (acres)	3.4 acres	11.2 acres	1.2 acres
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Non-riparian	Riparian non-riverine	Riparian non-riverine
Mapped Soil Series	Chewacla (Wehadkee and Armenia by detailed soil investigation)	Chewacla (Wehadkee and Armenia by detailed soil investigation)	Chewacla
Drainage class	Poorly drained	Poorly drained	Somewhat poorly drained
Soil Hydric Status	Drained Hydric	Drained Hydric	Non hydric
Source of Hydrology	Hillside seepage	Surface/Overbank Flow	Surface/Overbank Flow
Hydrologic Impairment	Ditching and Pasture	Ditching and Pasture	Ditching and Pasture
Native vegetation community	Pasture	Pasture	Pasture

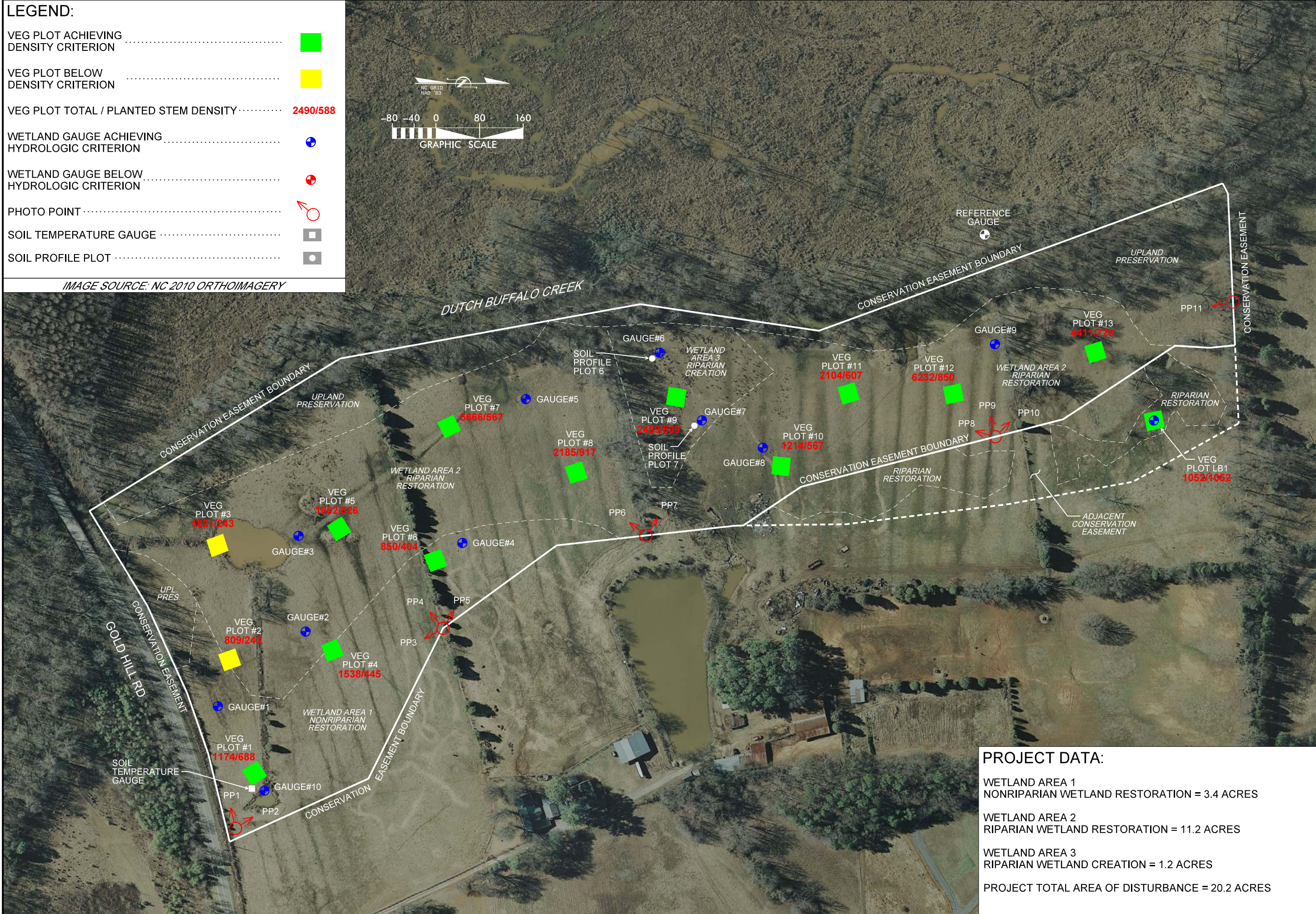
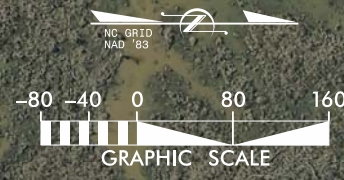
Appendix B

Visual Assessment Data

LEGEND:

- VEG PLOT ACHIEVING DENSITY CRITERION ■
- VEG PLOT BELOW DENSITY CRITERION ■
- VEG PLOT TOTAL / PLANTED STEM DENSITY 2490/588
- WETLAND GAUGE ACHIEVING HYDROLOGIC CRITERION ⊕
- WETLAND GAUGE BELOW HYDROLOGIC CRITERION ⊕
- PHOTO POINT ♂
- SOIL TEMPERATURE GAUGE ■
- SOIL PROFILE PLOT ●

IMAGE SOURCE: NC 2010 ORTHOIMAGERY



PROJECT DATA:

WETLAND AREA 1
NONRIPARIAN WETLAND RESTORATION = 3.4 ACRES

WETLAND AREA 2
RIPARIAN WETLAND RESTORATION = 11.2 ACRES

WETLAND AREA 3
RIPARIAN WETLAND CREATION = 1.2 ACRES

PROJECT TOTAL AREA OF DISTURBANCE = 20.2 ACRES

REV	DATE	APPROVED

NCDEQ DIVISION OF
MITIGATION SERVICES

KCI
ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS

4801 SIX FORKS ROAD
RALEIGH, NORTH CAROLINA 27609

BUFFALO FLATS
RESTORATION SITE
EEP PROJECT #94647
CABARRUS COUNTY, NORTH CAROLINA
MONITORING YEAR 04

DATE: DEC 2015
SCALE: 1" = 160'
CURRENT CONDITION PLAN VIEW
SHEET 1 OF 1

Table 5. Vegetation Condition Assessment						
Project Number and Name: 94647 – Buffalo Flats Restoration Site						
Planted Acreage 15.8			Easement Acreage 20.2			
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Not Depicted, Covers Most of Restoration Area	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	0	0.00	0.0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

Photo Point Photos



Photo Point 1: View looking west, from the southeastern corner of the project site. 3/1/2012– Baseline



Photo Point 1: View looking west, from the southeastern corner of the project site. 7/6/2015 - MY04



Photo Point 2: View looking north, from the southeastern corner of the project site. 3/1/2012– Baseline



Photo Point 2: View looking north, from the southeastern corner of the project site. 7/6/2015 - MY04



Photo Point 3: View looking south, from the eastern easement boundary. 3/1/2012– Baseline



Photo Point 3: View looking south, from the eastern easement boundary. 7/6/2015 - MY04



Photo Point 4: View looking west, from the eastern easement boundary. 3/1/2012– Baseline



Photo Point 4: View looking west, from the eastern easement boundary. 7/6/2015 - MY04



Photo Point 5: View looking north, from the eastern easement boundary. 3/1/2012– Baseline



Photo Point 5: View looking north, from the eastern easement boundary. 7/6/2015 - MY04



Photo Point 6: View looking southwest, from the eastern easement boundary. 3/1/2012– Baseline



Photo Point 6: View looking southwest, from the eastern easement boundary. 7/6/2015 - MY04



Photo Point 7: View looking northwest, from the eastern easement boundary. 3/1/2012– Baseline



Photo Point 7: View looking northwest, from the eastern easement boundary. 7/6/2015 - MY04



Photo Point 8: View looking southwest, from the eastern easement boundary. 3/1/2012– Baseline



Photo Point 8: View looking southwest, from the eastern easement boundary. 7/6/2015 - MY04



Photo Point 9: View looking west, from the eastern easement boundary. 3/1/2012– Baseline



Photo Point 9: View looking west, from the eastern easement boundary. 7/6/2015 - MY04



Photo Point 10: View looking north, from the eastern easement boundary. 3/1/2012– Baseline



Photo Point 10: View looking north, from the eastern easement boundary. 7/6/2015 - MY04



Photo Point 11: View looking south, from the north eastern corner of the project site. 3/1/2012– Baseline



Photo Point 11: View looking south, from the north eastern corner of the project site. 7/6/2015 - MY04

Vegetation Plot Photos



Vegetation Plot 1: 7/6/2015 - MY04



Vegetation Plot 2: 7/6/2015 - MY04



Vegetation Plot 3: 7/6/2015 - MY04



Vegetation Plot 4: 7/6/2015 - MY04



Vegetation Plot 5: 7/6/2015 - MY04



Vegetation Plot 6: 7/6/2015 - MY04



Vegetation Plot 7: 7/6/2015 - MY04



Vegetation Plot 8: 7/6/2015 - MY04



Vegetation Plot 9: 7/6/2015 - MY04



Vegetation Plot 10: 7/6/2015 - MY04



Vegetation Plot 11: 7/8/2015 - MY04



Vegetation Plot 12: 7/8/2015 - MY04



Vegetation Plot 13: 7/8/2015 - MY04

Appendix C

Vegetation Plot Data

Table 6. Vegetation Plot Criteria Attainment**Project Number and Name: 94647 - Buffalo Flats Restoration Site**

Vegetation Plot ID	Vegetation Survival Threshold Met? (288 planted stems/acre)	Monitoring Year 04 Planted Stem Density (stems/acre)	Monitoring Year 04 Total Stem Density (stems/acre)
1	Yes	688	1174
2	No	243	809
3	No	243	1,821
4	Yes	445	1,538
5	Yes	526	1,902
6	Yes	405	850
7	Yes	567	5,666
8	Yes	971	2,185
9	Yes	809	2,469
10	Yes	567	1,214
11	Yes	607	2,104
12	Yes	850	6,232
13	Yes	728	4,411

Table 7. CVS Vegetation Plot Metadata	
Project Number and Name: 94647 - Buffalo Flats Restoration Site	
Report Prepared By	Bethany Williams
Date Prepared	7/29/2015 13:45
database name	KCI-2014-B.mdb
database location	M:\2010\20100798_Buffalo_Flats\Vegetation
computer name	12-3ZV4FP1
file size	61476864
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY-----	
Project Code	94647
project Name	Buffalo Flats Restoration Site
Description	Wetland Restoration Site
River Basin	Yadkin River Basin
Sampled Plots	13

Table 8. CVS Stem Count Total and Planted by Plot and Species																										
Project Number and Name: 94647 - Buffalo Flats Restoration Site																										
		Current Plot Data (MY4-2015)																								
Scientific Name	Common Name	Species Type	E94647-EEP-0001			E94647-EEP-0002			E94647-EEP-0003			E94647-EEP-0004			E94647-EEP-0005			E94647-EEP-0006			E94647-EEP-0007			E94647-EEP-0008		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree			2					1			2			13						8			1	
Acer rubrum	red maple	Tree								1			4			3			3			80				
Baccharis halimifolia	eastern baccharis	Shrub											2									1				
Betula nigra	river birch	Tree				1	1	1	1	1	1								1	1	1	2	2	2		
Diospyros virginiana	common persimmon	Tree													1											
Fraxinus pennsylvanica	green ash	Tree				3	3	3			31		5		7		3	1	1	2					7	
Juniperus virginiana	eastern redcedar	Tree													1											
Liquidambar styraciflua	sweetgum	Tree			6						2		10		7							23			21	
Liriodendron tulipifera	tuliptree	Tree																2	2	2						
Nyssa aquatica	water tupelo	Tree												2	2	2										
Pinus taeda	loblolly pine	Tree			2																					
Platanus occidentalis	American sycamore	Tree	2	2	2				1	1	5		4	1	1	1	2	2	7	1	1	12				
Populus deltoides	eastern cottonwood	Tree						4																		
Quercus	oak	Tree																								
Quercus laurifolia	laurel oak	Tree	4	4	4							1	1	1			1	1	1	2	2	2				
Quercus lyrata	overcup oak	Tree																								
Quercus michauxii	swamp chestnut oak	Tree	2	2	2				2	2	2						2	2	2	2	2	2	5	5	5	
Quercus pagoda	cherrybark oak	Tree	5	5	5	1	1	1	1	1	1				4	4	4	4	4	4	2	2	2	7	7	8
Quercus palustris	pin oak	Tree	4	4	5									2	2	2							1	1	1	
Quercus phellos	willow oak	Tree			1	1	1	1	1	1	1	8	8	8	6	6	6	1	1	1	3	3	5	9	9	9
Salix nigra	black willow	Tree						10																		
Ulmus americana	American elm	Tree														2										
Unknown		Shrub or Tree																								
Stem count			17	17	29	6	6	20	6	6	45	11	11	38	13	13	47	10	10	21	14	14	140	24	24	54
size (ares)			1			1			1			1			1			1			1			1		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
Species count			5	5	9	4	4	6	5	5	9	3	3	9	4	4	11	5	5	7	8	8	12	5	5	8
Stems per ACRE			688	688	1174	243	243	809	243	243	1821	445	445	1538	526	526	1902	405	405	850	567	567	5666	971	971	2185

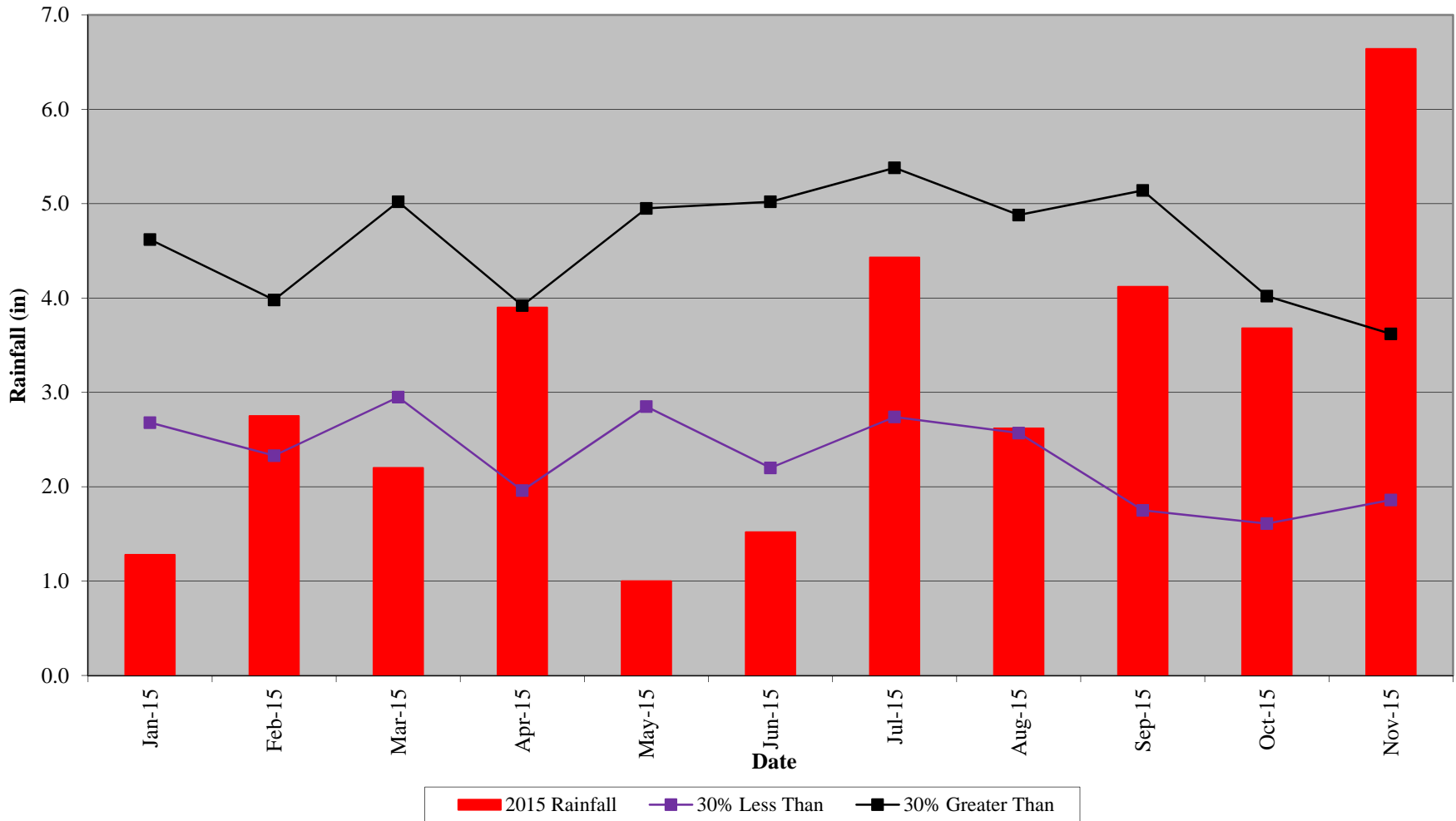
Table 8. CVS Stem Count Total and Planted by Plot and Species Cont.
Project Number and Name: 94647 - Buffalo Flats Restoration Site

			Current Plot Data (MY3-2014)															Annual Means														
Scientific Name	Common Name	Species Type	E94647-EEP-0009			E94647-EEP-0010			E94647-EEP-0011			E94647-EEP-0012			E94647-EEP-0013			MY4 (2015)			MY3 (2014)			MY2 (2013)			MY1 (2012)			MY0 (2012)		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree									6			10			3			46			61			41			16			
Acer rubrum	red maple	Tree			8			9			5			3			5			121			101			53			5			
Baccharis halimifolia	eastern baccharis	Shrub									1			5						9			3									
Betula nigra	river birch	Tree	3	3	3	2	2	2	3	3	3	4	4	4	1	1	1	18	18	18	22	22	22	25	25	25	27	27	27	47	47	47
Diospyros virginiana	common persimmon	Tree			1			1						2			7			12			5			5			4			
Fraxinus pennsylvanica	green ash	Tree	3	3	27			2			11	4	4	64	6	6	73	17	17	235	17	17	118			30			14			
Juniperus virginiana	eastern redcedar	Tree												6			2			9			4									
Liquidambar styraciflua	sweetgum	Tree			2			2			3			3						79			35			25			7			
Liriodendron tulipifera	tuliptree	Tree				1	1	1	1	1	2							4	4	5	4	4	5	4	4	7	4	4	4			
Nyssa aquatica	water tupelo	Tree	1	1	1	3	3	3	1	1	1	3	3	3	5	5	5	15	15	15	18	18	18	18	18	18	16	16	16	6	6	6
Pinus taeda	loblolly pine	Tree																		2			1									
Platanus occidentalis	American sycamore	Tree	3	3	7	1	1	3	4	4	12	8	8	51	1	1	7	24	24	111	24	24	93	3	3	84	3	3	33			
Populus deltoides	eastern cottonwood	Tree																		4						2			2			
Quercus	oak	Tree																						4	4	11	1	1	1	3	3	3
Quercus laurifolia	laurel oak	Tree																8	8	8	6	6	6	7	7	7	10	10	10	19	19	19
Quercus lyrata	overcup oak	Tree													1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Quercus michauxii	swamp chestnut oak	Tree			2													13	13	15	13	13	13			15						
Quercus pagoda	cherrybark oak	Tree	4	4	4	4	4	4	5	5	5	2	2	2				39	39	40	39	39	40	36	36	39	42	42	43	24	24	24
Quercus palustris	pin oak	Tree																7	7	8	7	7	7	7	7	7	8	8	8			
Quercus phellos	willow oak	Tree	6	6	6	3	3	3	1	1	3			1	4	4	4	43	43	49	44	44	46	34	34	37	29	29	29	14	14	14
Salix nigra	black willow	Tree															1			11												
Ulmus americana	American elm	Tree																		2			1									
Unknown		Shrub or Tree																						3	3	3	11	11	11	124	124	124
Stem count			20	20	61	14	14	30	15	15	52	21	21	154	18	18	109	189	189	800	195	195	580	142	142	410	152	152	231	237	237	237
size (ares)			1			1			1			1			1			13			13			13			13					
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.32			0.32			0.32			0.32					
Species count			6	6	10	6	6	10	6	6	11	5	5	12	6	6	11	11	11	21	11	11	19	11	11	18	11	11	17	7	7	7
Stems per ACRE			809	809	2469	567	567	1214	607	607	2104	850	850	6232	728	728	4411	588	588	2490	607	607	1806	442	442	1276	473	473	719	738	738	738

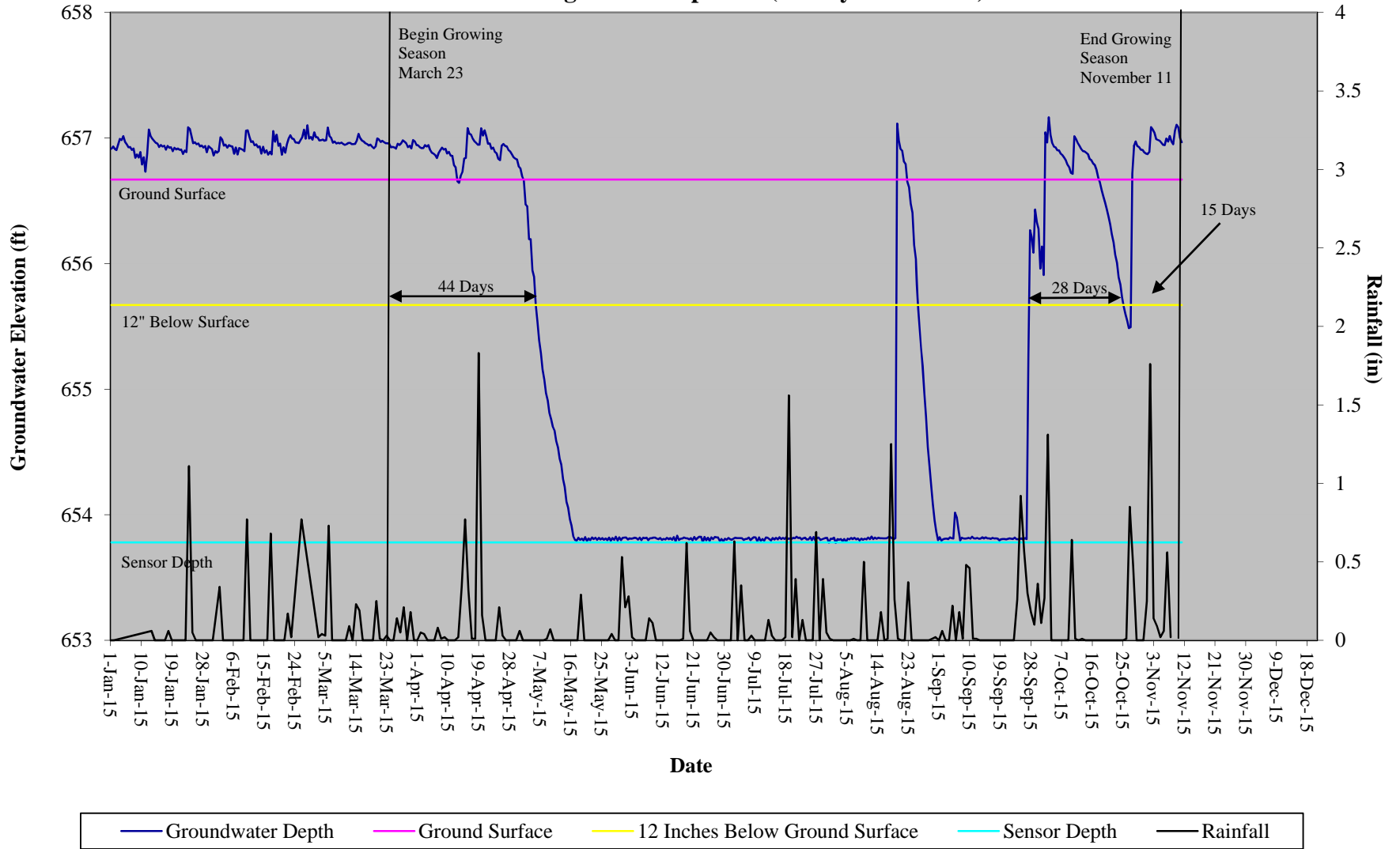
Appendix D

Hydrologic Data

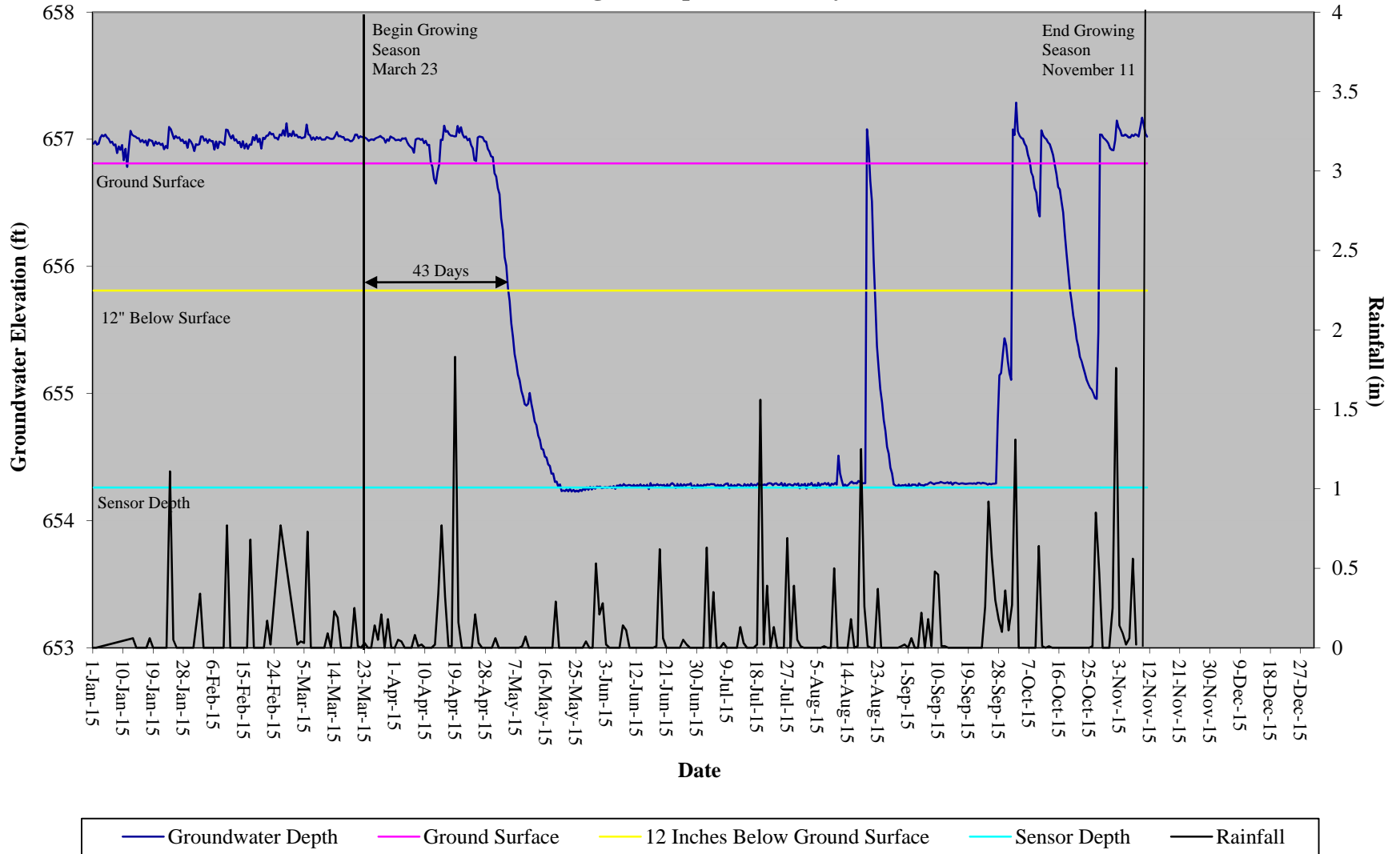
**Buffalo Flats Restoration Site
30-70 Percentile Graph
WETS Station Name: KRUQ - Rowan County Airport**



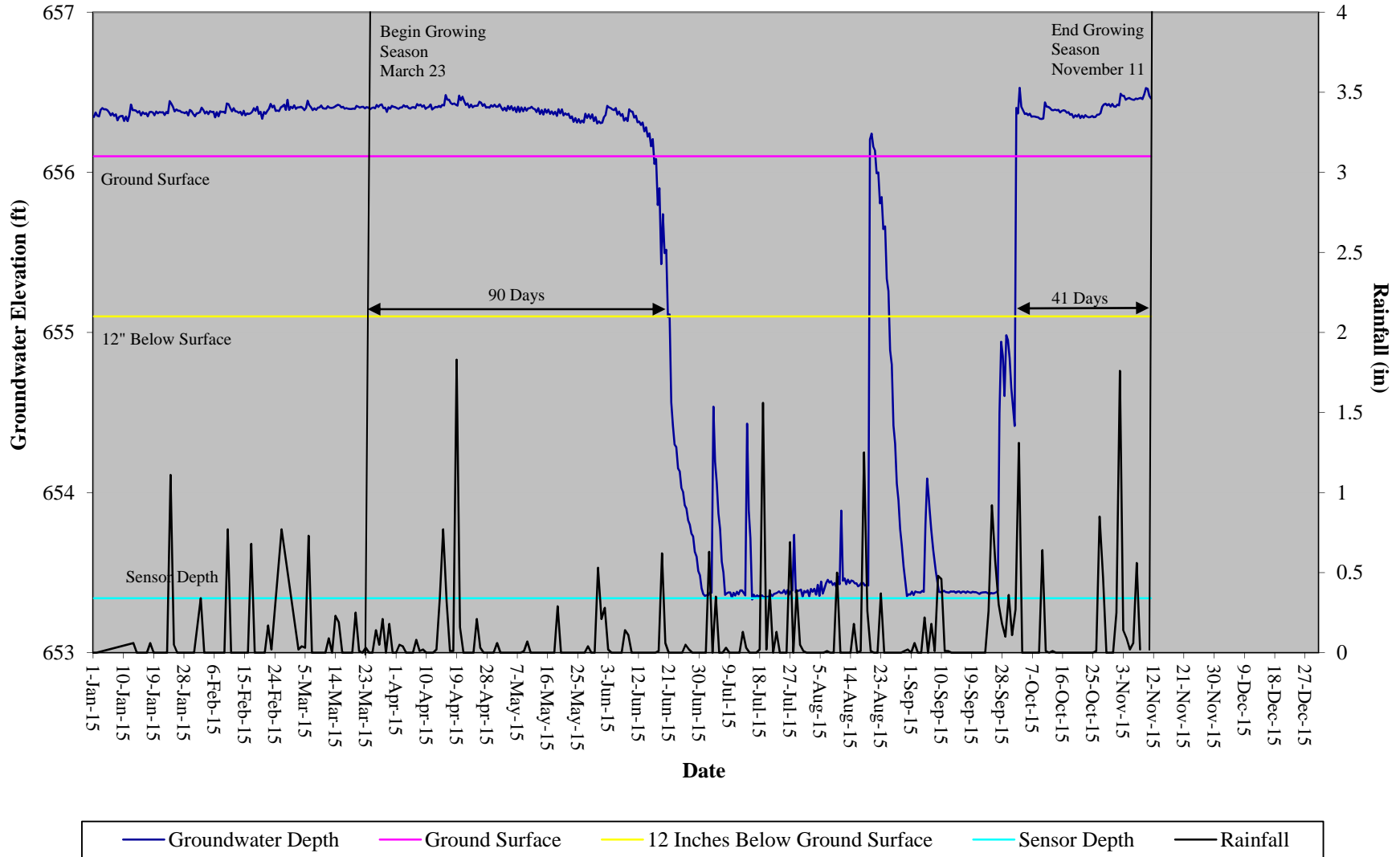
**Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 1 - Nonriparian (12 Days Minimum)**



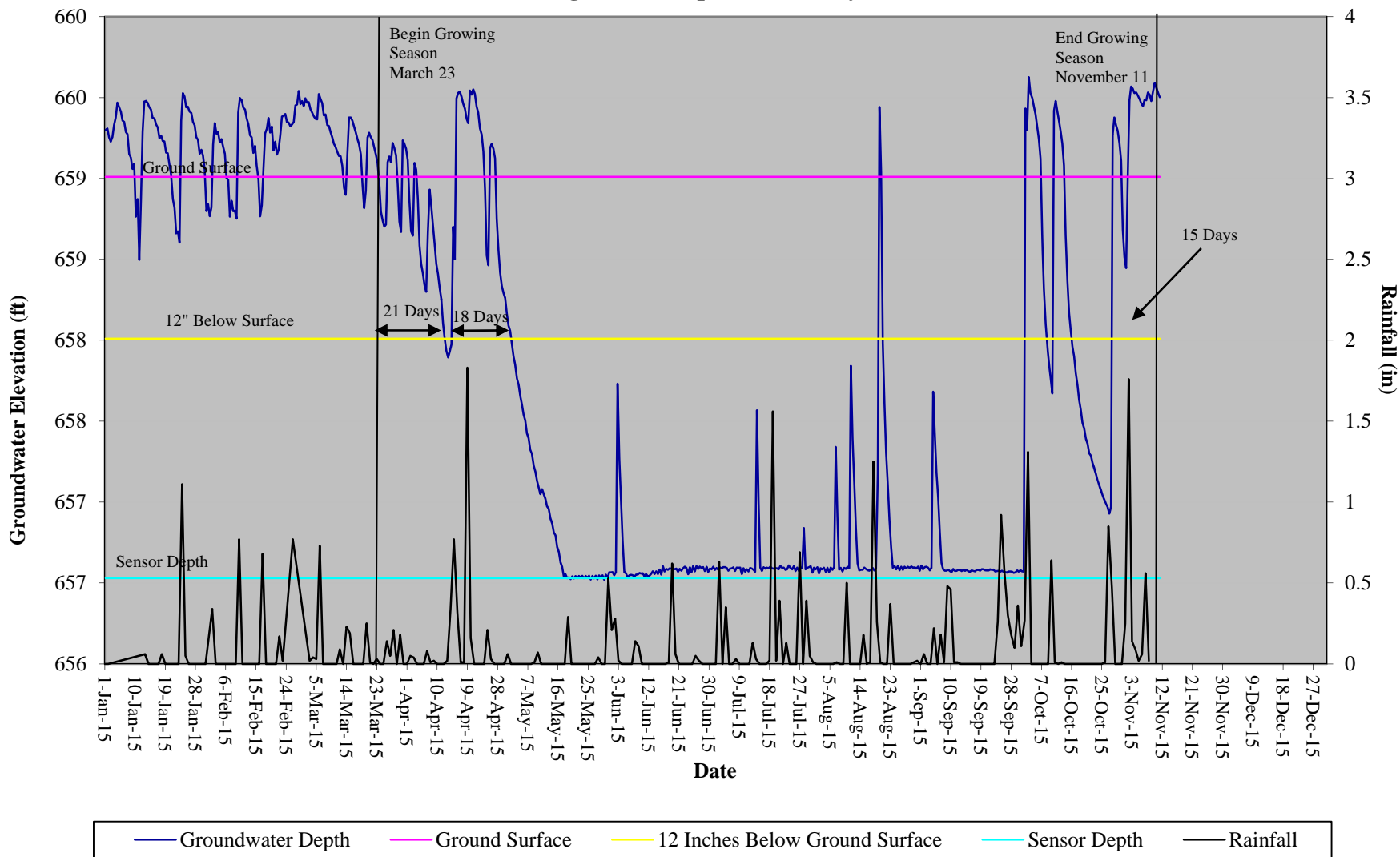
**Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 2 - Riparian (25 Days Minimum)**



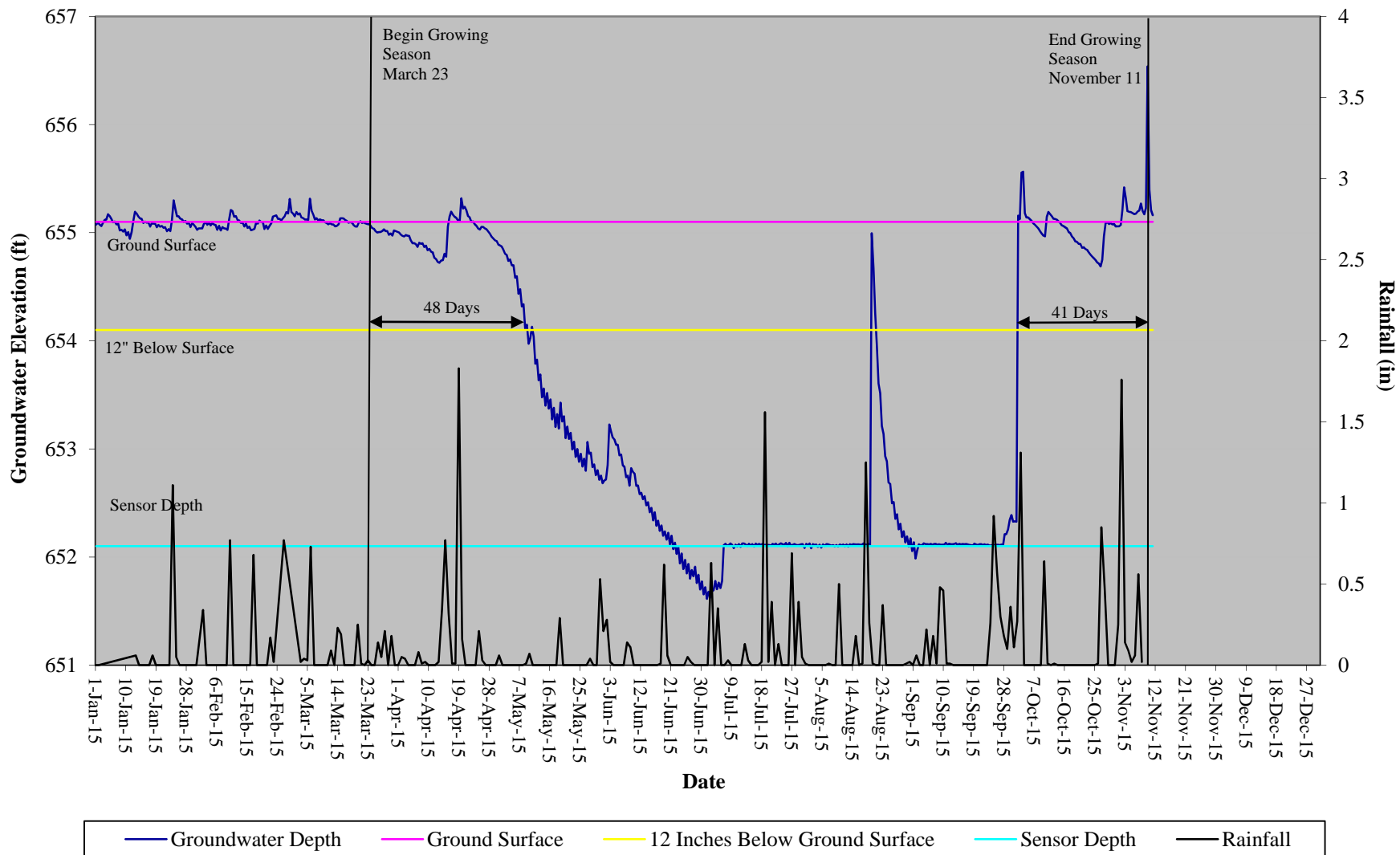
Buffalo Flats Restoration Site Hydrograph Wetland Gauge 3 - Riparian (25 Days Minimum)



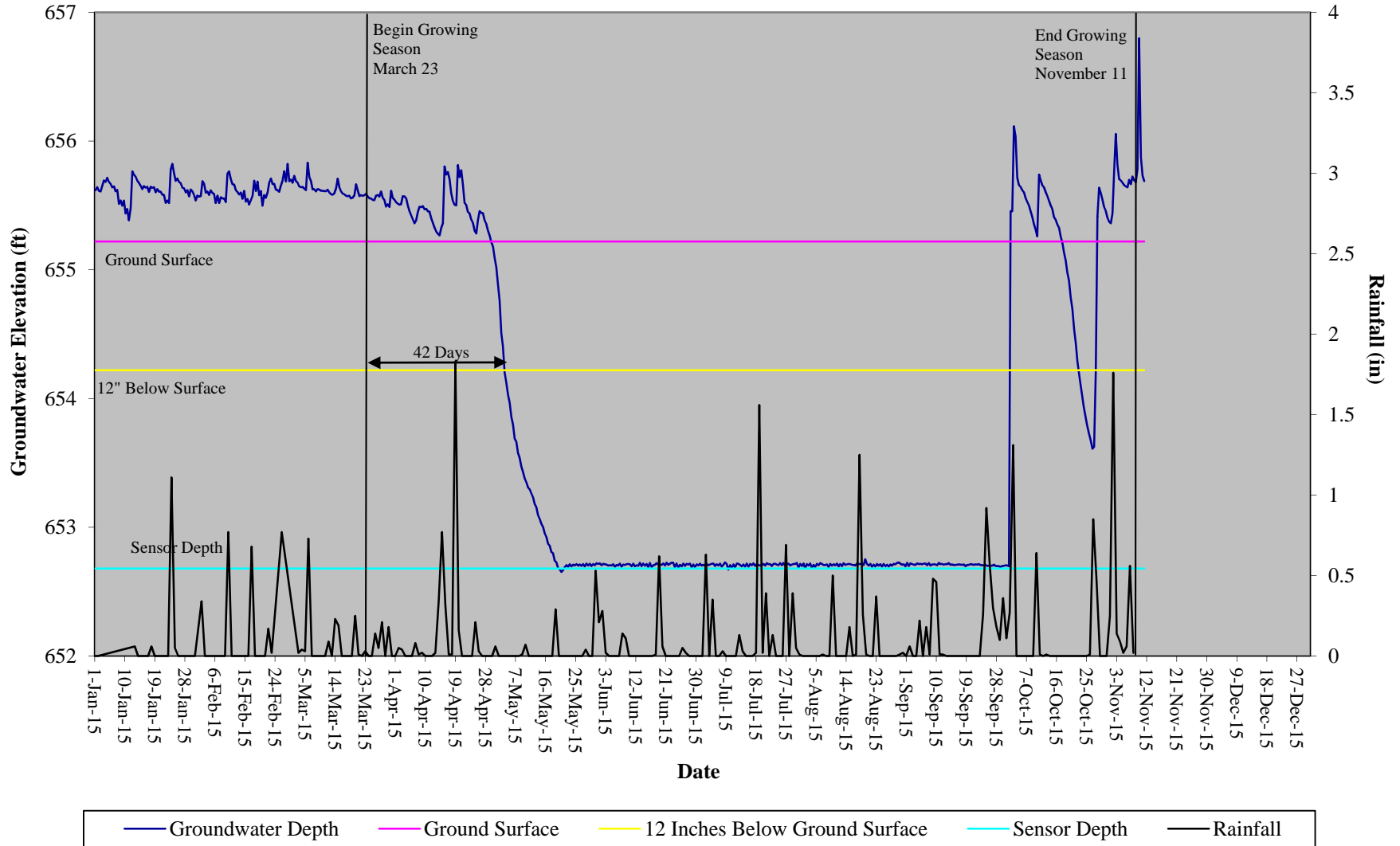
Buffalo Flats Restoration Site Hydrograph Wetland Gauge 4 - Nonriparian (12 Days Minimum)



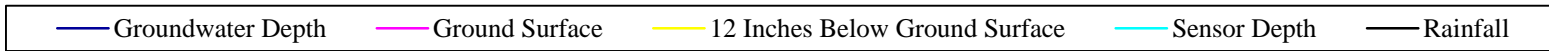
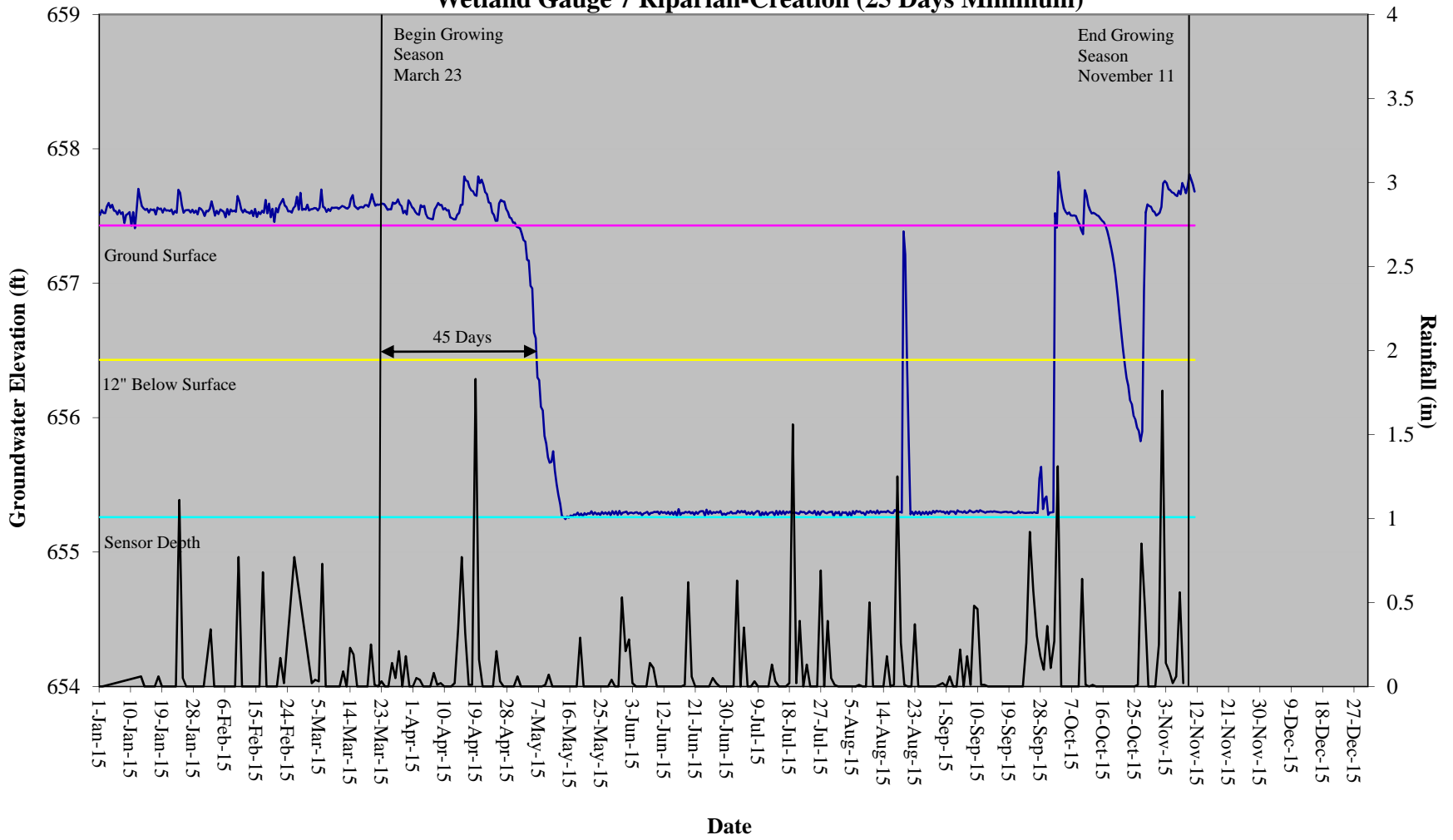
Buffalo Flats Restoration Site Hydrograph Wetland Gauge 5 - Riparian (25 Days Minimum)



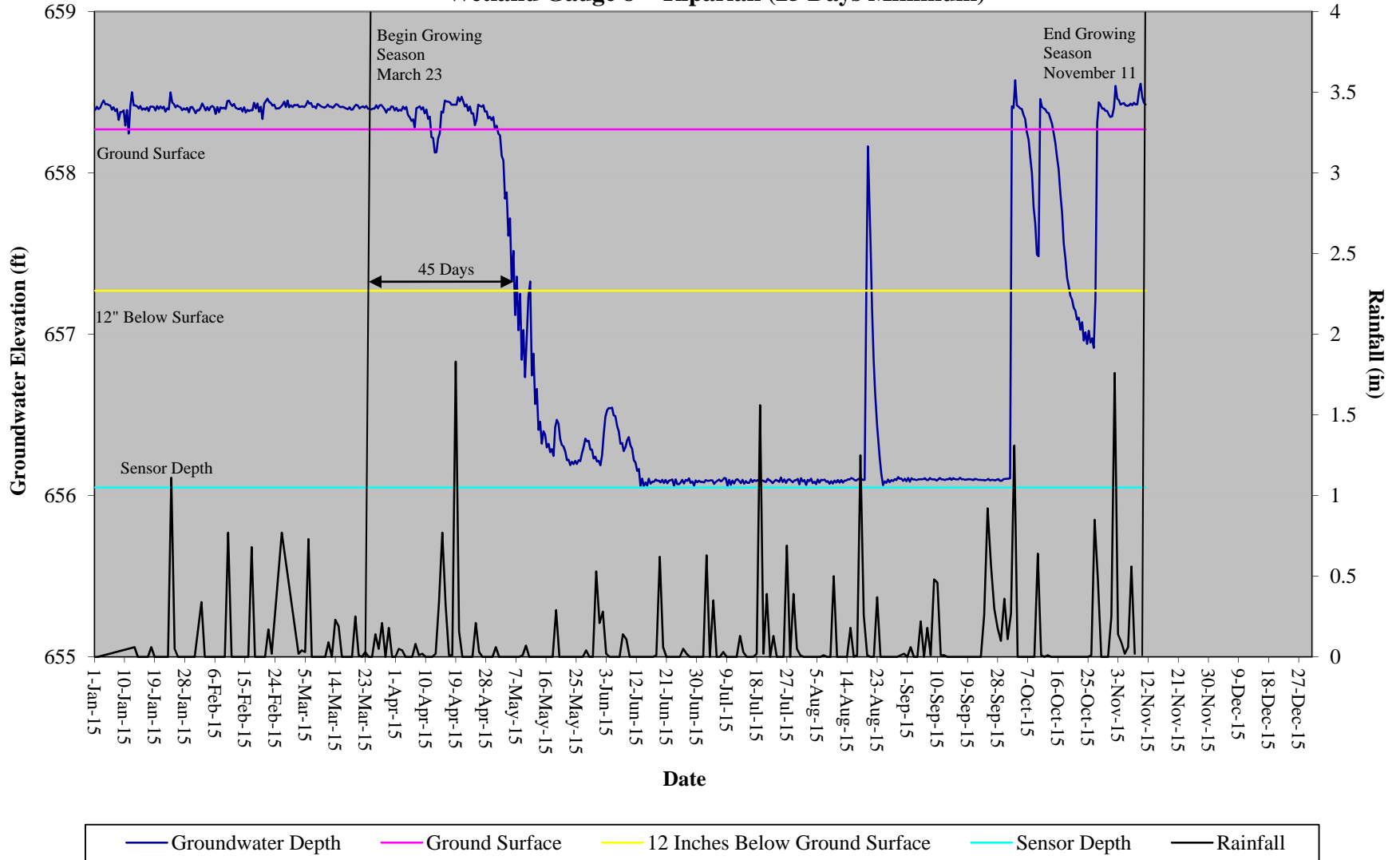
Buffalo Flats Restoration Site Hydrograph Wetland Gauge 6 - Riparian-Creation (25 Days Minimum)



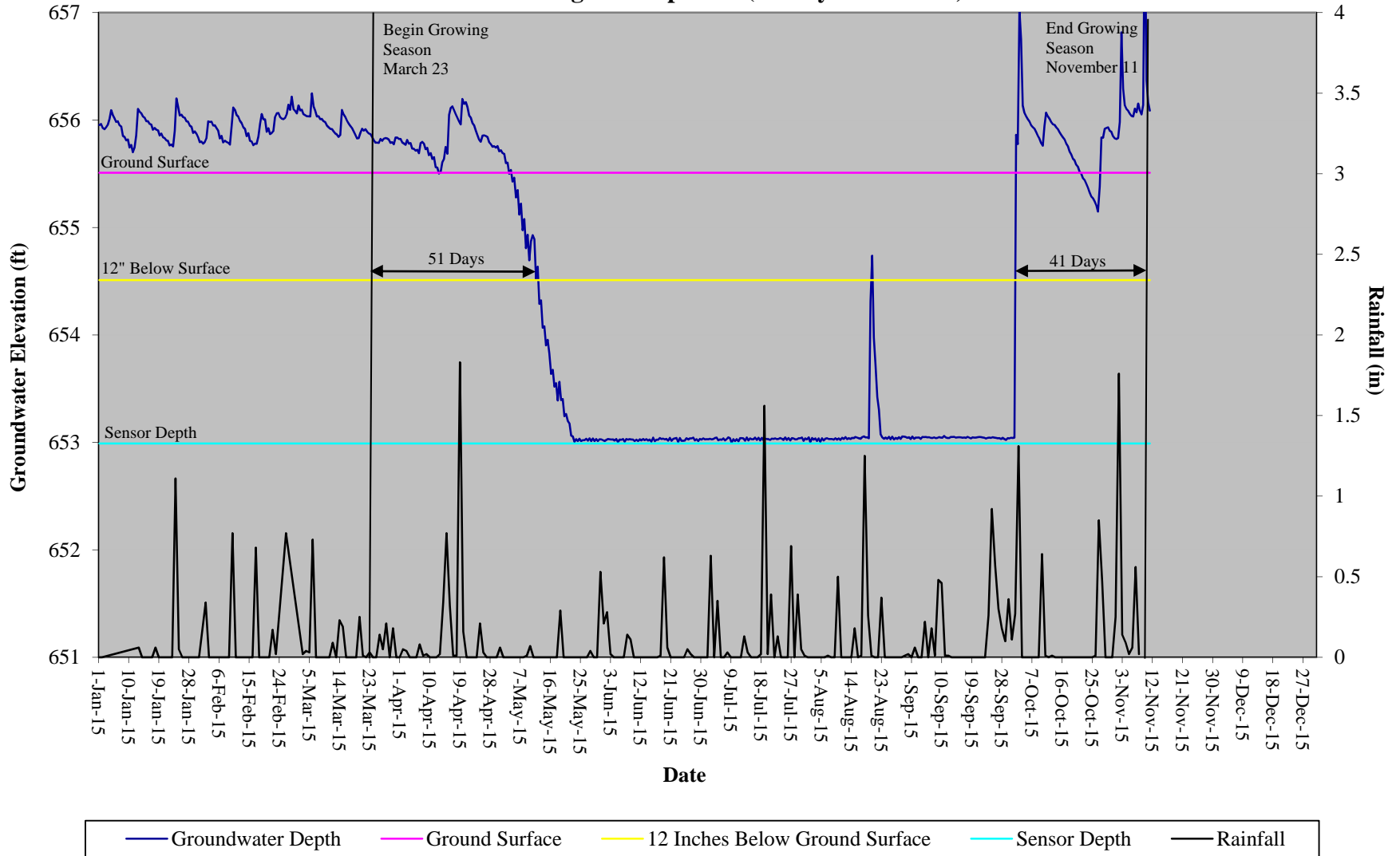
Buffalo Restoration Site Hydrograph Wetland Gauge 7 Riparian-Creation (25 Days Minimum)



**Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 8 - Riparian (25 Days Minimum)**



**Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 9 - Riparian (25 Days Minimum)**



Buffalo Flats Restoration Site Hydrograph Wetland Gauge 10 - Nonriparian (12 Days Minimum)

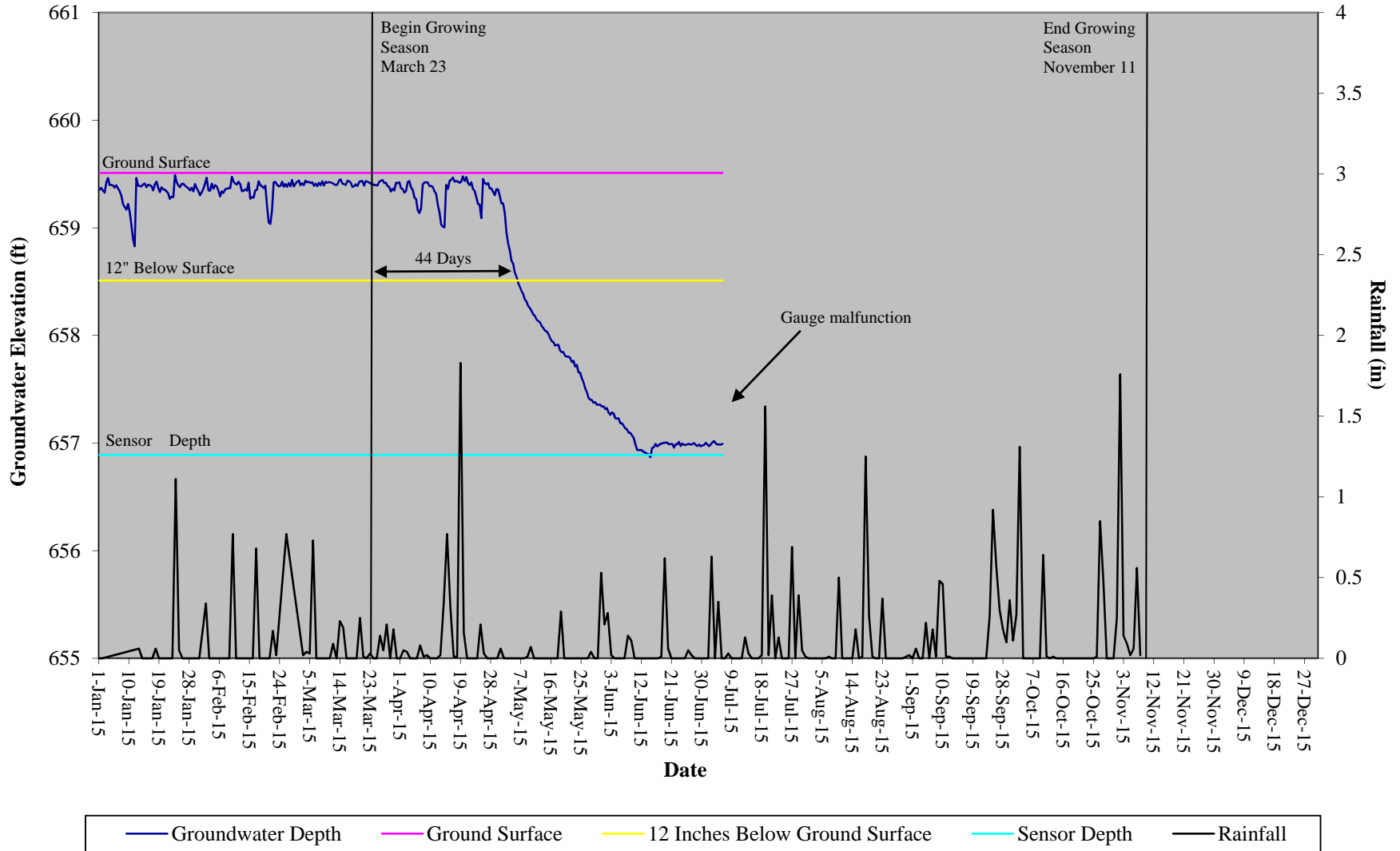


Table 9. Wetland Hydrology Criteria Attainment Table						
Project Number and Name: 94647 - Buffalo Flats Restoration Site						
	Success Criteria Achieved / Max Consecutive Days During Growing Season (Percentage)					
Wetland Area 1						
Success Criteria	12	MY-01	MY-02	MY-03	MY-04	MY-05
days (5%)		2012	2013	2014	2015	
Well 1		Yes/23 (9.7%)	Yes/64 (27.5%)	Yes/60 (23.9%)	Yes/44 (17.7%)	
Well 4		No/6 (2.4%)	Yes/33 (14.2%)	Yes/52 (20.9%)	Yes/21 (8.2%)	
Well 10 (Installed May 23, 2012)		No/0 (0%)	No/1 (0.4%)	Yes/78 (31.1%)	Yes/44* (17.7%)	
Wetland Area 2						
Success Criteria	25	MY-01	MY-02	MY-03	MY-04	MY-05
days (10%)		2012	2013	2014	2015	
Well 2		No/20 (8.6%)	Yes/36 (15.2%)	Yes/58 (23.3%)	Yes/43 (17.3%)	
Well 3		Yes/134 (57.3%)	Yes/236 (100%)	Yes/120 (48.0%)	Yes/90 (35.9%)	
Well 5		Yes/28 (11.8%)	Yes/172 (73.6%)	Yes/60 (23.9%)	Yes/48 (19.1%)	
Well 8		No/19 (7.9%)	Yes/98 (42.0%)	Yes/61 (24.5%)	Yes/45 (17.9%)	
Well 9		Yes/23 (10.0%)	Yes/103 (44.2%)	Yes/67 (26.9%)	Yes/51 (20.3%)	
Wetland Area 3						
Success Criteria		MY-01	MY-02	MY-03	MY-04	MY-05
25 days (10%)		2012	2013	2014	2015	
Well 6 (Creation Area)		Yes/25 (10.7%)	Yes/71 (30.5%)	Yes/61 (24.5%)	Yes/42 (16.7%)	
Well 7 (Creation Area)		No/18 (7.5%)	Yes/70 (30.0%)	Yes/62 (24.7%)	Yes/45 (17.9%)	

*=gauge malfunction, data only recorded for 106 out of 233 days during MY04 growing season

Appendix E

Soil Data



SOIL PROFILE DESCRIPTION

Client: KCI Associates of North Carolina, P.A. **Date:** June 1, 2015
Project: Buffalo Flats Wetland Restoration Site **Project #:** 20100798 6MO.Y4
County: Cabarrus **State:** NC
Location: 4939 Gold Hill Road **Site/Lot:** MW# 6
Soil Series: Chewacla Variant
Soil Classification: Fine-loamy, mixed, active, thermic Fluvaquentic Dystrochrepts
AWT: >36" **SHWT:** 6-12" **Slope:** 0-1% **Aspect:** _____
Elevation: -655 **Drainage:** Poorly Drained **Permeabilit:** Moderate to Moderately slow
Vegetation: Herbaceous: Predominantly Virginia Wildrye with planted River Birch, Green Ash, American Sycamore
Borings terminated at 54 **Inches**

HORIZON	DEPTH (IN)	MATRIX	MOTTLES	TEXTURE	STRUCTURE	CONSISTENCE	BOUNDARY	NOTES
Ap	0-6	10YR 5/3	5YR 4/6c2p	sl	1fsbk	mfr	cs	5YR mottles 10% in matrix, oxidized roots
			7.5YR 5/6c2d					7.5YR mottles 10% pore linings
Bg1	6-11	10YR 5/2	2.5YR 4/4	sl	1fsbk	mfr	cs	30% redox in pore linings and matrix
Bg2	11-18	10YR 5/2	2.5YR 3/4	sl	1fsbk			20% mottles in pore linings and matrix
			10YR 2/2					2% Mn concretions
Bg3	18-36	6/5GY	7.5YR 5/8m3d	cl	1msbk	mfr	gw	30% mottles in pore linings and matrix
			7.5YR 2/2					2% soft masses and concretions
Bg4	36-49	6/10Y	10YR 4/3c2d					5% mottles in pore linings and matrix
			7.5YR 5/8m3p	c	1msbk	mfi	gw	30% mottles in pore linings and matrix
			7.5YR 2/2					2% soft masses and concretions
Cg	49-54	6/10Y	10YR 4/3c2d					5% mottles in pore linings and matrix
			7.5YR 5/8m3p	sc	massive	mfi		30% mottles in pore linings and matrix gravelly with quartz

COMMENTS:
 No surface water present.
 The SHWT develops more fully each year from surface saturation from precipitation, overbank flooding and inundation and is maintained due to the very slow permeability of the compacted, angular structured subsurface horizons.
 Meets hydric soil criteria F3: Depleted Matrix and F8: Redox Depressions
 using Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)
 Top 12" of surface has positive reaction with alpha, alpha-dipyridyl. The reagent provides evidence that the soil is hydric.

DESCRIBED BY: SFS **DATE:** 6/1/2015

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: BUFFALO FLAYS City/County: Concord / Cabarrus Sampling Date: 6-1-15
 Applicant/Owner: KCI ASSOCIATES OF NC State: NC Sampling Point: MW#6
 Investigator(s): S. Stokes & T. Seelinger Section, Township, Range: 100
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0-1
 Subregion (LRR or MLRA): LRR P Lat: 35°27'26.2507" N Long: -080°29'49.1797" W Datum: NAD 83
 Soil Map Unit Name: Chewacla Variant NWI classification: PSSIA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks: <i>Seasonally high water table is 6-12 inches. Wetland creation site - 4th year monitoring</i>	

HYDROLOGY

<p>Wetland Hydrology Indicators:</p> <p><u>Primary Indicators (minimum of one is required; check all that apply)</u></p> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input checked="" type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<p><u>Secondary Indicators (minimum of two required)</u></p> <input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<p>Field Observations:</p> Surface Water Present? Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>> 18"</u> Water Table Present? Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>> 18"</u> Saturation Present? Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>> 18"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: mw#6

Tree Stratum (Plot size: <u>30ft</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Platanus occidentalis</u>	40	✓	FACW-
2. <u>Acer negundo</u>	10	✓	FACW
3. <u>Betula nigra</u>	10	✓	FACW
4. _____			
5. _____			
6. _____			
7. _____			

_____ = Total Cover
 50% of total cover: 30 20% of total cover: 12

Sapling/Shrub Stratum (Plot size: <u>30ft</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer rubrum</u>	10	✓	FAC
2. <u>Liquidambar styraciflua</u>	10	✓	FAC+
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			

_____ = Total Cover
 50% of total cover: 10 20% of total cover: 4

Herb Stratum (Plot size: <u>1m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Tanunculus sp.</u>	30	✓	FACW
2. <u>Carex vulpinoidea</u>	25	✓	OBL
3. <u>Commelina communis</u>	10	✓	FAC
4. <u>Pleocharis obtusa</u>	10	✓	OBL
5. <u>Betula nana</u>	5		FACW
6. <u>Salix nigra</u>	5		OBL
7. <u>Mentha aquatica</u>	5		XI
8. <u>Quercus paspada</u>	5		
9. _____			
10. _____			
11. _____			

_____ = Total Cover
 50% of total cover: 47.5 20% of total cover: 19

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			

_____ = Total Cover
 50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	<u>8</u>	(A)
Total Number of Dominant Species Across All Strata:	<u>9</u>	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>88</u>	(A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____	(A) _____ (B) _____
Prevalence Index = B/A = _____	

- Hydrophytic Vegetation Indicators:**
- ___ 1 - Rapid Test for Hydrophytic Vegetation
 - ___ 2 - Dominance Test is >50%
 - ___ 3 - Prevalence Index is ≤3.0¹
 - ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - ___ Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)

Other species in area:
 Vernonia noveboracensis FAC+
 Typha latifolia OBL
 Polygonum pennsylvanicum FACW
 Rubus sp.

SOIL

Sampling Point: MW#6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10YR 5/3	80	5YR 4/6	10	C	m	sl	Oxidized root channels
			7.5YR 5/6	10	C	PL		
6-11	10YR 5/2	70	2.5YR 4/4	30	C	PL, m	sl	
11-18	10YR 5/2	70	2.5YR 3/4	20	C	PL, m	sl	
			10YR 2/2	10	C	m		Manganese concretions
18-19	6/5Y 4	68	7.5YR 5/8	25	C	m, PL	cl	
			7.5YR 2/2	2				
			10YR 4/3	5				

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Reached with a reagent in upper 12".



SOIL PROFILE DESCRIPTION

Client: KCI Associates of North Carolina, P.A. **Date:** June 1, 2015
Project: Buffalo Flats Wetland Restoration Site **Project #:** 20100798 6MO.Y4
County: Cabarrus **State:** NC
Location: 4939 Gold Hill Road **Site/Lot:** MW#7
Soil Series: Chewacla Variant
Soil Classification: Fine-loamy, mixed, active, thermic Fluvaquentic Dystrochrepts
AWT: >36" **SHWT:** 0-12 **Slope:** 0-1% **Aspect:** _____
Elevation: ~657 **Drainage:** Poorly Drained **Permeability:** low
Vegetation: Herbaceous: Predominantly Virginia Wildrye with Cherry-bark Oak, Red Maple
Borings terminated at 36 **Inches**

HORIZON	DEPTH (IN)	MATRIX	MOTTLES	TEXTURE	STRUCTURE	CONSISTENCE	BOUNDARY	NOTES
Ap	0-8	10YR 4/1	5YR 4/6c1p	sl	1 fsbk	mfr	cs	15% redox concentrations in
			5YR 2.5/2c2p					pore spaces & 3% soft masses in matrix
			2.5YR 4/8c1p					15% pore linings
Bw1	8-12	10YR 5/4	10YR 6/6c2f	sl	1 fsbk	mfr	cs	10% mottles, 5mm concretions
			7.5YR 5/8c2d					5% mottles in matrix
Bw2	12-17	7.5YR 5/8	10YR 5/1	sc	1 msbk	mfi	gw	20% redox in pore linings, matrix
								many BB sized concretions
			7.5YR 3/4c2f					10% pore linings
			2.5YR 4/6c1p					5% on pore linings
Cg1	17-35	5/5GY	2.5Y 6/6c2p	sc	mass	mfi	gw	5% pore linings
			7.5YR 3/4c2p					5% mottles on ped surfaces
			7.5YR 5/6c2d					10% mottles pore linings and matrix
			2.5YR 2.5/2c2p					5% marble sized concretions, much plinthite
Cg2	35-36	5/10Y	7.5YR 4/6c2p	sc	mass	mfi		2" chunk of plinthite
								15% redox in pore linings and matrix
								1/4"-1" quartz gravels

COMMENTS:

No surface water present.
 The SHWT develops more fully each year from surface saturation from precipitation, overbank flooding and inundation and is maintained due to the very slow permeability of the compacted, angular structured subsurface horizons.
 Meets hydric soil criteria F3: Depleted Matrix and F8: Redox Depressions using Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)
 Top 12" of surface has positive reaction with alpha, alpha-dipyridyl. The reagent provides evidence that the soil is hydric.

DESCRIBED BY: SFS **DATE:** 6/1/2015

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Buffalo Flats City/County: _____ Sampling Date: 6-1-15
 Applicant/Owner: KCI Associates of NC State: _____ Sampling Point: MW#7
 Investigator(s): S. Stokes & T. Seelinger Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0.1
 Subregion (LRR or MLRA): LRR P Lat: 35°27'27.0212" Long: -80°29'47.7051" Datum: _____
 Soil Map Unit Name: Cheswela Variant NWI classification: PSSIA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <p style="margin-left: 20px;"><i>Seasonally High Water Table is 0-12 inches. Wetland Creation Site - 4th year monitoring</i></p>	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input checked="" type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): <u>>36"</u> Saturation Present? Yes _____ No _____ Depth (inches): <u>>36"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: MW#7

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer negundo</u>	<u>5</u>	<input checked="" type="checkbox"/>	<u>FACW</u>
2. <u>Acer rubrum</u>	<u>5</u>	<input checked="" type="checkbox"/>	<u>FAC</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 5 20% of total cover: 2

Herb Stratum (Plot size: <u>1m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Polygonum pennsylvanicum</u>	<u>70</u>	<input checked="" type="checkbox"/>	<u>FACW</u>
2. <u>Panicum virgatum</u>	<u>10</u>	<input checked="" type="checkbox"/>	<u>FAC+</u>
3. <u>Fragaria pennsylvanicum</u>	<u>5</u>	<input checked="" type="checkbox"/>	<u>FACW</u>
4. <u>Quercus michauxii</u>	<u>5</u>	<input checked="" type="checkbox"/>	<u>FACW-</u>
5. <u>Nyssa sylvatica</u>	<u>2</u>	<input checked="" type="checkbox"/>	<u>FAC</u>
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 46 20% of total cover: 18.4

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____	(A) _____ (B) _____

Prevalence Index = B/A = _____

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Other species in area:
 Ranunculus sp.
 Ryegrass
 Eleocharis obtusa
 Aster sp.
 Bidens sp.

SOIL

Sampling Point: MW#17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features			Texture	Remarks	
	Color (moist)	%	Color (moist)	%	Type ¹			Loc ²
0-8	10YR 4/1	67	5YR 4/6	15	C	PL, M	sc	Oxidized root channels
			5YR 2.5/2	3	D	M		
			2.5YR 4/8	15	C	PL		
8-12	10YR 5/4	85	10YR 6/6	10	C	M	sl	5mm concretions
			7.5YR 5/8	5	C	M		
12-	7.5YR 5/8	65	10YR 5/1	20	D	PL, M	sc	many BB sized concretions
			7.5YR 3/4	10	C	PL		
			2.5YR 4/6	5	C	M, PL		

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Meets a reagent in top 12" of soil.