As-Built Baseline Monitoring Report

Rough Horn Swamp Restoration Site
Monitoring Year – MY00
2020
DMS Site ID Number 97005
DMS Contract 6596
SAW-2015-00952 and NCDEQ DWR 2015-0903

Rough Horn Swamp II Restoration Site
DMS Site ID Number 100053
DMS Contract 7514
SAW-2016-02026 and NCDEQ DWR 2015-0903

Columbus County, North Carolina

Prepared for:
NC Department of Environmental Quality
Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699

Monitoring Data Collected: March 2020
Date Submitted: April 2020

KCI ASSOCIATES OF NORTH CAROLINA, PA

ENGINEERS • SCIENTISTS • SURVEYORS • CONSTRUCTION MANAGERS

4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 (919) 783-9214 (919) 783-9266 Fax

MEMORANDUM

Date: May 12, 2020
To: Kelly Phillips, DMS Project Manager
From: Adam Spiller, Project Manager
KCI Associates of North Carolina, PA
Subject: MY-00 Monitoring Report Comments
Rough Horn Swamp DMS #97005, Contract 6596
Rough Horn Swamp II DMS #100053, Contract 7514

Please find below our responses in italics to the MY-00 Monitoring Report comments from NCDMS received on May 4, 2020, for the Rough Horn Swamp and Rough Horn Swamp II Restoration Sites.

1. Update asset table with 5/2019 template tables. The numbers should match tables with the ones in the Mitigation Plan (pages 33-36). Specifically, RH1 final assets should reflect 20.267 RWMU and 11.873 NRWMU and RH2 final assets should reflect 4563.200 SMU and 20.993 RWMU.
KCI Response: This change has been made.

2. Page 29, Table 5, update project numbers (ones showing are contract numbers).
KCI Response: This change has been made

3. There was a discussion on-site about use of boulder footers since the stream is anticipated to have wet and dry cycles not conducive to footer logs for grade control as was proposed in original 60% design (MP). Justify use of boulder footers instead of footer logs in baseline report results for clarity.
KCI Response: A sentence explaining the use of the boulder footers instead of log footers has been added to the executive summary.

4. Provide reference gauge or the 4 pre-construction wetland gauge data if available (2019) or provide indication if this data will be available for MY1.
KCI Response: The data from the 4 pre-construction gauges has been added to the report. This data is available from January 2017 through the end of 2019. Gauge 3 was damaged during construction and no data from 2019 was collected for it. Data from the reference gauge will be available with the MY01 report.

5. Differentiate vegetation plots on CCPV to show permanent and random/temporary and move them in GIS to show all as visible on CCPV.
KCI Response: This change has been made.

6. Ensure signage posting is tied up along all boundaries.
KCI Response: Signage posting was completed the week of May 11, 2020.

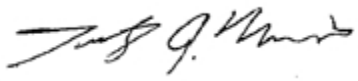
7. Provide links to any drone footage that KCI is interested in sharing with IRT for Baseline review.
   KCI Response: The meeting minutes from the October 22, 2019 Post Construction IRT Field Review meeting have been included at the end of the report. These minutes contain links to drone footage, as well as still pictures from the drone review of the site.

8. Digital Deliverables: Please provide DMS with the stream features as Shapefiles that are currently excluded, but connect creditable assets at easement breaks (i.e. UT 3-2, UT 3-1, LBC).
   KCI Response: These features have been added to the digital deliverables.

9. Provide justification why the ditch plugs were not shown on as-built plans. DMS observed that the ditch plugs were installed, but that layer was not on drawings.
   KCI Response: Ditch plugs were inadvertently left off of the as-built plans. This error has been corrected.

10. Check the labels of topo on the As-Builts. There were some instances in the field where the label did not appear to make sense for the topo line.
    KCI Response: Additional topo labels have been added to the as-built plans to clarify the elevations of the topo lines.

Sincerely,



Tim Morris
Project Manager

Monitoring and Design Firm

Prepared by:

KCI Associates of North Carolina, PC
4505 Falls of Neuse Road, Suite 400
Raleigh, NC 27609
(919) 783-9214

Project Contact: Tim Morris
Email: tim.morris@kci.com

April 2020

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PROJECT SUMMARY

The Rough Horn Swap Restoration Site (RHS) was completed in January 2020 and restored 20.267 acres of riparian wetlands and 11.873 of non-riparian wetlands. Additionally, RHS restored 2,132 linear feet of stream (non-credited). The site is generating 20.267 riparian wetland mitigation credits, and 11.873 non-riparian wetland mitigation credits. The Rough Horn II Wetland Restoration Site (RHSII) is located immediately upstream of RHS (to the north and east) and was also completed in January 2020. RHSII restored 17.079 acres, enhanced 5.956 acres, and preserved 15.319 acres of riparian wetlands. The site also restored 1.619 acres of non-riparian wetlands (non-credited). Additionally, RHSII restored 4,446 linear feet, enhanced 164 linear feet, and preserved 516 linear feet of stream. The site generated 20.993 riparian wetland mitigation credits and 4,564 stream mitigation credits.

RHS and RHSII are riparian and non-riparian systems in the Lumber River Basin (03040203 8-digit HUC) in Columbus County, North Carolina, that were historically modified to maximize agricultural production. The completed project aims to restore an integrated stream/wetland ecosystem that will buffer and support the Long Bay Creek/Lumber river corridor.

The RHS is protected by a 34.5-acre permanent conservation easement, while RHSII is protected by a 62.3-acre permanent conservation easement, both held by the North Carolina Division of Mitigation Services (DMS). Both sites are located near the Town of Evergreen in the west-central portion of Columbus County, NC. Specifically, the site is located just southwest of the intersection of Old Boardman Road and CCC Road.

The Lumber River Basin Restoration Priorities state the goals for the RHS and RHSII's 14-digit HUC are to protect and improve water quality throughout the Basin by reducing sediment and nutrient inputs into streams and rivers and to support efforts to restore local watersheds (NCDENR EEP, 2008). The project goals for RHS and RHSII are in line with the basin priorities and include the following:

- Replace buffer
- Repairing channelized streams
- Preserving existing resources

Additional goals for the project include:

- Restore an integrated wetland/stream system
- Reduce nutrient impacts to the Lumber River and its tributaries from existing and adjacent agricultural practices

The project goals will be addressed through the following objectives:

- Plant the site with native trees and shrubs that support the development of wetland communities
- Fill field ditches to slow the flow of surface and subsurface drainage
- Relocate channelized streams to their historic landscape position
- Convert existing agricultural land to wetland and stream buffer

Project planting and construction were completed in March 2020. Both RHS and RHSII were constructed as designed with no major modifications made to the design plan during construction. In the 60% design plans, footer logs were proposed for grade control. Since it is anticipated that the site will go through wet and dry cycles not conducive to footer logs, boulder footers were used in the final design for grade control.

The monitoring components were installed in March 2020 for both sites. Twenty-one monitoring gauges were installed to evaluate the attainment of jurisdictional wetland hydrology for both sites, thirteen at RHS

and eight at RHSII. One stream monitoring gauge, as well as a flow camera, was installed on Long Bay Creek within RHSII.

To determine the success of the planted mitigation areas, 10 meter by 10 meter vegetation monitoring plots were established. Forty-one total vegetation plots were assessed for baseline monitoring. Of these, 25 are permanent plots, with 16 in RHS (Plots 1-16) and 9 in RHSII (Plots 17-25), and an additional 16 temporary plots were randomly placed and measured throughout RHS (R1-R16). These plots will be repeated throughout the course of monitoring, but at different locations each year. All permanent plots were installed with flagged metal conduit at each corner and a flagged PVC pipe was installed at the photo corner. In each of the permanent plots, the plant's height, species, location, and origin (planted versus volunteer) will be noted. In the random plots, species and height will be recorded. In all plots, invasive stems will also be recorded to determine the percentage of invasive stems present. Additionally, a photograph will be taken of each plot. The site's vegetation will be monitored in years 1, 2, 3, 5, and 7.

Vegetative success criteria for wetland/stream mitigation is a woody stem density of 260 stems/acre after five years and 210 stems/acre after seven years. Trees in each plot must average 7 feet in height at Year 5 and 10 feet at Year 7. A single species may not account for more than 50% of the required number of stems within any plot. Volunteers must be present for a minimum of two growing seasons before being included in performance standards in Year 5 and Year 7. For any volunteer tree stem to count toward vegetative success, it must be a species from the approved planting list. Visual assessments will also be used to identify problem areas.

Wetland hydrology will be monitored with the series of 21 automatic gauges described above that record water table depth. The growing season for the project monitoring period will be March 1st through November 20th (265 days) based on correspondence with the USACE representative. To meet the success criterion, the upper 12 inches of the soil profile must have continuously saturated or inundated conditions for at least 12.0% (32 days) of the growing season in the wetland mitigation areas during normal weather conditions. A "normal" year will be based on NRCS climatological data for Columbus County, and using the 30th to 70th percentile thresholds as the range of normal, as documented in the USACE Technical Report "Accessing and Using Meteorological Data to Evaluate Wetland Hydrology, April 2000."

In the headwater stream area, one pressure transducer gauge and one camera, set to record a short video once a day, will document the presence of surface water flow. The project streams must meet the requirements for headwater stream hydrologic monitoring per the NCIRT 2016 guidelines. Each stream must have continuous surface water flow within a flowpath for a minimum of 30 continuous days within a calendar year (assuming normal precipitation) and for every year of monitoring. The stream must show signs of supporting flowpaths in all monitoring years. These indicators will be documented with pictures and may include evidence of: scour, sediment deposition and sorting, multiple flow events, wrack lines and flow over vegetation, leaf litter, matted vegetation, or water staining.

The site's geomorphology will be monitored per the NCIRT's 2016 guidance for headwater streams. Adjustment and lateral movement following construction are anticipated for these headwater stream systems. In monitoring years one through four the streams will be monitored for specific signs of concentrated flow. This could include linear scour, areas of flow that are deeper than adjacent flow, preferential paths through the wetland that are developing, and signs of continuous flow as documented by a field camera. As the site progresses to years five through seven, there should be signs of developing bed and banks throughout the site. These may not always be continuous, but evidence of an ordinary high water mark should be developing.

BASELINE CONDITIONS

Baseline monitoring data was collected in March 2020. RHS and RHSII were planted with a total of nineteen different species of bare root trees in March 2020 and baseline vegetation monitoring was completed on March 23, 2020. Installation of wetland and stream gauges was completed on March 3, 2020.

The results of the vegetation baseline monitoring show an average of 887 stems/acre in the planted restoration area. Additionally, stem counts within each individual plot were well-above the required 320 stems per acre. An attempt to identify all trees was made, but since monitoring was conducted while the trees were dormant, many were unidentifiable. All trees will be positively identified during the first year of monitoring.

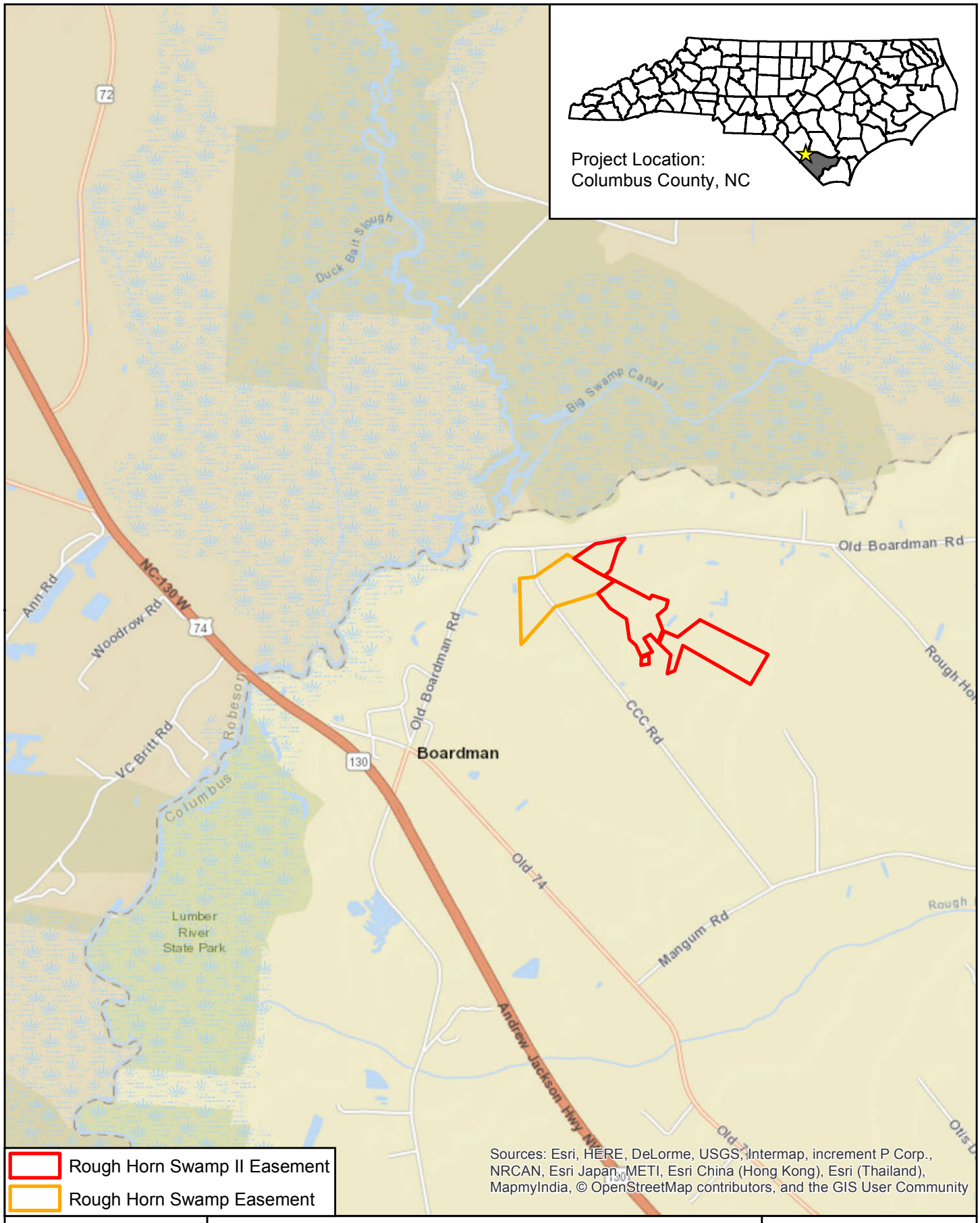
REFERENCES

NCDEQ, Division of Mitigation Services. June 2017. "As-built Baseline Monitoring Report Format, Data and Content Requirement." https://files.nc.gov/ncdeq/Mitigation%20Services/Document%20Management%20Library/Guidance%20and%20Template%20Documents/6_AB_Baseline__Rep_Templ_June%202017.pdf

NCDENR, Ecosystem Enhancement Program. 2008. "Lumber River Restoration Priorities 2008." https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed_Planning/Lumber_River_Basin/Lumber_RBRP_2008_FINAL.pdf

NCIRT. October 24, 2016. "Wilmington District Stream and Wetland Compensatory Mitigation Update." https://saw-reg.usace.army.mil/PN/2016/Wilmington-District-Mitigation-Update.pdf

USACE, Sprecher, S. W.; Warne, A. G. 2000. "Accessing and Using Meteorological Data to Evaluate Wetland Hydrology." https://ntrl.ntis.gov/NTRL/dashboard/searchResults/titleDetail/ADA378910.xhtml



PROJECT VICINITY MAP
ROUGH HORN SWAMP RESTORATION SITE &
ROUGH HORN SWAMP II RESTORATION SITE
COLUMBUS COUNTY, NC

APPENDIX A

Background Tables

Table 1. Mitigation Assets and Components
Rough Horn Swamp Restoration Site, DMS Project #97005

Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)	As-built Footage or Acreage	Comments
Long Bay Creek	3,470	1,959	Warm	Restoration	Low Energy Stream	0	1,959	60' ROW over CCC Rd.; completed for no stream credit
UT1	4	233	Warm	Restoration	Low Energy Stream	0	233	Completed for no stream credit
Riparian Wetland	None (drained wetland)	20.267	Riverine Riparian	Restoration (Re-establishment)		1	20.267	
Non-Riparian Wetland	0.16	11.873	Riverine Non-riparian	Restoration (Re-establishment)		1	11.873	

Project Credits

Restoration Level	Steam			Riparian Wetland		Non-riparian Wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Non-riverine		
Restoration	2,132 (not credited)						
Re-establishment				20.267		11.873	
Rehabilitation							
Enhancement							
Enhancement I							
Enhancement II							
Creation							
Preservation							
Total				**20.267**		**11.873**	

Table 1. Mitigation Assets and Components
Rough Horn Swamp II Restoration Site, DMS Project #100053

Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)	As-built Footage or Acreage	Comments
Long Bay Creek	2,077	1,866	Warm	Restoration	Low Energy Stream	1	1,866	30' crossing exception STA 14+66 to 14+96
UT1	815	917	Warm	Restoration	Headwater Stream	1	917	
UT2-1	516	516	Warm	Preservation	Headwater Stream	10	516	
UT2-2	120	120	Warm	Restoration	Headwater Stream	1	120	
UT3-1	168	164	Warm	Enhancement II	Headwater Stream	2.5	164	31' crossing exception STA 301+64 to 301+95
UT3-2	571	914	Warm	Restoration	Headwater Stream	1	914	
UT4	447	629	Warm	Restoration	Headwater Stream	1	629	
Riparian Wetland Restoration	None (drained wetland)	17.079	Riverine Riparian	Restoration (Re-establishment)		1	17.079	
Riparian Wetland Enhancement	7.900	5.956	Riverine Riparian	Enhancement		2.5	5.956	
Riparian Wetland Preservation	16.700	15.319	Riverine Riparian	Preservation		10	15.319	
Non-riparian Wetland Restoration	None (drained wetland)	1.619	Riverine Non-riparian	Restoration (Re-establishment)		0	1.619	Completed for no wetland credit

Project Credits

Restoration Level	Steam			Riparian Wetland		Non-riparian Wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Non-riverine		
Restoration	4,446.000						
Re-establishment				17.079		1.619 (not credited)	
Rehabilitation							
Enhancement				2.382			
Enhancement I							
Enhancement II	65.600						
Creation							
Preservation	51.600			1.532			
Total	**4,563.200**			**20.993**			

Table 2. Project Activity & Reporting History Rough Horn Swamp and Rough Horn Swamp II Restoration Sites, DMS Project #97005 and 1000053		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Mitigation Plan		April 2, 2019
Final Design - Construction Plans		April 16, 2019
Construction		January 24, 2020
Planting		March 13, 2020
Baseline Monitoring/Report	April 2020	April 2020
Vegetation Monitoring	*March 25, 2020*	
Photo Points	*April 8, 2020*	

Table 3. Project Contacts Rough Horn Swamp and Rough Horn II Swamp Restoration Sites DMS Project #97005 and 1000053	
Design Firm	KCI Associates of North Carolina, PC 4505 Falls of Neuse Rd. Suite 400 Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 783-9214 Fax: (919) 783-9266
Construction Contractor	KCI Environmental Technologies and Construction 4505 Falls of Neuse Rd. Suite 400 Raleigh, NC 27609 Contact: Mr. Tim Morris
Planting Contractor	Shenandoah Habitats 1983 Jefferson Highway Waynesboro, VA 22980 Contact: Mr. David Coleman Phone: (540) 941-0067
Monitoring Performers	
	KCI Associates of North Carolina, PC 4505 Falls of Neuse Rd. Suite 400 Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 783-9214 Fax: (919) 783-9266

Table 4. Project Attributes			
Rough Horn Swamp Restoration Site , DMS Project #97005			
Project Name	Rough Horn Swamp Restoration Site		
County	Columbus County		
Project Area (acres)	34.5 acres		
Project Coordinates (lat. and long.)	34.4481°, -78.9390°		
Project Watershed Summary Information			
Physiographic Province	Coastal Plain		
River Basin	Lumber		
USGS Hydrologic Unit 8-digit	03040203	**USGS Hydrologic Unit 14-digit**	03040203190010
DWQ Sub-basin	03-07-53		
Project Drainage Area (acres)	1,800 acres		
Project Drainage Area Percentage of Impervious Area	1%		
CGIA Land Use Classification	Agricultural Land, Forestland		
Reach Summery Information			
Parameters	**Long Bay Creek**		
Length of reach (linear feet)	3,702		
Valley classification	Type X		
Drainage area (acres)	1,800 acres		
NCDWQ Water Quality Classification	C (Aquatic Life, Secondary Recreation); Sw (Swamp Waters)		
Morphological Description (stream type)	N/A (Ditched Channel)		
Evolutionary trend	Channelized, Stage III		
Mapped Soil Series	Johnston		
Drainage class	Very poorly drained		
Soil Hydric status	Hydric A/D		
Slope	0%		
FEMA classification	Zone X		
Existing vegetation community	Row crops		
Wetland Summary Information (Post Restoration)			
Parameters			
Size of Wetland (acres)	0.16 (W3)		
Wetland Type	Headwater Forest		
Mapped Soil Series	Torhunta		
Drainage class	Very poorly drained		
Soil Hydric Status	Hydric A/D		
Source of Hydrology	Groundwater		
Hydrologic Impairment	Ditching		
Existing vegetation community	Row crops		
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting**
Waters of the United States – Section 404	Yes	Yes	Jurisdictional Determination
Waters of the United States – Section 401	Yes	Yes	Jurisdictional Determination
Endangered Species Act**	No	N/A	N/A
Historic Preservation Act**	No	N/A	N/A
Coastal Zone Management Act ** (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	FEMA Floodplain Checklist
Essential Fisheries Habitat**	No	N/A	N/A

Table 4. Project Attributes						
Rough Horn Swamp II Restoration Site, DMS Project #100053						
Project Name	Rough Horn Swamp II Restoration Site					
County	Columbus County					
Project Area (acres)	62.3 acres					
Project Coordinates (lat.	34.445253° , -81.937000°					
Project Watershed Summary Information						
Physiographic Province	Coastal Plain					
River Basin	Lumber					
USGS Hydrologic Unit 8-digit	03040203	**USGS Hydrologic Unit 14-digit**	03040203190010			
DWQ Sub-basin	03-07-53					
Project Drainage Area (acres)	1,684 acres (1,638 ac Long Bag Creek + 46 ac UT 1)					
Project Drainage Area Percentage of Impervious Area	1%					
CGIA Land Use Classification	Agricultural Land, Forestland					
Reach Summery Information						
Parameters	**Long Bay Creek**	**UT1**	**UT2**	**UT3**	**UT4**	**UT5**
Length of reach (lf)	2,077 (RHSII)	811 (RHSII)	636	739	447	597
Valley classification	Type X	Type X	Type X	Type X	Type X	Type X
Drainage area (acres)	1,638 acres	46 acres	602 acres	142 acres	84 acres	120 acres
NCDWQ Water Quality Classification	C; SW	C; SW	C; SW	C; SW	C; SW	C; SW
Morphological Description (stream type)	N/A (Ditched channel)	N/A (Ditched channel)	N/A (Ditched channel)	N/A (Ditched	N/A (Ditched channel)	N/A (Ditched channel)
Evolutionary trend	Channelized	Channelized	Channelized	Channelized	Channelized	Channelized
Mapped Soil Series	Johnston	Torhunta	Johnston	Johnston	Stallings	Johnston
Drainage class	Very poorly drained	Very poorly drained	Very poorly drained	Very poorly drained	Somewhat poorly drained	Very poorly drained
Soil Hydric status	Hydric A/D	Hydric A/D	Hydric A/D	Hydric A/D	Hydric A/D	Hydric A/D
Slope	0%	0%	0%	0%	0%	0%
FEMA classification	None	None	None	None	None	None
Existing vegetation community	Headwater Forest	Row crops	Headwater Forest	Headwater Forest	Headwater Forest	Headwater Forest
Wetland Summary Information						
Parameters	**W1, W2, WA**		**WC, WD**		**WB, WE**	
Size of Wetland (acres)	4.85 acres		3.05 acres		18.92 acres	
Wetland Type	Bottomland hardwood forest		Non-tidal freshwater marsh/headwater forest		Riverine swamp forest	
Mapped Soil Series	Johnston		Johnston		Johnston	
Drainage class	Very poorly drained		Very poorly drained		Very poorly drained	
Soil Hydric Status	Non-hydric		Hydric		Hydric	
Source of Hydrology	Surface water		Stream floodplain		Stream floodplain	
Hydrologic Impairment	Ditching		Ditching		Ditching	
Existing vegetation	Headwater forest		Headwater forest		Headwater forest	
Regulatory Considerations						
Regulation		**Applicable?**	**Resolved?**	**Supporting**		
Waters of the United States – Section 404		Yes	Yes	Jurisdictional		
Waters of the United States – Section 401		Yes	Yes	Jurisdictional		
Endangered Species Act**		No	N/A	N/A		
Historic Preservation Act**		No	N/A	N/A		
Coastal Zone Management Act ** (CZMA)/ Coastal Area Management Act (CAMA)		No	N/A	N/A		
FEMA Floodplain Compliance		Yes	Yes	FEMA Floodplain Checklist		
Essential Fisheries Habitat**		No	N/A	N/A		

APPENDIX B

Visual Assessment Data

Rough Horn Swamp Easement (34.5 ac)

Rough Horn Swamp II Easement (62.3 ac)

Filled Ditches

Unaltered Ditch

Coastal Plain Stream Corridor

Photo Points

Vegetation Plots

Permanent, Successful

Permanent, Not Successful

Random, Successful

Random, Not Successful

Wetland Gauges

Successful

Not Successful

Stream Gauge

RHS - Mitigation

Nonriparian Re-establishment (11.873 ac / 11.873 WMCs)

Riparian Re-establishment (20.267 ac / 20.267 WMCs)

RHS - Stream Center Line (2,132 lf - No Credit)

RHSII - Mitigation

Non-Riparian Wetland Re-establishment (1.619 ac - No Credit)

Riparian Wetland Enhancement (5.956 ac / 2.382 WMCs)

Riparian Wetland Re-establishment (17.079 ac / 17.079 WMCs)

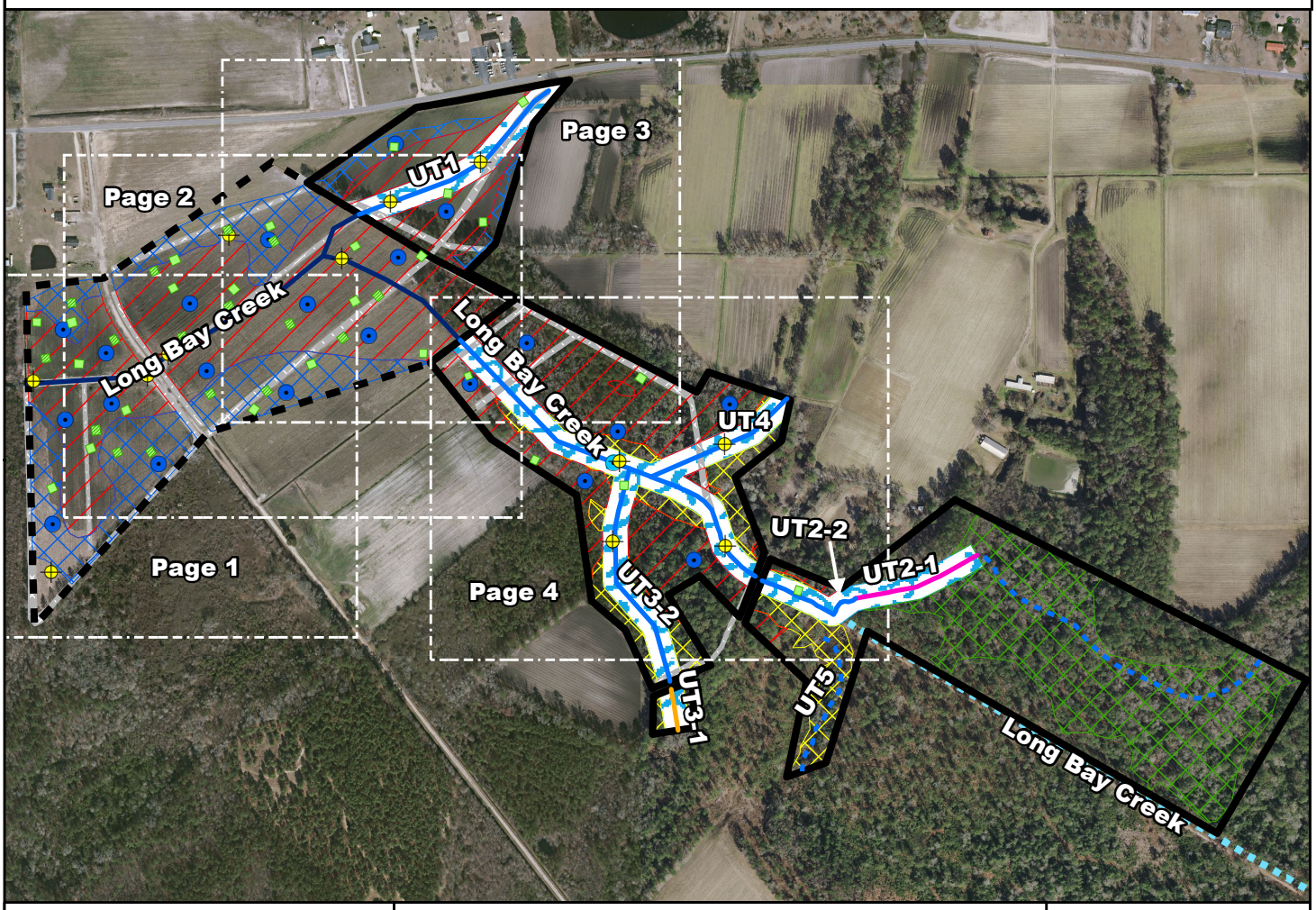
Riparian Wetland Preservation (15.319 ac / 1.532 WMCs)

No Credit

Stream Restoration (4,446 lf / 4,446 SMCs)

Stream Enhancement 2 (164 lf / 66 SMCs)

Stream Preservation (516 lf / 52 SMCs)



0 400 800 Feet

CURRENT CONDITIONS PLANVIEW
ROUGH HORN SWAMP RESTORATION SITE &
ROUGH HORN SWAMP II RESTORATION SITE
COLUMBUS COUNTY, NC

N

Source: NC Statewide Orthoimagery, 2016 and 2017

Rough Horn Swamp Easement (34.5 ac)

Rough Horn Swamp II Easement (62.3 ac)

Filled Ditches

Unaltered Ditch

Coastal Plain Stream Corridor

Photo Points

Vegetation Plots

Permanent, Successful

Permanent, Not Successful

Random, Successful

Random, Not Successful

Wetland Gauges

Successful

Not Successful

Stream Gauge

RHS - Mitigation

Nonriparian Re-establishment (11.873 ac / 11.873 WMCs)

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RHS - Stream Center Line (2,132 lf - No Credit)

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No Credit

Stream Restoration (4,446 lf / 4,446 SMCs)

Stream Enhancement 2 (164 lf / 66 SMCs)

Stream Preservation (516 lf / 52 SMCs)

0 150 300 Feet

CURRENT CONDITIONS PLANVIEW
ROUGH HORN SWAMP RESTORATION SITE &
ROUGH HORN SWAMP II RESTORATION SITE
COLUMBUS COUNTY, NC

N

Source: NC Statewide Orthoimagery, 2016 and 2017

Rough Horn Swamp Easement (34.5 ac)

Rough Horn Swamp II Easement (62.3 ac)

Filled Ditches

Unaltered Ditch

Coastal Plain Stream Corridor

Photo Points

Vegetation Plots

Permanent, Successful

Permanent, Not Successful

Random, Successful

Random, Not Successful

Wetland Gauges

Successful

Not Successful

Stream Gauge

RHS - Mitigation

Nonriparian Re-establishment (11.873 ac / 11.873 WMCs)

Riparian Re-establishment (20.267 ac / 20.267 WMCs)

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Non-Riparian Wetland Re-establishment (1.619 ac - No Credit)

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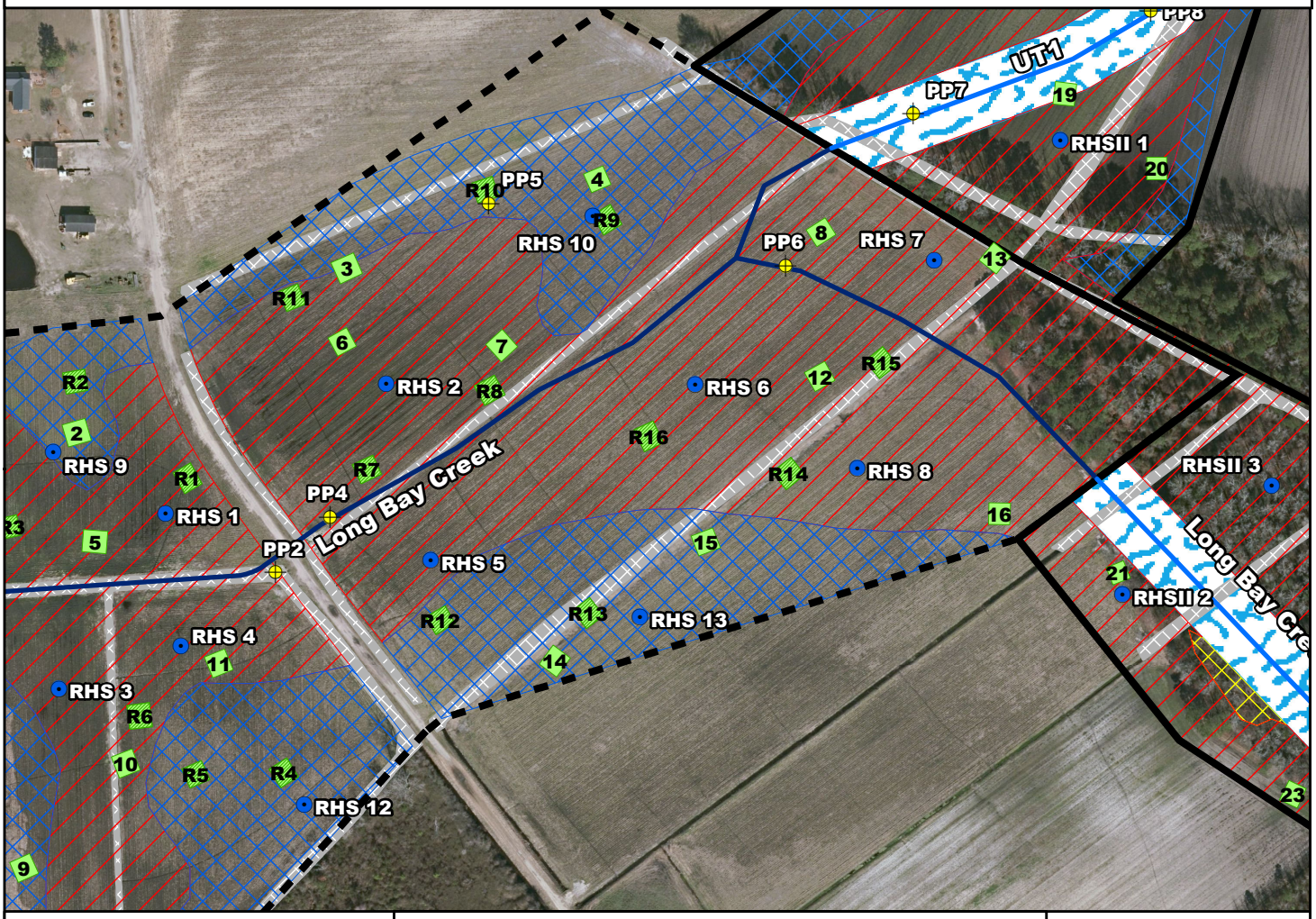


0 150 300 Feet

CURRENT CONDITIONS PLANVIEW
ROUGH HORN SWAMP RESTORATION SITE &
ROUGH HORN SWAMP II RESTORATION SITE
COLUMBUS COUNTY, NC

N

Source: NC Statewide Orthoimagery, 2016 and 2017

Rough Horn Swamp Easement (34.5 ac)

Rough Horn Swamp II Easement (62.3 ac)

Filled Ditches

Unaltered Ditch

Coastal Plain Stream Corridor

Photo Points

Vegetation Plots

Permanent, Successful

Permanent, Not Successful

Random, Successful

Random, Not Successful

Wetland Gauges

Successful

Not Successful

Stream Gauge

RHS - Mitigation

Nonriparian Re-establishment (11.873 ac / 11.873 WMCs)

Riparian Re-establishment (20.267 ac / 20.267 WMCs)

RHS - Stream Center Line (2,132 lf - No Credit)

RHSII - Mitigation

Non-Riparian Wetland Re-establishment (1.619 ac - No Credit)

Riparian Wetland Enhancement (5.956 ac / 2.382 WMCs)

Riparian Wetland Re-establishment (17.079 ac / 17.079 WMCs)

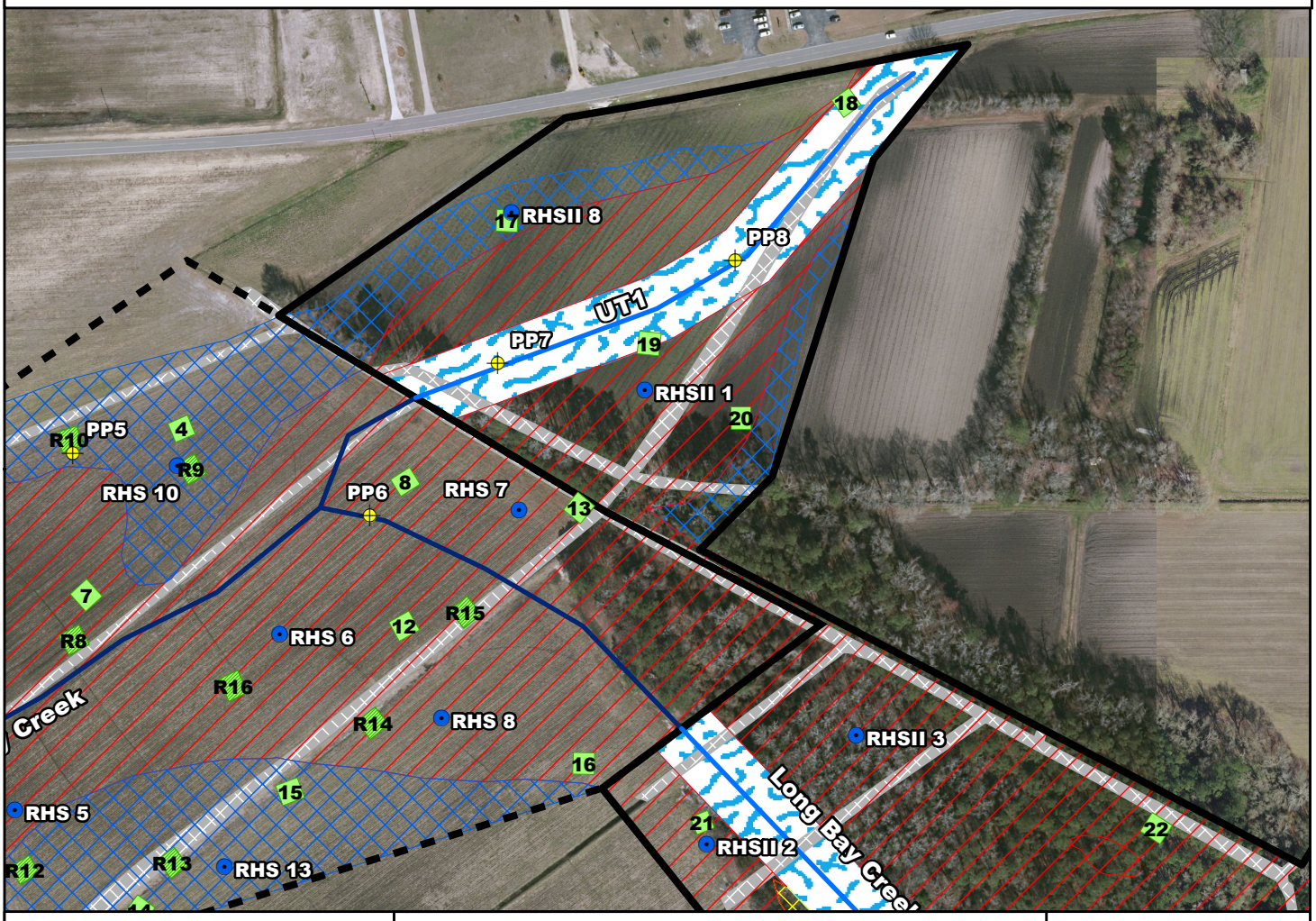
Riparian Wetland Preservation (15.319 ac / 1.532 WMCs)

No Credit

Stream Restoration (4,446 lf / 4,446 SMCs)

Stream Enhancement 2 (164 lf / 66 SMCs)

Stream Preservation (516 lf / 52 SMCs)



0 150 300 Feet

CURRENT CONDITIONS PLANVIEW
ROUGH HORN SWAMP RESTORATION SITE &
ROUGH HORN SWAMP II RESTORATION SITE
COLUMBUS COUNTY, NC

N

Source: NC Statewide Orthoimagery, 2016 and 2017

Rough Horn Swamp Easement (34.5 ac)

Rough Horn Swamp II Easement (62.3 ac)

Filled Ditches

Unaltered Ditch

Coastal Plain Stream Corridor

Photo Points

Vegetation Plots

Permanent, Successful

Permanent, Not Successful

Random, Successful

Random, Not Successful

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Stream Gauge

RHS - Mitigation

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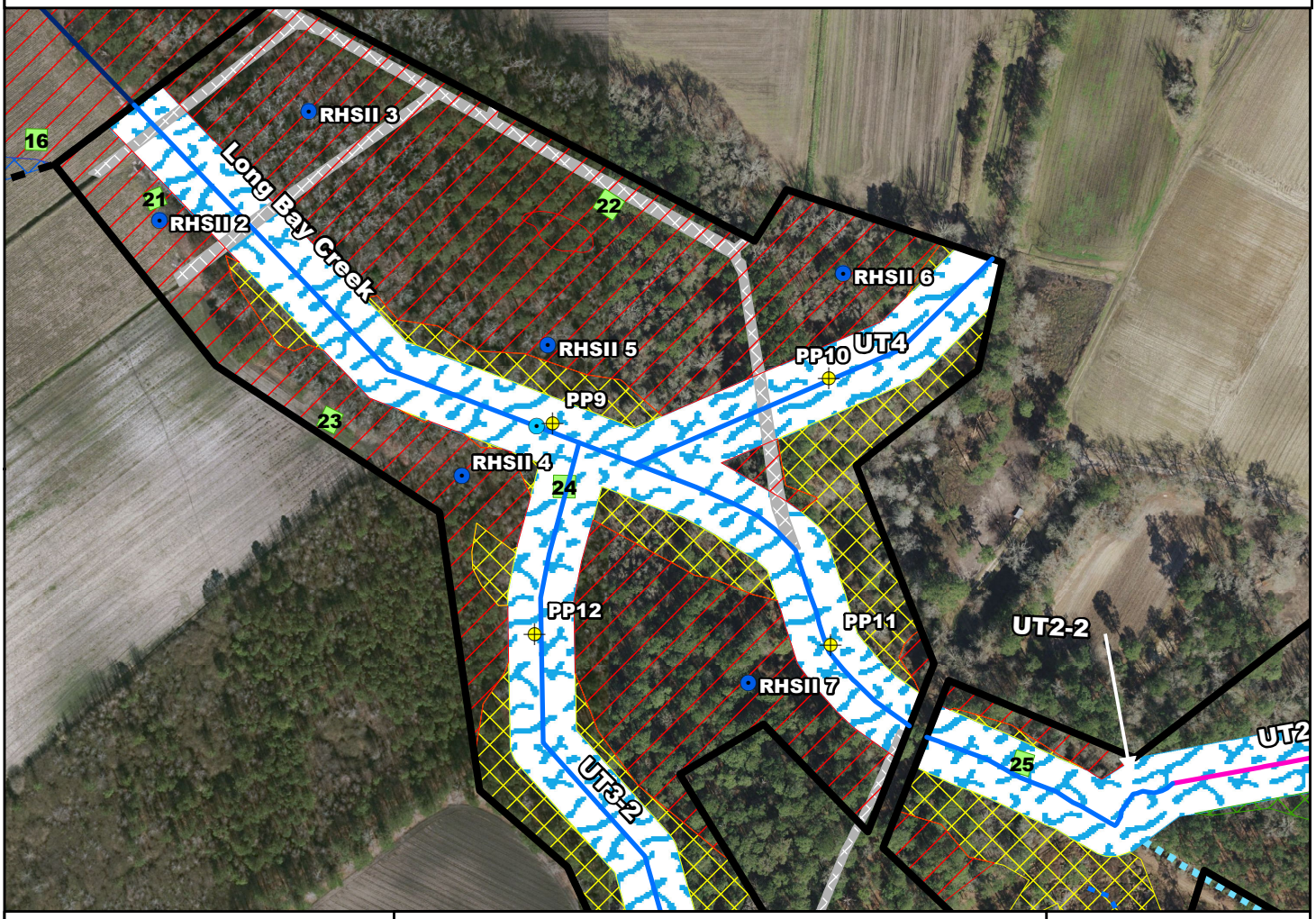
No Credit

Stream Restoration (4,446 lf / 4,446 SMCs)

Stream Enhancement 2 (164 lf / 66 SMCs)

Stream Preservation (516 lf / 52 SMCs)



0 150 300 Feet

CURRENT CONDITIONS PLANVIEW
ROUGH HORN SWAMP RESTORATION SITE &
ROUGH HORN SWAMP II RESTORATION SITE
COLUMBUS COUNTY, NC

N

Source: NC Statewide Orthoimagery, 2016 and 2017

Photo Reference Points

PP1 – MY-00 – 4/8/20

PP2 – MY-00 – 4/8/20

PP3 – MY-00 – 4/8/20

PP4 – MY-00 – 4/8/20

PP5 – MY-00 – 4/8/20

PP6 – MY-00 – 4/8/20

PP7 – MY-00 – 4/8/20

PP8 – MY-00 – 4/8/20

PP9 – MY-00 – 4/8/20

PP10 – MY-00 – 4/8/20

PP11 – MY-00 – 4/8/20

PP12 – MY-00 – 4/8/20

Vegetation Plot Photos

Vegetation Plot 1 – MY-00 – 3/11/20

Vegetation Plot 2 – MY-00 – 3/11/20

Vegetation Plot 3 – MY-00 – 3/19/20

Vegetation Plot 4 – MY-00 – 3/19/20

Vegetation Plot 5 – MY-00 – 3/11/20

Vegetation Plot 6 – MY-00 – 3/19/20

Vegetation Plot 7 – MY-00 – 3/19/20

Vegetation Plot 8 – MY-00 – 3/19/20

Vegetation Plot 9 – MY-00 – 3/11/20

Vegetation Plot 10 – MY-00 – 3/11/20

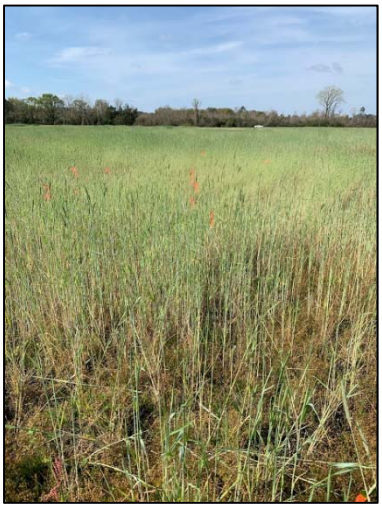
Vegetation Plot 11 – MY-00 – 3/11/20

Vegetation Plot 12 – MY-00 – 3/20/20

Vegetation Plot 13– MY-00 – 4/8/20

Vegetation Plot 14 – MY-00 – 3/11/20

Vegetation Plot 15 – MY-00 – 3/20/20



Vegetation Plot 16 – MY-00 – 3/20/20

Vegetation Plot 17 – MY-00 – 3/20/20

Vegetation Plot 18 – MY-00 – 3/23/20

Vegetation Plot 19 – MY-00 – 3/23/20

Vegetation Plot 20 – MY-00 – 3/23/20

Vegetation Plot 21 – MY-00 – 3/20/20

Vegetation Plot 22 – MY-00 – 3/23/20

Vegetation Plot 23 – MY-00 – 3/20/20

Vegetation Plot 24 – MY-00 – 3/23/20

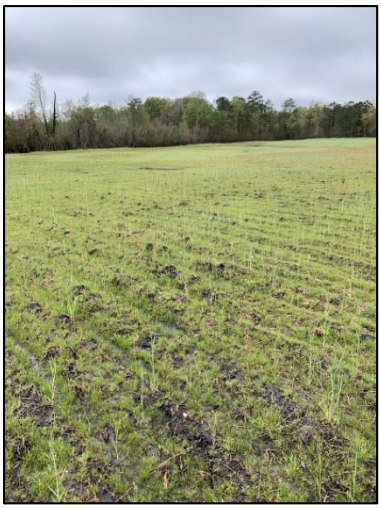
Vegetation Plot 25 – MY-00 – 3/23/20

Vegetation Plot R1 – MY-00 – 3/25/20

Vegetation Plot R2 – MY-00 – 3/25/20

Vegetation Plot R3 – MY-00 – 3/25/20

Vegetation Plot R4 – MY-00 – 3/25/20



Vegetation Plot R5 – MY-00 – 3/25/20

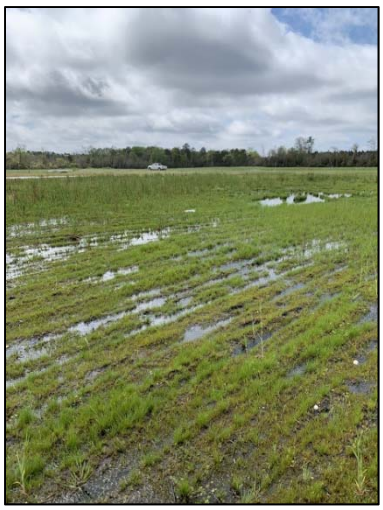
Vegetation Plot R6 – MY-00 – 3/25/20

Vegetation Plot R7 – MY-00 – 3/25/20

Vegetation Plot R8 – MY-00 – 3/25/20

Vegetation Plot R9 – MY-00 – 3/25/20

Vegetation Plot R10 – MY-00 – 3/25/20



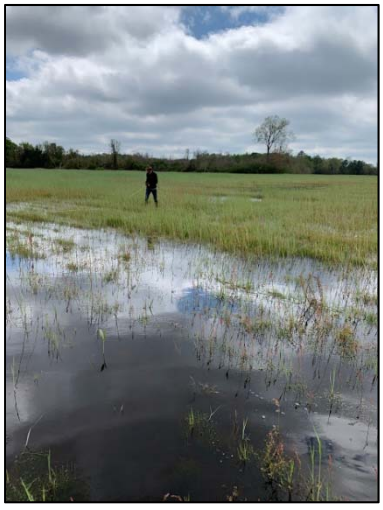
Vegetation Plot R11 – MY-00 – 3/25/20

Vegetation Plot R12 – MY-00 – 3/25/20

Vegetation Plot R13 – MY-00 – 3/25/20

Vegetation Plot R14 – MY-00 – 3/25/20

Vegetation Plot R15 – MY-00 – 3/25/20



Vegetation Plot R16 – MY-00 – 3/25/20

APPENDIX C

Vegetation Plot Data

Table 5. Stem Count by Plot and Species
Rough Horn Swamp and Rough Horn Swamp II, DMS Project #97005 and 100053

	Current Plot Data (MY00 2020)									
	Plot 01		Plot 02		Plot 03		Plot 04		Plot 05	
Species	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Bald Cypress (*Taxodium distichum)*	14	14	1	1	3	3			10	10
Black Willow (*Salix nigra*)										
Buttonbush (*Cephalanthus occidentalis*)					1	1				
Laurel Oak (*Quercus laurifolia)*			3	3	7	7	7	7		
Loblolly Pine (*Pinus taeda*)										
Oak (*Quercus sp.)*	1	1	9	9	2	2	5	5	8	8
Red Maple (*Acer rubrum*)										
River Birch (*Betula nigra*)	1	1	3	3	4	4	6	6	1	1
Silky Dogwood (*Cornus amomum*)										
Swamp Bay (*Persea palustris*)	4	4							2	2
Swamp Chestnut Oak (*Quercus michauxii*)										
Sweetgum (*Liquidambar styraciflua*)										
Willow Oak (*Quercus phellos*)										
Unknown	5	5	5	5	4	4	6	6	4	4
Stem count	25	25	21	21	21	21	24	24	25	25
size (ares)	1		1		1		1		1	
size (ACRES)	0.025		0.025		0.025		0.025		0.025	
Species count	5	5	5	5	6	6	4	4	5	5
Stems per ACRE	1,012	1,012	850	850	850	850	971	971	1,012	1,012

Table 5. Stem Count by Plot and Species
Rough Horn Swamp and Rough Horn Swamp II, DMS Project #97005 and 100053

	Current Plot Data (MY00 2020)									
	Plot 06		Plot 7		Plot 8		Plot 9		Plot 10	
Species	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Bald Cypress (*Taxodium distichum)*	8	8	15	15	21	21	1	1	10	10
Black Willow (*Salix nigra*)										
Buttonbush (*Cephalanthus occidentalis*)										
Laurel Oak (*Quercus laurifolia)*							11	11		
Loblolly Pine (*Pinus taeda*)										
Oak (*Quercus sp.)*	3	3	3	3	1	1	2	2	4	4
Red Maple (*Acer rubrum*)										
River Birch (*Betula nigra*)	7	7					4	4	1	1
Silky Dogwood (*Cornus amomum*)										
Swamp Bay (*Persea palustris*)	2	2			1	1			1	1
Swamp Chestnut Oak (*Quercus michauxii*)										
Sweetgum (*Liquidambar styraciflua*)										
Willow Oak (*Quercus phellos*)										
Unknown	4	4	7	7	2	2	8	8	6	6
Stem count	24	24	25	25	25	25	26	26	22	22
size (ares)	1		1		1		1		1	
size (ACRES)	0.025		0.025		0.025		0.025		0.025	
Species count	5	5	3	3	4	4	5	5	5	5
Stems per ACRE	971	971	1,012	1,012	1,012	1,012	1,052	1,052	890	890

Table 5. Stem Count by Plot and Species
Rough Horn Swamp and Rough Horn Swamp II, DMS Project #97005 and 100053

	Current Plot Data (MY00 2020)									
	Plot 11		Plot 12		Plot 13		Plot 14		Plot 15	
Species	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Bald Cypress (*Taxodium distichum)*	13	13			11	11				
Black Willow (*Salix nigra*)										
Buttonbush (*Cephalanthus occidentalis*)					1	1				
Laurel Oak (*Quercus laurifolia)*							4	4	7	7
Loblolly Pine (*Pinus taeda*)										
Oak (*Quercus sp.)*	4	4	3	3			4	4	1	1
Red Maple (*Acer rubrum*)						4				
River Birch (*Betula nigra*)	2	2	5	5	14	14	7	7	5	5
Silky Dogwood (*Cornus amomum*)					1	1				
Swamp Bay (*Persea palustris*)										
Swamp Chestnut Oak (*Quercus michauxii*)					2	2				
Sweetgum (*Liquidambar styraciflua*)										
Willow Oak (*Quercus phellos*)					3	3			1	1
Unknown	3	3	13	13	2	2	4	4	4	4
Stem count	22	22	21	21	34	38	19	19	18	18
size (ares)	1		1		1		1		1	
size (ACRES)	0.025		0.025		0.025		0.025		0.025	
Species count	4	4	3	3	7	8	4	4	5	5
Stems per ACRE	890	890	850	850	1,376	1,538	769	769	728	728

Table 5. Stem Count by Plot and Species
Rough Horn Swamp and Rough Horn Swamp II, DMS Project #97005 and 100053

	Current Plot Data (MY00 2020)									
	Plot 16		Plot 17		Plot 18		Plot 19		Plot 20	
Species	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Bald Cypress (*Taxodium distichum)*							19	19	6	6
Black Willow (*Salix nigra*)										
Buttonbush (*Cephalanthus occidentalis*)										
Laurel Oak (*Quercus laurifolia)*			1	1	6	6				
Loblolly Pine (*Pinus taeda*)										
Oak (*Quercus sp.)*	3	3	5	5	9	9	6	6	3	3
Red Maple (*Acer rubrum*)										
River Birch (*Betula nigra*)	2	2	7	7	5	5	1	1	4	4
Silky Dogwood (*Cornus amomum*)										
Swamp Bay (*Persea palustris*)	1	1					1	1		
Swamp Chestnut Oak (*Quercus michauxii*)			3	3					1	1
Sweetgum (*Liquidambar styraciflua*)										
Willow Oak (*Quercus phellos*)										
Unknown	13	13	1	1	6	6			3	3
Stem count	19	19	17	17	26	26	27	27	17	17
size (ares)	1		1		1		1		1	
size (ACRES)	0.025		0.025		0.025		0.025		0.025	
Species count	4	4	5	5	4	4	4	4	5	5
Stems per ACRE	769	769	688	688	1,052	1,052	1,093	1,093	688	688

Table 5. Stem Count by Plot and Species
Rough Horn Swamp and Rough Horn Swamp II, DMS Project #97005 and 100053

	Current Plot Data (MY00 2020)									
	Plot 21		Plot 22		Plot 23		Plot 24		Plot 25	
Species	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Bald Cypress (*Taxodium distichum)*			9	9			14	14	21	21
Black Willow (*Salix nigra*)						1				
Buttonbush (*Cephalanthus occidentalis*)										
Laurel Oak (*Quercus laurifolia)*										
Loblolly Pine (*Pinus taeda*)						3				
Oak (*Quercus sp.)*	5	5	2	2	9	9			3	3
Red Maple (*Acer rubrum*)		15								
River Birch (*Betula nigra*)	2	2			8	8	3	3		
Silky Dogwood (*Cornus amomum*)									6	6
Swamp Bay (*Persea palustris*)			2	2	1	1	1	1	1	1
Swamp Chestnut Oak (*Quercus michauxii*)									1	1
Sweetgum (*Liquidambar styraciflua*)		3								
Willow Oak (*Quercus phellos*)										
Unknown	16	16	7	7	10	10	4	4		
Stem count	23	41	20	20	28	32	22	22	32	32
size (ares)	1		1		1		1		1	
size (ACRES)	0.025		0.025		0.025		0.025		0.025	
Species count	3	5	4	4	4	6	4	4	5	5
Stems per ACRE	931	1,659	809	809	1,133	1,295	890	890	1,295	1,295

Table 5. Stem Count by Plot and Species
Rough Horn Swamp and Rough Horn Swamp II, DMS Project #97005 and 100053

	Current Plot Data (MY00 2020)									
	Plot R1		Plot R2		Plot R3		Plot R4		Plot R5	
Species	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Bald Cypress (*Taxodium distichum)*	6	6			10	10	1	1	1	1
Black Willow (*Salix nigra*)										
Buttonbush (*Cephalanthus occidentalis*)										
Laurel Oak (*Quercus laurifolia)*							1	1		
Loblolly Pine (*Pinus taeda*)										
Oak (*Quercus sp.)*	8	8	10	10	2	2	9	9	10	10
Red Maple (*Acer rubrum*)						2				
River Birch (*Betula nigra*)	2	2	12	12	3	3	6	6	6	6
Silky Dogwood (*Cornus amomum*)										
Swamp Bay (*Persea palustris*)					6	6				
Swamp Chestnut Oak (*Quercus michauxii*)										
Sweetgum (*Liquidambar styraciflua*)										
Willow Oak (*Quercus phellos*)										
Unknown	6	6	3	3	3	3	2	2		
Stem count	22	22	25	25	24	26	19	19	17	17
size (ares)	1		1		1		1		1	
size (ACRES)	0.025		0.025		0.025		0.025		0.025	
Species count	4	4	3	3	5	6	5	5	3	3
Stems per ACRE	890	890	1,012	1,012	971	1,052	769	769	688	688

Table 5. Stem Count by Plot and Species
Rough Horn Swamp and Rough Horn Swamp II, DMS Project #97005 and 100053

	Current Plot Data (MY00 2020)									
	Plot R6		Plot R7		Plot R8		Plot R9		Plot R10	
Species	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Bald Cypress (*Taxodium distichum)*	7	7	10	10	17	17	4	4	1	1
Black Willow (*Salix nigra*)										
Buttonbush (*Cephalanthus occidentalis*)										
Laurel Oak (*Quercus laurifolia)*										
Loblolly Pine (*Pinus taeda*)										
Oak (*Quercus sp.)*	5	5	4	4	2	2	10	10	9	9
Red Maple (*Acer rubrum*)										
River Birch (*Betula nigra*)			2	2			4	4	8	8
Silky Dogwood (*Cornus amomum*)										
Swamp Bay (*Persea palustris*)	4	4	2	2						
Swamp Chestnut Oak (*Quercus michauxii*)					1	1				
Sweetgum (*Liquidambar styraciflua*)										
Willow Oak (*Quercus phellos*)										
Unknown	2	2			3	3	1	1		
Stem count	18	18	18	18	23	23	19	19	18	18
size (ares)	1		1		1		1		1	
size (ACRES)	0.025		0.025		0.025		0.025		0.025	
Species count	4	4	4	4	4	4	4	4	3	3
Stems per ACRE	728	728	728	728	931	931	769	769	728	728

Table 5. Stem Count by Plot and Species
Rough Horn Swamp and Rough Horn Swamp II, DMS Project #97005 and 100053

	Current Plot Data (MY00 2020)									
	Plot R11		Plot R12		Plot R13		Plot R14		Plot R15	
Species	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Bald Cypress (*Taxodium distichum)*	6	6			1	1			10	10
Black Willow (*Salix nigra*)										
Buttonbush (*Cephalanthus occidentalis*)										
Laurel Oak (*Quercus laurifolia)*										
Loblolly Pine (*Pinus taeda*)										
Oak (*Quercus sp.)*	8	8	11	11	14	14	5	5	10	10
Red Maple (*Acer rubrum*)										
River Birch (*Betula nigra*)	4	4	6	6	2	2	4	4		
Silky Dogwood (*Cornus amomum*)										
Swamp Bay (*Persea palustris*)							2	2	1	1
Swamp Chestnut Oak (*Quercus michauxii*)										
Sweetgum (*Liquidambar styraciflua*)										
Willow Oak (*Quercus phellos*)										
Unknown	1	1	1	1			3	3	1	1
Stem count	19	19	18	18	17	17	14	14	22	22
size (ares)	1		1		1		1		1	
size (ACRES)	0.025		0.025		0.025		0.025		0.025	
Species count	4	4	3	3	3	3	4	4	4	4
Stems per ACRE	769	769	728	728	688	688	567	567	890	890

Table 5. Stem Count by Plot and Species Rough Horn Swamp and Rough Horn Swamp II, DMS Project #97005 and 100053				
			Annual Means	
	Plot R16		MY00 (2020)	
Species	Planted	Total	Planted	Total
Bald Cypress (*Taxodium distichum)*	4	4	254	254
Black Willow (*Salix nigra*)				1
Buttonbush (*Cephalanthus occidentalis*)			2	2
Laurel Oak (*Quercus laurifolia)*			47	47
Loblolly Pine (*Pinus taeda*)				3
Oak (*Quercus sp.)*	9	9	221	221
Red Maple (*Acer rubrum*)				21
River Birch (*Betula nigra*)	5	5	156	156
Silky Dogwood (*Cornus amomum*)			7	7
Swamp Bay (*Persea palustris*)	1	1	33	33
Swamp Chestnut Oak (*Quercus michauxii*)	1	1	9	9
Sweetgum (*Liquidambar styraciflua*)				3
Willow Oak (*Quercus phellos*)			4	4
Unknown	3	3	166	166
Stem count	23	23	899	927
size (ares)	1		41	
size (ACRES)	0.025		1.01	
Species count	6	6	10	14
Stems per ACRE	931	931	887	915

APPENDIX D

As-built Plan Sheet

CONTRACT #: 6596 & 7514

KCI JOB# : 20152925 & 161802917

NCDEQ DIVISION OF MITIGATION SERVICES

STATE	CONTRACT NUMBER	SHEET NO.	TOTAL SHEETS
N.C.	6596 & 7514	1	11

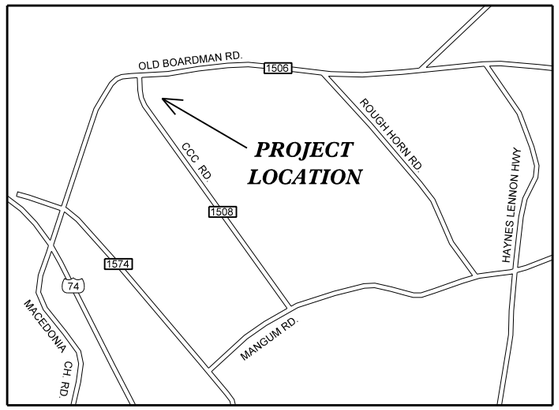
ROUGH HORN SWAMP & ROUGH HORN SWAMP II RESTORATION SITES

AS–BUILT PLANS

NOTE:
NO MAJOR CHANGES WERE MADE TO THE ORIGINAL CONSTRUCTION PLANS.

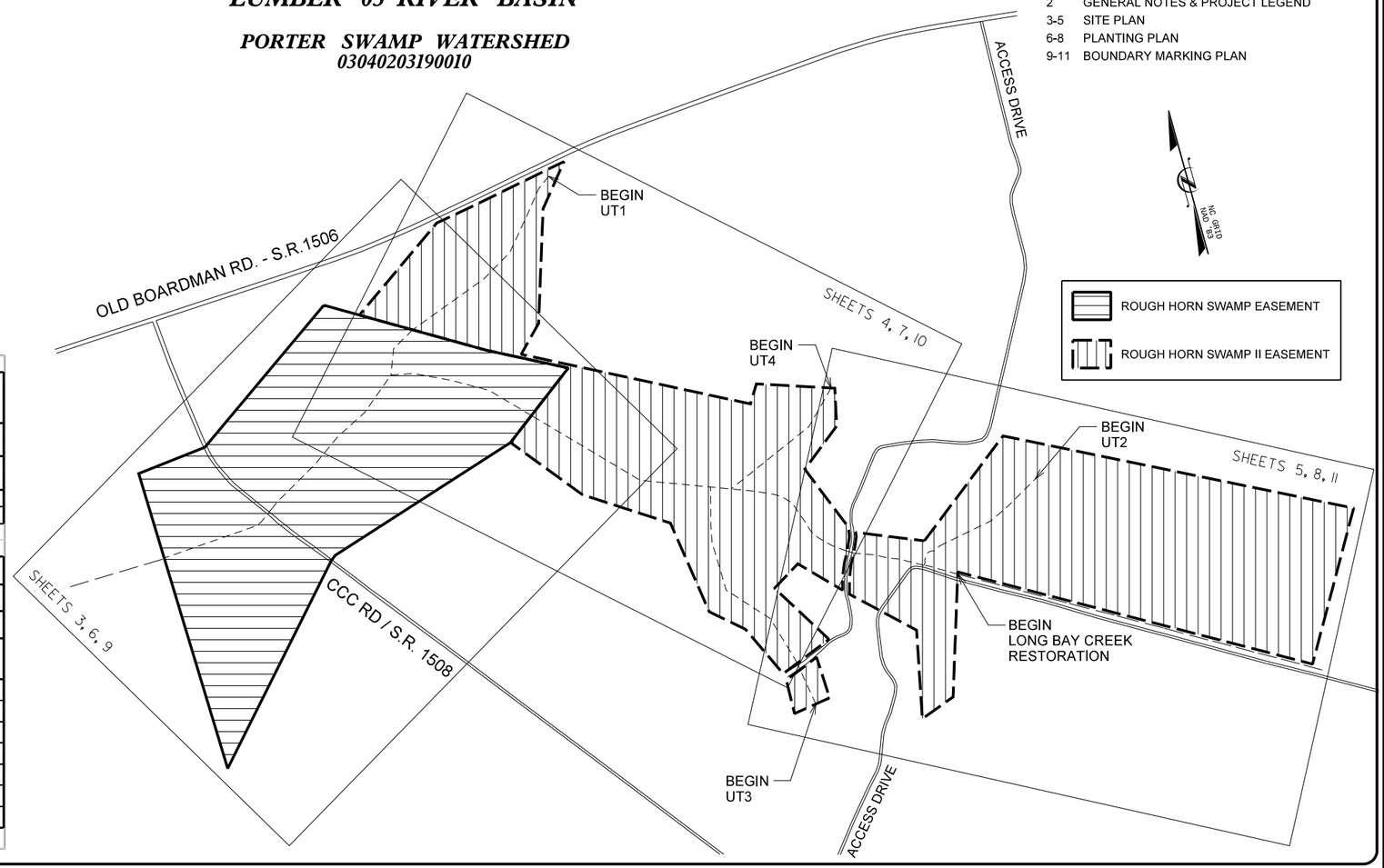
COLUMBUS COUNTY, NORTH CAROLINA
LUMBER 03 RIVER BASIN

PORTER SWAMP WATERSHED
03040203190010



VICINITY MAP
NOT TO SCALE

INDEX OF SHEETS



RHS - Project Asset Table

Project Component -or- Reach ID	Existing Footage/ Acreage	Stationing	Restoration Footage or Acreage	Creditable Footage or Acreage	Restoration Level	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Credits
Riparian Wetland	None (Drained Wetland)	N/A	20.267	20.267	Restoration (Re-establishment)	N/A	1 : 1	20.267
Non-Riparian Wetland	0.160 ac existing wetland	N/A	11.873	11.873	Restoration (Re-establishment)	N/A	1 : 1	11.873
Stream - LBC	3,470	30+49 to 50+08	1,959	1,899	Restoration	I	1 : 1	-
Stream - UT1	4	109+17 to 111+50	233	233	Restoration	I	1 : 1	-

RHSII - Project Asset Table

Riparian Wetland Restoration	None (Drained Wetland)	N/A	17.079	17.079	Restoration (Re-establishment)	N/A	1 : 1	17.079
Riparian Wetland Enhancement	7.900	N/A	5.956	5.956	Enhancement	N/A	2.5 : 1	2.382
Riparian Wetland Preservation	16.700	N/A	15.319	15.319	Preservation	N/A	10 : 1	1.532
Non-Riparian Wetland Restoration	None (Drained Wetland)	N/A	1.619	1.619	Restoration (Re-establishment)	N/A	1 : 1	-
Stream - LBC	2077	10+00 to 30+49	2,049	1,866	Restoration	I	1 : 1	1,866
Stream - UT1	811	100+00 to 109+17	917	917	Restoration	I	1 : 1	917
Stream - UT2-1	516	200+00 to 205+16	516	516	Preservation	I	10 : 1	52
Stream - UT2-2	120	205+16 to 206+36	120	120	Restoration	I	1 : 1	120
Stream - UT3-1	168	300+00 to 301+64	164	164	Enhancement II	I	2.5 : 1	66
Stream - UT3-2	571	301+95 to 311+09	914	914	Restoration	I	1 : 1	914
Stream - UT4	447	400+00 to 406+29	629	629	Restoration	I	1 : 1	629

* Crossings have been removed from creditable linear footage for all project streams.

DIRECTIONS TO SITE

FROM RALEIGH, TAKE I–40 EAST. AT BENSON, EXIT ONTO I–95 SOUTH. FOLLOW I–95 SOUTH TO LUMBERTON. TAKE EXIT 13A TO MERGE ONTO US–74 EAST. FOLLOW US–74 EAST FOR ABOUT 12 MILES, THEN TAKE A LEFT ONTO OLD BOARDMAN ROAD (S.R. 1506). AFTER APPROXIMATELY 1.5 MILES, TAKE A RIGHT ONTO S.R. 1508. THE SITE IS 400 FEET DOWN THE STREET.

Prepared in the Office of:

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

GARY M. MRYNCZA, PE
PROJECT ENGINEER

ALEX FRENCH
PROJECT DESIGNER

Prepared for:

NCDEQ – DIVISION OF MITIGATION SERVICES

LINDSAY CROCKER
DMS PROJECT MANAGER

LIN XU
DMS REVIEW COORDINATOR

PROJECT SURVEYOR

P.E.
SIGNATURE:

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

P.E.
SIGNATURE:

GENERAL NOTES:

THIS SET OF PLANS IS BASED OFF OF AN AS-BUILT SURVEY COMPLETED BY KCI ASSOCIATES OF NC IN DECEMBER OF 2019.

THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARENT TRACTS. THE PARENT TRACT BOUNDARIES ADJACENT TO THIS EASEMENT ARE NOT CHANGED BY THIS PLAT.

DISTANCES SHOWN ARE HORIZONTAL GROUND DISTANCES IN U.S. SURVEY FEET UNLESS OTHERWISE NOTED.

THE BASIS OF THE MERIDIANS AND COORDINATES FOR THIS PLAT IS THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM 1983 (NAD 83), BASED ON DIFFERENTIAL GPS OBSERVATIONS. ALL DISTANCES ARE GROUND UNLESS OTHERWISE NOTED.

NO UNDERGROUND UTILITY LOCATING PERFORMED DURING THE COURSE OF THIS SURVEY.

AS-BUILT CONTROL POINTS:

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
3	255051.66	2019649.88	85.26	KCI#3
4	254945.66	2019068.40	85.02	KCI#4
5	254851.79	2018498.60	93.49	KCI#5
7	254277.90	2017857.89	83.92	KCI#7
8	253814.36	2018105.97	82.34	KCI#8
9	253373.72	2018472.74	83.26	KCI#9
10	252906.19	2018813.43	86.23	KCI#10
12	253476.07	2019681.14	84.08	KCI#12
15	254036.12	2020306.43	85.17	KCI#15
16	254458.95	2020345.49	85.63	KCI#16
21	253595.38	2019734.54	82.89	KCI#21
100	253862.89	2018074.99	84.30	MAG SET
101	254706.26	2018686.00	84.82	NL SET
102	253446.39	2019676.24	84.07	NL SET
103	253983.57	2019368.11	83.03	NL SET
104	254851.78	2018498.59	93.54	CHK 5
105	254112.11	2019474.15	83.16	NL SET
106	253914.03	2019839.02	85.40	NL SET
107	253775.84	2020122.96	85.12	NL SET
108	253907.99	2020290.00	85.03	NL SET
109	253337.33	2019799.45	83.76	NL SET
110	253166.07	2019772.71	84.89	NL SET
111	252946.15	2019809.10	84.90	NL SET
112	252606.60	2020039.65	85.08	NL SET
113	252665.02	2020206.31	84.85	NL SET
114	252854.61	2020170.16	84.48	NL SET
115	252970.10	2020166.39	84.90	NL SET
116	253013.77	2020265.04	85.10	NL SET
117	252881.52	2020400.46	85.63	NL SET
118	252512.12	2020176.77	84.13	NL SET
119	253008.33	2020427.95	85.45	NL SET
120	253135.95	2020491.75	86.48	NL SET
300	252657.20	2020206.21	84.82	KCI#300
301	252582.29	2020030.71	84.97	KCI#301
302	252730.32	2020385.18	85.74	KCI#302
304	252434.36	2020045.23	85.68	8049

* FOR COMPLETE LIST OF CONTROL POINTS, CONTACT KCI *

PROJECT LEGEND:

Filled Existing Ditch .....

Installed Boulder Drop .....
(log sills replaced with boulder sills)

Installed Live Lift .....

Installed Woody Debris in Channel .....

Stream Valley Stationing (Design) ..... 10+00 11+00

Installed pilot channel .....

Installed Ditch Plug .....

Existing Woods Line .....

Minor Contour Line (LiDAR) .....

Major Contour Line (LiDAR) 77

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

PROJECT ENGINEER

PROJECT SURVEYOR

REVISIONS

SYM.	DESCRIPTION	DATE

NCDEQ – DIVISION OF MITIGATION SERVICES

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD, SUITE 400
RALEIGH, NORTH CAROLINA 27609

ROUGH HORN SWAMP
& ROUGH HORN SWAMP II
RESTORATION SITES

AS-BUILT PLANS

COLUMBUS COUNTY, NORTH CAROLINA

DATE: APRIL 2020
SCALE: N.T.S.

GENERAL NOTES & PROJECT LEGEND

NC GRID
NAD 83

–80′ –40′ 0′ 80′ 160′
GRAPHIC SCALE

S.R. 1506

CONSERVATION EASEMENT (RH)

INSTALLED CONSTRUCTED RIFFLE / LIVE LIFTS

INSTALLED BOULDER DROP

INSTALLED BOULDER DROP

INSTALLED BOULDER DROP

INSTALLED PITCH PLUG (TYP)

INSTALLED 20'-4"Wx4'-6"H ALUMINUM CULVERT

FILLED DITCH (TYPICAL ALL)

INSTALLED BOULDER DROP

INSTALLED BOULDER DROP

WOODY DEBRIS EMBEDDED IN NEW STREAM THALWEGS TO ACT AS NATURAL HABITAT AND AID IN BED VARIABILITY.

FILLED DITCH (TYPICAL ALL)

CONSERVATION EASEMENT (RH)

INSTALLED DITCH PLUG AND GRADED TO REDIRECT DRAINAGE PATH TOWARD CENTER OF WETLAND

CONSERVATION EASEMENT (RH)

CCC RD / S.R. 1508

REMOVED SPOIL PILES

FILLED DITCH (TYPICAL ALL)

CONSERVATION EASEMENT (RH2)

MATCHLINE - SEE SHEET 4

MATCHLINE - SEE SHEET 4

50+00 49+00 48+00 47+00 46+00 45+00 44+00 43+00 42+00 41+00 40+00 39+00 38+00 37+00 36+00 35+00 34+00 33+00 32+00 31+00 30+00 29+00 28+00 27+00 26+00 25+00 24+00 23+00 22+00 21+00 20+00 19+00 18+00 17+00 16+00 15+00 14+00 13+00 12+00 11+00 10+00 09+00 08+00 07+00 06+00 05+00

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

PROJECT ENGINEER

PROJECT SURVEYOR

REVISIONS			
SYM.	DESCRIPTION	DATE	

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ROUGH HORN SWAMP & ROUGH HORN SWAMP II RESTORATION SITES

AS–BUILT PLANS

COLUMBUS COUNTY, NORTH CAROLINA

DATE: APRIL 2020
SCALE: GRAPHIC

SITE PLAN

SHEET 3 OF 11

OLD BOARDMAN RD. - S.R. 1506

BEGIN UT1 RESTORATION

BOULDER DROP STRUCTURES NOT INSTALLED

CONSERVATION EASEMENT (RH2)

CONFLUENCE OF UT1 AND LONG BAY CREEK

LONG BAY CREEK

FILLED DITCH (TYPICAL ALL)

MATCHLINE - SEE SHEET 3

GRADED TO REDIRECT DRAINAGE PATH TOWARD CENTER OF WETLAND

REMOVED SPOIL PILES

WOODY DEBRIS EMBEDDED IN NEW STREAM THALWEGS TO ACT AS NATURAL HABITAT AND AID IN BED VARIABILITY.

CONFLUENCE OF UT3 AND LONG BAY CREEK

CONFLUENCE OF UT4 AND LONG BAY CREEK

BEGIN UT4 RESTORATION

INSTALLED DITCH PLUG (TYP)

MATCHLINE - SEE SHEET 5

NC GRID NAD 83

–80′ –40′ 0′ 80′ 160′

GRAPHIC SCALE

PROJECT SURVEYOR

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

NO.	DESCRIPTION	DATE
	REVISIONS	

NC NCDEQ – DIVISION OF MITIGATION SERVICES

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ROUGH HORN SWAMP
& ROUGH HORN SWAMP II
RESTORATION SITES

AS–BUILT PLANS

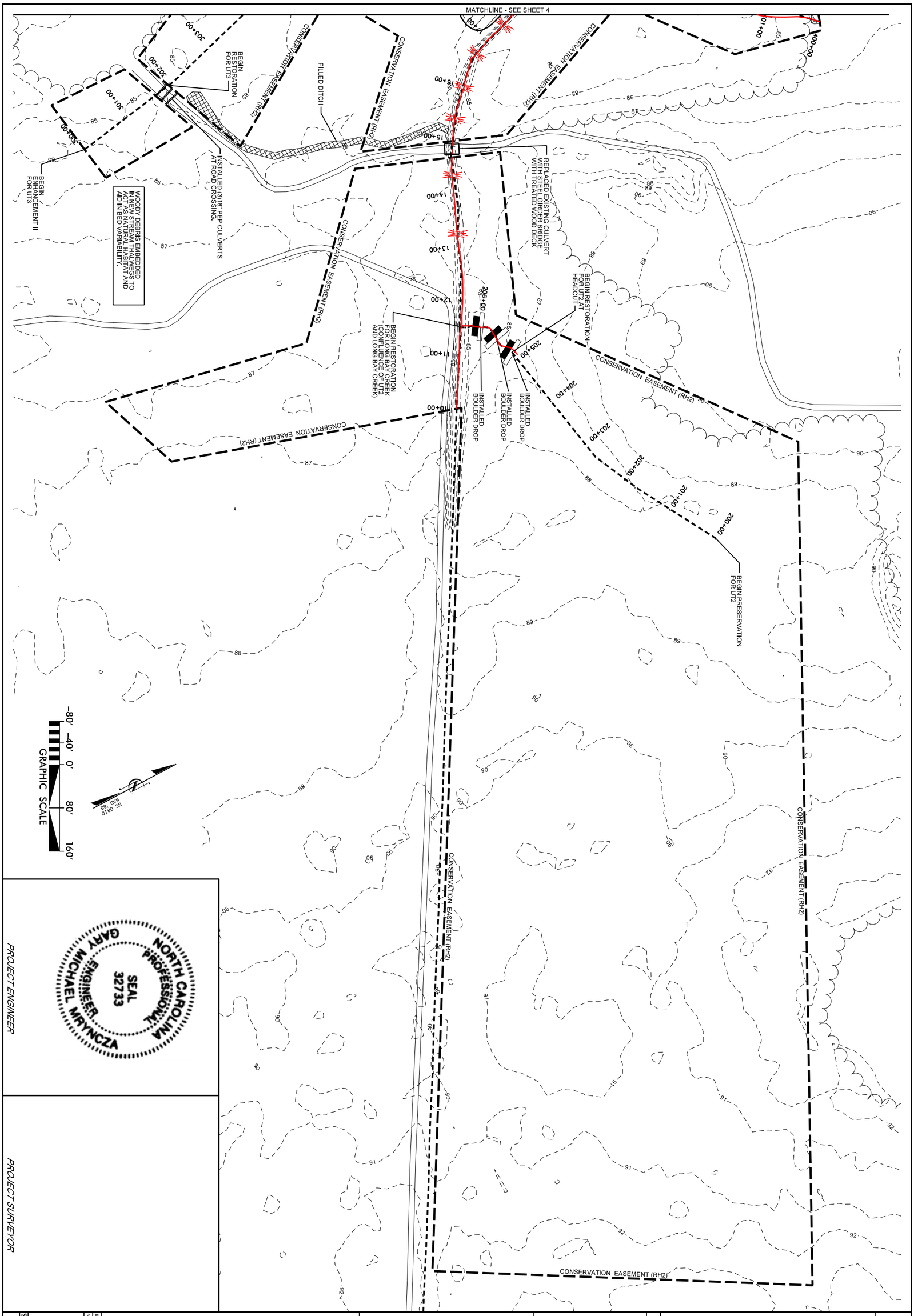
COLUMBUS COUNTY, NORTH CAROLINA

DATE: APRIL 2020

SCALE: GRAPHIC

SITE PLAN

SHEET 4 OF 11



PROJECT ENGINEER

GARY MICHAEL MRYNCZA
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 32733

PROJECT SURVEYOR

SHEET 5 OF 11

SITE PLAN

DATE: APRIL 2020
SCALE: GRAPHIC

ROUGH HORN SWAMP & ROUGH HORN SWAMP II RESTORATION SITES

AS-BUILT PLANS

COLUMBUS COUNTY, NORTH CAROLINA

KCI ASSOCIATES OF NC
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NCDEQ – DIVISION OF MITIGATION SERVICES

SYM.	DESCRIPTION	DATE
	REVISIONS	

PROJECT SURVEYOR

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

S.R. 1506

CONSERVATION EASEMENT (RH)

CONSERVATION EASEMENT (RH)

CONSERVATION EASEMENT (RH)

CCC RD / S.R. 1508

CONSERVATION EASEMENT (RH)

CONSERVATION EASEMENT (RH)

NC GRID MAD 83

–80′ –40′ 0′ 80′ 160′

GRAPHIC SCALE

MATCHLINE - SEE SHEET 7

MATCHLINE - SEE SHEET 7

RIPARIAN PLANTING PLAN

18" - 24" BARE ROOT MATERIAL
968 STEMS/ACRE (9' X 5' SPACING), RANDOM SPECIES PLACEMENT

32.7 ACRES

COMMON NAME	SCIENTIFIC NAME	WETLAND INDICATOR	% OF TOTAL	# OF PLANTS
RIVER BIRCH	BETULA NIGRA	FACW	10	3,170
BUTTONBUSH	CEPHALANTHUS OCCIDENTALIS	OBL	5	1,585
WATER TUPELO	NYSSA AQUATICA	OBL	15	4,755
SWAMP BAY	PERSEA PALUSTRIS	FACW	5	1,585
~~SWAMP TUPELO~~	~~NYSSA BIFLORA~~	~~OBL~~	~~10~~	~~3,170~~
OVERCUP OAK	QUERCUS LYRATA	OBL	5	1,585
SWAMP CHESTNUT OAK	QUERCUS MICHAUXII	FACW	15	4,755
BALD CYPRESS	TAXODIUM DISTICHUM	OBL	40	12,680
~~ATLANTIC WHITE CEDAR~~	~~CHAMAECYPARIS THYOIDES~~	~~OBL~~	~~5~~	~~1,585~~
RED CHOKEBERRY	ARONIA ARBUTIFOLIA	FACW	5	1,585
			100	31,700

NON-RIPARIAN PLANTING PLAN

18" - 24" BARE ROOT MATERIAL
968 STEMS/ACRE (9' X 5' SPACING), RANDOM SPECIES PLACEMENT

13.8 ACRES

COMMON NAME	SCIENTIFIC NAME	WETLAND INDICATOR	% OF TOTAL	# OF PLANTS
RIVER BIRCH	BETULA NIGRA	FACW	25	3,350
AMERICAN SYCAMORE	PLATANUS OCCIDENTALIS	FACW	10	1,340
WATER TUPELO	NYSSA AQUATICA	OBL	5	670
WATER OAK	QUERCUS NIGRA	FAC	5	670
LAUREL OAK	QUERCUS LAURIFOLIA	FACW	20	2,680
OVERCUP OAK	QUERCUS LYRATA	OBL	5	670
SWAMP CHESTNUT OAK	QUERCUS MICHAUXII	FACW	25	3,350
BALD CYPRESS	TAXODIUM DISTICHUM	OBL	5	670
			100	13,400

UPLAND PLANTING PLAN

18" - 24" BARE ROOT MATERIAL
680 STEMS/ACRE (8' X 8' SPACING), RANDOM SPECIES PLACEMENT

2.6 ACRES

COMMON NAME	SCIENTIFIC NAME	WETLAND INDICATOR	% OF TOTAL	# OF PLANTS
SOUTHERN RED OAK	QUERCUS FALCATA	FACU	35	630
~~GREEN ASH~~	~~FRAXINUS PENNSYLVANICA~~	~~FACW~~	~~20~~	~~360~~
WILLOW OAK	QUERCUS PHELLOS	FACW	25	430
AMERICAN ELM	ULMUS AMERICANA	FAC	15	270
PIN OAK	QUERCUS PALUSTRIS	FACW	15	270
PERSIMMON	DIOSPYROS VIRGINIANA	FAC	10	180
			100	1,780

* GREEN ASH REMOVED FROM PLANTIG PLAN

LIVE STAKING NOTE:

ONE ROW OF LIVE STAKES WERE INSTALLED ALONG ALL NEWLY CUT PILOT CHANNELS. (500 EACH OF ELDERBERRY, BLACK WILLOW, SILKY WILLOW, AND SILKY DOGWOOD)

NO.	DESCRIPTION	DATE
	REVISIONS	
1	REVISED PER IRT COMMENTS	APRIL 2019

NCDEQ – DIVISION OF MITIGATION SERVICES

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ROUGH HORN SWAMP
& ROUGH HORN SWAMP II
RESTORATION SITES

AS-BUILT PLANS

COLUMBUS COUNTY, NORTH CAROLINA

DATE: APRIL 2020
SCALE: GRAPHIC

PLANTING PLAN

SHEET 6 OF 11

RIPARIAN PLANTING PLAN

NON-RIPARIAN PLANTING PLAN

UPLAND PLANTING PLAN

*NOTE: SEE SHEET 6 FOR PLANTING QUANTITIES

OLD BOARDMAN RD. - S.R. 1506

CONSERVATION EASEMENT (RH2)

CONSERVATION EASEMENT (RH)

MATCHLINE - SEE SHEET 6

MATCHLINE - SEE SHEET 8

NC GRID NAD 83

–80′ –40′ 0′ 80′ 160′

GRAPHIC SCALE

PROJECT SURVEYOR

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

NO.	DESCRIPTION	DATE
	REVISIONS	
1	REVISED PER IRT COMMENTS	APRIL 2019

NCDEQ – DIVISION OF MITIGATION SERVICES

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ROUGH HORN SWAMP & ROUGH HORN SWAMP II RESTORATION SITES

AS-BUILT PLANS

COLUMBUS COUNTY, NORTH CAROLINA

DATE: APRIL 2020

SCALE: GRAPHIC

PLANTING PLAN

SHEET 7 OF 11

RIPARIAN PLANTING PLAN

*NOTE: SEE SHEET 6 FOR PLANTING QUANTITIES

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

PROJECT ENGINEER

PROJECT SURVEYOR

STAL	DESCRIPTION	DATE
	REVISIONS	

NC

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ROUGH HORN SWAMP
& ROUGH HORN SWAMP II
RESTORATION SITES
AS–BUILT PLANS
COLUMBUS COUNTY, NORTH CAROLINA

DATE: APRIL 2020
SCALE: GRAPHIC

PLANTING PLAN

SHEET 8 OF 11

S.R. 1506

CCC RD / S.R. 1508

CE

MATCHLINE - SEE SHEET 10

MATCHLINE - SEE SHEET 10

EASEMENT BOUNDARY MARKING

THE EASEMENT BOUNDARY WAS MARKED WITH METAL OR SALT TREATED WOOD POSTS AND CONSERVATION EASEMENT SIGNS AT THE CORNERS AND AT A MINIMUM OF 100' INTERVALS ALONG THE BOUNDARY.

WHEN APPROPRIATE, PROVIDER SHALL MARK EXISTING TREES WITH CONSERVATION EASEMENT SIGNS AND / OR BLAZE PROPERTY LINES AT APPROXIMATELY EYE LEVEL.

- 6-FOOT TALL DURABLE WITNESS POSTS AND 5/8" REBAR 30" IN LENGTH WITH 3-1/4" ALUMINUM CAPS ON ALL EASEMENT CORNERS. CAPS SHALL MEET DMS SPECIFICATIONS (BERNSTEN RBD5325 IMPRINTED WITH NC STATE LOGO #B9087 OR EQUIVALENT). AFTER INSTALLATION, CAPS SHALL BE STAMPED WITH THE CORRESPONDING NUMBER.
- 6-FOOT TALL DURABLE WITNESS POST ALONG BOUNDARY OF CONSERVATION EASEMENT. POSTS SHALL BE MADE OF MATERIAL THAT WILL LAST A MINIMUM OF 20 YEARS. THE PROVIDER SHALL ATTACH A CONSERVATION EASEMENT SIGN TO EACH WITNESS POST AND PLACE ADDITIONAL SIGNS AT NO MORE THAN 100-FOOT INTERVALS ON BOUNDARY LINES.
- — CE — CONSERVATION EASEMENT

NC GRID NAD 83

–80′ –40′ 0′ 80′ 160′

GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

PROJECT ENGINEER

PROJECT SURVEYOR

REVISIONS

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ROUGH HORN SWAMP
& ROUGH HORN SWAMP II
RESTORATION SITES

AS-BUILT PLANS

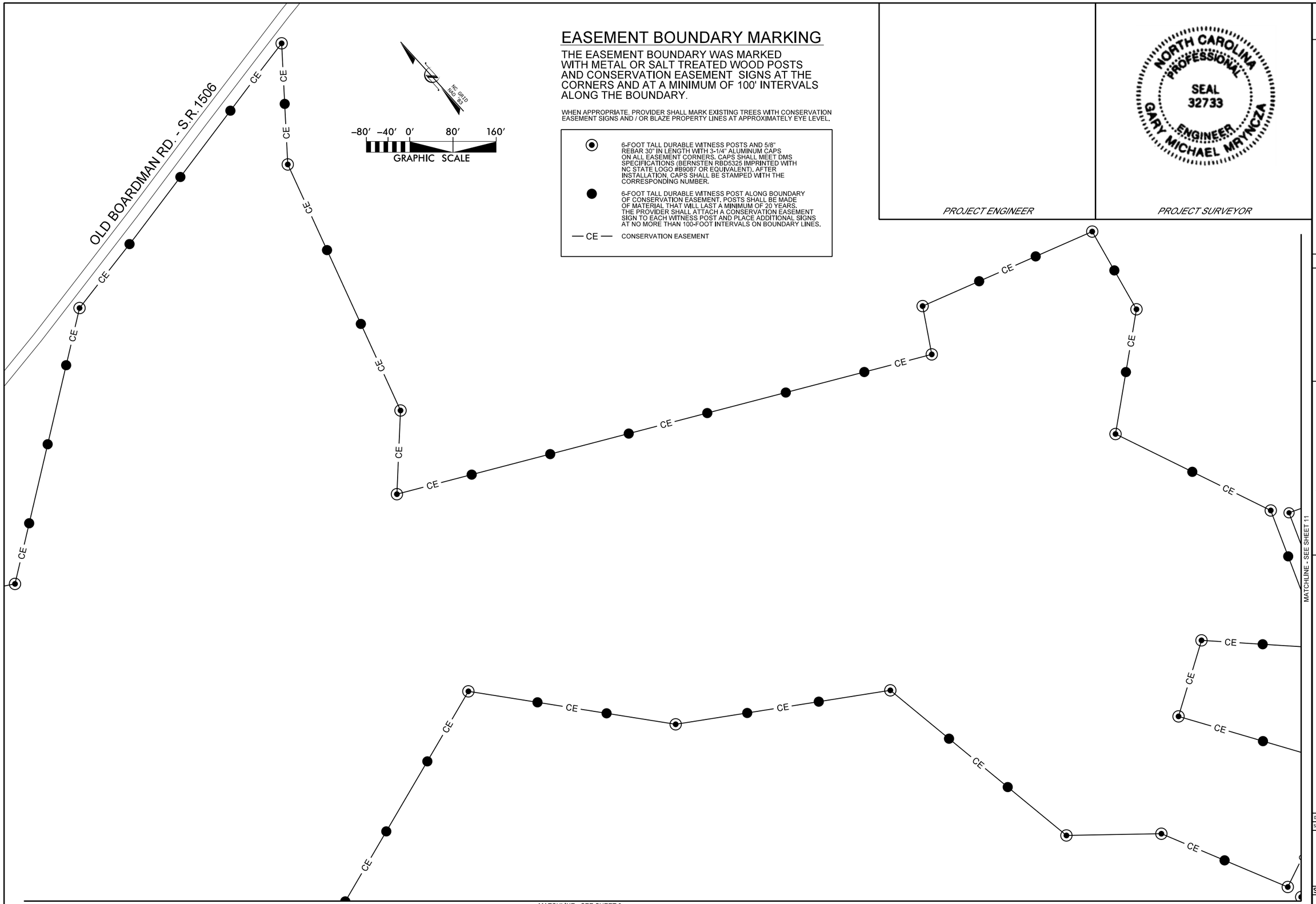
COLUMBUS COUNTY, NORTH CAROLINA

DATE: APRIL 2020

SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET 9 OF 11



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- — CE — CONSERVATION EASEMENT

PROJECT ENGINEER

PROJECT SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

REVISIONS

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ROUGH HORN SWAMP
& ROUGH HORN SWAMP II
RESTORATION SITES

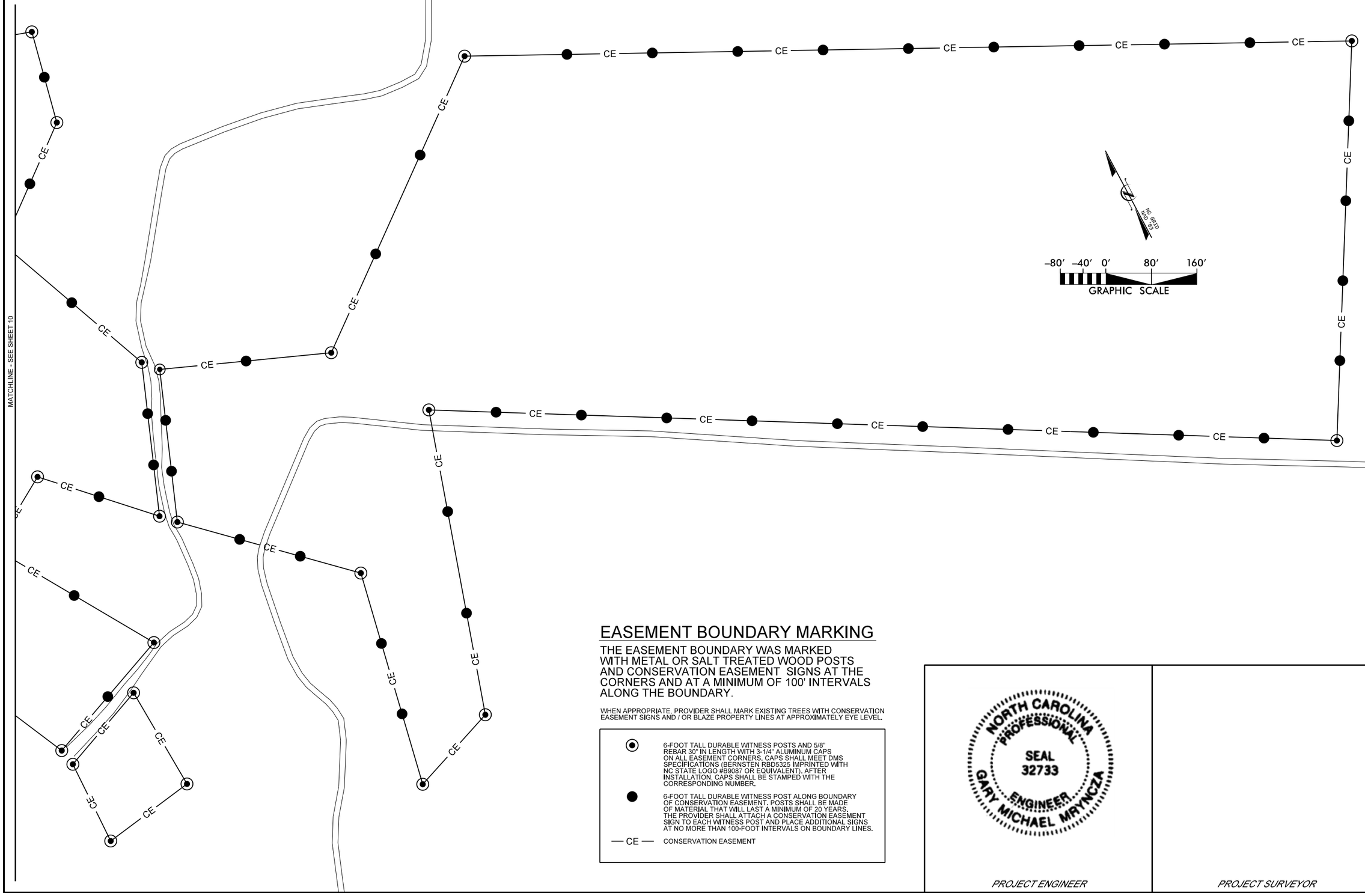
AS-BUILT PLANS

COLUMBUS COUNTY, NORTH CAROLINA

DATE: APRIL 2020
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET 10 OF 11



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- — CE — CONSERVATION EASEMENT

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

PROJECT ENGINEER

PROJECT SURVEYOR

REVISIONS

SYM.	DESCRIPTION	DATE

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ROUGH HORN SWAMP & ROUGH HORN SWAMP II RESTORATION SITES

AS-BUILT PLANS

COLUMBUS COUNTY, NORTH CAROLINA

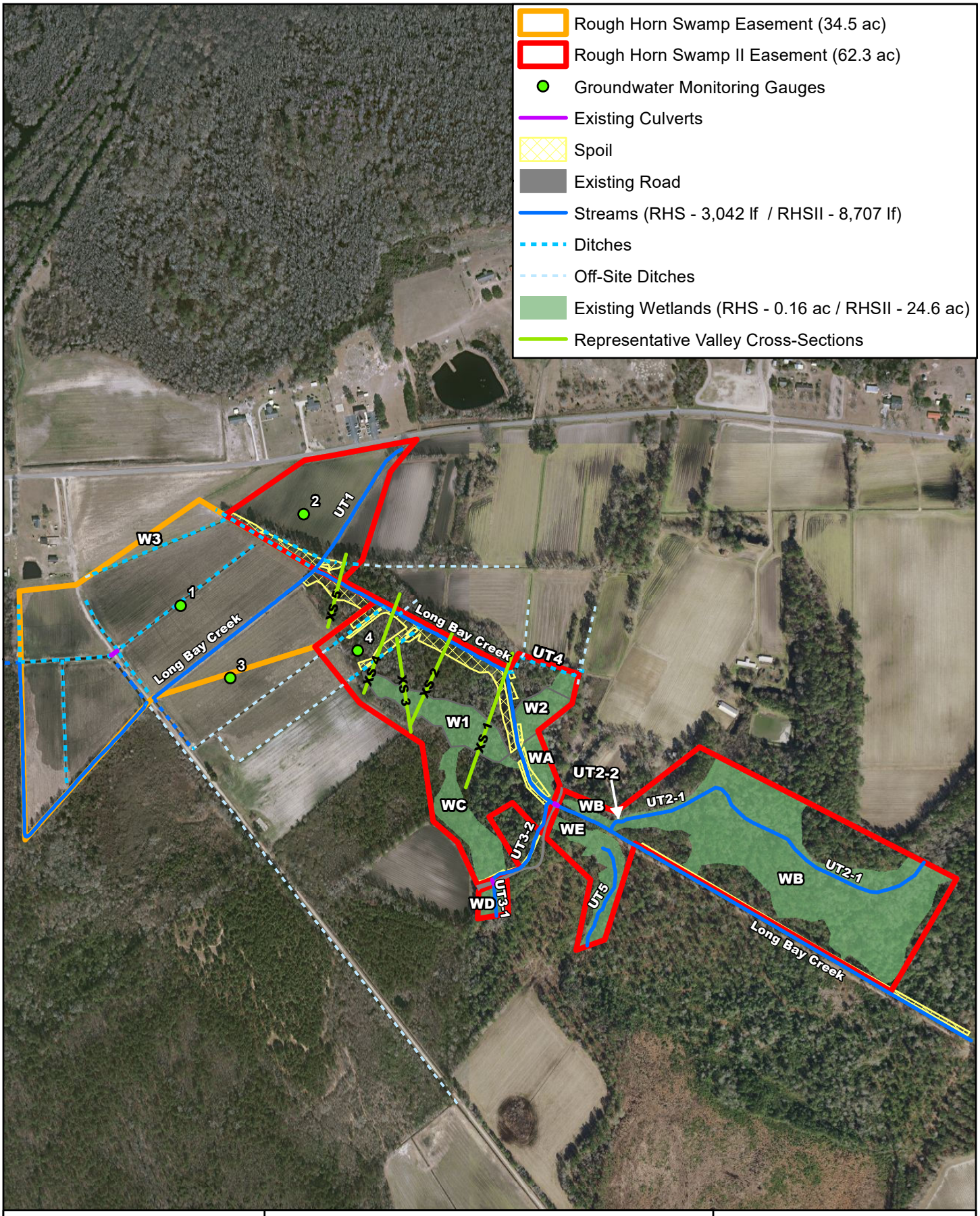
DATE: APRIL 2020
SCALE: GRAPHIC

BOUNDARY MARKING PLAN

SHEET 11 OF 11

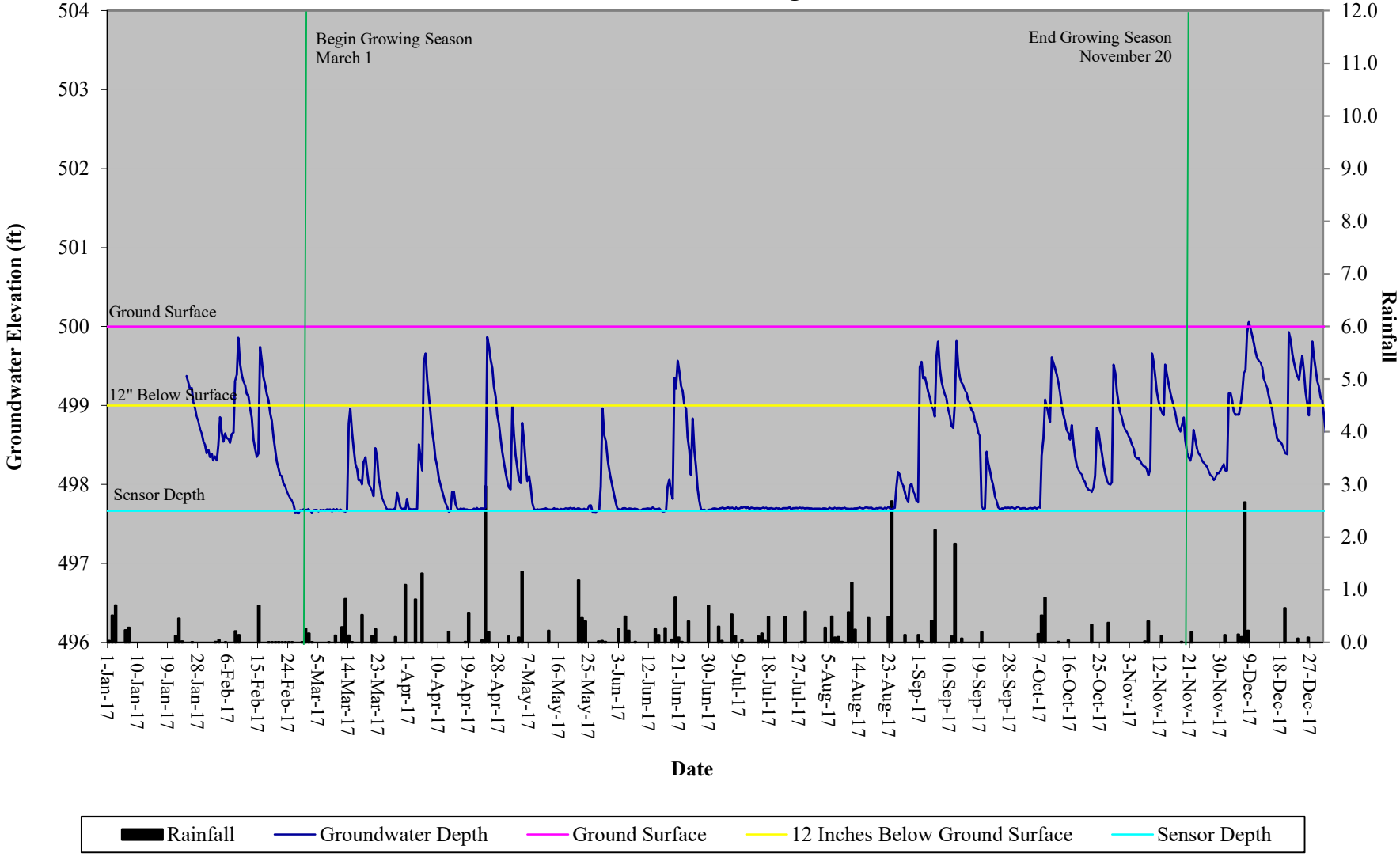
APPENDIX E

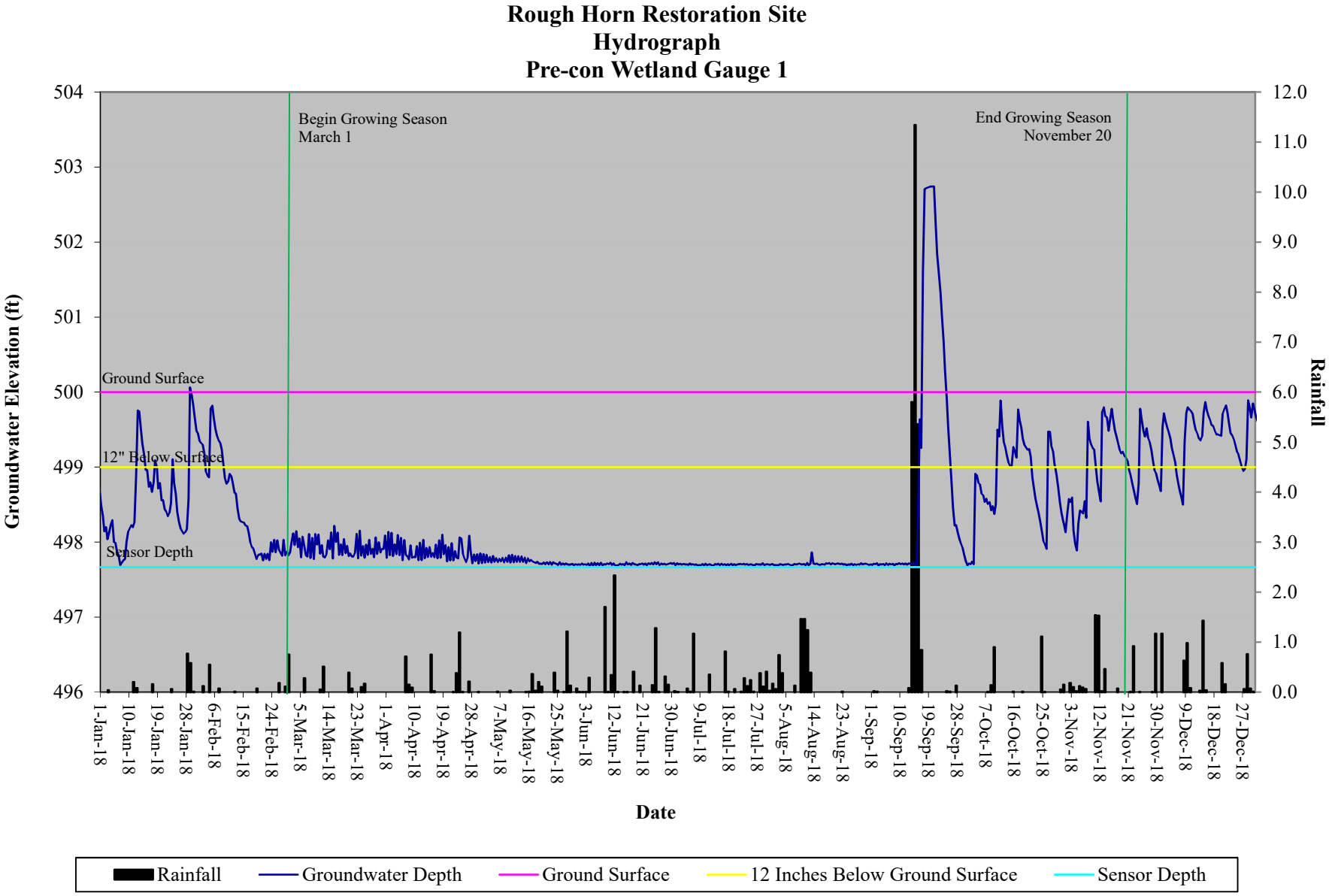
Additional Information



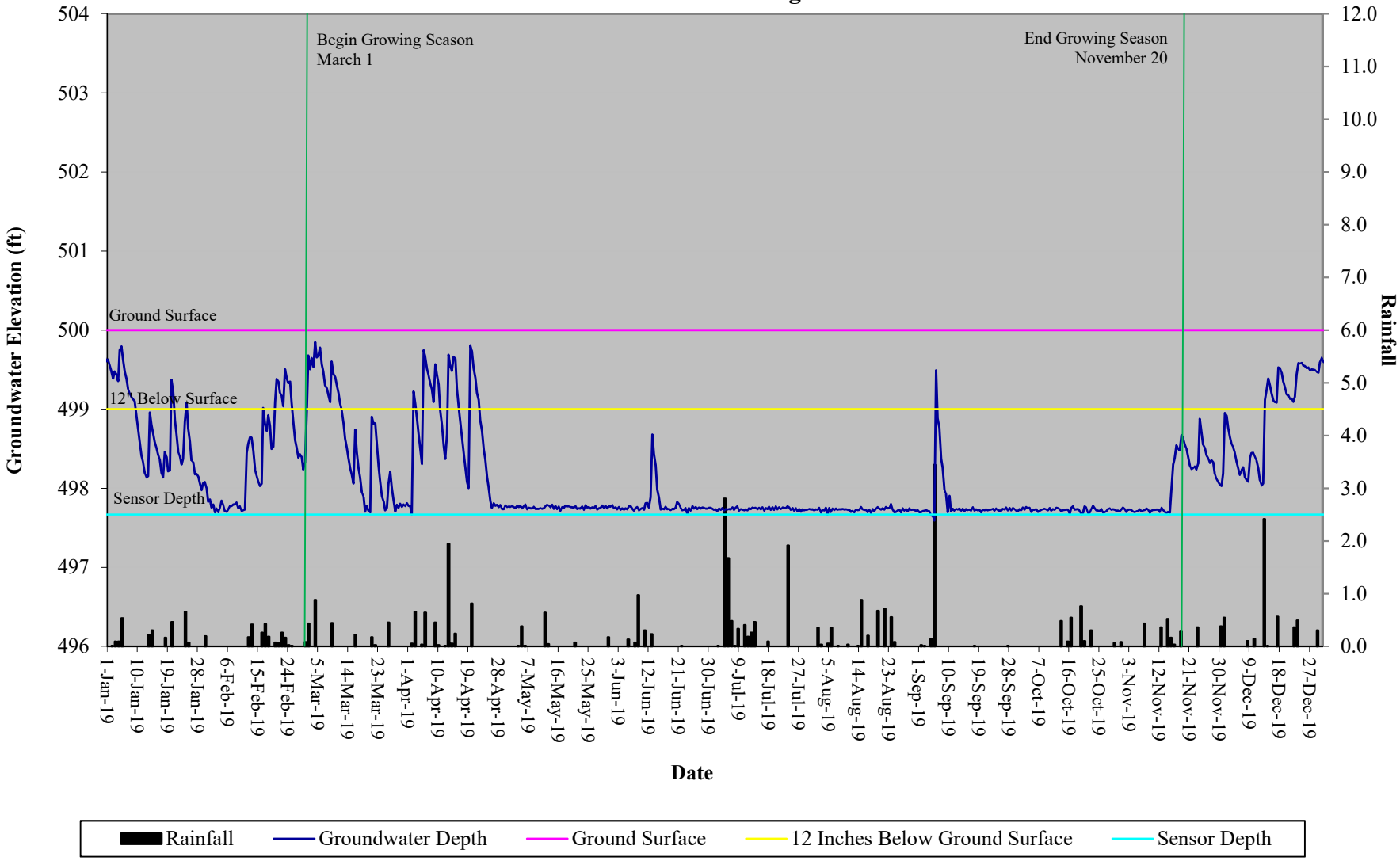
PRE-CONSTRUCTION GAUGE LOCATIONS
ROUGH HORN SWAMP RESTORATION SITE &
ROUGH HORN SWAMP II RESTORATION SITE
COLUMBUS COUNTY, NC

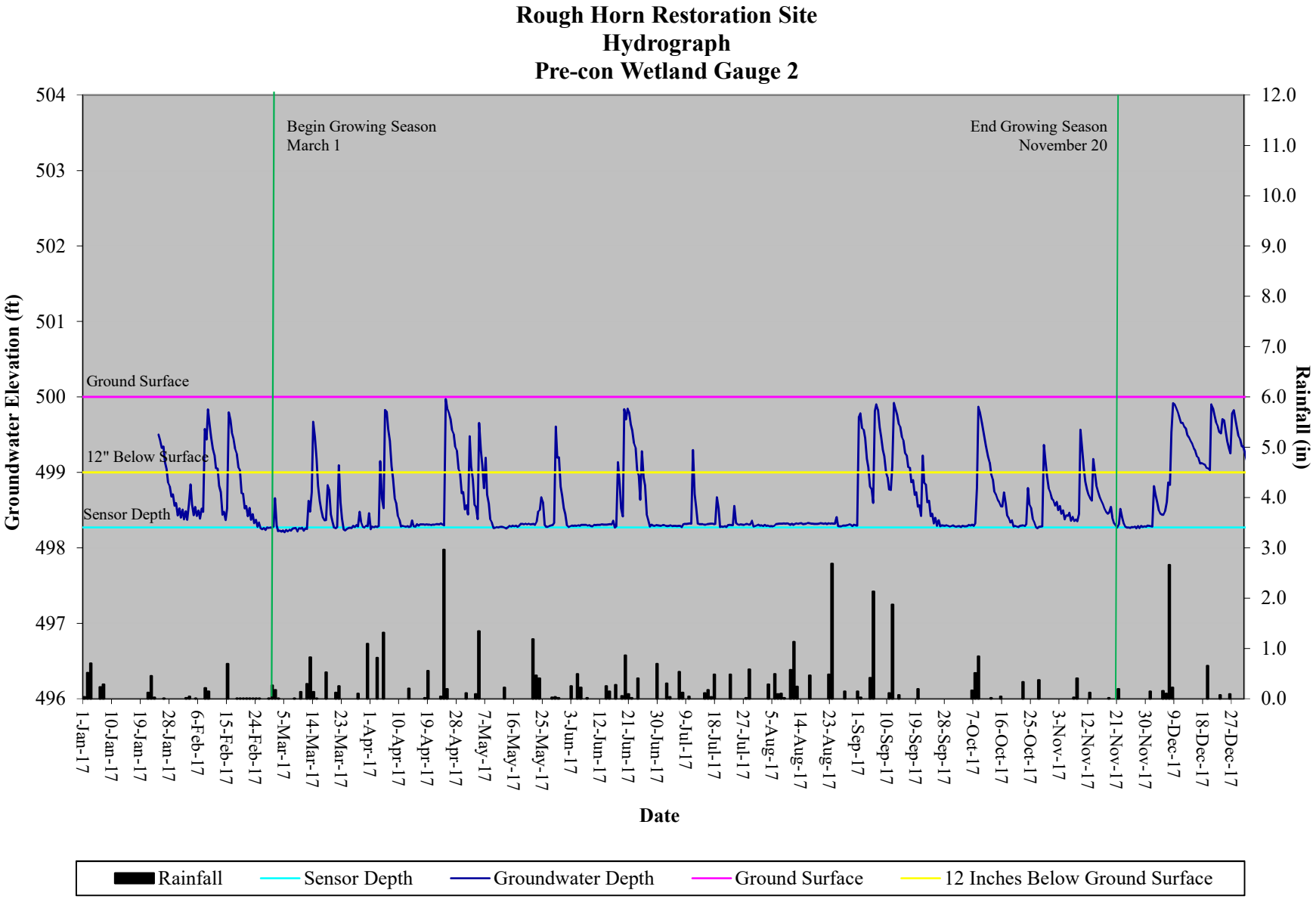
Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 1



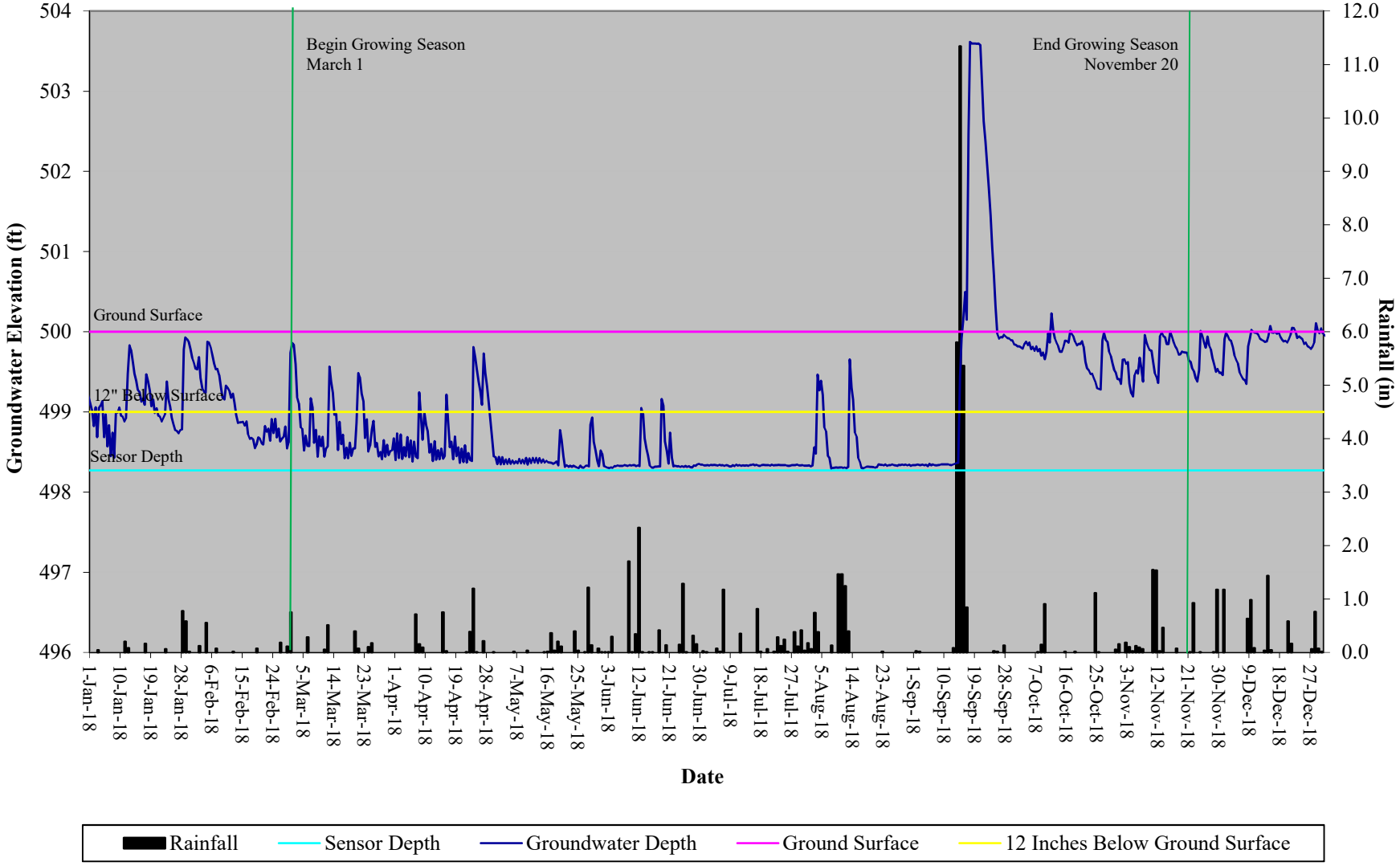

Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 1
Groundwater Elevation (ft)
Rainfall
Date
Begin Growing Season
March 1
End Growing Season
November 20
Ground Surface
12" Below Surface
Sensor Depth
504
503
502
501
500
499
498
497
496
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-18
10-Jan-18
19-Jan-18
28-Jan-18
6-Feb-18
15-Feb-18
24-Feb-18
5-Mar-18
14-Mar-18
23-Mar-18
1-Apr-18
10-Apr-18
19-Apr-18
28-Apr-18
7-May-18
16-May-18
25-May-18
3-Jun-18
12-Jun-18
21-Jun-18
30-Jun-18
9-Jul-18
18-Jul-18
27-Jul-18
5-Aug-18
14-Aug-18
23-Aug-18
1-Sep-18
10-Sep-18
19-Sep-18
28-Sep-18
7-Oct-18
16-Oct-18
25-Oct-18
3-Nov-18
12-Nov-18
21-Nov-18
30-Nov-18
9-Dec-18
18-Dec-18
27-Dec-18
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth

Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 1

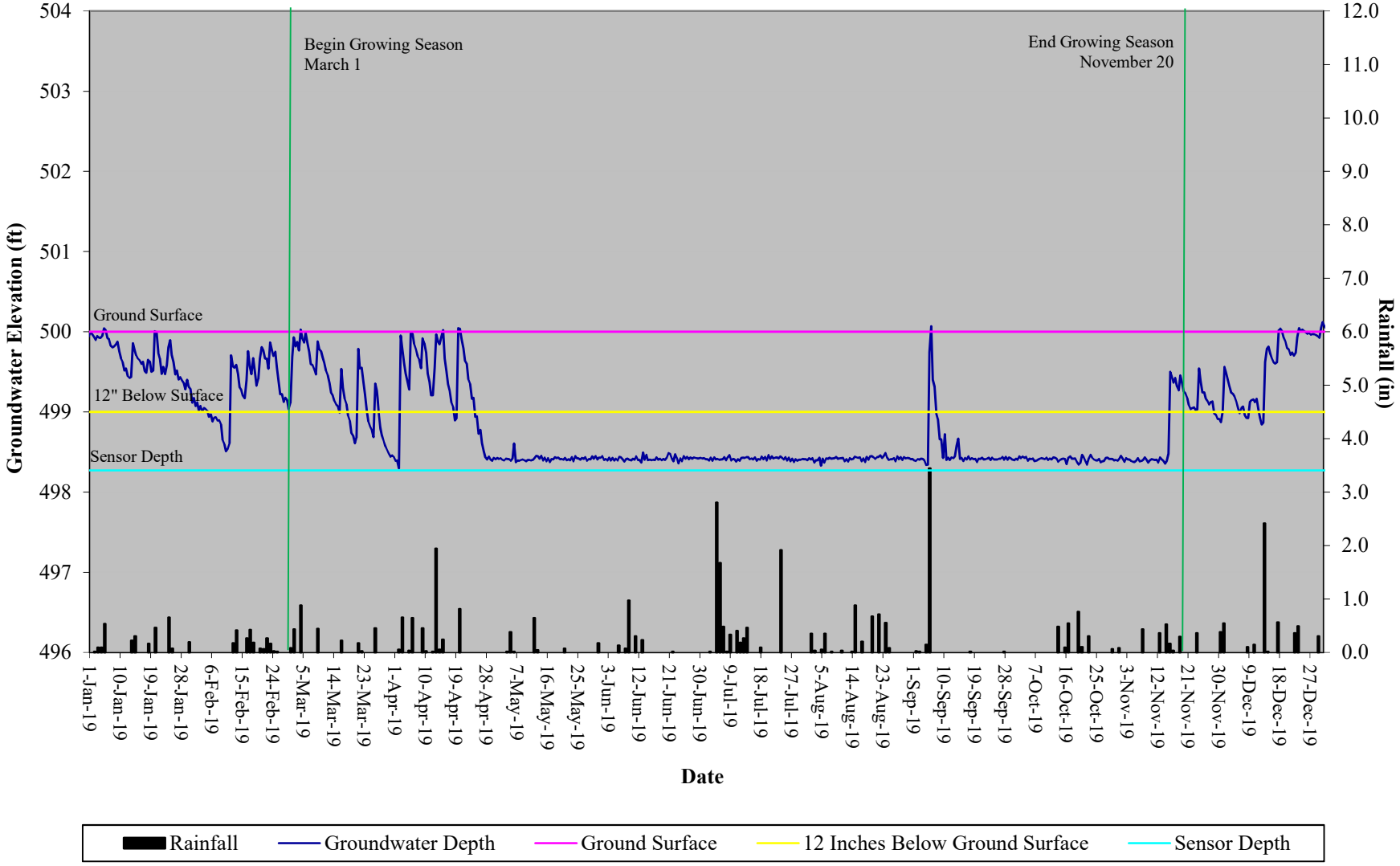



Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 2
Begin Growing Season
March 1
End Growing Season
November 20
Ground Surface
12" Below Surface
Sensor Depth
Groundwater Elevation (ft)
Rainfall (in)
Date
504
503
502
501
500
499
498
497
496
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-17
10-Jan-17
19-Jan-17
28-Jan-17
6-Feb-17
15-Feb-17
24-Feb-17
5-Mar-17
14-Mar-17
23-Mar-17
1-Apr-17
10-Apr-17
19-Apr-17
28-Apr-17
7-May-17
16-May-17
25-May-17
3-Jun-17
12-Jun-17
21-Jun-17
30-Jun-17
9-Jul-17
18-Jul-17
27-Jul-17
5-Aug-17
14-Aug-17
23-Aug-17
1-Sep-17
10-Sep-17
19-Sep-17
28-Sep-17
7-Oct-17
16-Oct-17
25-Oct-17
3-Nov-17
12-Nov-17
21-Nov-17
30-Nov-17
9-Dec-17
18-Dec-17
27-Dec-17
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface

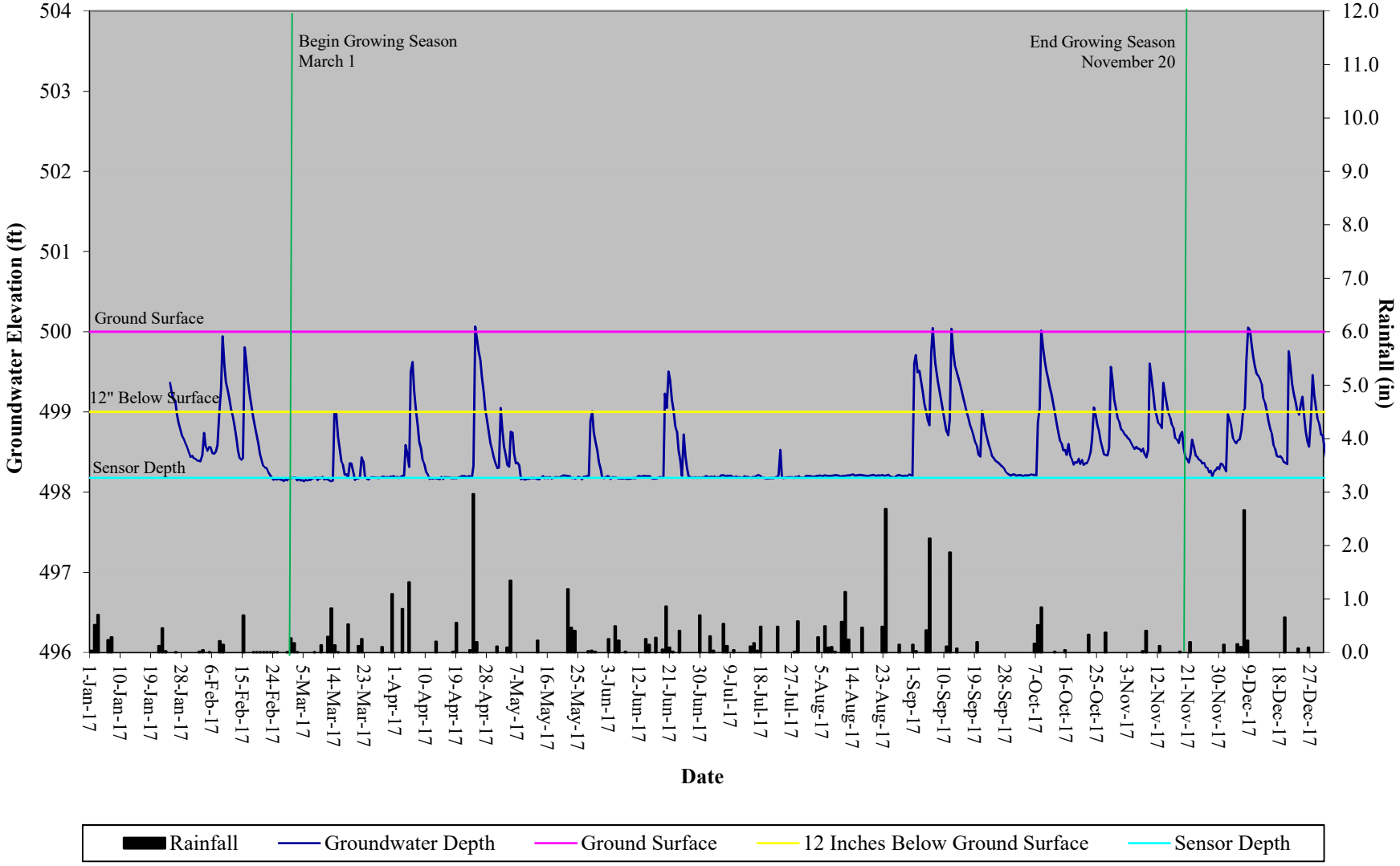
Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 2



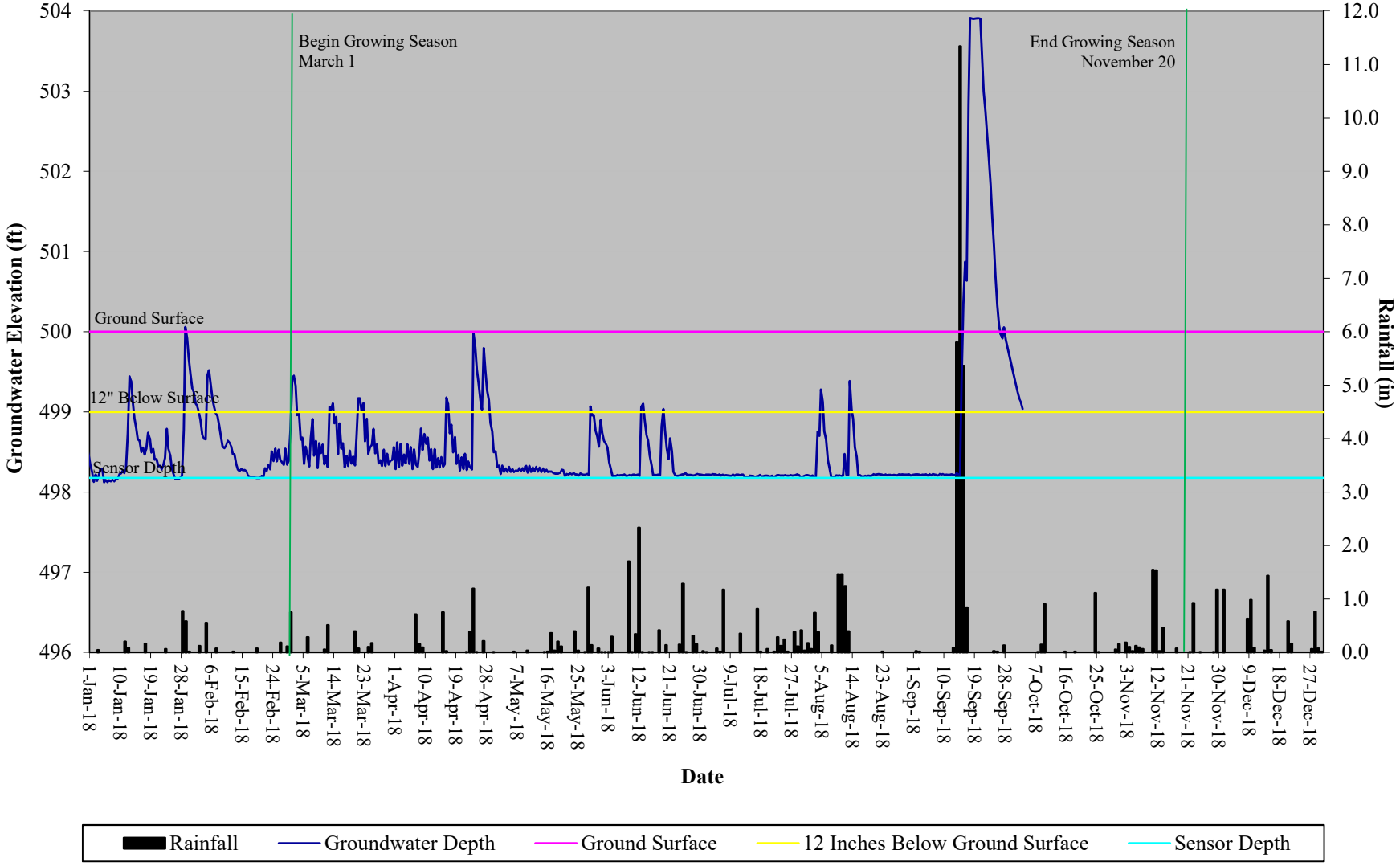
Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 2



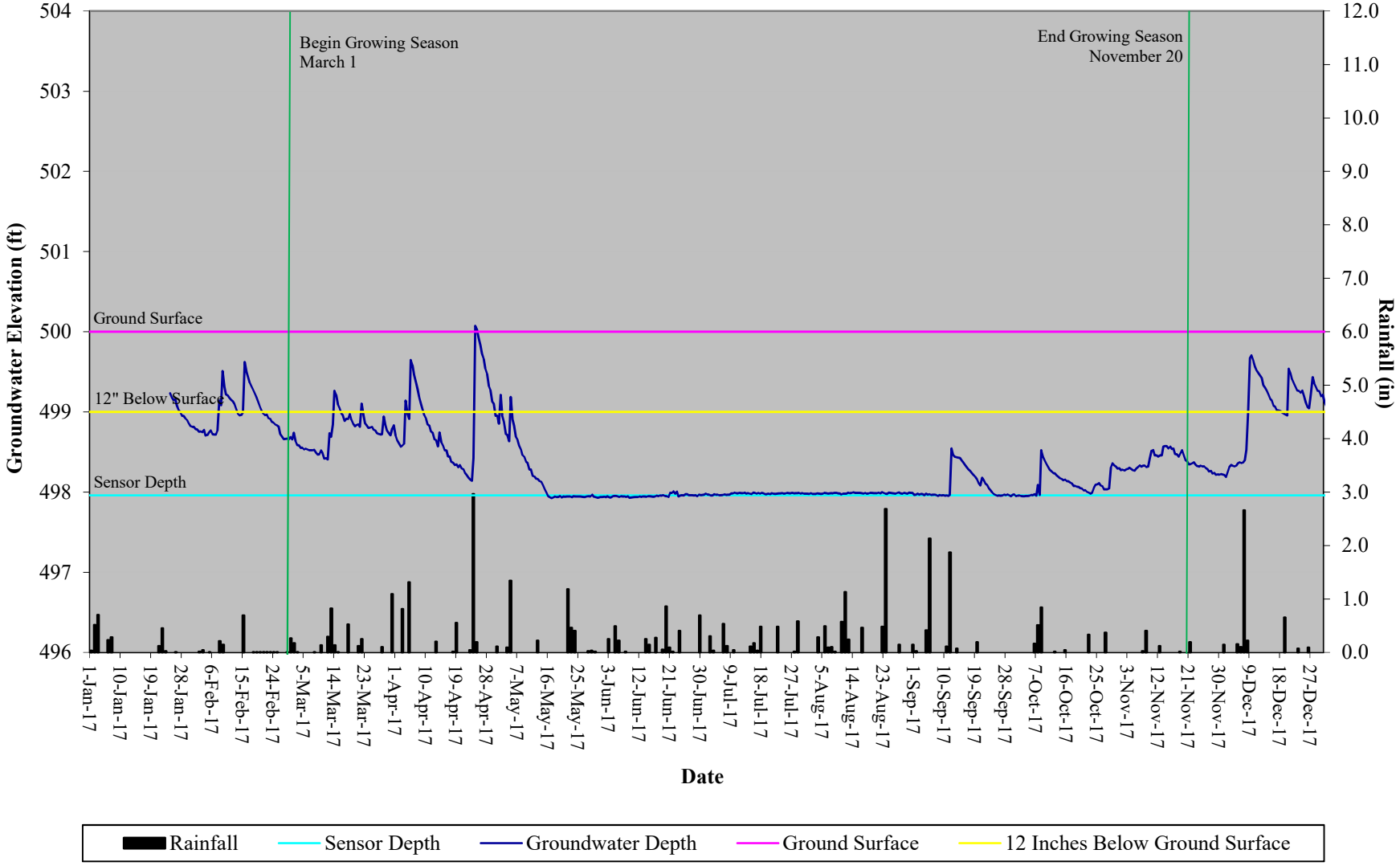
Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 3



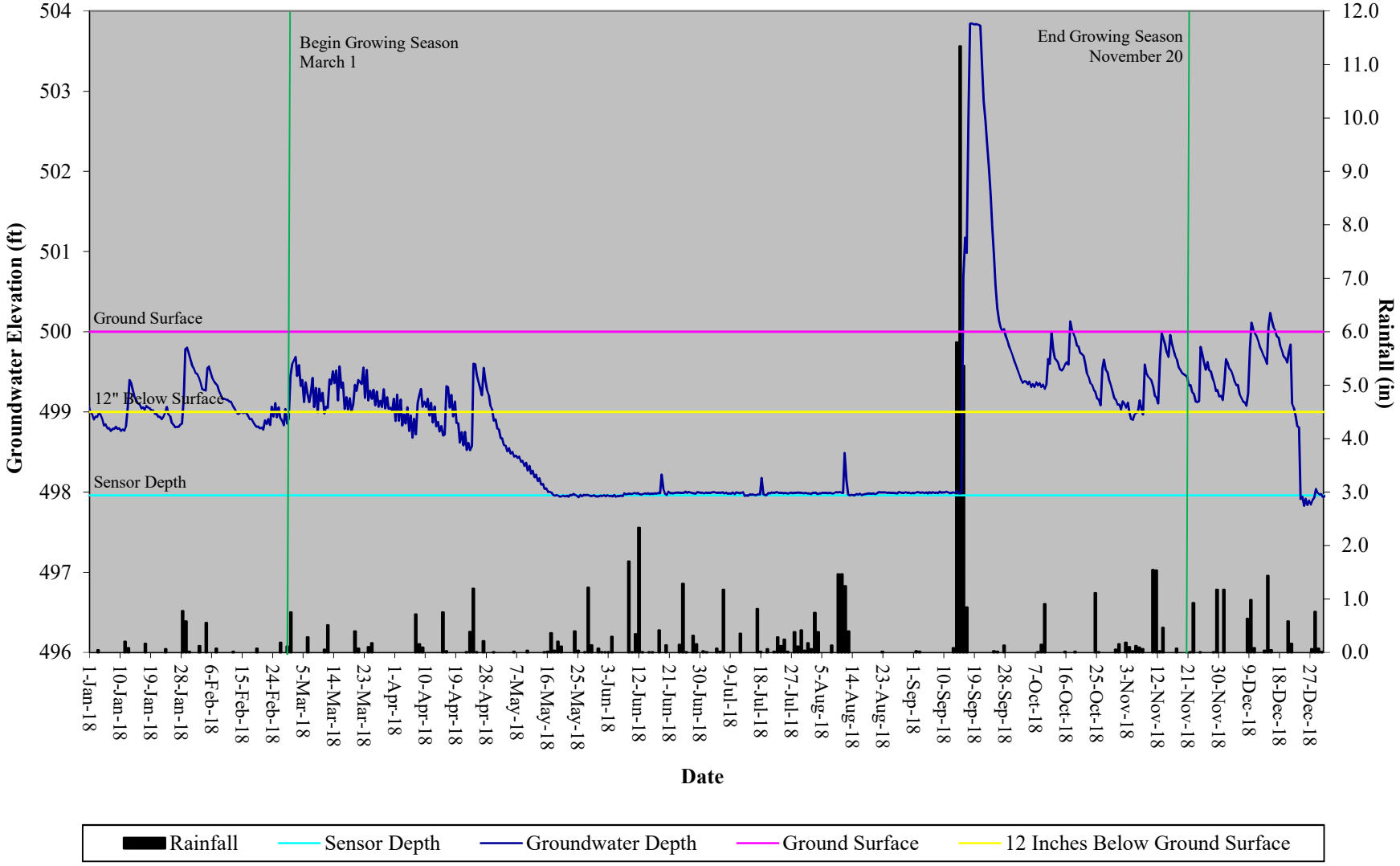
Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 3



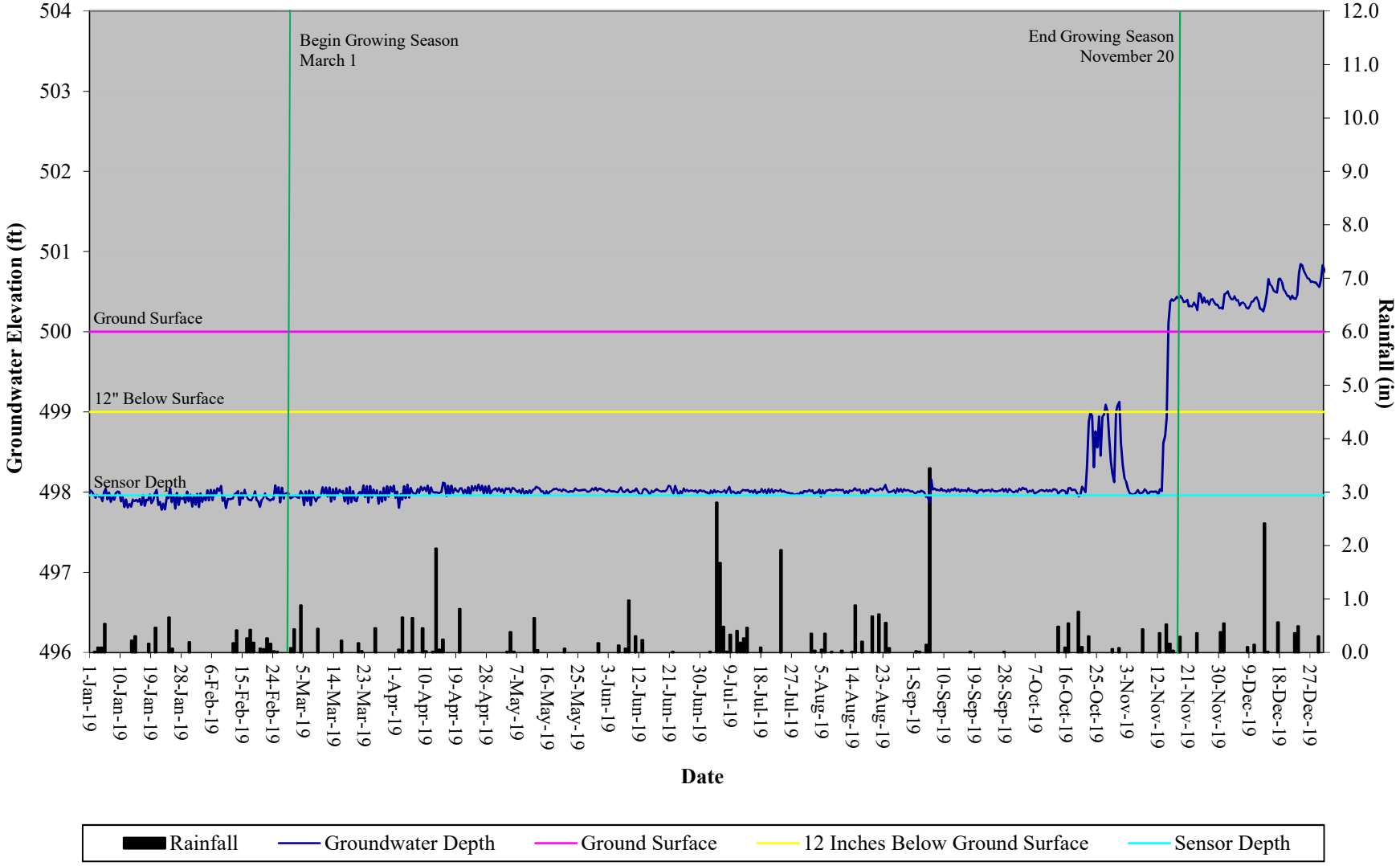
Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 4



Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 4



Rough Horn Restoration Site
Hydrograph
Pre-con Wetland Gauge 4



KCI ASSOCIATES OF NC

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ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

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Date: October 22, 2019

Attendees: Lindsay Crocker, NC Division of Mitigation Services
Jeff Schaffer, NC Division of Mitigation Services
Tim Baumgartner, NC Division of Mitigation Services
Mac Haupt, NC Division of Water Resources
Erin Davis, Division of Water Resources
Todd Tugwell, US Army Corps of Engineers
Jordan Jessop, US Army Corps of Engineers
Tim Morris, KCI Technologies, Inc.
Kevin O'Briant, KCI Technologies, Inc.

From: Tim Morris, Project Manager
KCI Technologies, Inc.

Subject: Rough Horn/Rough Horn II – Stream and Wetland Mitigation
Field Review – During Construction
Lumber 03
Columbus County, North Carolina

Purpose

A field review meeting was conducted for the above referenced project on October 22, 2019. The purpose of the meeting was to address concerns brought up during an earlier site review meeting by Jordan Jessop of the US Army Corps of Engineers and others who had viewed photos that had been taken during that field visit.

Site Conditions

Construction was nearing completion at the time of the site visit. The construction of a bridge and some cleanup activities were the remaining activities ongoing at the time of the meeting. According to data collected as part of the NPDES requirements of the construction project, only 1.18" of rainfall had been recorded for the previous 30 days of record. The upper end of the mainstem (Long Bay Creek) was the only flowing waterbody noted during the site visit, although that stream eventually stopped flowing before it hit the open agricultural fields beyond the wooded area. The Rough Horn project has a 2-square mile drainage area at the downstream project boundary. Considering the size of the drainage area the lack of flow in the channel was indicative of the extreme dry conditions witnessed during construction (started in July). The flow in the Long Bay Creek had been increasing steadily during the past two weeks as evapotranspiration rates within the forest had been slowing down and the groundwater elevation

within the forested had started to rise. This increase in flow was occurring without any rainfall during that period.

Meeting Minutes

The site walk was started at Station 15+00 at the location of the proposed steel span bridge. The comments from the meeting are summarized below and are grouped into four basic issues/questions.

1. The channel looked like a ditch that could drain the wetlands surrounding it.
2. The channel should have more wood in it as indicated on the project plans.
3. Why does there need to be a channel at all?
4. Why couldn't we have graded the floodplain down to match the channel section in transition zones such as 15+00 to 18+50

Tim Morris explained the following:

The project stream was constructed almost exactly as per plan. Exceptions included:

1. Small alignment changes to avoid trees were made in the wooded area
2. In areas where the existing grade matched the design grade (or was lower), such as between Station 24+00 to 29+00 and Station 302+00 to 310+00, no grading (or minimal grading) was completed. In these areas the stream was left to find its own course through the woods

Tim Morris explained that a detailed grading plan did need to be prepared to ensure that hydrologic trespass issues associated with surrounding drainage features were addressed to avoid legal issues associated with adjacent parcels outside the easement. While we would have preferred to have had just released the water into the relic channels, we did need to do our due diligence with regards to standards of care from an engineering perspective. The maximum depth of the channels as per the design is 0.8' for the main channel and 0.6' for tributary channels. In contrast, prior to construction, the mainstem was ditched on average 3-4' deep and in some areas deeper. Many peripheral ditches were ditched to similar depths to assist in draining the site for agricultural production. Those ditches were all filled. Tim Morris also pointed out that we were in a drought and that in normal conditions (as per design) the baseflow in the channels would be at the top of bank or overbank as per design. To demonstrate that, drone and still photos taken after the meeting during times of normal rainfall have been provided (see photos 1-8). For these low gradient coastal systems, the water surface in the channel essentially represents the surrounding groundwater elevation. If the water is at or near the surface (as depicted in the photos), it is strong assurance that the surrounding wetlands will be meeting their hydrology standard. For this particular site, because of the concern for long term inundation we did need to ensure some level of positive drainage through the site to keep our trees alive.

In response to agency input at this meeting, KCI completed the following modifications to the project.

- Installed woody debris jams in the channel in multiple areas (see drone footage and still photos as well as as-built plans for locations of wood in channels)
- Added additional live stakes to the channels
- Graded the floodplain down between 15+00 and 18+00 and added some side channels
- Graded the floodplain down between 100+00 and 105+00 and added some side channels

We have included the following YouTube videos for your reference. These videos represent the as-built condition of the site prior to planting. This memo is provided as a compliment to the Baseline Monitoring Report and as-built plans as the discussions at this meeting did lead to some minor changes to the project plans.

Rough Horn II – Wooded Section of Long Bay Creek (stream and wetland) – starting downstream and moving to preservation area

https://youtu.be/8qOT9VxoaDA

Rough Horn I – Open field (wetland mitigation)

https://youtu.be/aChv9c2nSjQ

Rough Horn II – UT1 (overview and closeup, stream and wetland mitigation)

https://youtu.be/_rgaXYf1vNo

KCI understands the IRT's concerns expressed on the day of the site visit. We do believe that the conditions on that day are not indicative of normal conditions on this site. We also do not believe the shallow pilot channels will effectively drain the restored wetlands on this site. There is the potential that modifications can be made during the adaptive management period if it turns out that hydrologic trespass issues do not end up being a concern. Log structures could be added to the site to act as sills and raise the water surface elevations in select areas of the site, however those types of modifications will need to be deferred until as-built condition is monitored and fully understood.

Photo from Station 15+00 looking upstream (from the bridge location) – Photo taken – 1-7-2020

Photo from Station 15+00 looking downstream (from the bridge location) – Photo taken 1-7-2020

Drone Photo taken 11-19-2019 – Shows side channel modifications and floodplain grading below 15+00

Still Photo taken at 22+00 looking upstream. 11-19-10

Still Photo taken near 25+00 looing upstream – 1-7-20

Drone photo of UT1 – 1-7-20

Closeup of UT1 after floodplain modifications 1-7-20

Drone photo of Rough Horn 1 wetlands looking North across site 1-24-20

Photo showing channel volume at top of bank. 1-7-20

Photo showing downstream of arch culvert 1-24-20