FINAL MITIGATION PLAN

Barefoot Site
Sampson County, North Carolina

Neuse River Basin
HUC 03020201

DMS Project #: 100044
Contract #: 7418
USACE Action ID: SAW-2018-00433
DWR Project #2017-01-01505
RFP: 16-007279

Prepared for:

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July 2019

This mitigation plan has been written in conformance with the requirements of the following:

- *Federal rule for compensatory mitigation project sites as described in the Federal Register Title 33 Navigation and Navigable Waters Volume 3 Chapter 2 Section § 332.8 paragraphs (c)(2) through (c)(14).*
- *NCDEQ Division of Mitigation Services In-Lieu Fee Instrument signed and dated July 28, 2010*

These documents govern NCDMS operations and procedures for the delivery of compensatory mitigation.

M E M O R A N D U M

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TO: NCIRT and NCDMS

FROM: Brad Breslow - RES

DATE: July 3, 2019

RE: Response to Barefoot Final Draft Mitigation Plan NCIRT Comments 30-day review DMS Project ID No. 100044, Contract #7418, USACE Action ID #SAW-2018-00433

Todd Bowers, EPA, May 10, 2019:

Cover Page:

1) The USACE Action ID is given as SAW-2018-01001 as is the JD number listed on page 5. The Public Notice published on March 22, 2018 lists Action ID as SAW-2018-00433. Please resolve or explain the discrepancy noted.
The correct Action ID is SAW-2018-00433. This has been corrected in the document.

Section 3.2.4, page 5:

2) The submitted JD summary is very informative however, there is no clear distinction on how the restored wetland areas will be hydrologically connected to waters of the U.S. The current non-jurisdictional ditches surrounding the site appear to sever connection to jurisdictional areas and the adjacent sites outside the project boundaries are stated as providing connectivity to headwater streams to the west and north. The provided maps do not illustrate the connection to jurisdictional waters and I think the summary can be improved to clearly outline the necessary connectivity in order for the restored wetlands not to be considered isolated features. Will filling/plugging of ditches reconnect the new wetlands to waters of the U.S.?
The site is connected to both an unnamed tributary to Reedy Prong to the west and to an unnamed tributary to Mill Branch to the northeast by a network of ditches (See Figure 2). This is typical of mineral flats being located in the upper reaches of the landscape where the landscape is nearly level. Natural historic hydrologic connections between this site and these headwater streams was present prior to ditching and cultivation of areas closer to these headwater streams. Note: there may be some confusion because we state that "determined that no jurisdictional waters of the US are present in the project area" We should have stated "are not located within the project boundary." We also stated that the ditches remove the connection to the watershed, but we needed to state that jurisdictional wetlands appear to be present in the watershed adjacent to the project site. This is probably just a matter of being clear and covering the hydrologic connections completely. The AJD does not include the ditches as jurisdictional although they provide a connection between "potential" jurisdictional wetland in the watershed adjacent to the project and the downstream headwaters. The ditches could be considered jurisdictional due to this connection. This lack of hydrologic connection and the absence of any mention of adjacent wetlands is likely

clouding the issue of describing hydrology, hydrologic connections, and how this is not an isolated wetland.

Section 3.5.6, page 12

3) AJD of December 27, 2018 has a DA # of SAW-2018-01001 which is consistent with the document but differs from the Public Notice of March 22, 2018 (SAW- 2018-00433)
The correct Action ID is SAW-2018-00433. This has been corrected in the document.

4) Similar comments about jurisdiction and connectivity of the re-established wetlands based on lack of any jurisdictional wetlands, streams or ditches present within the project boundaries. Concern here is restoring wetlands that may be isolated from waters of the U.S. based on current lack of connectivity.
Please see response to Section 3.2.4, page 5, comment 2).

Section 4, page 13

5) Excellent and well-stated objectives of the project.
RES appreciates this compliment.

Section 5, page 14

6) Project goal of reducing inputs into the stream/wetland system may be misleading since there is no stream system tied directly to the project.
The project goal "reduce sediment and nutrient inputs into the stream/wetland system" has been revised to "reduce sediment and nutrient input into downslope receiving streams by limited runoff and sediment into connecting ditches."

7) Project objective of providing hydrologic connectivity to a larger wetland community is somewhat demonstrated by the mitigation plan, however connection to waters of the U.S. in unclear.
Please see response to Section 3.2.4, page 5, comment 2).

8) Section 5.1.1 second paragraph notes that the project will improve water quality entering the headwater ditches that eventually flow to Mill Creek and the Neuse River. A clear connection to waters of the U.S. has not been clearly demonstrated by the mitigation plan as these ditches have been determined to be non-jurisdictional. A JD that encompasses the adjacent wetlands and nearest jurisdictional stream would be helpful in determining how the re-established wetlands will not be an isolated aquatic feature.
Please see response to Section 3.2.4, page 5, comment 2). Additionally, the adjacent wetland area is not owned by the cooperating landowner. Without landowner consent, the Corps cannot enter the property to make an official determination.

Section 6.2.1, page 16

9) EPA Region 4 commends the sponsors willingness to include a 50-foot upland buffer around much of the proposed re-established wetland area. Recommend illustrating this buffer in Figure 9 and/or Appendix A. It is our understanding that this buffer area will not be planted and only seeded with species outlined in the planting plan of Appendix A. On the surface there is no specific reason to plant the buffer with trees. However, if parts of the re-established wetland areas do not meet performance criteria for either hydrology or vegetation, and parts of the buffer does meet those same criteria, the sponsor may wish to consider a contingency plan to include the buffer to minimize loss of credit in the re-established areas. To be clear I am not recommending any extra credit for the buffer in the current approach.
This area will be planted according to the planting plan. Sheet P1 has been updated to reflect this.

Section 6.2.4, page 17

10) The statement "The ditches surrounding the project area sever the hydrologic connection to the natural watershed. The forested areas upslope of the Project and outside of these ditches appear to be jurisdictional" is somewhat unclear without further information. Is there any evidence to support this statement and provide a clear demonstration that the project will not be isolated from waters of the U.S.?
Because this is a different landowner, the soil scientist only evaluated only a few soil profile points in this area close to the Project. Two of these points have descriptions in the soils report: both had hydric indicators, the water table at one point was found at -3, and the water table at the other was found at -14. Additional discussion on why the Project will not create isolated features is presented above in the response to Section 3.2.4, page 5, comment 2).

11) A similar statement is made on Page 18 and "appear to be currently jurisdictional" is not sufficient when compared to the AJD that clearly states that the project does not contain any jurisdictional waters. Recommend that the sponsor perform a Jurisdictional Determination of adjacent wetlands and streams that clearly demonstrates that hydrologic connectivity is possible with this project.
The watershed immediately adjacent to the site does appear to meet Jurisdictional qualifications but is not owned by the cooperating landowner. Without landowner consent, the Corps cannot enter the property to make an official determination.

Section 6.3.3/Page 20

12) "Any topsoil that is removed during construction will be stockpiled and placed over the Project during final soil preparation." Is it prudent to stockpile soil that has likely received decades of fertilizer, pesticide and herbicide applications?
Stockpiling soil is a standard construction practice that promotes the re-establishment of vegetation after site construction. In terms of nutrient and pesticide content of stockpiled soils, utilizing previously-applied nutrients already available in agricultural soils makes sense from both a nutrient management and cost efficiency standpoint. Additionally, it is our experience that restoring a site with native soil is the most practical approach, as it also reduces the need for trucking/hauling and topsoil purchase and disposal costs. If erosion of a stockpiled soil is the concern, it can be expected that any stockpiled soils will have appropriate erosion and sediment controls applied to them to prevent water pollution.

Mac Haupt/Erin Davis, NCDWR, May 10, 2019:

1) RES/DMS is including a section of site that was not previously identified. The question is: what is the appropriate ratio if not planting but attaining hydrology?
Because the southern ditch below W2 is being plugged and filled to re-establish hydrology of a non-jurisdictional area RES is proposing a 2:1 ratio for re-establishment. RES will begin to monitor hydrology pre-construction and will continue to monitor hydrology throughout the life of the project.

   a) Regarding hydrology re-establishment, why isn't the south section of the west ditch along the easement boundary proposed to be plugged/filled?
   The property boundary between Daniel Kornegay and Westbrook Land Company, LLC is tied to the centerline of the ditch in question. While RES is purchasing land from Mr. Kornegay, RES cannot fill this ditch without approval of Westbrook Land Company and/or purchase of that land.

b) Since hydrology is the primary functional uplift proposed for W2, DWR requests one or two gauges be installed now to collect preconstruction data.
RES will install gauges in this area in July 2019, as requested. These are shown as existing gauges on the updated Figure 11, and language describing them has been added to Section 3.4, W2.

c) The sample points included in the Jurisdictional Determination appear to be clustered and located outside of the NWI wetland mapped within the proposed easement. Are there additional sample points available to confirm characteristics are representative of entire timber harvest area? If not, DWR will recommend to IRT that a visit to that area occur before the mitigation plan is approved.
More boring locations were sampled by the soil scientist in this area, as indicated by the soils report in Appendix G (see esp. both Figures 2 within the Appendix).

2) DWR liked seeing that gauges were installed in W1 to gather preconstruction site data.
RES appreciates the positive feedback.

3) DWR likes Figure B1 – it would be useful to record the ground elevation for each wetland gauge at as-built/MY0
RES plans on recording groundwater monitoring gauge locations and elevations as part of the as-built survey. See Section 8.1.

4) In general, DWR is in agreement with the proposed wetland gauge locations. However, we would like one more gauge added in the center of W1 (see Sheet W1 mark-up). Also, during field placement none of the proposed wetland gauges should be located above any of the old drain tiles.
This gauge has been added to the monitoring plan, per the comment, and RES will avoid placing gauges above old drain tiles during installation.

5) Section 5.1.1 describes flow attenuation structures, please show the location(s) of these structures on Sheet W1. DWR would also like to see a typical for these structures.
Callouts have been added to Sheet W1 indicating where flow attenuation structures should be installed. Detail F on Sheet D2 provides a typical of this structure.

6) Section 6.2.2- Surface roughening- DWR is open to surface roughening and the creation of depressions, however, RES should guard against making the shallow depression features too deep (>6-7 inches).
Detail C on Sheet D1 has been revised per the comment.

7) Section 6.2.2- Based on Soils Report, the top 18 inches of soil onsite generally lacks the clay content typically used to construct effective ditch plugs. Please identify potential offsite source location(s) for supplemental clay content.
RES is planning to borrow soil from onsite by digging until we reach a clay layer and then backfilling the borrow area.

8) The Soils Report did not show many redoximorphic features in the upper 12 inches of soil onsite. It will be interesting to see if the site meets its minimum hydrologic standards, how many new redox features will form in the upper 12 inches and in which monitoring year will they become prevalent.
Some redoximorphic features may form, but this will depend on the soils. More likely, you will see increases in organic matter, but that will be hard to quantify in the monitoring period. To be conclusive, you would need to have a soil analysis for OM. Ultimately, some of these areas will

begin to exhibit a mucky mineral at the surface, but this will likely take longer than the monitoring period to develop.

9) Section 6.2.4 states that the ditch north of W1 will be relocated approximately 75 feet to the north, however, the Water Balance Wetland Data Analysis states that the ditch will be relocated approximately 95 feet north. If the proposed distance is 75 feet, does RES/DMS think this discrepancy may affect the outer creditable boundary of the wetland area proposed?
The ditch north of W1 is proposed to be relocated approximately 95 ft directly north of the existing ditch, or approximately 80 ft in a perpendicular direction from the existing ditch (roughly NNW). The distance stated in Section 6.2.4 has been corrected to 95 ft. This may be based on the proposed ditch depth, but with the "berm" farm path, the site should be fine at 85 ft for a 4 ft deep ditch, and the proposed ditch is only 3 ft deep.

10) Section 7.1- DWR will accept the 10% saturation criterion as proposed by RES, however, DWR will not accept a target of 8% for the first two years of monitoring, as stated in the 2016 Mitigation Update, that will be left up to the discretion of the IRT.
The success criterion has been updated to 10% for all monitoring years, per this and USACE comments.

11) DWR noted that Atlantic White Cedar (AWC) is on the planting plan. AWC typically does better on organic soils or mineral soils with a lot of organic material in the upper horizon. DWR cautions about planting many of these species, except for in wetter areas (with Bald Cypress).
RES will take this into consideration during site construction. The soil report (Appendix G) indicates that the surface soil horizon does contain a fair amount of OM throughout, and the species is currently limited to 10% of the planting plan.

12) In the Site Visit Memo dated February 22, 2018, "RES stated the easement on all sides of the site extend beyond existing perimeter ditches to allow for potential residual drainage effect from ditches following plugging. This area from the perimeter ditches to the easement boundary will be planted, however not included in credit-generating calculations". The draft mitigation plan does show a buffer between the creditable wetland re-establishment areas and perimeter ditches within the easement on three sides. However, this buffer area is not identified for planting on Sheet P1. Please confirm that the buffer area around W1 will be planted.
This area will be planted according to the planting plan. Sheet P1 has been updated to reflect this.

13) In the Site Visit Memo, RES states that pines, red maple and sweetgum or other undesirable species that inhibit survivability and success of planted trees will be controlled. Please include this action in the monitoring and maintenance sections.
Language has been updated in Section 8.4 and Appendix F to address the comment.

14) DWR requests that at least 1 random veg plot be included in W2 to track wetland habitat development, including woody plant density and diversity.
One random vegetation plot will be added, per the comment. Verbiage has been revised in Section 8.4, and the note has been updated in Figure 11 to account for this.

15) Additional signage may be necessary along the easement boundary north of W2 with the assumption that the adjacent area will continue to be harvested for timber.
RES may install additional signage if this area is to be harvested.

16) Can a LiDAR figure of the project site please be provided for review?
A figure with a digital elevation model of the project area has been added per the comment (Figure 12).

Kim Browning, USACE, May 10, 2019:

1) Success criteria for wetland hydro-period should be 10% for all years.
Section 7.1.1 has been revised per the comment.

2) It's unclear how much of the ditches are being plugged (length), or where the soil is coming from. The design sheets indicate that the ditch is to be partially filled, but the detail does not specify the amount.
The majority of the ditches onsite will all be filled according to Detail H on Sheet D2. The ditch on the eastern boundary of the Project will be filled to within 3 feet of ground surface (per Detail B on Sheet D1) for the majority of its length; fill will taper to meet the invert elevation of the existing culvert at the northern end of this ditch after the proposed culvert removal at the northeastern end of the easement.

3) Shallow depressions should occur naturally through time as trees fall. I would caution against creating a lot of depressions since this is not a site that would have small seasonally flooded riparian areas. If depressions are created on this site, monitoring wells should not be placed in these areas, and I would recommend placing woody debris or logs in these areas for habitat. Are these the source for your fill material?
Some fill material will be obtained from these depressions; however, fill material will be primarily obtained from berms alongside the ditches, and additional fill will need be borrowed from on-site. If needed, clay will be brought from offsite.

4) Monitoring cost for controlling pines and red maple should be considered.
RES will consider control of these species in the monitoring budget.

5) Please place an additional wetland gauge in W2 in the northeast corner where the Upland Data Points (170, 171,172) are indicated on the wetland delineation map.
A gauge has been added to the monitoring plan per the comment.

6) Section 6.1.1: Please specify in the final plan the location and hydroperiod of the reference wetland.
The reference wetland will be the closed-out Cox II Mitigation Site, located approximately 9 miles northeast of the Project. A more descriptive writeup is provided in an updated Section 6.1.1.

7) All gauges should be installed according to guidance using bentonite.
RES will install groundwater monitoring gauges according to USACE guidance.

8) Section 7.1.1: Please remove the section "if a restoration gauge hydroperiod exceeds the reference gauge hydroperiod, then the gauge will be deemed successful." The gauges need to meet the 10% success criteria.
Language in Section 7.1.1 has been updated per the comment. The sentence "if a restoration gauge hydroperiod exceeds the reference gauge hydroperiod, then the gauge will be deemed successful" has been updated to "While a gauge will be considered unsuccessful if it doesn't meet the ten percent criteria, reference gauge data may be used to help explain abnormally dry periods."

9) The correct USACE ID is SAW-2018-00433
This has been revised throughout the document per the comment.

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1 PROJECT INTRODUCTION

1.1 Project Components

The Barefoot Project ("Project") is located within a rural watershed in Sampson County, North Carolina approximately two miles west of Newton Grove and six miles southeast of Peacocks Crossroads. The Project lies within the Neuse River Basin, North Carolina Division of Water Resources (NCDWR) sub-basin 03-04-04 and United States Geological Survey (USGS) 8-digit hydrologic unit code (HUC) 03020201 (**Figure 1**). The Project proposes to re-establish 23.23 acres of non-riparian wetlands within a 123 acre drainage area. The Project is located in the Rolling Coastal Plain level IV ecoregion within the Southeastern Plains level III ecoregion.

The Project area is comprised of a 33.29 acre easement involving a drained mineral flat wetland area, which eventually drains into Mill Creek and later the Neuse River. The wetland mitigation components are summarized in **Table 1**. The Project is located west of Warren Mill Road (SR 1647) and north of Harnett Dunn Highway (Hwy 55) and is accessible from Warren Mill Road. Coordinates for the Project areas are as follows: 35.253742, -78.392667.

1.2 Project Outcomes

The area proposed for restoration has been significantly impacted by agricultural practices. Proposed improvements to the Project will help meet the river basin needs expressed in the 2010 Neuse River Basin Restoration Priorities (RBRP; amended August 2018) as well as ecological improvements to wetlands within the easement.

The Project presents 23.23 acres of proposed non-riparian wetland re-establishment, generating 19.94 Wetland Mitigation Units (WMU) (**Table 1**). This mitigation plan is consistent with the February 22, 2018 Post Contract IRT Meeting Minutes and IRT response emails (**Appendix B**).

Table 1. Barefoot Project Components Summary

Mitigation Approach	Acres	Ratio	Non-Riparian Wetland Mitigation Units
Wetland Re-establishment	16.64	1:1	16.64
Wetland Re-establishment	6.59	2:1	3.30
Total	**23.23**		**19.94**

2 WATERSHED APPROACH

The Project was selected based on its potential to support the objectives and goals of the 2010 Neuse RBRP (amended August 2018). The 2010 Neuse RBRP identified several restoration needs for the entire Neuse River Basin, as well as for HUC 03020201. The Project watershed was identified as a Target Local Watershed (TLW) (HUC 03020201150040, Mill Creek TLW), a watershed that exhibits both the need and opportunity for stream, wetland, and riparian buffer restoration. Approximately 55% of this TLW is agricultural lands and nearly 80% of the watershed soils are hydric. Goals outlined in the 2010 RBRP for the watershed include:

1. *Promote nutrient reduction in municipal areas through the implementation of stormwater best management practices;*

2. *Promote nutrient and sediment reduction in agricultural areas by restoring and preserving wetlands, streams, and riparian buffers;*

3. *Continue targeted implementation of projects under the Nutrient Offset and Buffer programs, as well as focusing DOT sponsored restoration in areas where they will provide the most functional improvement to the ecosystem;*

4. *Support the Falls Lake Watershed Management Plan; a separate prioritization process for DMS will be developed in the next 1-2 years;*

5. *Continue to implement planning initiatives including the NCDMS Phase IV LWP for the Upper Neuse (incorporates updated plans for DMS LWPs including Ellerbe Creek, Lake Rogers/Ledge Creek, Lick Creek, Little Lick Creek, and Upper Swift Creek) and the Upper Neuse River Basin Association's Upper Neuse Watershed Management Plan; and*

6. *Protect, augment and connect Natural Heritage Areas and other conservation lands.*

The Project is located in the headwaters of Mill Creek, near the edge of HUC 03020201 on a broad mineral flat that drains north. Due to its location and proposed improvements, the Project will provide numerous ecological and water quality benefits within the Neuse River Basin. While many of these benefits are limited to the Project area, others, such as pollutant removal and improved aquatic and terrestrial habitat, will have more far-reaching effects. Many of the Project design goals and objectives filter runoff from agricultural operations and improve terrestrial habitat. The Project will address the degraded water quality and nutrient input from farming that were identified as major watershed stressors in the 2010 Neuse RBRP. The Project is adjacent to a larger wetland complex within a watershed that includes a Concentrated Animal Feeding Operation (CAFO) and agricultural fields. The CAFO is within the watershed of the larger, mineral flat wetland complex, but appears to drain by another outlet to the west. The Project will provide moderate water quality benefits by removing approximately 20 acres of cultivated agricultural land and the associated potential surface water inputs of fertilizer, herbicide, and insecticide, addressing Goal 2 of the 2010 Neuse RBRP. It will provide additional wetland area to treat runoff from agricultural fields in its watershed. It may also reduce peak runoff flow and help maintain adequate flow in downslope stream channels. Finally, the protection of the proposed wetlands in a conservation easement will insure the continuation of these benefits into the future.

2.1 **Site Selection**

Currently the Project area has an absence of wetland hydrology and ecology and has been impacted by historic and current row crop production. The Project will directly and indirectly address stressors identified in the 2010 Neuse RBRP by reducing sediment and nutrient loads and protecting/restoring forested wetlands. Project-specific goals and objectives will be addressed further in **Section 5**. A project watershed map with the Project's drainage areas is shown on **Figure 2** and watershed planning priority boundaries are shown on **Figure 1.**

The land required for the construction, management, and stewardship of this project includes portions of one parcel in Sampson County with the following ownership in **Table 2 & Figure 3**. Once finalized, a copy of the land protection instrument will be included in **Appendix C**. The Division of Mitigation Services (DMS) Conservation Easement model template will be utilized to draft the site protection instruments.

Table 2. Project Parcel and Landowner Information

Owner of Record	PIN Or Tax Parcel ID#	Project Area
Daniel F. Kornegay, Jr. Paula S. Kornegay	1584-08-9015 (Sampson County)	All

3 BASELINE AND EXISTING CONDITIONS

3.1 Watershed Summary Information

3.1.1 *Drainage Area and Land Use*

The Project area is comprised of one contiguous potential non-riparian wetland area, that drains to Mill Creek and ultimately to the Neuse River. The total drainage area for the Project is 123 acres (0.19 mi^2). Primary land use within the drainage area consists of approximately 73 percent forest and 27 percent agricultural land. Impervious area is not present in the drainage area of the Project (**Table 3** & **Figure 4**). Within the agricultural land use, row crops make up 100 percent of the area. Although the project watershed is primarily forested, the majority of the agricultural areas within the watershed are in close proximity to the Project and are drained via ditches and drain tiles (**Figure 5**), which plays a significant role in the degradation of the Project wetlands. Historic and current land use within the immediate project area have been primarily crop production and silviculture. These activities have negatively impacted both water quality and habitat within the project area.

Table 3. Project Watershed Summary Information

Level IV Ecoregion	65m – Rolling Coastal Plain
River Basin	Neuse
USGS Hydrologic Unit 8-digit	03020201
USGS Hydrologic Unit 14-digit	03020201150040
DWR Sub-basin	03-04-04
Project Drainage Area (acres)	123
Percent Impervious Area	0%
Surface Water Classification (drains to)	Class C and NSW

3.2 Landscape Characteristics

3.2.1 *Physiography and Topography*

The Project is located in the Rolling Coastal Plain level IV ecoregion within the Southeastern Plains level III ecoregion. This region of rolling, irregular plains consists of moderately low gradient streams, although gradients are greater than the Middle Atlantic Coastal Plains to the east. The region consists of broad interstream areas of well-drained soil that are dominated by agricultural fields of corn, soybeans, tobacco, cotton, sweet potatoes, peanuts, and wheat interspersed with pasture, woodland, and forest (Griffith et al. 2002). It has a slightly cooler and shorter growing season than the Atlantic Southern Loam Plains. The topography of the Project area is generally flat with elevations ranging from 189 feet to 196 feet.

3.2.2 *Geology*

According to geology data from the North Carolina Geologic Survey, published in 1985, the Project is within Black Creek formation (Kb) geologic map unit occurring in the Coastal Plain Belt. This map unit is associated with sedimentary type rocks of the Black Creek formation that formed in the Cretaceous period within the Mesozoic Era between 63 and 138 million years ago. This formation is composed of gray to black, lignitic clay; often with thin beds and laminae of fine-grained micaceous sand and thick lenses of cross-bedded sand. The upper portion often contains glauconitic, fossiliferous clayey sand lenses.

3.2.3 *Vegetation*

Current land use in the vicinity of the Project is primarily agricultural and silvicultural with land use immediately surrounding the Project including row crops and loosely managed pine plantation land. Most of these managed lands have been recently harvested.

The proposed restoration area is split into two land uses, with the main area in cultivated row crops which is managed to reduce annual weeds and grasses. The second area is in timber production. The surrounding ditches have limited vegetation due to regular maintenance. Herbaceous vegetation along the ditches is weedy, including crabgrass (*Digitaria* species), annual ragweed (*Ambrosia artemisiifolia*), and dogfennel (*Eupatorium capillifolium*).

The surrounding forest land has a closed canopy where trees have not been harvested. Dominant canopy species include loblolly pine (*Pinus taeda*), swamp tupelo (*Nyssa biflora*), red maple (*Acer ruburm*), and sweetgum (*Liquidambar styraciflua*). Remaining trees and stumps within the clear-cuts appear to reflect similar tree species. The shrub layer is variable and dense in places, consisting of swamp titi (*Cyrilla racemiflora*), high bush blueberry (*Vaccinium corymbosum*), sweet bay (*Magnolia virginiana*), sweet pepperbush (*Clethra alnifolia*), American holly (*Ilex opaca*), and redbay (*Persea borbonia*). Common woody vines are swamp greenbrier (*Smilax laurifolia*) and Carolina jessamine (*Gelsemium sempervirens*). The herbaceous vegetation is sparse where a forest canopy is mostly closed. In open areas and within the recent clear-cut, numerous graminoids are present including purple bluestem (*Andropogon glaucopsis*), woolgrass (*Scirpus cyperinus*), common rush (*Juncus effusus*), shallow sedge *(Carex lurida*), and fringed sedge *(Carex crinata*). Sawtooth blackberry (*Rubus argutus*) was also observed in disturbed areas.

The natural forest community is best described as Nonriverine Wet Hardwood Forest - Oak Flat subtype that occurs on mineral flats (Schafale and Weakley, 1990; Schafale, 2012).

3.2.4 *Existing Wetlands*

The US Fish and Wildlife Service (USFWS) National Wetland Inventory Map (NWI) depicts two wetlands within the project area (**Figure 6**). The clear-cut portion of the Project is mapped as a PSS1/4A (*Palustrine Scrub-Shrub Broad-Leaved Deciduous Needle-Leaved Evergreen*). To the south and west of the Project, areas are mapped as PFO4B *(Palustrine Forested Needle-Leaved Evergreen Seasonally Saturated*). The NWI developed these maps and classification based upon photo interpretation using 1:58,000 scale color infrared imagery from 1983 or prior years. The methodology utilized by the NWI excludes certain types of "farmed wetlands" as may be defined by the Food Security Act or that do not coincide with the Cowardin et al. definition (1979). The cultivated field is not depicted as a wetland, likely because it was farmed prior to 1983 when this classification was developed and would not have been classified as a wetland.

A wetland delineation was performed in March 2018 following current methodology outlined in the 1987 U.S. Army Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0; Environmental Laboratory, 1987). Soils were characterized and classified using the Field Indicators of Hydric Soils in the United States, Version 8.1 (NRCS, 2017). No wetlands are present within the cultivated field. The clear-cut area to the west has hydric soils and was evaluated based on current hydrology. This clear-cut area is surrounded by significant ditches that remove the surface water connection with its watershed. This reduces the watershed to the area within the ditches and it was determined to lack sufficient hydrology to maintain a wetland hydroperiod. With a growing season of 254 days, the minimum hydroperiod of 5 percent would be over 13 days with the water table within 12 inches of the ground surface.

The adjacent wetland outside of the Project provides connectivity between a wetland and the headwater streams to the west and north but is currently disconnected from the project area hydrologically. A Jurisdictional Determination request was submitted to the U.S. Army Corps of Engineers (USACE) on May 15, 2018. An Approved Jurisdictional Determination was received from USACE on December 27, 2018 (SAW-2018-00433); it determined that no jurisdictional waters of the US are present in the project area (**Appendix H**). Wetland forms are included in **Appendix H**.

3.2.5 *Soil Survey*

The Barefoot Mitigation Project is located in the Middle Coastal Plain Physiographic Province that is divided into three major units based mostly on age and weathering. The Project lies in an area where broad interstream divides are nearly level with gentle micro relief and soils typically have high water table due to lack of drainage features (Daniels, et al., 1984). The soils within the Coastal Plain region of Sampson County formed in sediment deposited several million years ago by the oceans and streams. Broad, nearly level interstream divides often have poorly drained soils with better drained soils occurring along gentle slopes above drainageways with poorly drained alluvial soils. Sandy textured soil dominate this landform, but because of the depositional nature, clays can occur anywhere.

Within a general area, soils are shown to occur in associations having distinctive patterns of soil, relief, and drainage in a unique natural landscape. The Project occurs within this General Soil Map Unit of a Norfolk-Rains-Goldsboro association. This association occurs on broad, smooth flats on uplands. It consists of Norfolk (27 percent), Rains (25 percent), and Autryville (13 percent) with miscellaneous soils contributing to the remaining 35 percent. The poorly drained Rains is on the broad flats, the Goldsboro is on better drained smooth landscapes, and the nearly level to gently sloping Norfolk soil are on higher ground and along drainage features. Most soils in this landscape are used for cropland or pasture. The main limitation to most uses is the seasonal high water table.

Because the landscape surrounding the Project and local area is a broad interstream divide, large soil units are mapped. The Sampson County Soil Survey shows a single series mapped across the Project, a poorly drained Rains sandy loam (USDA SCS, 1985). Rains soils occur on the broad interstream divides on marine terraces and nearly level landscapes with negligible runoff. Mapped within the watershed and near the Project are moderately well drained Foreston and poorly drained Woodington loamy sands. Woodington is found in nearly level to slightly concave landscapes with Foreston on the slightly convex landscapes. The soil series found at the Project and within the surrounding landscape are described below and summarized in **Table 4** and **Figure 7**.

Rains sandy loam (Ra). This is a poorly-drained soil found on broad flats and shallow depressions near drainageways. It has moderate permeability and runoff is negligible. The seasonal high water table ranges from 0 to 12 inches below the surface. It typically has a sandy clay loam subsoil. Major uses are forest, pasture, and cropland. The NRCS rates this soil as hydric. Potential inclusions include Lynchburg (10%) and Pantego (8%).

Woodington loamy sand (Wo). This is a poorly-drained soil found on smooth flats. Permeability is moderately rapid and runoff is slow. The seasonal high water table ranges from 0 to 12 inches below the surface. It typically has a sandy loam subsoil. Major uses are forest, pasture, and where drained, cropland. The NRCS rates this soil as hydric.

Norfolk loamy sand (No). This is a well-drained soil found on broad smooth uplands. It has moderate permeability and runoff is moderate to negligible. The seasonal high water table ranges from 40 to 72 inches below the surface. A loamy sand surface is typically underlain by a sandy clay loam. It is considered prime farmland and major uses are cleared and used for cultivated cropland. This soil is not considered hydric by the NRCS. Potential inclusions include moderately well drained Goldsboro (9%) and well drained Wagram (8%).

Foreston loamy sand (Fo). This is a moderately-well-drained soil found on broad smooth uplands. It has moderately rapid permeability and runoff is slow. The seasonal high water table ranges from 24 to 42 inches below the surface. It typically has a sandy loam subsoil. Major uses are cultivated cropland, forest, and pasture. This soil is not considered hydric by the NRCS. This soil is not considered hydric by the NRCS but contains potential hydric inclusions. Potential inclusions include Rains (3%) and Woodington (2%).

Project soils are mapped by the NRCS as Foreston loamy sand and Rains sandy loam (**Figure 7**).

Table 4. Mapped Soil Series

Map Unit		Percent Hydric	Drainage Class	Hydrologic Soil Group	Landscape Setting
Symbol	Name				
Ra	Rains sandy loam	82%	Poorly	B	linear-linear
Wo	Woodington loamy sand	90%	Poorly	A/D	linear-concave
NoA	Norfolk loamy sand	0%	Well	A	linear-convex
Fo	Foreston loamy sand	5%	Moderately Well	B	linear-convex

3.2.6 *Existing Hydric Soil*

Hydric soils within the proposed wetland re-establishment areas were verified through auger borings by a licensed soil scientist. Topography of the Project is nearly level with slight concave microrelief. The site evaluation identified three distinct soil areas; 1) having indicators without wetland hydrology (clear-cut), 2) disturbed soils having hydric indicators and lacking wetland hydrology (cultivated field), and 3), lack both hydric indicators and hydrology (**Appendix G**).

Soils having hydric indicators are located throughout the project area with the exception of a small area at the northeast corner of the Project (**Appendix G**). No jurisdictional wetlands are present within the project area because all hydric soil at the Project lacks jurisdictional hydrology. The absence of hydrology is primarily due to the extensive ditch network surrounding the Project that effectively lowers the groundwater table and limits the functional watershed. The ditches are a hydrological barrier to both surface water and groundwater from the surrounding landscape, limiting the contributing watershed. Within the cultivated field, a drain tile system is also present to further lower the water table and provides for quicker farm equipment access.

Generally, soil in the proposed wetland re-establishment areas typically exhibit a dark surface with a sandy loam texture underlain by a sandy texture or sandy clay loam. The typical soil surface consists of dark to black sandy loam ranging from 9 inches thick to greater than 40 inches. This black surface is underlain by a dark gray to very dark grey, depleted horizon having a weak structure. Reddish mottles of redoximorphic concentrations were occasionally observed within the subsoils. The presence of drain tiles combined with the sandy texture has lowered the water table and further shortened hydroperiods. Within the field the water table was observed to be at 20 to 28 inches depth, just above where soil structure becomes weak. If originally present, any mucky characteristics at the surface have been destroyed from cultivation and tillage. Based upon limited observations in the less disturbed areas surrounding the Project, a muck surface was occasionally observed. This soil type is similar to a Pantego inclusion expected of this series and within this landscape. It is likely that small inclusions of Pantego would have occurred throughout much of the Project prior to cultivation (**Appendix G**).

The most common hydric soil indicators are A11-Depleted Below a Dark Surface, A12-Thick Dark Surface, and F3-Depleted Matrix. Surrounding undisturbed soils have additional indicators of A7-Mucky Mineral and A9-Muck. Within the cultivated field tillage would have destroyed any mucky horizons (**Appendix G**).

3.3 Land Use - Historic, Current, and Future

The Barefoot Mitigation Project was once a Nonriverine Wet Hardwood Forest wetland subject to prolonged saturation as indicated by soil mapping, historical aerial photography, and the landowner's efforts to provide site drainage (e.g. constructed ditches and drain tiles). Historic aerial imagery indicates that clearing and ditching of the land directly north of the Project began around 1973, prior to which the area was completely wooded. The project area itself was fully converted to its current land use and drainage features by 1983. The silvicultural area was most recently harvested in 2014 (**Figure 8**).

The eastern portion of the Project remains in agricultural use and is being used for row crops, while the western portion remains in silvicultural use. The land west and southwest of the easement remains forested.

The future land use for the Project will include an established 33.29-acre conservation easement, that will be protected in perpetuity. The conservation easement will encompass 23.23 acres of protected, re-established wetlands at a target hydrology of greater than 12% and an additional 50-foot buffer surrounding this area that may achieve wetland hydrology at a hydroperiod between 6% and 12%. The Project will reconnect this area to adjacent forested wetlands to the south. Outside the Project to the north, east, and southeast will likely remain in agricultural use.

3.4 Wetland Summary Information

The Project is comprised of one easement area just upstream of Mill Creek. The easement has no agricultural crossings. The wetland area to be restored is split into two areas, W1 and W2, with both receiving hydrologic restoration, but only W1 being planted with the target community (**Figure 9**).

The proposed re-establishment areas do not currently function as wetlands. Current conditions demonstrate significant habitat degradation and lack of wetland hydrology as a result of impacts from agriculture. The Project contains a network of drain tiles that lower the water table. Additionally, drainage ditches located on-site and in the immediate vicinity facilitate water movement in an overall northward direction. The drainage effect of these ditches reduces the elevation of the surficial aquifer beneath the Project. As a result, the proposed re-established wetland areas do not currently meet criteria for wetland hydrology. Moreover, habitat throughout the majority of the restoration areas is poor in that there is little landform or vegetation diversity. Wetland forms are located in the JD package included in **Appendix H**.

3.4.1 *Existing Conditions*

W1

Wetland re-establishment area W1 is approximately 20 acres of agricultural fields in row-crop production that are drained by ditches on all four sides and through the middle, as well as drainage tiles running east to west. The area does not currently exhibit wetland hydrology, although the soils have hydric indicators (**Appendix G**). Ten groundwater monitoring gauges were installed in two transects across the field to capture the drainage effects of the ditches and drain tiles (**Figure 5**). These gauges recorded groundwater elevations from May 4, 2018 through October 16, 2018. Based on this season of monitoring, seasonal high water tables appear to reflect the depth of the drain tiles and ditches, as shown in the field groundwater transect charts in **Appendix B**. Groundwater gauges also showed groundwater at the site staying consistently below the required 12 inch depth for wetland jurisdiction throughout the growing season, except after significant rainfall events (Groundwater gauge charts, **Appendix B**).

Looking east towards the farm access road from the field that will be W1

Looking south into the southwest corner of the field that will be W1

W2

Wetland re-establishment area W2 is approximately 10 acres in timber production that is drained by ditches on all four sides. This area was originally thought to be existing wetland area, so was not proposed for re-establishment at the Proposal stage. However, an approved jurisdictional determination concluded that this area did not exhibit the hydrology to be considered a wetland (**Appendix H**). This area was likely wetland before being drained for silvicultural use, as soil survey revealed that the soils have hydric indicators, so re-establishment is appropriate for W2 (**Appendix G**). Two groundwater monitoring gauges will be installed on the ends of the proposed wetland areas (**Figure 5**). These gauges will record groundwater elevations from July 2019 through construction and through the monitoring period of the project. This area is currently vegetated with a mixture of young trees, shrubs, and herbaceous plants, so does not require wetland planting. Re-establishment will be claimed at a lower credit ratio to account for the lack of planting. Further explanation of the approach may be found in section 6.2.1.

Looking along old skid trail in clear-cut

Typical vegetation within W2

3.5 Regulatory Considerations and Potential Constraints

Table 5 is a summary of regulatory considerations for the Project. Supporting documentation can be found in **Appendix H** and **Appendix J**.

Table 5. Regulatory Considerations

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States - Section 404	No	Yes	Appendix H
Waters of the United States - Section 401	No	No	N/A
Endangered Species Act	Yes	Yes	Appendix J
National Historic Preservation Act	Yes	Yes	Appendix J
Coastal Zone Management Act (CZMA) /Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	N/A
Magnuson-Stevens Act - Essential Fisheries Habitat	No	N/A	N/A

3.5.1 *Property, Boundary, and Utilities*

There are no significant hydrologic or infrastructure constraints to the Project. There are no crossings or breaks within the conservation easement. No overhead or underground utility lines are present. A drainage ditch and farm access road will be constructed beyond the northern edge of the Project to allow landowners to continue current land use and access as needed (**Figure 9**). These will be constructed to limit drainage of the project wetlands. Culvert crossings on both ends of the ditch will tie it to existing drainage ditches. Any culvert maintenance will be the responsibility of RES through completion of monitoring. Once the Project has completed monitoring and the Project is closed out, the culvert will be the responsibility of the landowner(s).

No General Aviation or Commercial airports are located within five miles of the proposed project. The Project is located within five miles of one privately owned and operated airstrip. Massengill Airport is located approximately 4.3 miles north of the Project. No impacts to its functions are anticipated from the Project.

3.5.2 *Federal Emergency Management Agency (FEMA)/ Hydrologic Trespass*

According to the North Carolina Floodplain Mapping Information System, the Project is not within a flood hazard zone (**Figure 10).** The Project can be found on Flood Insurance Rate Map (FIRM) panel 1584 (map number 3720158400L), effective date June 20, 2018, and on FIRM panel 1564 (map number 3720156400K), effective January 5, 2007. A DMS Floodplain Requirements Checklist form was completed for the Project and is included in **Appendix K**.

3.5.3 *Environmental Screening and Documentation*

To ensure that a project meets the "Categorical Exclusion" criteria, the Federal Highways Administration (FHWA) and NCDMS have developed a categorical exclusion (CE) checklist that is included as part of each mitigation project's Environmental Screening Process. The CE Approval Form for the Barefoot Project is included in **Appendix J** and was approved by DMS and FHWA in October 2018.

3.5.4 *Threatened and Endangered Species*

Plants and animals with a federal classification of endangered or threatened are protected under provisions of Sections 7 and 9 of the Endangered Species Act of 1973, as amended. A desktop analysis was performed to identify rare species or unique habitats on-site, including using the USFWS Information for Planning and Conservation (IPAC) online tool and performing a query of the January 2018 North Carolina Natural Heritage Program database of natural heritage element occurrences (NCNHP, 2018). Additionally, a field investigation was conducted to evaluate federally protected species potentially occurring on the Project. The USFWS was consulted to review the project and provide input on whether there are any possible concerns for threatened and endangered species. The USFWS provided comments on two species, the red-cockaded wood pecker (*Picoides borealis*) and pondberry (*Lindera melissifolia*), and these comments were satisfactorily addressed. All correspondence is included in **Appendix J** with the Categorical Exclusion checklist. Furthermore, the USFWS Raleigh Ecological Services online project review process was performed and submitted on October 4, 2018 indicating "no effect" and "not likely to adversely affect" listed species (**Appendix J**).

3.5.5 *Cultural Resources*

A review of North Carolina State Historic Preservation Office (SHPO) GIS Web Service (accessed January 4, 2018) database did not reveal any listed or potentially eligible historic or archeological resources on the proposed project property. There are no anticipated impacts from project activities to state surveyed properties as there are none in the proposed project vicinity. Further, SHPO was consulted to review and comment on potential cultural resources occurring within the vicinity of the Project and responded that there will be no effect on historic resources. Correspondence is included in **Appendix J** with the Categorical Exclusion checklist.

3.5.6 *Clean Water Act - Section 401/404*

A Jurisdictional Determination request was submitted to the USACE on May 15, 2018. An Approved Jurisdictional Determination was received from USACE on December 27, 2018 (SAW-2018-00433; **Appendix H**). No jurisdictional wetlands, streams, or ditches are currently present on the Project, so no impacts to these resources are anticipated.

4 FUNCTIONAL UPLIFT POTENTIAL

The objective of this project is to produce 19.94 non-riparian WMUs and maximize the improvement of hydrologic function, water quality, and aquatic and terrestrial habitat through the restoration of a continuous Nonriverine Wet Hardwood Forest system. With a focus on total ecosystem restoration, the mitigation design will improve wetland function at the Project and provide numerous ecological and environmental benefits to the broader Neuse River basin. Benefits, which are described in more detail below, will include increased hydrologic function, improvements to water quality, and improved wetland habitat.

4.1 **Anticipated Functional Benefits and Improvements**

4.1.1 *Hydrologic Function*

The filling and stabilizing of on-site ditches and removal of agricultural drain tiles will restore natural flow patterns including surface and subsurface hydrology. This will lead to improvements in the hydrologic function of the Project. Soil investigation shows that much of the landscape within the Project exhibits hydric characteristics indicating that historically a shallow seasonal high water table was present (**Appendix G**). Based on the landscape position of the restoration Project, the nearly level topography, and the surrounding landscape, improvement of hydrologic function will be realized in various degrees across the landscape. The restoration areas will improve surface water storage and retention, and with the range of soil characteristics and landscape positions will also provide direct improvement in subsurface water storage and retention. The rehabilitation of this nonriverine hardwood forest system will aid in the maintenance of water table levels by increasing infiltration and groundwater recharge in the higher positions of the landscape.

Raising the local groundwater table and increasing residence time within the upper layers of the soil will allow greater groundwater recharge to the local aquifer. This aquifer recharge may provide positive impacts beyond the local area because this project is located high on the landscape.

4.1.2 *Water Quality*

The improved hydrologic function and water storage of the Project will lead to water quality improvement including nutrient removal, sediment reduction, and runoff filtration. By trapping sediment, retaining excess nutrients, and filtering runoff, the Project will provide valuable benefits to the water quality of the downstream and surrounding areas. The improved hydrologic function and water quality improvements will, in turn, lead to direct and indirect benefits to the aquatic and terrestrial habitat in the area.

4.1.3 *Habitat*

Re-establishment of wetland hydrology and planting species for a Nonriverine Wet Hardwood Forest will recreate habitat previously lost to agricultural practices. Additionally, reconnection with adjacent forested wetlands will compound habitat benefits by providing an established area from which native species can migrate.

5 MITIGATION PROJECT GOALS AND OBJECTIVES

The Barefoot Wetland Restoration Project was identified as a wetland restoration opportunity to improve water quality, habitat, and hydrology within the Neuse 01 River Basin. Specific, attainable goals and objectives will be realized by the Project. These goals clearly address the degraded water quality and nutrient input from farming that were identified as major watershed stressors in the 2010 Neuse River RBRP (amended in 2018). The Project will address outlined RBRP Goal 2 (listed in **Section 2**).

The project goals are:

- Reduce sediment and nutrient input into downslope receiving streams by limited runoff and sediment into connecting ditches,
- Improve filtration of runoff in project drainage area,
- Re-establish a historical aquatic resource into a functioning non-riparian wetland, and
- Improve aquatic and terrestrial habitat.

The project goals will be addressed through the following project objectives:

- Convert active row crop land to a nonriverine hardwood forest,
- Plug, fill, and stabilize existing ditches and drainage tiles,
- Treat exotic invasive species,
- Provide habitat and hydrologic connectivity to a larger wetland community, and
- Establish a permanent conservation easement on the Project.

The Project is anticipated to bring functional uplift, benefits, and improvements to the project area and adjacent forests. Restoration of wetland hydrology and reconnection with the supplying watershed will re-establish wetlands lost to past agricultural practices, and conversion of agricultural lands will reduce sediment and nutrients contributed to downstream systems. Planting of native species and control of invasives will restore terrestrial habitat, and reconnection of the project area with the adjacent forested wetlands will provide a source of native flora and fauna for the project area.

5.1.1 *Flow Attenuation*

Due to the rural nature of this project, individual stormwater best management practices (BMPs) will not be required. However, flow dissipation structures will be applied at locations where ditches or other forms of concentrated flow enter or leave the conservation easement (**Figure 9**). These may consist of rip-rap protection on ditch plug slopes or below culvert outfalls. All flow dissipation structures not addressing culvert crossings will be installed within the conservation easement so that landowners will not have access to the structures. Failure or maintenance of the structures is not anticipated as structures will be installed in low-gradient areas, and the areas proposed to dissipate flow will be well vegetated and matted.

This project will improve water quality entering the headwater ditches that eventually flow to Mill Creek and the Neuse River. Areas of concentrated flow will be protected as needed with erosion control matting, plantings, and natural design structures. Stormwater management issues resulting from future development of adjacent properties will be governed by the applicable state and local ordinances and regulations. It is recommended that any future stormwater entering the Project maintain pre-development peak flow. Any future stormwater diverted into the Project should be done in a manner as to prevent erosion, adverse conditions, or degradation of the Project in any way.

6 MITIGATION WORK PLAN

6.1 Reference Wetland

The restoration portions of the Project are characterized by agricultural and silvicultural practices. Several ditches surround the Project that disconnect it from its watershed. Physical parameters of the Project were used, as well as other reference materials, to determine the target community type. An iterative process was used to develop the final information for the project design.

To develop the target reference conditions, physical project parameters were reviewed. This included the land use, soils mapping units, as well as general topography. Because of the project location above headwaters in a nearly level, broad, interstream ridge, the Project is a nonriverine system that falls into a mineral flat classification. The "Classification of the Natural Communities of North Carolina" was used to narrow the potential community types that would have existed at the Project (Schafale and Weakley, 1990). The design of the Project will restore a Nonriverine Wet Hardwood Forest system that will be intermittently to seasonally saturated. This community is further refined into an Oak Flat subtype (Schafale, 2012). Historically, these communities were common in the outer coastal plain and have occurred throughout the middle coastal plain; however, because these sites are easy to drain and convert into excellent farmland, very few of these communities are left.

Target reference conditions included the following:

- Located within the Physiographic Region – Inner Coastal Plain,
- Similar topography,
- Similar land use on-site and in the watershed,
- Similar watershed soil types,
- Ideal, undisturbed habitat, and
- Minimal presence of invasive species.

6.1.1 *Reference Site Search Methodology*

Finding reference sites on the coastal plain is difficult because many have been disturbed by farming or urban development; as such, the final reference is not an ideal match on all parameters. The final reference wetland is the closed-out Cox II Mitigation Site. This site is located approximately 9 miles northeast of the Barefoot project off Westbrook Lowgrounds Road. Cox II is composed of a mix of riverine wetland restoration, bottomland hardwood preservation, and non-riverine wet hardwood preservation. The site is located in the same geologic formation as the Barefoot Project, drains to the same stream (Mill Creek), and the wet hardwood preservation area is located in the same level IV ecoregion. The area of non-riverine wet hardwood preservation, located in the most upstream portion of the site, seems to be an ideal community match based on the vegetation survey performed for the Preservation Letter. The canopy is dominated by oaks and sweetgum, and the understory has a locally dense shrub component that fits the definition of a non-riverine wet hardwood forest – oak flat subtype provided by Schafale, 2012. As this was a preservation area, no groundwater gauges were installed to monitor the hydroperiod of this wetland. However, a reference groundwater well will be installed at this site prior to the as-built report.

6.2 Design Parameters

6.2.1 *Wetland Restoration Approach*

The Barefoot Mitigation Project will provide 19.94 wetland mitigation units through wetland re-establishment. The existing agricultural fields and clear-cut on the Project will be Wetland Re-establishment by restoring the hydrology, restoring vegetation in the agricultural field, and providing long-term protection. Wetland restoration activities will include: plugging the interior ditches and all ditches

surrounding the agricultural fields, removing/plugging the drain tiles, removing spoil along the ditches, and limited grading of the area to reconstruct historical contours that include shallow depressions in the nearly level topography. Additionally, the ditch to the north of W1 will be relocated approximately 95 feet north of the present location to allow continued use of the agricultural fields north of the Project, but to also limit drainage effect on the restored area. The field will be planted with trees and a permanent seed mix. No additional plantings within the clear-cut are anticipated to be necessary. A ratio of 1:1 is expected within re-established area of W1, which totals 16.64 acres. Within W2, wetland re-establishment at a ratio of 2:1 is being proposed as hydrology is being re-established through the plugging of ditches, but existing vegetation is being left undisturbed. An additional buffer of 50 feet around the proposed area of wetland re-establishment may achieve wetland hydrology at a lower hydroperiod. The remaining area between that and the easement edge is not expected to achieve wetland hydrology but will act as additional buffer between the wetland area and agricultural practices outside the easement. Conceptual plan views are provided in **Figure 9** and in **Appendix A**.

6.2.2 *Wetland Restoration Summary*

The primary wetland re-establishment activities will include:

- The plugging and backfilling of ditches in and around the cultivated field,
- Removing/plugging all of the drain tiles within the agricultural field,
- Plugging and backfilling the ditches on two sides of the cut-over,
- Removal of spoil berms to reconnect the Project to its historical watershed,
- Creation of shallow depressional features typical of the community type, and
- Areas of cut and fill along interior ditches will be re-graded to create a continuous wetland flat system.

Plugging ditches and side ditches

Plugging of the main drainage ditches surrounding the Project and internal ditches will be accomplished through a combination of backfilling and the construction of ditch plugs throughout the easement area (Sheet W1, **Appendix A**). Approximately 4900 linear feet of open ditch on the Project will be backfilled within the easement boundary, and an additional approximate 1200 linear feet of open ditch will be partially filled outside the easement boundary (**Figure 9**; Sheet W1, **Appendix A**). Ditches within the easement will be filled, compacted and graded to the adjacent elevation. The ditch east of the project boundary will be partially filled to within 3 feet of the top of bank elevation. Typical ditch plugs will be 30 feet wide and extend above the top of the ditch bank elevation a minimum of 6 inches. Plugs will be constructed of compacted fill placed in 12-inch lifts with the final 18 inches being minimally compacted to allow for plant growth (Sheet D2, **Appendix A**). Plugs are to be spaced such that successive plugs are no more than 6 inches in elevation below one another. At the point of departure from the conservation easement, ditch fill will be graded at a stable slope to existing ditch elevations outside the easement. When possible, ditch plugs will be constructed using excavated material from the restoration activities. If low permeability soil material with sufficient clay content is not present on-site, it will be brought to the site from an off-site source.

Removing and plugging drain tiles

Drain tiles will be disabled by excavating out 10 linear feet of tile at each end of the drain tile and excavating out the same length at a maximum of every 300 feet between each end. This will be accomplished by removing the drain tile and any porous material originally placed to improve its efficiency and backfilling with suitable impervious material to 6 inches above and below the former tile extents. If suitable material is unavailable, exposed tile ends in each excavated trench will be plugged with 1 foot of concrete or grout. The remaining trench will be filled with material, which is compacted in 12-inch lifts. The soil surface will be contoured to approximate the surrounding area (Sheet D2, **Appendix A**).

Removal of spoil berms

Along the ditches, a low berm of spoil exists within the cultivated field and has been spread and leveled and smoothed out to facilitate crop production. The berms within W2 have not been leveled and are more distinct. The available spoil will be used to partially backfill the ditches. Along the northern boundary between the Project and the ongoing agricultural activities, the berm shall remain or be enhanced to limit surface drainage off-site and encroachment upon the agricultural activities. The berms on ditches surrounding the Project to the east, west, and south will be placed in the ditch or removed to allow a natural connection of surface flows between the Project and the surrounding watershed.

Surface roughening and enhancing shallow depressional features

Within the agricultural field, cultivation has eliminated natural surface topography. The entire cultivated field will be disked to break up the plow layer, increase surface roughness, and promote infiltration (Sheet P1, **Appendix A**). This activity to roughen the surface will create and enhance shallow depressions. This activity will promote infiltration and provide diverse micro habitats with a range of biological activity similar to the target natural wetland community.

6.2.3 *Proposed Wetland Hydrology*

The restoration plan for the Project consists of filling and stabilizing current ditches, converting active agricultural fields to a mineral flat wetland system, and restoring a Nonriverine Wet Hardwood community within the agricultural field. Additionally, this project will restore natural wetland hydrology to parts of the adjoining cut-over forest. The disabling of the drain tile and backfilling and plugging of the ditches will lengthen wetland hydroperiods by halting artificial subsurface drainage, preventing rapid surface drainage, and reconnecting the Project to its historic watershed. Saturation and shallow ponding across the Project are essential to sustain plants and wildlife characteristic of the mineral flat wetlands (Schafale and Weakley, 1990). The drainage area for the Project is approximately 0.19 square miles (123 acres) once the ditches are plugged and the Project is reconnected to its watershed. The restored wetland hydroperiod regime will vary across the site due to the subtle topography across the Project.

6.2.4 *Wetland Hydrologic Analysis*

The proposed Project and surrounding areas were once a forested wetland directly connected as part of a larger nearly level interstream divide. Due to the nearly flat topography, the broad interstream divide is poorly drained. Currently drainage is provided by a ditch network with drain tile providing additional drainage within the cultivated field. The ditch network has its highest elevations within the project area. Although the soils in the restoration area are classified as poorly drained, the extensive ditching and tile draining have effectively drained the restoration area. The natural drainage divide of the watershed parallels Highway 50 to the south. This slightly higher elevation slopes down northward toward the Project. The ditches surrounding the project area sever the hydrologic connection to the natural watershed. The forested areas upslope of the Project and outside of these ditches appear to be jurisdictional.

In general, the hydrology of the Project is dictated by inputs of precipitation and surface runoff with losses through drainage ditches, evapotranspiration, and tile drainage. Very little surface runoff would be expected from natural conditions, but within the agricultural field, temporary shallow ponding after rain events was observed near field edges due to soil compaction and poor surface infiltration. The ponding has created small erosion channels into ditches. Based on a single season of monitoring, seasonally high water tables appear to reflect the depth of the drain tile (**Appendix B**).

The soils report (**Appendix G**) indicated that a majority of the Project has hydric soil indicators present but lacks wetland hydrology. Combined with the level topography, this presents conditions favorable to re-establish a high water table. The design of the Project will restore intermittently to seasonally saturated soils by raising water tables, removing drainage ditches and tiles, and re-establishing runoff from the

surrounding upland landscape. This natural system type relies on precipitation and slow to very slow runoff that permits extended saturation and ponding.

The hydroperiod of the water table may vary seasonally to yearly in magnitude, duration, and frequency (WRP Technical Note HY-EV-2.1, 1993). It may be anticipated that the majority of the seasonally saturated wetlands occur during the winter months and the early portions of the growing season. Surface water may be present for extended periods during the growing season, especially during periods of high rain fall, but it is typically absent during the middle of the growing season in most typical years (EPA, 1995). Based upon average local climate data, high periods of precipitation occur during the latter half of the growing season after evapotranspiration has peaked and begun to decline toward the end of the growing season. In the absence of surface water, the water table is expected to often be near the ground elevation. A complete hydrologic analysis of the Project with associated results is presented in **Appendix B**.

A preliminary assessment of hydrologic trespass was performed on the Project. It appears that the adjacent agricultural fields to the east are topographically elevated sufficiently to provide drainage onto the floodplain without impacting the existing drainage. The adjacent forest to the south and west appear to be currently jurisdictional wetlands and it was determined that the Project will not significantly increase their hydrology and cause a change of use. The agricultural fields to the north of W2 will be separated from the Project by a shallow berm between the Project and a ditch that will remain open. The ditch to the north of W1 will be relocated approximately 95 feet north of the present location to allow continued use of the agricultural fields north of the Project, but to also limit drainage effect on the restored area.

6.3 **Vegetation and Planting Plan**

6.3.1 *Plant Community Restoration*

The restoration of the plant communities is an important aspect of the restoration Project. Several sources of information were used to determine the most appropriate species for the restoration Project. The selection of plant species is based on the natural community type description and remnant species present in the forest surrounding the restoration Project. Additional species observed at a reference wetland may be added if appropriate.

Restoration areas will be restored to a Nonriverine Wet Hardwood Forest-Oak Flat subtype as described by Schafale and Weakly (Schafale and Weakley, 1990; Schafale, 2012). This community type is classified as a Hardwood Flat using the NCWAM dichotomous key to general North Carolina wetland types. This target community will be used for the planting areas within the Project, shown in **Figure 11** and **Appendix A**. This community is found on the poorly drained interstream flats with fine-textured mineral soil and is intermittently to seasonally saturated. Hydrology is driven by upland runoff and extended water storage due to the nearly flat topography with distant natural drainage features. This community type is characterized by the dominance or substantial presence of bottomland oaks in sites remote from rivers and not subject to stream flooding. The *Oak Flat Subtype* is distinguished by a canopy containing swamp chestnut oak (*Quercus michauxii*), cherrybark oak (*Quercus pagoda*), or a mixture of oaks. The dominance of the shrub layer by coastal doghobble (*Leucothoe axillaris*) or sweet pepperbush (*Clethra alnifolia*) also distinguishes them. Though these communities can become strongly dominated by sweetgum if they are clear-cut. In the clear-cut adjacent to the cultivated portion of the Project, sweetgum and loblolly pine are dominating the regenerating saplings in many areas. The plant species list can be found in **Table 6**. Species with high dispersal rates are not included because of locally-occurring, adjacent seed sources and the high potential for natural regeneration. The high dispersal species include red maple and sweetgum. Both species are typical of Nonriverine Wet Hardwood Forests, and sweetgum especially can be used to distinguish this community from others in similar settings. In more disturbed examples, these species tend to dominate, so while these species could be counted towards success, they should be monitored to ensure they do not outcompete the other proposed species (Schafale, 2012).

It is anticipated that the vegetation planting/replanting will be conducted between November 15 and March 15, per the October 2016 USACE/North Carolina Interagency Review Team (NCIRT) monitoring guidance.

Table 6. Proposed Plant List

Bare Root Planting Tree Species				
Species	**Common Name**	**Spacing (ft)**	**Unit Type**	**% of Total Species Composition**
Quercus michauxii	Swamp chestnut oak	9X6	Bare Root	20
Quercus pagoda	Cherry-bark oak	9X6	Bare Root	20
Quercus phellos	Willow oak	9X6	Bare Root	10
Quercus laurifolia	Laurel oak	9X6	Bare Root	10
Nyssa sylvatica	Black gum	9X6	Bare Root	10
Magnolia virginiana	Sweetbay	9X6	Bare Root	10
Chamaecyparis thyoides	Atlantic white cedar	9X6	Bare Root	10
Taxodium distichum	Bald cypress	9X6	Bare Root	10

6.3.2 *On-Site Invasive Species Management*

Within the restoration are areas of cultivated agricultural row crop. Common to most agricultural fields, many annual weedy species occur, including numerous invasive annual grasses. These annual weedy species likely have a viable seed bank that may germinate and if dense, can compete with planted and target species. Within the clear-cut, invasive species are limited and are primarily located along the field edges and ditches. Woody invasive species noted include Chinese privet (*Ligustrum sinense*) and Japanese honeysuckle (*Lonicera japonica*). Treatment for invasive species will be performed within the wetland mitigation areas before planting activities are completed and on an as-needed basis during post construction monitoring. Invasive species will require different and multiple treatment methods, depending on plant phenology and the location of the species being treated (**Appendix I**). All treatment will be conducted as to maximize its effectiveness and reduce chances of detriment to surrounding native vegetation. Treatment methods will include mechanical (cutting with loppers, clippers, or chain saw) and chemical (foliar spray, cut stump, and hack and squirt techniques). Plants containing mature, viable seeds will be removed from the Project and properly disposed. All herbicide applicators will be supervised by a certified ground pesticide applicator with a North Carolina Department of Agriculture and Consumer Services (NCDA&CS) license and adhere to all legal and safety requirements according to herbicide labels, and NC and Federal laws. Management records will be kept on the plant species treated, type of treatment employed, type of herbicide used, application technique, and herbicide concentration and quantities used. These records will be included in all reporting documents.

6.3.3 *Soil Restoration*

Hydric soils were located throughout the Project. The soil series found on the Project and surrounding landscape is Rains loam that is naturally poorly drained (**Table 4**; **Appendix G**). Based upon field observations, these areas have significantly altered hydrology due to the drainage modification. These modifications have increased the rate of surface runoff and lowered the groundwater elevation throughout the area containing hydric soil in both the agricultural field and the cutover.

Surface roughness that creates diverse microtopography is key to promoting infiltration of precipitation and recharge of the shallow water table. After construction, the surface will be scarified and the subsoil ripped to remove compaction. Surface roughening to create shallow depressions with low hummock will be completed prior to planting. Any topsoil that is removed during construction will be stockpiled and placed over the Project during final soil preparation. This process should provide favorable soil conditions for plant growth. Rapid establishment of vegetation will provide natural stabilization for the Project. Soils in the wetland restoration area will be tested for fertility and soil amendments may be specified as needed.

6.4 Mitigation Summary

The Project involves the re-establishment of 23.23 acres of wetlands that have been disturbed by historic and current agricultural practices. The conceptual design presents 16.64 acres of credited wetland re-establishment at a ratio of 1:1 and 6.59 acres of wetland re-establishment at a ratio of 2:1, generating 19.94 Non-Riparian Wetland Mitigation Units (WMU's). An additional buffer of 50 feet from the proposed wetland edge may achieve wetland hydrology at a lower hydroperiod and act as a buffer between the restored wetland and continued agricultural practices. Wetland Restoration activities will include: plugging and filling drainage ditches in and surrounding the Project, plugging and removing drainage tiles, partially filling the drainage ditch to the east, surface roughening of the area to reconstruct historical contours, and planting species of the target community type. The designs presented in this report provide for the restoration of a natural Nonriverine Wet Hardwood Forest.

A portion of the existing ditches throughout the wetland area will be filled using material brought from off-site. However, the rest of the ditches will be plugged and left unfilled to provide habitat diversity.

An appropriate non-riparian plant community (Nonriverine Wet Hardwood Forest - Oak Flat subtype) will be established to include a diverse mix of species. The plant species list has been developed and can be found in **Table 6**. Although there is one planting zone, certain targeted species will be planted in the appropriate target community location.

Due to the rural nature of this project, individual stormwater best management practices (BMPs) will not be required. However, flow dissipation structures will be applied at locations where ditches or other forms of concentrated flow enter or leave the conservation easement (**Figure 9**). These may consist of rip-rap protection on ditch plug slopes or below culvert outfalls (**Appendix A**). All flow dissipation structures not addressing culvert crossings will be installed within the conservation easement so that landowners will not have access to the structures. Failure or maintenance of the structures is not anticipated as structures will be installed in low-gradient areas, and the areas proposed to dissipate flow will be well vegetated and matted.

No jurisdictional wetlands or streams are currently present on the Project, so no impacts to these resources are anticipated.

6.5 Determination of Credits

Mitigation credits presented in **Table 7** are projections based upon project design (**Figure 9**). All credit releases will be based on the total credit generated as reported in the approved final mitigation plan, unless there are major discrepancies and then a mitigation plan addendum will be submitted. Any deviation from the mitigation plan post approval, including adjustments to credits, will require a request for modification. This will be approved by the USACE. The release of project credits will be subject to the criteria described in **Appendix D**.

Table 7. Barefoot Project (ID-100044) - Mitigation Components

Project Component (wetland ID)	Wetland Position and Hydro Type	Existing Acreage	Stationing	Mitigation Plan Acreage	As-Built Acreage	Restoration Level	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Credits	Notes/Comments
No Stream Mitigation										
Wetland W1	NR	0		16.64		R		1	16.64	Hydrologic restoration via plugging ditches and drainage tiles, planting
Wetland W2	NR	0		6.59		R		2	3.30	Hydrologic restoration via plugging ditches

Length and Area Summations by Mitigation Category

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)
		Riverine	Nonriverine	
Restoration				23.23
Enhancement				
Enhancement I				
Enhancement II				
Creation				
Preservation				
High Quality Pres				

Overall Assets Summary

Asset Category	**Overall Credits**
Stream	**N/A**
RP Wetland	**N/A**
NR Wetland	**19.94**

7 PERFORMANCE STANDARDS

The success criteria for the Project will follow the 2016 USACE Wilmington District Stream and Wetland Compensatory Mitigation Update and subsequent agency guidance. Specific success criteria components are presented below.

7.1 Wetland Restoration Success Criteria

7.1.1 *Hydrology*

The NRCS provides a current WETS table for Sampson County upon which to base a normal rainfall amount and average growing season. The closest comparable data station was determined to be WETS station Clinton 2 NE in Clinton NC (NRCS, n.d.). This station is located off Faison Highway near the Timberlake Golf Club approximately 17 miles south-southeast of the proposed mitigation project. The growing season for Sampson County is 254 days long, extending from March 13 to November 22, and is based on a daily minimum temperature greater than 28 degrees Fahrenheit occurring in five of ten years (**Appendix B**).

Because of the surface roughing and shallow depressions, a range of hydroperiods with areas of seasonal inundation is expected. RES proposes a target hydroperiod of ten percent (approximately 26 days) for the duration of the monitoring period.

While a gauge will be considered unsuccessful if it doesn't meet the ten percent criteria, reference gauge data may be used to help explain abnormally dry periods. If a gauge location fails to meet these success criteria in the seven-year monitoring period, then monitoring may be extended, remedial actions may be undertaken, or the limits of wetland restoration will be determined.

7.1.2 *Digital Image Stations*

The visual assessments will include vegetation density, vigor, invasive species, and easement encroachments. Visual assessments of wetland success will include an area walkthrough and structure and gauge inspection. Digital images will be taken at fixed representative locations to record each monitoring event, as well as any noted problem areas or areas of concern. Results of visual monitoring will be presented in a plan view exhibit with a brief description of problem areas and digital images. A series of images over time should indicate successional maturation of wetland vegetation.

7.2 Vegetation Success Criteria

Specific and measurable success criteria for plant density within the wetland areas on the Project will follow IRT Guidance. The interim measures of vegetative success for the Project will be the survival of at least 320 planted three-year old trees per acre at the end of Year 3, five-year old trees at seven feet in height at the end of Year 5, and the final vegetative success criteria will be 210 trees per acre with an average height of ten feet at the end of Year 7. Volunteer trees will be counted, identified to species, and included in the yearly monitoring reports, and may be counted towards the success criteria of total planted stems if appropriate for the community type. Moreover, any single species can only account for up to 50 percent of the required number of stems within any vegetation plot. Any stems in excess of 50 percent will be shown in the monitoring table but will not be used to demonstrate success.

8 MONITORING PLAN

Annual monitoring data will be reported using the DMS Monitoring Report Template dated June 2017 and NC IRT monitoring template. The monitoring report shall provide a project data chronology that will facilitate an understanding of project status and trends, research purposes, and assist in decision making regarding project close-out. Monitoring reports will be prepared annually and submitted to DMS. Monitoring of the Project will adhere to metrics and performance standards established by the USACE's April 2003 Wilmington District Stream Mitigation Guidelines and the NC IRT's October 2016 Wilmington District Stream and Wetland Compensatory Mitigation Update. Monitoring may identify project components and features that require routine maintenance. Some potential maintenance activities are found in **Appendix F**.

8.1 As-Built Survey

An as-built survey will be conducted following construction to document groundwater monitoring gauge locations and elevations; structure location and condition; proposed ditch size, location, and condition; and proposed access road size, location, and condition.

8.2 Visual Monitoring

Visual monitoring of all mitigation areas will be conducted a minimum of twice per monitoring year by qualified individuals. The visual assessments will include vegetation density, vigor, invasive species, and easement encroachments. Visual assessments of wetland success will include an area walkthrough and structure and gauge inspection. Digital images will be taken at fixed representative locations to record each monitoring event, as well as any noted problem areas or areas of concern. Results of visual monitoring will be presented in a plan view exhibit with a brief description of problem areas and digital images.

8.3 Hydroperiod Monitoring

Wetland hydrology will be monitored to document hydric conditions in the wetland restoration areas. This will be accomplished with automatic recording pressure transducer gauges installed in representative locations across the restoration areas (**Figure 11**). Twelve existing gauges will be augmented with ten more after construction. The gauges will be downloaded quarterly and wetland hydroperiods will be calculated during the growing season. Gauge installation will follow current NCIRT guidance. Visual observations of primary and secondary wetland hydrology indicators will also be recorded during quarterly Project visits.

8.4 Vegetation Monitoring

Vegetation monitoring plots will be a minimum of 0.02 acres in size and cover a minimum of two percent of the planted area. There will be fourteen plots within the planted area (22.94 acres) and one plot in W2. Plots will be a mixture of fixed and random plots, with ten fixed plots and four random plots, and the plot in W2 will be random. Planted area indicates all area in the easement that will be planted with trees (**Figure 11**). Existing wooded areas are not included in the planted area. The following data will be recorded for all trees in the fixed plots: species, height, planting date (or volunteer), and grid location (Peet, Wentworth, and White, 1998). For random plots, species and height will be recorded for all woody stems. The location (GPS coordinates and orientation) of the random plots will be identified in the annual monitoring reports. Vegetation will be planted and plots established at least 180 days prior to the initiation of the first year of monitoring. Monitoring will occur in Years 1, 2, 3, 5, and 7 between July 1st and leaf drop. Invasive and noxious species will be monitored so that none become dominant or alter the desired community structure of the Project. Additionally, the native species sweetgum and red maple will be monitored to ensure they do not outcompete the planted species. If necessary, RES will develop a species-specific treatment plan.

8.5 **Scheduling/Reporting**

A baseline monitoring report and as-built drawings documenting wetland restoration activities will be developed within 60 days of the planting completion on the Project. The report will include all information required by DMS mitigation plan guidelines, including elevations, photographs and sampling plot locations, gauge locations, and a description of initial species composition by community type. The report will also include a list of the species planted and the associated densities. Baseline vegetation monitoring will include species, height, date of planting, and grid location of each stem. The baseline report will follow DMS As-Built Baseline Monitoring Report Template June 2017, USACE guidelines, and the October 2017 Mitigation Credit Calculation Memo.

The monitoring program will be implemented to document system development and progress toward achieving the success criteria. The restored wetland hydrology will be assessed to determine the success of the mitigation. The monitoring program will be undertaken for seven years or until the final success criteria are achieved, whichever is longer.

Monitoring reports will be prepared in the fall of each year of monitoring and submitted to DMS. The monitoring reports will include all information and be in the format required by USACE.

9 ADAPTIVE MANAGEMENT PLAN

In the event the mitigation project or a specific component of the mitigation project fails to achieve the necessary performance standards as specified in the mitigation plan, the sponsor shall notify the members of the NCIRT and work with the NCIRT to develop contingency plans and remedial actions.

10 LONG-TERM MANAGEMENT PLAN

The Project will be transferred to the NCDEQ Stewardship Program (or 3rd party if approved). This party shall serve as conservation easement holder and long-term steward for the property and will conduct periodic inspection of the Project to ensure that restrictions required in the conservation easement are upheld. Funding will be supplied by the responsible party on a yearly basis until such time an endowment is established. The NCDEQ Stewardship Program is developing an endowment system within the nonreverting, interest-bearing Conservation Lands Conservation Fund Account. The use of funds from the Endowment Account will be governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable.

The Stewardship Program will periodically install signage as needed to identify boundary markings as needed. Any livestock or associated fencing or permanent crossings will be the responsibility the owner of the underlying fee to maintain.

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Figures List

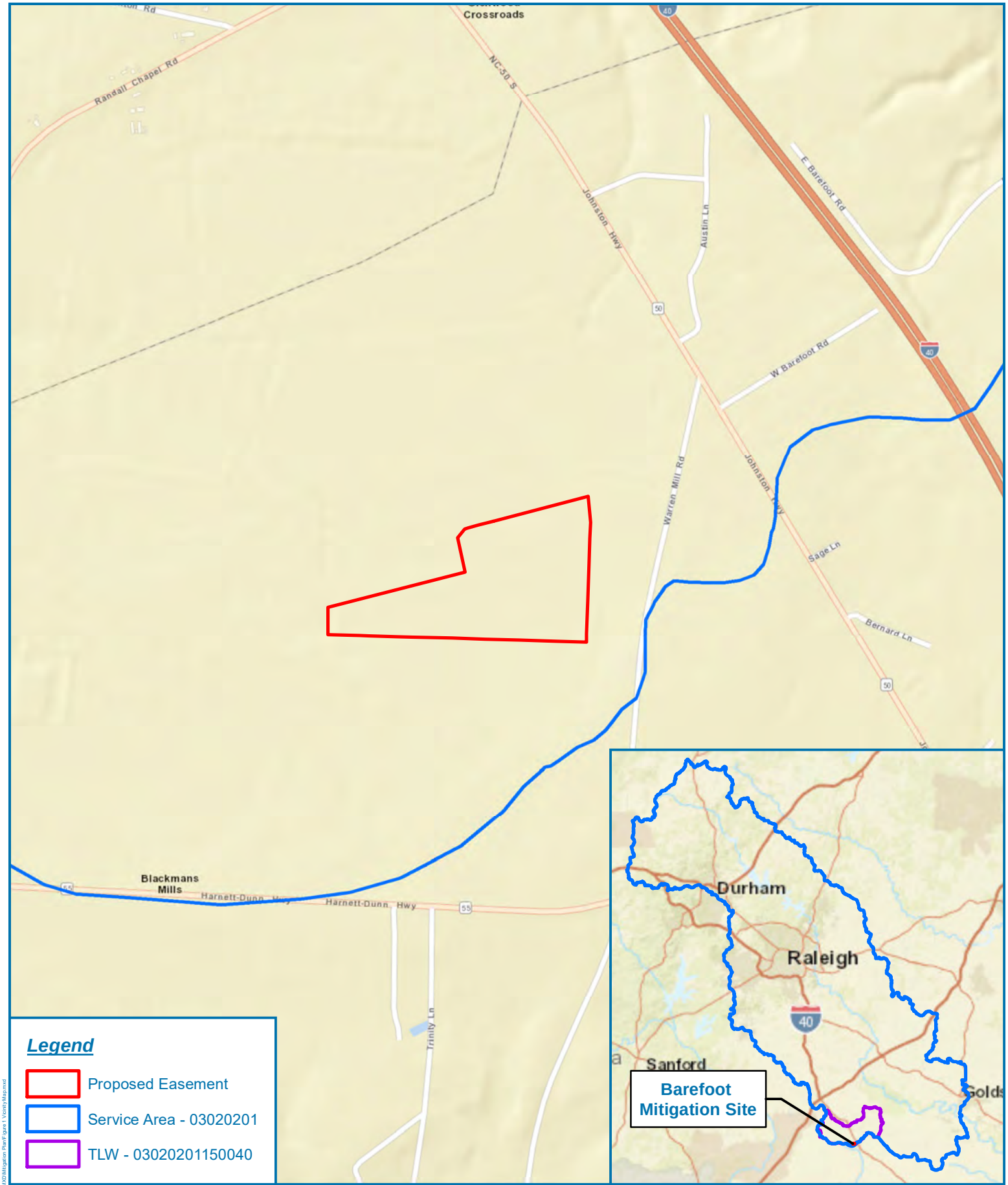

Figure 1 - Vicinity Map

Barefoot Mitigation Site

Sampson County, North Carolina

Date: 2/27/2019

Drawn by: SCF

Checked by: JRM

1 inch = 1,000 feet

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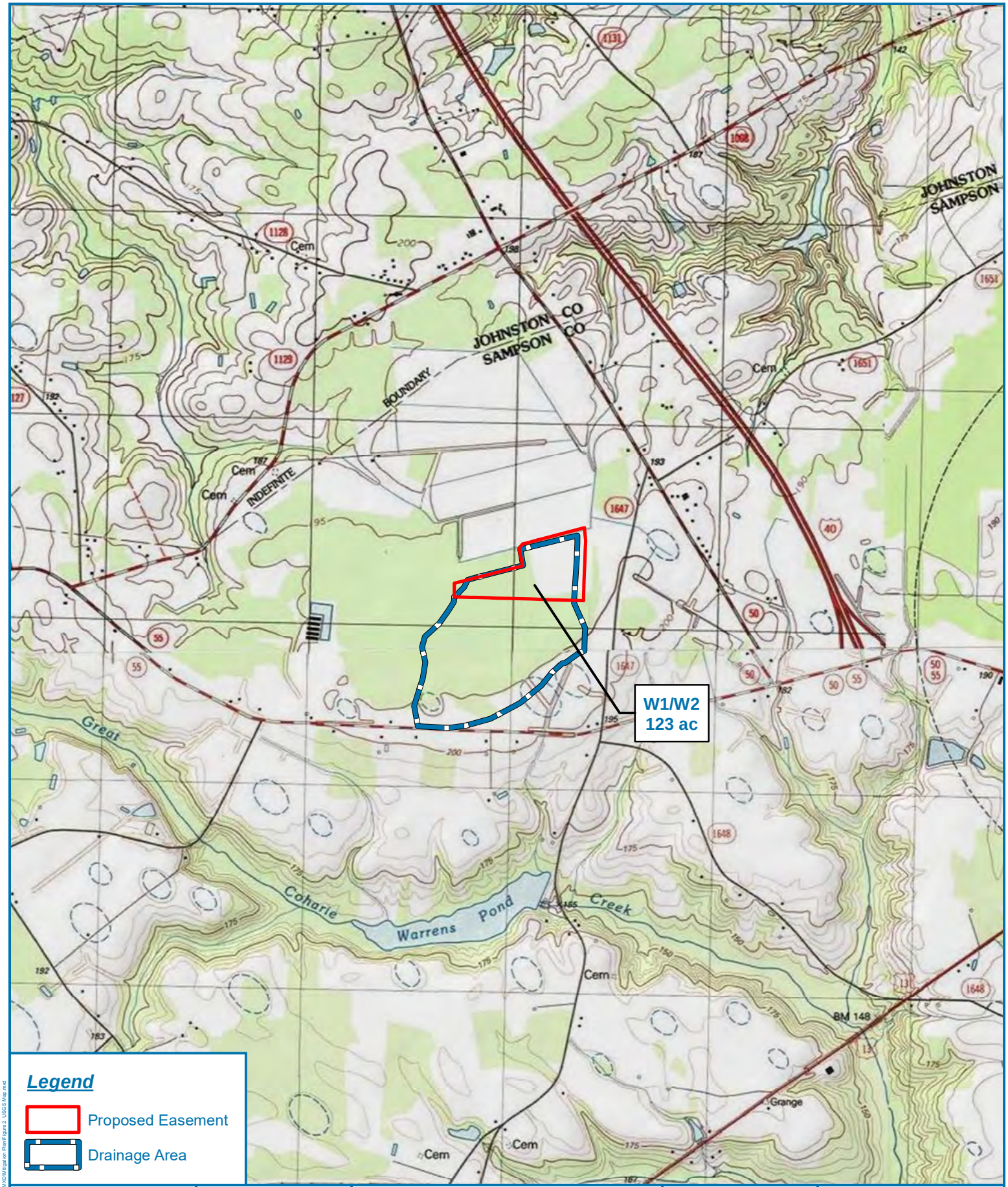
Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\Mitigation Plan\Figure 1 VicinityMap.mxd



Legend

- Proposed Easement
- Drainage Area

N
W E
S

0 1,000 2,000
Feet

Figure 2 - USGS Map

Barefoot Mitigation Site

Sampson County, North Carolina

Date: 2/7/2019

Drawn by: SCF

Checked by: JRM

1 inch = 2,000 feet

res

Document Path: S:\@RES GIS\Projects\NC\Bare foot\MXD\Mitigation Plan\Figure 2 - USGS Map.mxd

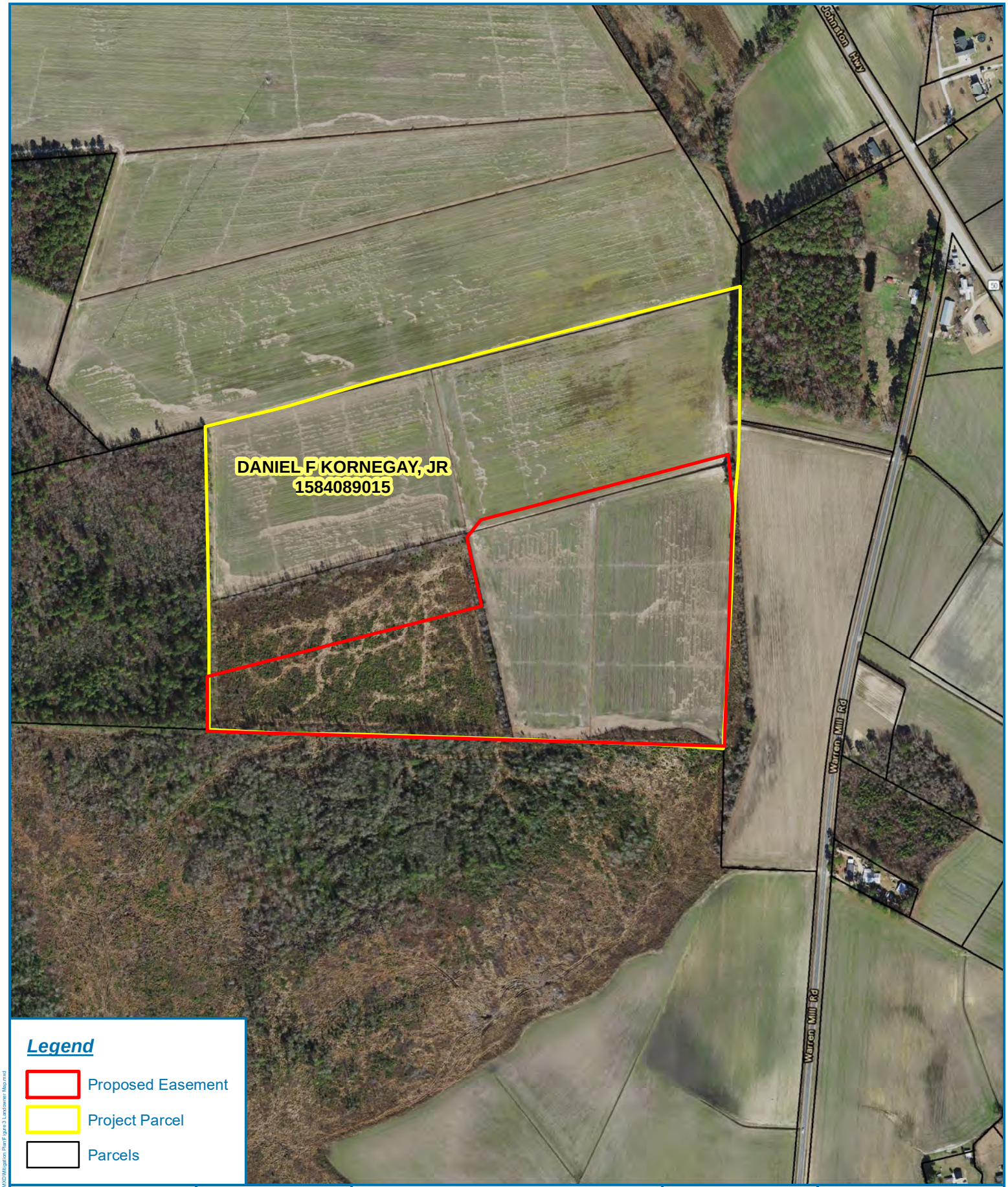


Figure 3 - Landowner Map

Barefoot Mitigation Site

Sampson County, North Carolina

Date: 2/7/2019

Drawn by: SCF

Checked by: JRM

1 inch = 500 feet

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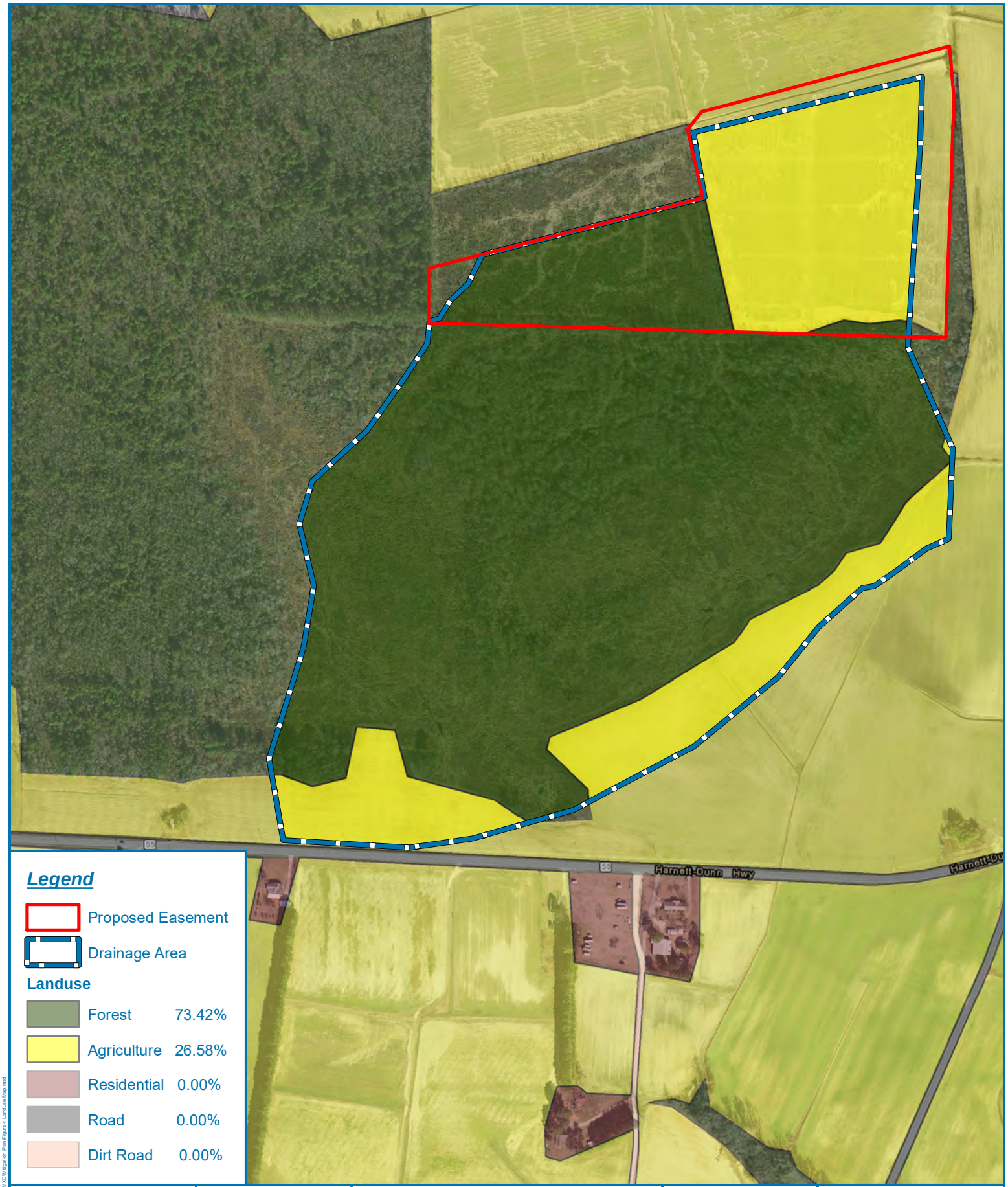
Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\Mitigation Plan\Figure 3 Landowner Map.mxd

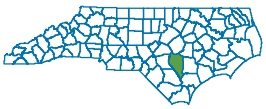


Legend

- Proposed Easement
- Drainage Area

Landuse

Forest	73.42%
Agriculture	26.58%
Residential	0.00%
Road	0.00%
Dirt Road	0.00%



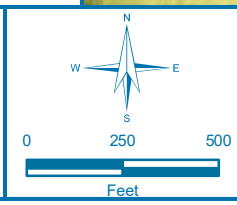


Figure 4 - Land-use Map

Barefoot Mitigation Site

Sampson County, North Carolina

Date: 2/12/2019

Drawn by: SCF

Checked by: JRM

1 inch = 500 feet

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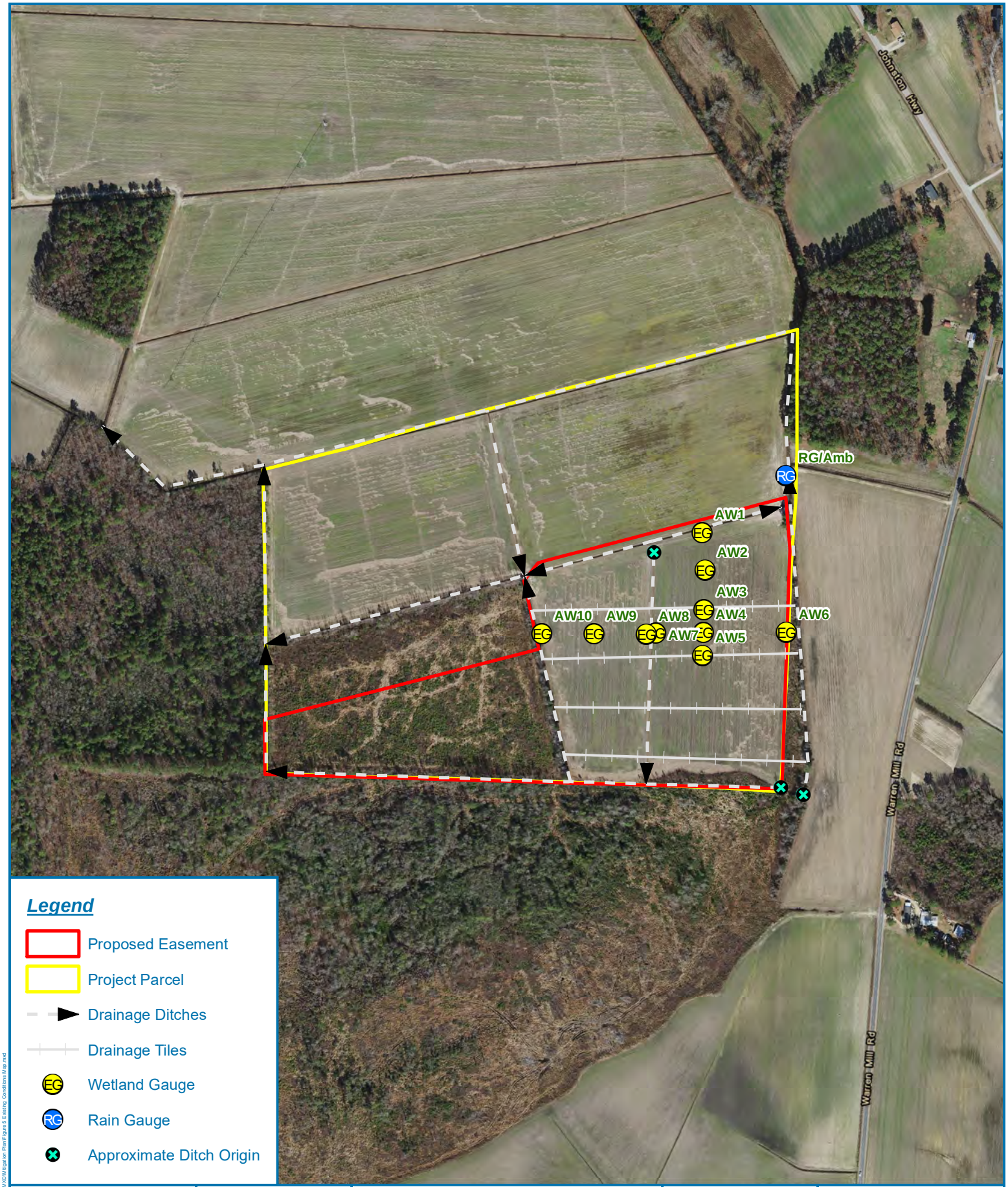


Figure 5 - Existing Conditions Map

Barefoot Mitigation Site

Sampson County, North Carolina

Date: 3/7/2019

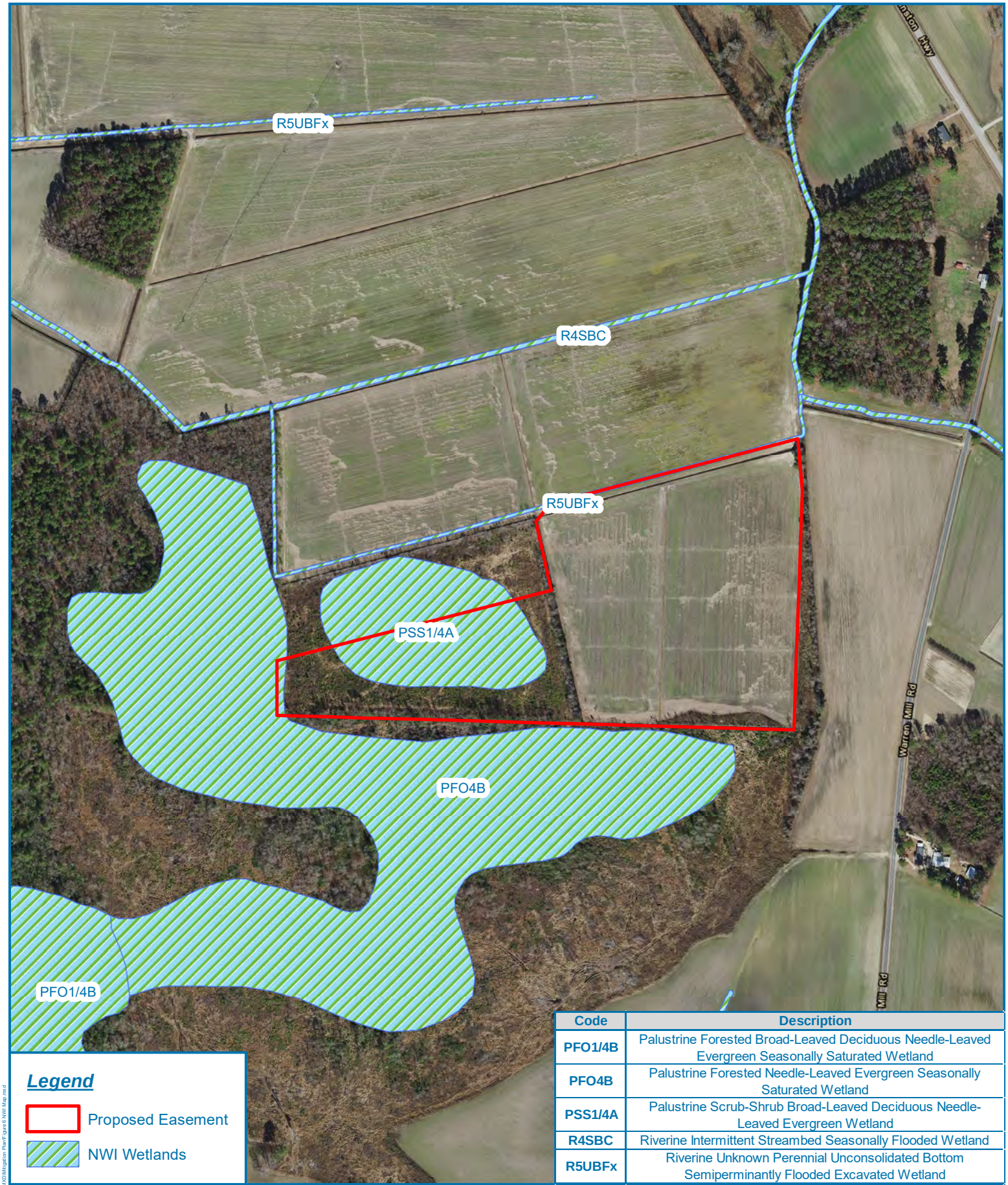
Drawn by: SCF

Checked by: JRM

1 inch = 500 feet

res

Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\Mitigation Plan\Figure 5 Existing Conditions Map.mxd

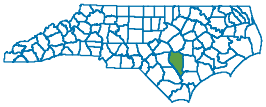


Code	Description
PFO1/4B	Palustrine Forested Broad-Leaved Deciduous Needle-Leaved Evergreen Seasonally Saturated Wetland
PFO4B	Palustrine Forested Needle-Leaved Evergreen Seasonally Saturated Wetland
PSS1/4A	Palustrine Scrub-Shrub Broad-Leaved Deciduous Needle-Leaved Evergreen Wetland
R4SBC	Riverine Intermittent Streambed Seasonally Flooded Wetland
R5UBFx	Riverine Unknown Perennial Unconsolidated Bottom Semiperminantly Flooded Excavated Wetland

Legend

Proposed Easement

NWI Wetlands



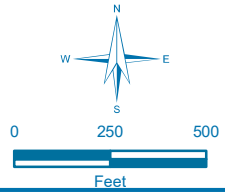


Figure 6 - NWI Map

Barefoot Mitigation Site

Sampson County, North Carolina

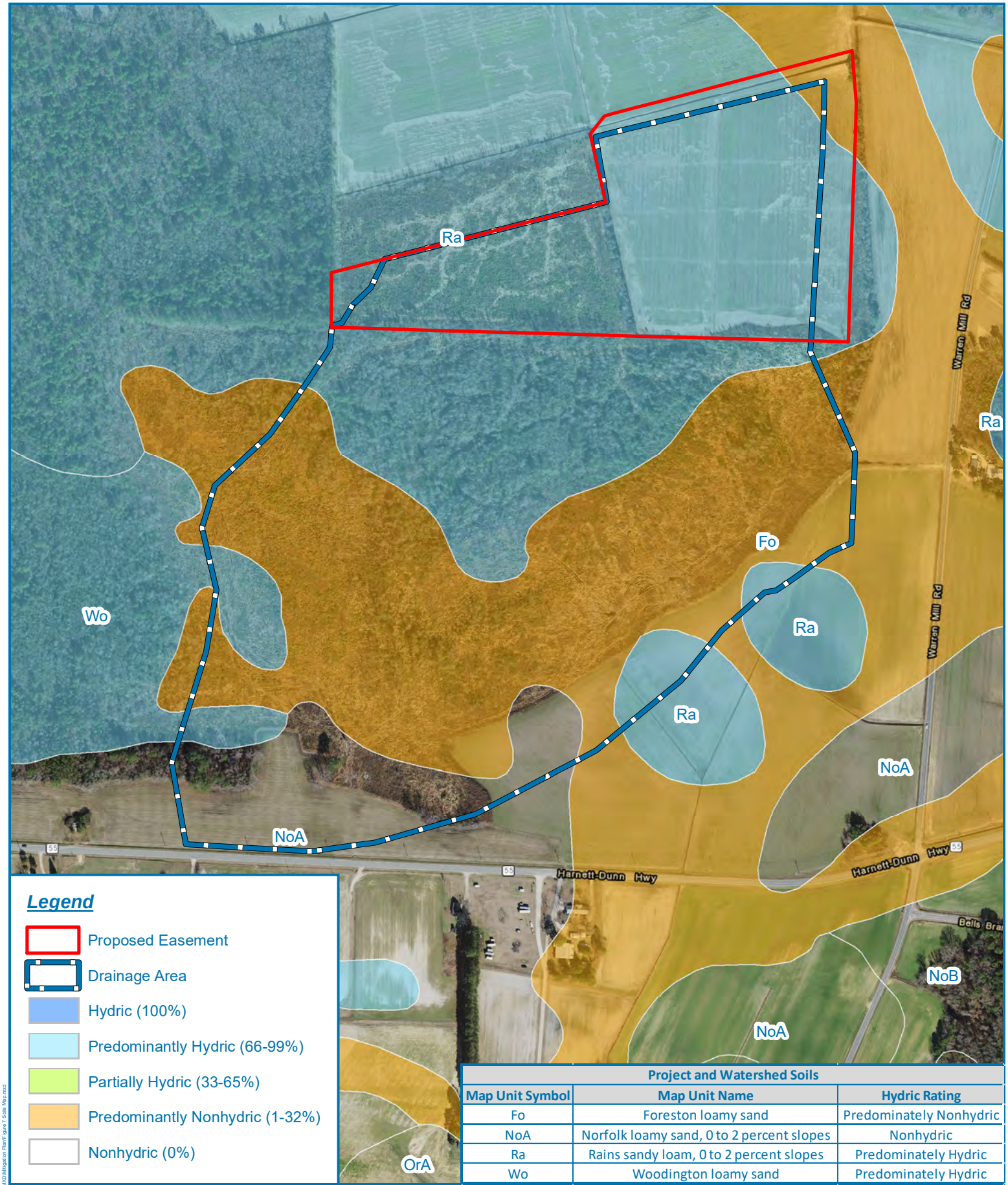
Date: 2/12/2019

Drawn by: SCF

Checked by: JRM

1 inch = 500 feet

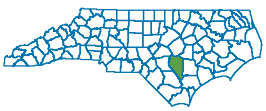
res



Legend

- Proposed Easement
- Drainage Area
- Hydric (100%)
- Predominantly Hydric (66-99%)
- Partially Hydric (33-65%)
- Predominantly Nonhydric (1-32%)
- Nonhydric (0%)

Project and Watershed Soils		
Map Unit Symbol	Map Unit Name	Hydric Rating
Fo	Foreston loamy sand	Predominately Nonhydric
NoA	Norfolk loamy sand, 0 to 2 percent slopes	Nonhydric
Ra	Rains sandy loam, 0 to 2 percent slopes	Predominately Hydric
Wo	Woodington loamy sand	Predominately Hydric



N W E S

0 250 500

Feet

Figure 7 - Soils Map

Barefoot Mitigation Site

Sampson County, North Carolina

Date: 2/12/2019

Drawn by: SCF

Checked by: JRM

1 inch = 500 feet

res

Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\Mitigation Plan\Figure 7 Soils Map.mxd

Legend

Proposed Easement

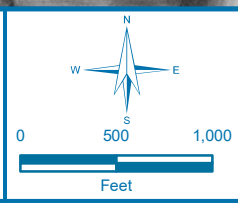


Figure 8 - Historical Aerials

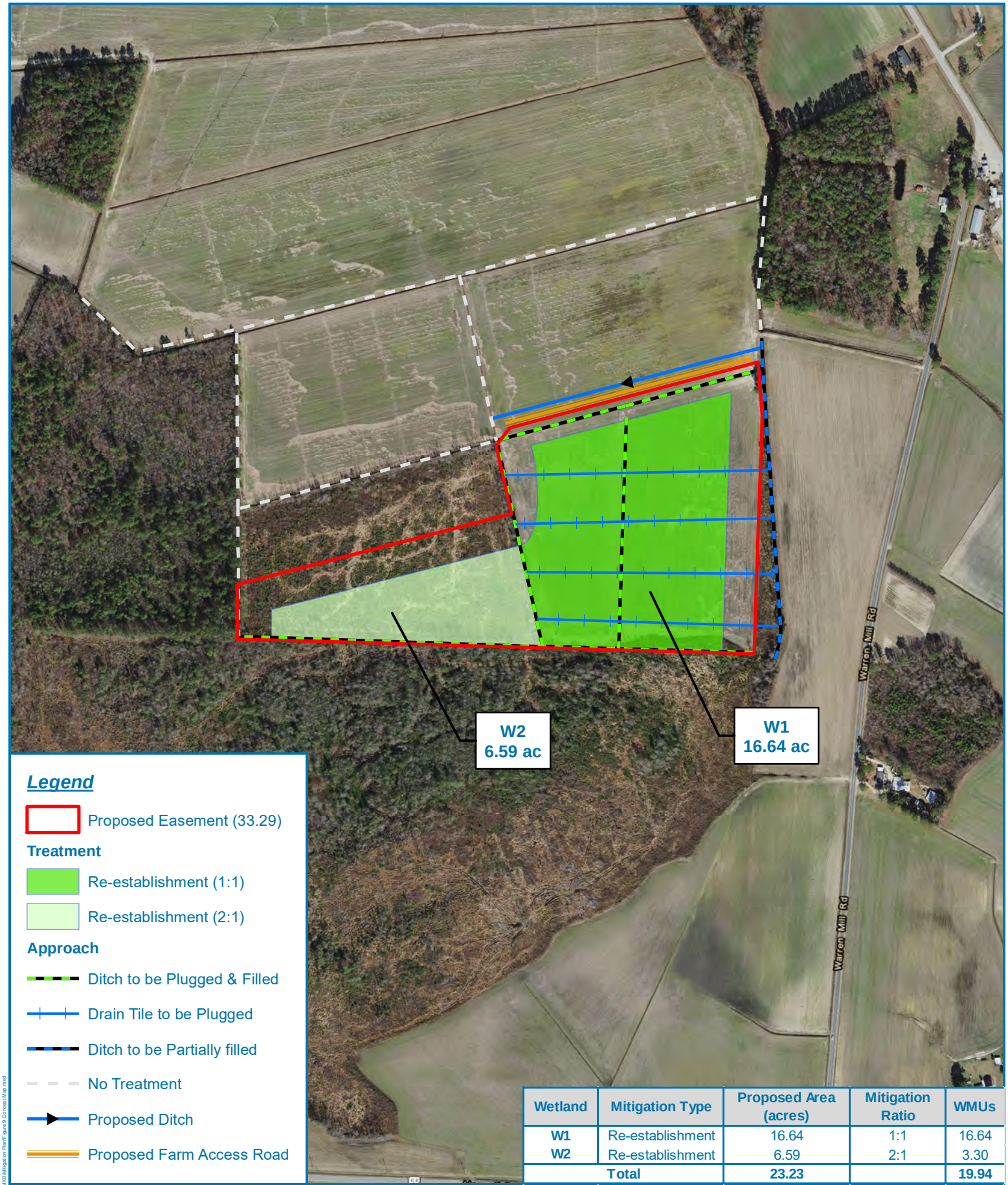
Barefoot Mitigation Site

Sampson County, North Carolina

Date:	2/13/2019
Drawn by:	SCF
Checked by:	JRM
1 inch =	1,000 feet

res

Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\Mitigation Plan\Figure 8 Historical Imagery Map.mxd



Legend

- Proposed Easement (33.29)

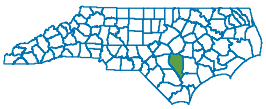
Treatment

- Re-establishment (1:1)
- Re-establishment (2:1)

Approach

- Ditch to be Plugged & Filled
- Drain Tile to be Plugged
- Ditch to be Partially filled
- No Treatment
- Proposed Ditch
- Proposed Farm Access Road

Wetland	Mitigation Type	Proposed Area (acres)	Mitigation Ratio	WMUs
W1	Re-establishment	16.64	1:1	16.64
W2	Re-establishment	6.59	2:1	3.30
Total		**23.23**		**19.94**



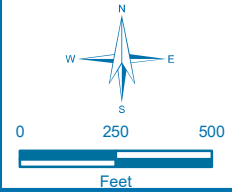


Figure 9 - Concept Map

Barefoot Mitigation Site

Sampson County, North Carolina

Date: 4/4/2019

Drawn by: SCF

Checked by: JRM

1 inch = 500 feet

res

Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\Mitigation Plan\Figure 9 Concept Map.mxd

Legend

- Proposed Easement
- Zone AE - None in Project Area

N
W E
S

0 250 500

Feet

Figure 10 - FEMA Map

Barefoot Mitigation Site

Sampson County, North Carolina

Date: 2/12/2019

Drawn by: SCF

Checked by: JRM

1 inch = 500 feet

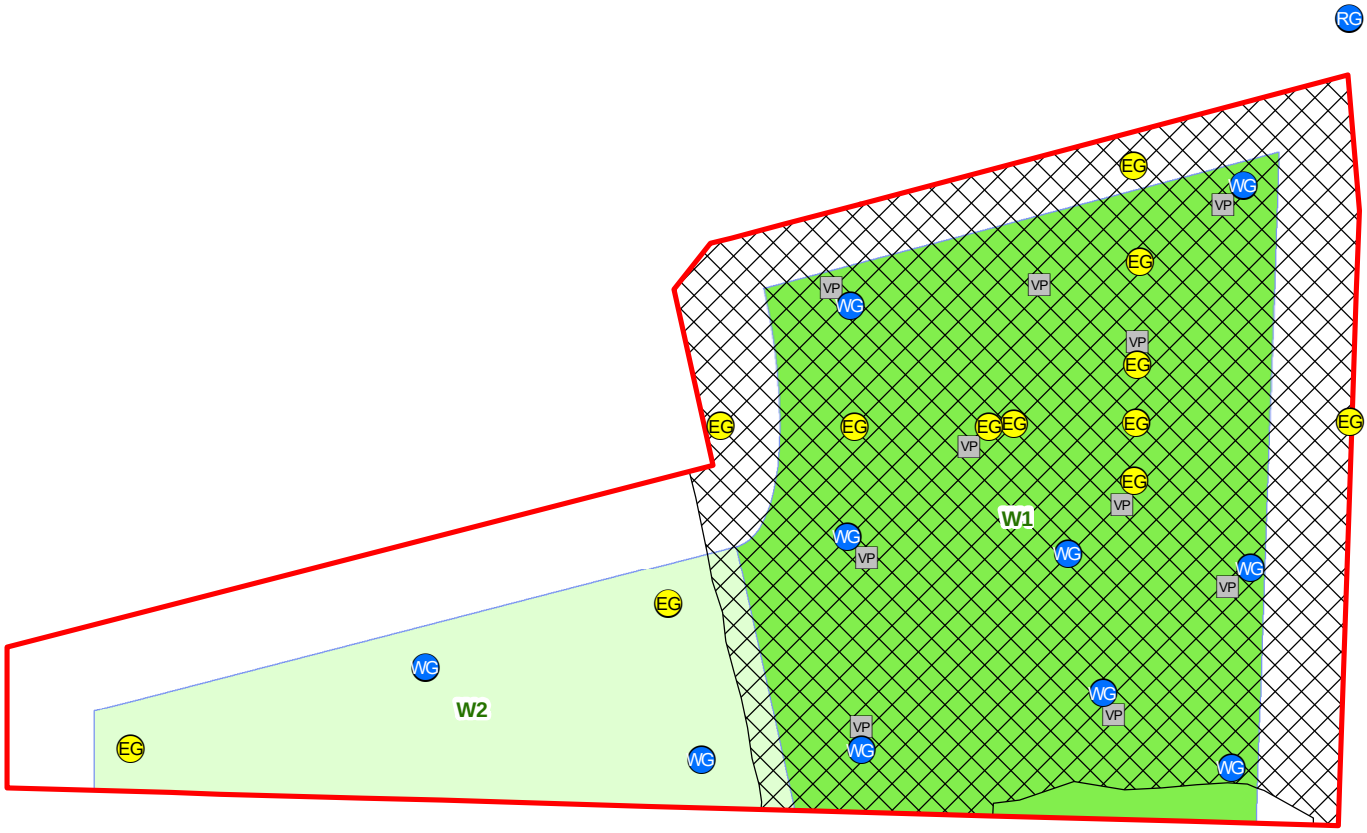
res

Document Path: S:\@RES GIS\Projects\NC\Bare\fon\MXD\Mitigation Plan\Figure 10 FEMA Map .mxd

Note:
There will be 10 fixed vegetation plots and 5 will be randomly placed each monitoring year. One of the randomly placed plots will be placed in area W2 each monitoring year.

Random vegetation plots are not shown in this monitoring plan. Random plots will vary by location and dimension.

Wetland gauge and vegetation plot locations are all proposed locations.

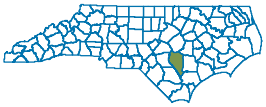


Legend

- Proposed Easement (33.29 ac)
- Planting Area (22.94 ac)

Treatment

- Re-establishment (1:1)
- Re-establishment (2:1)
- EG — Existing Wetland Gauge
- RG — Rain Gauge
- WG — Proposed Wetland Gauge
- VP — Vegetation Plot



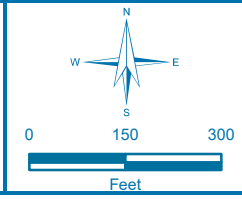


Figure 11 - Monitoring Map

Barefoot Mitigation Project

Sampson County, North Carolina

Date: 7/1/2019

Drawn by: SCF

Checked by: JRM

1 inch = 300 feet

res

Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\Mitigation Plan\Figure 11 Monitoring Map.mxd

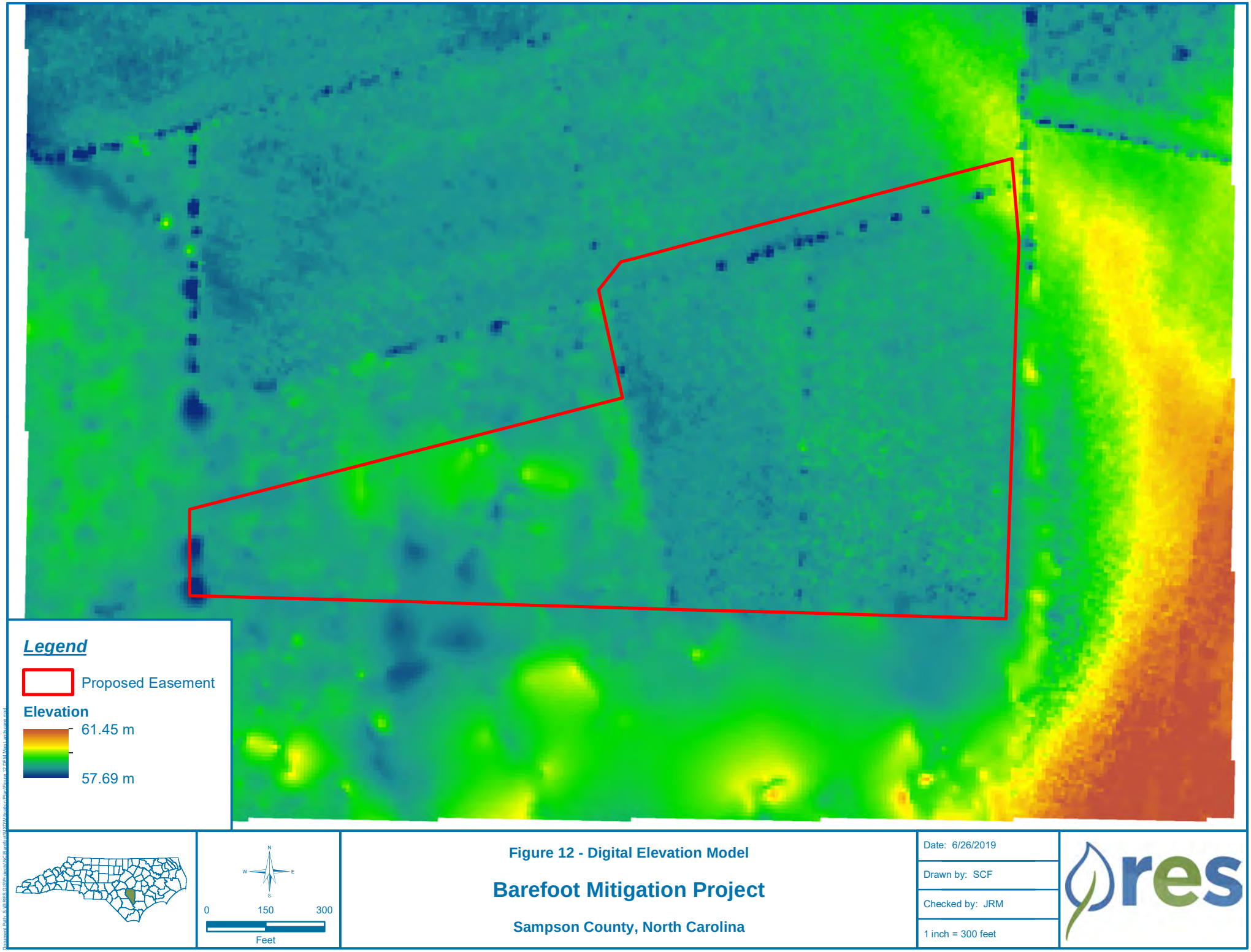


Figure 12 - Digital Elevation Model

Barefoot Mitigation Project

Sampson County, North Carolina

Date: 6/26/2019

Drawn by: SCF

Checked by: JRM

1 inch = 300 feet

Appendix A - Plan Sheets

BAREFOOT WETLAND MITIGATION SITE

SAMPSON COUNTY, NC

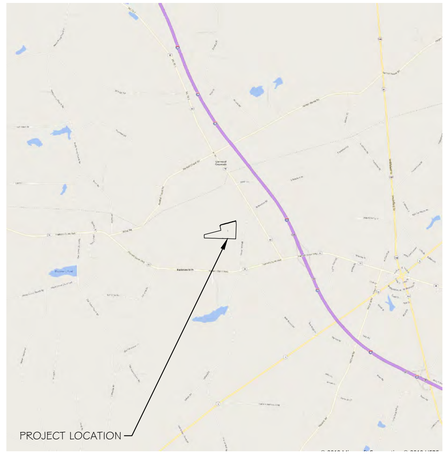
NEUSE RIVER BASIN: HUC 03020101

JULY 2019

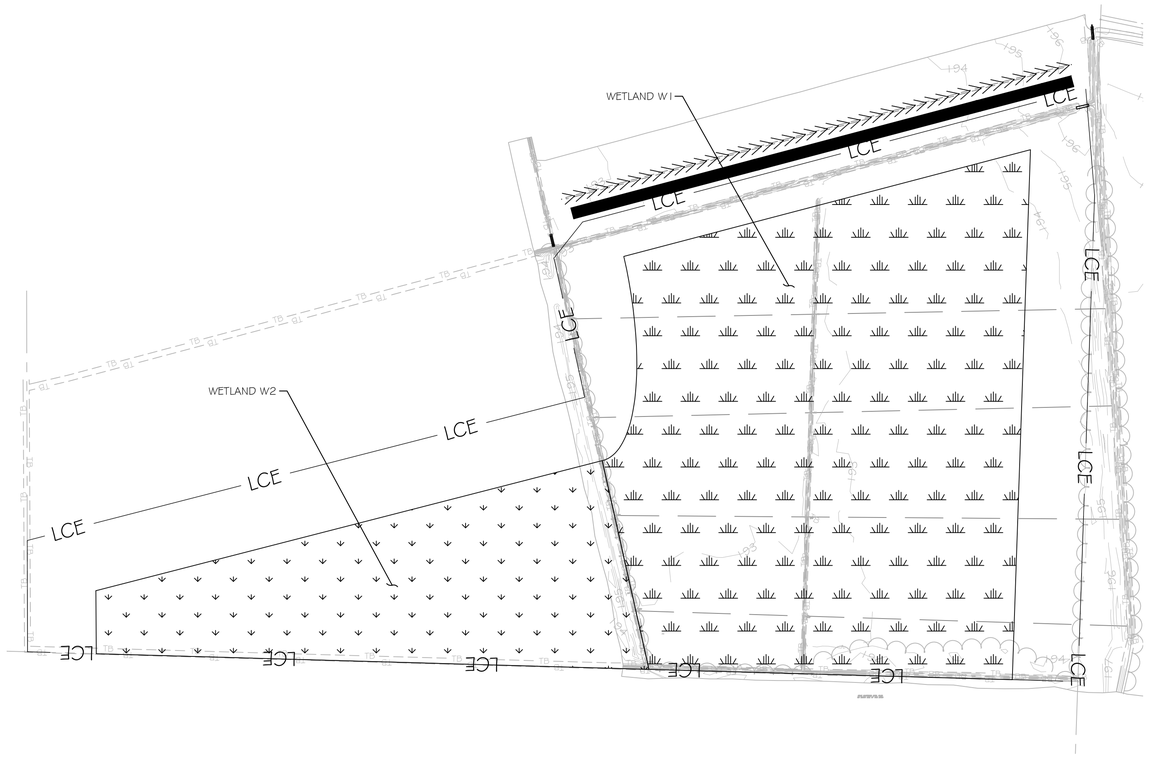
RESOURCE ENVIRONMENTAL SOLUTIONS, LLC

302 JEFFERSON ST, SUITE 110

RALEIGH, NC 27605



VICINITY MAP
NTS



SITE MAP
NTS

Sheet List Table	
Sheet Number	Sheet Title
-	COVER
A1	OVERAL AERIAL
E1	EXISTING CONDITIONS
W1	PROPOSED
P1	PLANTING PLAN
D1	DETAILS
D2	DETAILS
D3	DETAILS

DMS PROJECT #: 100044
CONTRACT #: 7418
USACE ACTION ID #: SAW-2018-00433
RFP #: 16-007279

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Raleigh, NC 27605
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SEAL

MARK	DATE	DESCRIPTION

REVISIONS:

RELEASED FOR:

PRELIMINARY - NOT FOR CONSTRUCTION

PLOT DATE: 7/2/2019

PROJECT NUMBER:	0517
PROJECT MANAGER:	BPB
DESIGNED:	GKL
DRAWN:	SCF
CHECKED:	----

SHEET NUMBER:

-

FILE NAME:S:\@RES GIS\Projects\NC\Barefoot\CAD\DWG\0517_C3D_DESIGN_SCF.dwg SAVED BY: Stasking

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SEAL

FULL SCALE: 1"=150

0 150 301

2" = FULL SCALE
1" = HALF SCALE

MARK	DATE	DESCRIPTION
REVISIONS:		

RELEASED FOR:
PRELIMINARY - NOT FOR CONSTRUCTION

PLOT DATE: 07/02/2019

PROJECT NAME:
BAREFOOT WETLAND MITIGATION SITE
SAMPSON COUNTY, NC

DRAWING TITLE:
OVERAL AERIAL

PROJECT NUMBER:	0517
PROJECT MANAGER:	BPB
DESIGNED:	GKL
DRAWN:	SCF
CHECKED:	----

SHEET NUMBER:
A1

FILE NAME:S:\@RES GIS\Projects\NC\Barefoot\CAD\DWG\0517_C3D_DESIGN_SCF.dwg SAVED BY: Sfasking

LEGEND

- EXISTING CONTOUR MAJOR — 50
- EXISTING DITCH
- EXISTING TOP OF BANK — TB
- EXISTING DRAINAGE TILE
- PROPERTY LINE
- EXISTING TREELINE
- EXISTING EASEMENT OR RIGHT OF WAY
- EXISTING CULVERT
- EXISTING DITCH FLOW DIRECTIOIN

JAMES S. BAREFOOT, JR.
DB 1119, PG 579
MB 23, PG 58

18" RCP
N. INV.=188.32'
S. INV.=189.38'

DANIEL F. KORNEGAY, JR.
PAULA S. KORNEGAY
DB 1888, PG 802

48"/54" CMP
W. INV.=189.41'
E. INV.=188.97'
(PIPES PUT TOGETHER)

CONNIE B. WILLIAMSON
DB 1119, PG 582
MB 23, PG 58

18" HDPE
N. INV.=190.54'
S. INV.=190.30'

DITCH ELEV: 189.9'
BERM ELEV: 197.3'

DITCH ELEV: 190.2'
BERM ELEV: 197.1'

DITCH ELEV: 191.3'
BERM ELEV: 197.3'

DITCH TERMINATES
SOUTH OF SURVEY

NO CULVERT
CONNECTION

BETSY T. SUTTON
BARBARA T. BENTON
DB 990, PG 223

LLC.

FILE NAME:S:\@RES GIS\Projects\NC\Barefoot\CAD\DWG\0517_C3D_DESIGN_SCF.dwg SAVED BY: Stasking

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SEAL

FULL SCALE: 1"=100

0 100 200

2" = FULL SCALE
1" = HALF SCALE

PLOT DATE: 07/02/2019

MARK	DATE	DESCRIPTION
REVISIONS:		

RELEASED FOR: PRELIMINARY - NOT FOR CONSTRUCTION

PROJECT NAME:
BAREFOOT WETLAND MITIGATION SITE
SAMPSON COUNTY, NC

DRAWING TITLE:
EXISTING CONDITIONS

PROJECT NUMBER:	0517
PROJECT MANAGER:	BPB
DESIGNED:	GKL
DRAWN:	SCF
CHECKED:	----

SHEET NUMBER:

E1

LEGEND

- EXISTING CONTOUR MAJOR
- EXISTING DITCH
- EXISTING TOP OF BANK (TB)
- EXISTING DRAINAGE TILE
- PROPERTY LINE
- EXISTING TREELINE
- LIMITS OF PROPOSED CONSERVATION EASEMENT (LCE)
- PROPOSED WETLAND W1
- PROPOSED WETLAND W2
- PROPOSED DITCH PLUG (SEE DETAILS E & F, SHEET D2)
- PROPOSED DITCH TO BE FILLED (SEE DETAIL H, SHEET D2)
- PROPOSED DRAIN TILE PLUG (SEE DETAIL D, SHEET D2)
- EXISTING / PROPOSED CULVERT
- PROJECTED DITCH FLOW DIRECTIOIN

REMOVE 25 LF OF EXISTING 48"/54" CMP

PARTIAL FILL TO BE GRADED TO EXISTING CULVERT INVERT ELEVATION

PROPOSED EXCAVATED DITCH (SEE DETAIL A, SHEET D1)

DITCH SPOIL PLACEMENT FOR FARM ACCESS ROAD (SEE DETAIL A, SHEET D1)

DITCH TO BE FILLED

PROPOSED 20 LF OF DBL 36" HDPE

PROPOSED 20 LF OF DBL 36" HDPE WITH CULVERT OUTFALL PROTECTION (SEE DETAIL G, SHEET D2)

FLOW ATTENUATION STRUCTURES

DITCH TO BE PARTIALLY FILLED (SEE DETAIL B, SHEET D1)

DITCH TO BE FILLED

DITCH TO BE FILLED

FLOW ATTENUATION STRUCTURE

DITCH TO BE FILLED

WETLAND W2 RE-ESTABLISHMENT (2:1) 6.59 ACRES

WETLAND W1 RE-ESTABLISHMENT (1:1) 16.64 ACRES

DITCH TO BE FILLED

NOTE:
OPTIONAL SHALLOW DEPRESSIONS MAY BE EXCAVATED THROUGHOUT W1 PER DIRECTION OF ENGINEER (SEE DETAIL C, SHEET D1)

FULL SCALE: 1" = 100

0 100 200

2" = FULL SCALE
1" = HALF SCALE

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PLOT DATE: 07/02/2019

PROJECT NAME:
BAREFOOT WETLAND MITIGATION SITE
SAMPSON COUNTY, NC

DRAWING TITLE:
PROPOSED

PROJECT NUMBER:	0517
PROJECT MANAGER:	BPB
DESIGNED:	GKL
DRAWN:	SCF
CHECKED:	----

SHEET NUMBER:
W1

FILE NAME:S:\@RES GIS\Projects\NC\Barefoot\CAD\DWG\0517_C3D_DESIGN_SCF.dwg SAVED BY: Sfasking

PLANTING TABLE

Permanent Herb Seed Mix		
Common Name	Scientific Name	Percent Composition
Virginia Wildrye	*Elymus virginicus*	25%
Switchgrass	*Panicum virgatum*	25%
Little Blue Stem	*Schizachyrium scoparium*	10%
Soft Rush	*Juncus effusus*	10%
Blackeyed susan	*Rudbeckia hirta*	10%
Deertongue	*Dichanthelium clandestinum*	10%
Wild senna	*Senna hebecarpa*	10%

Bare Root Planting Tree Species		
Common Name	Scientific Name	Percent Composition
Swamp chestnut oak	*Quercus michauxii*	20%
Cherry-bark oak	*Quercus pagoda*	20%
Willow oak	*Quercus phellos*	10%
Laurel oak	*Quercus laurifolia*	10%
Black gum	*Nyssa sylvatica*	10%
Sweetbay	*Magnolia virginiana*	10%
Atlantic white cedar	*Chamaecyparis thyoides*	10%
Bald cypress	*Taxodium distichum*	10%

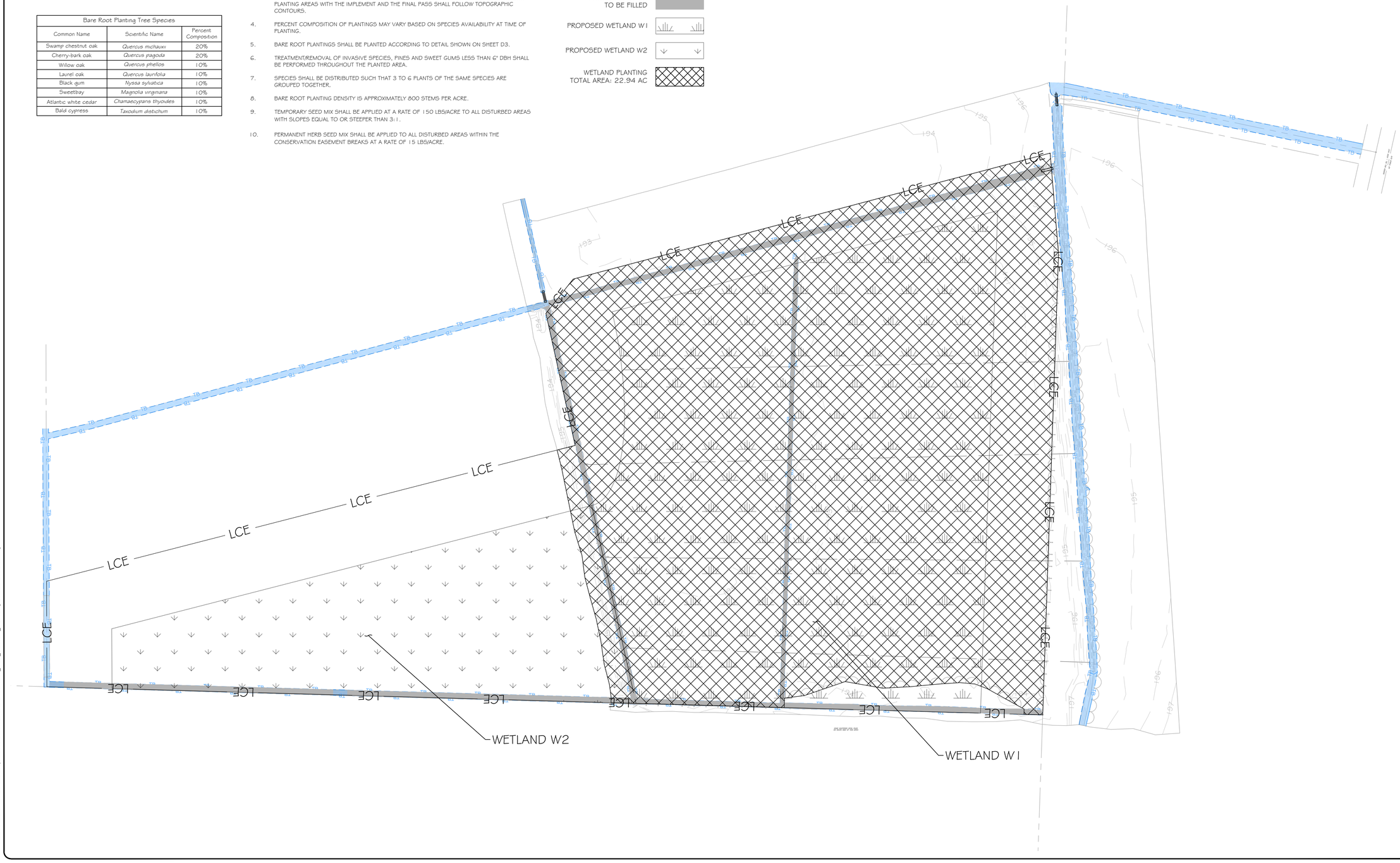
PLANTING NOTES

ALL PLANTING AREAS

1. EROSION CONTROL MEASURES SHALL BE PROPERLY MAINTAINED UNTIL PERMANENT VEGETATION IS ESTABLISHED AND FINAL APPROVAL HAS BEEN ISSUED. THE CONTRACTOR SHALL INSPECT EROSION CONTROL MEASURES AT THE END OF EACH WORKING DAY TO ENSURE MEASURES ARE FUNCTIONING PROPERLY.
2. DISTURBED AREAS NOT AT FINAL GRADE SHALL BE TEMPORARILY VEGETATED WITHIN 10 WORKING DAYS. UPON COMPLETION OF FINAL GRADING, PERMANENT VEGETATION SHALL BE ESTABLISHED FOR ALL DISTURBED AREAS WITHIN 10 WORKING DAYS. SEEDING SHALL BE IN ACCORDANCE WITH EROSION CONTROL PLAN.
3. ALL DISTURBED AREAS SHALL BE PREPARED PRIOR TO PLANTING BY DISC OR SPRING-TOOTH CHISEL PLOW TO MINIMUM DEPTH OF 12 INCHES. MULTIPLE PASSES SHALL BE MADE ACROSS PLANTING AREAS WITH THE IMPLEMENT AND THE FINAL PASS SHALL FOLLOW TOPOGRAPHIC CONTOURS.
4. PERCENT COMPOSITION OF PLANTINGS MAY VARY BASED ON SPECIES AVAILABILITY AT TIME OF PLANTING.
5. BARE ROOT PLANTINGS SHALL BE PLANTED ACCORDING TO DETAIL SHOWN ON SHEET D3.
6. TREATMENT/REMOVAL OF INVASIVE SPECIES, PINES AND SWEET GUMS LESS THAN 6" DBH SHALL BE PERFORMED THROUGHOUT THE PLANTED AREA.
7. SPECIES SHALL BE DISTRIBUTED SUCH THAT 3 TO 6 PLANTS OF THE SAME SPECIES ARE GROUPED TOGETHER.
8. BARE ROOT PLANTING DENSITY IS APPROXIMATELY 800 STEMS PER ACRE.
9. TEMPORARY SEED MIX SHALL BE APPLIED AT A RATE OF 150 LBS/ACRE TO ALL DISTURBED AREAS WITH SLOPES EQUAL TO OR STEEPER THAN 3:1.
10. PERMANENT HERB SEED MIX SHALL BE APPLIED TO ALL DISTURBED AREAS WITHIN THE CONSERVATION EASEMENT BREAKS AT A RATE OF 15 LBS/ACRE.

PLANTING LEGEND

- LIMITS OF CONSERVATION EASEMENT
- EXISTING TREELINE
- PROPERTY LINE
- EXISTING DITCH
- PROPOSED DITCH TO BE FILLED
- PROPOSED WETLAND W1
- PROPOSED WETLAND W2
- WETLAND PLANTING TOTAL AREA: 22.94 AC



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FULL SCALE: 1" = 100

0 100 200

2" = FULL SCALE
1" = HALF SCALE

MARK	DATE	DESCRIPTION

REVISIONS:

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PLOT DATE: 07/02/2019

PROJECT NAME:
BAREFOOT WETLAND MITIGATION SITE
SAMPSON COUNTY, NC

DRAWING TITLE:
PLANTING PLAN

PROJECT NUMBER:	0517
PROJECT MANAGER:	BPB
DESIGNED:	GKL
DRAWN:	SCF
CHECKED:	----

SHEET NUMBER:

P1

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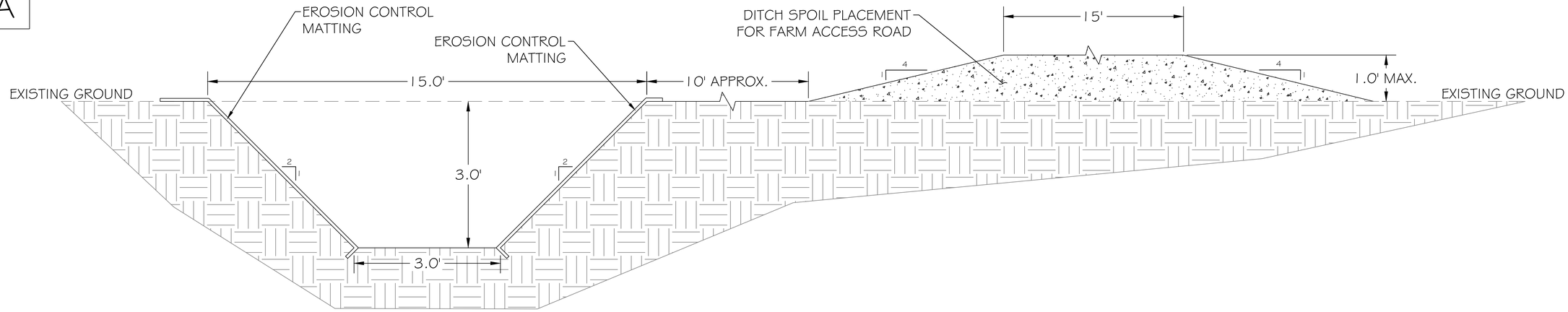
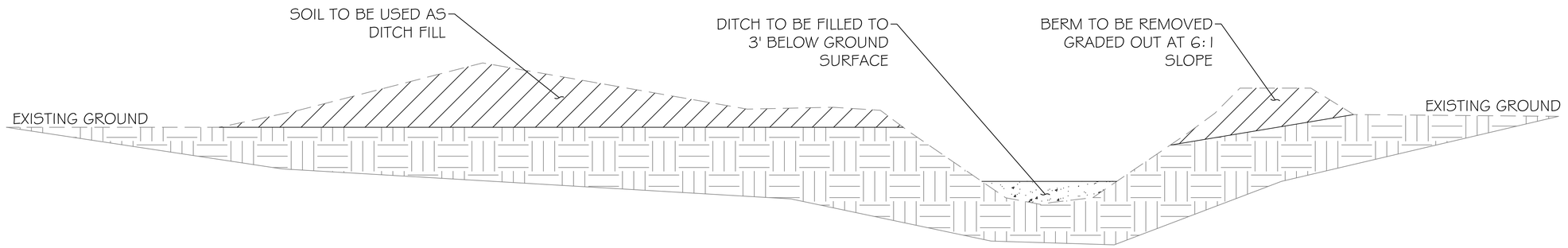
A



EXCAVATED DITCH AND FARM ACCESS TYPICAL XS

NTS

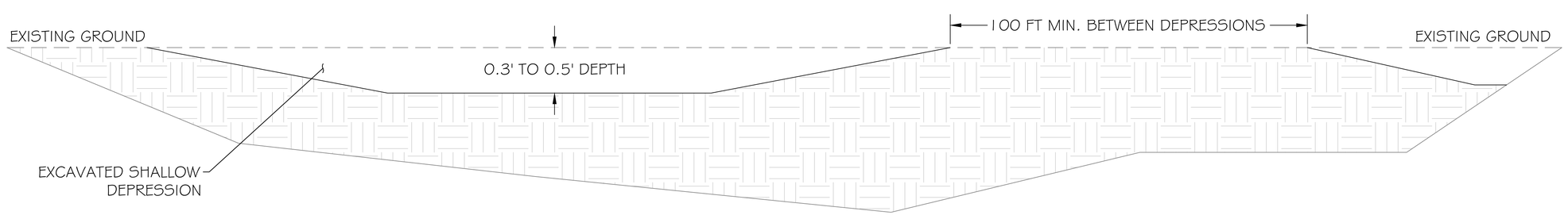
B



PARTIAL DITCH FILL AND BERM REMOVAL TYPICAL XS

NTS

C



NOTES:

1. DEPRESSIONS SHALL MAKE UP NO MORE THAN 1.4 ACRES OF WETLAND AREA
2. INDIVIDUAL DEPRESSIONS SHALL BE NO LARGER THAN 0.2 ACRES

OPTIONAL EXCAVATED SHALLOW DEPRESSIONS

NTS

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SEAL

SCALE: AS SHOWN

PLOT DATE: 7/2/2019

MARK	DATE	DESCRIPTION

REVISIONS:

RELEASED FOR: PRELIMINARY - NOT FOR CONSTRUCTION

PROJECT NAME: BAREFOOT WETLAND MITIGATION SITE
SAMPSON COUNTY, NC

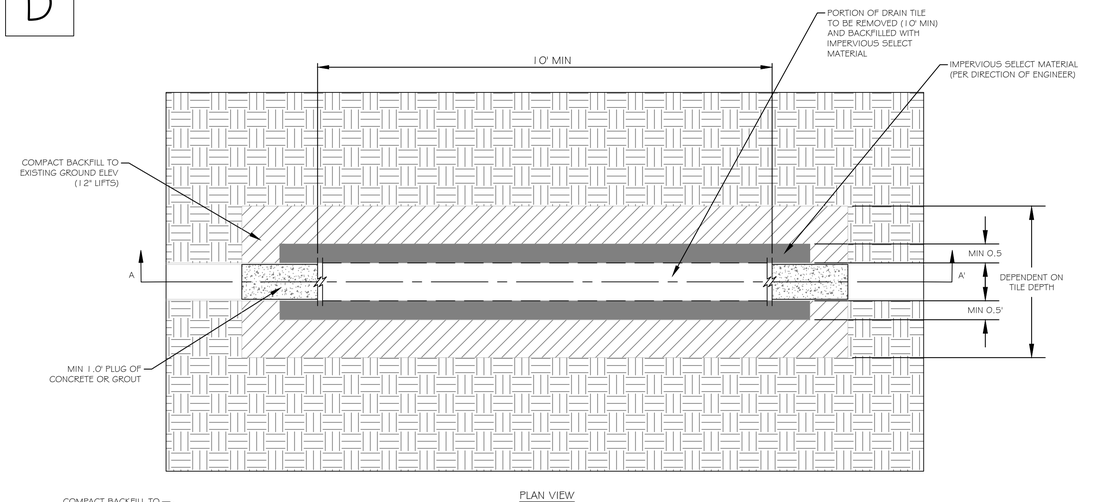
DRAWING TITLE: DETAILS

PROJECT NUMBER:	0517
PROJECT MANAGER:	BPB
DESIGNED:	GKL
DRAWN:	SCF
CHECKED:	----

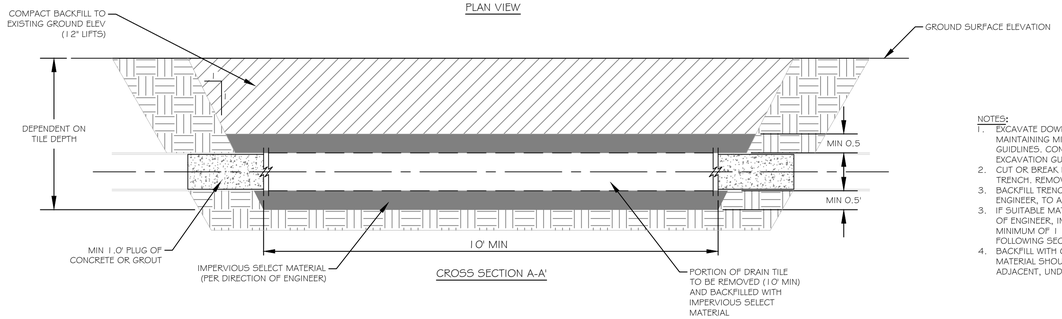
SHEET NUMBER:

D1

D



PLAN VIEW

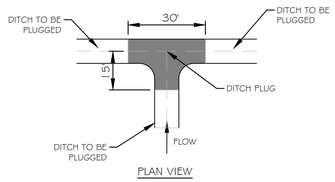


CROSS SECTION A-A'

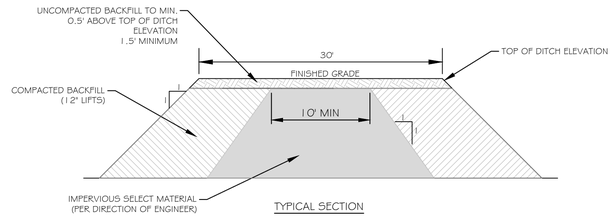
NOTES:
1. EXCAVATE DOWN TO DRAIN TILE FOR A MINIMUM OF 10 FT OF TILE LENGTH, MAINTAINING MINIMUM 1:1 SIDE SLOPES, OR SLOPES MEETING OSHA GUIDLINES. CONTRACTOR SHALL FOLLOW ALL OSHA TRENCHING AND EXCAVATION GUIDELINES.
2. CUT OR BREAK DRAIN TILE AND REMOVE ALL FRAGMENTS FROM EXCAVATED TRENCH. REMOVED TILE IS TO BE DISPOSED OF OFF-SITE.
3. BACKFILL TRENCH WITH IMPERVIOUS SELECT MATERIAL, PER DIRECTION OF ENGINEER, TO A MINIMUM OF 0.5' ABOVE AND BELOW FORMER TILE EXTENTS.
3. IF SUITABLE MATERIAL FOR IMPERVIOUS FILL IS UNAVAILABLE, OR PER DIRECTION OF ENGINEER, INSTALL PLUGS IN REMAINING TILE ENDS. PLUGS ARE TO FILL A MINIMUM OF 1 FT OF TILE AND ARE TO BE COMPOSED OF CONCRETE OR GROUT FOLLOWING SECTION 1000 OF THE NCDOT DIVISION 10 MATERIALS SPECS.
4. BACKFILL WITH COMPACTED MATERIAL TO EXISTING GROUND ELEVATION. MATERIAL SHOULD BE COMPACTED IN 12" LIFTS TO DENSITIES SIMILAR TO ADJACENT, UNDISTURBED SOILS.

DRAIN TILE PLUG
NTS

E



PLAN VIEW

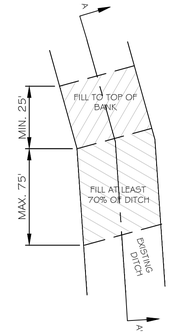


TYPICAL SECTION

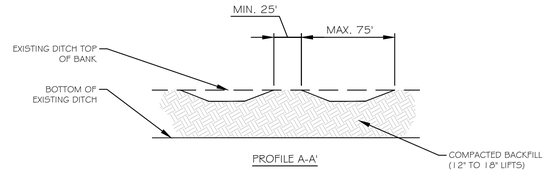
NOTE:
1. TERMINAL DITCH PLUGS SHALL BE USED IN PLACE OF STANDARD DITCH PLUGS WHERE PLUGGED DITCH TRANSITIONS TO OPEN DITCH.

DITCH PLUG
NTS

H



PLAN VIEW

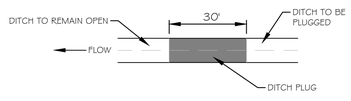


PROFILE A-A'

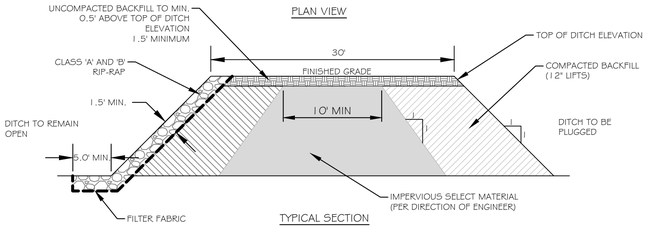
NOTES:
1. FILL EXISTING DITCH TO TOP OF BANK ELEVATION WHEN POSSIBLE.
2. DITCH MUST BE FILLED IN 12" TO 18" LIFTS.
3. IF DITCH CANNOT BE COMPLETELY FILLED TO TOP OF BANK, FILL TO TOP OF BANK FOR 25' OUT OF EVERY 100' SEGMENT.

DITCH BACKFILL
NTS

F



PLAN VIEW

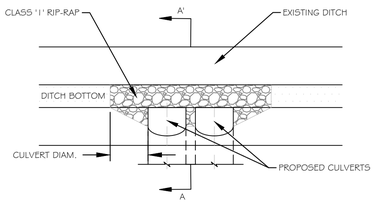


TYPICAL SECTION

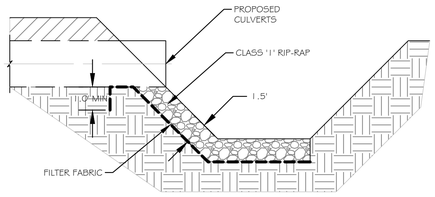
NOTES:
1. TERMINAL DITCH PLUGS SHALL BE USED IN PLACE OF STANDARD DITCH PLUGS WHERE PLUGGED DITCH TRANSITIONS TO OPEN DITCH
2. FILTER FABRIC USED SHALL BE NCDOT TYPE 2 ENGINEERING FABRIC OR EQUIVALENT.

TERMINAL DITCH PLUG
NTS

G



PLAN VIEW



CROSS SECTION A-A'

NOTES:
1. CONSTRUCT OUTFALL PROTECTON WHEN WATER IS LOW.
2. FILTER FABRIC USED SHALL BE NCDOT TYPE 2 ENGINEERING FABRIC OR EQUIVALENT.

CULVERT OUTFALL PROTECTION
NTS

res
302 Jefferson Street, Suite 110
Raleigh, NC 27605
Main: 919.829.9909
Fax: 919.829.9913
www.res.us

SEAL

SCALE: AS SHOWN

MARK	DATE	DESCRIPTION
REVISIONS:		

RELEASED FOR: PRELIMINARY - NOT FOR CONSTRUCTION

PLOT DATE: 7/2/2019

PROJECT NAME: BAREFOOT WETLAND MITIGATION SITE
SAMPSON COUNTY, NC

DRAWING TITLE: DETAILS

PROJECT NUMBER:	0517
PROJECT MANAGER:	BPB
DESIGNED:	GKL
DRAWN:	SCF
CHECKED:	----

SHEET NUMBER: D2

FILE NAME:S:\@RES GIS\Projects\NC\Barefoot\CAD\DWG\0517_C3D_DESIGN_SCF.dwg SAVED BY: Stasking

I

INSTALLATION NOTES:

SITE PREPARATION

1. GRADE AND COMPACT AREA.
2. REMOVE ALL ROCKS, CLODS, VEGETATION, AND OBSTRUCTIONS SO THAT MATTING WILL HAVE DIRECT CONTACT WITH THE SOIL.
3. PREPARE SEEDBED BY LOOSENING 3 TO 4 INCHES OF TOPSOIL ABOVE FINAL GRADE.
4. TEST SOILS FOR ANY NUTRIENT DEFICIENCIES AND SUBMIT SOIL TEST RESULTS TO THE ENGINEER. APPLY ANY TREATMENT SUCH AS LIME OR FERTILIZERS TO THE SOIL IF NEEDED.

SEEDING

1. SEE PLANTING SHEETS FOR SEEDING REQUIREMENTS.
2. APPLY SEED TO SOIL BEFORE PLACING MATTING.

INSTALLATION - STREAM BANK

1. SEE GRADING NOTES ON PLAN AND PROFILE SHEETS AND DETAIL SHEETS FOR INFORMATION REGARDING WHAT AREAS ARE TO RECEIVE COIR MATTING.
2. OVERLAP ADJACENT MATS 3' (IN DIRECTION PARALLEL TO FLOW) AND ANCHOR EVERY 12" ACROSS THE OVERLAP. THE UPSTREAM MAT SHOULD BE PLACED OVER THE DOWNSTREAM MAT.
3. EDGES SHOULD BE SHINGLED AWAY FROM THE FLOW OF WATER.
4. LAY MAT LOOSE TO ALLOW CONTACT WITH SOIL. DO NOT STRETCH TIGHT.
5. ANCHOR MAT USING BIODEGRADABLE STAKES OR PINS.
6. CUT 8" x 8" TRENCH ALONG TOP OF BANK FOR MAT TERMINATION AS SHOWN IN FIGURES 1 & 2. EXTEND MAT 2 TO 3 FEET PAST TOP OF BANK.
7. PLACE ADJACENT ROLLS IN THE ANCHOR TRENCH WITH A MINIMUM OF 4" OVERLAP. SECURE WITH BIODEGRADABLE STAKES OR PINES, BACKFILL ANCHOR TRENCH, AND COMPACT SOIL.
8. STAPLE AT 12" INTERVALS ALONG OVERLAP.
9. STREAM BANK MATTING TO BE INSTALLED FROM TOE OF BANK TO A MINIMUM OF 2.0' PAST TOP OF BANK. SEE FIGURE 3 FOR TERMINATION AT TOP OF BANK.
10. IF MORE THAN ROLL IS REQUIRED TO COVER THE CHANNEL FROM THE TOP OF BANK DOWN TO THE TOE, THEN OVERLAP MATTING BY A MINIMUM OF 1'.

EROSION CONTROL MATTING MUST MEET OR EXCEED THE FOLLOWING REQUIREMENTS:

- 100 % COCONUT FIBER (COIR) TWINE WOVEN INTO A HIGH STRENGTH MATRIX.
- THICKNESS - 0.35 IN. MINIMUM.
- SHEAR STRESS – 5 LBS/SQFT
- FLOW VELOCITY- OBSERVED 16 FT/SEC
- WEIGHT - 29 OZ/SY
- OPEN AREA - 38%
- SLOPES – UP TO A MAXIMUM OF 1:1

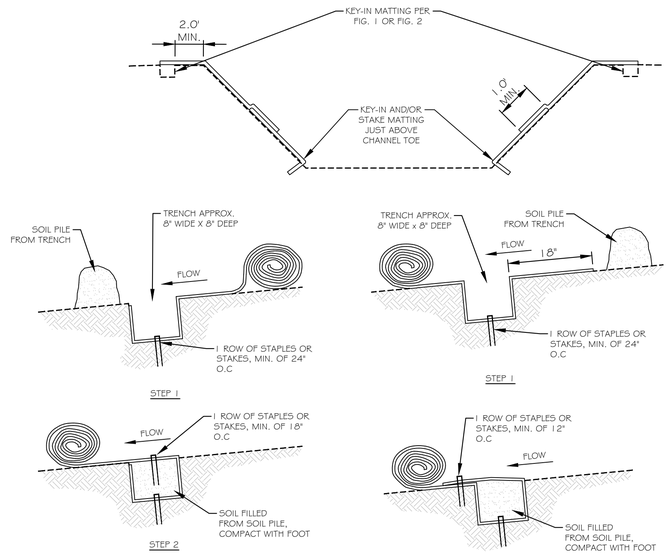


FIGURE 1

FIGURE 2

COIR MATTING

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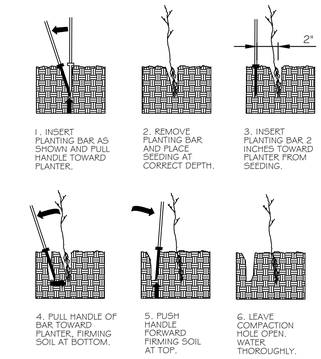
DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



PLANTING NOTES:

PLANTING BAG
DURING PLANTING, SEEDLINGS SHALL BE KEPT IN A MOIST CANVAS BAG OR SIMILAR CONTAINER TO PREVENT THE ROOT SYSTEMS FROM DRYING.

KBC PLANTING BAR
PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.

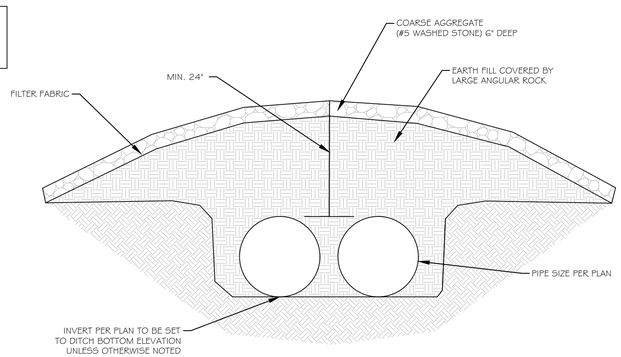
ROOT PRUNING
ALL SEEDLINGS SHALL BE ROOT PRUNED, IF NECESSARY, SO THAT NO ROOTS EXTEND MORE THAN 10 INCHES BELOW THE ROOT COLLAR.

NOTES:
BARE ROOTS SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.

BARE ROOT PLANTING

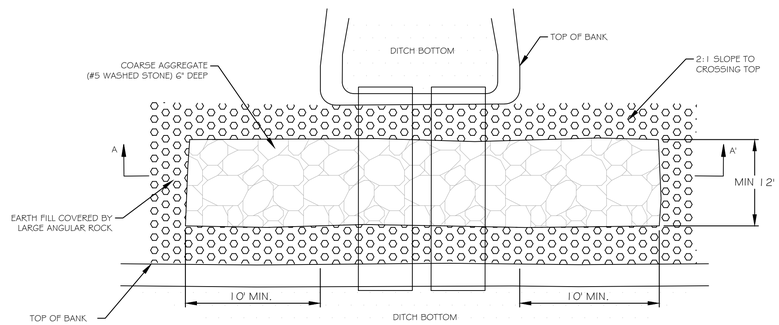
NTS

K



CROSS SECTION A-A'

NOTES:
1. CONSTRUCT DITCH CROSSING WHEN WATER IS LOW.
2. INSTALL DITCH CROSSING PERPENDICULAR TO FLOW.
3. CONTRACTOR TO COORDINATE APPROPRIATE BEDDING MATERIAL WITH MANUFACTURER.
4. FILTER FABRIC USED SHALL BE NCDOT TYPE 2 ENGINEERING FABRIC OR EQUIVALENT.
5. WIDTH OF TYPICAL FARM CROSSINGS SHALL BE PER PLAN OR A MINIMUM OF 15'.
6. WHEN REQUIRED, CONTRACTOR TO ENSURE PIPE MATERIAL AND COVER MEET H-20 LOADING REQUIREMENTS.



PLAN VIEW

PROPOSED CULVERT CROSSING

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res
302 Jefferson Street, Suite 110
Raleigh, NC 27605
Main: 919.829.9909
Fax: 919.829.9913
www.res.us

SEAL

SCALE: AS SHOWN

MARK	DATE	DESCRIPTION
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BAREFOOT WETLAND MITIGATION SITE
SAMPSON COUNTY, NC

DRAWING TITLE:
DETAILS

PROJECT NUMBER:	0517
PROJECT MANAGER:	BPB
DESIGNED:	GKL
DRAWN:	SCF
CHECKED:	----

SHEET NUMBER:
D3

Appendix B –
Data/Analysis/Supplementary Information

IRT Meeting Minutes

M E M O R A N D U M

302 Jefferson Street, Suite 110 Raleigh, North Carolina 27605 919.209.1052 tel. 919.829.9913 fax

TO: **NC IRT, NC DMS**

FROM: **Bob White, RES**

DATE: **02-22-18**

RE: **RES Barefoot Full Delivery Wetland Mitigation Site**
IRT Site Visits, February 20, 2018

Attendees: Mac Haupt (NC DWR), Henry Wicker (USACE), Travis Wilson (NCWRC), Jeff Schaffer (NC DMS), Tim Baumgartner (NCDMS) Bob White (RES), Daniel Ingram (RES), Burt Rudolph (RES), Frasier Mullen (RES), George Lankford (George K. Lankford, LLC)

Site Visit Date: February 20, 2018

Barefoot – Non- Riparian Wetland Mitigation Site

The Barefoot site is located on the west side of Warren Mill Road northwest of Newton Grove, Sampson County, North Carolina. The site is a drained and tiled soy bean field with adjacent wooded wetlands separated by perimeter ditches. Overall drainage from the site is to the north through agricultural ditches and into unnamed tributaries of Mill Creek.

Field meeting comments:

- NC DWR evaluated the soil profile and discussed physical properties of the mapped Rains soil series. A general discussion of the suitability of onsite clayey or low permeability soils for ditch plugging ensued. The understanding by all is that soils selected for ditch plugs will be of sufficient clay content to prevent lateral and interior ditch drainage function. If low permeability soil material with sufficient clay content is not present on site it will be brought to the site from an offsite source.

- USACE, NC DWR, NC WRC discussed the methodology of preventing horizontal drainage from the site through the existing drainage tiles. General agreement was that the tiles did not have be removed but that the flow through the tiles would be "interrupted" through excavating and blocking sections sufficient to prevent pockets of wet areas resulting from concentrated water movement. The tiles would not be simply plugged on the ends where seeping to lateral ditches.

- RES stated that the easement on all sides of the site extended beyond existing perimeter ditches to allow for potential residual drainage effect from ditches following plugging.

This area from perimeter ditches to the easement boundary will be planted, however not included in credit-generating calculations.

- NC DWR requested numerous wells or piezometers to determine wetland hydrologic conditions of sufficient duration throughout the site. RES shall work with George K. Langford, LLC to determine the appropriate number of wells and locations. Wells will be included in adjacent "hydrologic reference" wetlands. RES has scheduled well installation for late February or early March to capture pre-construction conditions and to aid in specification of grade elevation tolerances for final design. All wells will be installed with dedicated transducers that log water table elevation at a frequency of one hour. Water table elevations will be incorporated to hydrographs for each well.

- NC WRC requested that *pinus spp*. are not included in the planting plan. RES will not include pine trees in the planting plan and will control pines (and red maple and sweet gum or other undesirable species) that inhibit the survivability and success of trees specified in the approved Final Mitigation Plan.

- Overall, the IRT members agree that the Barefoot Site is suitable to provide non-riparian compensatory mitigation. Final credit approach will be determined in the approved mitigation plan.

From: Haupt, Mac
To: Schaffer, Jeff; andrea.w.hughes@usace.army.mil; Wilson, Travis W.
Cc: Baumgartner, Tim; Crocker, Lindsay; Bob White; Daniel Ingram
Subject: RE: [External] IRT Site Visit Notes for Barefoot and Matthew
Date: Friday, March 16, 2018 2:56:41 PM
Attachments: image001.png

Jeff,

I reviewed the site notes for Barefoot and Matthew and have the following comments:

Barefoot:

1. Did not think I requested "numerous" gauges, but enough to cover the site adequately to support the proposed wetland hydroperiod.
2. Site seemed pretty straight forward, but should make a concerted effort to find all the field tile outlets.

Matthew:

3. Wanted to emphasize that we did bring up the small and disconnected site discussion on this site, given the fact that the site is relatively small given the drainage area. In the future, such sites may result in decreased credits as a function of their size and connectivity in the watershed/catchment.
4. I believe we discussed the removal of the sediment soil piles below the dam. This may result in an enhancement ratio versus a preservation ratio/condition. I do not believe restoration was mentioned.

In general DWR accepts the notes as accurate and representative of the discussions on the site visit.

Thanks,
Mac

From: Schaffer, Jeff
Sent: Monday, March 12, 2018 8:44 AM
To: andrea.w.hughes@usace.army.mil; Haupt, Mac <mac.haupt@ncdenr.gov>; Wilson, Travis W. <travis.wilson@ncwildlife.org>
Cc: Baumgartner, Tim <tim.baumgartner@ncdenr.gov>; Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Bob White <bwhite@res.us>; Daniel Ingram <dingram@res.us>
Subject: FW: [External] IRT Site Visit Notes

Attached are the site visit notes for the Barefoot Non-Riparian Wetland Project and the Matthew Stream & Riparian Wetland Project. Please let Bob White at RES know if you have any revisions, questions, or comments on either of these.

Thanks!

Jeff Schaffer
Eastern Supervisor, Project Management

Division of Mitigation Services (https://deq.nc.gov/about/divisions/mitigation-services)
NC Department of Environmental Quality (NCDEQ)

(919) 707-8308 office
(919) 812-2634 mobile
Jeff.Schaffer@ncdenr.gov

217 West Jones St., Suite 3000A
1652 Mail Service Center
Raleigh, NC 27699-1652

From: Bob White [mailto:bwhite@res.us]
Sent: Monday, March 12, 2018 8:22 AM
To: Schaffer, Jeff <jeff.schaffer@ncdenr.gov>
Subject: RE: [External] IRT Site Visit Notes

Jeff, can you please distribute these as appropriate.
Thanks

Bob White
Project Manager
RES | res.us
Mobile: 239.233.7570

From: Schaffer, Jeff [mailto:jeff.schaffer@ncdenr.gov]
Sent: Friday, March 9, 2018 9:53 AM
To: Bob White <bwhite@res.us>
Subject: RE: [External] IRT Site Visit Notes

Bob,

Just checking to see if you ever sent the IRT site visit notes for Barefoot and Matthew to the IRT. If so, please send me a final version of each.

Thanks!

Jeff Schaffer
Eastern Supervisor, Project Management
Division of Mitigation Services (https://deq.nc.gov/about/divisions/mitigation-services)
NC Department of Environmental Quality (NCDEQ)

(919) 707-8308 office
(919) 812-2634 mobile
Jeff.Schaffer@ncdenr.gov

217 West Jones St., Suite 3000A
1652 Mail Service Center
Raleigh, NC 27699-1652

From: Bob White [mailto:bwhite@res.us]
Sent: Friday, February 23, 2018 7:39 AM
To: Schaffer, Jeff <jeff.schaffer@ncdenr.gov>
Cc: Daniel Ingram <dingram@res.us>
Subject: RE: [External] IRT Site Visit Notes

Thanks Jeff. Shall do.

Bob White
Project Manager
RES | res.us
Mobile: 239.233.7570

From: Schaffer, Jeff [mailto:jeff.schaffer@ncdenr.gov]
Sent: Friday, February 23, 2018 6:45 AM
To: Bob White <bwhite@res.us>
Subject: RE: [External] IRT Site Visit Notes

Bob,

Thanks for getting these done so quickly. My only comment for both Barefoot and Matthew is to include a statement to the effect that the IRT agrees with the overall concept and crediting strategy proposed and would entertain modification to the proposed based on activities carried out based upon

these conversations.

Have a great weekend.

Jeff Schaffer
Eastern Supervisor, Project Management
Division of Mitigation Services (https://deq.nc.gov/about/divisions/mitigation-services)
NC Department of Environmental Quality (NCDEQ)

(919) 707-8308 office
(919) 812-2634 mobile
Jeff.Schaffer@ncdenr.gov

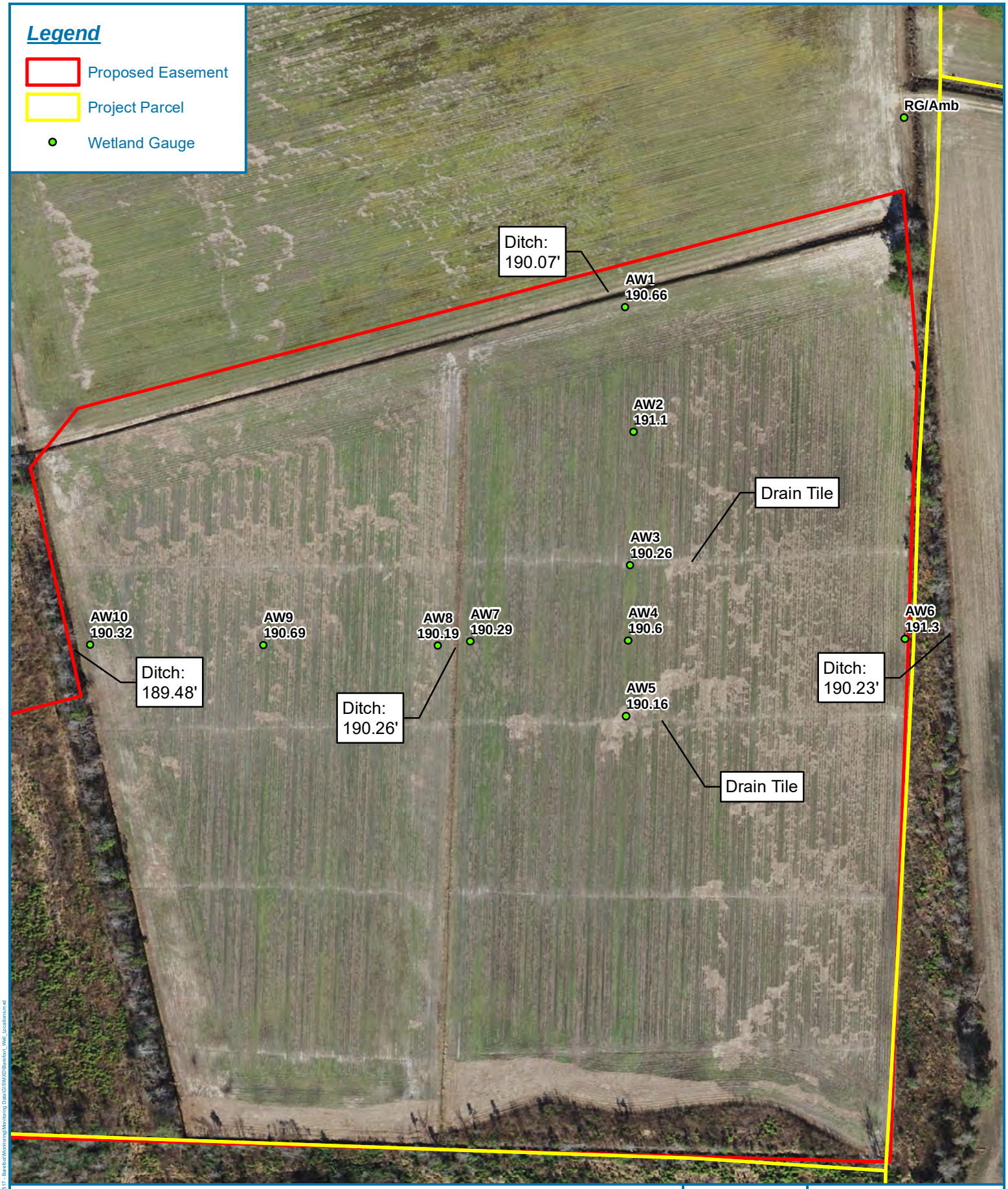
217 West Jones St., Suite 3000A
1652 Mail Service Center
Raleigh, NC 27699-1652

From: Bob White [mailto:bwhite@res.us]
Sent: Thursday, February 22, 2018 4:09 PM
To: Schaffer, Jeff <jeff.schaffer@ncdenr.gov>
Subject: [External] IRT Site Visit Notes

Jeff, How about taking a look at these notes before I distribute.
Thanks

Bob White
Project Manager
RES | res.us
Mobile: 239.233.7570

Existing Well Locations & Data



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Feet

Figure B2 - Well Locations

Barefoot Wetland Mitigation Project

Sampson County, North Carolina

Date: 2/12/2019

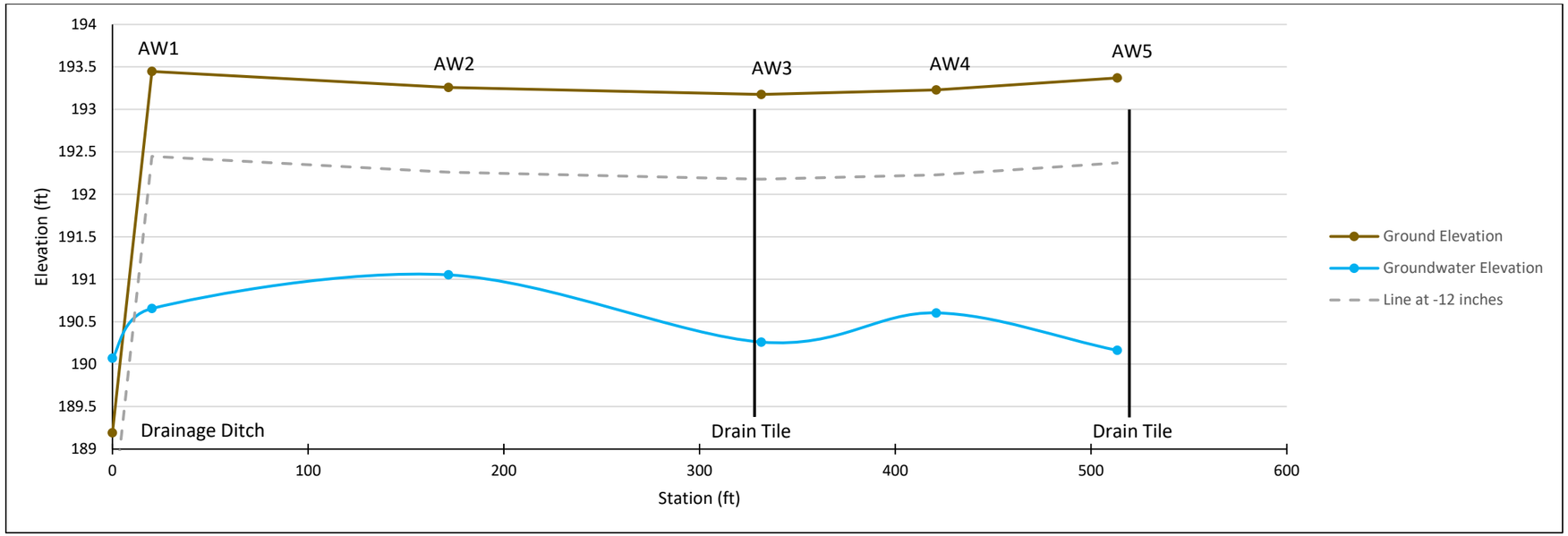
Drawn by: RTM

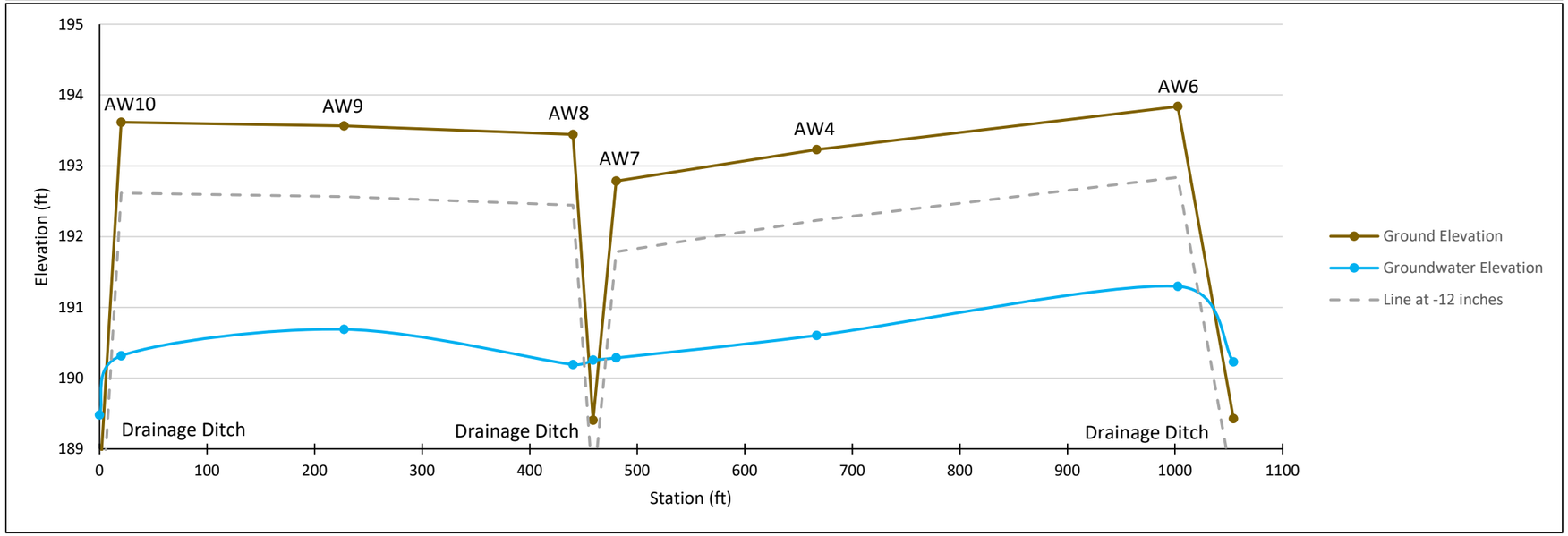
res

Document Path: S:\@RES Projects\North Carolina\05017 - Barefoot\Monitoring\Monitoring Data\GIS\MXD\Barefoot_Well_Locations.mxd

Barefoot Pre-Construction Wells – Transect Charts (5/2/2018)

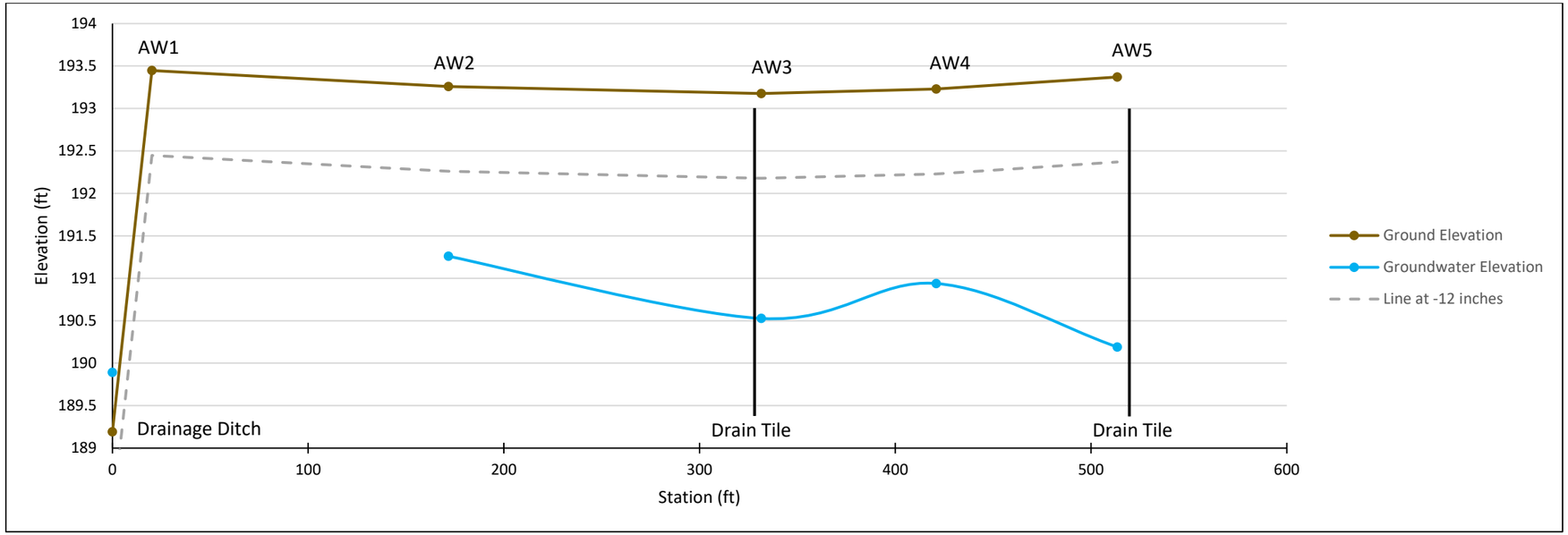
These charts display the approximate groundwater elevation across the field transects based on measurements taken on field visits at the pre-construction monitoring wells and in the drainage ditches. Well locations are shown on **Figure B1**

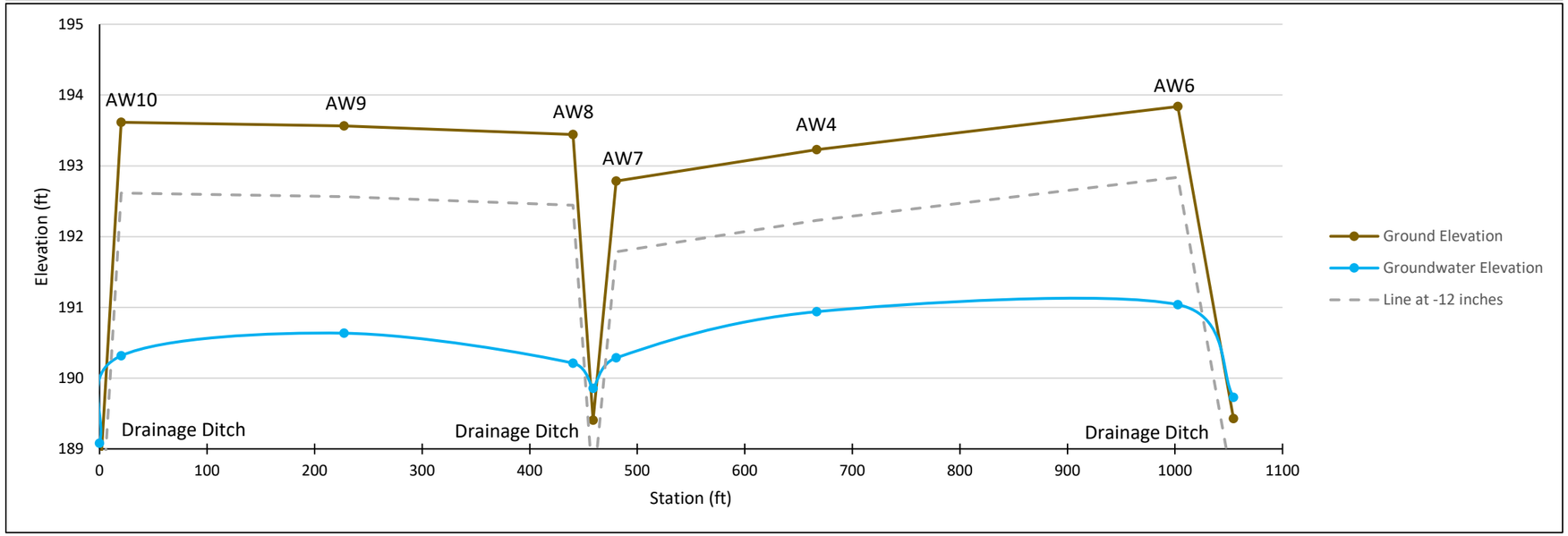




Barefoot Pre-Construction Wells – Transect Charts (10/16/2018)

Pre-construction monitoring well AW1 was run over by a tractor in late May and filled in.

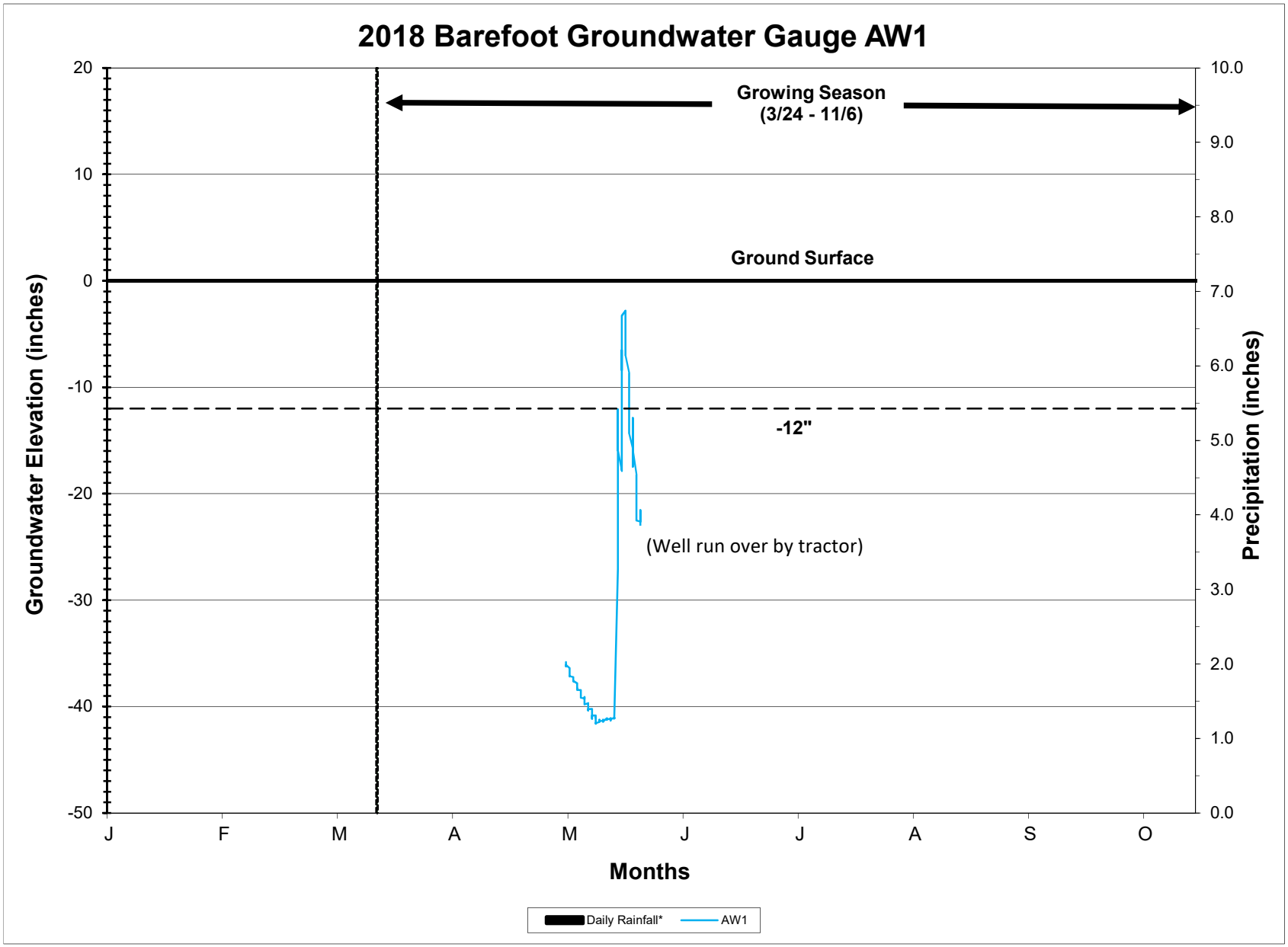




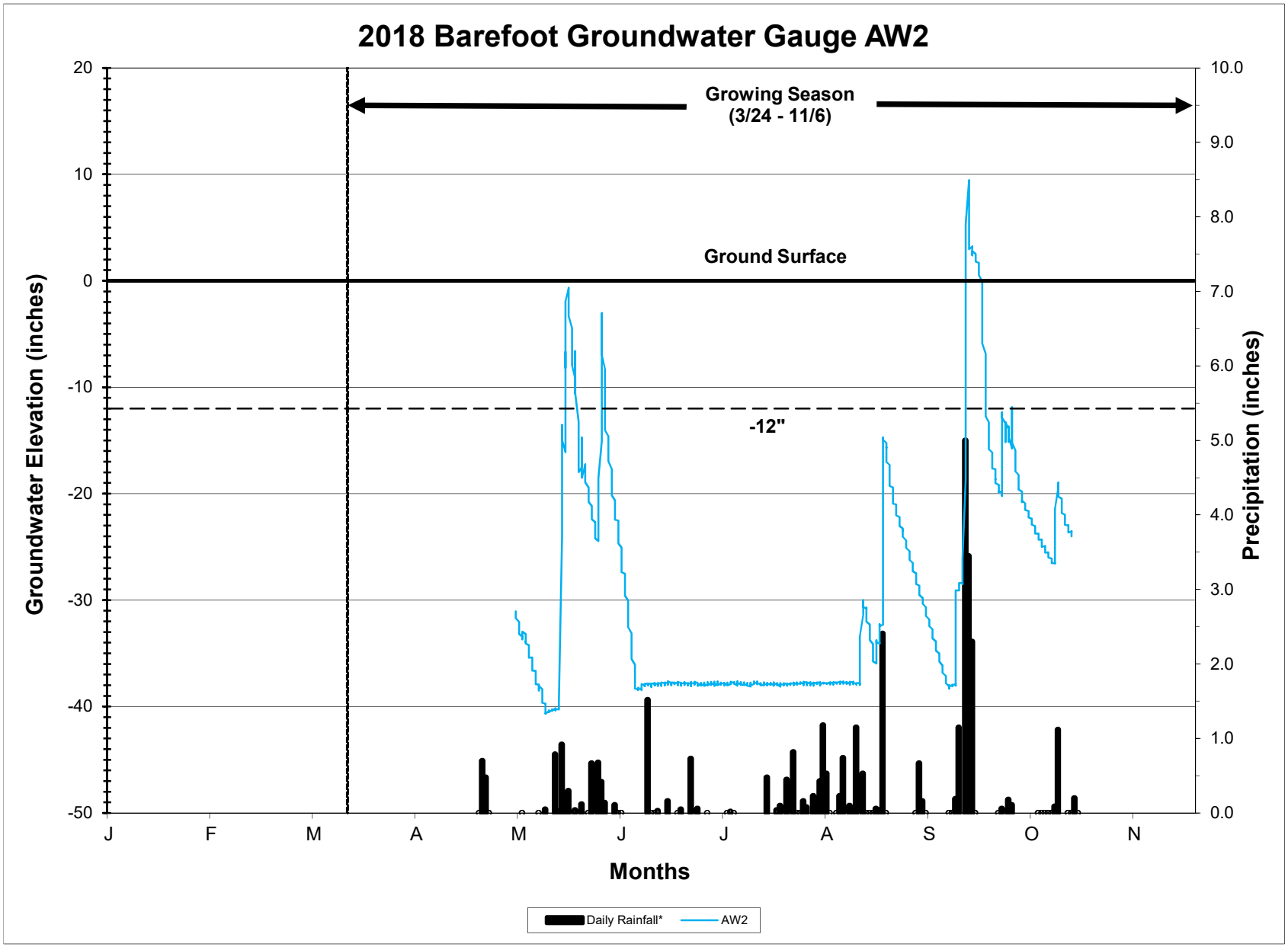
Summary Table of the hydroperiod at each groundwater monitoring well:

2018 Max Hydroperiod (Growing Season 13-Mar through 22-Nov, 254 days) Well Data for May 4, 2018 thru October 16, 2018 Success Criterion: 5%					
Gauge	**Max Consecutive**		**Cumulative**		**Occurrences**
	Days	**Percent of growing Season**	**Days**	**Percent of growing Season**	
AW1	2.3	0.9%	2.3	0.9%	1
AW2	6.5	2.6%	11.7	4.6%	4
AW3	3.8	1.5%	3.8	1.5%	1
AW4	5.2	2.0%	6.3	2.5%	3
AW5	2.8	1.1%	2.8	1.1%	1
AW6	7.3	2.9%	12.1	4.8%	6
AW7	5.2	2.0%	7.3	2.9%	6
AW8	2.3	0.9%	2.3	0.9%	1
AW9	3.8	1.5%	4.2	1.6%	2
AW10	1.5	0.6%	1.5	0.6%	1

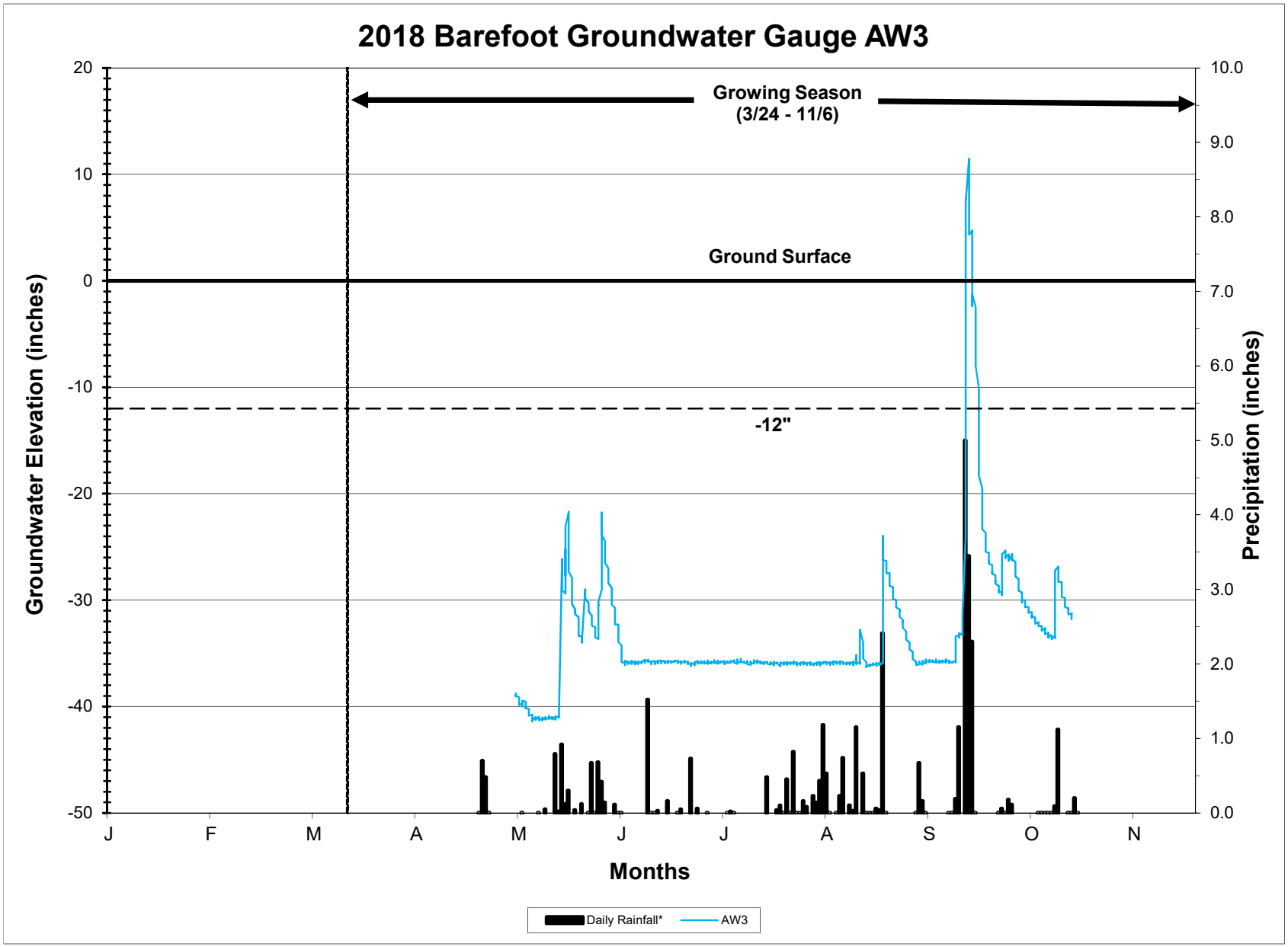
Note: Well data was recorded every 4 hours. Max Consecutive was defined as the longest recorded period where groundwater was within 12" of ground surface. Cumulative was defined as the sum of all periods where groundwater was within 12". Occurrences were defined as periods where consecutive groundwater readings were within 12". See subsequent plots for time distribution of recorded groundwater elevations at each well.



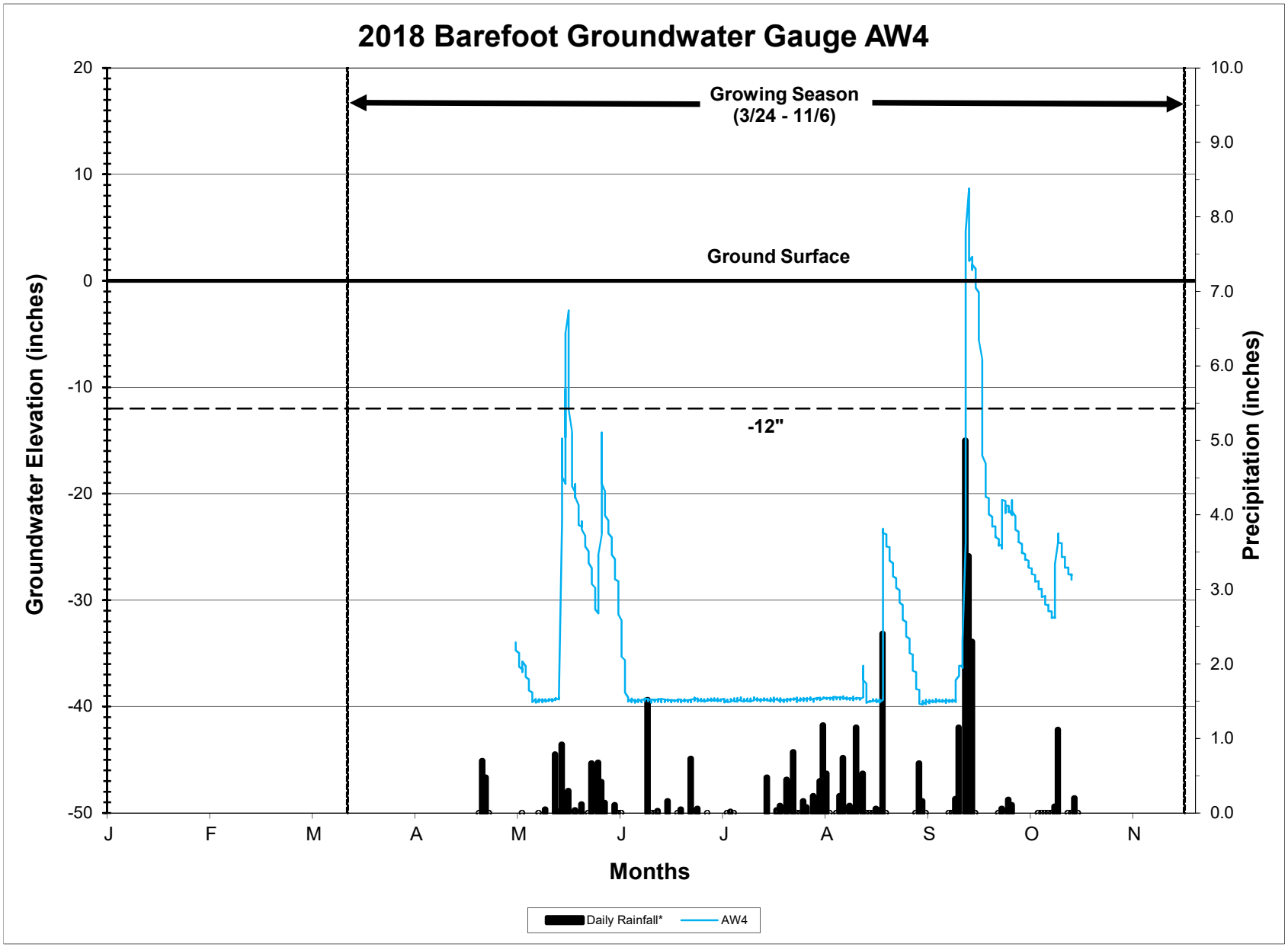
*Rainfall data recorded at State Climate Office Station NC-SM-2 - Dunn 7.1 SSE via manual rain gauge



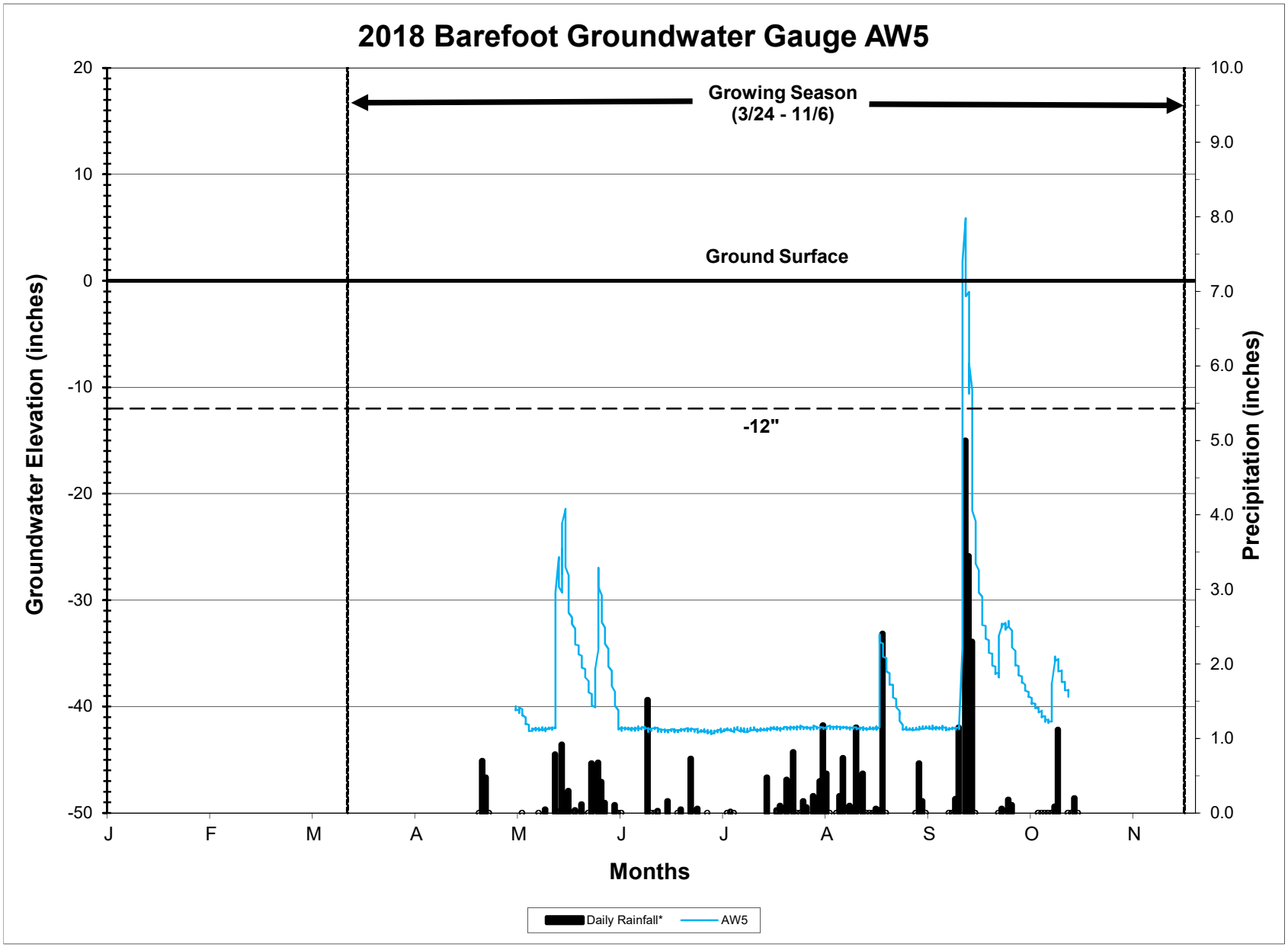
*Rainfall data recorded at State Climate Office Station NC-SM-2 - Dunn 7.1 SSE via manual rain gauge



*Rainfall data recorded at State Climate Office Station NC-SM-2 - Dunn 7.1 SSE via manual rain gauge



*Rainfall data recorded at State Climate Office Station NC-SM-2 - Dunn 7.1 SSE via manual rain gauge



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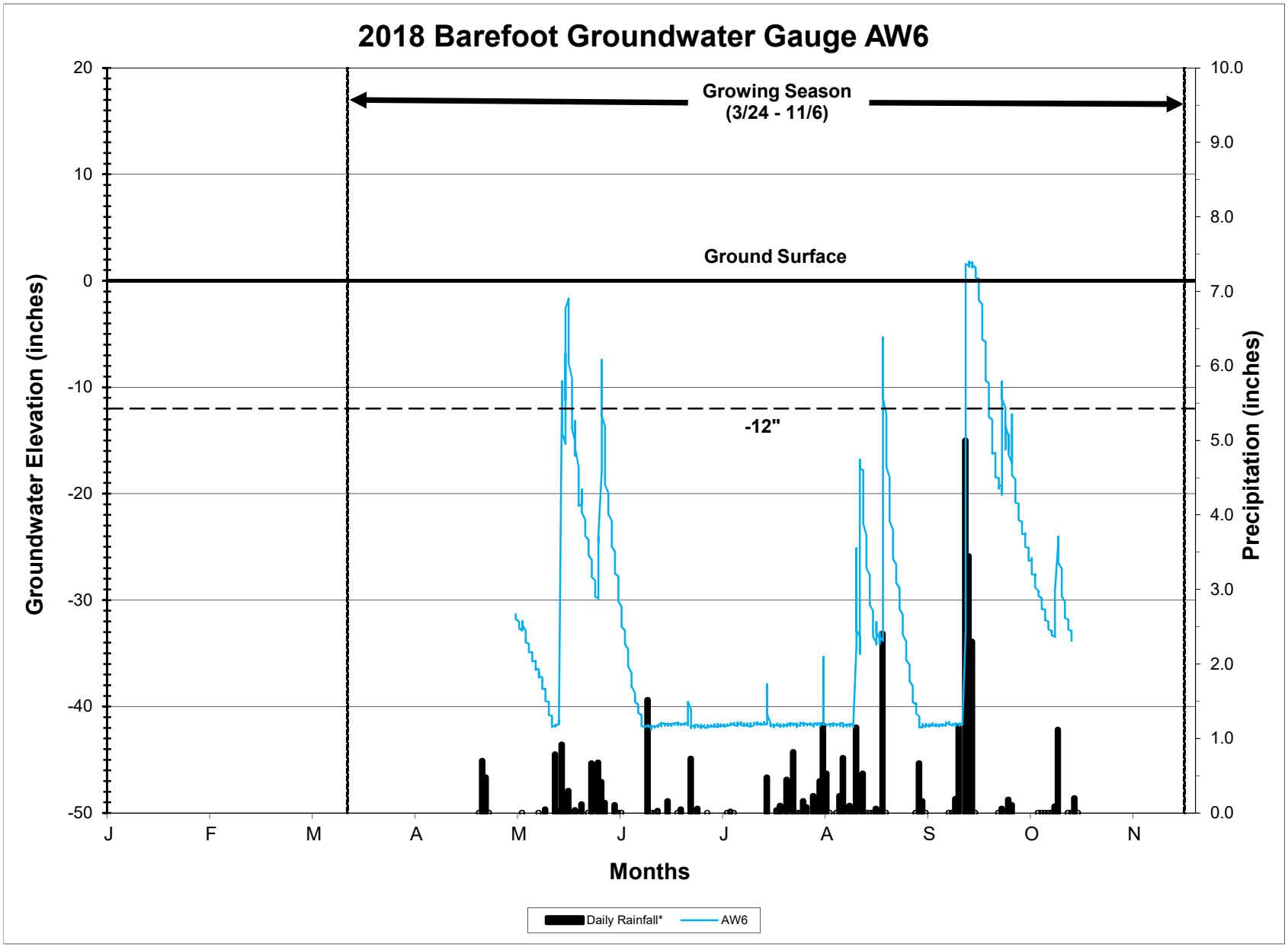
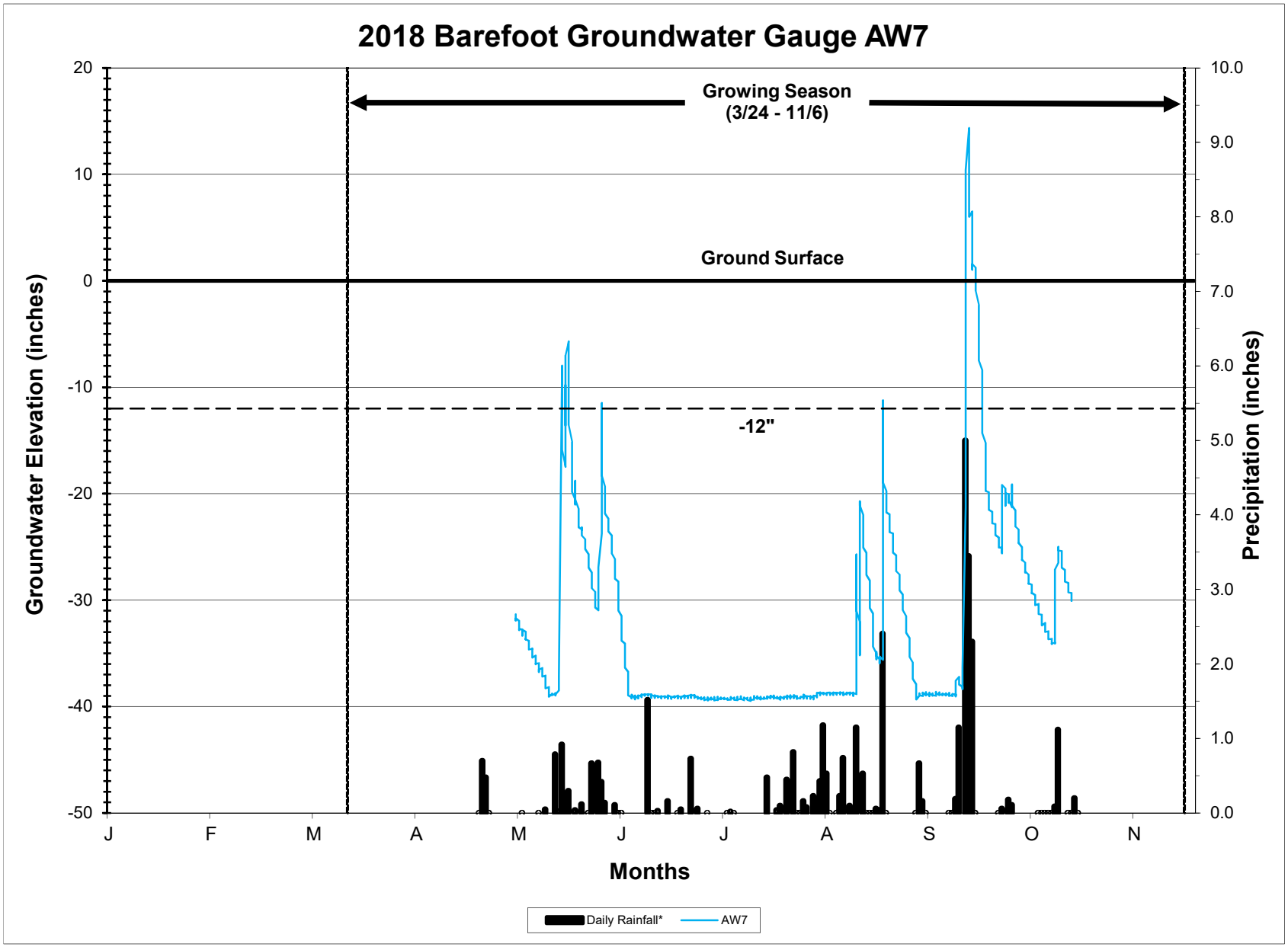
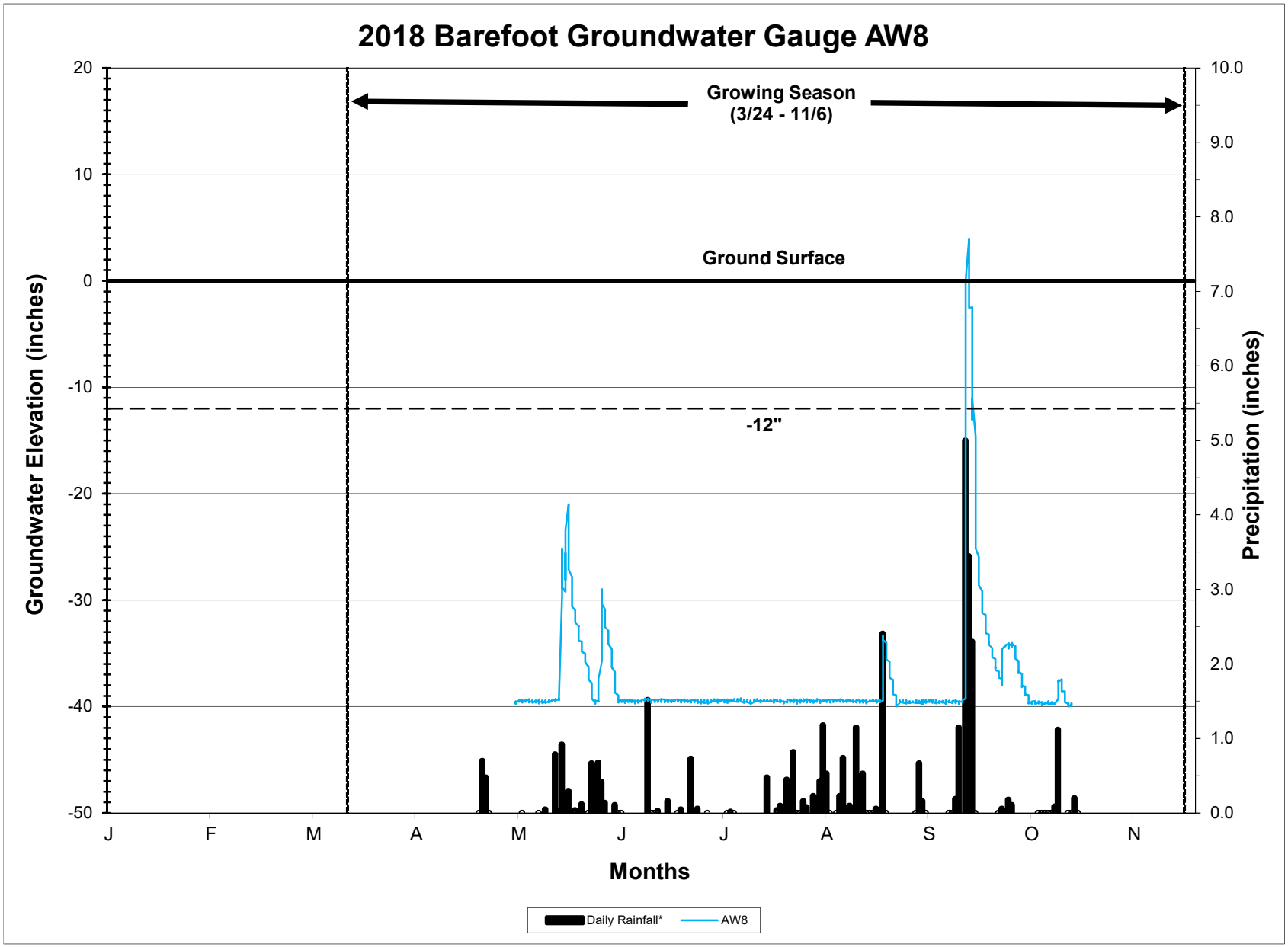


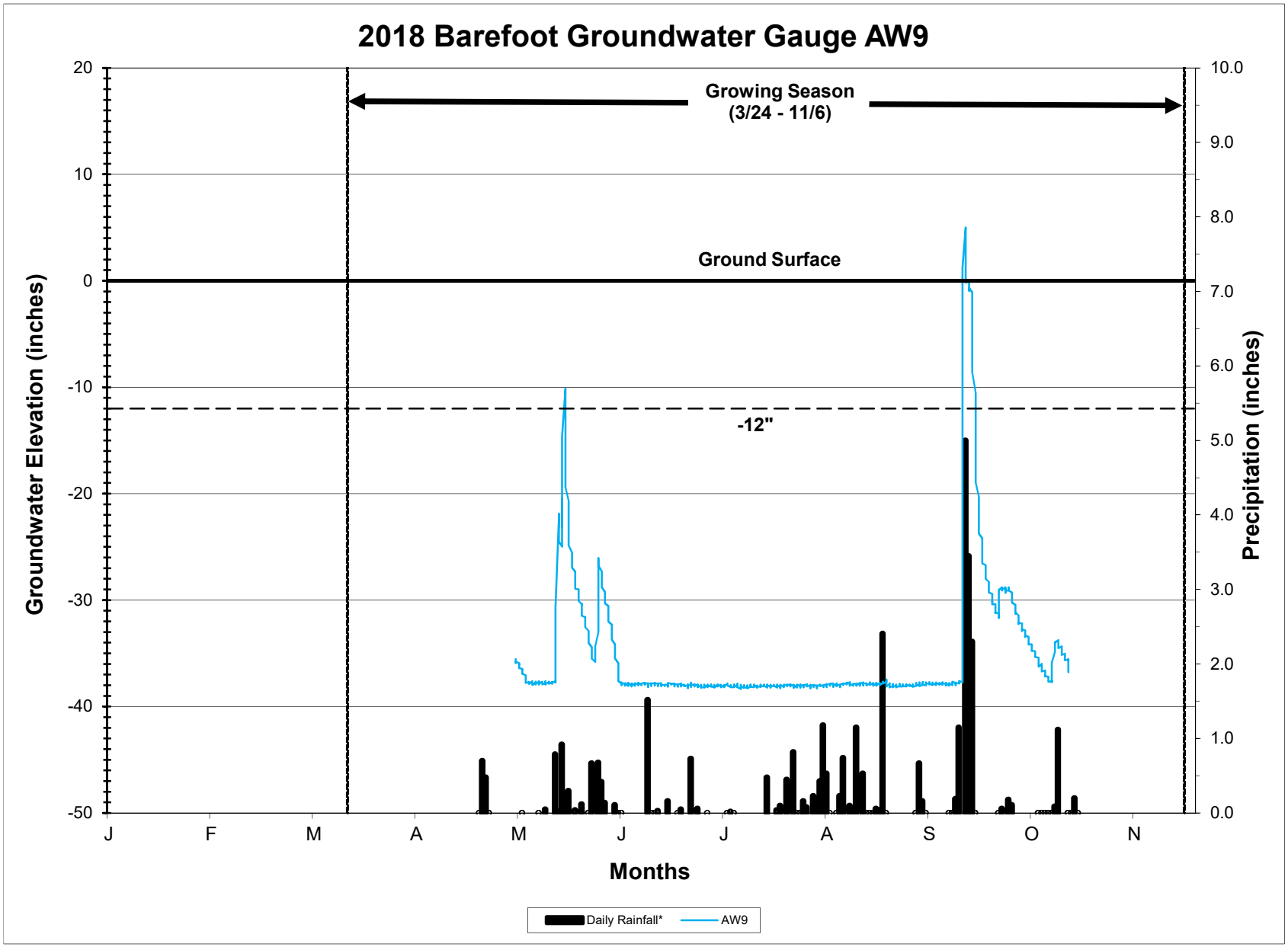
*Rainfall data recorded at State Climate Office Station NC-SM-2 - Dunn 7.1 SSE via manual rain gauge



*Rainfall data recorded at State Climate Office Station NC-SM-2 - Dunn 7.1 SSE via manual rain gauge



*Rainfall data recorded at State Climate Office Station NC-SM-2 - Dunn 7.1 SSE via manual rain gauge



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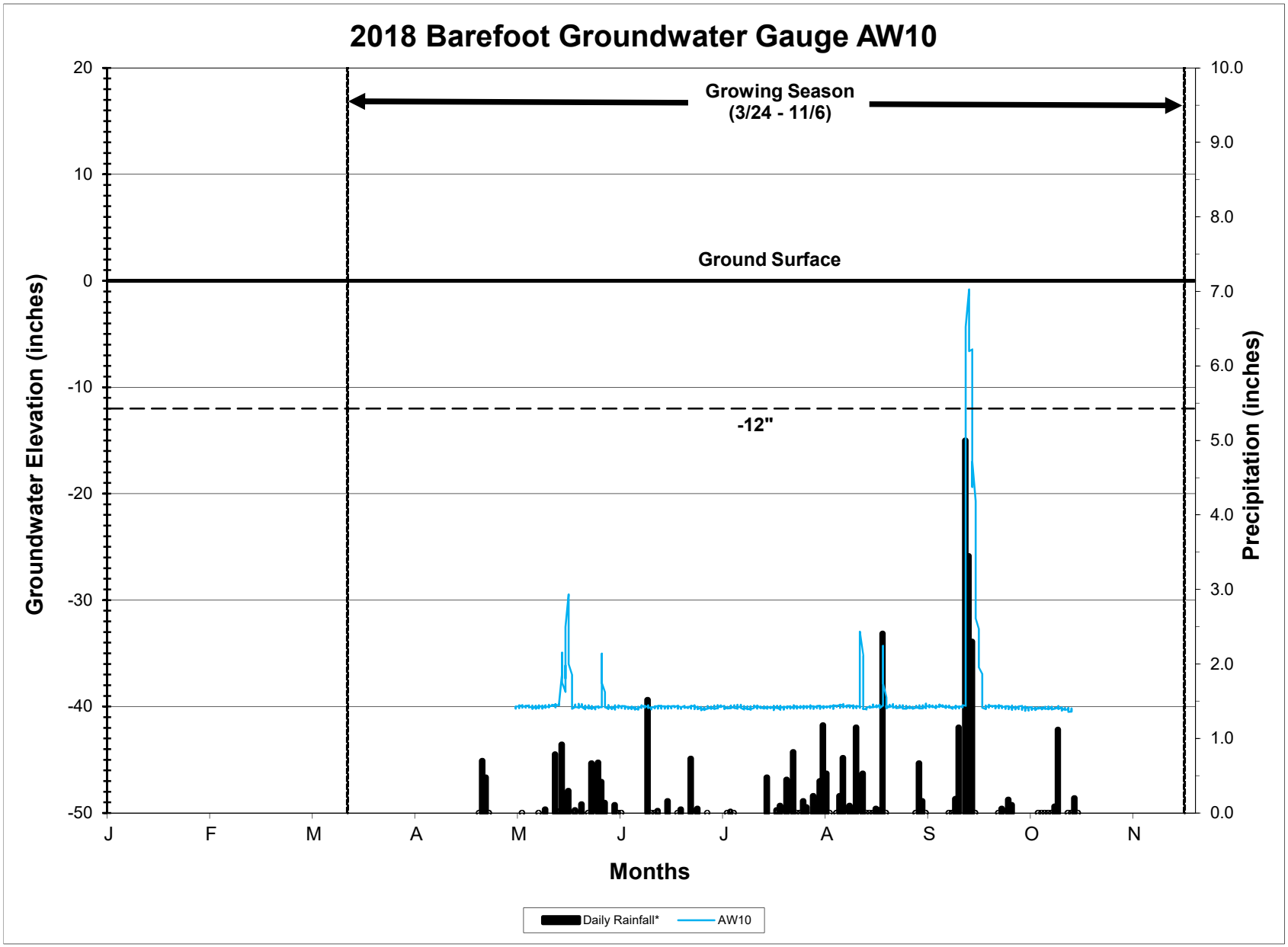
2018 Barefoot Groundwater Gauge AW10
Growing Season
(3/24 - 11/6)
Ground Surface
-12"
Groundwater Elevation (inches)
Precipitation (inches)
20
10
0
-10
-20
-30
-40
-50
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
J
F
M
A
M
J
J
A
S
O
N
Months
Daily Rainfall*
AW10

WETS Table for Sampson County

WETS Station: CLINTON 2 NE, NC

Requested years: 1988 - 2018

Month	Temperature (°F)			Precipitation (inches)				
	Avg daily max	Avg daily min	Avg daily mean	Avg	30% chance will have		Avg number of days with 0.10 inch or more	Average total snowfall
					less than	more than		
Jan	53.3	31.8	42.5	3.51	2.42	4.18	7	0.8
Feb	56.6	34.2	45.4	3.03	2.06	3.62	6	0.5
Mar	63.6	40.4	52.0	3.77	2.67	4.47	7	0.0
Apr	73.3	49.0	61.1	3.20	2.04	3.85	6	0.0
May	80.2	57.9	69.0	3.90	2.82	4.60	7	0.0
Jun	87.2	66.5	76.8	4.87	3.31	5.82	7	0.0
Jul	89.9	70.5	80.2	6.00	4.25	7.11	8	0.0
Aug	88.2	68.8	78.5	5.70	3.93	6.78	8	0.0
Sep	83.0	63.0	73.0	6.32	3.06	7.72	7	0.0
Oct	73.9	50.2	62.0	3.48	1.90	4.25	5	0.0
Nov	64.6	40.8	52.7	3.25	1.91	3.95	5	0.0
Dec	56.3	34.8	45.6	3.30	2.16	3.97	6	0.8
Annual:					46.37	54.43		
Average	72.5	50.7	61.6	-	-	-	-	-
Total	-	-	-	50.34			78	2.2

GROWING SEASON DATES

Requested years of data:	1988 - 2018		
Years with missing data:	24 deg = 4	28 deg = 4	32 deg = 4
Years with no occurrence:	24 deg = 0	28 deg = 0	32 deg = 0
Data years used:	24 deg = 27	28 deg = 27	32 deg = 27

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	2/24 to 12/11 290 days	3/13 to 11/22 254 days	3/29 to 11/7 223 days
70 percent *	2/19 to 12/17 301 days	3/8 to 11/28 265 days	3/25 to 11/11 231 days

** Percent chance of the growing season occurring between the Beginning and Ending dates.*

STATS TABLE

Total precipitation (inches)

Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1971	5.37	3.95	6.50	5.56	3.63	4.53	6.81	9.09	3.06	8.48	1.22	1.78	59.98
1972	4.92	4.74	3.49	2.07	5.78	3.17	8.15	6.57	3.93	5.06	5.36	2.95	56.19
1973	3.49	5.56	4.91	6.37	3.58	5.21	4.52	4.57	1.58	0.65	0.26	6.83	47.53
1974	3.97	4.63	4.85	3.77	4.01	3.84	6.74	7.69	3.15	2.40	2.36	3.95	51.36
1975	3.24	3.16	4.71	2.77	6.77	2.05	7.38	1.59	8.48	2.63	2.07	5.10	49.95
1976	4.60	1.58	2.66	0.19	5.07	5.18	3.10	1.34	4.72	2.58	3.74	4.69	39.45
1977	3.62	1.54	5.58	1.95	3.37	5.28	2.06	8.31	3.43	3.99	4.17	4.77	48.07
1978	5.77	1.07	5.30	8.09	1.91	2.58	5.58	5.07	0.19	1.33	5.85	2.23	44.97
1979	4.09	3.89	5.00	2.35	7.21	3.78	6.43	2.70	10.70	1.05	3.42	1.36	51.98
1980	4.16	1.98	8.01	1.89	3.38	4.09	5.79	0.89	4.94	5.18	2.35	3.23	45.89
1981	1.49	2.07	1.62	0.60	4.25	6.25	3.52	16.71	1.04	1.42	0.90	4.94	44.81
1982	5.67	5.04	1.65	3.59	3.77	4.59	5.81	3.35	3.34	1.98	2.08	4.34	45.21
1983	3.68	6.79	9.09	5.22	1.37	6.43	2.70	2.02	3.44	2.33	3.95	6.03	53.05
1984	2.64	4.93	8.19	3.23	3.48	2.88	8.91	4.66	11.51	0.85	1.08	1.19	53.55
1985	3.74	5.02	1.67	1.43	2.34	2.17	8.79	5.95	1.62	4.02	3.08	0.95	40.78
1986	1.59	2.20	2.19	0.46	4.77	5.37	5.28	6.38	0.67	3.17	2.71	3.97	38.76
1987	7.12	3.98	4.53	4.92	2.59	3.00	3.14	4.37	2.61	0.80	1.68	3.78	42.52
1988	4.00	1.54	2.09	2.11	5.76	5.17	7.80	4.06	4.58	1.57	2.20	0.80	41.68
1989	2.47	3.45	5.92	4.40	4.03	7.74	7.25	3.73	6.86	3.23	3.62	4.40	57.10
1990	2.75	2.01	3.52	2.98	4.77	2.00	3.30	6.33	0.08	8.74	2.14	2.40	41.02
1991	4.40	1.48	4.85	1.97	1.60	2.50	17.47	10.15	4.58	1.32	2.00	2.20	54.52
1992	3.34	1.37	3.91	2.97	2.79	4.99	2.64	14.84	1.93	4.28	5.47	3.13	51.66
1993	6.63	2.05	4.25	4.93	2.04	2.38	9.81	4.60	6.27	4.05	1.48	2.78	51.27
1994	4.12	2.14	5.55	1.26	1.73	7.09	4.45	3.69	3.55	3.44	2.97	2.16	42.15
1995	4.68	5.15	3.75	0.50	3.02	12.87	3.65	1.38	4.34	5.07	3.24	1.91	49.56
1996	3.83	2.58	4.64	2.65	4.07	5.19	8.64	3.17	12.62	5.30	3.84	3.20	59.73
1997	3.87	2.79	3.46	3.28	1.48	1.58	9.82	3.19	6.61	3.42	6.49	4.74	50.73
1998	7.41	7.02	6.66	4.89	5.74	1.84	2.42	7.25	3.23	0.83	1.42	4.46	53.17
1999	7.96	1.54	2.37	4.00	2.71	4.50	4.21	4.24	21.63	6.84	2.52	1.14	63.66
2000	5.46	1.58	4.12	4.29		6.36	5.52	4.77	5.15	0.16	3.00	1.73	42.14

Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
2001	0.67	3.20	4.93	0.60	3.06	6.18	4.89	6.34	2.53	1.29	2.95	0.78	37.42
2002	4.97	2.03	6.12	2.40	2.19	6.00	5.98	8.09	2.46	2.85	4.09	3.20	50.38
2003	1.83	4.75	4.53	4.94	7.06	5.66	11.11	4.34	2.51	3.95	2.00	4.62	57.30
2004	1.17	4.56	0.56	5.47	7.39	4.63	2.51	9.39	3.27	1.40	4.03	1.70	46.08
2005	2.09	2.27	2.75	2.89	4.00	5.37	6.56	4.46	3.46	5.92	3.23	4.37	47.37
2006	3.34	1.63	1.04	3.98	4.45	5.64	4.05	4.18	9.07	3.66	8.04	3.68	52.76
2007	M2.05				1.85			0.99	3.16	M5.86	0.31	6.27	20.49
2008	1.68	5.42	4.10		3.78	1.45	6.63	10.61	9.99	1.41	6.59	1.78	53.44
2009	1.70	1.28	5.44	1.50	3.99	2.87	5.65	8.00	2.26	1.45	5.41	6.10	45.65
2010	4.33	4.22	4.81	0.56	6.70	5.68	2.90	5.62	9.60	1.69	0.88	M1.88	48.87
2011	M1.03	2.81	3.40	3.25	2.50	3.42	M2.53	9.81	5.29	M1.98	2.97	0.66	39.65
2012	2.43	2.30	3.76	1.63	7.91	2.06	6.66	4.26	1.44	1.95	0.64	4.34	39.38
2013	2.21	4.04	1.42	3.65	1.61	10.02	5.45	6.49	M0.98	M0.99	M2.87	M2.87	42.60
2014	1.95	2.53	3.63	M1.49	3.47	M6.14	4.46	5.40	5.02	2.09	3.33	M3.91	43.42
2015	4.44	3.94	4.47	4.79	4.09	5.87	M2.16	3.67	6.05	6.78	6.74	6.49	59.49
2016	2.75	8.27	1.36	2.79	4.87	3.62	5.15	4.09	10.89	10.45	0.78	4.03	59.05
2017	2.97	1.26	2.59	6.44	4.01	6.04	5.43	4.59	5.34	1.91	M1.08	3.92	45.58
2018	3.81	1.82	3.23	4.39	4.34	2.60	7.18	4.85	25.68	1.64	3.98	6.79	70.31
2019	2.60	M0.00											2.60

Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.
Data missing for all days in a month or year is blank.

Creation date: 2019-02-09

Skaggs Method Determination

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Skaggs Method - Lateral Effects Analysis
Barefoot Mitigation Site - Sampson County NC

Provide for:
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This purpose of this report is to provide documentation regarding the expected lateral drainage effects of ditches affecting the Barefoot Wetland Mitigation project in Sampson County, NC. The site location is approximately 2.1 miles west of Newton Grove and west of Warren Mill Road (SR 1647) within an existing cultivated field.

1 WETLAND HYDROLOGIC ANALYSIS - LATERAL EFFECT OF DITCHES

1.1 Purpose and Background of Analysis

The Barefoot Mitigation site is a wetland restoration on the edge of a mineral flat. The site is in agricultural row crop currently and surrounded by loosely managed forest land and agricultural row crops. Due to poor drainage of nearly level topography, soil wetness has been addressed by installation of a ditch network and drain tile. The restoration project desires to restore wetland hydrology to the site. Site modifications proposed include removal of the drain tile and plugging and filling ditches within the project area.

Outside of the project area, existing drainage ditches are required to remain open to allow continued agricultural activities in the adjacent fields. These ditches are expected to have a lateral drainage effect that may extends a distance onto the project site. This analysis attempts to provide guidance on the distance this lateral effect will impact the proposed project.

1.2 Methodology

The Skaggs Method for determining the lateral effect of drainage ditches was used because it is relatively straightforward and is simple to use. This method is specifically designed for single ditch effects common in agricultural and forestry activities. This method was originally modified from the more complex DRAINMOD modeling that is used to determine the effect on local groundwater between two ditches. It estimates a spacing where ground water will be expected to be at 30 cm (11.8 inches) or more below ground elevation for the minimal time required for accepted wetland hydrology (5 percent of the growing season). Both models use soil conductivity data of common soil series from the NRCS Soil Survey. With the model, the depth of a proposed ditch can be varied to determine the potential distance it will effectively lower groundwater below 30 cm (~12 inches) within 14 days.

Limitations of this Approach
This model uses a number of variables that vary by site, but some have limitations for site specific values. These limitations include:

- Lack of site-specific soil conductivity data and depends on average data for a series.
- Restricts hydroperiod evaluated (5 percent of the growing season or 14 days (14 days equals 5.7 percent of growing season at the Barefoot Site).
- Surface storage variable is limited to a 1-inch or 2-inch depth
- The lateral effect is expected to extend beyond this calculated distance, although the effect lessens with distance..

- For wetland restoration it will provide a minimal jurisdiction hydrology along the boundary identified by his model.

Strengths of this model:

- Ease of use and ability to evaluate numerous scenarios related to ditch depth.
- Soils in this region have a relatively narrow range of conductivity based upon the developer's model validation efforts, make this an appropriate estimate of the site's conductivity values.
- Beyond the calculated lateral effect distance soils are expected to have wetland hydrology with an increasing hydroperiod with distance)

Based upon simulations for this site, the Skaggs Method for Determining Lateral Effects is relatively robust with the more sensitive variables being ditch depth and site storage.

1.3 Current Conditions

Historically the hydrology at the Barefoot site was seasonal with localized temporary ponding. The seasonal high water table elevation was largely controlled by an extended residence time due to the low relief of the site with limited drainage. The source was watershed runoff and local precipitation. The duration and frequency of ponding would have been inconsistent from year to year because of the dependency upon precipitation and runoff.

The project site is completely surrounded by agricultural ditches. These ditches flow to the east and west from the site. The total project area is approximately 30 acres that is effectively drained by the surrounding ditch network that effectively removes the natural surface connection the natural contributing watershed and allows more rapid drainage of surface water. Consisting of two land use areas, the project area to the east is a cultivated field and to the west is recently harvest timberland. The cultivated field also contains a series of drain tiles to further lower the local groundwater.

1.4 Parameter Description Justification

Outside of the proposed restoration site, agricultural ditches will need to remain open to allow cultivation of the adjacent fields. Ditches contribute to lowering local groundwater elevation that extends a finite distance from each ditch. The effective drainage distance from each ditch is dependent upon depth of the ditch, soil texture, surface roughness, soil porosity, and the presence of restrictive soil horizons.

Inherent factors affecting drainage such as soil texture, the major inherent factor affecting internal drainage, cannot be changed. Soil texture and soil structure are related to soil porosity. Greater porosity allows water to move more quickly through a soil, but also allows a soil to retain a higher volume when fully saturated. Compaction can result from equipment traffic, especially on wet soils, and tillage pans. Compacted soil layers have less pore space and restrict water movement through the soil profile. Within this region, soils formed from similar parent materials with topography being one of the greatest differences between many series.

To estimate the potential effect distance of these remaining ditches on proposed hydrology, the Skaggs Method for determining the lateral effect of drainage ditches was used. This method estimates the drainage effect of ditches using accepted physical relationships within soil groups and types of soils. The parameters that affect lateral drainage are hydraulic conductivity and surface storage. Within the Rains series the hydraulic conductivity has been found to be relatively consistent and falls within a narrow range. Based

upon the site soil profiles collected at the Barefoot Site, the average values given by NRCS should be adequate to estimate the lateral drainage effects and approximate this distance within reason to be useful.

1.5 NRCS Soil Parameters

Important variables that affect this method include soil porosity, ditch depth, and the surface roughness or surface storage within the wetland area. The porosity of a soil is strongly correlated with texture in the Rains series and typically falls within a narrow range. Without site conductivity data, the suggested porosity value for a Rains soil of 0.04 was used. The depth of the ditches is a variable that may be changed by plugging, and filling or partially filling of existing ditches. The site roughness can be modified during construction to at least the maximum value allowed in the model analysis. Site modifications during construction may be greater than this maximum value due to inherent topography and the target community type proposed. All hydraulic conductivities in this model for soils at the Barefoot site are average values provided by the NRCS Soil Survey data for a Rains soil.

1.6 The Parameters used for Skaggs Method

The method originates from another modeling program, DRAINMOD, that was developed to determine the effective spacing of ditches (or drain tile) necessary to allow drainage for farming. This Skaggs Method was developed using the same techniques to assess the lateral drainage effect of a borrow pit on nearby wetlands. This was further extended to the lateral effect of a single ditch on wetland hydrology. Unfortunately, the criteria selected is close to the lower limits for an acceptable hydroperiod in a forested wetland. The current method allows for the selection of 14 consecutive days as the target for the water table to remain within 30 cm (11.6 inches) of the surface. For the Barefoot site this is 5.7 percent of the growing season (243 day growing season in Sampson County). This is less than the target desired for soils at this site and recommendations for effective distance will be greater than identified by this method, although if the prediction is correct, this fringe between the target hydroperiod and the identified lateral effect should still qualify as jurisdictional wetland. Drainable porosity is a calculated ratio expressed as a percent of the soil in the upper 30 cm of soil. This is the amount of water within this 30 cm that can be drained to lower the water table from the surface to 30 cm depth.

The T25 is defined by the time required for the water table to be drawn down by drainage to a depth of 25 cm (10 in.) (Phillips 2010). This value was determined to be relatively constant among different soil series for a given location, drain depth, and surface depression storage.

The distance from the ditch to the point where the water table will be lowered from the surface to a depth of 25 cm in time T25 (Skaggs et al., 2005). The wetland hydrologic criterion will be barely satisfied at that location, and the distance is defined as the lateral impact of the ditch on wetland hydrology (Phillips 2010). A potential distance effected by Lateral Drainage of a ditch was assessed using a surface storage value of 1-inch depth or 2-inch depth. The model only allows these two values although this site is expected to have at least a 2-inch surface storage after construction. The other variable assessed is ditch depths. The eastern most ditch is currently six feet or greater and is expected to be plugged and filled to a maximum depth of 3-feet at the outlet from the site. Ditches that are to remain open range from 2-feet to 5 feet in depth and will not be altered.

2 RESULTS FOR LATERAL DRAINAGE EFFECT

To estimate the drainage effect of ditching in this soil type, ditch depth and surface storage are the two parameters varied.

2.1 Surface Storage

When using either 1-inch or 2-inches of depressional storage the lateral effect ranges from 73.1 to 53.8 for a ditch depth of two feet. For a ditch depth of 5 feet the lateral effect ranges from 104.9 to 82.5 feet. (Table 1)

2.2 Ditch Depth

Ditch depths evaluated are 2, 3, and 4 feet. The current ditches range from approximately 7 feet deep to less than 3 feet. The proposed drainage modifications will plug and fill the deeper ditches to approximately 3 feet near the proposed restoration area.

2.3 Assessment Using Site Profile

In an attempt to relate this method to specific site conditions, a representative soil profile of 60 inches was used to profile horizon texture and thickness data while using the standard NRCS soil conductivity. This was performed o determine if variable horizon thickness would significantly affect the lateral drainage values. This run determined slightly smaller lateral effects and support NRCS data as a reasonable representation of the site soils.
T

Table 1. Results of Lateral Drainage Effect: Variable Ditch Depth and Surface Storage

Run	**101E**	**101D**	**101C**	**101H**	**101F**	**101A**	**101B**	**101G**
	Surface Storage 1-inch				Surface Storage 2-inch			
Ditch Depth (ft)	2	3	4	5	2	3	4	5
T25 = Default (days)	8.9	9.1	8.9	9.5	4.8	4.9	5.5	5.5
Results								
Soil Conductivity from NRCS Soil Survey Rains Soil (using average value by horizon)								
Lateral effect (ft) (NRCS data)	**73.1**	**94.9**	**104.9**	**114.8**	**53.8**	**69.7**	**82.5**	**87.4**
Soil Conductivity from Site Soil Profile (using average value by horizon)								
Lateral effect (ft) (Site data)	**72.4**	**91.9**	**98.9**	**104.6**	**53.3**	**67.5**	**77.8**	**79.6**

Range for 1-inch surface storage 114.8 to 73.1 feet (Difference = 41.7)
Range for 2-inch surface storage 87.4 to 53.8 feet (Difference = 33.6)
Range for 5-foot depth 114.9 to 87.4 feet (Difference = 27.45)

3 DISCUSSION OF LATERAL DRAINAGE EFFECT

Based upon the selected parameters for soil at the Barefoot Site, it is estimated for one inch of surface storage within the wetland that a lateral drainage effect of a 5-foot deep drainage ditch will extend to at least 115 feet from the ditch using minimal surface storage. Increasing surface storage to two inches changes the expected effect to 88 feet from the ditch. Both adding greater surface storage or having a shallower ditch will decrease this distance further. This estimated distance assumes that minimal hydrology meeting wetland criteria is present at this distance, with hydroperiods increasing with distance.

4 CONCLUSIONS

Method was developed for relatively smooth surfaces. The proposed site will have greater surface storage after surface roughening. Shallow berms will further increase surface storage and limit site losses. Equipment traffic likely has produced soil compaction and will reduce lateral flow toward the ditches. Surface storage provide the greatest variable affecting the lateral drainage effect. A conservative estimate of significant lateral effect at the barefoot site is 115 feet from a ditch five feet deep.

5 REFERENCES

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Wetland Water Balance

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Water Balance - Wetland Data Analysis
Barefoot Mitigation Site - Sampson County NC

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This scope of this report is to provide documentation regarding a water balance analysis of the subject property and project site. This report describes the methods and assumptions used in the analysis. The site location is approximately 2.1 miles west of Newton Grove and west of Warren Mill Road (SR 1647) within an existing cultivated field (Figure 1).

1 WETLAND HYDROLOGIC ANALYSIS

A Water Balance analysis was developed for the proposed Barefoot Mitigation site to evaluate potential hydrologic success for the project and provide guidance for setting hydrologic success criteria. This analysis examines potential inputs, storage, and removal of water at the site. Utilizing the NC Wetland Assessment Method, this site is most likely a degraded Hardwood Flat wetland type (WFAT 2016). The processes by which water is introduced, temporarily stored, and removed from a wetland are commonly known as the water budget or water balance. This type of analysis provides a tool that evaluates the potential hydroperiod of a site by evaluating the watershed, local soil types, patterns of water movement, and expected drainage from the site once the project modifications have been constructed. Technical guidance and procedures for identifying and delineating wetlands follows the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0) (2010 U.S. Army Corps of Engineers). This technique uses a multi-parameter approach, which requires positive evidence of three (3) criteria:

- Hydrophytic vegetation
- Hydric soils
- Wetland hydrology

Areas exhibiting the above three wetland characteristics, as well as surface waters, are considered jurisdictional waters of the U.S.

This evaluation examines the hydrology or hydroperiod that may be supported at project site. Wetland hydrology is defined by the length of time a soil is inundated or saturated within 12 inches of the surface. In general, water that drives hydrology can be introduced to a wetland through direct precipitation, overland flow (or runoff), channel and overbank flow, groundwater discharge, and tidal flow. Temporary storage includes channel, overbank, basin, and groundwater storage. Water is removed from the wetland through evaporation, plant transpiration, channels and ditches, overland and tidal flow, and groundwater recharge. Depressional wetlands differ and can have residence times ranging from weeks to seasons with a water balance that depend for the most part on direct precipitation, evaporation, transpiration, and groundwater interaction (WRP Technical Note HY-EV-2.1, 1993). This analysis is tailored to reflect the site and watershed conditions present and expected at the Barefoot Mitigation Site.

1.1 Background

The Barefoot site represents the hardwood mineral flat wetland type and the natural classification would be as a Hardwood Flat by NC Wetland Assessment Method (WAM). Hardwood Flat correspond to NC Natural Heritage Program types Nonriverine Wet Hardwood Forests Oak Flat subtype (Schafale and Weakley 1990, Schafale 2012). The hydrology of wet flats can be highly seasonal where the hydrology of mineral flat

wetland system is derived from direct precipitation, runoff from the watershed, and groundwater rather than overbank flooding typical of alluvial systems (2010 U.S. Army Corps of Engineers). The seasonal high water table elevation is largely controlled by extended residence time due to the low relief of the site and expected resulting slow drainage.

After the proposed site modifications, hydrology at the Barefoot site is expected to be seasonally saturated with some temporary ponding typical of mineral flats. Surface water may be present locally for extended periods during the growing season and saturation throughout the proposed site is expected to be usually greater than 25 consecutive days. The duration and frequency of potential ponding are expected to be variable from year to year because of dependency upon precipitation and runoff. In the absence of surface water, the local water table should often be near the ground elevation. To determine the general input from the watershed in terms of providing the significant hydrology needed to sustain saturated conditions, a general water balance analysis was performed.

1.2 Current Conditions

The proposed wetland restoration area is located on a broad interstream divide in the Neuse River basin (Figure 2). Because of the low relief and large extent of the area, drainage occurs at the fringes of this nearly level extent where it flows into multiple small watersheds. The total project area is approximately 30 acres and is surrounded by a system of ditches that effectively removes the natural surface connection the natural contributing watershed. This site is between two of these natural headwater drainage points.

The project site contains two land use types, a cultivated field to the east, and a clear-cut to the west (Figure 4). Currently, surface and subsurface drainage occurs from agricultural ditches extend into the proposed restoration area and drain to natural drainage points. The local watershed of this project is limited by the surrounding ditches. The cultivated field also contains a series of drain tiles to further lower the local groundwater (Figure 5).

1.3 Proposed Modifications

To reconnect the watershed runoff contribution to the project, the proposed drainage modifications include plugging and filling of the surrounding drainage ditches to reconnect the site to the watershed and to plug/remove the drain tile system in the cultivated field (Figure 10). Proposed modifications include plugging and filling the southern ditch to reconnect the site to its watershed. The interior ditches will be plugged and filled to join the site into a single, connected water table. The eastern and western ditches are outside of the easement and will remain open. All drain tiles within the cultivated field will be disabled and plugged. The eastern half of the northern ditch is to be relocated approximately 95 feet northward. The ditch will be constructed wider with sloping banks for stability and ease of maintenance. This ditch will be separated from the restoration site by a raised farm access path that will function as a low berm to prevent flooding of the adjacent farm field and retain surface water on the project site.

This water balance analysis assumes these modifications will be effectively constructed, reconnecting and redirecting watershed runoff onto the proposed project site.

1.4 Proposed Watershed

The proposed modifications will reconnect the site to a large portion of the natural watershed. The watershed is estimated at approximately between these two natural drainage features to the south and north (Figure 4). The estimated watershed area contains only the portions that are expected to drain to the site. The watershed will consist of cultivated farmland of annual row crops in the upper elevations with the

majority of loosely managed, poorly drained, forest and pine plantations that lie adjacent to the project. Large areas of the forested watershed have been harvested. Ditches and other drainage modifications in this watershed do not appear present (Figure 3). A Concentrated Agricultural Feeding Operation (CAFO) is present to the west but was not included in the contributing watershed due to a visible drainage feature that flows west away from the project. Runoff from the local watershed is expected to provide adequate hydrologic input and an opportunity for nutrient and pollutant removal in these wetlands.

2 WETLAND WATER BALANCE

To determine if a suitable hydrology for the proposed wetland restoration/enhancement of Nonriverine Wet Hardwood Forests can be achieved, existing hydrologic conditions were evaluated through a water balance analysis. This water balance is a model for estimating monthly water depths and potential drawdown for the proposed wetland site. A watershed approach was applied and methods outlined in *Planning hydrology for constructed wetlands* (Pierce, 1993) were followed. The model is based on 30 years of recorded local weather conditions. The water balance presented in this report was determined from the following equation:

$$S = P + R + G - ET - I.$$

Where S is storage, P is precipitation, R is runoff, G is groundwater, ET is evapotranspiration, and I is infiltration. Long-term rainfall was obtained from the North Carolina Climate Office, and potential watershed runoff was estimated using methodology detailed in Urban Hydrology for Small Watershed-Technical Release 55 (USDA-NRCS 1986). Using local rainfall data, a table of average monthly values was generated using the water balance equation to summarize and graph monthly storage at this site. Appropriate hydroperiods were compared to the WETS table available from the NRCS for this area. A contributing watershed was delineated using available topographic mapping, historic aerial photography, and limited site observation. Based on the expected watershed discussed in Section 1.4, the individual components of the water balance are discussed below.

2.1 Precipitation

Daily precipitation data and temperature data from the Horticultural Crops Research Station (ID CLIN) weather station has been compiled for a 30-year period of record from January 1, 1987 through *October 10, 2018* (The North Carolina State Climatologist https://climate.ncsu.edu). The Clinton Station was used because it is the closest station to the site. The Clinton Station is part of the North Carolina Environment and Climate Observing Network (ECONet) maintained by the State Climate Office. Its first observation on April 17, 1984.

A portion of the daily records are unavailable. The recorded local weather data at the Clinton weather station is missing nearly 22% of data with missing data, mostly occurring between November 1988 through 1990 and January 1991 through November 1996. Although 7 years of data are missing from the record (78.6% data available), this is the closest weather station with long term data record and in consultation with the Climate Center, it was deemed appropriate to use for this analysis. Months having greater than 20% missing values was excluded from the average calculations. Average monthly precipitation values were then calculated from these data and applied to the water balance calculations.

Precipitation is used to calculate runoff from the local watershed after the proposed drainage modifications. The contributing watershed encompasses a nearly level to gently sloping upland flat. Due to subtle elevation differences and often imperceptible slopes, the watershed was conservatively delineated A detailed evaluation of topography in landscape would result in a more accurate contributing watershed, but time and expense would be prohibitive. The surrounding landscape is naturally subject to a high water table that may

be influenced well beyond the watershed shown. Soils having a high water table limits infiltration and increases precipitation driven runoff to the site.

2.2 Runoff Calculations

Runoff onto the wetland creation/enhancement site was determined by using the TR-55 Curve Number Method. Rainfall is defined as each 24-hour rainfall total (P_{24}) as recorded by the local weather station data as daily precipitation. The drainage area for the local watershed or the proposed wetland was delineated using Google Earth historic aerials and 7.5 Minute USGS topographic quadrangle for Peacocks Crossroads, North Carolina. The watershed after construction modification was estimated to be approximately 123 acres. The proposed restoration area within the cultivated field is approximately 18 acres with an additional 10 acres in within the clear-cut area. The area expected that may have hydrology restored is 30 acres total.

Determination of days producing runoff is based upon the minimum rainfall amount needed to produce runoff (Q). The value of Q for the drainage area was calculated from daily precipitation values over the period of record. The equation for calculating runoff is as follows:

$$Q = \frac{(P_{24} - 0.2S)^2}{(P_{24} + 0.8S)}$$

$$S = \left(\frac{1000}{CN}\right) - 10$$

$$Q = \frac{\left[P_{24} - 0.2\left(\left(\frac{1000}{CN}\right) - 10\right)\right]^2}{\left[P_{24} + 0.8\left(\left(\frac{1000}{CN}\right) - 10\right)\right]}$$

P_{24} A daily rainfall record was determined using precipitation data.

Q Runoff (per acres) determined using precipitation data and watershed characteristics specific to the site.

S The potential maximum retention after runoff begins (all losses before runoff begins). This is related to soil and soil cover conditions of the watershed through the Curve Number (see below).

CN The NRCS Runoff Curve Number related to specific soil and cover conditions of the watershed has a range of 0 to 100. The major factors that determine CN are the hydrologic soil group (HSG), cover type, treatment, hydrologic condition, and antecedent runoff condition or land uses.

Where P_{24} is the rainfall occurring in each daily 24-hour period (over the period of record), CN is the composite curve number, and S is the storage capacity of the soil. A composite curve was calculated by subdividing the watershed with respect to soil hydrologic group and land use then determining the appropriate curve number for each subdivision using tables published by the USDA (1986). The area and curve number were multiplied, summed and divided by the total watershed area to calculate the composite curve number as described below.

$$CN = \frac{\sum(CN * SubdividedArea)}{(WatershedArea)}$$

By this method, a composite curve number for proposed wetland restoration/enhancement site was 73.7 for the estimated 122.9 acres of contributing watershed area. The site designated for hydrologic restoration is calculated using 30 acres for the area proposed for restoration and includes the cultivated field and the adjacent cut-over. Trends were evaluated using 20, 30, and 40 acres of area potentially having restored hydrology. Vegetative cover for estimating the runoff curve number was by hydrologic soil group for cultivated row crops or under wooded with a hydrologic condition of fair or good.

When precipitation occurred, a daily runoff (R) was calculated and days that that returned positive values (i.e. runoff occurred) were then summed to return the monthly *runoff* (*R*) produced by each acre in the watershed.Once runoff values were calculated for the drainage area, it was necessary to adjust these values to reflect the amount of water seen on the site as follows:

$$R = (Watershed\ Runoff) * (Watershed\ Area) / (Site\ Area)$$

These runoff values are then summed each month for the entire period and averaged for the watershed.

2.3 Evapotranspiration

Evapotranspiration (ET) was estimated using simplified version of the Penman-Monteith equation as described in by Allen et.al (1998). This method uses an estimate of solar radiation by latitude. The long-term record of daily temperature and precipitation data has been used to calculate ET by using the Penman-Monteith equation for calculating reference and crop evapotranspiration from meteorological data and crop coefficients (Allen et al. 1998). Values for R_a for different latitudes are given in a table provided by the authors, where values "deviate from values that are averaged over each day of the month by less than one percent for all latitudes during non-frozen periods ...".

Penman-Monteith equation $ET_o = 0.0023(Tmean +17.8) (Tmax -Tmin)^{0.5} R_a$

Where;

ET_o	reference crop evapotranspiration [mm day-1]
Tmean	daily mean air temperature [°C]
Tmax	daily maximum air temperature [°C]
Tmin	daily minimum air temperature [°C]
R_a	extraterrestrial radiation [MJ m-2 day-1]

The project site is located at 35.253571° latitude and -78.393841° longitude. Values used in the calculation for R_a are the average of the 34 and 36 latitude values shown in the table. Errors may occur in this step due to simplification and absence of wind and humidity data.

During short-term droughts when the water table drops below the rooting zone and available soil water becomes unavailable, vegetation naturally reduces ET to near zero until adequate moisture is returned. Plant stress under this drought situation is normal and native vegetation is adapted and can usually survive these short-term climatic events. The overall ET for a site does not appear limited by available water-moisture.

2.4 Groundwater

Based upon observation in the wetland directly to the south and west of the site, groundwater discharge may contribute locally due to the nearly level topography and the presence of a high groundwater table throughout much of the year. If present, the amount of groundwater input would be difficult to estimate and groundwater is not expected to provide a significant input or discharge for this wetland system. For this analysis it was assumed that any groundwater is relatively static and any discharge elevation is just below the wetland and does not provide direct hydrologic input. No value for groundwater was used in this analysis.

A number of ditches outside of the project are not proposed for removal, but may be modified to limit groundwater loss due to the lateral drainage effect. It was determined that lateral soil drainage could be minimized with a berm constructed of appropriate soil. The lateral effect of these ditches is evaluated using the Skaggs Method and determined that a minimum of 115 feet from a 5-foot deep ditch is an appropriate distance for a lateral effect (Appendix B).

2.5 Infiltration

A high groundwater table will limit infiltration and increase runoff, both onto the site from the contributing watershed and increase runoff from the site. Lower infiltration will result in potential ponding and increase the potential for inundation at the project site.

Soil across the site and the majority of the watershed are classified as Hydrologic Soil Group D soil (in an undrained condition). For an infiltration estimate, the wetter, undrained condition was assumed for the restoration site. This hydrologic group rating is due to the water table being normally within 24 inches of the soil surface and limits infiltration and increases the potential for runoff.

The proposed wetland rehabilitation area is mapped as Rains sandy loam (hydrologic soil group A/D) (Figure 7). The contributing watershed consists of Rains and Foreston (hydrologic soil group B) soil with smaller areas of Woodington (hydrologic soil group A/D) and Norfolk (hydrologic soil group A). The Rains soil is poor drained, the Foreston soil is moderately well drained, the Woodington soil is poorly drained, and the Norfolk soil is well drained. Soils typically have moderate or moderately rapid permeability and moderate to high saturated hydraulic conductivity due to the sandier textures. Soil borings at the site indicate the site soil are most like a Rains with inclusions having a deep dark surface that most resembles a disturbed Pantego loam. The Pantego inclusions were likely present prior to the site's conversion to agricultural use.

The time and amount of infiltration are also restricted by the capacity of unsaturated soil above the water table. This capacity is related to soil porosity that can be filled by infiltrating water. For a typical Rains soil having an estimated available water storage of 7.8 inches throughout the 81-inch standard profile depth (Web Soil Survey), it was calculated to have approximately 16 percent of pore space for available storage of free water within the average profile. When the water table is within 12 inches of the surface, this would limit infiltration amounts to 16 percent (compared to surface water storage) or 1.25 inches and 2.5 inches when the water table is at 24 inches (typical of hydrologic Group D soils). This soil water estimate is also used as a correction of Net Values when storage becomes negative (Section 2.6). When the soil is saturated throughout the profile, no additional infiltration can occur.

At this site the nearly level landscape creates slow to negligible runoff and a normally high water table limits infiltration. Estimated infiltration at this site was determined to be low or zero during times of a high water table. Infiltration values were set at zero for November through March when the water table is typically at or above the ground surface. During the growing season a high groundwater will also limit

infiltration, potentially resulting in values being low or near zero during periods of higher precipitation. During transition months at the beginning and end of the growing season, the infiltration rate was set at half the growing season rate. The months of September and October show evapotranspiration rates dropping and the long-term precipitation indicates higher rainfall, so these months were also set at a lower infiltration rate because of the expected higher groundwater.

2.6 Net Values

The net values for each main part of the water balance equation (precipitation, runoff, evapotranspiration, infiltration) are compiled into an average monthly value with the summed values providing the average total storage within the wetland for each month (Net Values Tables). Net values were determined for ability to provide adequate runoff for 20-, 30-, and 40-acre restoration areas. Where monthly net values are negative, an estimated 16 percent available porosity of the soil was used to approximate water volume in soil pore space. This estimate reflect that the water table drops more rapidly from ET once storage drops to the ground surface (zero storage). This makes the data more closely resemble hydrologic conditions of saturation and ground water elevations.

2.7 Hydrograph

The calculated data was plotted on a hydrograph illustrating the monthly average of water in and out of the proposed wetland construction area. Graphs representing a restoration area of 20, 30, and 40 acres are shown. Monthly values are plotted on the 15th of each month and are represented in acre-inches of water. The hydrographs provide a visual representation of the results.

Using the climate data for this site, at the beginning of the growing season it is expected to exhibit a high water table that drops into the summer as ET increases. Results of this analysis indicate during the growing season there is a period of drawdown during the months of April through June that begins to increase beginning in July due to a normal increase in rainfall. The graph shows the water table drops below 12 inches below the ground surface in May and June, but rarely drops below -24 inches. By late summer, the data indicate significant rainfall normally occurs that equals or exceeds ET into the fall and winter. Rainfall is typically high July through September. Average monthly totals indicate that this system is typical of most terrestrial systems and ET may limit by available moisture during the mid-summer months. This pattern is expected to occur on average in most years based on the climate data.

3 CONCLUSIONS

The modeling presented by this analysis indicates that there will most likely be sufficient hydrology at appropriate times of the year to meet hydrologic success criteria and will support wetland vegetation. This water balance analysis was conducted to evaluate if the proposed wetland design is appropriate for this site and the potential for restoring adequate wetland hydrology. The proposed easement is approximately 35 acres. A number of scenarios were evaluated using a variable acreage for the target restoration area (20 acres 30 acres, and 40 acres).

The climate data provided by the NC Climate Office appears to be of adequate quality. Although there are missing values, the data was deemed sufficient for this model. The proximity of the climate data provides reasonable confidence in its applicability to this site. The contributing watershed used in this analysis was delineated conservatively due to the level of detail in topographic data and to potential unseen existing modifications due to land use. The actual boundary may be larger. Potential errors of this analysis may be the result of assumptions within the water balance calculations, presence of groundwater discharge, and atypical soil characteristics.

The successful construction of proposed site modifications may alter parts of the analysis, including runoff, drainage, and storage at the site, with resulting differences in hydroperiods. It is expected that high groundwater elevation during portions of the growing season will provide additional input not accounted for in these water balance calculations. However, without more detailed and specific site data, this analysis should be used as predictive tool of trends and potential at this site. Field observations indicate that existing conditions of the proposed wetland restoration area includes hydric soils and a depressional landscape suitable for storing runoff.

3.1 Wetland Success Criteria

The NRCS's current WETs table for Sampson County is available for the same weather station as the precipitation data and presents the growing season runs from March 12 to November 22. Based on a daily minimum temperature greater than 28 degrees Fahrenheit occurring in five of ten years, the growing season for Sampson County is 255 days long. Successful establishment of wetland hydrology should be demonstrated by a minimum wetland hydroperiod of nine percent and at least twelve percent in the lowest landscape area (23 to 31 days) in growing seasons with normal rainfall.

These results of this analysis suggest that runoff and direct precipitation will, in average years, provide adequate hydrology for achieving suitable wetland hydrology. Successful hydrology is defined as the water table occurring within 12 inches of the ground surface for at least 4 weeks (11 percent). From this analysis, hydrology appears likely to occur during first four weeks of the growing season and the last 8 weeks (22 percent) of the growing season for each of the three scenarios evaluated (20, 30 and 40 acres of restoration).

Monitoring of wetland hydrology to hydric conditions in the wetland restoration areas will be necessary to document success. Variations in hydrology after construction may indicate adaptive measures will need to be implemented if hydrologic success in not adequate.

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WATER BALANCE - NET VALUES
BAREFOOT SITE - WETLAND RESTORATION

Monthy Averages	WATER BALANCE NET VALUES All values are in acre inches												
	January	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Total**
Precipitation (P)[1]	2.92	2.92	2.95	3.15	3.21	3.92	4.69	4.56	5.25	3.29	3.07	3.08	43.01
Watershed Runoff (R)	1.06	1.25	1.14	1.47	1.47	1.97	2.61	2.48	3.05	1.38	1.69	1.31	20.88
Evapotranspiration (ET)	-1.62	-2.07	-3.46	-4.68	-5.95	-6.15	-6.34	-5.64	-4.37	-3.30	-2.13	-1.60	-47.31
Infiltration (I)[2]	0.0	0.0	0.0	-1.3	-1.3	-2.5	-2.5	-2.5	-1.3	-1.3	0.0	0.0	-12.70
Total (S)	**2.37**	**2.09**	**0.63**	**-1.35**	**-2.57**	**-2.76**	**-1.54**	**-1.10**	**2.62**	**0.07**	**2.62**	**2.79**	**3.87**
Adjusted Total (aS)[3]	**2.37**	**2.09**	**0.63**	**-8.47**	**-16.07**	**-17.23**	**-9.65**	**-6.85**	**2.62**	**0.44**	**2.62**	**2.79**	**24.21**
			<----------Growing Season March 13 through November 22----------->										

[1]Precipitation data from Horticultural Crops Research Station (CLIN - ECONET)
[2]based on estimated maximum storage capicity of soil during growing season
[3]negative storage values adjusted to reflect an estimated 16 percent porosity in soil

Water Balance Equation

Precipitation + Runoff + Groundwater - Evapotranspiration - Infiltration = Storage

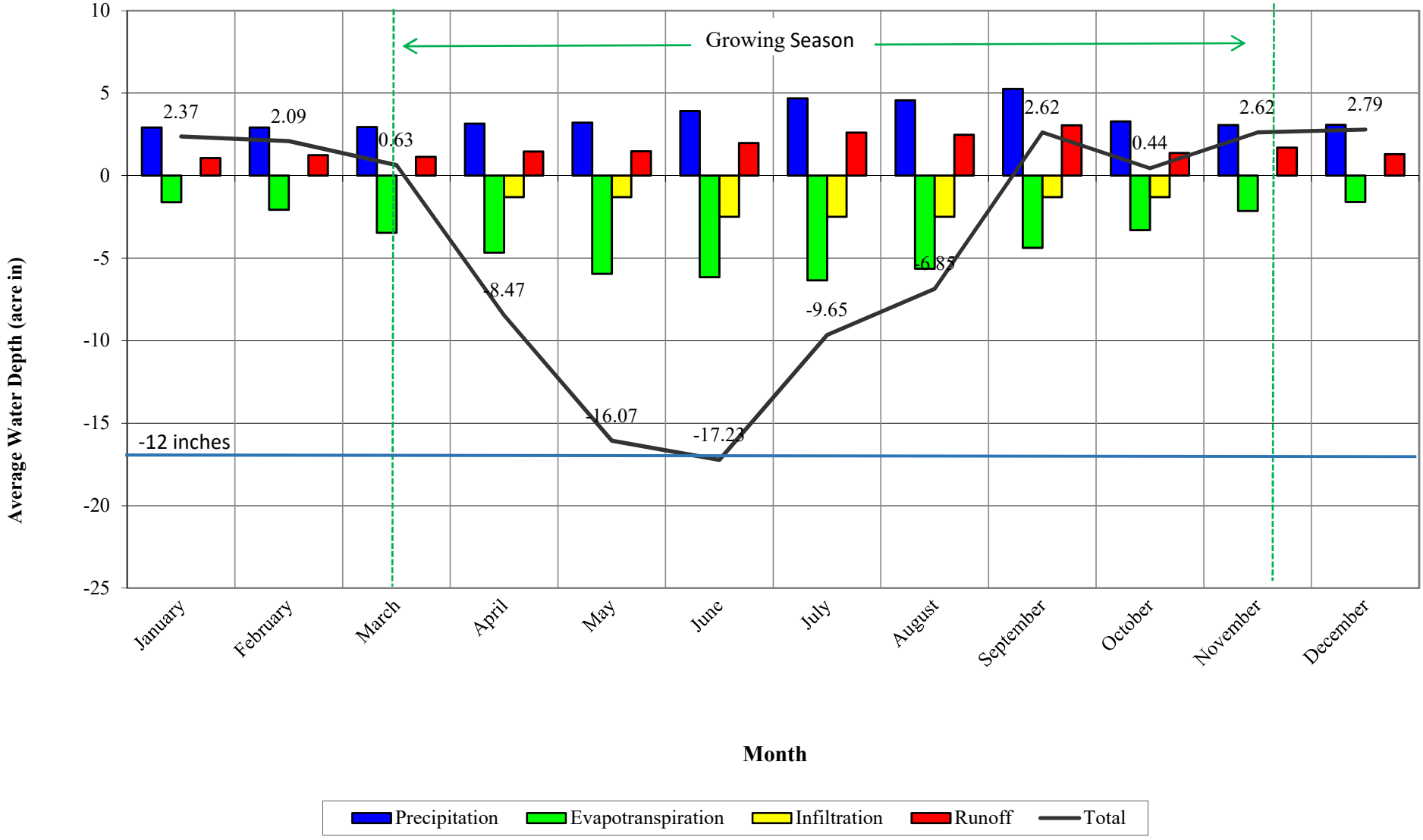
P + R + G* – ET – I =S

*Ground water input assumed to be negligible at this site.

Watershed Composite Curve Number					
Soil Series	**Land Use**	**Hydrologic Group**	**Acres**	**CN**	**Acres x CN**
Foreston (Fo)	Woods Fair	B	47.0	70	3,287
Foreston (Fo)	Row Crop	B	4.9	81	400
Nofolk (NoA)	Woods Good	A	5.2	45	234
Nofolk (NoA)	Row Crop	A	8.1	72	581
Rains (Ra)	Woods Fair	A/D	51.4	79	4,060
Rains (Ra)	Row Crop	A/D	2.5	79	200
Woodington (Wo)	Woods Fair	A/D	3.7	77	287
Woodington (Wo)	Row Crop	A/D	0.1	72	5
Total Watershed Acres			122.9	**Composite CN**	73.7

Proposed Wetland Area		
20.00	= Acres	
Rainfall Needed before Runoff (Q) occurs (inches)		
0.71		
Growing Season Dates WETS Station: CLINTON 2 NE, NC 1971-2000		
March 13 to November 22		
254 days		
15 percent =	38.1	days
10 percent =	25.4	days
5 percent =	12.7	days

WATER BALANCE - HYDROGRAPH
BAREFOOTSITE MITIGATION SITE
Hydrologic Restoration - 20 Acres



References:
North Carolina State Climate Office-Horticultural Crops Research Station (CLIN - ECONET) weather station

2/10/2019

WATER BALANCE - NET VALUES
BAREFOOT SITE - WETLAND RESTORATION

Monthy Averages	WATER BALANCE NET VALUES All values are in acre inches												
	January	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Total**
Precipitation (P)[1]	2.92	2.92	2.95	3.15	3.21	3.92	4.69	4.56	5.25	3.29	3.07	3.08	43.01
Watershed Runoff (R)	0.71	0.83	0.76	0.98	0.98	1.32	1.74	1.65	2.03	0.92	1.13	0.87	13.92
Evapotranspiration (ET)	-1.62	-2.07	-3.46	-4.68	-5.95	-6.15	-6.34	-5.64	-4.37	-3.30	-2.13	-1.60	-47.31
Infiltration (I)[2]	0.0	0.0	0.0	-1.3	-1.3	-2.5	-2.5	-2.5	-1.3	-1.3	0.0	0.0	-12.70
Total (S)	**2.01**	**1.67**	**0.25**	**-1.84**	**-3.06**	**-3.41**	**-2.42**	**-1.92**	**1.61**	**-0.39**	**2.06**	**2.36**	**-3.09**
Adjusted Total (aS)[3]	**2.01**	**1.67**	**0.25**	**-11.53**	**-19.14**	**-21.34**	**-15.10**	**-12.02**	**1.61**	**-2.43**	**2.06**	**2.36**	**-19.29**
			<----------Growing Season March 13 through November 22----------->										

[1]Precipitation data from Horticultural Crops Research Station (CLIN - ECONET)

[2]based on estimated maximum storage capicity of soil during growing season

[3]negative storage values adjusted to reflect an estimated 16 percent porosity in soil

Water Balance Equation

Precipitation + Runoff + Groundwater - Evapotranspiration - Infiltration = Storage

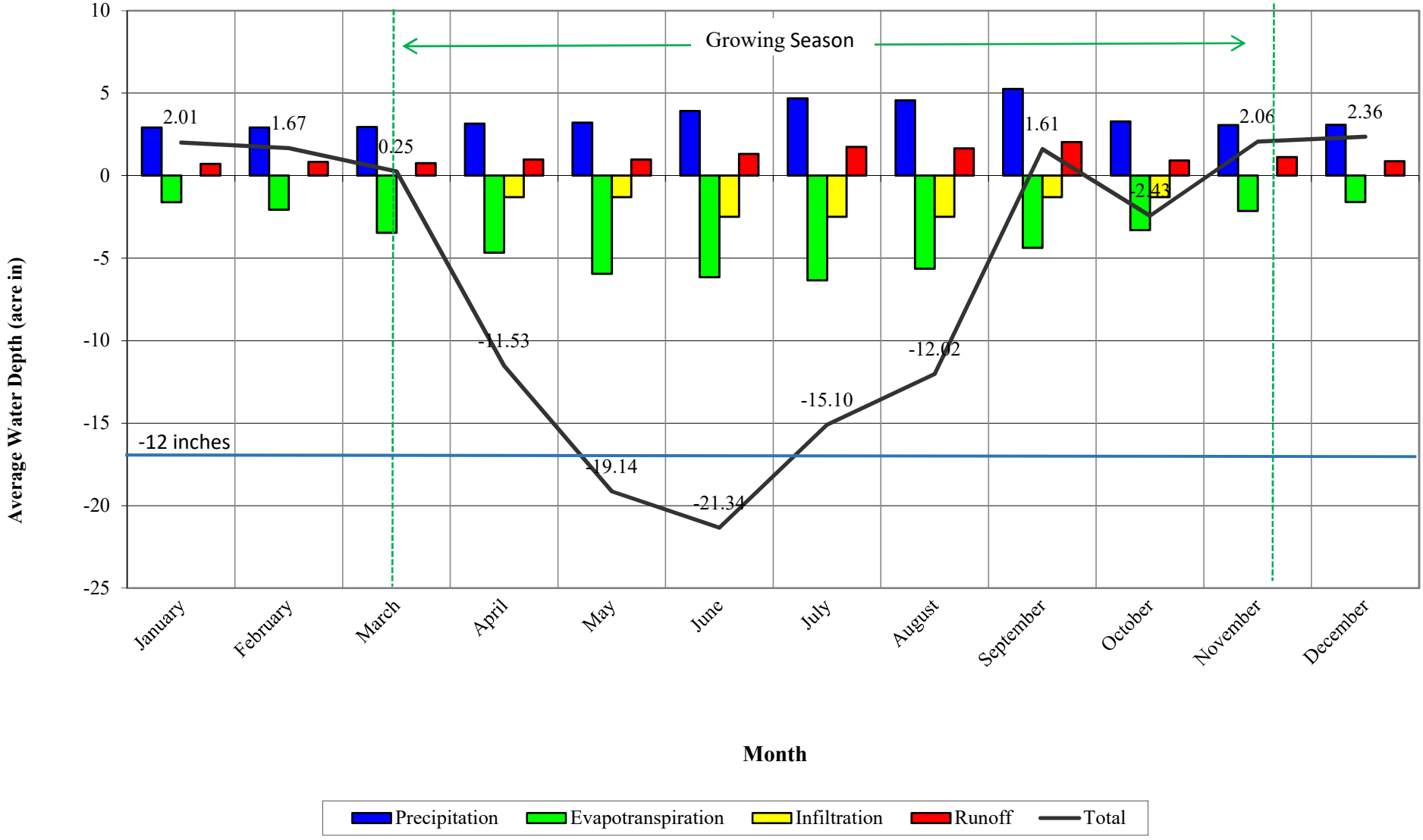
P + R + G* – ET – I =S

*Ground water input assumed to be negligible at this site.

Watershed Composite Curve Number						
Soil Series	**Land Use**	**Hydrologic Group**	**Acres**	**CN**	**Acres x CN**	
Foreston (Fo)	Woods Fair	B	47.0	70	3,287	
Foreston (Fo)	Row Crop	B	4.9	81	400	
Nofolk (NoA)	Woods Good	A	5.2	45	234	
Nofolk (NoA)	Row Crop	A	8.1	72	581	
Rains (Ra)	Woods Fair	A/D	51.4	79	4,060	
Rains (Ra)	Row Crop	A/D	2.5	79	200	
Woodington (Wo)	Woods Fair	A/D	3.7	77	287	
Woodington (Wo)	Row Crop	A/D	0.1	72	5	
Total Watershed Acres			122.9	**Composite CN**	73.7	

Proposed Wetland Area		
30.00	= Acres	
Rainfall Needed before Runoff (Q) occurs (inches)		
0.71		
Growing Season Dates WETS Station: CLINTON 2 NE, NC 1971-2000 March 13 to November 22 254 days		
15 percent =	38.1	days
10 percent =	25.4	days
5 percent =	12.7	days

WATER BALANCE - HYDROGRAPH
BAREFOOTSITE MITIGATION SITE
Hydrologic Restoration - 30 Acres



References:
North Carolina State Climate Office-Horticultural Crops Research Station (CLIN - ECONET) weather station

2/10/2019

WATER BALANCE - NET VALUES
BAREFOOT SITE - WETLAND RESTORATION

Monthy Averages	WATER BALANCE NET VALUES All values are in acre inches												
	January	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Total**
Precipitation (P)[1]	2.92	2.92	2.95	3.15	3.21	3.92	4.69	4.56	5.25	3.29	3.07	3.08	43.01
Watershed Runoff (R)	0.53	0.62	0.57	0.73	0.74	0.99	1.31	1.24	1.52	0.69	0.85	0.65	10.44
Evapotranspiration (ET)	-1.62	-2.07	-3.46	-4.68	-5.95	-6.15	-6.34	-5.64	-4.37	-3.30	-2.13	-1.60	-47.31
Infiltration (I)[2]	0.0	0.0	0.0	-1.3	-1.3	-2.5	-2.5	-2.5	-1.3	-1.3	0.0	0.0	-12.70
Total (S)	**1.83**	**1.46**	**0.06**	**-2.09**	**-3.31**	**-3.74**	**-2.85**	**-2.34**	**1.10**	**-0.62**	**1.78**	**2.14**	**-6.57**
Adjusted Total (aS)[3]	**1.83**	**1.46**	**0.06**	**-13.05**	**-20.68**	**-23.40**	**-17.82**	**-14.60**	**1.10**	**-3.87**	**1.78**	**2.14**	**-41.04**
			<----------Growing Season March 13 through November 22----------->										

[1]Precipitation data from Horticultural Crops Research Station (CLIN - ECONET)
[2]based on estimated maximum storage capicity of soil during growing season
[3]negative storage values adjusted to reflect an estimated 16 percent porosity in soil

Water Balance Equation

Precipitation + Runoff + Groundwater - Evapotranspiration - Infiltration = Storage

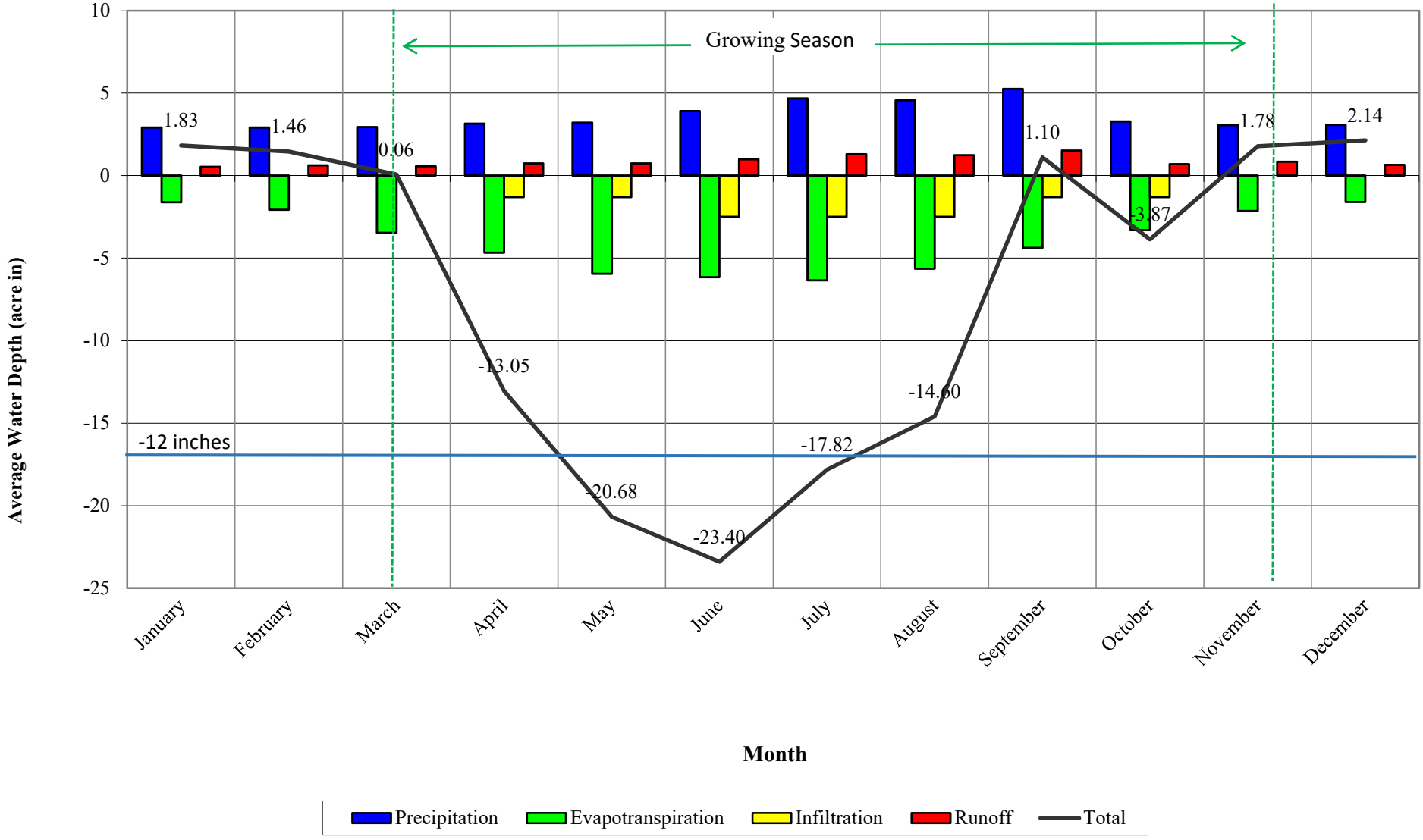
P + R + G* – ET – I =S

*Ground water input assumed to be negligible at this site.

Watershed Composite Curve Number						
Soil Series	**Land Use**	**Hydrologic Group**	**Acres**	**CN**	**Acres x CN**	
Foreston (Fo)	Woods Fair	B	47.0	70	3,287	
Foreston (Fo)	Row Crop	B	4.9	81	400	
Nofolk (NoA)	Woods Good	A	5.2	45	234	
Nofolk (NoA)	Row Crop	A	8.1	72	581	
Rains (Ra)	Woods Fair	A/D	51.4	79	4,060	
Rains (Ra)	Row Crop	A/D	2.5	79	200	
Woodington (Wo)	Woods Fair	A/D	3.7	77	287	
Woodington (Wo)	Row Crop	A/D	0.1	72	5	
Total Watershed Acres			122.9	**Composite CN**	73.7	

Proposed Wetland Area		
40.00	= Acres	
Rainfall Needed before Runoff (Q) occurs (inches)		
0.71		
Growing Season Dates WETS Station: CLINTON 2 NE, NC 1971-2000		
March 13 to November 22		
254 days		
15 percent =	38.1	days
10 percent =	25.4	days
5 percent =	12.7	days

WATER BALANCE - HYDROGRAPH
BAREFOOTSITE MITIGATION SITE
Hydrologic Restoration - 40 Acres



References:
North Carolina State Climate Office-Horticultural Crops Research Station (CLIN - ECONET) weather station

2/10/2019

Mitigation Components Table

Table 1. Barefoot Project (ID-100044) - Mitigation Components

Project Component (wetland ID)	Wetland Position and Hydro Type	Existing Acreage	Stationing	Mitigation Plan Acreage	As-Built Acreage	Restoration Level	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Credits	Notes/Comments
No Stream Mitigation										
Wetland W1	NR	0		16.64		R		1	16.64	Hydrologic restoration via plugging ditches and drainage tiles, planting
Wetland W2	NR	0		6.59		R		2	3.30	Hydrologic restoration via plugging ditches

Length and Area Summations by Mitigation Category

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)
		Riverine	Non-Riverine	
Restoration				23.23
Enhancement				
Enhancement I				
Enhancement II				
Creation				
Preservation				
High Quality Pres				

Overall Assets Summary

Asset Category	Overall Credits
Stream	N/A
RP Wetland	N/A
NR Wetland	19.94

Background Attribute Table

Table 4. Project Background Information			
Project Name	Barefoot Site		
County	Sampson		
Project Area (acres)	33.29		
Project Coordinates (latitude and longitude)	35.253742, -78.392667		
Planted Acreage (Acres of Woody Stems Planted)	22.94		
Project Watershed Summary Information			
Physiographic Province	65m - Rolling Coastal Plain		
River Basin	Upper Neuse		
USGS Hydrologic Unit 8-digit	3020201	USGS Hydrologic Unit 14-digit	3020201150040
DWR Sub-basin	03-04-04		
Project Drainage Area (Acres and Square Miles)	123 acres (0.19 sq mi)		
Project Drainage Area Percentage of Impervious Area	0%		
CGIA Land Use Classification	Cultivated, Evergreen Shrubland, Mixed Shrubland, and Southern Yellow Pine		
Reach Summary Information			
Parameters			
Length of reach (linear feet)			
Valley confinement (Confined, moderately confined, unconfined)			
Drainage area (Acres and Square Miles)			
Perennial, Intermittent, Ephemeral			
NCDWR Water Quality Classification			
Stream Classification (existing)			
Stream Classification (proposed)			
Evolutionary trend (Simon)			
FEMA classification			
Wetland Summary Information			
Parameters	**Wetland 1**	**Wetland 2**	
Size of Wetland (acres)	16.64	6.59	
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Non-riparian	Non-riparian	
Mapped Soil Series	Rains sandy loam / Foreston loamy sand	Rains sandy loam	
Drainage class	Poor	Poor	
Soil Hydric Status	Hydric / Nonhydric	Hydric	
Source of Hydrology	Groundwater	Groundwater	
Restoration or enhancement method (hydrologic, vegetative etc.)	Hydrologic & vegetative restoration	Hydrologic restoration	
Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	Yes	Appendix H
Water of the United States - Section 401	No	No	N/A
Endangered Species Act	Yes	Yes	Appendix J
Historic Preservation Act	Yes	Yes	Appendix J
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

Appendix C – Site Protection Instrument

SITE PROTECTION INSTRUMENT

Site Protection Instrument(s) Summary Information

The land required for the construction, management, and stewardship of this mitigation project includes portions of the parcels listed below in Table C1. EBX – Neuse I, LLC (an entity of RES) has obtained a conservation easement from the current landowners for the project area. The easement deed and survey plat will be submitted to DMS and State Property Office (SPO) for approval and will be held by the State of North Carolina. The easement deed will follow the NCDMS Full Delivery Conservation Easement Template dated May 5, 2017 and included in this appendix. Once recorded, the secured easement will allow EBX – Neuse I, LLC to proceed with the project development and protect the mitigation assets in perpetuity. Once finalized, a copy of the land protection instrument(s) will be included in **Appendix C**.

Table C1. Project Parcel and Landowner Information

Owner of Record	PIN	County	Site Protection Instrument	Deed Book and Page Numbers	Acreage Protected
Daniel F. Kornegay, Jr. Paula S. Kornegay	1584-08-9015	Sampson	Conservation Easement	--	33.29 ac

STATE OF NORTH CAROLINA

DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS PROVIDED PURSUANT TO FULL DELIVERY MITIGATION CONTRACT

_____ COUNTY

SPO File Number:
DMS Project Number:

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this _____day of _____, 20__, by _____*Landowner name goes here*_____, ("**Grantor**"), whose mailing address is _____*Landowner address goes here*_____, to the State of North Carolina, ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

WHEREAS, pursuant to the provisions of N.C. Gen. Stat. § 143-214.8 et seq., the State of North Carolina has established the Division of Mitigation Services (formerly known as the Ecosystem Enhancement Program and Wetlands Restoration Program) within the Department of Environment and Natural Resources for the purposes of acquiring, maintaining, restoring, enhancing, creating and preserving wetland and riparian resources that contribute to the

protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between *(insert name and address of full delivery contract provider)* and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number _____.

WHEREAS, The State of North Carolina is qualified to be the Grantee of a Conservation Easement pursuant to N.C. Gen. Stat. § 121-35; and

WHEREAS, the Department of Environment and Natural Resources and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Understanding, (MOU) duly executed by all parties on November 4, 1998. This MOU recognized that the Wetlands Restoration Program was to provide effective compensatory mitigation for authorized impacts to wetlands, streams and other aquatic resources by restoring, enhancing and preserving the wetland and riparian areas of the State; and

WHEREAS, the Department of Environment and Natural Resources, the North Carolina Department of Transportation and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Agreement, (MOA) duly executed by all parties in Greensboro, NC on July 22, 2003, which recognizes that the Division of Mitigation Services (formerly Ecosystem Enhancement Program) is to provide for compensatory mitigation by effective protection of the land, water and natural resources of the State by restoring, enhancing and preserving ecosystem functions; and

WHEREAS, the Department of Environment and Natural Resources, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the North Carolina Wildlife Resources Commission, the North Carolina Division of Water Quality, the North Carolina Division of Coastal Management, and the National Marine Fisheries Service entered into an agreement to continue the In-Lieu Fee operations of the North Carolina Department of Natural Resources' Division of Mitigation Services (formerly Ecosystem Enhancement Program) with an effective date of 28 July, 2010, which supersedes and replaces the previously effective MOA and MOU referenced above; and

WHEREAS, the acceptance of this instrument for and on behalf of the State of North Carolina was granted to the Department of Administration by resolution as approved by the Governor and Council of State adopted at a meeting held in the City of Raleigh, North Carolina, on the 8th day of February 2000; and

WHEREAS, the Division of Mitigation Services in the Department of Environmental Quality, which has been delegated the authority authorized by the Governor and Council of State to the Department of Administration, has approved acceptance of this instrument; and

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in _____ Township, _____ County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately _____ acres and being conveyed to the Grantor by deed as recorded in **Deed Book _____ at Page ____** of the _____ County Registry, North Carolina; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***if known, insert name of stream, branch, river or waterway here***.

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement along with a general Right of Access.

The Conservation Easement Area consists of the following:

Tracts Number _____ containing a total of _____ **acres** as shown on the plats of survey entitled "Final Plat, Conservation Easement for North Carolina Division of Mitigation Services, Project Name: _____, SPO File No._____, EEP Site No. _____, Property of _____," dated _____, 20__ by *name of surveyor*, PLS Number _____ and recorded in the _____ County, North Carolina Register of Deeds at **Plat Book _____ Pages _____.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat**.**

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

III. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees and agents, successors and assigns, receive a perpetual Right of Access to the Conservation Easement Area over the Property at reasonable times to undertake any activities on the property to restore, construct, manage, maintain, enhance, protect, and monitor the stream, wetland and any other riparian resources in the Conservation Easement Area, in accordance with restoration activities or a long-term management plan. Unless otherwise specifically set forth in this Conservation Easement, the rights granted herein do not include or establish for the public any access rights.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

E. Crossing Area(s). The Grantee is not responsible for maintenance of crossing area(s), however, the Grantee, its employees and agents, successors or assigns, reserve the right to repair crossing area(s), at its sole discretion and to recover the cost of such repairs from the Grantor if such repairs are needed as a result of activities of the Grantor, his successors or assigns.

IV. ENFORCEMENT AND REMEDIES

A. Enforcement. To accomplish the purposes of this Conservation Easement, Grantee is allowed to prevent any activity within the Conservation Easement Area that is inconsistent with the purposes of this Conservation Easement and to require the restoration of such areas or features in the Conservation Easement Area that may have been damaged by such unauthorized activity or use. Upon any breach of the terms of this Conservation Easement by Grantor, the Grantee shall, except as provided below, notify the Grantor in writing of such breach and the Grantor shall have ninety (90) days after receipt of such notice to correct the damage caused by such breach. If the breach and damage remains uncured after ninety (90) days, the Grantee may enforce this Conservation Easement by bringing appropriate legal proceedings including an action to recover damages, as well as injunctive and other relief. The Grantee shall also have the

power and authority, consistent with its statutory authority: (a) to prevent any impairment of the Conservation Easement Area by acts which may be unlawful or in violation of this Conservation Easement; (b) to otherwise preserve or protect its interest in the Property; or (c) to seek damages from any appropriate person or entity. Notwithstanding the foregoing, the Grantee reserves the immediate right, without notice, to obtain a temporary restraining order, injunctive or other appropriate relief, if the breach is or would irreversibly or otherwise materially impair the benefits to be derived from this Conservation Easement, and the Grantor and Grantee acknowledge that the damage would be irreparable and remedies at law inadequate. The rights and remedies of the Grantee provided hereunder shall be in addition to, and not in lieu of, all other rights and remedies available to Grantee in connection with this Conservation Easement.

B. Inspection. The Grantee, its employees and agents, successors and assigns, have the right, with reasonable notice, to enter the Conservation Easement Area over the Property at reasonable times for the purpose of inspection to determine whether the Grantor is complying with the terms, conditions and restrictions of this Conservation Easement.

C. Acts Beyond Grantor's Control. Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury or change in the Conservation Easement Area caused by third parties, resulting from causes beyond the Grantor's control, including, without limitation, fire, flood, storm, and earth movement, or from any prudent action taken in good faith by the Grantor under emergency conditions to prevent, abate, or mitigate significant injury to life or damage to the Property resulting from such causes.

D. Costs of Enforcement. Beyond regular and typical monitoring expenses, any costs incurred by Grantee in enforcing the terms of this Conservation Easement against Grantor, including, without limitation, any costs of restoration necessitated by Grantor's acts or omissions in violation of the terms of this Conservation Easement, shall be borne by Grantor.

E. No Waiver. Enforcement of this Easement shall be at the discretion of the Grantee and any forbearance, delay or omission by Grantee to exercise its rights hereunder in the event of any breach of any term set forth herein shall not be construed to be a waiver by Grantee.

V. MISCELLANEOUS

A. This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be invalid, the remainder of the provisions of the Conservation Easement, and the application of such provision to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

B. Grantor is responsible for any real estate taxes, assessments, fees, or charges levied upon the Property. Grantee shall not be responsible for any costs or liability of any kind related to the ownership, operation, insurance, upkeep, or maintenance of the Property, except as expressly provided herein. Upkeep of any constructed bridges, fences, or other amenities on the Property are the sole responsibility of the Grantor. Nothing herein shall relieve the Grantor of the

obligation to comply with federal, state or local laws, regulations and permits that may apply to the exercise of the Reserved Rights.

C. Any notices shall be sent by registered or certified mail, return receipt requested to the parties at their addresses shown herein or to other addresses as either party establishes in writing upon notification to the other.

D. Grantor shall notify Grantee in writing of the name and address and any party to whom the Property or any part thereof is to be transferred at or prior to the time said transfer is made. Grantor further agrees that any subsequent lease, deed, or other legal instrument by which any interest in the Property is conveyed is subject to the Conservation Easement herein created.

E. The Grantor and Grantee agree that the terms of this Conservation Easement shall survive any merger of the fee and easement interests in the Property or any portion thereof.

F. This Conservation Easement and Right of Access may be amended, but only in writing signed by all parties hereto, or their successors or assigns, if such amendment does not affect the qualification of this Conservation Easement or the status of the Grantee under any applicable laws, and is consistent with the purposes of the Conservation Easement. The owner of the Property shall notify the State Property Office and the U.S. Army Corps of Engineers in writing sixty (60) days prior to the initiation of any transfer of all or any part of the Property or of any request to void or modify this Conservation Easement. Such notifications and modification requests shall be addressed to:

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

General Counsel
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403

G. The parties recognize and agree that the benefits of this Conservation Easement are in gross and assignable provided, however, that the Grantee hereby covenants and agrees, that in the event it transfers or assigns this Conservation Easement, the organization receiving the interest will be a qualified holder under N.C. Gen. Stat. § 121-34 et seq. and § 170(h) of the Internal Revenue Code, and the Grantee further covenants and agrees that the terms of the transfer or assignment will be such that the transferee or assignee will be required to continue in perpetuity the conservation purposes described in this document.

VI. QUIET ENJOYMENT

Grantor reserves all remaining rights accruing from ownership of the Property, including the right to engage in or permit or invite others to engage in only those uses of the Conservation Easement Area that are expressly reserved herein, not prohibited or restricted herein, and are not inconsistent with the purposes of this Conservation Easement. Without limiting the generality of the foregoing, the Grantor expressly reserves to the Grantor, and the Grantor's invitees and licensees, the right of access to the Conservation Easement Area, and the right of quiet enjoyment of the Conservation Easement Area,

TO HAVE AND TO HOLD, the said rights and easements perpetually unto the State of North Carolina for the aforesaid purposes,

AND Grantor covenants that Grantor is seized of said premises in fee and has the right to convey the permanent Conservation Easement herein granted; that the same is free from encumbrances and that Grantor will warrant and defend title to the same against the claims of all persons whomsoever.

IN TESTIMONY WHEREOF, the Grantor has hereunto set his hand and seal, the day and year first above written.

_____ (SEAL)

NORTH CAROLINA
COUNTY OF _____

I, _____, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the _____ day of _____, 20__.

_____
Notary Public

My commission expires:

_____

Exhibit A

[INSERT LEGAL DESCRIPTION]

Appendix D – Credit Release Schedule

CREDIT RELEASE SCHEDULE

All credit releases will be based on the total credit generated as reported in the approved final mitigation plan, unless there are major discrepancies and then a mitigation plan addendum will be submitted. Under no circumstances shall any mitigation project be debited until the necessary Department of the Army (DA) authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the IRT, will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to be restarted or be extended, depending on the extent to which the site fails to meet the specified performance standard. The release of project credits will be subject to the criteria described as follows in **Table D1**.

Table D1. Wetland Credit Release Schedule

Credit Release Milestone	Release Activity	Interim Release	Total Release
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50%
3	Third year monitoring report demonstrates performance standards are being met	15%	65%
4*	Fourth year monitoring report demonstrates performance standards are being met	5%	70%
5	Fifth year monitoring report demonstrates performance standards are being met	15%	85%
6*	Sixth year monitoring report demonstrates performance standards are being met	5%	90%
7	Seventh year monitoring report demonstrates performance standards are being met and project has received closeout approval	10%	100%

**Please note that vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the IRT.*

Initial Allocation of Released Credits

The initial allocation of released credits, as specified in the mitigation plan, can be released by DMS without prior written approval of the DE upon satisfactory completion of the following activities:

1) Approval of the final Mitigation Plan.
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.
3) Completion of project construction (the initial physical and biological improvements to the mitigation site) pursuant to the mitigation plan; per the DMS Instrument, construction means that a mitigation site has been constructed in its entirety, to include planting, and an as-built report has been produced. As-built reports must be sealed by an engineer prior to project closeout, if appropriate but not prior to the initial allocation of released credits.

4) Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

Subsequent Credit Releases

All subsequent credit releases must be approved by the DE, in consultation with the IRT, based on a determination that required performance standards have been achieved. As projects approach milestones associated with credit release, DMS will submit a request for credit release to the DE along with documentation substantiating achievement of criteria required for release to occur. This documentation will be included with the annual monitoring report.

Appendix E – Financial Assurance

FINANCIAL ASSURANCE

Pursuant to Section IV H and Appendix III of the NCDEQ DMS (formerly Ecosystem Enhancement Program) In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environmental Quality (NCDEQ) has provided the USACE-Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by NCDEQ DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.

Appendix F – Maintenance Plan

MAINTENANCE PLAN

The site will be monitored on a regular basis and a physical inspection will be conducted a minimum of once per year throughout the post construction monitoring period until performance standards are met. These site inspections may identify site components and features that require routine maintenance. Routine maintenance should be expected most often in the first two years following site construction and may include the following:

F1. Maintenance Plan

Component/Feature	Maintenance through project close-out
Stream	N/A
Wetland	Routine wetland maintenance and repair activities may include securing of loose coir matting, channel plug maintenance, and supplemental installations of live stakes and other target vegetation within the wetland.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Exotic invasive plant species shall be treated by mechanical and/or chemical methods. The native species sweetgum and red maple may be similarly controlled, if they threaten to outcompete the targeted plant community. Any vegetation requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations. Vegetation maintenance activities will be documented and reported in annual monitoring reports. Vegetation maintenance will continue through the monitoring period.
Site Boundary	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries will be marked with signs identifying the property as a mitigation site, and will include the name of the long-term steward and a contact number. Boundaries may be identified by fence, marker, bollard, post, tree-blazing, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as-needed basis. Easement monitoring and staking/signage maintenance will continue in perpetuity as a stewardship activity.
Road Crossing	Road crossings within the site may be maintained only as allowed by conservation easement or existing easement, deed restrictions, rights of way, or corridor agreements. Crossings in easement breaks are the responsibility of the landowner to maintain.
Livestock Fencing	N/A
Beaver	Routine site visits and monitoring will be used to determine if beaver management is needed. If beaver activity poses a threat to project stability or vegetative success, RES will trap beavers and remove impoundments as needed. All beaver management activities will be documented and included in annual monitoring reports. Beaver monitoring and management will continue through the monitoring period.

Appendix G – Soils Report

Detailed Hydric Soils Report - Final
Barefoot Mitigation Site
Sampson County NC

Prepared for:

Mr. Bob White
Resource Environmental Solutions, LLC
302 Jefferson Street, Suite 110
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Prepared by:

George K Lankford Soil Scientist, LSS #1223
George K Lankford, LLC
238 Shady Grove Rd
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June 2018

Soil Scientist Seal

This report describes the results of the soil evaluation performed at the Barefoot Mitigation Site in Sampson County, NC. Any subsequent transfer of the report by the user shall be made by transferring the complete report, including figures, maps, appendices, all attachments and disclaimers.

Study Objectives and Scope

The purpose of the study was to determine the existence and delineate the extent of hydric soils that are potentially suitable for hydrologic restoration and mitigation. This evaluation is a soil delineation and all boundaries shown are based on the detailed field evaluation. Potential for hydrologic restoration of soils in this study is evaluated considering the existing land use and conditions with the sites potential for creating a hydroperiod suitable for the landscape and soils. Recommendations of practical modifications that utilize the available natural hydrology may include, but are not limited to surface drainage modifications, plugging drainage ditches, removal of fill materials, effective disabling of drain tile systems, and microtopographic alteration such as surface roughening or enhancing existing depressions. Removal of fill material is typically limited due to cost and potential environmental impacts if an extensive area is involved. Restoration success assumes practical design suitable for existing conditions and the ability to construct necessary site modification needed to restore adequate hydrology to the areas containing hydric soil. This report is to be used in determining the conditions and potential modifications unique to the project site.

This report presents an evaluation of the subject property based upon a field evaluation to identify, characterize, and describe the extent of hydric soil and assess the suitability for wetland restoration/mitigation at the site. A delineation of Jurisdictional wetlands was also performed within forested tract adjacent to the drained cultivated field.

The observations and opinions stated in this report reflect conditions apparent on the subject property at the time of the site evaluation. My findings, opinions, conclusions, and recommendations are based on the locations and boundaries of the property as evident in the field and professional experience.

Project Information and Background

The site location is approximately 2.1 miles west of Newton Grove and west of Warren Mill Road (SR 1647) within an existing cultivated field and adjacent cut-over forest. The project area is approximately 45 acres located on a broad nearly level interstream divide, much of which has been ditched and is currently being farmed. (Figure 1). The natural watershed originally encompassed over 200 acres with natural drainage patterns flowing to the northwest and northeast. Runoff in this landscape is slow and depressional areas frequently pond for short periods.

The project area is surrounded by drainage ditches that appear to effectively drain surface water from the project area. Ditches along the cultivated field range from three feet to more than five feet in depth and currently limit the contributing watershed. Drain tiles within the cultivated portions further lower the water table. The ditch network drains to the northeast and northwest into two unnamed tributaries of Mill Creek, a tributary to the Neuse River. No ditches or drainage features connections are apparent to the south toward the Great Coharie Creek.

The soil evaluation focused upon approximately 35 acres having higher potential for containing hydric soil suitable for wetland mitigation. Current use of the site is a cultivated field having a soybean-corn rotation to the east and a scrubby forest cutover to the west (Figure 2). Historic aerials indicate a timber harvest in the watershed between late 2013 and early 2014 (Google Earth). The surrounding land use is undeveloped land, farms, and single-family homes.

NRCS Soil Mapping

The landscape of the project and local area is a broad interstream divide having large soil units mapped across the landscape. General soil properties of the map units are shown in Table 1. Topography of the project site ranges from nearly level to slightly concave. The Natural Resource Conservation Service Sampson County Soil Survey (NRCS 1985) indicate soil in and surrounding the project are formed in

loamy marine deposits. The NRCS soil maps a single series, a poorly drained Rains sandy loam across the site. Rains soils occur on the broad interstream divides on marine terraces and nearly level landscapes with negligible runoff. Mapped near the site are moderately well drained Foreston and poorly drained Woodington loamy sands. Woodington is found in nearly level to slightly concave landscapes with Woodington on the convex landscapes.

Table 1. Barefoot NRCS Mapped Soil Mapping Units

Wetter ← ---------- → Drier

Mapping Unit/Series	Rains sandy loam	Woodington loamy sand	Lynchburg sandy loam	Foreston fine sand
Taxonomic Classification	*Typic Paleaquults*	*Typic Paleaquults*	*Aeric Paleaquults*	*Aquic Paleudults*
Parent Material	loamy marine deposits	loamy marine deposits	loamy marine deposits	loamy and sandy marine deposits
Topographic Slope Setting (down/across)	linear-linear	linear-concave	linear-linear	linear-convex
Drainage Class	poorly	poorly	somewhat poorly	moderately well
Seasonal High Water	0 to 12	0 to 12	6 to 18	24 to 42
Permeability	moderate	moderately rapid	moderate	moderately rapid
Runoff	negligible	slow	negligible	slow
Ksat (most limiting layer)	mod high to high	high	mod high to high	mod low to high
	0.20 to 1.98 in/hr	1.98 to 5.95 in/hr	0.57 to 1.98 in/hr	0.06 to 1.98 in/hr
Available Water Capacity (water storage in profile)	mod (~7.8 in)	mod (~7.0 in)	mod (~6.6 in)	mod (~6.0 in)
Hydroperiod Range *	10-12%	10-12%**	07-09%***	NA

*based on similar soil taxonomic subgroups (US Army Corps of Engineers. 2016)
**Rains (fine loamy vs coarse loamy)
*** Lenoir (fine-loamy, siliceous vs fine, mixed)

The Rains and Woodington soils are classified as hydric by the NRCS. The NRCS Web Soil Survey indicates the potential for inclusions of somewhat poorly drained Lynchburg (10%) and very poorly drained Pantego soils (8%). Pantego soils are wetter for extended periods and are within slightly concave landscapes leading to a muck or mucky mineral surface horizons due to being present. Foreston soils may

contain inclusions of Rains and Woodington. Rains and Lynchburg are considered prime farmland if drained. Foreston and Woodington are farmland of statewide importance.

Prior to cultivation the Rains would have a black to dark gray loamy surface and be underlain by a gray subsoil, often with having various mottles, with textures ranging from sandy loam to sandy clay loam. Permeability is expected to be moderate with slow runoff with shallow ponding. The seasonal high water table is near the surface. Rains and Woodington typically have a black to very dark gray, loamy sand, surface layer. Rains and Pantego subsoil texture ranges from sandy loam to sandy clay loams. Woodington subsoil is typically sandy loam. The Pantego soil is wetter and have a high seasonal water table soil for longer periods than Rains soil, allowing formation of muck horizons at the surface.

Methodology

A detailed hydric soil delineation was completed in March 2018. The evaluation focused upon areas with high potential for containing hydric soil, areas with suitable landscape position and where the NRCS county soil mapping indicates the presence of hydric soil. A series of soil borings were performed across the site to delineate the boundary between hydric soil and non-hydric soil. Soil borings were used to describe current soil characteristics, evaluate the soil properties, and delineate the extent of hydric soil suitable for restoration. Morphologic characteristics of the soil was used to determine hydric indicators and estimate current hydrology. Criteria to determine hydric soil is based on "Field Indicators of Hydric Soils in the United States" (USDA, NRCS, 2016, Version 8.1). Where possible, possible relict indicators were noted. These boring observations do not contain adequate detail to classify these soils to a series.

The site is located in the NRCS Major Land Resource Area (MLRA) 133A- Southern Coastal Plain and Land Resource Region (LRR) P-South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region. Indicators used are valid for the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0), and Land Resource Region P (133A Southern Coastal Plain) (U.S. Army Corps of Engineers. 2010). Technical guidance and procedures for identifying and delineating wetlands follows the Regional Guidance and this technique uses a multi-parameter approach, which requires positive evidence of three (3) criteria:

- Hydrophytic vegetation
- Hydric soils
- Wetland hydrology

Areas exhibiting the above three wetland characteristics, as well as surface waters, are considered jurisdictional waters of the U.S.

The soil boundary was delineated based on borings information, landscape position, and topographic relief. Boring locations were approximately located using the Trimble Outdoor Navigator smart phone application and exported to Google Earth. The hydric soil boundary points were delineated and collected using a GPS system by RES staff. These collected points and field boundaries were used to draw the figures and calculate acreage.

At the Barefoot site, more than 90 shallow borings from 12 to 30 inches were examined to delineate and characterize the soils. Profiles were documented to describe the representative range of characteristics found across the site. These characteristics include texture, color, mottling, and saturation-water table where present. Other important observations were noted as observed.

Results and Discussion

The site is nearly level to concave with minor topographic variations and a gentle slope draining to the northwest and northeast through agricultural ditches. The ditches bordering the site are maintained at

three feet or deeper and provide significant drainage of the surface and underlying soil horizons. The ditches are a hydrological barrier to surface water from the surrounding landscape, limiting the contributing watershed. Within the cultivated field, the watershed is defined by the ditches and further divided by a central ditch into 13 and 9 acres. The cut-over watershed is surrounded by ditches and is limited to 16 acres. A site having a small watershed without groundwater input does not support adequate hydrology for wetlands.

The mature pine stand to the west has mostly undisturbed soils and to the south within the cut-over the effects of timber harvesting are present as slightly concave linear paths that form a loose network to central loading areas. Slash appeared to be limited. The cut-over and forested areas to the south and west lack drainage ditches and ditching does not appear to be present based upon reviewing aerial photography.

Based upon the shallow soil borings observed throughout the project site, soils exhibited hydric soil indicators typical of the landscape setting within 12 inches of the soil surface. Hydric soil extended beyond the project area to the south, west and north. To the east the elevation rises toward Warren Mill Rosd. Soils appear relatively uniform across the project area and into the surrounding landscape. Borings exhibited a light sandy clay loam subsoil beginning around 30 inches with textures varying from sandy loam to a light sandy clay. Along the ditches, two deeper boring to more than five feet have sandy clay loam that becomes massive and restrictive to vertical infiltration. To the south and west of the project site where ditches are absent, soils have more organic material concentrated in the surface horizon, often exhibiting a thin layer of muck or mucky mineral surface layer.

Soils across the site are loamy or sandy with sandy loam or sandy clay loam subsoils with much of the area having a sandy texture to 30 inches throughout most of this area. The typical soil surface consists of dark sandy loam from 9 to greater than greater than 40 inches. This black surface is underlain by a dark gray to very dark grey, depleted horizon. Reddish mottles from redoximorphic concentrations were occasionally observed within the subsoils. The presence of drain tiles combined with the sandy texture has lowered the water table and further shortened hydroperiods. Within the field the water table was observed to be at 20 to 28 inches depth, just above where soil structure becomes weak. Any mucky characteristics originally present at the surface have been destroyed from cultivation and tillage. Based upon limited observations in the surrounding less disturbed areas, a mucky soil type similar to a Pantego is present. These inclusion of Pantego would have occurred as a common inclusion throughout much of the project prior to cultivation.

The most common hydric soil indicators are *A11-Depleted Below a Dark Surface*, *A12-Thick Dark Surface*, and *F3-Depleted Matrix*. Surrounding undisturbed soils have additional indicators of *A7-Mucky Mineral* and *A9-Muck*. Within the cultivated field tillage would have destroyed any mucky horizons. Adjacent to ditches the surface soil color is a very dark gray (3/1) surface horizon instead the black color found farther from the drainage ditches. Prior to tillage this soil likely exhibited depleted mottles that would meet the *F7-Depleted Dark Su*rface. The dark surface horizons are due to accumulations of organic matter from extended periods of anaerobic conditions caused by saturation for many years. The drained condition allows long periods of aerobic oxidation that eventually reduce the organic content within these soils, changing black organic surface colors to browner color.

Where the sandy clay loam horizon was observed, typically around 30 inches, the structure becomes weak with course soil peds and limited porosity that would slow water transmission. At deeper depth the structure becomes massive, becoming a moderately restrictive horizon and limiting vertical infiltration. Due to areas of sandy textures subsoils intermixed, there is limited vertical infiltration at this site. Based upon observations, the ditches have all been excavated to or just below this restrictive depth.

The project area within the recent cut over has soils similar to the cultivated field with small areas exhibiting a mucky sandy loam surface horizon underlain by sandy textured soil to a depth greater than 30 inches. The water table was observed to be at 12 to 16 inches in depth and deeper within the adjacent cut-over. Within the cut-over, excavated ditches appear to have been excavated from the project property with spoil placed only on the project side of ditches.

To the south and west outside of the project area, soils exhibited similar profiles. Within the mature forest, the water table was observed to be at the surface to three inches below the surface as distance from ditches increased beyond 100. To the south in the cut-over, standing surface water was observed throughout large portions of the area within the skidder paths. Within the undrained areas outside of the project, soils were occasionally observed with a thin layer of muck at the surface above the mucky mineral horizon.

Successful Hydroperiod and Restoration Potential

The current watershed for this area is restricted to precipitation falling within the ditched perimeters of the cultivated field and the adjacent cut-over. Where drain tiles are present, the water table is expected to be at or just above the drain tile depth most of the year. Within the cut-over, evapotranspiration will remove significant hydrology during the growing season and due to the limited watershed, a sufficient wetland hydroperiod is not expected.

Based upon this detailed study of site soils, disturbance in the cultivated field appears to be from multiple ditches, subsurface drain tile, and past cultivation. In the cut-over soil disturbance appears limited to past timber harvest where skid paths have created long linear depressions with increased drainage from the surrounding ditches. Surface mixing appears likely with potential surface compaction. In the cut-over significant soil changes due to the ditching are not apparent yet, but ongoing loss of organic matter is expected due to a loss of extended saturation.

From field observation across the site, the mapped NRCS Rains and adjacent Wooding show a good correlation to actual site soils. The soil series of map units represents most of the soil at the site and are classified as a *Typic Paleaquults* and Pantego is classified as an *Umbric Paleaquults.* Mitigation guidance for the Coastal Plain indicates a target hydroperiod for Rains and Woodington soils of 10-12 percent during which the water table is within 12 inches of the surface (US Army Corps of Engineers 2016). For Pantego soils a 12-16 percent hydroperiod would be suitable. Soils resembling the better drained Foreston or Lynchburg soils were not observed. The hydroperiod will be reduced closer to remaining with site observation suggesting this will occur out to 100 feet from ditches.

A number of techniques can be used to restore hydrology to this site. Removal/plugging of all drain tiles will prevent rapid subsurface drainage. Plugging and backfilling the ditches will eliminate the enhanced surface drainage of the field and clear-cut. Incomplete filling of the ditches is allowable if the plugging material and construction are adequate to prevent surface drainage and the design protects against erosion prior to vegetative establishment. Once the ditches have been successfully plugged, the contributing watershed for the cultivated field and cut-over will be connected to 150 to 180 acres. This watershed in this landscape should adequately provide hydrology to meet the suggested hydroperiods.

Within the cultivated portions, shallow ripping is suggested with surface roughening and enhancement/creation of shallow depressions throughout the area to mimic natural topographic conditions. The shallow depressions will potentially provide some short-term ponding and provide an appropriate landscape for diverse habitat. Within the cut-over, removal of the spoil berms is necessary to

reestablish the hydrologic surface connectivity to the surrounding watershed. An exception would be along the ditch adjacent to the remaining agricultural operation where the spoil will reduce surface runoff.

Summary Conclusions and Recommendations

The project site consists of a cultivated field and cut-over forest land totaling approximately 35 acres with a high potential for restoring hydrology to hydric soil. The general landscape across the project and surrounding area is interstream divide typical if the area. The site is nearly level to concave with gentle undulations with shallow depressional areas.

Project site consists of a cultivated field and an adjacent cut-over pine forest surrounded by drainage ditches. The field has drain tiles for additional drainage. Currently, the ditches have reduced the watershed of the cultivated field to 13 and 9 acres and the cut-over to 16 acres. The land use and management have increased surface drainage with shallow crowning, ditches that surrounding the site, and installation of subsurface drain tiles within the cultivated portion. Ongoing cultivation increases soil compaction while disturbing surface soil and destroying surface indicators.

Soils observed at the site are similar to the NRCS map unit of Rains with inclusions of Pantego. These soil map units are classified as hydric. The soils are sandy loam to a depth of 30 or more inches and underlain by light clayey soils with weak structure. Due to the sandy textured soils, the drainage effect of ditching can be significant. Based upon observations from the adjacent properties, this drainage affect becomes less important beyond 100 feet from ditches.

Hydric soil indicators observed include *A11-Depleted Below a Dark Surface*, *A12-Thick Dark Surface*, and *F3-Depleted Matrix* with the potential for *F7-Depleted Dark Su*rface. Surrounding the site in less disturbed soils, the *A7-Mucky Mineral* and *A9-Muck* indicators are found. Tillage has destroyed many indicators of hydric soils in the upper soil layers such as muck or mucky mineral surface horizons, and removed visible redoximorphic depletions and concentrations. A loss of normal oxidation-reduction cycle characteristic of wetlands results in increased aerobic conditions, allowing faster decomposition of organics with a potential loss of diagnostic dark surface colors. A suggested hydroperiod ranges from 10 to 12 percent across most of the site to 12 to 16 percent in shallow depressional areas. Saturation and hydroperiod will vary across these features.

Based upon this detailed study of site soils, surface and subsurface drainage with disconnection to the natural watershed have resulted in the loss of the wetland hydroperiod. Restoration techniques that can be used to restore hydrology include plugging of ditches, removal of drain tiles, and surface roughening. Within the cut-over removal of the spoil berms will allow reconnection to the natural watershed while serving as fill materials for the ditches.

Overall, the project is located within a landscape suitable for wetland restoration and contains soil exhibiting hydric indicators. An available water source for hydrology will be available when the watershed runoff is redirected to the site. The site can be modified to increase the watershed and improve site storage to provide appropriate hydrology for a natural self-sustaining wetland system. Successful hydrologic restoration at this site will provide numerous soil related functional uplifts. These include, reestablishment of natural oxidation-reduction cycling, improved nutrient and chemical transformations, increased organic carbon accumulation, improved soil structure (surface primarily), and increases in microbial and fungal populations and diversity important for soil health. Large scale benefits may include diverse wildlife habitat and connectivity to the surrounding natural community. Given the observed soil characteristics indicating past wetland hydrology, favorable landscape position, and the potential source for reconnecting to the larger watershed, inputs, this site appears suitable for hydrologic wetland restoration.

This report describes the results of the soil evaluation performed at the Barefoot Mitigation Site in Sampson County, NC. Any subsequent transfer of the report by the user shall be made by transferring the complete report, including figures, maps, appendices, all attachments and disclaimers.

References

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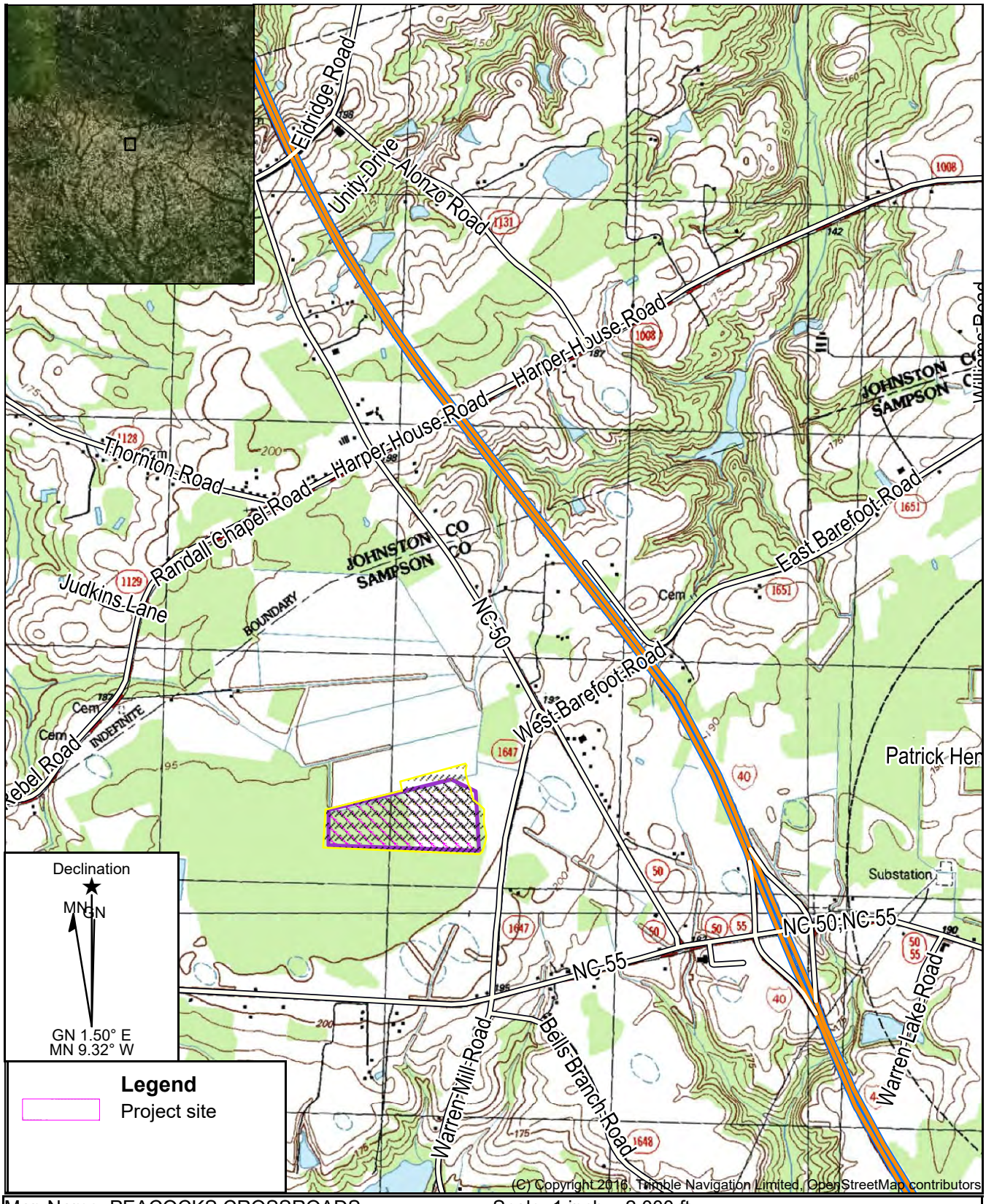
Figures

APPENDICE

Appendix A - Soil Boring Log

Appendix B - Photos

Appendix C - NRCS Web Soil Survey Report



Map Name: PEACOCKS CROSSROADS
Map Center: 035.262189° N, 078.390005° W
Horizontal Datum: WGS84

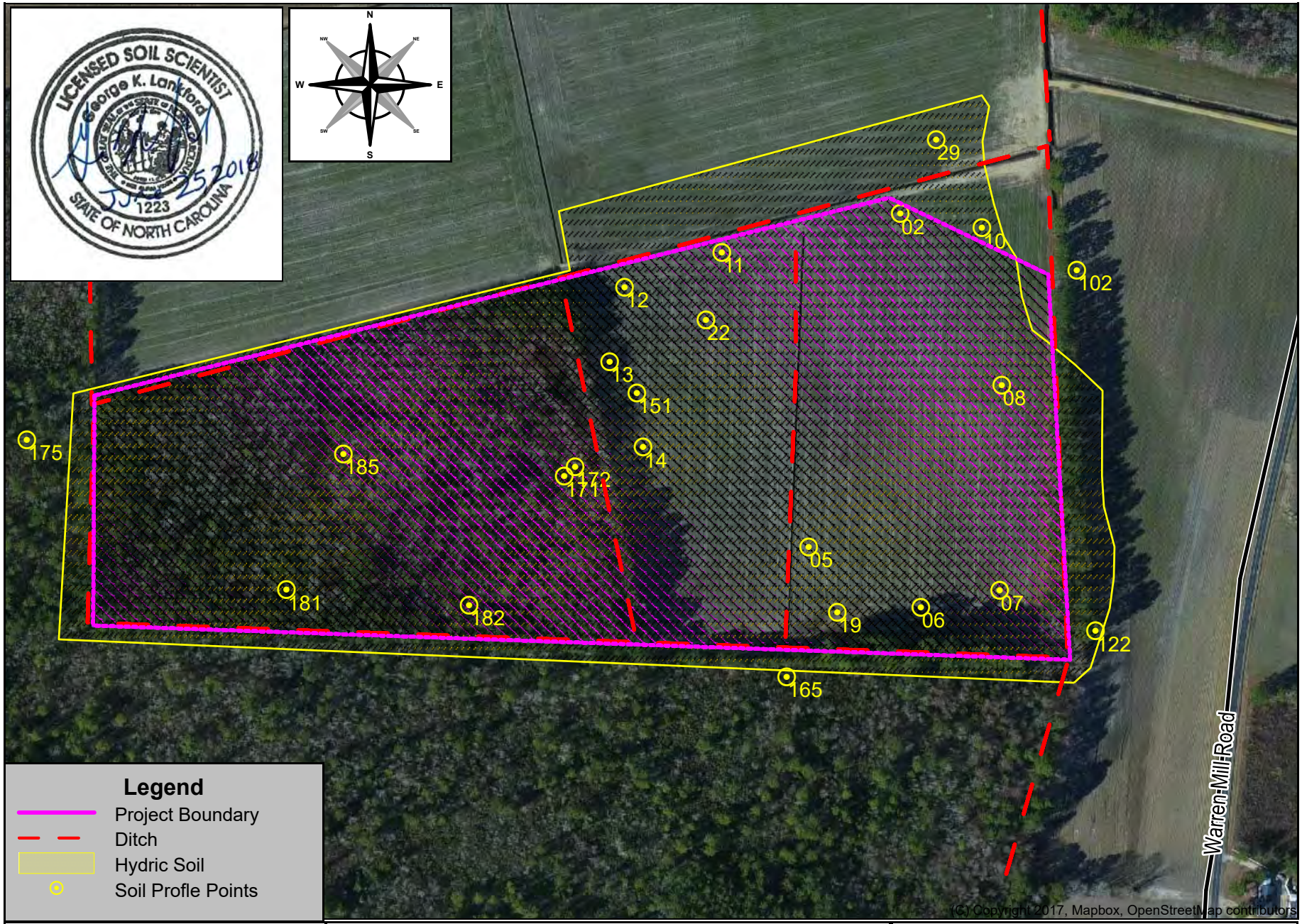
Scale: 1 inch = 2,000 ft.

Barefoot Mitigation Site
Figure 1. Vicinity Map-USGS

SCALE 1:24000

0 1000 2000 3000 4000
Feet

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
Miles



Scale: 1 inch = 300 ft.
Horizontal Datum: WGS84

Barefoot Mitigation Site
Figure 2. Aerial View

SCALE 1:3600

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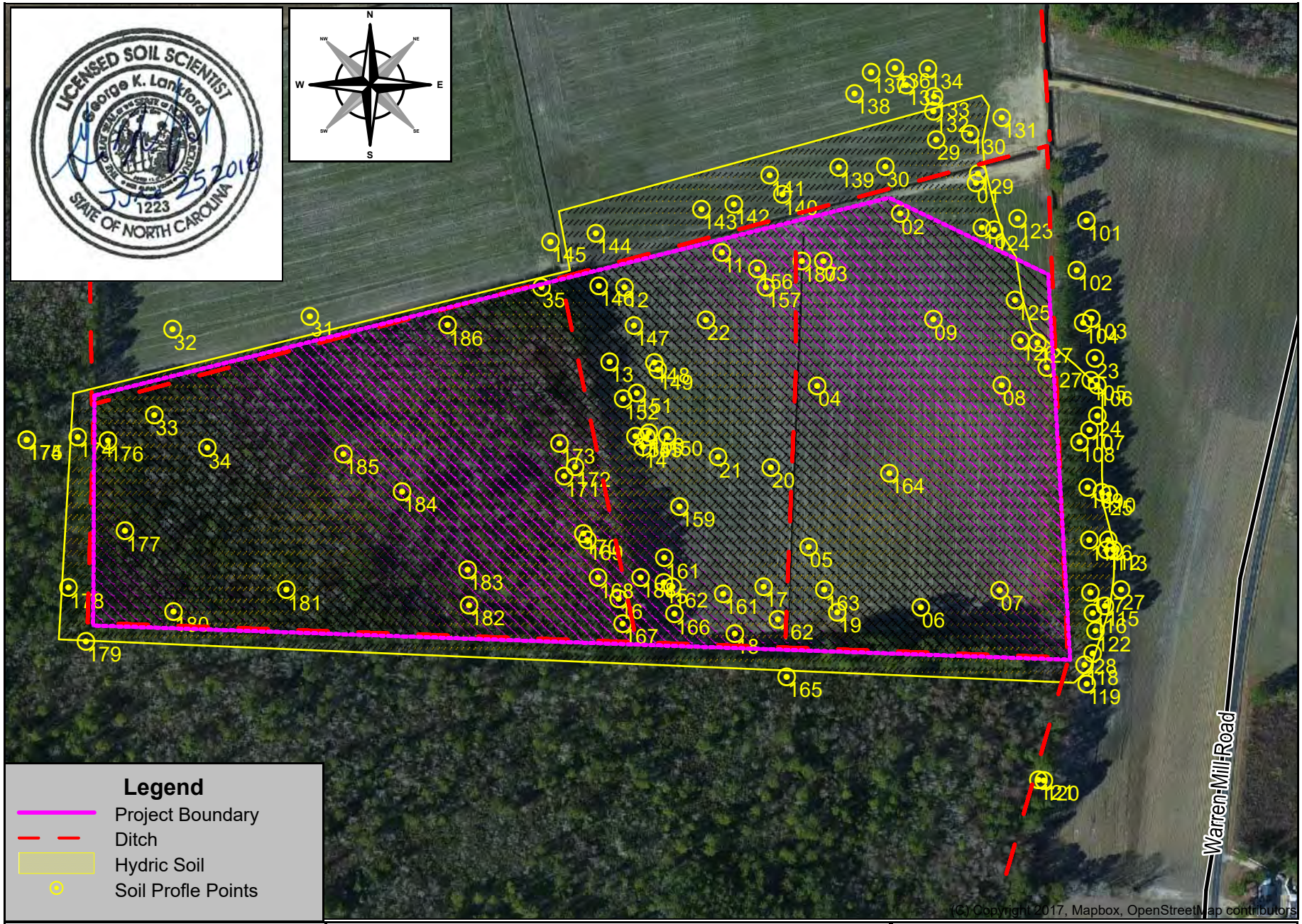
Feet

0.0 0.1
Miles



Scale: 1 inch = 300 ft.
Horizontal Datum: WGS84

Barefoot Mitigation Site
Figure 2. Aerial View

SCALE 1:3600

0 100 200 300 400 500 600 700
Feet

0.0 0.1
Miles

Appendix 2
Barefoot Site-Sampson County NC
Soil Boring Descriptions

Table. Representative Soil Profiles at Barefoot Mitigation Site

Cultivated field - Drained					
Depth (inches)	**Color**		**Mottle Percentage (Location*)**	**Texture****	**Notes**
	Matrix	**Mottle**			
SB 5 (Sept 7, 2017)			Hydric Indicators WT at -11 A12-Thick Dark Surface		
0-15	7.5 YR 2.5/1			SL	
15-19	7.5 YR 2.5/1	7.5 YR 3/2	15% (PL)	SL	
19-29	7.5 YR 5/2	7.5 YR 5/6	5% (PL)	SCL	
SB 6 (Sept 7 2017)			Hydric Indicators WT at -12 A11-Depleted Below a Dark Surface		
0-11	7.5 YR 2.5/1			SL	
11-18	7.5 YR 3/1	7.5 YR 5/2	10% (PL)	SL	
18-30	7.5 YR 5/2	7.5 YR 5/6	3% (PL)	SCL	
SB 7 (Sept 7, 2017)			Hydric Indicators WT at -24 A11-Depleted Below a Dark Surface		
0-10	7.5 YR 25/1			SL	
11-17	7.5 YR 5/1			SL	
17-27	7.5 YR 3/1	7.5 YR 5/1	30% (M)	SL	weakly spodic
SB 8 (Sept 7 ,2017)			Hydric Indicators WT at -18 A12-Thick Dark Surface		
0-9	7.5 YR 2.5/1			SL	
9-24	7.5 YR 5/1	7.5 YR 5/6	2% (PL)	SL	
SB 10 (Sept 7, 2017))			Hydric Indicators WT at -19 A11-Depleted Below a Dark Surface		
0-10	7.5 YR 2.5/1			SL	
10-21	7.5 YR 5/1	7.5 YR 4/6	20% (PL)	SL	
SB 12 (Sept 7, 2017)			Hydric Indicators WT at -24 A12-Thick Dark Surface		
0-9	7.5 YR 2.5/1			SL	
9-27	7.5 YR 5/2	7.5 YR 2.5/1 7.5 YR 3/2	15% (PL) 15% (PL)	S	
SB 14 (Sept 7, 2017)			Hydric Indicators WT at -27 A11-Depleted Below Dark Surface F3-Depleted Matrix		
0-9	7.5 YR 2.5/1			SL	
9-34	7.5 YR 5/2	7.5 YR 2.5/1	5% (M)	SL	
SB 19 (Sept 7, 2017)			Hydric Indicators WT at -19 A11-Depleted Below Dark Surface F3-Depleted Matrix		
0-8	7.5 YR 2.5/1			SL	
8-15	7.5 YR 5/2	7.5 YR 5/6	8% (PL)	SL	mottles have sharp boundary
15-24	7.5 YR 3/2			SCL	

Appendix 2
Barefoot Site-Sampson County NC
Soil Boring Descriptions

Table. Representative Soil Profiles at Barefoot Mitigation Site

Cultivated field - Drained					
Depth (inches)	**Color**		**Mottle Percentage (Location*)**	**Texture****	**Notes**
	Matrix	**Mottle**			
SB 22 (Sept 7, 2017)			Hydric Indicators WT at -20 (recent rainfall) A12-Thick Dark Surface		
0-15	7.5 YR 2.5/1			SL	
15-26	7.5 YR 3/1			SL	
26-29	7.5 YR 5/2	7.5 YR 4/6	15% (PL)	SCL	
SB 29 (Sept 7, 2017)			Hydric Indicators A12-Thick Dark Surface		
0-13	7.5 YR 2.5/1			SL	
13-18	7.5 YR 6/2	7.5 YR 5/6	12% (PL)	cSL	
SB 102 (March 5, 2018) ~30 ft from ditch			Hydric Indicators WT at -33 A11-Depleted Below Dark Surface F3-Depleted Matrix		
0-10	7.5 YR 2.5/1			SL	
10-20	7.5 YR 5/2	7.5 YR 5/6 7.5 YR 4/6	2% (PL) 2% (PL)	SL	
20-32	7.5 YR 6/2	7.5 YR 5/8	4% (PL)	SL	
32-37	7.5 YR 6/1	7.5 YR 5/8	10% (PL)	SCL	
SB 122 (March 5, 2018) ~40 ft from ditch			Hydric Indicators A11-Depleted Below Dark Surface F3-Depleted Matrix		
0-8	7.5 YR 2.5/1			SL	
8-11	7.5 YR 5/2			SL	
11-15	N 2.5/1			SL	may be a spodic horizon
SB 151 (March 5, 2018) ~40 ft from ditch			Hydric Indicators WT at -31 A12-Thick Dark Surface		
0-28	10 YR 2/1			SL	
28-42	10 YR 4/1	10 YR 4/6	12% (PL)	SCL	
SB 165 (March 5, 2018) Reference profile ~50 ft from ditch			Hydric Indicators WT at -14 A7-Mucky Mineral A9-Muck A12-Thick Dark Surface		
0-2	7.5 YR 2.5/1			muck	
2-4	7.5 YR 2.5/1			mucky SL	
4-14	7.5 YR 2.5/1			SL	
14-18	7.5 YR 5/2	7.5 YR 3/2	10% (PL)	SL	
18-34	7.5 YR 5/2	7.5 YR 4/4	8% (PL)	SCL	

Appendix 2
Barefoot Site-Sampson County NC
Soil Boring Descriptions

Table. Representative Soil Profiles at Barefoot Mitigation Site

Cultivated field - Drained					
Depth (inches)	**Color**		**Mottle Percentage (Location*)**	**Texture****	**Notes**
	Matrix	**Mottle**			
SB 187 (April 3, 2018) Ditch profile			Hydric Indicators WT at -32 A12-Thick Dark Surface		
0-16	N 2.5/-			fSL	
16-23	10 YR 5/1	10 YR 5/6	5% (PL)	SCL	
23-29	10 YR 5/1	10 YR 5/6	20% (PL)	SL	
29-43	7.5 YR 5/1	7.5 YR 3/4	30% (PL)	SCL	wk structure
43-64	7.5 YR 4/1	7.5 YR 4/6	5% (PL)	SL	massive
SB 188 (April 3, 2018) Ditch profile			Hydric Indicators WT at -39 A12-Thick Dark Surface (relict) F7-Depleted Dark Surface		
0-27	10 YR 3/1	10 YR 5/2	5% (PL)	SL	
27-51	7.5 YR 4/1	7.5 YR 4/6	25% (PL)	SCL	
51-58	7.5 YR 4/1			SL	

Cutover - Drained					
Depth (inches)	**Color**		**Mottle Percentage (Location*)**	**Texture****	**Notes**
	Matrix	**Mottle**			
SB 171 (March 8, 2018) ~100 ft from ditch within the cut-over in small depression/old skid path			Hydric Indicators WT at -15 A11-Depleted Below Dark Surface F3-Depleted Matrix		
0-2	N 2.5/1			mucky SL	
2-6	N 2.5/1			SL	
6-10	7.5 YR 3/1	7.5 YR 5/2	10% (PL)	SL	
10-21	7.5 YR 5/1	5 YR 2.5/2	10% (PL)	SL	
21-33	7.5 YR 5/1	7.5 YR 4/6	10% (PL)	SCL	
SB 172 (March 8, 2018) ~70 ft from ditch within the cut-over on low hummock beside skid path			Hydric Indicators WT at -21 A12-Thick Dark Surface		
0-3	7.5 YR 3/1			SL	
3-11	N 2.5/-			SL	
11-23	7.5 YR 5/2	7.5 YR 2.5/1	12% (PL)	SL	
SB 181 (March 23, 2018) ~110 ft from ditch (~95 from berm)			Hydric Indicators WT at -12 A12-Thick Dark Surface		
0-15	7.5 YR 2.5/1			SL	1 inch of duff/lvs/roots
15-18	7.5 YR 3/1	7.5 YR 5/2	15% (PL)	SL	
18-24	7.5 YR 5/1	7.5 YR 3/1	5% (PL)	SCL	

Appendix 2
Barefoot Site-Sampson County NC
Soil Boring Descriptions

Cutover - Drained

Depth (inches)	Color		Mottle Percentage (Location*)	Texture**	Notes
	Matrix	Mottle			
SB 182 (March 8, 2018) ~100 ft from ditch			Hydric Indicators WT at -18 A7-Mucky Mineral A11-Depleted Below Dark Surface F3-Depleted Matrix		
2-0	7.5 YR 2.5/1			dry duff	
0-3	7.5 YR 2.5/1			mucky SL	
3-11	7.5 YR 3/1	7.5 YR 4/3 7.5 YR 2.5/3	10% (PL) 2% (PL)	SL	
11-20	2.5 YR 4/2	7.5 YR 2.5/1	15% (PL)	SL	
SB 185 (March 8, 2018) relatively undisturbed between skid paths			Hydric Indicators WT at -15 A9-Muck A12-Thick Dark Surface		
0-5	7.5 YR 2.5/1			muck	
5-19	7.5 YR 2.5/1			SL	
19-28	7.5 YR 4/1	7.5 YR 4/4	2% (PL)	SL	

Adjacent cutover - Undrained

Depth (inches)	Color		Mottle Percentage (Location*)	Texture**	Notes
	Matrix	Mottle			
SB 121 (March 5, 2018) Potential reference profile			Hydric Indicators WT at -8 A7-Mucky Mineral A9-Muck F3-Depleted Matrix		
0-2	N 2.5/1			muck	
2-4	N 2.5/1			mucky SL	no redox conc. observed
4-14	7.5 YR 5/2			cS	
SB 165 (March 5, 2018) Reference profile ~50 ft from ditch			Hydric Indicators WT at -14 A7-Mucky Mineral A9-Muck A12-Thick Dark Surface		
0-2	7.5 YR 2.5/1			muck	
2-4	7.5 YR 2.5/1			mucky SL	
4-14	7.5 YR 2.5/1			SL	
14-18	7.5 YR 5/2	7.5 YR 3/2	10% (PL)	SL	
18-34	7.5 YR 5/2	7.5 YR 4/4	8% (PL)	SCL	

Appendix 2
Barefoot Site-Sampson County NC
Soil Boring Descriptions

Adjacent mature forest - Undrained					
Depth (inches)	**Color**		**Mottle Percentage (Location*)**	**Texture****	**Notes**
	Matrix	**Mottle**			
SB 175 (March 23, 2018) ~150 ft from ditch			Hydric Indicators F3-Depleted Matrix	WT at -3	
0-2	7.5 YR 2.5/3			SL	4 inches of duff/lvs/roots
2-9	7.5 YR 2.5/1	10 YR 4/1	2% (PL)	SL	
9-20	10 YR 4/1	7.5 YR 4/6	5% (PL)	SL	
20-26	7.5 YR 5/2		10% (PL)	SCL	

WT = observed apparent water table
*PL =pore lining, M = matrix
**Texture (follows USDA textural classification)
S = sand, L = loam, Si = silt, C = clay
f = fine, c = coarse (textural modifiers for sand)

Soil Scientist Seal

Appendix B
Barefoot Site
Photo Log

March 2018

1. A12 Thick Dark Surface in cultivated field.

2. Soybean field after harvest facing cutover.

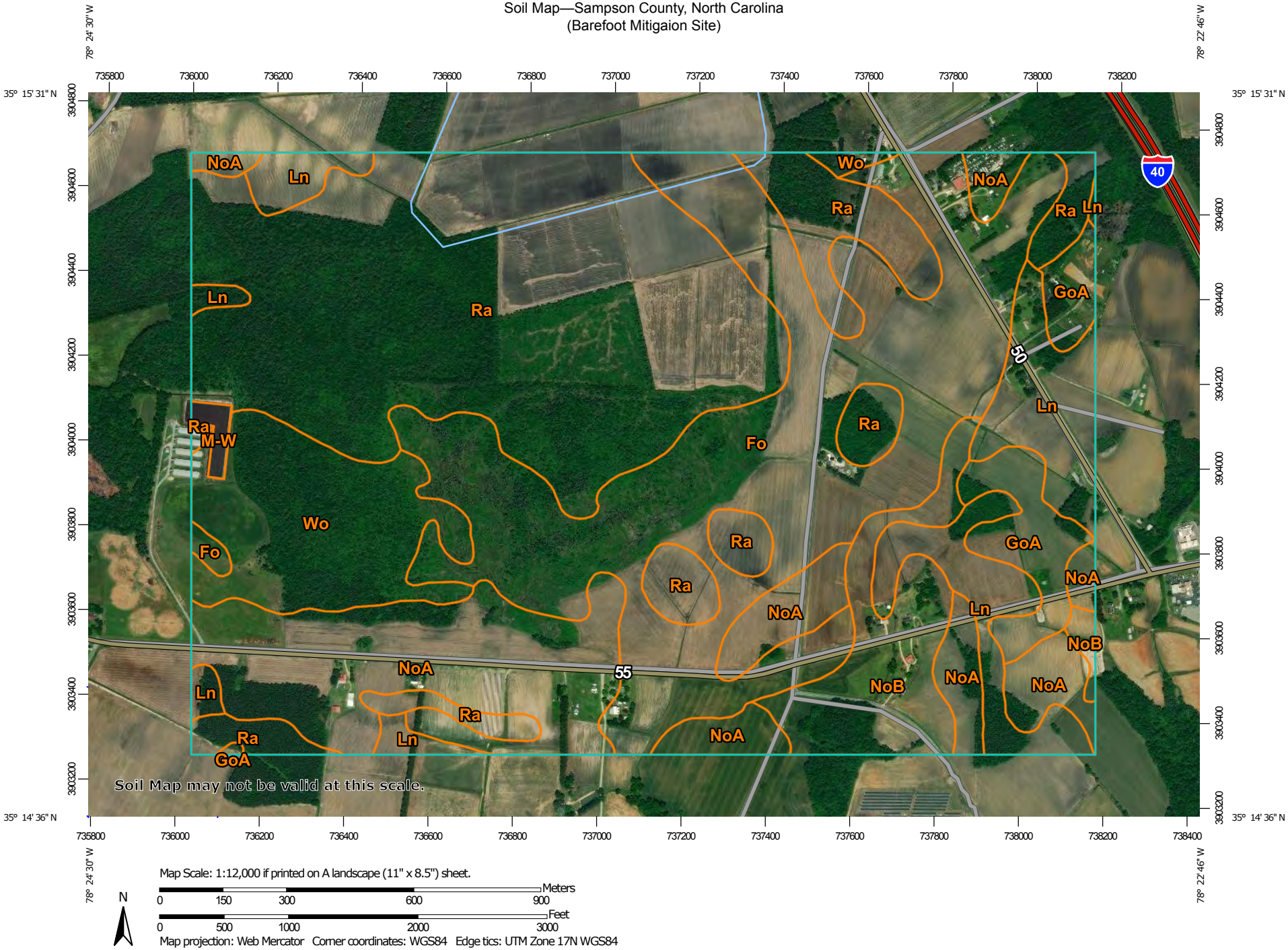
Appendix B
Barefoot Site
Photo Log

March 2018

3. A12-Thick Dark Surface in cutover.

4. Old skidder path in cutover.

Soil Map—Sampson County, North Carolina
(Barefoot Mitigaion Site)



Map Scale: 1:12,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sampson County, North Carolina
Survey Area Data: Version 17, Oct 3, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 29, 2014—Nov 28, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Fo	Foreston loamy sand	192.5	25.5%
GoA	Goldsboro loamy sand, 0 to 2 percent slopes, Southern Coastal Plain	25.5	3.4%
Ln	Lynchburg sandy loam, 0 to 2 percent slopes	59.9	7.9%
M-W	Miscellaneous water	2.4	0.3%
NoA	Norfolk loamy sand, 0 to 2 percent slopes	115.5	15.3%
NoB	Norfolk loamy sand, 2 to 6 percent slopes	40.5	5.4%
Ra	Rains sandy loam, 0 to 2 percent slopes	262.9	34.8%
Wo	Woodington loamy sand	56.1	7.4%
Totals for Area of Interest		**755.2**	**100.0%**

Appendix H – Wetland JD Forms and Maps

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2018-01001** County: **Sampson** U.S.G.S. Quad: **Peacocks Crossroads, NC**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner/Applicant: **Daniel Kornegay**
Address: **610 Worley Road**
Princeton, North Carolina 27569

Size (acres)	**35**	Nearest Town	**Newton Grove**
Nearest Waterway	**Great Coharie Creek**	River Basin	**Neuse**
USGS HUC	**03020201**	Coordinates	Latitude: **35.253597**
			Longitude: **-78.395799**

Location description: **The property is located in the northwest quadrant of the Warren Mill Road and Harnett-Dunn Highway in Newton Grove, Sampson County, NC.**

Indicate Which of the Following Apply:

A. Preliminary Determination

__ There are waters, including wetlands, on the above described property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The waters, including wetlands, have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.

_ There are wetlands on the above described property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the waters, including wetlands, have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the waters, including wetlands, at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the waters of the U.S. on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

B. Approved Determination

_ There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

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

_ We recommend you have the waters of the U.S. on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

_ The waters of the U.S., including wetlands, on your project area have been delineated and the delineation has been verified by the Corps. We recommend you have this delineation surveyed. Upon completion, this survey can be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA.

jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

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

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

_ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in Wilmington, NC, at (910) 796-7215 to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Emily Greer at 910.251.4567 or emily.c.greer@usace.army.mil**

C. Basis For Determination: See Approved Jurisdictional Determination dated December 27, 2018.

D. Remarks:

E. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information for Approved Jurisdiction Determinations (as indicated in Section B. above)

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

US Army Corps of Engineers
South Atlantic Division
Attn: Jason Steele, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by ___**February 25, 2019**_____.
It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: GREER.EMILY.C.1385325300

Digitally signed by GREER.EMILY.C.1385325300
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=GREER.EMILY.C.1385325300
Date: 2018.12.28 10:21:29 -05'00'

Date: **December 27, 2018** Expiration Date: **December 27, 2023**

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete our Customer Satisfaction Survey, located online at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0.

Copy Furnished:

Jeremy Schmid
RES

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Daniel Kornegay**	File Number: **SAW-2018-01001**	Date: **December 27, 2018**

Attached is:	See Section below
☐ INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
☐ PROFFERED PERMIT (Standard Permit or Letter of permission)	B
☐ PERMIT DENIAL	C
☒ APPROVED JURISDICTIONAL DETERMINATION	D
☐ PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: **District Engineer, Wilmington Regulatory Division, Attn: Emily Greer** **69 Darlington Avenue** **Wilmington, NC 28403**	If you only have questions regarding the appeal process you may also contact: Mr. Jason Steele, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, Attn: Ms. Emily Greer, 69 Darlington Avenue, Wilmington, North Carolina 28403

For Permit denials, Proffered Permits and approved Jurisdictional Determinations send this form to:

Division Engineer, Commander, U.S. Army Engineer Division, South Atlantic, Attn: Mr. Jason Steele, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

res

Potential Wetland or Non-Wetland Waters of the U.S. Map

Barefoot Mitigation Site

Sampson County, North Carolina

N
W
E
S

0 100 200

Feet

Date: 5/15/2018

Drawn By: MDE

Checked By: JLS

Revisions: NONE

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): December 27, 2018

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Wilmington District, Barefoot Mitigation Project_Warren Mill Road, SAW-2018-01001

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: NC County/parish/borough: Sampson City: Newton Grove
Center coordinates of site (lat/long in degree decimal format): Lat. 35.253597° **N**, Long. -78.395799° **W**.
Universal Transverse Mercator: **17 736938.89 3904265.22**
Name of nearest waterbody: **Great Coharie Creek**
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: **Neuse River**
Name of watershed or Hydrologic Unit Code (HUC): **Upper Neuse, 03020201**

☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:
☒ Field Determination. Date(s): December 12, 2018

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are no** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☐ TNWs, including territorial seas
      ☐ Wetlands adjacent to TNWs
      ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: linear feet: width (ft) and/or acres.
      Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Pick List**
      Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: **Several drainage ditches traverse the project area. All ditches are constructed in uplands, drain only uplands, and do not exhibit an OHWM. Well established vegetation was observed throughout the channels and no water was present during the site visit. According to the NWI map and the known presence of hydric soils, wetlands previously existed onsite; however, the ditches have effectively drained the wetlands through lateral effect, allowing the area to historically be used for agriculture purposes. Based on this information, there are no jurisdictional resources onsite.**

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW

Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW

Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: **Pick List**

Drainage area: **Pick List**

Average annual rainfall: inches

Average annual snowfall: inches

(ii) Physical Characteristics:

(a) Relationship with TNW:

☐ Tributary flows directly into TNW.

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[3] Supporting documentation is presented in Section III.F.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.

Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW[5]: .

Tributary stream order, if known: .

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):

Average width: feet

Average depth: feet

Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .

Presence of run/riffle/pool complexes. Explain: .

Tributary geometry: **Pick List**

Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: **Pick List**

Estimate average number of flow events in review area/year: **Pick List**

Describe flow regime: .

Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

☐ Dye (or other) test performed: .

Tributary has (check all that apply):

☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

☐ sediment deposition
☐ water staining
☐ other (list):
☐ multiple observed or predicted flow events
☐ abrupt change in plant community

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:
- ☐ oil or scum line along shore objects
- ☐ fine shell or debris deposits (foreshore)
- ☐ physical markings/characteristics
- ☐ tidal gauges
- ☐ other (list):

☐ Mean High Water Mark indicated by:
- ☐ survey to available datum;
- ☐ physical markings;
- ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: .

Identify specific pollutants, if known: .

(iv) Biological Characteristics. Channel supports (check all that apply):

☐ Riparian corridor. Characteristics (type, average width): .

☐ Wetland fringe. Characteristics: .

☐ Habitat for:

- ☐ Federally Listed species. Explain findings: .
- ☐ Fish/spawn areas. Explain findings: .
- ☐ Other environmentally-sensitive species. Explain findings: .
- ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is**: Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

☐ Directly abutting

☐ Not directly abutting

- ☐ Discrete wetland hydrologic connection. Explain: .
- ☐ Ecological connection. Explain: .
- ☐ Separated by berm/barrier. Explain: .

[7] Ibid.

(d) Proximity (Relationship) to TNW
Project wetlands are **Pick List** river miles from TNW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Flow is from: **Pick List.**
Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:
Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width): .

☐ Vegetation type/percent cover. Explain: .

☐ Habitat for:

☐ Federally Listed species. Explain findings: .

☐ Fish/spawn areas. Explain findings: .

☐ Other environmentally-sensitive species. Explain findings: .

☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)
All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

   Provide estimates for jurisdictional waters in the review area (check all that apply):
   - ☐ Tributary waters: linear feet width (ft).
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
   - ☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional waters within the review area (check all that apply):
   - ☐ Tributary waters: linear feet width (ft).
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
   - ☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

[8]See Footnote # 3.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
   ☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
   ☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
   As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
   ☐ Demonstrate that impoundment was created from "waters of the U.S.," or
   ☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
   ☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]

☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
   Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

☒ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
   ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☒ Other: (explain, if not covered above): **No OHWM.**

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.

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[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

☐ Other non-wetland waters: acres. List type of aquatic resource: .

☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).

☐ Lakes/ponds: acres.

☐ Other non-wetland waters: acres. List type of aquatic resource: .

☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: **Barefoot Mitigation Site, 5/15/2018**

☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
- ☒ Office concurs with data sheets/delineation report.
- ☐ Office does not concur with data sheets/delineation report.

☐ Data sheets prepared by the Corps: .

☐ Corps navigable waters' study: .

☒ U.S. Geological Survey Hydrologic Atlas: .
- ☐ USGS NHD data.
- ☒ USGS 8 and 12 digit HUC maps.

☒ U.S. Geological Survey map(s). Cite scale & quad name:1:24k, **Peacocks Crossroads, NC**

☒ USDA Natural Resources Conservation Service Soil Survey. Citation: **NRCS Web Soil Survey**

☒ National wetlands inventory map(s). Cite name: **USFWS Online Wetland Mapper**

☐ State/Local wetland inventory map(s): .

☒ FEMA/FIRM maps: **FEMA.gov**

☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)

☒ Photographs: ☒ Aerial (Name & Date): **SimSuite 2016**
or ☐ Other (Name & Date): .

☐ Previous determination(s). File no. and date of response letter: .

☐ Applicable/supporting case law: .

☐ Applicable/supporting scientific literature: .

☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

May 15, 2018

Ms. Emily Greer
U.S. Army Corps of Engineers
Wilmington Field Office
69 Darlington Ave
Wilmington, NC 28403

Dear Ms. Emily Greer,

Resource Environmental Solutions (RES) is pleased to present this Request for a Preliminary Jurisdictional Determination for Barefoot Mitigation Site located in Newton Grove, Sampson County, North Carolina. As part of this scope of work, RES is submitting this request to the U.S. Army Corps of Engineers (Corps) for a confirmation of the limits of Waters of the U.S. on the subject site.

The Project is located in the Neuse River Basin within Cataloging Unit 03020201, TLW 03020201150040, and NC Division of Water Resources (DWR) subbasin 03-04-04. The Project is within the Mill Creek watershed which is primarily forested and mixed agricultural land, and has historically served this purpose. Specifically, current land use within the project area consists of row crop production and disturbed forest. This proposed site will result in significant ecological improvements including water quality improvement, habitat restoration, and a decrease in non-point source pollution from agricultural practices.

The project provides an excellent opportunity for the re-establishment of a 15.33-acre coastal plain hardwood flat wetland ecological community. The wetland restoration area consists of a network of ditches that all converge in order to drain surrounding land for agricultural use. Surrounding land use consists of active forestry and agricultural fields. Extensive ditching and land-use practices have altered hydrology and vegetation significantly to where jurisdiction has been removed. Hydric soils within the proposed wetlands were confirmed in preliminary site visits and have been verified by George Lankford, LSS.

Attachments for Reference

- Jurisdictional Determination Request Form
- Preliminary Jurisdictional Determination Form
- Landowner Authorization Form
- Project Vicinity Map
- Project Location Map (with topography)
- National Wetlands Inventory Map
- Aerial Imagery
- Soils Map
- Wetland Delineation Data Sheets
- Waters of the U.S. Delineation Map

RES respectfully requests that the Corps confirm this delineation of Waters of the U.S. on this property. I will contact you in the coming days to arrange a site visit for this purpose. Please contact me at (919) 345-3034 if you have any additional questions regarding this matter.

Sincerely,

Jeremy Schmid, PWS
Senior Ecologist

Attachments

Barefoot Mitigation Site
Potential Wetland Area Description

Project Information and Background

The site location is approximately 2.1 miles west of Newton Grove and west of Warren Mill Road (SR 1647) within an existing cultivated field and an adjacent clear-cut. The surrounding landscape is a broad nearly level interstream divide (Figure 1). This project site is surrounded by drainage ditches. Soils are typical Rains soils tending toward the sandier textures, but falls within the expected range of characteristics. The site drains both to the northeast and northwest into two unnamed tributaries to Mill Creek, a tributary to the Neuse River. No apparent ditches or drainage connections the south and Great Coharie Creek were observed.

The cultivated field has drain tiles that enhance drainage. The cut-over forested are to the west is surrounded by ditches, but no drain tiles are known. Historic aerials suggest a timber harvest in the watershed between late 2013 and early 2014 (Google Earth). The surrounding land use is undeveloped land, farms, and single-family homes. Ditches surrounding the site have steep to near vertical sides with a flat, wide bottom and are 3 to 4 feet deep averaging 10 feet wide. Spoil from excavation is located on the bank inside the clear-cut.

The clear-cut area appears to lack hydrology although there is evidence of being wetland in the past. Hydric soil is prevalent throughout the site. During the site evaluations in mid-March before the growing season began, and in mid-April, after the start of the growing season, the water table was not observed to be within 12 inches of the ground surface. The growing season begins on March 18 based upon the NRCS WETS table data with a 50 percent probability of 28^{o} F or higher. Due to the ditches and sandier textured soils, an adequate hydroperiod length was called into question. Although soils do retain a mucky layer, a thick muck layer can persist for many years after wetland hydrology has been effectively removed (Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0, pg 104). Direct observations of the water table in this area ranged from -12 inches to -21 inches below ground elevation.

Natural Community

This area is part of a larger landscape consisting of an interstream divide. The natural wetland community is currently disconnected hydrologically from the larger landscape. The area is in a nearly level interstream divide. The natural watershed originally encompassed over 200 acres with drainage features to the northwest and northeast. Runoff in this nearly level landscape is slow with natural hydrology dependent upon long retention periods. The drainage ditches currently limit the contributing watershed and allow more rapid runoff. The existing natural communities consist of shrub/immature trees and linear disturbances from the timber harvest. The linear disturbances exhibit some compaction and appear to be slightly lower in elevation. The linear disturbances consist mostly of herbaceous species. Ponding within the lower elevations is mostly absent. Hydric soils indicators predominately meet *A7-Mucky Mineral*, *A11-Depleted Below Dark Surface*, and *F3-Depleted Matrix* hydric soil indicators.

This drained wetland is a recent clear-cut with young loblolly pine (*Pinus taeda*), sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and swamp tupelo (*Nyssa biflora*). Shrubs consist of titi (*Cyrilla racemiflora*), sweet bay (*Magnolia virginiana*), highbush blueberry (*Vaccinium corymbosum*), and large gall berry (*Ilex coriacea*). Herbaceous vegetation is concentrated within the old skid paths left from the recent timber harvesting. This includes purple bluestem (*Andropogon glaucopsis*), common rush *(Juncus effusus*), and various sedges (*Carex* sp.).

Jurisdictional Determination Request

US Army Corps of Engineers
Wilmington District

This form is intended for use by anyone requesting a jurisdictional determination (JD) from the U.S. Army Corps of Engineers, Wilmington District (Corps). Please include all supporting information, as described within each category, with your request. You may submit your request via mail, electronic mail, or facsimile. Requests should be sent to the appropriate project manager of the county in which the property is located. A current list of project managers by assigned counties can be found on-line at: http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram/Contact/CountyLocator.aspx, by calling 910-251-4633, or by contacting any of the field offices listed below. Once your request is received you will be contacted by a Corps project manager.

ASHEVILLE & CHARLOTTE REGULATORY FIELD OFFICES
US Army Corps of Engineers
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006
General Number: (828) 271-7980
Fax Number: (828) 281-8120

RALEIGH REGULATORY FIELD OFFICE
US Army Corps of Engineers
3331 Heritage Trade Drive, Suite 105
Wake Forest, North Carolina 27587
General Number: (919) 554-4884
Fax Number: (919) 562-0421

WASHINGTON REGULATORY FIELD OFFICE
US Army Corps of Engineers
2407 West Fifth Street
Washington, North Carolina 27889
General Number: (910) 251-4610
Fax Number: (252) 975-1399

WILMINGTON REGULATORY FIELD OFFICE
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, North Carolina 28403
General Number: 910-251-4633
Fax Number: (910) 251-4025

INSTRUCTIONS:

All requestors must complete Parts A, B, C, D, E, F and G.

NOTE TO CONSULTANTS AND AGENCIES: If you are requesting a JD on behalf of a paying client or your agency, please note the specific submittal requirements in **Part H**.

NOTE ON PART D – PROPERTY OWNER AUTHORIZATION: Please be aware that all JD requests must include the current property owner authorization for the Corps to proceed with the determination, which may include inspection of the property when necessary. This form must be signed by the current property owner(s) or the owner(s) authorized agent to be considered a complete request.

NOTE ON PART D - NCDOT REQUESTS: Property owner authorization/notification for JD requests associated with North Carolina Department of Transportation (NCDOT) projects will be conducted according to the current NCDOT/USACE protocols.

NOTE TO USDA PROGRAM PARTICIPANTS: A Corps approved or preliminary JD may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should also request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

A. PARCEL INFORMATION

Street Address: WARREN MILL RD - OFF

City, State: NEWTON GROVE NC 28366

County: SAMPSON

Parcel Index Number(s) (PIN): 11059716001

B. REQUESTOR INFORMATION

Name: Resource Environmental Solutions

Mailing Address: 302 Jefferson Street, Suite 110

Raleigh, NC 27605

Telephone Number: 239-233-7570

Electronic Mail Address: jschmid@res.us

Select one:

- ☐ I am the current property owner.
- ☑ I am an Authorized Agent or Environmental Consultant[1]
- ☐ Interested Buyer or Under Contract to Purchase
- ☐ Other, please explain. _____

C. PROPERTY OWNER INFORMATION[2]

Name: KORNEGAY, DANIEL FRANKLIN JR

Mailing Address: 610 WORLEY RD

Princeton, NC 27569

Telephone Number: _____

Electronic Mail Address: _____

[1] Must provide completed Agent Authorization Form/Letter.

[2] Documentation of ownership also needs to be provided with request (copy of Deed, County GIS/Parcel/Tax Record).

D. PROPERTY ACCESS CERTIFICATION[3,4]

By signing below, I authorize representatives of the Wilmington District, U.S. Army Corps of Engineers (Corps) to enter upon the property herein described for the purpose of conducting on-site investigations, if necessary, and issuing a jurisdictional determination pursuant to Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. I, the undersigned, am either a duly authorized owner of record of the property identified herein, or acting as the duly authorized agent of the owner of record of the property.

Jeremy Schmid
Print Name

Capacity: ☐ Owner ☑ Authorized Agent[5]

May 15, 2018
Date

Signature

E. REASON FOR JD REQUEST: (Check as many as applicable)

☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.

☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.

☑ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.

☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.

☐ I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 10 list and/or is subject to the ebb and flow of the tide.

☑ A Corps JD is required in order obtain my local/state authorization.

☐ I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.

☐ I believe that the site may be comprised entirely of dry land.

☑ Other: Site will be developed as a wetland mitigation bank.

[3] For NCDOT requests following the current NCDOT/USACE protocols, skip to Part E.

[4] If there are multiple parcels owned by different parties, please provide the following for each additional parcel on a continuation sheet.

[5] Must provide agent authorization form/letter signed by owner(s).

Exhibit C

LANDOWNER AUTHORIZATION FORM

Site: Barefoot Site

PROPERTY LEGAL DESCRITION:

Deed Book	Page	County
1888	0802	Sampson

Parcel ID Number: A portion of Tax ID 11059716001 in Sampson County North Carolina as shown on **Exhibit A.**

Street Address: Warren Mill Road, Newton Grove, NC

Property Owner (please print): Daniel Kornegay

The undersigned, registered property owner(s) of the above property, do hereby authorize

EBX, Neuse I, LLC, Resource Environmental Solutions ("RES"), the NC Department of Environment and Natural Resources, and the US Army Corps of Engineers, their employees, agents or assigns to have reasonable access to the above referenced property for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations.

Property Owners(s) Address: 610 Worley Road
Princeton, NC 27569

Property Owner Telephone Number: 919-920-7865

I/We hereby certify the above information to be true and accurate to the best of my/our knowledge.

By: Danny Kor 2/12/18

(Property Owner Authorized Signature) **(Date)**

F. JURISDICTIONAL DETERMINATION (JD) TYPE (Select One)

☑ I am requesting that the Corps provide a preliminary JD for the property identified herein.

A Preliminary Jurisdictional Determination (PJD) provides an indication that there may be "waters of the United States" or "navigable waters of the United States"on a property. PJDs are sufficient as the basis for permit decisions. For the purposes of permitting, all waters and wetlands on the property will be treated as if they are jurisdictional "waters of the United States". PJDs cannot be appealed (33 C.F.R. 331.2); however, a PJD is "preliminary" in the sense that an approved JD can be requested at any time. PJDs do not expire.

☐ I am requesting that the Corps provide an approved JD for the property identified herein.

An Approved Jurisdictional Determination (AJD) is a determination that jurisdictional "waters of the United States" or "navigable waters of the United States" are either present or absent on a site. An approved JD identifies the limits of waters on a site determined to be jurisdictional under the Clean Water Act and/or Rivers and Harbors Act. Approved JDs are sufficient as the basis for permit decisions. AJDs are appealable (33 C.F.R. 331.2). The results of the AJD will be posted on the Corps website. A landowner, permit applicant, or other "affected party" (33 C.F.R. 331.2) who receives an AJD may rely upon the AJD for five years (subject to certain limited exceptions explained in Regulatory Guidance Letter 05-02).

☐ I am unclear as to which JD I would like to request and require additional information to inform my decision.

G. ALL REQUESTS

☑ Map of Property or Project Area. This Map must clearly depict the boundaries of the review area.

☑ Size of Property or Review Area 35 acres.

☑ The property boundary (or review area boundary) is clearly physically marked on the site.

H. REQUESTS FROM CONSULTANTS

☑ Project Coordinates (Decimal Degrees): Latitude: 35.253597°
Longitude: -78.395799°

☑ A legible delineation map depicting the aquatic resources and the property/review area. Delineation maps must be no larger than 11x17 and should contain the following: (Corps signature of submitted survey plats will occur after the submitted delineation map has been reviewed and approved).[6]

- North Arrow
- Graphical Scale
- Boundary of Review Area
- Date
- Location of data points for each Wetland Determination Data Form or tributary assessment reach.

For Approved Jurisdictional Determinations:

- Jurisdictional wetland features should be labeled as Wetland Waters of the US, 404 wetlands, etc. Please include the acreage of these features.
- Jurisdictional non-wetland features (i.e. tidal/navigable waters, tributaries, impoundments) should be labeled as Non-Wetland Waters of the US, stream, tributary, open water, relatively permanent water, pond, etc. Please include the acreage or linear length of each of these features as appropriate.
- Isolated waters, waters that lack a significant nexus to navigable waters, or non-jurisdictional upland features should be identified as Non-Jurisdictional. Please include a justification in the label regarding why the feature is non-jurisdictional (i.e. "Isolated", "No Significant Nexus", or "Upland Feature"). Please include the acreage or linear length of these features as appropriate.

For Preliminary Jurisdictional Determinations:

- Wetland and non-wetland features should not be identified as Jurisdictional, 404, Waters of the United States, or anything that implies jurisdiction. These features can be identified as Potential Waters of the United States, Potential Non-wetland Waters of the United States, wetland, stream, open water, etc. Please include the acreage and linear length of these features as appropriate.

☑ Completed Wetland Determination Data Forms for appropriate region
(at least one wetland and one upland form needs to be completed for each wetland type)

[6] Please refer to the guidance document titled "Survey Standards for Jurisdictional Determinations" to ensure that the supplied map meets the necessary mapping standards. http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Jurisdiction/

- [x] Completed appropriate Jurisdictional Determination form
  - **PJDs,** please complete a Preliminary Jurisdictional Determination Form[7] and include the Aquatic Resource Table
  - **AJDs**, please complete an Approved Jurisdictional Determination Form[8]
- [x] Vicinity Map
- [x] Aerial Photograph
- [x] USGS Topographic Map
- [x] Soil Survey Map
- [ ] Other Maps, as appropriate (e.g. National Wetland Inventory Map, Proposed Site Plan, previous delineation maps, LIDAR maps, FEMA floodplain maps)
- [ ] Landscape Photos (if taken)
- [ ] NCSAM and/or NCWAM Assessment Forms and Rating Sheets
- [ ] NC Division of Water Resources Stream Identification Forms
- [ ] Other Assessment Forms

[7] www.saw.usace.army.mil/Portals/59/docs/regulatory/regdocs/JD/RGL_08-02_App_A_Prelim_JD_Form_fillable.pdf
[8] Please see http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Jurisdiction/

Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USAGE website.
Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.

Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD:

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Jeremy Schmid, RES,302 Jefferson Street, Suite 110, Raleigh, NC 27605

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: NC County/parish/borough: Sampson City: Newton Grove

Center coordinates of site (lat/long in degree decimal format):

Lat.: 35.253597° Long.: -78.395799°

Universal Transverse Mercator:

Name of nearest waterbody: Neuse River

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:

☐ Field Determination. Date(s):

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)

1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there *"may be"* waters of the U.S. and/or that there *"may be"* navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for PJD (check all that apply)

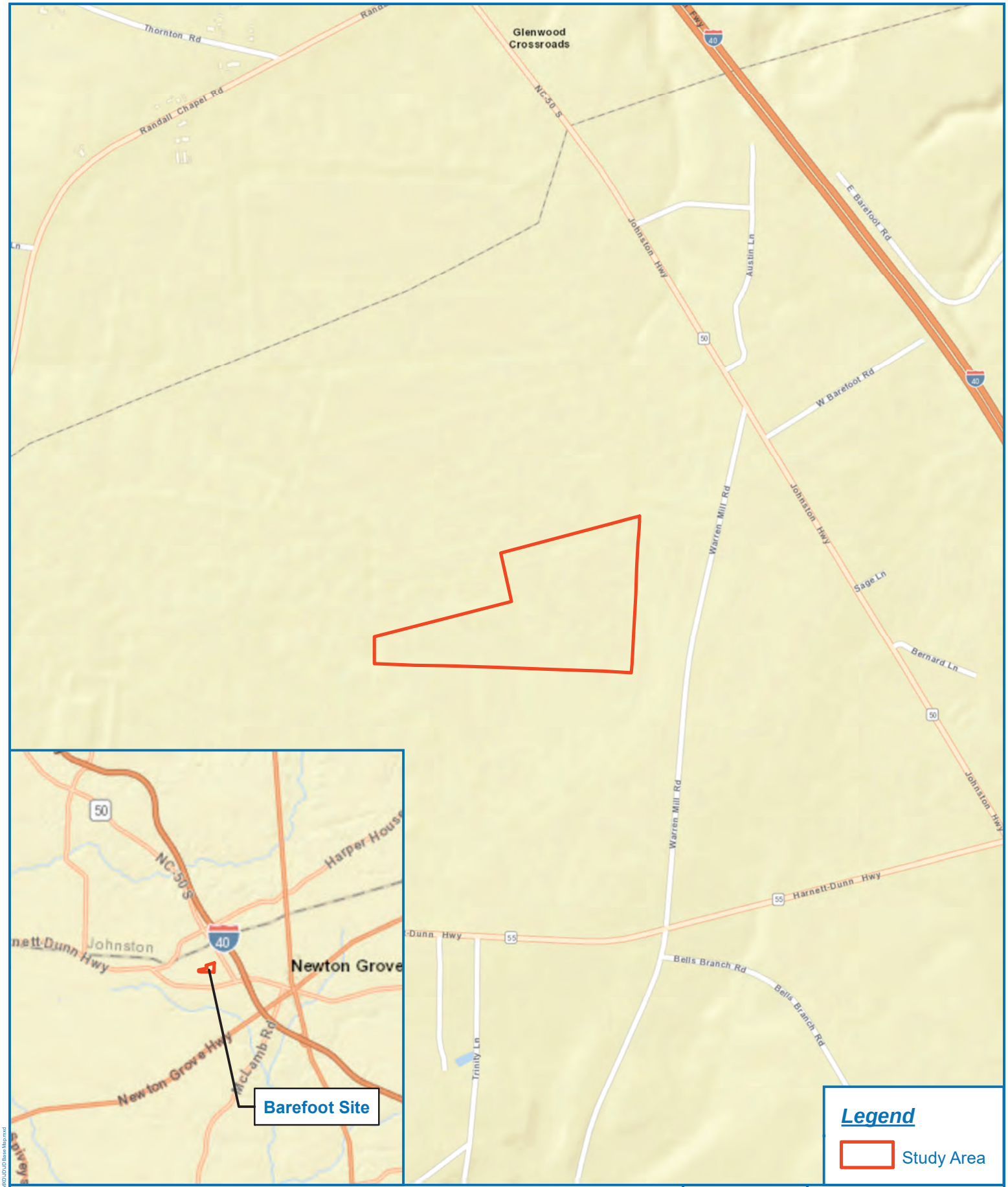
Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- [x] Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
  Map: _____.
- [x] Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - [ ] Office concurs with data sheets/delineation report.
  - [ ] Office does not concur with data sheets/delineation report. Rationale: _____.
- [ ] Data sheets prepared by the Corps: _____.
- [ ] Corps navigable waters' study: _____.
- [ ] U.S. Geological Survey Hydrologic Atlas: _____.
  - [ ] USGS NHD data.
  - [ ] USGS 8 and 12 digit HUC maps.
- [x] U.S. Geological Survey map(s). Cite scale & quad name: _____.
- [x] Natural Resources Conservation Service Soil Survey. Citation: _____.
- [ ] National wetlands inventory map(s). Cite name: _____.
- [ ] State/local wetland inventory map(s): _____.
- [ ] FEMA/FIRM maps: _____.
- [ ] 100-year Floodplain Elevation is: _____.(National Geodetic Vertical Datum of 1929)
- [x] Photographs: [x] Aerial (Name & Date): _____.
  or [ ] Other (Name & Date): _____.
- [ ] Previous determination(s). File no. and date of response letter: _____.
- [ ] Other information (please specify): _____.

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

_____	George K Lankford Digitally signed by George K Lankford Date: 2017.07.03 14:38:54 -04'00'
Signature and date of Regulatory staff member completing PJD	Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable)[1]

[1] Districts may establish timeframes for requestor to return signed PJD forms. If the requestor does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.



Vicinity Map

Barefoot Mitigation Site

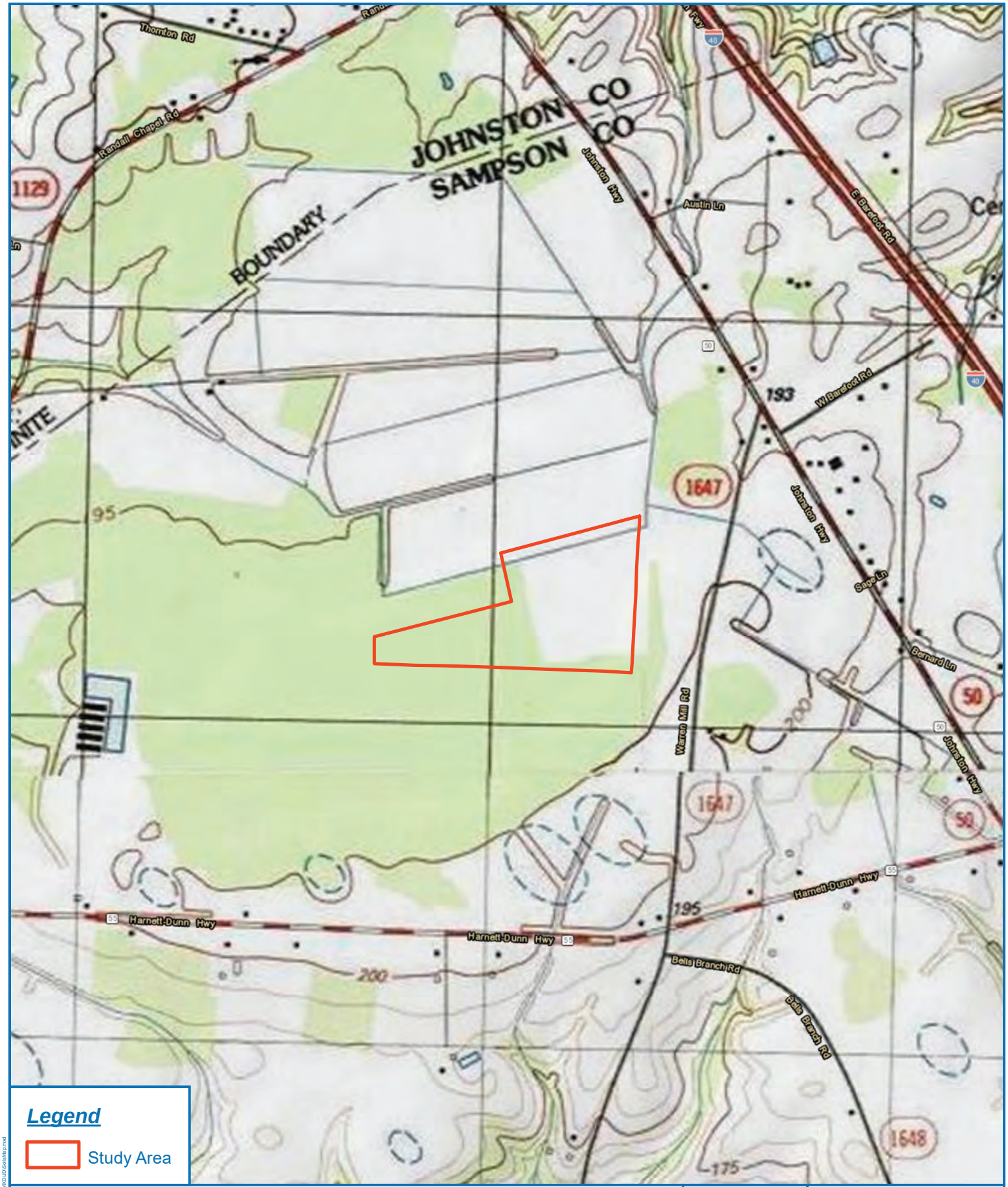
Sampson County, North Carolina

Date: 5/14/2018

Drawn by: MDE

Checked by: JLS

Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\JD\JD Base Map.mxd



Legend

Study Area

N
W E
S

0 500 1,000

Feet

Soils Map

Barefoot Mitigation Site

Sampson County, North Carolina

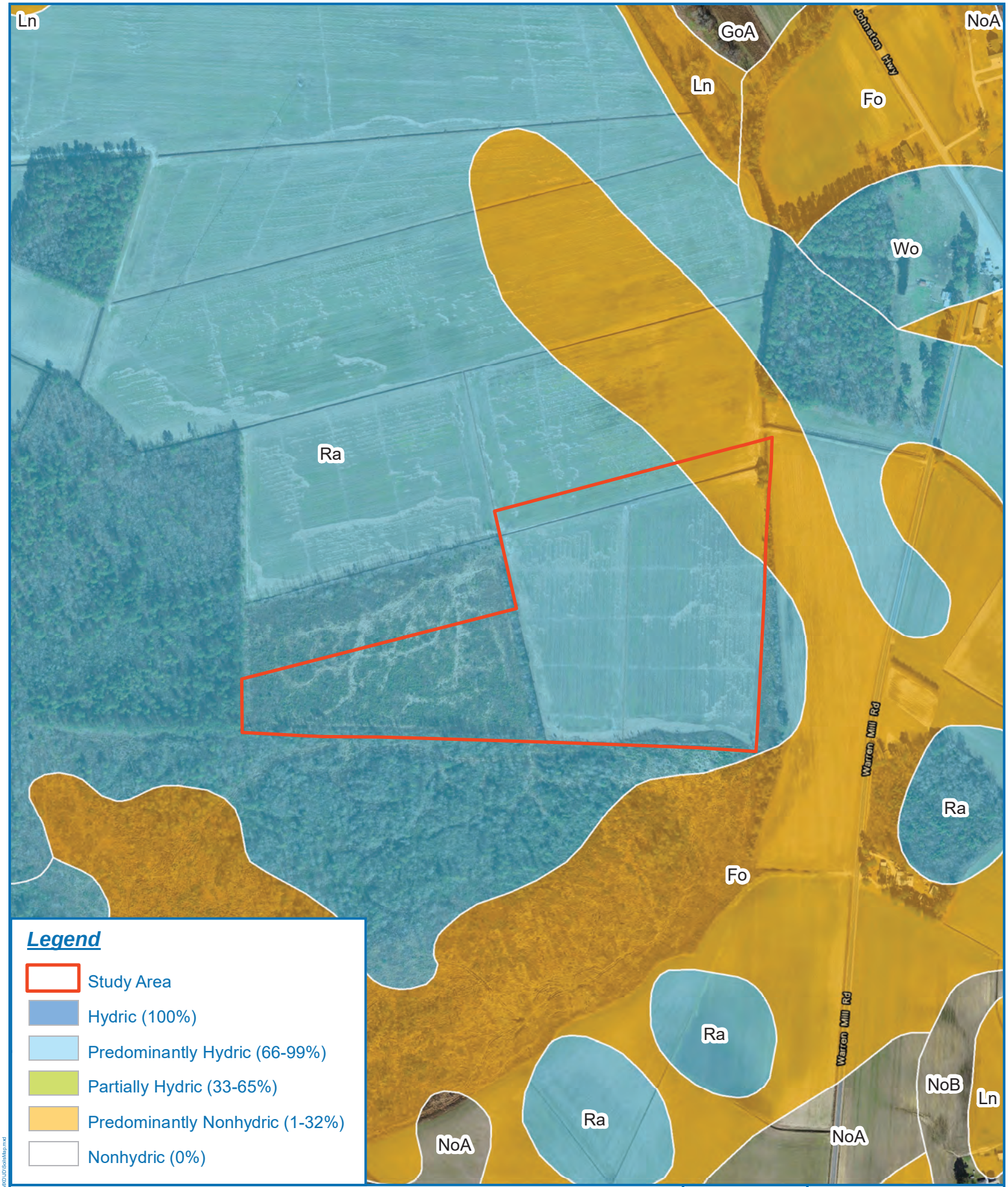
Date: 5/14/2018

Drawn by: MDE

Checked by: JLS

res

Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\JD\SoilsMap.mxd



Legend

- Study Area
- Hydric (100%)
- Predominantly Hydric (66-99%)
- Partially Hydric (33-65%)
- Predominantly Nonhydric (1-32%)
- Nonhydric (0%)

N
W
E
S

0 250 500

Feet

Soils Map

Barefoot Mitigation Site

Sampson County, North Carolina

Date: 5/14/2018

Drawn by: MDE

Checked by: JLS

res

Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\JD\SoilsMap.mxd

Legend

- Study Area
- NWI Wetlands

0 500 1,000

Feet

National Wetland Inventory Map

Barefoot Mitigation Site

Sampson County, North Carolina

Date: 5/14/2018

Drawn by: MDE

Checked by: JLS

res

Document Path: S:\@RES GIS\Projects\NC\Barefoot\MXD\JLS\JLS_Map.mxd

res

Potential Wetland or Non-Wetland Waters of the U.S. Map

Barefoot Mitigation Site

Sampson County, North Carolina

N
W
E
S

0 100 200

Feet

Date: 5/15/2018

Drawn By: MDE

Checked By: JLS

Revisions: NONE

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Barefoot Mitigation Site City/County: Sampson Sampling Date: 03/08/2018

Applicant/Owner: Resource Environmental Solutions State: NC Sampling Point: 171

Investigator(s): G Lankford Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): concave Slope (%): <1%

Subregion (LRR or MLRA): LRR P Lat: 35.253455 Long: -78.394448 Datum: WGS 84

Soil Map Unit Name: Rains sandy loam, occasionally flooded NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

MLRA 133A - Southern Coastal Plain
Located in ~ four year old pine cut over. Distance to drainage ditch is ~90 ft
In shallow depression of skidder path.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): -15
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): -15

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: 171

Tree Stratum (Plot size: 20' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		
Sapling/Shrub Stratum (Plot size:)			
1. Clethra alnifolia	2	NA	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	2 = Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 20' radius)			
1. Panicum anceps	55	Yes	FAC
2. Rubus argutus	2	No	FACU
3. Carex sp.	2	No	--
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	59 = Total Cover		
50% of total cover: 30	20% of total cover: 12		
Woody Vine Stratum (Plot size:)			
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: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (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	77	x 3 =	231
FACU species	2	x 4 =	8
UPL species		x 5 =	
Column Totals:	79 (A)		239 (B)

Prevalence Index = B/A = 3.03

Hydrophytic Vegetation Indicators:

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☐ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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 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 X No

Remarks: (If observed, list morphological adaptations below).

Vegetation is borderline hydrophytic.

SOIL

Sampling Point: 171

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	N 2.5/1	100					mucky SL	
2-6	N 2.5/1	100					SL	
6-10	7.5 YR 3/1	90	7.5 YR 5/2	10	D	M	SL	
--	--	--	N 2.5/1	5	C	PL	--	
10-21	7.5 YR 6/1	60	5 YR 2.5/2	10	C	PL	SL	
21-33	7.5 YR 5/1	70	7.5 YR 4/6	10	C	PL	SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☑ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☑ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Barefoot Mitigation Site City/County: Sampson Sampling Date: 03/08/2018

Applicant/Owner: Resource Environmental Solutions State: NC Sampling Point: 172

Investigator(s): G Lankford Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): level Slope (%): <1%

Subregion (LRR or MLRA): LRR P Lat: 35.253511 Long: -78.394367 Datum: WGS 84

Soil Map Unit Name: Rains sandy loam, occasionally flooded NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

MLRA 133A - Southern Coastal Plain
Located in ~ four year old pine cut over. Distance to drainage ditch is ~70 ft)
In slightly elevated undisturbed area outside of skidder path.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes X	No _____	Depth (inches): -21
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): -21

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: 172

Tree Stratum (Plot size: 20' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	75	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	75 = Total Cover		
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (Plot size: 20' radius)			
1. Liquidambar styraciflua	5	Yes	FAC
2. Vaccinium corymbosum	2	Yes	FACW
3. Rhus copallinum	2	Yes	FACU
4.			
5.			
6.			
7.			
8.			
	9 = Total Cover		
50% of total cover: 4.5	20% of total cover: 1.8		

Herb Stratum (Plot size: 20' radius)			
1. Panicum anceps	5	Yes	FAC
2. Eupatorium capillifolium	2	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	7 = Total Cover		
50% of total cover: 3.5	20% of total cover: 1.4		

Woody Vine Stratum (Plot size:)			
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: 5 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.3 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	2	x 2 =	4
FAC species	87	x 3 =	261
FACU species	2	x 4 =	8
UPL species		x 5 =	
Column Totals:	91 (A)		275 (B)

Prevalence Index = B/A = 3.02

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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 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 X

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: 172

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5 YR 3/1	100					SL	
3-11	N 2.5/1	100					SL	
11-23	7.5 YR 5/2	90	N 2.5/1	12	D	M	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☑ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Barefoot Mitigation Site City/County: Sampson Sampling Date: 03/23/2018

Applicant/Owner: Resource Environmental Solutions State: NC Sampling Point: 175r

Investigator(s): G Lankford Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): concave Slope (%): <1%

Subregion (LRR or MLRA): LRR P Lat: 35.253676 Long: -78.398414 Datum: WGS 84

Soil Map Unit Name: Rains sandy loam, occasionally flooded NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

MLRA 133A - Southern Coastal Plain. Point is for reference conditions outside of project area. Located in ~ four year old pine cut over. Distance to drainage ditch is ~130 ft

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes X	No _____	Depth (inches): -3
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): -3

Wetland Hydrology Present? Yes X 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: 175r

Tree Stratum (Plot size: 20' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	50	Yes	FAC
2. Acer rubrum	7	No	FAC
3. Nyssa biflora	5	No	FACW
4.			
5.			
6.			
7.			
8.			
	62 = Total Cover		
50% of total cover: 31	20% of total cover: 12.4		

Sapling/Shrub Stratum (Plot size:)			
1. Cyrilla racemiflora	15	Yes	FACW
2. Clethra alnifolia	10	Yes	FAC
3. Vaccinium corymbosum	5	No	FACW
4. Magnolia virginiana	5	No	FACW
5.			
6.			
7.			
8.			
	35 = Total Cover		
50% of total cover: 17.5	20% of total cover: 7		

Herb Stratum (Plot size: 20' radius)			
1. Panicum anceps	55	Yes	FAC
2. Rubus argutus	2	No	FACU
3. Carex sp.	2	No	--
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	59 = Total Cover		
50% of total cover: 30	20% of total cover: 12		

Woody Vine Stratum (Plot size: 20' radius)			
1. Smilax laurifolia	5	Yes	OBL
2. Gelsemium sempervirens	5	Yes	FACW
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (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:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [ ] 2 - Dominance Test is >50%
- [ ] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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 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** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: 175r

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	7.5 YR 2.5/3	100					mucky	
2-9	7.5YR 2.5/1	98	7.5 YR 4/1	2	D	M	SL	
9-20	10 YR 4/1	95	7.5 YR 4/6	5	C	PL	SL	
20-26	7.5 YR 5/2	90	7.5 YR 4/6	10	C	PL	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☑ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☑ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

Area surrounding point with ~4 inches of partially decomposed duff and leaf litter.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Barefoot Mitigation Site City/County: Sampson Sampling Date: 03/23/2018

Applicant/Owner: Resource Environmental Solutions State: NC Sampling Point: 181

Investigator(s): G Lankford Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): level Slope (%): <1%

Subregion (LRR or MLRA): LRR P Lat: 35.252771 Long: -78.396497 Datum: WGS 84

Soil Map Unit Name: Rains sandy loam, occasionally flooded NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X No ____	**Is the Sampled Area within a Wetland?** Yes X No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:

MLRA 133A - Southern Coastal Plain
Located in ~ four year old pine cut over. Distance to drainage ditch is ~100 ft

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): -12
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): -12

Wetland Hydrology Present? Yes X 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: 181

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	75 = Total Cover		
50% of total cover:		20% of total cover:	
Sapling/Shrub Stratum (Plot size: 20' radius)			
1. Acer rubrum	50	Yes	FAC
2. Pinus taeda	5	No	FAC
3. Ilex opaca	3	No	FACU
4. Cyrilla racemiflora	3	No	FACW
5. Vaccinium corymbosum	2	No	FACW
6.			
7.			
8.			
	63 = Total Cover		
50% of total cover: 31		20% of total cover: 12.6	
Herb Stratum (Plot size: 20' radius)			
1. Smilax laurifolia	2	NA	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	7 = Total Cover		
50% of total cover: 3.5		20% of total cover: 1.4	
Woody Vine Stratum (Plot size:)			
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: _____ (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (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 ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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 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** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: 181

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-15	7.5 YR 2.5/1	100					SL	
15-16	7.5 YR 3/1	85	7.5 YR 5/2	15	D	PL	SL	
18-24	7.5 YR 5/1	95	7.5 YR 3/1	5	C	PL	SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☑ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Barefoot Mitigation Site City/County: Sampson Sampling Date: 03/23/2018

Applicant/Owner: Resource Environmental Solutions State: NC Sampling Point: 182

Investigator(s): G Lankford Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): level Slope (%): <1%

Subregion (LRR or MLRA): LRR P Lat: 35.252771 Long: -78.396497 Datum: WGS 84

Soil Map Unit Name: Rains sandy loam, occasionally flooded NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

MLRA 133A - Southern Coastal Plain
Located in ~ four year old pine cut over. Distance to drainage ditch is ~90 ft

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes X	No _____	Depth (inches): -18
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): -18

Wetland Hydrology Present? Yes X 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: 182

Tree Stratum (Plot size: 20' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	90	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	90 = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Sapling/Shrub Stratum (Plot size: 20' radius)			
1. Acer rubrum	5	Yes	FAC
2. Persea borbonia	2	Yes	FACW
3. Clethra alnifolia	1	No	FAC
4.			
5.			
6.			
7.			
8.			
	8 = Total Cover		
50% of total cover: 4	20% of total cover: 1.6		

Herb Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Woody Vine Stratum (Plot size: ____)			
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: ____ (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (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 ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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 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** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: 182

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5 YR 2.5/1	100					mucky SL	
3-11	7.5 YR 3/1	85	7.5 YR 4/3	10	C	PL	SL	
11-20	2.5 Y 4/2	95	7.5 YR 2.5/1	15	C	PL	SL	

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

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☑ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☑ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

Has a dry partially decomposed duff layer.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Barefoot Mitigation Site City/County: Sampson Sampling Date: 03/23/2018

Applicant/Owner: Resource Environmental Solutions State: NC Sampling Point: 185

Investigator(s): G Lankford Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): level Slope (%): <1%

Subregion (LRR or MLRA): LRR P Lat: 35.253589 Long: -78.396078 Datum: WGS 84

Soil Map Unit Name: Rains sandy loam, occasionally flooded NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X No ____	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes ____ No X	

Remarks:

MLRA 133A - Southern Coastal Plain
Located in ~ four year old pine cut over. Point is centrally located relative to ditching.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): -15
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): -15

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: 185

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	75 = Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 20' radius)			
1. lex coriacea	65	Yes	FACW
2. Cyrilla racemiflora	5	No	FACW
3. Liquidambar styraciflua	5	No	FAC
4. Acer rubrum	2	No	FAC
5.	2	No	FACW
6.			
7.			
8.			
	79 = Total Cover		
50% of total cover: 40	20% of total cover: 16		
Herb Stratum (Plot size: 20' radius)			
1. Panicum anceps	5	Yes	FAC
2. Andropogon glaucopsis	5	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10 = Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size: 20' radius)			
1. Smilax laurifolia	2	NA	OBL
2.			
3.			
4.			
5.			
	2 = Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (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 ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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 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** X **No** _____

Remarks: (If observed, list morphological adaptations below).

Point appears relatively undisturbed by timber harvest beyond canopy removal.

SOIL

Sampling Point: 185

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	7.5 YR 2.5/1	100					Muck	
5-19	7.5 YR 2.5/1						SL	
19-28	7.5 YR 4/1	98	7.5 YR 4/4	2	C	M	SL	

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

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☑ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☑ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

Appendix I – Invasive Species Plan

INVASIVE SPECIES PLAN

Annual monitoring and semi-annual site visits will be conducted to assess the condition of the finished project. These site inspections may identify the presence of invasive vegetation. RES will treat invasive species vegetation within the project area and provide remedial action on a case-by-case basis. Common invasive species vegetation, such as Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), tree-of-heaven (*Ailanthus altissima*), and Japanese honeysuckle (*Lonicera japonica*), will be treated to allow native plants to become established within the conservation easement. Invasive species vegetation will be treated by approved mechanical and/or chemical methods such that the percent composition of exotic/invasive species is less than 5% of the total wetland re-establishment area. Any control methods requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations. If areas of invasive species exist within the easement, they will be monitored yearly as part of the monitoring protocol and treated if necessary. If required, problem areas will continue to be treated until the project easement shows overall trending towards meeting all monitoring requirements.

Appendix J – Approved FHWA Categorical Exclusion Form

Categorical Exclusion Form for Division of Mitigation Services Projects
Version 1.4

Part 1: General Project Information	
Project Name:	Barefoort
County Name:	Sampson
DMS ID Number:	100044
Project Sponsor:	Resource Environmental Solutions LLC
Project Contact Name:	Bob White
Project Contact Address:	302 Jefferson Street Suite 110, Raleigh, NC 27605
Project Contact E-mail:	bwhite@res.us
DMS Project Manager:	Lindsay Crocker

Project Description

The Barefoot site is located in the Neuse River Basin within Cataloging Unit 03020201, TLW 03020201150040, and NC Division of Water Resources (DWR) subbasin 03-04-04. The Project will protect roughly 35 acres and provides an excellent opportunity for the re-establishment of a 15.3-acre coastal plain hardwood flat wetland ecological community. The wetland restoration area consists of a network of ditches that all converge in order to drain surrounding land for agricultural use. Wetland restoration activities will include: plugging existing ditches and interrupting subsurface flow through drain tiles; grading restoration areas to match historical contours and promote surface water retention and infiltration; subsoil ripping to alleviate compaction and promote soil structure; and replanting with appropriate tree species and a permanent seed mix.

For Official Use Only

Reviewed By:

10/10/2018
Date

LHCrocker.
DMS Project Manager

Conditional Approved By:

Date

For Division Administrator FHWA

☐ **Check this box if there are outstanding issues**

Final Approval By:

10-10-18
Date

For Division Administrator FHWA

Part 2: All Projects Regulation/Question	Response
Coastal Zone Management Act (CZMA)	
1. Is the project located in a CAMA county?	☐ Yes ☑ No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?	☐ Yes ☐ No ☑ N/A
3. Has a CAMA permit been secured?	☐ Yes ☐ No ☑ N/A
4. Has NCDCM agreed that the project is consistent with the NC Coastal Management Program?	☐ Yes ☐ No ☑ N/A
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	
1. Is this a "full-delivery" project?	☑ Yes ☐ No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?	☐ Yes ☑ No ☐ N/A
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☑ No ☐ N/A
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☐ No ☑ N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?	☐ Yes ☐ No ☑ N/A
6. Is there an approved hazardous mitigation plan?	☐ Yes ☐ No ☑ N/A
National Historic Preservation Act (Section 106)	
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?	☐ Yes ☑ No
2. Does the project affect such properties and does the SHPO/THPO concur?	☐ Yes ☐ No ☑ N/A
3. If the effects are adverse, have they been resolved?	☐ Yes ☐ No ☑ N/A
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)	
1. Is this a "full-delivery" project?	☑ Yes ☐ No
2. Does the project require the acquisition of real estate?	☑ Yes ☐ No ☐ N/A
3. Was the property acquisition completed prior to the intent to use federal funds?	☐ Yes ☑ No ☐ N/A
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?	☑ Yes ☐ No ☐ N/A

Part 3: Ground-Disturbing Activities Regulation/Question	Response
American Indian Religious Freedom Act (AIRFA)	
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?	☐ Yes ☑ No
2. Is the site of religious importance to American Indians?	☐ Yes ☐ No ☑ N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?	☐ Yes ☐ No ☑ N/A
4. Have the effects of the project on this site been considered?	☐ Yes ☐ No ☑ N/A
Antiquities Act (AA)	
1. Is the project located on Federal lands?	☐ Yes ☑ No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Archaeological Resources Protection Act (ARPA)	
1. Is the project located on federal or Indian lands (reservation)?	☐ Yes ☑ No
2. Will there be a loss or destruction of archaeological resources?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Endangered Species Act (ESA)	
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	☑ Yes ☐ No
2. Is Designated Critical Habitat or suitable habitat present for listed species?	☑ Yes ☐ No ☐ N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?	☐ Yes ☑ No ☐ N/A
4. Is the project "likely to adversely affect" the species and/or "likely to adversely modify" Designated Critical Habitat?	☐ Yes ☐ No ☑ N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?	☐ Yes ☐ No ☑ N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	☐ Yes ☐ No ☑ N/A

Executive Order 13007 (Indian Sacred Sites)	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	☐ Yes ☑ No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	☐ Yes ☐ No ☑ N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	☐ Yes ☐ No ☑ N/A
Farmland Protection Policy Act (FPPA)	
1. Will real estate be acquired?	☑ Yes ☐ No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	☑ Yes ☐ No ☐ N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	☑ Yes ☐ No ☐ N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	☑ Yes ☐ No
2. Have the USFWS and the NCWRC been consulted?	☑ Yes ☐ No ☐ N/A
Land and Water Conservation Fund Act (Section 6(f))	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	☐ Yes ☑ No
2. Has the NPS approved of the conversion?	☐ Yes ☐ No ☑ N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	☐ Yes ☑ No
2. Is suitable habitat present for EFH-protected species?	☐ Yes ☐ No ☑ N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	☐ Yes ☐ No ☑ N/A
4. Will the project adversely affect EFH?	☐ Yes ☐ No ☑ N/A
5. Has consultation with NOAA-Fisheries occurred?	☐ Yes ☐ No ☑ N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	☐ Yes ☑ No
2. Have the USFWS recommendations been incorporated?	☐ Yes ☐ No ☑ N/A
Wilderness Act	
1. Is the project in a Wilderness area?	☐ Yes ☑ No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	☐ Yes ☐ No ☑ N/A

From: Stancil, Vann F
To: Matthew DeAngelo
Subject: RE: [External] Project Scoping for Barefoot Mitigation Project in Sampson County
Date: Tuesday, March 6, 2018 4:18:34 PM

Matt,

I've reviewed the Barefoot Wetland Mitigation Site. It's located in northern Sampson County, west of Newton Grove, in the Mill Creek watershed. The site consists of cleared agricultural land and forested land. There are no records of any state or federally listed species at the site nor any in the immediate vicinity of the site.

The Matthew Stream and Wetland Mitigation Site is located in Johnston County, southeast of Four Oaks. The site formerly impounded an unnamed tributary to Juniper Swamp before the dam was breached during Hurricane Matthew in 2016. There are no records of any state or federally listed species at the site nor any in the immediate vicinity of the site.

Regarding terrestrial species, the U.S. Fish and Wildlife Service (USFWS) recently listed the northern long-eared bat (*Myotis septentrionalis*) as threatened under the Endangered Species Act. Johnston & Sampson counties are within the range (https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf) of the northern long-eared bat and may be present or in the vicinity of the project site. As such, consultation with the USFWS may be required. For more information, please see https://www.fws.gov/midwest/endangered/mammals/nleb/ or https://www.fws.gov/raleigh/NLEB_RFO.html or contact the Raleigh office of the USFWS to ensure that potential issues related to this species are addressed.

Looking back at your emails after I typed up this response, I see that you said to disregard the Barefoot Site. I thought I deleted your email about it but apparently I did not. If there are any other outstanding projects that you need me to review, please let me know and let me know if I can assist further with the Matthew project.

Thanks,
Vann

From: Matthew DeAngelo [mailto:mdeangelo@res.us]
Sent: Monday, January 15, 2018 1:20 PM
To: Stancil, Vann F <vann.stancil@ncwildlife.org>
Subject: [External] Project Scoping for Barefoot Mitigation Project in Sampson County

Dear Mr. Stancil,

The Barefoot Wetland Mitigation Site has been identified by Resource Environmental Solutions, LLC (RES) to provide compensatory mitigation for unavoidable wetland impacts in Sampson County, North Carolina through the North Carolina Division of Mitigation Services.

The purpose of this letter is to request, review, and comment on any possible issues that might emerge with respect to fish and wildlife associated with a potential wetland restoration project on the attached site (A USGS site map with approximate property lines and areas of potential ground disturbance are enclosed along with a KMZ file).

We thank you in advance for your timely response and cooperation. You may return the comment to my attention at the address listed in the attached letter or via email. Please feel free to contact me at mdeangelo@res.us with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,

Matt DeAngelo
Ecologist

RES | res.us
Direct: 984.255.9133 | Mobile: 757.202.4471

USDA
United States Department of Agriculture

Natural Resources
Conservation Service

North Carolina
State Office

4407 Bland Road
Suite 117
Raleigh, NC 27609
Voice 919-873-2171
Fax (844) 325-2156

January 25, 2018

Megan D. Engel
Field Ecologist
RES
302 Jefferson Street, Suite 110
Raleigh, NC 27605

Dear Ms. Engel:

Thank you for your letter dated January 11, 2018, Subject: Proposed Barefoot Mitigation Site, Conservation Easement, Sampson Co., NC. The following guidance is provided for your information.

Projects are subject to the Farmland Protection Policy Act (FPPA) requirements if they may irreversibly convert farmland (directly or indirectly) to non-agricultural use and are completed by a federal agency or with assistance from a federal agency. Farmland means prime or unique farmlands as defined in section 1540(c)(1) of the FPPA or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the Secretary of Agriculture to be farmland of statewide local importance.

For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forestland, pastureland, cropland, or other land, but not water or urban built-up land.

Farmland does not include land already in or committed to urban development or water storage. Farmland *already in* urban development or water storage includes all such land with a density of 30 structures per 40-acre area. Farmland already in urban development also includes lands identified as *urbanized area* (UA) on the Census Bureau Map, or as urban area mapped with a *tint overprint* on the United States Geological Survey (USGS) topographical maps, or as *urban-built-up* on the United States Department of Agriculture (USDA) Important Farmland Maps.

The area in question meets one or more of the above criteria for Farmland. Farmland area will be affected or converted. Enclosed is the Farmland Conversion Impact Rating form AD1006 with PARTS II, IV and V completed by NRCS. The corresponding agency will need to complete the evaluation, according to the Code of Federal Regulation 7CFR 658, Farmland Protection Policy Act.

If you have any questions, please contact Milton Cortes, Assistant State Soil Scientist at 919-873-2171 or by email: milton.cortes@nc.usda.gov.

Again, thank you for inquiry. If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

Milton Cortes

Milton Cortes
Assistant State Soil Scientist

cc:
Kent Clary, State Soil Scientist, NRCS, Raleigh, NC

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 1/11/2017
Name of Project Barefoot Mitigation Site	Federal Agency Involved Federal Highway Admin (FHWA)
Proposed Land Use Conservation Easement	County and State Sampson County, NC
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 1/11/2017 / Person Completing Form: Milton Cortes NRCS NC

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑ NO ☐	Acres Irrigated: none	Average Farm Size: 273 acres
Major Crop(s): CORN	Farmable Land In Govt. Jurisdiction — Acres: 86.8 % 534,789 acres	Amount of Farmland As Defined in FPPA — Acres: 76.6 % 472,209 acres	
Name of Land Evaluation System Used: Sampson Co. NC LESA	Name of State or Local Site Assessment System: N/A	Date Land Evaluation Returned by NRCS: January 25, 2018 by eMail	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating: Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	35.07			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	35.07			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	32.70			
B. Total Acres Statewide Important or Local Important Farmland	2.30			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.0074			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	27.3%			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	81			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	15			
2. Perimeter In Non-urban Use	(10)	10			
3. Percent Of Site Being Farmed	(20)	11			
4. Protection Provided By State and Local Government	(20)	0			
5. Distance From Urban Built-up Area	(15)	15			
6. Distance To Urban Support Services	(15)	15			
7. Size Of Present Farm Unit Compared To Average	(10)	0			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	0			
10. On-Farm Investments	(20)	10			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	76	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	81	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	76	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	157	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form:	Date:

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map**,** or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \text{ X } 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies should use this form for the optional streamlined consultation framework for the northern long-eared bat (NLEB). This framework allows federal agencies to rely upon the U.S. Fish and Wildlife Service's (USFWS) January 5, 2016, intra-Service Programmatic Biological Opinion (BO) on the final 4(d) rule for the NLEB for section 7(a)(2) compliance by: (1) notifying the USFWS that an action agency will use the streamlined framework; (2) describing the project with sufficient detail to support the required determination; and (3) enabling the USFWS to track effects and determine if reinitiation of consultation is required per 50 CFR 402.16.

This form is not necessary if an agency determines that a proposed action will have no effect to the NLEB or if the USFWS has concurred in writing with an agency's determination that a proposed action may affect, but is not likely to adversely affect the NLEB (i.e., the standard informal consultation process). Actions that may cause prohibited incidental take require separate formal consultation. Providing this information does not address section 7(a)(2) compliance for any other listed species.

Information to Determine 4(d) Rule Compliance:	**YES**	**NO**
1. Does the project occur wholly outside of the WNS Zone[1]?	☒	☐
2. Have you contacted the appropriate agency[2] to determine if your project is near known hibernacula or maternity roost trees?	☒	☐
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	☐	☒
4. Could the project alter the entrance or interior environment of a known hibernaculum?	☐	☒
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	☐	☒
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	☐	☒

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the BO.

Agency and Applicant[3] (Name, Email, Phone No.):

Donnie Brew, Donnie.brew@dot.gov, 919-747-7017
Federal Highway Administration

Bob White, bob.white@res.us, (919)829-9909
Resource Enviornmental Solutions

[1] http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf
[2] See http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html
[3] If applicable - only needed for federal actions with applicants (e.g., for a permit, etc.) who are party to the consultation.

Project Name: Barefoot Mitigation Project

Project Location (include coordinates if known):

The Barefoot Wetland Mitigation Project ("Project") is located in Sampson County approximately 2 miles west of Newton Grove in Sampson County, NC. The Project is located in the Neuse River Basin within Cataloging Unit 03020201, TLW 03020201150040, and NC Division of Water Resources (DWR) subbasin 03-04-04. The Project will protect roughly 35 acres. Coordinates for the site are as follows: 35.253501 N, -78.39209 W.

Basic Project Description (provide narrative below or attach additional information):

A key design consideration for the Project is ensuring the restored wetlands achieve maximum functional uplift while allowing the existing agricultural land uses to continue. All restoration practices will be designed and implemented to accommodate current and future flow conditions.

The project provides an excellent opportunity for the re-establishment of a 15.33-acre coastal plain hardwood flat wetland ecological community. The wetland restoration area consists of a network of ditches that all converge in order to drain surrounding land for agricultural use. Surrounding land use consists of active forestry and agricultural fields. Extensive ditching and land-use practices have altered hydrology and vegetation significantly to where jurisdiction has been removed. Hydric soils within the proposed wetlands were confirmed in preliminary site visits and have been verified by a licensed soil scientist. Wetland restoration activities will include:

- The existing ditches will be backfilled and stabilized;
- Grading restoration areas to match historical contours and promote detention and infiltration;
- Subsoil ripping to alleviate compaction and promote soil structure; and
- Areas will be replanted with appropriate tree species and a permanent seed mix.

The resulting natural community will provide a functional, stable wetland system with a diversity of habitats that offers multiple values and uses.

General Project Information	YES	NO
Does the project occur within 0.25 miles of a known hibernaculum?	☐	☒
Does the project occur within 150 feet of a known maternity roost tree?	☐	☒
Does the project include forest conversion[4]? (if yes, report acreage below)	☐	☒
Estimated total acres of forest conversion		
If known, estimated acres[5] of forest conversion from April 1 to October 31		
If known, estimated acres of forest conversion from June 1 to July 31[6]		
Does the project include timber harvest? (if yes, report acreage below)	☐	☒
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	☐	☒
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	☐	☒
Estimated wind capacity (MW)		

Agency Determination:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.

Signature: _____ Date Submitted: _____

[4] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the BO).
[5] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[6] If the activity includes tree clearing in June and July, also include those acreage in April to October.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636-3726

Date: 10/04/2018

Self-Certification Letter

Project Name Barefoot

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Raleigh Ecological Services online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the project named above in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. Based on your analysis, mark all the determinations that apply:

- [x] "no effect" determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- [x] "may affect, not likely to adversely affect" determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- [ ] "may affect, likely to adversely affect" determination for the Northern long-eared bat (Myotis septentrionalis) and relying on the findings of the January 5, 2016, Programmatic Biological Opinion for the Final 4(d) Rule on the Northern long-eared bat;
- [x] "no Eagle Act permit required" determinations for eagles.

We certify that use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the "no effect" or "not likely to adversely affect" determinations for proposed and listed species and proposed and designated critical habitat; the "may affect" determination for Northern long-eared bat; and/or the "no Eagle Act permit required" determinations for eagles. Additional coordination with this office is not needed. Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species. Should project plans change or if additional information on the distribution of proposed or listed species, proposed or designated critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for 1 year. Information about the online project review process including instructions, species information, and other information regarding project reviews within North Carolina is available at our website http://www.fws.gov/raleigh/pp.html. If you have any questions, you can write to us at Raleigh@fws.gov or please contact Leigh Mann of this office at 919-856-4520, ext. 10.

Sincerely,

/s/Pete Benjamin

Pete Benjamin
Field Supervisor
Raleigh Ecological Services

Enclosures - project review package

Megan Engel

From: Raleigh, FW4 <raleigh@fws.gov>
Sent: Thursday, October 4, 2018 10:05 AM
To: Megan Engel
Subject: Confirmation of Project Receipt Re: [EXTERNAL] Online project review certification letter: Barefoot Mitigation Site

Thank you for submitting your online project package. We will review your package within 30 days of receipt. If you have submitted an online **project review request letter**, expect our response within 30 days. If you have submitted an online **project review certification letter**, you will typically not receive a response from us since the certification letter is our official response. However, if we have additional questions or we do not concur with your determinations, we will contact you during the review period.

Species Conclusions Table

Project Name: Barefoot Mitigation Site

Date: 09/21/2018

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Red-cockaded Woodpecker (*Picoides borealis)*	No suitable habitat present	No Effect	
Yellow Lance (*Elliptio lanceolate)*	No suitable habitat present	No Effect	
American Alligator (*Alligator mississippiensis)*	No suitable habitat present	No Effect	
Pondberry (*Lindera melissifolia)*	Suitable habitat present, species not present	Not likely to adversely effect	A habitat evaluation and species survey was conducted on March 6, 2018.
Bald Eagle (Haliaeetus leucocephalus)	Unlikely to disturb nesting bald eagles	No Eagle Act Permit Required	
Critcal Habitat	No critical habitat present		

Acknowledgement: I agree that the above information about my proposed project is true. I used all of the provided resources to make an informed decision about impacts in the immediate and surrounding areas.

Matthew DeAngelo (Ecologist) — 10/4/2018

Signature /Title — Date

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
Phone: (919) 856-4520 Fax: (919) 856-4556

In Reply Refer To:
Consultation Code: 04EN2000-2018-SLI-1317
Event Code: 04EN2000-2018-E-02728
Project Name: Barefoot

September 21, 2018

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The species list generated pursuant to the information you provided identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Section 7 of the Act requires that all federal agencies (or their designated non-federal representative), in consultation with the Service, insure that any action federally authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species. A biological assessment or evaluation may be prepared to fulfill that requirement and in determining whether additional consultation with the Service is necessary. In addition to the federally-protected species list, information on the species' life histories and habitats and information on completing a biological assessment or

evaluation and can be found on our web page at http://www.fws.gov/raleigh. Please check the web site often for updated information or changes

If your project contains suitable habitat for any of the federally-listed species known to be present within the county where your project occurs, the proposed action has the potential to adversely affect those species. As such, we recommend that surveys be conducted to determine the species' presence or absence within the project area. The use of North Carolina Natural Heritage program data should not be substituted for actual field surveys.

If you determine that the proposed action may affect (i.e., likely to adversely affect or not likely to adversely affect) a federally-protected species, you should notify this office with your determination, the results of your surveys, survey methodologies, and an analysis of the effects of the action on listed species, including consideration of direct, indirect, and cumulative effects, before conducting any activities that might affect the species. If you determine that the proposed action will have no effect (i.e., no beneficial or adverse, direct or indirect effect) on federally listed species, then you are not required to contact our office for concurrence (unless an Environmental Impact Statement is prepared). However, you should maintain a complete record of the assessment, including steps leading to your determination of effect, the qualified personnel conducting the assessment, habitat conditions, site photographs, and any other related articles.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

Not all Threatened and Endangered Species that occur in North Carolina are subject to section 7 consultation with the U.S Fish and Wildlife Service. Atlantic and shortnose sturgeon, sea turtles,when in the water, and certain marine mammals are under purview of the National Marine Fisheries Service. If your project occurs in marine, estuarine, or coastal river systems you should also contact the National Marine Fisheries Service, http://www.nmfs.noaa.gov/

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office. If you have any questions or comments, please contact John Ellis of this office at john_ellis@fws.gov.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
(919) 856-4520

Project Summary

Consultation Code: 04EN2000-2018-SLI-1317

Event Code: 04EN2000-2018-E-02728

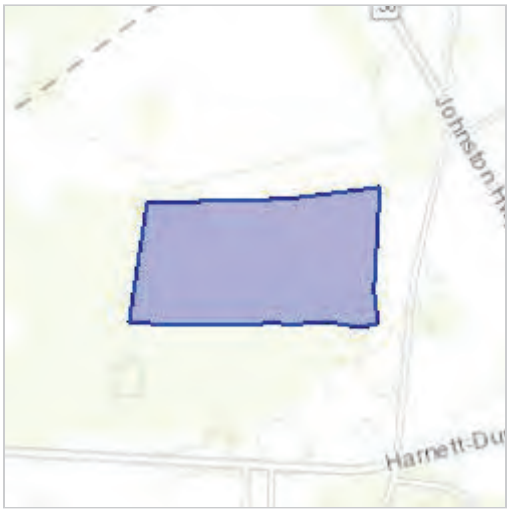
Project Name: Barefoot

Project Type: LAND - RESTORATION / ENHANCEMENT

Project Description: Wetland Mitigation Project

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/35.25342487397529N78.39569671493288W



Counties: Sampson, NC

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Red-cockaded Woodpecker Picoides borealis No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7614	Endangered

Reptiles

NAME	STATUS
American Alligator Alligator mississippiensis No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/776	Similarity of Appearance (Threatened)

Clams

NAME	STATUS
Yellow Lance Elliptio lanceolata No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4511	Threatened

Flowering Plants

NAME	STATUS
Pondberry Lindera melissifolia	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/1279

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

February 1, 2018

Matt DeAngelo
RES
302 Jefferson St., Suite 110
Raleigh, NC 27605

Re: Barefoot Mitigation Site, Sampson County NC

Dear Mr. DeAngelo:

This letter is in response to your request for information on your proposed Barefoot Mitigation Project. Our comments are submitted pursuant to, and in accordance with, provisions of the Endangered Species Act (the Act). According to the submitted information, the site consists of agricultural and forested lands, and appears to be located within the watershed for Great Coharie Creek, although it is difficult to tell from the information provided.

The Service has established an on-line project planning and consultation process which assists developers and consultants in determining whether a federally-listed species or designated critical habitat may be affected by a proposed project. For future projects, please visit the Raleigh Field Office's project planning website at https://www.fws.gov/raleigh/pp.html. If you are only searching for a list of species that may be present in the project's Action Area, then you may use the Service's Information, Planning, and Consultation System (IPaC) website to determine if any listed, proposed, or candidate species may be present in the Action Area and generate a species list. The IPaC website may be viewed at https://ecos.fws.gov/ipac/. The IPaC web site contains a complete and frequently updated list of all endangered and threatened species protected by the provisions of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)(Act), and other resources.

Federally Protected Species

If your project contains suitable habitat for any of the federally-listed species known to be present within Sampson County, the proposed action has the potential to adversely affect those species, and surveys should be conducted. As such, we recommend that surveys be conducted to determine the species' presence or absence within the project area. The use of North Carolina Natural Heritage program data should not be substituted for actual field surveys. The Service has reviewed its Geographic Information System (GIS) database for recorded locations of federally listed threatened and endangered species on or adjacent to the proposed project site. The GIS database is a compilation of data received from several sources. In Sampson County, there are records for red-cockaded woodpecker (*Picoides borealis*) and pondberry (*Lindera*

melissifolia). In a January 30, 2018 email to Kathy Matthews of my staff, you indicated that suitable habitat for pondberry may exist on the site.

Based on the information you submitted, the Service concurs with your determination for red-cockaded woodpecker. However, the Service recommends that surveys be conducted for pondberry in areas of suitable habitat on the site. Surveys should be conducted by a qualified professional and within the optimal survey window of late February through March. We note that presence of pondberry on the site does not infer that there will be adverse impacts to the species from the project. The Service believes that properly planned mitigation projects may benefit listed species such as pondberry, and we would encourage actions that would benefit this species on the site.

If you determine that the proposed action may affect (i.e., likely to adversely affect or not likely to adversely affect, including beneficial effects) a federally-protected species, you should notify this office with your determination, the results of your surveys, survey methodologies, and an analysis of the effects of the action on listed species, including consideration of direct, indirect, and cumulative effects, before conducting any activities that might affect the species. If you determine that the proposed action will have no effect (i.e., no beneficial or adverse, direct or indirect effect) on federally listed species, then you are not required to contact our office for concurrence (unless an Environmental Impact Statement is prepared). However, you should maintain a complete record of the assessment, including steps leading to your determination of effect, the qualified personnel conducting the assessment, habitat conditions, site photographs, and any other related articles.

If you have any questions or comments, please contact Kathy Matthews of this office at (919) 856-4520 ext. 27.

Sincerely,

Pete Benjamin
Field Supervisor

Bob White

From: Schaffer, Jeff <jeff.schaffer@ncdenr.gov>
Sent: Tuesday, March 27, 2018 7:35 AM
To: andrea.w.hughes@usace.army.mil
Cc: Bob White
Subject: RE: [External] FWS survey required - BAREFOOT PROJECT - SAW-2018-00433

Thanks, Andrea!

Jeff Schaffer
Eastern Supervisor, Project Management
Division of Mitigation Services (https://deq.nc.gov/about/divisions/mitigation-services)
NC Department of Environmental Quality (NCDEQ)

(919) 707-8308 office
(919) 812-2634 mobile
Jeff.Schaffer@ncdenr.gov

217 West Jones St., Suite 3000A
1652 Mail Service Center
Raleigh, NC 27699-1652

-----Original Message-----
From: Hughes, Andrea W CIV USARMY CESAW (US) [mailto:Andrea.W.Hughes@usace.army.mil]
Sent: Tuesday, March 27, 2018 7:33 AM
To: Schaffer, Jeff <jeff.schaffer@ncdenr.gov>
Subject: RE: [External] FWS survey required - BAREFOOT PROJECT - SAW-2018-00433

Jeff,

Thank you for promptly checking into this. I touched base with Kathy yesterday and provided her the information from Bob. She said the information was satisfactory and FWS does not have any additional comments on this site.

Thanks,

Andrea

Andrea W. Hughes
Mitigation Project Manager

Regulatory Division, Wilmington District
3331 Heritage Trade Drive, Suite 107
Wake Forest, North Carolina 27587
Phone: (919) 554-4884 x 59

-----Original Message-----
From: Schaffer, Jeff [mailto:jeff.schaffer@ncdenr.gov]
Sent: Monday, March 26, 2018 12:46 PM
To: Bob White <bwhite@res.us>; Daniel Ingram <dingram@res.us>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Hughes, Andrea W CIV USARMY CESAW (US) <Andrea.W.Hughes@usace.army.mil>
Subject: [Non-DoD Source] Re: [External] FWS survey required - BAREFOOT PROJECT - SAW-2018-00433

Bob,

I suggest touching base with USF&W on what response they need.

Jeff Schaffer
NCDMS
Sent from my Verizon, Samsung Galaxy smartphone

-------- Original message --------
From: Bob White <bwhite@res.us>
Date: 3/26/18 12:19 PM (GMT-05:00)
To: "Schaffer, Jeff" <jeff.schaffer@ncdenr.gov>, Daniel Ingram <dingram@res.us>
Cc: "Crocker, Lindsay" <Lindsay.Crocker@ncdenr.gov>, "andrea.w.hughes@usace.army.mil" <Andrea.W.Hughes@usace.army.mil>
Subject: RE: [External] FWS survey required - BAREFOOT PROJECT - SAW-2018-00433

CAUTION: External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to Report Spam. <mailto:report.spam@nc.gov>

Jeff, we had two ecologists on site on March 6, 2018. Prior to performing the site survey they examined a reference population at the NC Plant Conservation Program's Pondberry Bay Preserve within the larger White Woods Preserve in Sampson County. They observed numerous flowering stems at this reference site. Additionally, our soil scientist who is very knowledgeable of wetland plants and is experienced in identifying Pondberry was looking for plants during soils and wetland work in early March and again during the second week of March.

None of these qualified scientists observed Pondberry during the early to mid-march survey.

Please let me know if you need additional information.

Sincerely,

Bob White

Project Manager

RES | res.us <Blockedhttp://www.res.us/>

Mobile: 239.233.7570

From: Schaffer, Jeff [mailto:jeff.schaffer@ncdenr.gov]
Sent: Monday, March 26, 2018 6:34 AM
To: Daniel Ingram <dingram@res.us>; Bob White <bwhite@res.us>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; andrea.w.hughes@usace.army.mil
Subject: FW: [External] FWS survey required - BAREFOOT PROJECT - SAW-2018-00433
Importance: High

Bob and Daniel,

I received this email from Andrea Hughes regarding correspondence from the USF&W advising RES that a survey for Pondberry is required on the Barefoot Mitigation Site and the survey should be conducted in late Feb through March by a qualified professional. Andrea says that this information is not in the Public Notice information that RES submitted and the timeframe for this survey is rapidly coming to the end. Please respond to Andrea with a copy to Lindsay and me regarding the status of this survey and when the information will be submitted.

Jeff Schaffer

Eastern Supervisor, Project Management

Division of Mitigation Services (Blockedhttps://deq.nc.gov/about/divisions/mitigation-services)

NC Department of Environmental Quality (NCDEQ)

(919) 707-8308 office

(919) 812-2634 mobile

Jeff.Schaffer@ncdenr.gov <mailto:Jeff.Schaffer@ncdenr.gov>

217 West Jones St., Suite 3000A

1652 Mail Service Center

Raleigh, NC 27699-1652

Email correspondence to and from this address is subject to the

North Carolina Public Records Law and may be disclosed to third parties.

-----Original Message-----
From: Hughes, Andrea W CIV USARMY CESAW (US) [mailto:Andrea.W.Hughes@usace.army.mil]
Sent: Sunday, March 25, 2018 3:47 PM
To: Schaffer, Jeff <jeff.schaffer@ncdenr.gov <mailto:jeff.schaffer@ncdenr.gov> >
Subject: [External] FWS survey required - BAREFOOT PROJECT - SAW-2018-00433

CAUTION: External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to Report Spam.<mailto:report.spam@nc.gov <mailto:report.spam@nc.gov> >

Hi Jeff,

Kathy Matthews notified me that they sent a letter to RES advising that a survey for Pondberry will be required on the Barefoot Mitigation Site and the survey should be conducted in late Feb through March by a qualified professional. The PN information submitted by RES (after the date of the letter) did not mention the survey. We are in the last week of March so they have ~5 days to complete the survey. Just wanted to touch base with you to see if you are aware or if you can provide a status update.

Thanks,

Andrea

Andrea W. Hughes

Mitigation Project Manager

Regulatory Division, Wilmington District

3331 Heritage Trade Drive, Suite 107

Wake Forest, North Carolina 27587

Phone: (919) 554-4884 x 59

North Carolina Department of Natural and Cultural Resources
Natural Heritage Program

Governor Roy Cooper | Secretary Susi H. Hamilton

NCNHDE-5010

January 4, 2018

Matthew DeAngelo
Resource Environmental Solutions, LLC
302 Jefferson Street
Raleigh, NC 27607
RE: Barefoot Site

Dear Matthew DeAngelo:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

A query of the NCNHP database, based on the project area mapped with your request, indicates that there are no records for rare species, important natural communities, natural areas, or conservation/managed areas within the proposed project boundary. Please note that although there may be no documentation of natural heritage elements within the project boundary, it does not imply or confirm their absence; the area may not have been surveyed. The results of this query should not be substituted for field surveys where suitable habitat exists. In the event that rare species are found within the project area, please contact the NCNHP so that we may update our records.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists and is included for reference. Tables of natural areas and conservation/managed area within a one-mile radius of the project area, if any, are also included in this report.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

The NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve (DNP), Registered Heritage Area (RHA), Clean Water Management Trust Fund (CWMTF) easement, or Federally-listed species are documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at rodney.butler@ncdcr.gov or 919.707.8603.

Sincerely,
NC Natural Heritage Program

MAILING ADDRESS:
1651 Mail Service Center
Raleigh, NC 27699-1651

Telephone: (919) 707-8107
www.ncnhp.org

LOCATION:
121 West Jones Street
Raleigh, NC 27603

Appendix K – DMS Floodplain Requirements Checklist

EEP Floodplain Requirements Checklist

This form was developed by the National Flood Insurance program, NC Floodplain Mapping program and Ecosystem Enhancement Program to be filled for all EEP projects. The form is intended to summarize the floodplain requirements during the design phase of the projects. The form should be submitted to the Local Floodplain Administrator with three copies submitted to NFIP (attn. State NFIP Engineer), NC Floodplain Mapping Unit (attn. State NFIP Coordinator) and NC Ecosystem Enhancement Program.

Project Location

Name of project:	Barefoot
Name if stream or feature:	N/A
County:	Sampson County
Name of river basin:	Neuse River Basin
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Sampson County
DFIRM panel number for entire site:	1584 & 1564 (map number 3720158400L, effective date May 18, 2009; and map number 3720156400K, effective January 5, 2007)
Consultant name:	Resource Environmental Solutions
Phone number:	(984) 255-9127
Address:	302 Jefferson Street, Suite 110 Raleigh, NC 27605

Design Information

The Barefoot Mitigation Site is located within a rural watershed in Sampson County, within the Neuse River Basin and USGS 14-digit HUC 03020201150040. The Project proposes to restore 23.38 acres of wetland and provide water quality benefit for 123 acres of drainage area. The wetland mitigation components are summarized in the table below. The purpose of the Project is to meet water quality improvements addressed in the River Basin Restoration Priorities and improve overall stream health.

Wetland	Acreage	Mitigation Type
W1	16.64	Re-establishment
W2	6.59	Re-establishment

Floodplain Information

Is project located in a Special Flood Hazard Area (SFHA)?

○ Yes ◉ No

If project is located in a SFHA, check how it was determined:

☐ Redelineation

☐ Detailed Study

☐ Limited Detail Study

☐ Approximate Study

☐ Don't know

List flood zone designation: Zone X (outside 0.2% floodplain)

Check if applies:

☐ AE Zone

- ○ Floodway
- ○ Non-Encroachment
- ◉ None

☐ A Zone

- ○ Local Setbacks Required
- ○ No Local Setbacks Required

If local setbacks are required, list how many feet:

Does proposed channel boundary encroach outside floodway/non-encroachment/setbacks?

○ Yes ◉ No

Land Acquisition (Check)

☐ State owned (fee simple)

☐ Conservation easment (Design Bid Build)

☑ Conservation Easement (Full Delivery Project)

Note: if the project property is state-owned, then all requirements should be addressed to the Department of Administration, State Construction Office (attn: Herbert Neily, (919) 807-4101)

Is community/county participating in the NFIP program?

Is community/county participating in the NFIP program? ◉ Yes ○ No Note: if community is not participating, then all requirements should be addressed to NFIP (attn: State NFIP Engineer, (919) 715-8000)
Name of Local Floodplain Administrator: Myron Cashwell Phone Number: (910) 592-0146

Floodplain Requirements

This section to be filled by designer/applicant following verification with the LFPA

☑ No Action

☐ No Rise

☐ Letter of Map Revision

☐ Conditional Letter of Map Revision

☐ Other Requirements

List other requirements:

Comments:

Name: _Samuel C. Fasking_____ Signature: _____

Title: __Engineer I_____ Date: __04.04.2019_____

M E M O R A N D U M

302 Jefferson Street, Suite 110 Raleigh, North Carolina 27605 919.209.1062 tel.
919.829.9913 fax

TO: North Carolina Division of Mitigation Services

FROM: Brad Breslow - RES

DATE: April 5, 2019

RE: Response to Barefoot Draft Mitigation Plan Comments DMS Project ID No. 100044, Contract #7418

General

a) Can RES explain why the forested portion of the wetland restoration was added? This was not in the technical proposal, nor was it discussed during the IRT post-contract. If RES is proposing this as full restoration and the area is not currently jurisdictional, why not propose a 1:1 ratio? Was the 3:1 based solely on lack of restoration work or on both lack of work and expectation that this are will likely be dominated by pine, sweetgum, and red maple during the monitoring phase of the project? Maybe this is a decision on ratio that can be deferred to the IRT?
The proposed area for W2 was thought to be jurisdictional at the proposal phase, and wetland enhancement was not desired for the RFP. Further investigation and USACE consultation determined it was not jurisdictional and could be re-established as a wetland. The southern ditch below W2 is being plugged and filled to re-establish hydrology. Since the area is currently vegetated, the proposed 3:1 ratio was based on the lack of planting and vegetation monitoring; hydrology will still be monitored in W2. After further discussion with DMS and internally, the ratio has been updated to 2:1 to better account for the work being done. This increases the total credits produced to 19.94, and this has been updated throughout the report, figures, and appendices. Additionally, verbiage has been revised in section 6.2.1 to clarify the reasoning for the ratio.

WATERSHED APPROACH

a) Page 2. A couple of the goals listed as RBRP goals do not apply to this project, items 4 and 5. These are not more specific, they are broader.
All goals from the RBRP for the watershed as a whole and for HUC 03020201 specifically were listed for completeness. The first paragraph of this section has been revised; "more specifically" has been removed in response to the comment.

BASELINE AND EXISTING CONDITIONS

a) Page 5, Vegetation, last paragraph. Forest community described as 'nonriverine wet hardwood forest - oak flat subtype.' I see this is described in detail on page 15, but please provide the reference here for clarification since it has not previously been cited.
An in-text citation was added to this paragraph in response to the comment.

b) Page 11, Environmental Screening and Documentation. Please revise description of ERTR to "Environmental Screening process." DMS no longer uses ERTRs.
The description was revised per the comment.

c) Page 12, Threatened and Endangered Species. RES states twice that the USFWS "concurred" with their determination on endangered species. That is not the case, the USFWS does not concur on these items, they are notified and provide comment if necessary. Please re-state to indicate that USFWS was notified and consulted regarding the RES species determinations. Also as an FYI, the environmental screening process and deliverable was developed to "cover" the items that include cultural resources and T&E. It is fine for RES to refer to that process and omit these items in future Mitigation Plans.
This section and the Cultural Resources section have been revised and shortened per the comment.

MITIGATION PROJECT GOALS AND OBJECTIVES

a) Page 14, Agricultural Best Management Practices (BMPs). The use of BMP terminology implies these will be designed by an engineer to meet BMP specifications and require maintenance. Is this the case? If these are just flow diffusion structures DMS suggests rephrasing.
Section 5.1.1 has been renamed to "Flow Attenuation" per the comment.

MITIGATION WORK PLAN

a) Page 15. Typically, the Mitigation Plan is the place where the provider describes and presents information on the target reference. This would be difficult to do later in the project process. In checking the DMS project database there is a DOT site Benson Grove which may be suitable within 10 miles, and there is a newer project, Stony Fork, which may be useful to check the reference used for that site.
Several reference wetland options are currently being evaluated, and this section has been revised with a description on one of the most promising sites. A reference well will be installed in the final reference wetland prior to the as-built report.

b) Page 18. Vegetation and Planting Plan. The current IRT guidance states that you may use volunteers toward success, but they must be listed on the planting plan (re: red maple, sweetgum). Although suitable to the target community, many of the species on your planting plan are slower growing hardwoods. RES may want to consider incorporating a faster growing species such as Liriodendron tulipifera to help achieve height requirements.
Verbiage was added to paragraph two of section 6.3.1 to address the comment: "The high dispersal species include red maple and sweetgum. Both species are typical of Nonriverine Wet Hardwood Forests, and sweetgum especially can be used to distinguish this community from others in similar settings. In more disturbed examples, these species tend to dominate, so while these species could be counted towards success, they should be monitored to ensure they do not outcompete the other proposed species (Schafale, 2012)."

Verbiage was also updated in section 7.2 to address the comment: "Volunteer trees will be counted, identified to species, and included in the yearly monitoring reports, and may be counted towards the success criteria of total planted stems if appropriate for the community type."

PERFORMANCE STANDARDS

a) Page 22, hydrology success criteria. It is not advisable to set a success criterium contingent on a wetland reference that has not been selected yet. It is likely that the IRT will not find this acceptable. The reference/>5% concept does not go along with current IRT guidance.
This section has been revised to reflect current IRT guidance, including adding "Based on the extensive management history of the Site and soil compaction, RES proposes a target hydroperiod

of eight percent for monitoring years 1 and 2 (approximately 21 days), with the understanding that ten percent will be the target hydroperiod for the remainder of the monitoring period (approximately 26 days)."

Plan Sheets

a) General – These will need to be sealed by an engineer before construction.
Planset will be sealed prior to construction.

b) W1 – Looks like 2, 48" road culverts being replaced by 36" culverts. Has the drainage area been reviewed to ensure those will handle flow?
The eastern culvert is currently a 48" piece and a 54" piece stuck end-to-end to form one culvert. The 48" portion of the existing culvert is the controlling size hydraulically and has a cross-sectional area of 12.6 ft^2. This is being replaced with two 36" culverts with a combined cross-sectional area of 14.1 ft^2. As such, flow capacity is increasing relative to existing conditions.

Appendices

Appendix B

a) Pre-restoration data: can RES provide a table that summarizes the number of days and % hydroperiod where each gauge was within 12"? I see the graphs, but it is hard to tell the exact number of days.
This has been added to Appendix B in the "Existing Well Locations & Data" section.

b) The WETS table growing season dates typically used are the 50% dates, for this site it would be 243.
The most recent 30-year WETS table for Sampson County (Years 1988 – 2018; Provided in Appendix B – WETS Table for Sampson County) lists the 50% growing season for 28F or higher as 254 days (March 13 to November 22).

Appendix C

a) Need finalized conservation easement (appendix C) to acquire permits. Update this section before final version of Mitigation Plan is printed (401/404 permit applications can't be submitted until the easement is finalized and task 2 of the project is completed).
A finalized conservation easement will be added to Appendix C when obtained.

Appendix J

a) Provide all pages of the Cat Ex checklist to show how each federal item was considered and reconciled.
Appendix J was amended in response to the comment.

M E M O R A N D U M

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TO: **NC IRT, NC DMS**

FROM: **Bob White, RES**

DATE: **02-22-18**

RE: **RES Barefoot Full Delivery Wetland Mitigation Site**
IRT Site Visits, February 20, 2018

Attendees: Mac Haupt (NC DWR), Henry Wicker (USACE), Travis Wilson (NCWRC), Jeff Schaffer (NC DMS), Tim Baumgartner (NCDMS) Bob White (RES), Daniel Ingram (RES), Burt Rudolph (RES), Frasier Mullen (RES), George Lankford (George K. Lankford, LLC)

Site Visit Date: February 20, 2018

Barefoot – Non- Riparian Wetland Mitigation Site

The Barefoot site is located on the west side of Warren Mill Road northwest of Newton Grove, Sampson County, North Carolina. The site is a drained and tiled soy bean field with adjacent wooded wetlands separated by perimeter ditches. Overall drainage from the site is to the north through agricultural ditches and into unnamed tributaries of Mill Creek.

Field meeting comments:

- NC DWR evaluated the soil profile and discussed physical properties of the mapped Rains soil series. A general discussion of the suitability of onsite clayey or low permeability soils for ditch plugging ensued. The understanding by all is that soils selected for ditch plugs will be of sufficient clay content to prevent lateral and interior ditch drainage function. If low permeability soil material with sufficient clay content is not present on site it will be brought to the site from an offsite source.

- USACE, NC DWR, NC WRC discussed the methodology of preventing horizontal drainage from the site through the existing drainage tiles. General agreement was that the tiles did not have be removed but that the flow through the tiles would be "interrupted" through excavating and blocking sections sufficient to prevent pockets of wet areas resulting from concentrated water movement. The tiles would not be simply plugged on the ends where seeping to lateral ditches.

- RES stated that the easement on all sides of the site extended beyond existing perimeter ditches to allow for potential residual drainage effect from ditches following plugging.

This area from perimeter ditches to the easement boundary will be planted, however not included in credit-generating calculations.

- NC DWR requested numerous wells or piezometers to determine wetland hydrologic conditions of sufficient duration throughout the site. RES shall work with George K. Langford, LLC to determine the appropriate number of wells and locations. Wells will be included in adjacent "hydrologic reference" wetlands. RES has scheduled well installation for late February or early March to capture pre-construction conditions and to aid in specification of grade elevation tolerances for final design. All wells will be installed with dedicated transducers that log water table elevation at a frequency of one hour. Water table elevations will be incorporated to hydrographs for each well.

- NC WRC requested that *pinus spp*. are not included in the planting plan. RES will not include pine trees in the planting plan and will control pines (and red maple and sweet gum or other undesirable species) that inhibit the survivability and success of trees specified in the approved Final Mitigation Plan.

- Overall, the IRT members agree that the Barefoot Site is suitable to provide non-riparian compensatory mitigation. Final credit approach will be determined in the approved mitigation plan.