**MITIGATION PLAN**

**Bear Basin Restoration Site**
**Onslow County, North Carolina**
**EEP Contract 004741**
**EEP Project Number 95362**

**White Oak Basin**
**Cataloging Unit 03030001**

Prepared for:

NC Department of Environment and Natural Resources
Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

FINAL - July 2014

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Prepared by:



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FINAL – July 2014

## EXECUTIVE SUMMARY

*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).*
- *NCDENR Ecosystem Enhancement Program In-Lieu Fee Instrument signed and dated July 28, 2010*

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

The Bear Basin Restoration Site (BB) is a full-delivery mitigation project being developed for the North Carolina Ecosystem Enhancement Program (EEP). The BB is in the White Oak 01 Basin (03030001 8-digit HUC) in Onslow County, North Carolina that has been substantially modified to maximize agricultural production. The site offers the chance to restore impacted agricultural lands to non-riparian wetland habitat.

Consistent with the goals set forth in the White Oak River Basin Restoration Priorities (WORBRP), (Breeding, 2010) the Bear Basin project will help achieve the following goals:

- Protect and improve water quality by reducing sediment and nutrient inputs
- The protection of a watershed draining into shellfish harvesting waters

Additional goals not included in the WORBRP include:

- Provide habitat for aquatic flora and fauna by improving physical structure and vegetative composition
- Increase the local hydroperiod by encouraging both surface and subsurface storage and retention
- Restore and establish a functional wetland community

These goals will be accomplished through implementation of the following objectives:

- Fill field ditches to restore surface flow retention and elevate local groundwater levels.
- Redevelop longer wetland flow patterns to increase surface flow retention time.
- Restore a wetland vegetation community through maintenance and germination of volunteer wetland vegetation from adjacent seed sources, planting of wetland trees and shrubs, and incorporation of a custom wetland seed mix

The site is located approximately 5 miles to the west of the Town of Richlands in Onslow County, North Carolina. The site has undergone significant modifications (clearing and ditching) that have altered the site's hydrologic and vegetative composition since at least 1982. The site will be restored to non-riparian wetland with two sections of upland inclusion. The ditches across the site will be filled and redeveloped to retain and distribute surface flow across the site. Once site grading is complete, the non-riparian communities will be planted as Hardwood Flats (NCWAM, v. 4.1 2010). The site will be monitored for seven years or until the success criteria are met.

| Bear Basin Restoration Site, Onslow County | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Mitigation Credits** | | | | | | | | | |
| | **Stream** | | **Riparian Wetland** | | **Non-riparian Wetland** | | **Buffer** | **Nitrogen Nutrient Offset** | **Phosphorous Nutrient Offset** |
| **Type** | R | RE | R | RE | R | RE | | | |
| **Acres** | - | - | - | - | 8.6 | - | | | |
| **Credits** | - | - | - | - | 8.6 | - | - | - | - |
| **TOTAL CREDITS** | | | | | 8.6 | | | | |

R= Restoration RE= Restoration Equivalent of Creation or Enhancement

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## 1.0 RESTORATION PROJECT GOALS AND OBJECTIVES

EEP develops River Basin Restoration Priorities to guide its restoration activities within each of the state's 54 cataloging units. RBRPs delineate specific watersheds that exhibit both the need and opportunity for wetland, stream and riparian buffer restoration. These watersheds are called Targeted Local Watersheds (TLWs) and receive priority for EEP planning and restoration project funds.

The 2010 White Oak River Basin Restoration Priorities identified HUC 03030001010010 (Upper New River Watershed) as a Targeted Local Watershed (http://portal.ncdenr.org/c/document_library/get_file?uuid=1c0b7e5a-9617-4a44-a5f8-df017873496b&groupId=60329). The watershed is characterized by 51% forested and 44% agricultural area with impacts to streams including increased agricultural inputs, road construction impacts, and channelization.

The 2010 White Oak River Basin RBRP identified poor riparian zones and fragmented forests as major stressors within this TLW. The Bear Basin Restoration Site (BB) Project was identified as a wetland restoration opportunity to improve habitat and hydrologic regime within the TLW.

Consistent with the goals set forth in the White Oak River Basin Restoration Priorities (WORBRP), (Breeding, 2010) the Bear Basin project will help achieve the following goals:

- Protect and improve water quality by reducing sediment and nutrient inputs
- The protection of a watershed draining into shellfish harvesting waters

Additional goals not included in the WORBRP include:

- Provide habitat for aquatic flora and fauna by improving physical structure and vegetative composition
- Increase the local hydroperiod by encouraging both surface and subsurface storage and retention
- Restore and establish a functional wetland community

These goals will be accomplished through implementation of the following objectives:

- Fill field ditches to restore surface flow retention and elevate local groundwater levels.
- Redevelop longer wetland flow patterns to increase surface flow retention time.
- Restore a wetland vegetation community through maintenance and germination of existing wetland seed stores, planting of wetland trees and shrubs, and incorporation of a custom wetland seed mix

## 2.0 SITE SELECTION

### 2.1 Directions

The BB is located on a single parcel located off of Jesse Williams Road approximately 5 miles to the west of the Town of Richlands in Onslow County, North Carolina. To reach the site from Raleigh: proceed east on I-40 for approximately 72 miles. Then travel on NC-24 east toward Magnolia and travel for six miles. Turn right to remain on NC-24 East for an additional 19 miles. Next, turn left onto Jesse Williams Road. The site will be approximately 0.8 mile ahead on the right after the pine forest.

### 2.2 Site Selection

The site is part of the 03030001 USGS Cataloging Unit (White Oak 01). The White Oak River Basin as a whole is experiencing a large amount of habitat alteration due to population growth mainly in Onslow County in the vicinity of the City of Jacksonville. As a result, the focus in this watershed is on mitigating impacts to water quality from nonpoint source pollution and protecting and/or restoring existing habitat (NCDENR EEP, 2010).

The project site is bounded by Jesse Williams Road to the north, a ditch along the property line to the west and south, and agricultural land to the east. The site has undergone significant modifications (clearing and ditching) that have altered the site's hydrologic and vegetative composition since at least 1982. The deeply entrenched ditches have severely altered the site's historic hydrologic regime, effectively reducing or eliminating the wetland hydroperiod on the site. The existing site conditions are shown in Section 2.6 and seen in site photographs (Section 2.8). Within the White Oak Basin, the Upper New River drainage (03030001010010) remains relatively unaffected by urban development. The site drains to the Upper New River (DWQ Subbasin19-(1)), which is located approximately 0.5 miles west of the project site. The Upper New River is classified as Class C with the supplemental listing of nutrient sensitive waters (NSW). Currently, there are no portions of the 14-digit HUC that are protected and approximately 44% of its land use is in agriculture (NCDENR EEP, 2010). Impervious cover in the 14-digit HUC is approximately 3.6%. The project watershed for the BB is comprised of 32.7 total acres. The land use distribution in the project watershed closely mirrors the land use within the 14-digit HUC, and consists of primarily agriculture (14.4 ac/44%) and forest (16.3 ac/50%). The approximate total impervious cover of the project watershed is 2.0%.

Historic aerials from Onslow County were examined for any information about how the site hydrology and vegetation have changed over the last century. They were obtained from USGS Earth Explorer from 1950, 1958, 1964, 1974, 1982, 1993, 1998, and 2010. The reviewed aerials are included in Section 2.7. From this photographic record, it is apparent that the area surrounding the project site has been a mix of agricultural and forested land for many years. Prior to 1982, the site appears in a forested condition adjacent to existing agricultural fields to the east. Sometime between 1974 and 1982 the site was cleared and ditched for crop production. From 1982 to the present time, the photos indicate that the site has not been significantly altered from its present day condition. The land cover remains in agriculture currently. The surrounding area is rural with low development pressure at this time. These land use trends indicated that restoring this property back to a forested wetland will provide an important habitat enhancement in the watershed.

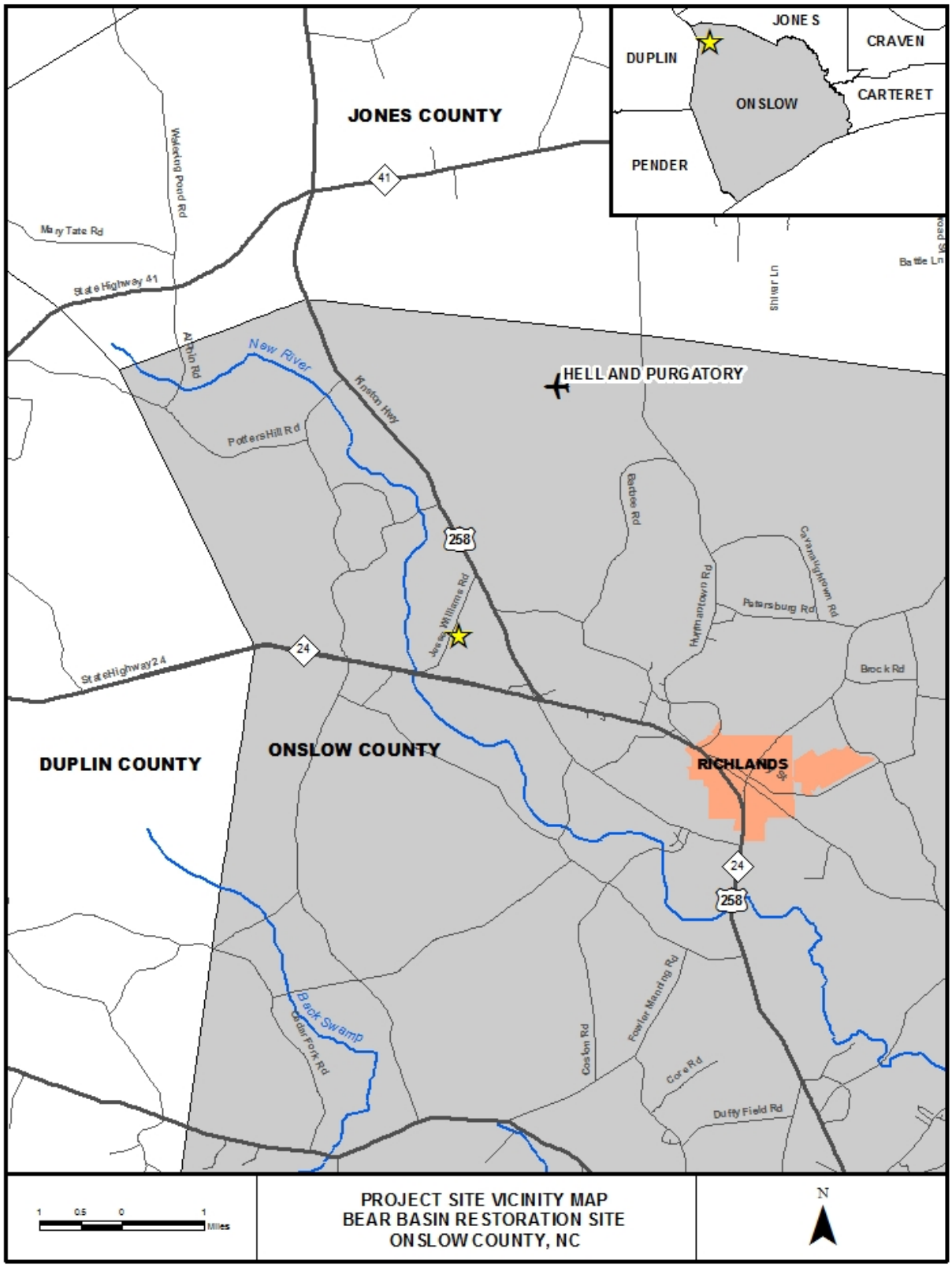
The site lies within the Castle Hayne geologic formation of the Coastal Plain physiographic province. The primary rock type in these areas is limestone with dolomite existing as a common secondary rock type.

The site topography is generally flat with only 2 feet of elevation change across the site (exclusive of site ditching).

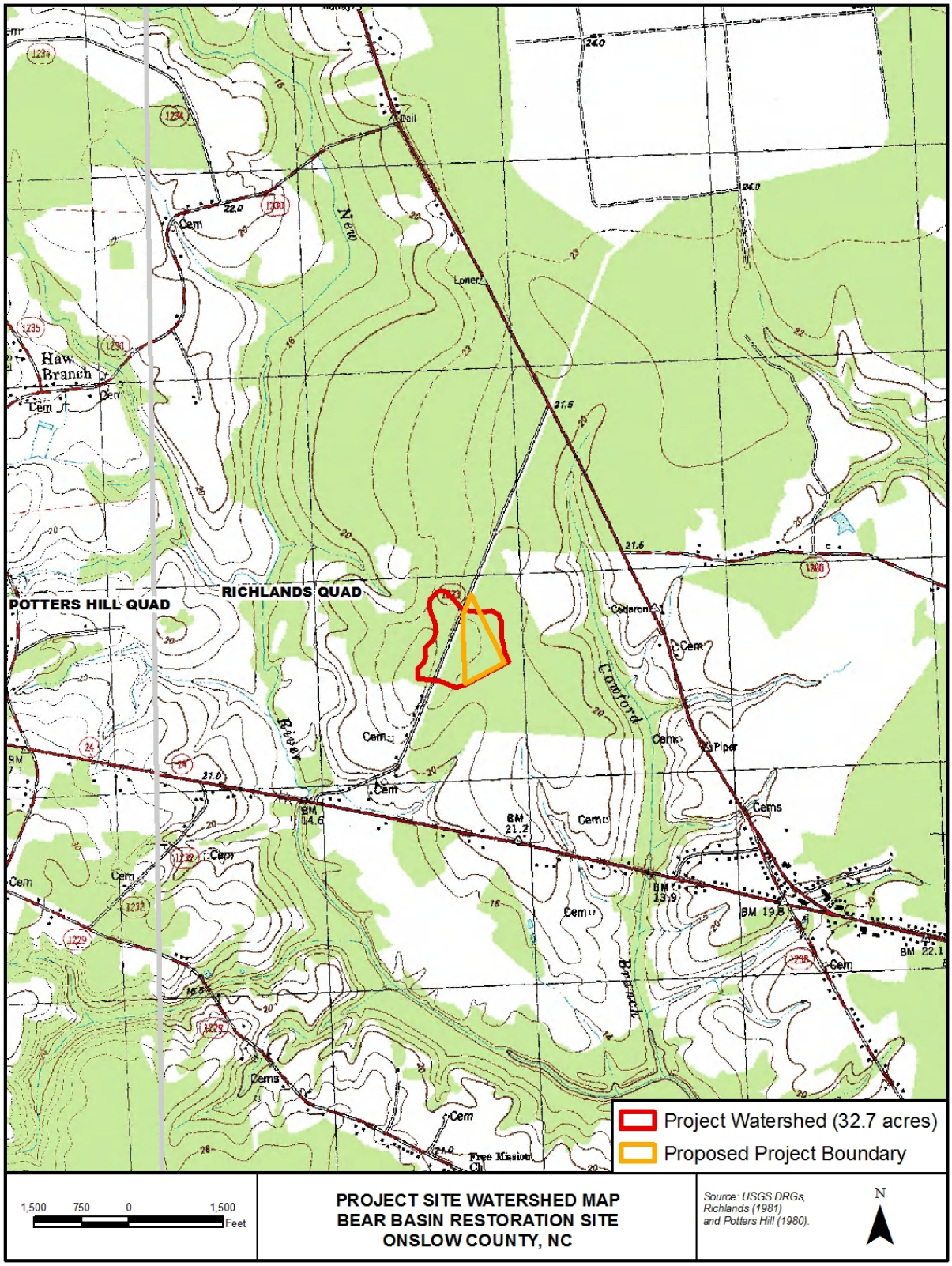
According to the Onslow County Soil Survey, the soils within the project site are mapped as Rains fine sandy loam and Stallings loamy fine sand. A detailed investigation of the mapped soils resulted in several changes to the type and boundaries of these two soil series. The soil mapped as Rains fine sandy loam is more appropriately described as Pantego mucky loam (also a poorly drained soil), and the area mapped as Stallings loamy fine sand was more accurately described as Lynchburg fine sandy loam, a somewhat poorly drained soil. The restoration area will be focused on the areas determined to be underlain by Pantego mucky loam. Both the mapped soils and the field-verified soils are described in detail in Appendix C.

Based on these watershed and site-specific attributes, the BB was selected as a candidate for wetland mitigation. The restored site will expand forested wetland habitat in an area that has been actively used for agriculture since at least 1982.

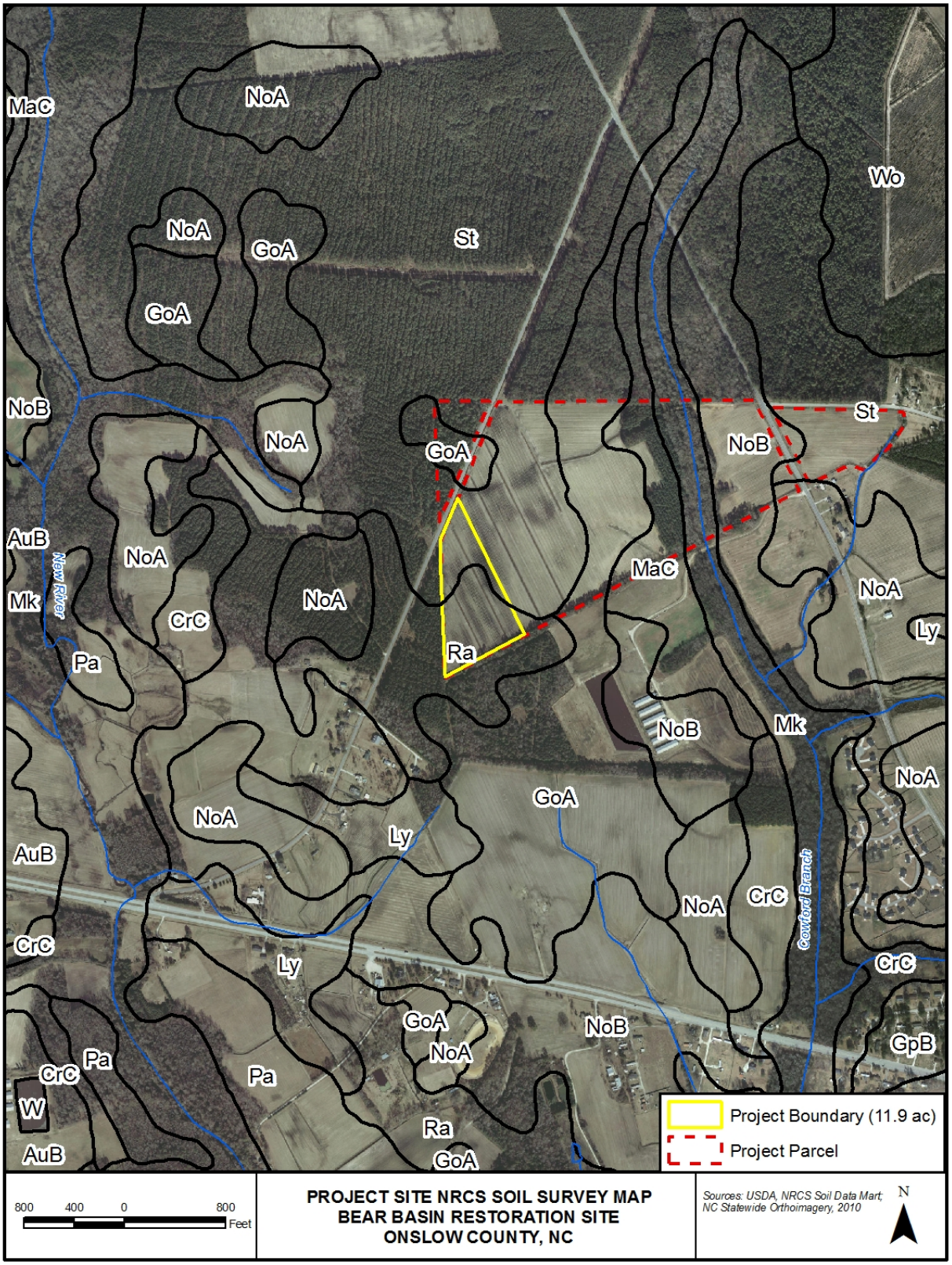
## 2.3 Vicinity Map



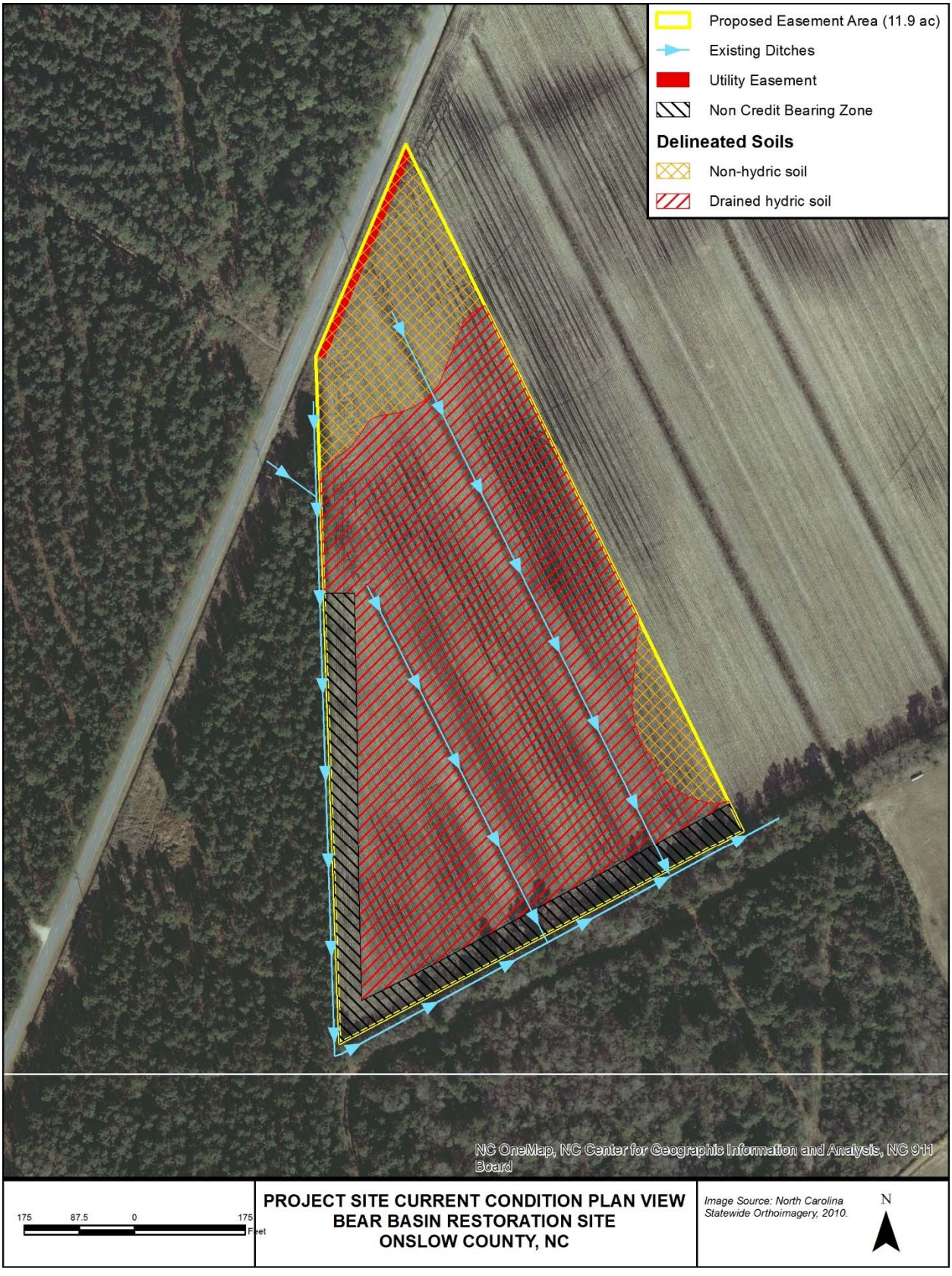
## 2.4 Watershed Map



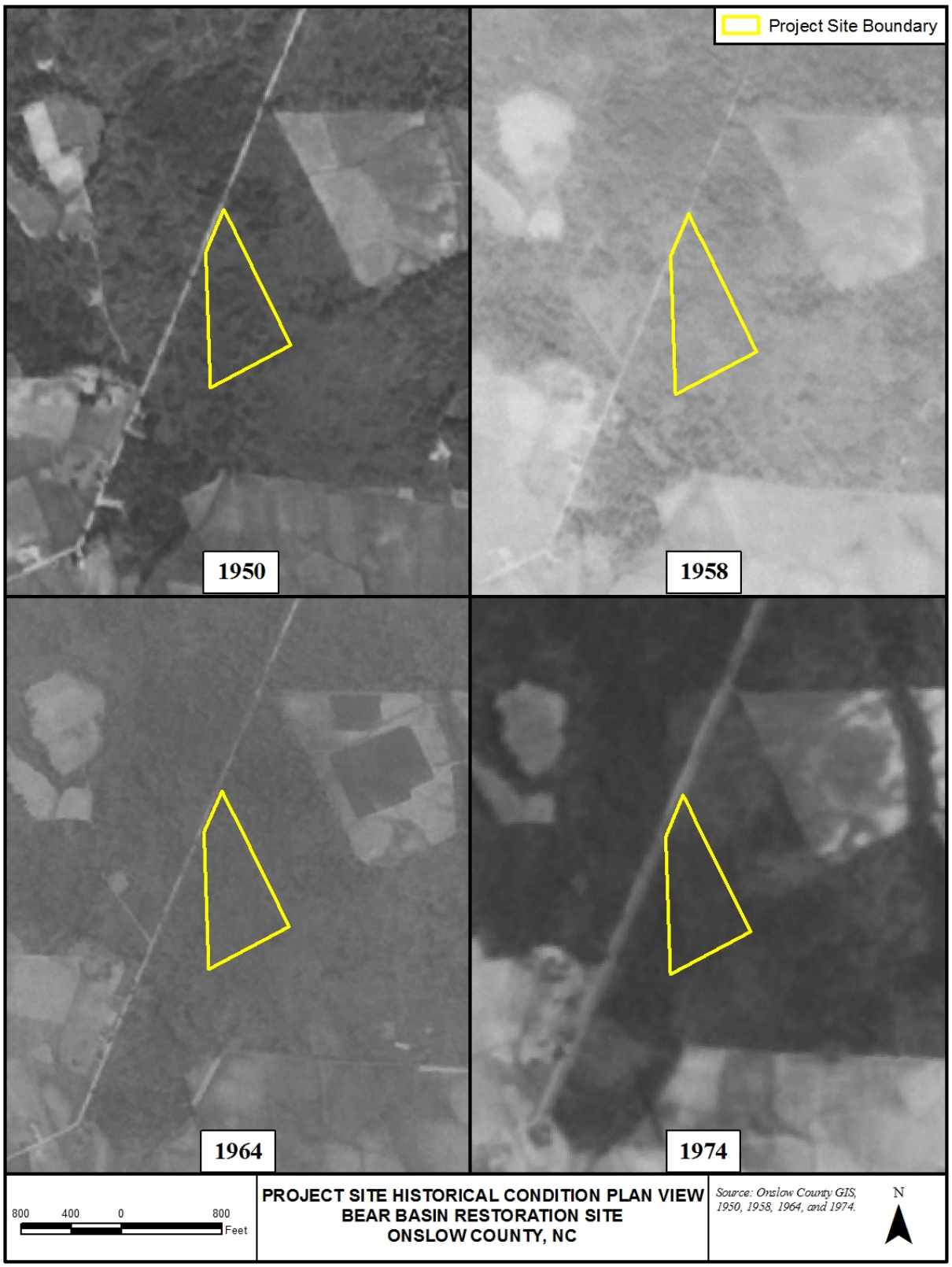
## 2.5 Soil Survey

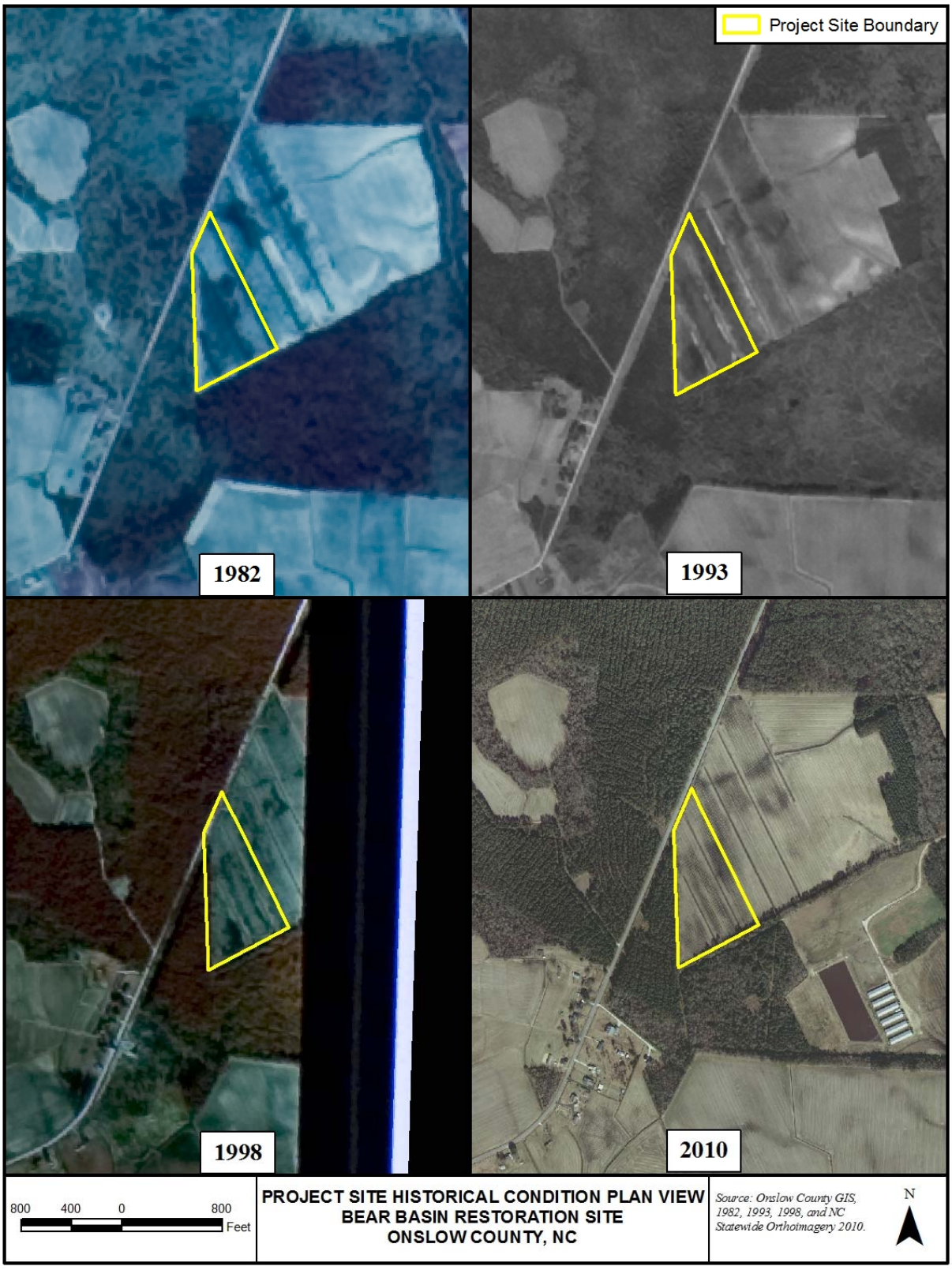


## 2.6 Current Condition Plan View



## 2.7 Historical Condition Plan View




Project Site Boundary
1982
1993
1998
2010
800 400 0 800
Feet
PROJECT SITE HISTORICAL CONDITION PLAN VIEW
BEAR BASIN RESTORATION SITE
ONSLOW COUNTY, NC
Source: Onslow County GIS, 1982, 1993, 1998, and NC Statewide Orthoimagery 2010.
N

## 2.8 Site Photographs

| | |
|---|---|
|  |  |
| Lateral drainage ditch draining to the southeast. 9/12/2011 | View of fields looking southwest from the northeast corner of the site. 9/12/2011 |
|  |  |
| Evidence of extended periods of ponding. 9/12/2011 | Facing north - typical view of ditchline. 9/12/2011 |
|  |  |
| Facing south - typical view of ditchline. 9/12/2011 | View of fields looking southwest from the northeast corner of the site. 9/12/2011 |

| | |
|---|---|
|  |  |
| Looking south from the northwest project boundary along existing ditch. 10/3/2012 | Looking north from the western project boundary along existing ditch. 10/3/2012 |
|  |  |
| Looking southwest from the southern project boundary along existing ditch. 10/3/2012 | Looking toward the northeast over the site. 10/3/2012 |
|  |  |
| A view northwest toward an existing ditch and the northern edge of the site boundary. 10/3/2012 | A view southeast toward an existing ditch and the existing forested area along the southern project boundary. 10/3/2012 |

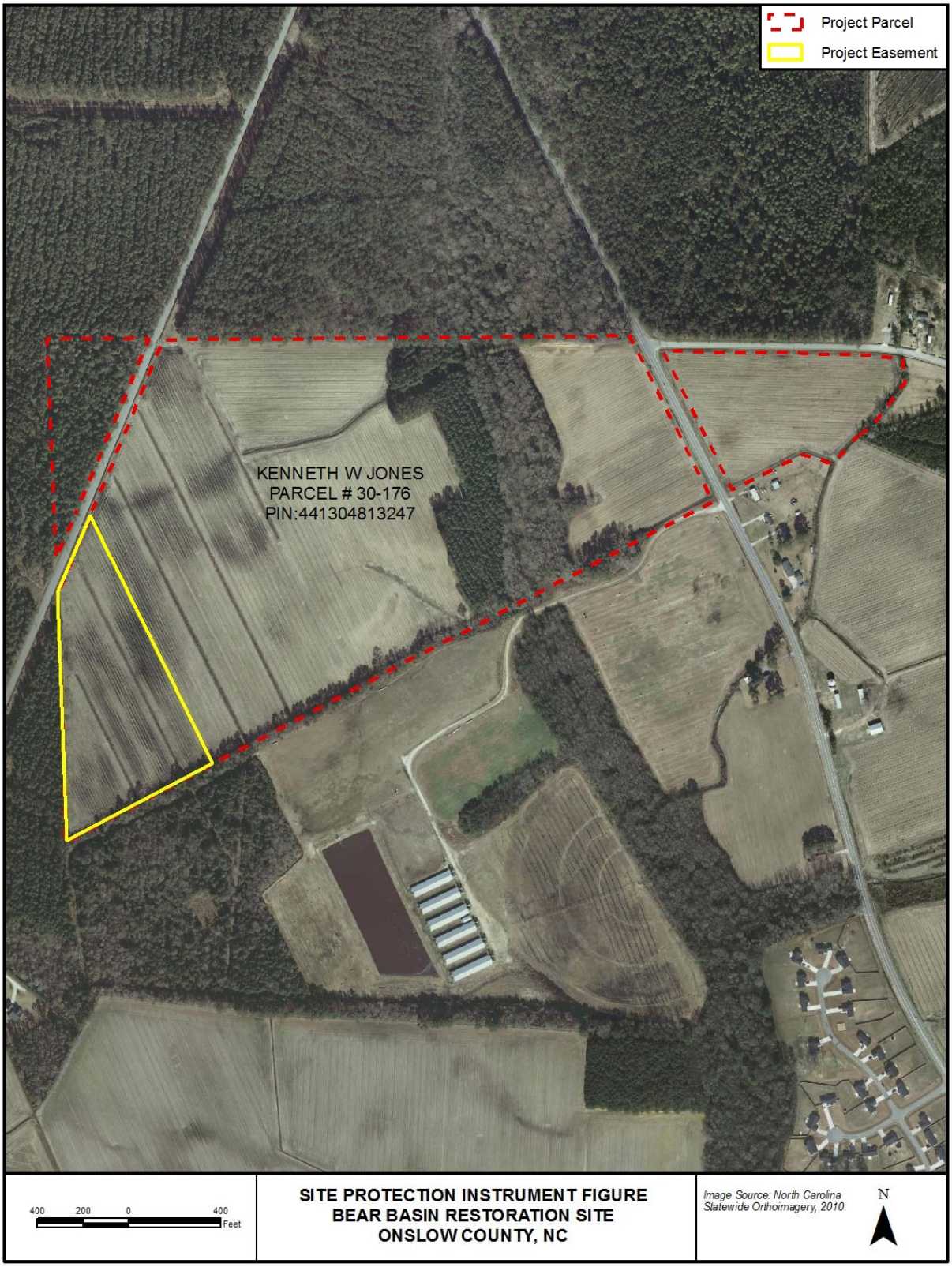
## 3.0 SITE PROTECTION INSTRUMENT

### 3.1 Site Protection Instrument Summary Information

The land required for the construction, management, and stewardship of this mitigation project includes portions of the following parcels. The conservation easement documents were finalized in October 2012. A copy of the land protection instrument is included in Appendix A.

| | Landowners | PIN | County | Site Protection Instrument | Deed Book and Page Number | Acreage protected |
|---|---|---|---|---|---|---|
| Parcel A | Kenneth Jones | 4413-0481-3247 | Onslow | Conservation Easement | DB 531 PG 388 | 11.9 acres |

## 3.2 Site Protection Instrument Figure



## 4.0 BASELINE INFORMATION

| **Project Information** | | | |
|---|---|---|---|
| **Project Name** | Bear Basin Wetland Restoration Site | | |
| **County** | Onslow County | | |
| **Project Area (acres)** | 11.9 acres | | |
| **Project Coordinates (lat. and long.)** | 34.925365 N , -77.607461 W | | |
| **Project Watershed Summary Information** | | | |
| **Physiographic Province** | Coastal Plain | | |
| **River Basin** | White Oak | | |
| **USGS Hydrologic Unit 8-digit** | 03030001 | **USGS Hydrologic Unit 14-digit** | 03030001010010 |
| **DWQ Sub-basin** | 03-05-02 | | |
| **Project Drainage Area (acres)** | 32.7 acres | | |
| **Project Drainage Area Percentage of Impervious Area** | 2% | | |
| **CGIA Land Use Classification** | 44% Cultivated, 4% Managed Herbaceous Cover, 50% Southern Yellow Pine, and 2% High Intensity Developed | | |
| **Wetland Summary Information** | | | |
| **Parameters** | **Wetland Area 1** | | |
| Size of Wetland (acres) | 8.6 acres | | |
| Wetland Type (non-riparian, riparian riverine or riparian non-riverine) | Non-riparian | | |
| Mapped Soil Series | Rains and Stallings (Pantego and Lynchburg by detailed soil investigation) | | |
| Drainage class | Poorly drained | | |
| Soil Hydric Status | Drained Hydric | | |
| Source of Hydrology | Precipitation | | |
| Hydrologic Impairment | Ditching and Crops | | |
| Native vegetation community | Crops | | |
| Percent composition of exotic invasive vegetation | 0% | | |

| **Regulatory Considerations** | | | |
|---|---|---|---|
| **Regulation** | **Applicable?** | **Resolved?** | **Supporting Documentation** |
| Waters of the United States – Section 404 | Yes | Applying for NWP 27 | Jurisdictional Determination |
| Waters of the United States – Section 401 | Yes | Applying for NWP 27 | Jurisdictional Determination |
| Endangered Species Act* | No | N/A | N/A |
| Historic Preservation Act* | No | N/A | N/A |
| Coastal Zone Management Act * (CZMA)/ Coastal Area Management Act (CAMA) | No | N/A | N/A |
| FEMA Floodplain Compliance | No | N/A | N/A |
| Essential Fisheries Habitat* | No | N/A | N/A |

* Items addressed in the Categorical Exclusion in Appendix B.

### 4.1 Watershed Summary Information

The site is within the 03030001 USGS Cataloging Unit (White Oak 01 Basin). The White Oak River Basin as a whole is experiencing a large amount of habitat alteration due to population growth mainly in Onslow County. According to 1996 land cover data from the North Carolina Center for Geographic Information and Analysis (CGIA), only 3% of the watershed is developed, but the area is expected to continue to grow. The predominant land uses are 49% forest and 12% agriculture.

The project watershed for the BB is comprised of 32.7 total acres. Current land use in the project watershed consists of agriculture (14.4 ac/44%), forest (16.3 ac/50%), and high-intensity development (0.8 ac/2%). The approximate total impervious cover of the project watershed is 2.0%. The site drains to the Upper New River, which is located approximately 0.5 mile west of the project site. The project area is located in the United States Geological Survey (USGS) Potters Hill (1980) and Richlands (1981) Quadrangles.

### 4.2 Reach Summary Information

Not applicable for this project.

### 4.3 Wetland Summary Information

Currently, there are no existing wetlands present. The wetland data forms are included in Appendix B.

The project site has experienced significant hydrologic and vegetative modifications to allow for agricultural development. A jurisdictional determination delineation was completed in which the ditch network installed at the site was identified as jurisdictional tributaries (see Appendix B for jurisdictional determination plat). The historic aerials indicate that the existing ditches were installed on the site sometime after 1974. The site contains two interior ditches that serve to drain the site to the southeast where they enter a perimeter ditch that carries water in a northeasterly direction, eventually discharging into an unnamed tributary to the New River. The site topography is generally flat with only 2 feet of elevation change across the site (exclusive of site ditching). This site is not located within a geomorphic floodplain or a topographic crenulation and is not contiguous with a body of open water. This was the basis for the designation of the site as non-riparian restoration. At the time of the first site visit (September 2011), the site was planted in corn. The site was planted in soybeans at the time of the second site visit (October 2012). Currently, there are no cattle grazing on the property. The surrounding area is rural with low development pressure at this time.

### 4.4 Regulatory Considerations

A jurisdictional determination was submitted to the US Army Corps of Engineers on October 9, 2012 and approved on October 31, 2012. Following the completion of the mitigation plan, a pre-construction notification (PCN) will be completed to apply for a Nationwide 27 Permit (NWP) to comply with Sections 401 and 404 of the Clean Water Act with the Wilmington District of the US Army Corps of Engineers and the NCDENR Division of Water Quality.

BB is not located within the 100-year floodplain of the New River and therefore a flood study is not anticipated for this project.

## 5.0 DETERMINATION OF CREDITS

| Bear Basin Restoration Site, Duplin County | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Mitigation Credits** | | | | | | | | | |
| | **Stream** | | **Riparian Wetland** | | **Non-riparian Wetland** | | **Buffer** | **Nitrogen Nutrient Offset** | **Phosphorous Nutrient Offset** |
| **Type** | R | RE | R | RE | R | RE | | | |
| **Acres** | - | - | - | - | 8.6 | - | - | - | - |
| **Credits** | - | - | - | - | 8.6 | - | - | - | - |
| **TOTAL CREDITS** | | | | | 8.6 | | | | |

| Project Components | | | | | | |
|---|---|---|---|---|---|---|
| **Project Component -or- Reach ID** | **Stationing/ Location** | **Existing Footage/ Acreage** | **Approach (PI, PII etc.)** | **Restoration -or- Restoration Equivalent** | **Restoration Footage or Acreage** | **Mitigation Ratio** |
| Wetland Area 1 | Central and Southwestern corner of project | 8.6 acres | - | Restoration | 8.6 acres | 1:1 |

| Component Summation | | | | | | |
|---|---|---|---|---|---|---|
| **Restoration Level** | **Stream (linear feet)** | **Riparian Wetland (acres)** | | **Non-riparian Wetland (acres)** | **Buffer (square feet)** | **Upland (acres)** |
| | | Riverine | Non-Riverine | | | |
| Restoration | - | - | - | 8.6 acres | - | - |
| Enhancement | | - | - | | - | - |
| Enhancement I | - | | | | | |
| Enhancement II | - | | | | | |
| Creation | | - | - | - | | - |
| Preservation | - | - | - | - | | 1.9 acres |
| High Quality Preservation | - | - | - | - | | - |
| **TOTAL** | | | | 8.6 acres | | 1.9 acres |

R= Restoration RE= Restoration Equivalent of Creation or Enhancement

## 6.0 CREDIT RELEASE SCHEDULE

All credit releases will be based on the total credit generated as reported by the as-built survey of the mitigation site. Under no circumstances shall any mitigation project be debited until the necessary 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 Interagency Review Team (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 restart 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:

| **Forested Wetlands Credits** | | | |
|---|---|---|---|
| **Monitoring Year** | **Credit Release Activity** | **Interim Release** | **Total Released** |
| 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 | 10% | 60% |
| 4 | Fourth year monitoring report demonstrates performance standards are being met | 10% | 70% |
| 5 | Fifth year monitoring report demonstrates performance standards are being met; Provided that all performance standards are met, the IRT may allow the NCEEP to discontinue hydrologic monitoring after the fifth year, but vegetation monitoring must continue for an additional two years after the fifth year for a total of seven years. | 10% | 80% |
| 6 | Sixth year monitoring report demonstrates performance standards are being met | 10% | 90% |
| 7 | Seventh year monitoring report demonstrates performance standards are being met, and project has received close-out approval | 10% | 100% |

**Initial Allocation of Released Credits**

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

- Approval of the final Mitigation Plan
- Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
- Completion of project construction (the initial physical and biological improvements to the mitigation site) pursuant to the mitigation plan; Per the NCEEP 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.

- 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. For stream projects a reserve of 15% of a site's total stream credits shall be released after two bank-full events have occurred, in separate years, provided the channel is stable and all other performance standards are met. In the event that less than two bank-full events occur during the monitoring period, release of these reserve credits shall be at the discretion of the IRT. As projects approach milestones associated with credit release, the NCEEP 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.

## 7.0 MITIGATION WORK PLAN

### 7.1 Target Wetland Types and Plant Communities

Wetland plantings shall consist of native species commonly found in the Hardwood Flats Community (NCWAM, v. 4.1 2010). Trees and shrubs will be planted at a density of 968 stems per acre (9 feet x 5 feet spacing) to achieve a survivability of two hundred ten (210) live stems per acre after seven years. Woody vegetation planting will be conducted during dormancy. Species to be planted may consist of the following consistent with a hardwood flat (NCWAM, v. 4.1 2010):

| **Common Name** | **Scientific Name** | **Wetland Indicator** |
|---|---|---|
| Red maple | *Acer rubrum* | FAC |
| Red chokeberry | *Aronia arbutifolia* | FACW |
| Tulip poplar | *Liriodendron tulipifera* | FACU |
| Sweetbay magnolia | *Magnolia virginiana* | FACW |
| Swamp red bay | *Persea palustris* | FACW |
| Swamp chestnut oak | *Quercus michauxii* | FACW |
| Water oak | *Quercus nigra* | FAC |
| Cherrybark oak | *Quercus pagoda* | FAC |
| American elm | *Ulmus americana* | FACW |
| Highbush blueberry | *Vaccinium corymbosum* | FACW |

An adjoining upland area in the northern portion of the easement will be planted at 625 stems per acre and will include an equal mix of red maple (*Acer rubrum*), cherrybark oak (*Quercus pagoda*), Shumard oak (*Quercus shumardii*), and persimmon (*Diospyros virginiana*). A custom herbaceous seed mix composed of appropriate native species found in reference communities will also be developed and used to further stabilize and restore the wetland.

All of the above options will be marked and surveyed as per EEP's requirements contained within http://portal.ncdenr.org/web/eep/fd-forms-templates. In addition, the easement boundaries will be marked with salt-treated wooden posts placed approximately 100 feet apart. Each line post will be marked with a conservation easement placard. Corner posts will be marked with signs stating "Conservation Easement Corner."

### 7.2 Design Parameters

The mitigation approach for BB will focus on restoring an integrated wetland ecosystem that will buffer and support the Upper New River basin. Restoration actions will focus on reestablishing an appropriate wetland hydroperiod by filling ditches, surface roughening, and planting the site with appropriate hydrophytes. The site will be restored to a condition that resembles the former wetland community. A local comparable reference wetland system was identified approximately 0.15 mile northeast of the restoration site and was used to aid in design of a wetland community most suited to the area. Please see the mitigation overview in Section 7.4 and the wetland plans included in Appendix D. The following elements of functional uplift are expected from this project:

1. Increase in flood storage
2. Increase in groundwater recharge
3. Increase in sediment trapping and filtration

4. Increase in carbon storage
5. Increase in biochemical cycling of nutrients and other pollutants
6. Increase in habitat utilization by wildlife (migrants and residents)
7. Increase in landscape patch structure

*Non-Riparian Wetland Restoration – 8.6 acres*
This site offers the potential to develop 8.6 acres of non-riparian wetlands within the Upper New River basin. Restoration actions would include filling approximately 2,500 linear feet of drainage ditches, removing sidecast ditch spoils, eliminating field crowning, and scarifying the existing compacted surface soils. The primary receiving ditch, which runs west to east, will remain open. Following the completion of site grading, the non-riparian wetland will be planted as Hardwood Flats Community as described in Section 7.1. Proposed project conditions are shown in Section 7.4.

*Upland Inclusions – 1.9 acre of Upland Inclusions*
In addition to the wetland components being offered, approximately 2 acres of upland buffer will be included within the northern portion and southeastern corner of the easement area to augment the sites potential to buffer pollutants from adjacent agricultural land and the existing roadway. Once the grading is completed, the northern portion will be planted as an upland zone while the southeastern corner will be planted as the Hardwood Flats Community as described in Section 7.1.

*Non-Credit Areas – 3.3 acres*
There are three non-credit generating areas on the site. There are 1.9 acres of uplands located in the northern and southeastern corner of the project boundary. These areas will remain undisturbed and is included in the BB conservation easement. There is a utility easement on the northern side of the site, located in the upland area, along Jesse Williams Road that remains undisturbed. There are two ditches that border the site that will also remain open. The first is the primary receiving ditch, which runs west to east, and will remain open to prevent potential hydrologic trespass. The second is the lower two thirds of the ditch on the west side of the site that runs north to south. This portion of the western ditch is not on the project parcel. It is anticipated that leaving these ditches open will have minimal impacts to the overall hydrologic performance of the site. The hydrologic influence of the ditches were modeled using Lateral Effect, a software program that determines the lateral effect of a drainage ditch or borrow pit on adjacent wetland hydrology (NCSU BAE, 2011). This analysis determined that the potential horizontal drainage influence averages 85'. It is assumed that with the onsite modifications, such as filling other ditches and surface roughening, the entire site will have more surface and groundwater, which may decrease the effect of these ditches. For this reason, the non-credit generating portion of the site is assumed to be half of the zone (42.5') of influence for the ditch. This area covers approximately 1.4 acres.

*Reference Wetland*
A suitable reference wetland was found approximately 0.15 mile northeast of the BB and on the opposite side of Jesse Williams Road. The reference wetland is comprised of deciduous hardwoods over a shrub layer with broad leaved evergreens and is consistent with the Hardwood Flats Community that will be the target wetland type at the project site. A groundwater monitoring well has been installed to document the reference wetland hydrology during the course of monitoring.

## 7.3 Data Analysis

The numerous modifications to the hydrology of the BB have effectively drained the historic wetlands on-site. The development of a network of field ditches has significantly altered the retention of surface hydrology in these areas. The pre and post-restoration effects of ditching on wetland hydrology was evaluated using a hydrologic budget for the site (see Appendix C).

*Existing Conditions*
Existing site hydrology was modeled by developing an annual water budget that calculates hydrologic inputs and outputs in order to calculate the change in storage on a monthly time step. In order to set up the water budget, historic climatic data were obtained from the North Carolina State Climatic Office. The weather station in Maysville, North Carolina was used, which is the closest station with the longest period of record and is approximately 21 miles to the east of BB. Monthly precipitation totals from the entire period of record (1945-2011) were reviewed and three years were selected to represent a range of precipitation conditions: dry year (1990), average year (1973), and wet year (1991).

Potential inputs to the water budget include precipitation, groundwater, and surface inputs. For precipitation, the data from the three selected years were used in the budget. Groundwater inputs likely exist, but they were considered to be negligible to be conservative for the purposes of this study. Surface water input was calculated using the USDA Soil Conservation Service (SCS) runoff curve number equation (USDA, SCS 1986).

Outputs from the site include potential evapotranspiration (PET), groundwater, and surface water diversion. PET was calculated by the Thornthwaite method using mean monthly temperatures determined from the chosen years of record: 1990, 1973, and 1991. Surface water was assumed entirely lost since there is no surface storage in the existing conditions model.

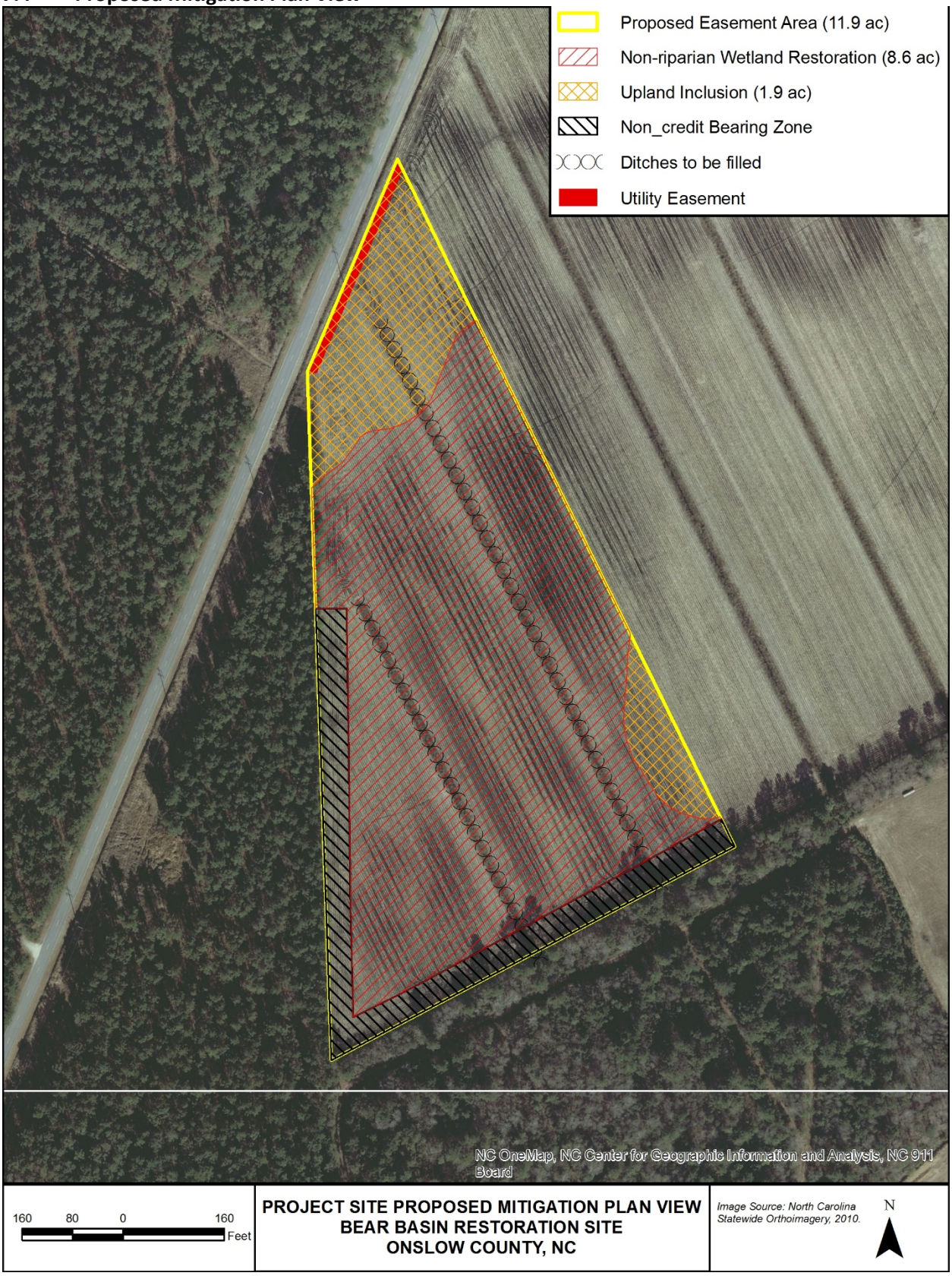
Once the inputs and outputs were determined, a net monthly total was calculated in inches and used to estimate a yearly water budget. The model assumes unsaturated conditions at the beginning of the year. A maximum wetland water volume of 3.6 inches was calculated based on the specific yield of 0.10 for 36 inches of Pantego soil. The resulting hydrographs for the average and wet years show a seasonal pattern. The model shows that the majority of hydrologic inputs to the site come during the rainy spring months for the average year and during both the spring months and late summer/early fall for the wet year. The site begins to lose saturation in the upper twelve inches in the late spring and early summer months for both years. However, after late spring, the wet year shows an increase in hydrologic inputs that continues through the summer months and then decreases in fall. The average year does not see an increase in hydrologic inputs until the late fall. The dry year shows very little hydrology overall. It is clear from the existing model output that the ditches within the site are exerting a larger influence on the site's storage capacity than the water budget is accurately able to predict. The site is currently not achieving the wetland hydrology that the model predicts.

*Proposed Conditions*

A modified water budget was developed to analyze the effect of mitigation actions described in Section 7.2 on the site hydrology. All surface flow is assumed to be retained in the proposed condition, because it will no longer be immediately routed off the site. To estimate the impact from surface roughening, an additional 2.4 inches of hydrologic capacity was added to the calculations to represent surface roughness. Based on these changes, the budget shows the site potentially attaining jurisdictional wetland hydrology in portions of the spring and summer for the average and wet years when compared to the existing conditions. The dry year remains relatively unchanged from the pre-construction condition, indicating that the site's wetland hydrology may be susceptible to drought conditions.

The southernmost ditch adjacent to the restoration area will be left open and not filled per landowner requirements. The northern top 400'of the westernmost ditch will be filled and the drainage from the NCDOT ditch coming in from the northwest will be brought into the restored wetland. The lower 650' of the westernmost ditch will remain open similar to the southern ditch line. It is anticipated that leaving portions of these ditches open will have minimal impacts to the overall hydrologic performance of the site. The hydrologic influence of the ditches was modeled using Lateral Effect, a software program that determines the lateral effect of a drainage ditch or borrow pit on adjacent wetland hydrology (NCSU BAE, 2011). This software determined that the potential horizontal drainage influence averages 85'. Additional groundwater gauges will be installed to quantify the effect of these unfilled ditches (see Section 10.0).

## 7.4 Proposed Mitigation Plan View



## 8.0 MAINTENANCE PLAN

The site will be monitored on a regular basis, with a physical inspection of the site 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:

| Component/Feature | Maintenance Through Project Close-Out |
|---|---|
| Wetland | Routine wetland maintenance and repair activities may include securing of loose coir matting and supplemental installations of live stakes and other target vegetation within the wetland. Areas where stormwater and floodplain flows intercept the wetland may also require maintenance to prevent scour. |
| 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 controlled by mechanical and/or chemical methods. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations. |
| Site Boundary | Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. 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. |

Additionally, a utility right of way exists adjacent to the restored wetland, but because there is no creditable acreage within this right of way, it is not expected that the utility maintenance will affect the restored wetland.

## 9.0 PERFORMANCE STANDARDS

The BB will be monitored to determine if the development of the wetland indicators on site meet the standards for mitigation credit production as presented in Section 5.0. The credits will be validated upon confirmation that the success criteria described below are met. The site will be monitored for performance standards for seven years after completion of construction.

**Hydrologic Performance**

Verification of hydrologic performance standards within the wetland mitigation area will be determined through evaluation of automatic recording well data supplemented by documentation of wetland hydrology indicators as defined in the 1987 US ACOE Wetland Delineation Manual (Manual). Sixteen automatic recording gauges will be established within the restoration area of the site.

To meet success criteria, the upper 12 inches of the soil profile will display continuously saturated or inundated conditions for at least 8% of the growing season with a 50% probability of reoccurrence during normal weather conditions. A “normal” year is based on NRCS climatological data for Onslow County using the 30th to 70th percentile thresholds as the range of normal as documented in the USACE Technical Report “Accessing and Using Meteorological Data to Evaluate Wetland Hydrology, April 2000.”

According to the Natural Resources Conservation Service, the growing season for Onslow County is considered to extend from March 18th to November 16th, comprising 243 days (NRCS, 2002). KCI will monitor soil temperature to verify that the local growing season is consistent with the NRCS published data and reserves the right to present this information as a modifier to the number of days saturation is required to achieve jurisdictional status.

Due to the inherent variability in the sites soils and associated drainage characteristics, it is unlikely that the project will exhibit uniform hydrologic conditions across the site, making a single hydrologic performance criterion unrepresentative of the sites performance. As such, the gauge data can be evaluated and presented as a spatial average with each gauge representing the area half the distance to adjacent gauges. The spatial average will be the calculated value for comparison with the performance standard for credit validation. Gauges representing areas not achieving a minimum of 6.5% saturation will be considered non-attaining even if the spatial average exceeds the credit validation performance standard.

**Vegetation Success**

The vegetation success criteria will comply with guidance included in "Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation" (NCDENR EEP, 2011), which states that the plots must achieve a stem density of 320 live stems/acre after three years, 260 live stems/acre after five years and live 210 stems/acre after seven years to be considered successful. In addition to density requirements, plant height will be monitored within the monitoring plots to ensure that trees average 10 feet in height after seven years.

## 10.0 MONITORING REQUIREMENTS

Annual monitoring data will be reported using the EEP monitoring template. The monitoring report shall provide a project data chronology that will facilitate an understanding of project status and trends, population of EEP databases for analysis, research purposes, and assist in decision making regarding project close-out.

| Required | Parameter | Quantity | Frequency | Notes |
|---|---|---|---|---|
| Yes | Groundwater Hydrology | 7-8 gauges distributed throughout the restored wetland and an additional 12 gauges to determine the effect of the open ditch | Annual | Groundwater monitoring gauges with data recording devices will be installed on site; the data will be downloaded on a monthly basis during the growing season |
| Yes | Vegetation | Will be distributed to ensure sufficient coverage of planted vegetation | During monitoring years 1, 2, 3, 5, and 7. | Vegetation will be monitored using the Carolina Vegetation Survey (CVS) protocols |
| Yes | Exotic and nuisance vegetation | | Annual | Locations of exotic and nuisance vegetation will be mapped |
| Yes | Project boundary | | Semi-annual | Locations of vegetation damage, boundary encroachments, etc. will be mapped |

The first scheduled monitoring will be conducted during the first full growing season following project completion. Monitoring shall subsequently be conducted annually for a total period of seven years or until the project meets its success criteria.

Groundwater elevations will be monitored to evaluate the attainment of jurisdictional wetland hydrology. Verification of wetland hydrology will be determined by automatic recording well data collected within the project area and reference wetland. Seven to eight automatic recording gauges will be established within the mitigation areas. Daily data will be collected from the automatic gauges for a minimum of a 5-year monitoring period following wetland construction. A nearby reference wetland will also be monitored using the same procedures for comparative analysis (see Appendix B for reference wetland data sheet and location map). Additionally, to monitor the effect of the unfilled ditches described in Section 7.3, four sets of coupled gauges will be established perpendicular to each unfilled ditch. Each set will include a gauge that is 50' from the open ditch and another gauge that is 80' from the ditch. An additional four gauges will be established between the coupled gauges to monitor hydrology less than 42.5' from the open ditch. Two sets of the coupled gauges will be used at the unfilled ditch along the southern project boundary. The first set will be established one-third of the distance from the western project boundary and the second set will be established at two-thirds of that distance. The two remaining sets of gauges will also be established perpendicular to the 650' of unfilled ditch along the western project boundary. The first set will be established one-third of the distance from where the ditch is left open to the southern project boundary and the second set will be established at two-thirds of that distance. A figure in Appendix C shows the potential gauge locations at the site.

Beginning at the end of the first growing season, KCI will monitor the planted vegetation in monitoring years 1, 2, 3, 5, and 7 or until the success criterion is met. The survivability of the vegetation plantings will be evaluated using a sufficient number of 100 $m^2$ vegetative sampling plots randomly placed throughout the restored wetland. Permanent monuments will be established at the corners of each monitoring plot and documented by either conventional survey or GPS. These plots will be monitored according to the Level 2 method of the current CVS/EEP monitoring protocol (http://cvs.bio.unc.edu/methods.htm).

Photograph reference points (PRPs) will be established to assist in characterizing the site and to allow qualitative evaluation of the site conditions. The location of each photo point will be marked in the monitoring plan and the bearing/orientation of the photograph will be documented.

Annual monitoring reports will be prepared and submitted after all monitoring tasks for each year are completed. The report will document the monitored components and include all collected data, analyses, and photographs. Each report will provide the new monitoring data and compare the most recent results against previous findings. The monitoring report format will be similar to that set out in the most recent EEP monitoring protocol.

## 11.0 LONG-TERM MANAGEMENT PLAN

Upon approval for close-out by the Interagency Review Team (IRT), the site will be transferred to the NCDENR Division of Natural Resource Planning and Conservation's Stewardship Program. This party shall be responsible for periodic inspection of the site to ensure that restrictions required in the conservation easement are upheld. Endowment funds required to uphold easement and deed restrictions shall be negotiated prior to site transfer to the responsible party.

The NCDENR Division of Natural Resource Planning and Conservation's Stewardship Program currently houses EEP stewardship endowments within the non-reverting, interest-bearing Conservation Lands Stewardship Endowment Account. The use of funds from the Endowment Account is governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used only

for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable. The NCDENR Stewardship Program intends to manage the account as a non-wasting endowment. Only interest generated from the endowment funds will be used to steward the compensatory mitigation sites. Interest funds not used for those purposes will be re-invested in the Endowment Account to offset losses due to inflation.

## 12.0 ADAPTIVE MANAGEMENT PLAN

Upon completion of site construction KCI will implement the post-construction monitoring protocols previously defined in this document. Project maintenance will be performed as described previously in this document. If, during the course of annual monitoring it is determined the site's ability to achieve site performance standards are jeopardized, KCI will notify the EEP and the USACE of the need to develop a Plan of Corrective Action. The Plan of Corrective Action may be prepared using in-house technical staff or may require engineering and consulting services. Once the Corrective Action Plan is prepared and finalized KCI will:

1. Notify the EEP and USACE as required by the Nationwide 27 permit general conditions.
2. Revise performance standards, maintenance requirements, and monitoring requirements as necessary and/or required by the USACE.
3. Obtain other permits as necessary.
4. Implement the Corrective Action Plan.
5. Provide the USACE a Record Drawing of Corrective Actions. This document shall depict the extent and nature of the work performed.

## 13.0 FINANCIAL ASSURANCES

Pursuant to Section IV H and Appendix III of the Ecosystem Enhancement Program's In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environment and Natural Resources has provided the U.S. Army Corps of Engineers Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by EEP. This commitment provides financial assurance for all mitigation projects implemented by the program.

## 14.0 OTHER INFORMATION

### 14.1 Definitions

8-digit Catalog Unit (CU) – The USGS developed a hydrologic coding system to delineate the country into uniquely identified watersheds that can be commonly referenced and mapped. North Carolina has 54 of these watersheds uniquely defined by an 8-digit number. EEP typically addresses watershed – based planning and restoration in the context of the 17 river basins (each has a unique 6-digit number), 54 catalog units and 1,601 14-digit hydrologic units.

14–digit Hydrologic Unit (HU) – In order to address watershed management issues at a smaller scale, the U.S. Natural Resources Conservation Service (NRCS) developed methodology to delineate and uniquely identify watersheds at a scale smaller than the 8-digit catalog unit. A hydrologic unit is a drainage area delineated to nest in a multilevel, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream or similar surface waters. North Carolina has 1,601 14-digit hydrologic units.

DWQ – North Carolina Division of Water Quality

EEP – The North Carolina Ecosystem Enhancement combines existing wetlands restoration initiatives (formerly the Wetlands Restoration Program or NCWRP) of the N.C. Department of Environment and Natural Resources with ongoing efforts by the N.C. Department of Transportation (NCDOT) to offset unavoidable environmental impacts from transportation-infrastructure improvements.

Native vegetation community – a distinct and reoccurring assemblage of populations of plants, animals, bacteria and fungi naturally associated with each other and their population; as described in Schafale, M.P. and Weakley, A. S. (1990), Classification of the Natural Communities of North Carolina, Third Approximation.

Project Area - includes all protected lands associated with the mitigation project.

RBRP - The River Basin Restoration Priorities are documents that delineate specific watersheds (Targeted Local Watersheds) within a River Basin that exhibit both the need and opportunity for wetland, stream and riparian buffer restoration.

TLW - Targeted Local Watershed, are 14-digit hydrologic units which receive priority for EEP planning and restoration project funds.

USGS – United States Geological Survey

## 14.2 References

Breeding, Rob. 2010. White Oak River Basin Restoration Priorities 2010. Raleigh, NC. NCDENR, Ecosystem Enhancement Program. Last accessed 02/2013 at: http://portal.ncdenr.org/c/document_library/get_file?uuid=1c0b7e5a-9617-4a44-a5f8-df017873496b&groupId=60329

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1. Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.

Faber-Langendoen, D., Rocchio, J., Schafale, M., Nordman, C., Pyne, M., Teague, J., Foti, T., Comer, P. 2006. Ecological Integrity Assessment and Performance Measures for Wetland Mitigation. NatureServe, Arlington, Virginia.

Lindenmayer, D.B., and J.F. Franklin. 2002. Conserving forest biodiversity: A comprehensive multiscaled approach. Island Press, Washington, DC.

Natural Resources Conservation Service. 2002. Climate Information – Wetlands Retrieval for North Carolina. Last accessed 10/2012 at: http://www.wcc.nrcs.usda.gov/ftpref/support/climate/wetlands/nc/37133.txt

NCDENR, Ecosystem Enhancement Program. 2011. Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation. Last accessed 11/2012 at: http://portal.ncdenr.org/c/document_library/get_file?p_l_id=1169848&folderId=2288101&name=DLFE-39234.pdf

NC Natural Heritage Program. 2012. Heritage Data Search. Last accessed 10/2012 at: http://portal.ncdenr.org/web/nhp/database-search\

NCSU BAE. North Carolina State University, Biological and Agricultural Engineering. 2011. Method to Determine Lateral Effect of a Drainage Ditch on Adjacent Wetland Hydrology. Last accessed 11/2012 at: http://www.bae.ncsu.edu/soil_water/projects/lateral_effect.html

NCSU, State Climate Office of North Carolina. 2012. Climate Data for Maysville, NC

NC Wetland Functional Assessment Team. 2010. NC Wetland Assessment Method (NC WAM) User Manual, version 4.1. Last accessed 11/2012 at: http://portal.ncdenr.org/c/document_library/get_file?uuid=76f3c58b-dab8-4960-ba43-45b7faf06f4c&groupId=38364

Peet, R.K., Wentworth, T.S., and White, P.S. 1998. A flexible, multipurpose method for recording vegetation composition and structure. Castanea 63:262-274

Rosgen, D. (1996), Applied River Morphology, 2nd edition, Wildland Hydrology, Pagosa Springs, CO

Schafale, M.P. and Weakley, A. S. 1990. Classification of the Natural Communities of North Carolina, Third Approximation, NC Natural Heritage Program, Raleigh, NC

Sprecher, S.W. 2000. Accessing and Using Meteorological Data to Evaluate Wetland Hydrology. Headquarters, U.S. Army Corps of Engineers, Operations Division, Regulatory Branch.

Stream Mitigation Guidelines, April 2003, US Army Corps of Engineers Wilmington District

USDA, Natural Resources Conservation Service. 2010. Field Indicators of Hydric Soils in the United States: a Guide for Identifying and Delineating Hydric Soils, Version 7.0.

USDA, Natural Resources Conservation Service, Water and Climate Center. 2012. RUSLE2 Related Attributes Table for Onslow, North Carolina. Last accessed 11/2012 at: http://soildatamart.nrcs.usda.gov/Survey.aspx?County=NC133

USDA, Soil Conservation Service. 1986. Urban Hydrology for Small Watersheds. Technical Release 55. Washington, DC: Soil Conservation Service.

USDA. 1992. Soil Survey of Onslow County, North Carolina. United States Department of Agriculture.

USFWS. 2012. Environmental Conservation Online System - Species by County Report. Last accessed 10/2012 at: http://ecos.fws.gov/tess_public/countySearch!speciesByCountyReport.action?fips=37133

Young, T.F. and Sanzone, S. (editors). 2002. A framework for assessing and reporting on ecological condition. Ecological Reporting Panel, Ecological Processes and Effects Committee. EPA Science Advisory Board. Washington, DC.

## 14.3 Appendix A. Site Protection Instrument

Doc ID: 010296830009 Type: CRP
Recorded: 02/06/2013 at 03:15:20 PM
Fee Amt: $265.00 Page 1 of 9
Revenue Tax: $239.00
Onslow County, NC
Rebecca L. Pollard Reg. of Deeds
BK3928 PG776-784

**STATE OF NORTH CAROLINA**

**CONSERVATION EASEMENT PROVIDED PURSUANT TO FULL DELIVERY MITIGATION CONTRACT**

**ONSLOW COUNTY**
**SPO File Number 67-AW**
**EEP Site ID Number 95362 (Bear Basin)**
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

Excise Tax: $ 239.00

**THIS CONSERVATION EASEMENT DEED,** made this 6th day of February, 2013 by **Kenneth W. Jones and wife, Sue Jones Jones** ("**Grantor**"), whose mailing address is **322 Jonestown Road, Pink Hill NC 28572**, 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 Ecosystem Enhancement Program (formerly known as the 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 **KCI Technologies, Inc.** and the North Carolina Department of Environment and Natural Resources, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environment and Natural Resources Purchase and Services Contract Number **004741**.

**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, 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 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 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 Ecosystem Enhancement Program in the Department of Environment and Natural Resources, 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 **Richlands Township, Onslow County**, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately **42.40** acres, described as "Tract No. 5" on plat recorded in Map Book 9, Page 35, Onslow County Registry and being conveyed to the Grantor by deed as recorded in **Deed Book 531 at Page 388** of the **Onslow County** Registry, North Carolina; and

**WHEREAS,** Grantor is willing to grant a Conservation Easement over the herein described areas of the Property, thereby restricting and limiting the use of the included areas of the Property to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept such Conservation Easement. This Conservation Easement shall be for the protection and benefit of **New River**.

**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 Easement Area consists of the following:

Conservation Easement containing a total of **11.94 acres** as shown on the plat of survey entitled "Final Plat, Conservation Easement for North Carolina Ecosystem Enhancement Program, Project Name: **Bear Basin Non-Riparian Wetland Restoration Site**, EEP Project #: 95362, SPO#: **67-AW**," dated **August 23, 2012** by **James M. Gellenthin**, PLS Number **L-3860** and recorded in the **Onslow County**, North Carolina Register of Deeds at **Map Book** 65 **Pages** 198.

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

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the 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 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 ACTIVITES

The 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 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 Easement Area for the purposes thereof.

**B. Motorized Vehicle Use.** Motorized vehicle use in the Easement Area is prohibited.

**C. Educational Uses.** The Grantor reserves the right to engage in and permit others to engage in educational uses in the Easement Area not inconsistent with this Conservation Easement, and the right of access to the 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. Vegetative Cutting.** Except as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Easement Area is prohibited.

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

**F. Agricultural Use.** All agricultural uses are prohibited within the 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 Easement Area.

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

**I. Signs.** No signs shall be permitted in the Easement Area except interpretive signs describing restoration activities and the conservation values of the 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 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 Easement Area is prohibited.

**K. Grading, Mineral Use, Excavation, Dredging.** There shall be no grading, filling, excavation, dredging, mining, drilling; 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 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 Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Easement Area may temporarily be used for good cause shown as needed for the survival of livestock and agricultural production on the Property.

**M. Subdivision and Conveyance.** Grantor voluntarily agrees that no subdivision, partitioning, or dividing of the underlying Property owned by the Grantor in fee simple ("fee") that is subject to this Easement is allowed. Unless agreed to by the Grantee in writing, any future conveyance of the underlying fee and the rights conveyed herein shall be as a single block of property. Any future transfer of the fee simple shall be subject to this Conservation Easement. Any transfer of the fee is subject to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Easement Area for the purposes set forth herein.

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

**O. Disturbance of Natural Features.** Any change, disturbance, alteration or impairment of the natural features of the 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 N.C. Ecosystem Enhancement Program, whose mailing address is 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, are hereby granted and receive a perpetual non-exclusive easement for access to the Easement Area over the Property at reasonable times to undertake any activities to restore, construct, manage, maintain, enhance, and monitor the stream, wetland and any other riparian resources in the 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.** The Grantee, its employees and agents, successors or assigns, shall be permitted to place fencing on the Property to restrict livestock access. Although the Grantee is not responsible for fence maintenance, the Grantee reserves the right to repair the fence, at its sole discretion.

## IV. ENFORCEMENT AND REMEDIES

**A. Enforcement.** To accomplish the purposes of this Conservation Easement, Grantee is allowed to prevent any activity within the Easement Area that is inconsistent with the purposes of this Easement and to require the restoration of such areas or features in the 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 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 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 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 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 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. Such notification shall be addressed to: Justin McCorkle, 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 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 Easement Area, and the right of quiet enjoyment of the 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.

Kenneth W. Jones (SEAL)
**Kenneth W. Jones**

Sue Jones Jones (SEAL)
**Sue Jones Jones**

**NORTH CAROLINA**
***COUNTY OF ONSLOW***

I, J. Dewey Edwards, Jr. a Notary Public in and for the County and State aforesaid, do hereby certify that **Kenneth W. Jones and wife, Sue Jones Jones**, 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 6th day of February, 2013.

J. Dewey Edwards Jr.
Notary Public

J. DEWEY EDWARDS, JR. NOTARY PUBLIC ONSLOW COUNTY, N.C.

My commission expires:

July 9, 2016

# Exhibit A

## Conservation Easement Description

A parcel of land to be used for conservation easement purposes located on lands now or formerly owned by Kenneth W. Jones (DB 531 Pg 388), located in Richlands Township, Onslow County, North Carolina and being more particularly described as follows:

Beginning at a set iron pin at the intersection of the Southeasterly right-of-way line of Jesse Williams Road (60 foot public right-of-way) and the West line of said lands owned by Kenneth W. Jones; said point having State Plane Coordinates (NAD '83) of Northing:431134.41 and Easting:2417125.15;

Thence N 22°59'18" E, on the said Southeasterly right-of-way line of Jesse Williams Road (NCSR 1233), a distance of 364.54 feet to a point;

Thence S 26°12'37" E a distance of 1209.57 feet to a point on the Northwesterly line of lands now or formerly owned by MR Hogs (DB 1687 Pg 917);

Thence S 62°10'31" W, on the said Northwesterly line of MR Hogs lands, a distance of 721.97 feet to a point at the Southwest corner of said lands of Kenneth W. Jones;

Thence N 02°00'29" W, on the West line of Kenneth W. Jones lands, a distance of 1087.28 feet to the **Point of Beginning**.

Containing 520,207 square feet or 11.94 acres.

| Point Table (Table of Coordinates) | | | |
|---|---|---|---|
| Point | Northing | Easting | Description |
| 1 | 431134.41 | 2417125.15 | Easement Corner |
| 2 | 431470.00 | 2417267.52 | Easement Corner |
| 3 | 430384.79 | 2417801.74 | Easement Corner |
| 4 | 430047.80 | 2417163.25 | Easement Corner |

NOTES:

1. THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARENT TRACTS. THE PARENT TRACT BOUNDARIES ADJACENT TO THIS EASEMENT ARE NOT CHANGED BY THIS PLAT. BOUNDARY INFORMATION SHOWN HEREON WAS DERIVED FROM DEEDS AND MAPS OF RECORD IN ONSLOW COUNTY ALONG WITH MONUMENTATION FOUND IN THE FIELD.
2. DISTANCES SHOWN ARE HORIZONTAL GROUND DISTANCES IN U.S. SURVEY FEET UNLESS OTHERWISE NOTED.
3. AREA COMPUTED BY COORDINATE METHOD.
4. THE BASIS OF THE MERIDIANS AND COORDINATES FOR THIS PLAT IS THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM 1983 (NAD 83), BASED ON DIFFERENTIAL GPS OBSERVATIONS PERFORMED IN AUGUST 2012. ALL DISTANCES ARE GROUND UNLESS OTHERWISE NOTED.
5. DEED REFERENCES: AS SHOWN HEREON.
6. SUBJECT PROPERTIES KNOWN AS TAX NUMBER: AS SHOWN HEREON.
7. SUBJECT PROPERTIES PARTIALLY LIE WITHIN THE AREA DESIGNATED AS ZONE "X", BASED ON FEDERAL FLOOD INSURANCE RATE MAP 3720441300J EFFECTIVE NOV. 3, 2005.
8. NO UNDERGROUND UTILITY LOCATING PERFORMED DURING THE COURSE OF THIS SURVEY.
9. THE STATE PLANE COORDINATES FOR THIS PROJECT WERE PRODUCED WITH RTK GPS OBSERVATIONS. THE NETWORK POSITIONAL ACCURACY OF THE RTK DERIVED POSITIONAL INFORMATION IS 0.02 METER. HORIZONTAL POSITIONS ARE REFERENCED TO NAD 83 (NSRS2007). VERTICAL POSITIONS ARE REFERENCED TO NAVD88 (GEOID09). COMBINED SCALE FACTOR = 0.999889501

THIS PLAT IS NOT SUBJECT TO THE ONSLOW COUNTY SUBDIVISION REGULATIONS.

1/11/13 — DATE — SUBDIVISION ADMINISTRATOR

STATE OF NORTH CAROLINA
ONSLOW COUNTY

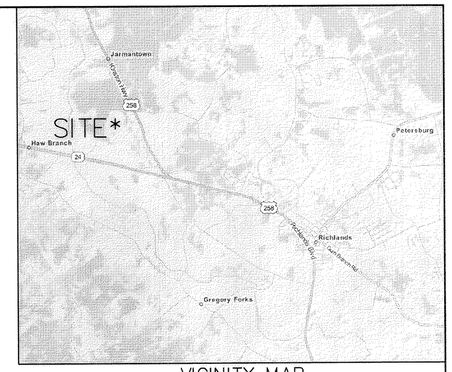
I, Jane Holland, REVIEW OFFICER OF ONSLOW COUNTY, CERTIFY THAT THE MAP OR PLAT WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

Jane Holland 1/11/13
REVIEW OFFICER DATE

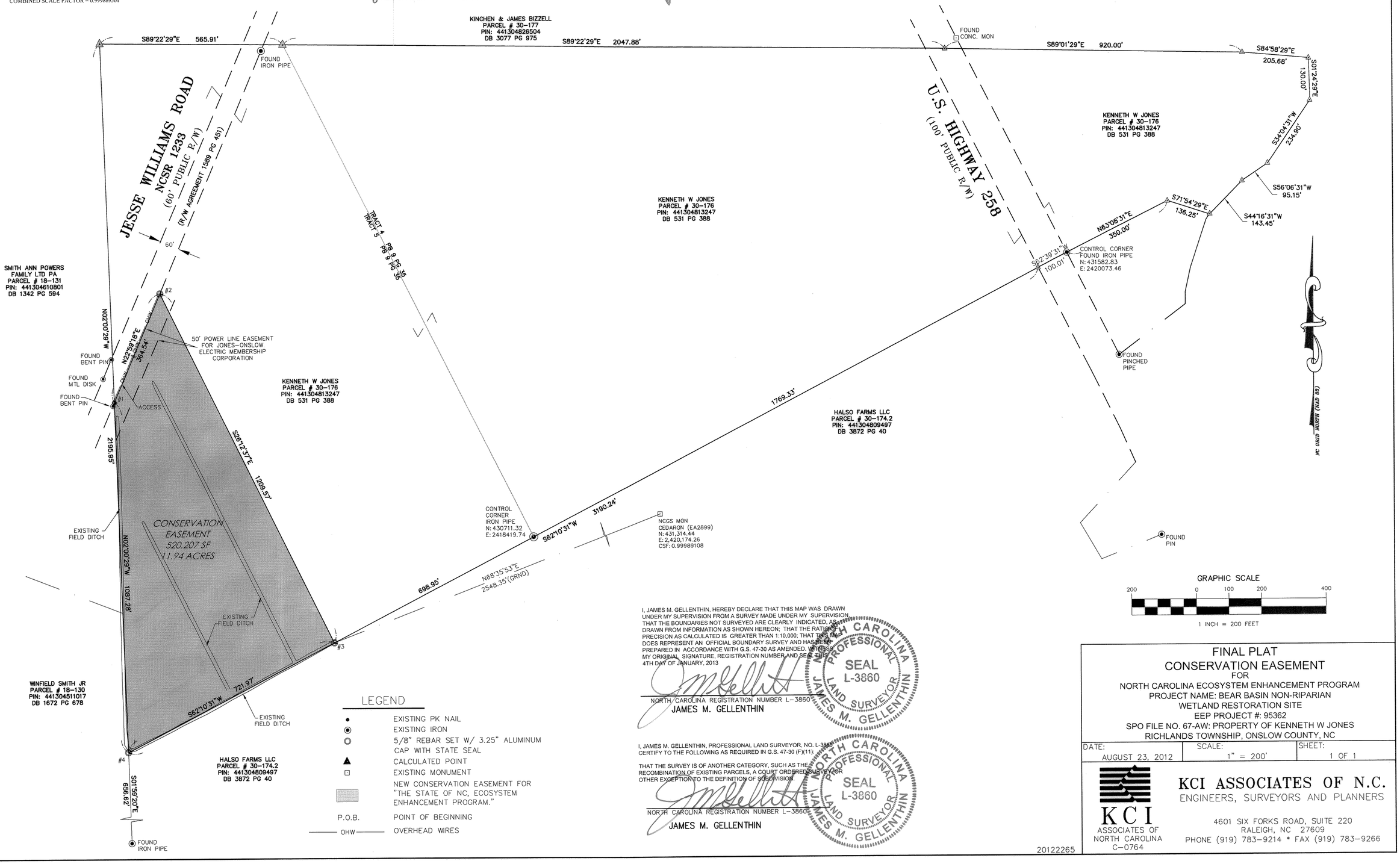
Doc ID: 010243410001 Type: CRP
Recorded: 01/11/2013 at 12:41:04 PM
Fee Amt: $21.00 Page 1 of 1
Onslow County NC
Rebecca L. Pollard Reg. of Deeds
BK 65 PG 198

ONSLOW COUNTY REGISTER OF DEEDS

| POINT TABLE | | | |
|---|---|---|---|
| POINT | NORTHING | EASTING | DESCRIPTION |
| 1 | 431134.41 | 2417125.15 | ESMT CORNER |
| 2 | 431470.00 | 2417267.52 | ESMT CORNER |
| 3 | 430384.79 | 2417801.74 | ESMT CORNER |
| 4 | 430047.80 | 2417163.25 | ESMT CORNER |




VICINITY MAP
(NOT TO SCALE)




LEGEND

- EXISTING PK NAIL
- EXISTING IRON
- 5/8" REBAR SET W/ 3.25" ALUMINUM CAP WITH STATE SEAL
- CALCULATED POINT
- EXISTING MONUMENT
- NEW CONSERVATION EASEMENT FOR "THE STATE OF NC, ECOSYSTEM ENHANCEMENT PROGRAM."
- P.O.B. POINT OF BEGINNING
- OHW OVERHEAD WIRES

GRAPHIC SCALE

200 0 100 200 400

1 INCH = 200 FEET

I, JAMES M. GELLENTHIN, HEREBY DECLARE THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM A SURVEY MADE UNDER MY SUPERVISION THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED, AS DRAWN FROM INFORMATION AS SHOWN HEREON; THAT THE RATIO OF PRECISION AS CALCULATED IS GREATER THAN 1:10,000; THAT THIS MAP DOES REPRESENT AN OFFICIAL BOUNDARY SURVEY AND HAS BEEN PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 4TH DAY OF JANUARY, 2013

NORTH CAROLINA REGISTRATION NUMBER L-3860
JAMES M. GELLENTHIN

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN

I, JAMES M. GELLENTHIN, PROFESSIONAL LAND SURVEYOR, NO. L-3860 CERTIFY TO THE FOLLOWING AS REQUIRED IN G.S. 47-30 (F)(11):

THAT THE SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT ORDERED SURVEY OR OTHER EXCEPTION TO THE DEFINITION OF SUBDIVISION.

NORTH CAROLINA REGISTRATION NUMBER L-3860
JAMES M. GELLENTHIN

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN

# FINAL PLAT
# CONSERVATION EASEMENT
FOR
NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM
PROJECT NAME: BEAR BASIN NON-RIPARIAN WETLAND RESTORATION SITE
EEP PROJECT #: 95362
SPO FILE NO. 67-AW: PROPERTY OF KENNETH W JONES
RICHLANDS TOWNSHIP, ONSLOW COUNTY, NC

| DATE: | SCALE: | SHEET: |
|---|---|---|
| AUGUST 23, 2012 | 1" = 200' | 1 OF 1 |


KCI ASSOCIATES OF NORTH CAROLINA C-0764

KCI ASSOCIATES OF N.C.
ENGINEERS, SURVEYORS AND PLANNERS
4601 SIX FORKS ROAD, SUITE 220
RALEIGH, NC 27609
PHONE (919) 783-9214 * FAX (919) 783-9266


20122265

## 14.4 Appendix B. Baseline Information Data

**USACE Wetland Determination Forms**

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Bear Basin City/County: Richlands / Onslow Sampling Date: 9-26-12

Applicant/Owner: KCI Associates of NC State: NC Sampling Point: DP# 1 at A2 NW

Investigator(s): S. Stokes Section, Township, Range:

Landform (hillslope, terrace, etc.): FLAT Local relief (concave, convex, none): FLAT Slope (%): 0 - 1

Subregion (LRR or MLRA): LRR T Lat: 34° 55' 39.10" N Long: 77° 36' 26.55" W Datum:

Soil Map Unit Name: Rains / Pantego NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ____, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✓

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ____ | No ✓ | **Is the Sampled Area within a Wetland?** Yes ____ No ✓ |
| Hydric Soil Present? | Yes ____ | No ✓ | |
| Wetland Hydrology Present? | Yes ____ | No ✓ | |

Remarks:
FARMLAND is draining and is planted in Soybeans

### 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 ____ | Depth (inches): ____ |
| Water Table Present? | Yes ____ | No ✓ | Depth (inches): > 18" |
| Saturation Present? (includes capillary fringe) | Yes ____ | No ____ | Depth (inches): ____ |

**Wetland Hydrology Present?** Yes ____ 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: DP#1

| | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| Tree Stratum (Plot size: _____) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| = Total Cover | | | |
| 50% of total cover: _____ 20% of total cover: _____ | | | |
| Sapling/Shrub Stratum (Plot size: _____) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| = Total Cover | | | |
| 50% of total cover: _____ 20% of total cover: _____ | | | |
| Herb Stratum (Plot size: 1m) | | | |
| 1. Soybeans | | | |
| 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 _____ No ✓

Remarks: (If observed, list morphological adaptations below).

**SOIL**

Sampling Point: DP#1

**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 |
|---|---|---|---|---|---|---|---|---|
| 0-7 | 10yr 4/1 | 100 | | | | | fsl | |
| 7-10 | 10yr 4/1 | 98 | 10yr 5/2 | 2 | | | fsl | |
| 10-15 | 10yr 5/6 | 95 | 10yr 5/4 | 5 | C | m | vfsl | very fine sandy loam |
| 15-18 | 10yr 5/6 | 95 | 10yr 5/2 | 5 | C | m | vfsl-fsl | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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 _____ No ✓

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Bear Basin City/County: Richlands / Onslow Sampling Date: 9-26-12

Applicant/Owner: KCI Associates of NC State: NC Sampling Point: DP#2@A12

Investigator(s): S. Sykes Section, Township, Range: _____

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): Flat Slope (%): 0-1

Subregion (LRR or MLRA): LRR T Lat: 34°55'37.25"N Long: 77°36'25.64"W Datum: _____

Soil Map Unit Name: Rains / Pantego NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil _____, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✓

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No ✓ | **Is the Sampled Area within a Wetland?** Yes _____ No ✓ |
| Hydric Soil Present? | Yes ✓ | No _____ | |
| Wetland Hydrology Present? | Yes _____ | No ✓ | |

Remarks:

Farmland is drained and is planted in Soybeans

### 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 _____ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): > 18"

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present?** Yes _____ 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: DP# 2

| Tree Stratum (Plot size: _____) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| 50% of total cover: _____ | 20% of total cover: _____ | | |
| Sapling/Shrub Stratum (Plot size: _____) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| 50% of total cover: _____ | 20% of total cover: _____ | | |
| Herb Stratum (Plot size: 1/111) | | | |
| 1. Soybeans | | | |
| 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 _____ No ✓

Remarks: (If observed, list morphological adaptations below).

**SOIL**

Sampling Point: DP# 2

**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 |
|---|---|---|---|---|---|---|---|---|
| 0-8 | 10yr 3/1 | 100 | | | | | l | loam |
| 8-11 | 10yr 4/2 | 100 | | | | | l | |
| 11-18 | 10yr 5/2 | 100 | | | | | sl | sandy loam |
| 18-20 | 10yr 5/2 | 98 | 10yr 5/6 | 2 | C | M | 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 ✓ No ___

Remarks:

Soil is drained therefore redoximorphic features are absent making this non hydric by Regional Indicators but hydric by 1987 manual.

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Bear Basin City/County: Richlands / Onslow Sampling Date: 9-26-12

Applicant/Owner: Kerr Associates of NC State: NC Sampling Point: DP# 3 @ A23

Investigator(s): S. Stokes Section, Township, Range:

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): Flat Slope (%): 0-1

Subregion (LRR or MLRA): LRR T Lat: 34°55'34.37"N Long: 77°36'18.61"W Datum:

Soil Map Unit Name: Bains / Pantego NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ____, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✓

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ____ | No ✓ | **Is the Sampled Area within a Wetland?** Yes ____ No ✓ |
| Hydric Soil Present? | Yes ✓ | No ____ | |
| Wetland Hydrology Present? | Yes ____ | No ✓ | |

Remarks:

Farmland is drained and is planted in Soybeans.

### 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 ____ | Depth (inches): ____ |
| Water Table Present? | Yes ____ | No ✓ | Depth (inches): >18 |
| Saturation Present? (includes capillary fringe) | Yes ____ | No ____ | Depth (inches): ____ |

**Wetland Hydrology Present?** Yes ____ 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: DP# 3

| Tree Stratum (Plot size: _____) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| 50% of total cover: _____ | 20% of total cover: _____ | | |
| Sapling/Shrub Stratum (Plot size: _____) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| 50% of total cover: _____ | 20% of total cover: _____ | | |
| Herb Stratum (Plot size: 1m) | | | |
| 1. Soybeans | | | |
| 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 _____ No ✓

Remarks: (If observed, list morphological adaptations below).

## SOIL

Sampling Point: DP# 3

**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 |
|---|---|---|---|---|---|---|---|---|
| 0-11 | 10yr 3/1 | 100 | | | | | fsl | |
| 11-13 | 10yr 4/2 | 100 | | | | | fsl | |
| 13-16 | 10yr 4/2 | 98 | 10yr 6/4 | 2 | C | M | SL | |
| 16-20 | 10yr 6/2 | 99 | 7.5yr 5/6 | 1 | C | M/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 ✓ No ___

Remarks:

Meets A11: Depleted Below Dark Surface

**Reference Wetland**

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Bear Basin Reference Wetland City/County: Richlands / Onslow Sampling Date: 11-5-2012

Applicant/Owner: KCI / EEP State: NC Sampling Point: DP#1

Investigator(s): S. Stokes, K. O'Briant Section, Township, Range:

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 0-1

Subregion (LRR or MLRA): LRR T Lat: N 34° 55' 46.4" Long: W 077° 36' 25.9" Datum:

Soil Map Unit Name: Pantego NWI classification: PFO1B

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No ____ | **Is the Sampled Area within a Wetland?** Yes ✓ No ____ |
| Hydric Soil Present? | Yes ✓ | No ____ | |
| Wetland Hydrology Present? | Yes ✓ | No ____ | |

Remarks:

Reference site is composed of >50% canal coverage from deciduous hardwoods over shrub layer with >60% broad leaved evergreens.

### 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 ____ | Depth (inches): ____ |
| Water Table Present? | Yes ____ | No ✓ | Depth (inches): 25" |
| Saturation Present? (includes capillary fringe) | Yes ____ | No ____ | Depth (inches): ____ |

**Wetland Hydrology Present?** Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Water table @ 39" on 11-5-12. Then came up to 25" overnight without rain event.

**VEGETATION (Four Strata)** – Use scientific names of plants. Sampling Point: DP#1

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Water Oak - Quercus nigra | 50 | ✓ | FAC |
| 2. Loblolly Pine - Pinus taeda | 15 | ✓ | FAC |
| 3. Sweetgum - Liquidambar styraciflua | 5 | | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 70 = Total Cover | | |
| 50% of total cover: 35 | 20% of total cover: 14 | | |
| Sapling/Shrub Stratum (Plot size: 30') | | | |
| 1. Swamp Bay - Persea palustris | 60 | ✓ | FACW |
| 2. Swamp Tupelo - Nyssa Biflora | 20 | ✓ | OBL |
| 3. Southern Highbush Blueberry - Vaccinium formosum | 15 | | FACW |
| 4. Red Maple - Acer rubrum | 10 | | FAC |
| 5. Sweetgum - Liquidambar Styraciflua | 10 | | FAC |
| 6. Titi - Cyrilla Racemiflora | 10 | | FACW |
| 7. Common Sweetleaf - Symplocus tinctoria | 5 | | FACW |
| 8. | | | |
| | 130 = Total Cover | | |
| 50% of total cover: 65 | 20% of total cover: 26 | | |
| Herb Stratum (Plot size: 1m) | | | |
| 1. Swamp Bay - Persea palustris | 5 | ✓ | FACW |
| 2. Sweet pepper Bush - Clethra alnifolia | 5 | ✓ | FACW |
| 3. Highbush Blueberry - Vaccinium formosum | 5 | ✓ | FACW |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 15 = Total Cover | | |
| 50% of total cover: 7.5 | 20% of total cover: 3 | | |
| 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: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

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

**Prevalence Index worksheet:**

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

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[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 ___

Remarks: (If observed, list morphological adaptations below).

Virginia Chain Fern - Woodwardia virginica 5%

Giant Cane - Arundinaria gigantea 10%

**SOIL**

Sampling Point: DP#1

**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 |
|---|---|---|---|---|---|---|---|---|
| 0-7 | 10yr 3/1 | 100 | | | | | mucky l | |
| 7-10 | 10yr 3/1 | 90 | 10yr 4/1 | 10 | C | m | l | |
| 10-14 | 10yr 4/1 | 100 | | | | | sl | |
| 14-20 | 10yr 6/1 | 80 | 10yr 5/6 | 20 | C | m | scl | |
| 20-44 | 10yr 6/1 | | 10yr 5/6 | 20 | C | m | scl | |
| | | | 7.5yr 5/6 | 5 | C | pl | | |
| 44-56 | 10yr 5/2 | | 7.5yr 5/6 | 5 | C | PL/m | 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.

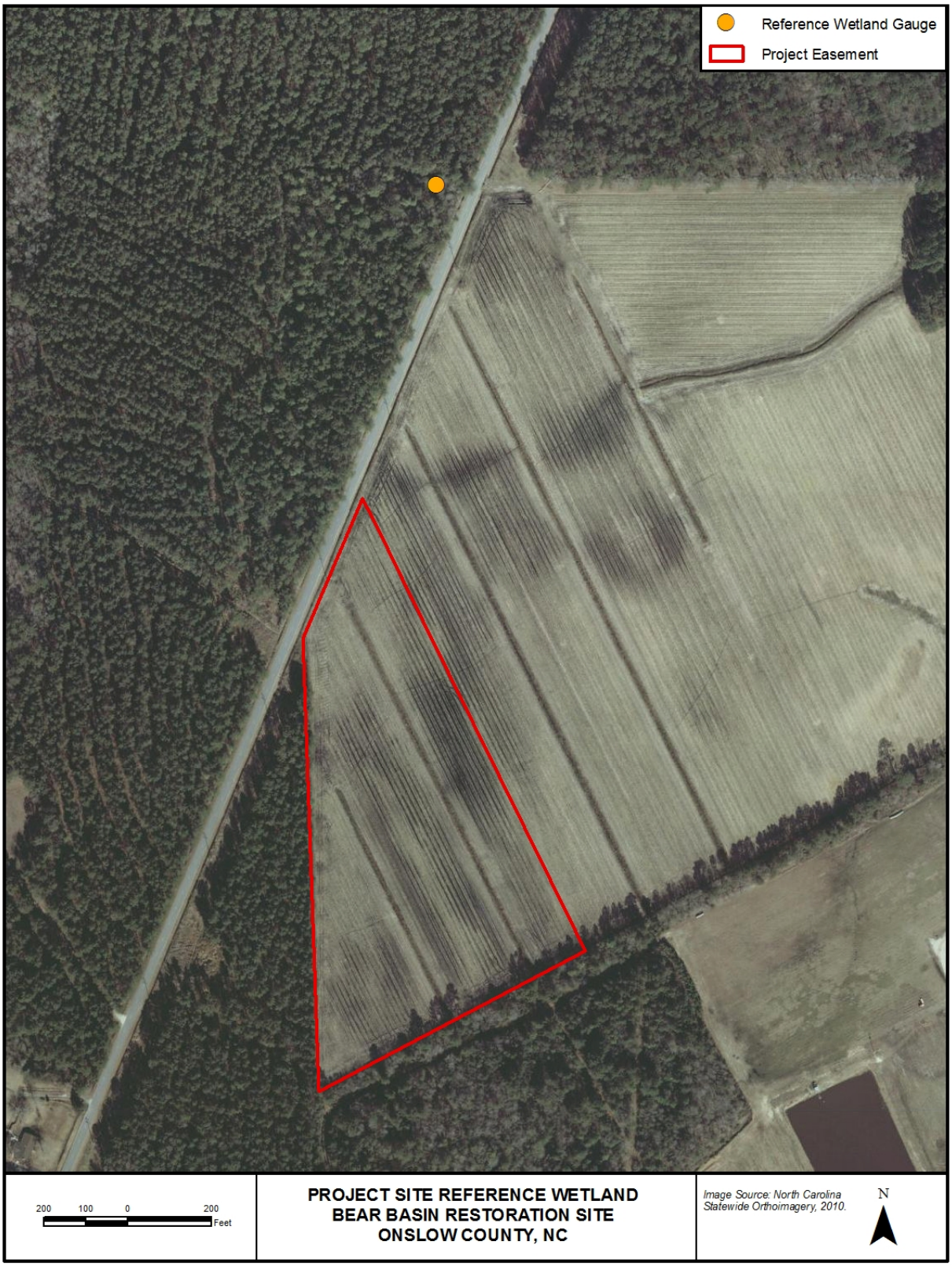
**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes ✓ No ___

Remarks:


Reference Wetland Gauge
Project Easement
200 100 0 200
Feet
PROJECT SITE REFERENCE WETLAND
BEAR BASIN RESTORATION SITE
ONSLOW COUNTY, NC
Image Source: North Carolina Statewide Orthoimagery, 2010.
N

**FHWA Categorical Exclusion Form**

November 14, 2012

Mr. Tim Morris
KCI Associates of NC, PA
Landmark Center II, Suite 220
4601 Six Forks Road
Raleigh NC 27609

Subject: Categorical Exclusion
Bear Basin Wetland Restoration Project
White Oak River Basin – CU# 03030001
Onslow County, North Carolina
Contract No. 004741, RFP No. 16-004107

Dear Mr. Morris:

Attached please find the approved Categorical Exclusion form for the subject full delivery project. Please include a copy of the approval form in your Mitigation Plan. You may submit your invoice for completion of the Task 1 deliverable for review and approval.

If you have any questions, or wish to discuss this matter further, please contact me at any time. I can be reached at (910) 796-7475, or email me at kristin.miguez@ncdenr.gov.

Sincerely,

Kristin E. Miguez, Project Manager

cc: Donnie Brew, FHWA
file

# Categorical Exclusion Form for Ecosystem Enhancement Program Projects
## Version 1.4

**Note: Only Appendix A should to be submitted (along with any supporting documentation) as the environmental document.**

| Part 1: General Project Information | |
|---|---|
| **Project Name:** | Bear Basin Wetland Restoration Project |
| **County Name:** | Onslow County, NC |
| **EEP Number:** | 95362 |
| **Project Sponsor:** | KCI Technologies, Inc. |
| **Project Contact Name:** | Tim Morris |
| **Project Contact Address:** | 4601 Six Forks Rd, Suite 220, Raleigh, NC 27609 |
| **Project Contact E-mail:** | tim.morris@kci.com |
| **EEP Project Manager:** | Kristin Miguez |

**Project Description**

**For Official Use Only**

**Reviewed By:**

RMiguez — 11-9-12

**Date** — **EEP Project Manager**

**Conditional Approved By:**

**Date** — **For Division Administrator FHWA**

☐ **Check this box if there are outstanding issues**

**Final Approval By:**

11-8-12 — Todd W Bree

**Date** — **For Division Administrator FHWA**

RECEIVED
NOV 7 2012
NC ECOSYSTEM ENHANCEMENT PROGRAM

| Part 2: All Projects<br>Regulation/Question | Response |
|---|---|
| **Coastal Zone Management Act (CZMA)** | |
| 1. Is the project located in a CAMA county? | ☒ Yes<br>☐ No |
| 2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)? | ☐ Yes<br>☒ No<br>☐ N/A |
| 3. Has a CAMA permit been secured? | ☐ Yes<br>☐ No<br>☒ N/A |
| 4. Has NCDCM agreed that the project is consistent with the NC Coastal Management Program? | ☐ Yes<br>☐ No<br>☒ N/A |
| **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)** | |
| 1. Is this a "full-delivery" project? | ☒ Yes<br>☐ No |
| 2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial? | ☐ Yes<br>☒ No<br>☐ 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<br>☒ No<br>☐ 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<br>☐ No<br>☒ 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<br>☐ No<br>☒ N/A |
| 6. Is there an approved hazardous mitigation plan? | ☐ Yes<br>☐ No<br>☒ 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<br>☒ No |
| 2. Does the project affect such properties and does the SHPO/THPO concur? | ☐ Yes<br>☐ No<br>☒ N/A |
| 3. If the effects are adverse, have they been resolved? | ☐ Yes<br>☐ No<br>☒ N/A |
| **Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)** | |
| 1. Is this a "full-delivery" project? | ☒ Yes<br>☐ No |
| 2. Does the project require the acquisition of real estate? | ☒ Yes<br>☐ No<br>☐ N/A |
| 3. Was the property acquisition completed prior to the intent to use federal funds? | ☐ Yes<br>☒ No<br>☐ N/A |
| 4. Has the owner of the property been informed:<br>* prior to making an offer that the agency does not have condemnation authority; and<br>* what the fair market value is believed to be? | ☒ Yes<br>☐ No<br>☐ N/A |

| Part 3: Ground-Disturbing Activities<br>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<br>☒ No |
| 2. Is the site of religious importance to American Indians? | ☐ Yes<br>☐ No<br>☒ N/A |
| 3. Is the project listed on, or eligible for listing on, the National Register of Historic Places? | ☐ Yes<br>☐ No<br>☒ N/A |
| 4. Have the effects of the project on this site been considered? | ☐ Yes<br>☐ No<br>☒ N/A |
| **Antiquities Act (AA)** | |
| 1. Is the project located on Federal lands? | ☐ Yes<br>☒ No |
| 2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity? | ☐ Yes<br>☐ No<br>☒ N/A |
| 3. Will a permit from the appropriate Federal agency be required? | ☐ Yes<br>☐ No<br>☒ N/A |
| 4. Has a permit been obtained? | ☐ Yes<br>☐ No<br>☒ N/A |
| **Archaeological Resources Protection Act (ARPA)** | |
| 1. Is the project located on federal or Indian lands (reservation)? | ☐ Yes<br>☒ No |
| 2. Will there be a loss or destruction of archaeological resources? | ☐ Yes<br>☐ No<br>☒ N/A |
| 3. Will a permit from the appropriate Federal agency be required? | ☐ Yes<br>☐ No<br>☒ N/A |
| 4. Has a permit been obtained? | ☐ Yes<br>☐ No<br>☒ N/A |
| **Endangered Species Act (ESA)** | |
| 1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county? | ☒ Yes<br>☐ No |
| 2. Is Designated Critical Habitat or suitable habitat present for listed species? | ☐ Yes<br>☒ No<br>☐ N/A |
| 3. Are T&E species present or is the project being conducted in Designated Critical Habitat? | ☐ Yes<br>☒ No<br>☐ N/A |
| 4. Is the project "likely to adversely affect" the specie and/or "likely to adversely modify" Designated Critical Habitat? | ☐ Yes<br>☐ No<br>☒ N/A |
| 5. Does the USFWS/NOAA-Fisheries concur in the effects determination?<br>(By virtue of no-response) | ☒ Yes<br>☐ No<br>☐ N/A |
| 6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination? | ☐ Yes<br>☐ No<br>☒ 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<br>☒ No |
| 2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project? | ☐ Yes<br>☐ No<br>☒ N/A |
| 3. Have accommodations been made for access to and ceremonial use of Indian sacred sites? | ☐ Yes<br>☐ No<br>☒ N/A |
| **Farmland Protection Policy Act (FPPA)** | |
| 1. Will real estate be acquired? | ☒ Yes<br>☐ No |
| 2. Has NRCS determined that the project contains prime, unique, statewide or local important farmland? | ☒ Yes<br>☐ No<br>☐ N/A |
| 3. Has the completed Form AD-1006 been submitted to NRCS? | ☒ Yes<br>☐ No<br>☐ N/A |
| **Fish and Wildlife Coordination Act (FWCA)** | |
| 1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body? | ☒ Yes<br>☐ No |
| 2. Have the USFWS and the NCWRC been consulted? | ☒ Yes<br>☐ No<br>☐ 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<br>☒ No |
| 2. Has the NPS approved of the conversion? | ☐ Yes<br>☐ No<br>☒ N/A |
| **Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)** | |
| 1. Is the project located in an estuarine system? | ☐ Yes<br>☒ No |
| 2. Is suitable habitat present for EFH-protected species? | ☐ Yes<br>☐ No<br>☒ N/A |
| 3. Is sufficient design information available to make a determination of the effect of the project on EFH? | ☐ Yes<br>☐ No<br>☒ N/A |
| 4. Will the project adversely affect EFH? | ☐ Yes<br>☐ No<br>☒ N/A |
| 5. Has consultation with NOAA-Fisheries occurred? | ☐ Yes<br>☐ No<br>☒ N/A |
| **Migratory Bird Treaty Act (MBTA)** | |
| 1. Does the USFWS have any recommendations with the project relative to the MBTA? | ☐ Yes<br>☒ No |
| 2. Have the USFWS recommendations been incorporated? | ☐ Yes<br>☐ No<br>☒ N/A |
| **Wilderness Act** | |
| 1. Is the project in a Wilderness area? | ☐ Yes<br>☒ No |
| 2. Has a special use permit and/or easement been obtained from the maintaining federal agency? | ☐ Yes<br>☐ No<br>☒ N/A |

**Jurisdictional Determination**

# U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. SAW-2012-01391 County: Onslow U.S.G.S. Quad: Richlands

## NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner: Kenneth Jones
Address: 322 Jonestown Road
Pink Hill, NC 28572

Agent: KCI Associates of NC
attn: Steven F. Stokes
Address: Landmark Center II, Suite 220
4601 Six Forks Road
Raleigh, NC 27609

Property description:
Size (acres) ~17
Nearest Waterway Cowford Branch
USGS HUC 03030001
Nearest Town Richlands
River Basin White Oak
Coordinates 34.925626 N -77.607253 W
Location description: The property is located on the east side of Jesse Williams Road, approximately 0. 8 mi. north of its intersection with NC 24, near Richlands, Onslow County, North Carolina. The Project Area is located in the southwestern corner of Parcel #: 30-176.

## Indicate Which of the Following Apply:

### A. Preliminary Determination

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

### B. Approved Determination

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

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

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

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

_ The 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.

_ 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 Morehead City, NC, at (252) 808-2808 to determine their requirements.

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Mr. David E. Bailey** at **(910) 251-4469 / David.E.Bailey2@usace.army.mil**.

## C. Basis For Determination

**The site exhibits features with Ordinary High Water. The waters on-site include an 3 unnamed tributaries (UTs) to Cowford Branch - all Relatively Permanent Waters (RPWs) which flow via another Cowford Branch (RPW) to the New River, a Traditionally Navigable Water.**

## D. Remarks

**The Waters of the US were delineated by Steve Stokes (KCI), with changes made in the field by Dave E. Bailey (USACE), and are approximated as the shaded areas on the attached figure entitled "Jurisdictional Tributary Delineation Map for Bear Basin Non-Riparian Wetland Restoration Site", dated 8/20/2012.**

## 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.

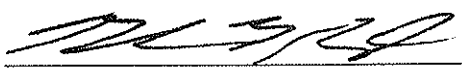
## F. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B. above)

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

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 District Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **December 30 2012**.

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

Corps Regulatory Official: 

Date **October 31, 2012** Expiration Date **October 31, 2017**

Copy furnished:
Joanne Steenhuis , NCDENR-DWQ, 127 Cardinal Drive Extension, Wilmington, NC 28405

SMITH ANN POWERS
FAMILY LTD PA
PARCEL # 18–131
PIN: 441304610801
DB 1342 PG 594

JESSE WILLIAMS ROAD
NCSR 1233
(60' PUBLIC R/W)

CONSERVATION
EASEMENT
BOUNDARY

KENNETH W JONES
PARCEL # 30–176
PIN: 441304813247
DB 531 PG 388

STUDY AREA
520,200 SF
11.9 ACRES

2.2'
2.8'
2.0'
3.2'
2.0'
2.8'
2.3'
2.5'
3.3'
3.2'
3.1'
2.4'
3.7'

JURISDICTIONAL
TRIBUTARY
CONTINUES
PAST PROJECT
LIMITS

WINFIELD SMITH JR
PARCEL # 18–130
PIN: 441304511017
DB 1672 PG 678

M R HOGS
PARCEL # 30–174.2
PIN: 441304809497
DB 1687 PG 917

*** JD IS FOR THE EXISTING JONES ***
PROPERTY (BEAR BASIN) LABELED AS
STUDY AREA AND DOES NOT EXTEND ONTO
ADJACENT PROPERTIES


VICINITY MAP
NOT TO SCALE

N
W
E
S

LINEAR FEET OF JURISDICTIONAL
TRIBUTARY – 3,348'

JURISDICTIONAL
TRIBUTARY – 9,223 S.F.
(0.21 ACRES)

GRAPHIC SCALE
0 75 150 300
1 INCH = 150 FEET

JURISDICTIONAL TRIBUTARY
DELINEATION MAP
FOR
BEAR BASIN NON–RIPARIAN WETLAND
RESTORATION SITE
RICHLANDS TWP, ONSLOW COUNTY
NORTH CAROLINA

| DATE: | SCALE: | SHEET: |
|---|---|---|
| AUGUST 20, 2012 | 1" = 150' | 1 OF 1 |

KCI ASSOCIATES OF N.C.
ENGINEERS, SURVEYORS AND PLANNERS
4601 SIX FORKS ROAD, SUITE 220
RALEIGH, NC 27609
PHONE (919) 783–9214 * FAX (919) 783–9266
KCI ASSOCIATES OF NORTH CAROLINA
C–0764

20122266

**FEMA Floodplain Checklist**

# U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. SAW-2012-01391 County: Onslow U.S.G.S. Quad: Richlands

## NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner: Kenneth Jones
Address: 322 Jonestown Road
Pink Hill, NC 28572

Agent: KCI Associates of NC
attn: Steven F. Stokes
Address: Landmark Center II, Suite 220
4601 Six Forks Road
Raleigh, NC 27609

Property description:
Size (acres) ~17
Nearest Waterway Cowford Branch
USGS HUC 03030001
Nearest Town Richlands
River Basin White Oak
Coordinates 34.925626 N -77.607253 W
Location description: The property is located on the east side of Jesse Williams Road, approximately 0. 8 mi. north of its intersection with NC 24, near Richlands, Onslow County, North Carolina. The Project Area is located in the southwestern corner of Parcel #: 30-176.

## Indicate Which of the Following Apply:

### A. Preliminary Determination

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

### B. Approved Determination

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

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

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

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

_ The 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.

_ 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 Morehead City, NC, at (252) 808-2808 to determine their requirements.

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Mr. David E. Bailey** at **(910) 251-4469 / David.E.Bailey2@usace.army.mil**.

## C. Basis For Determination

**The site exhibits features with Ordinary High Water. The waters on-site include an 3 unnamed tributaries (UTs) to Cowford Branch - all Relatively Permanent Waters (RPWs) which flow via another Cowford Branch (RPW) to the New River, a Traditionally Navigable Water.**

## D. Remarks

**The Waters of the US were delineated by Steve Stokes (KCI), with changes made in the field by Dave E. Bailey (USACE), and are approximated as the shaded areas on the attached figure entitled "Jurisdictional Tributary Delineation Map for Bear Basin Non-Riparian Wetland Restoration Site", dated 8/20/2012.**

## 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.

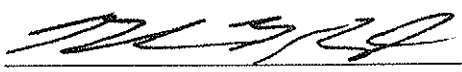
## F. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B. above)

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

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 District Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **December 30 2012**.

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

Corps Regulatory Official: 

Date **October 31, 2012** Expiration Date **October 31, 2017**

Copy furnished:
Joanne Steenhuis , NCDENR-DWQ, 127 Cardinal Drive Extension, Wilmington, NC 28405

SMITH ANN POWERS
FAMILY LTD PA
PARCEL # 18–131
PIN: 441304610801
DB 1342 PG 594

JESSE WILLIAMS ROAD
NCSR 1233
(60' PUBLIC R/W)

CONSERVATION
EASEMENT
BOUNDARY

KENNETH W JONES
PARCEL # 30–176
PIN: 441304813247
DB 531 PG 388

STUDY AREA
520,200 SF
11.9 ACRES

2.2'
2.8'
2.0'
3.2'
2.0'
2.8'
2.3'
2.5'
3.3'
3.2'
3.1'
2.4'
3.7'

JURISDICTIONAL
TRIBUTARY
CONTINUES
PAST PROJECT
LIMITS

WINFIELD SMITH JR
PARCEL # 18–130
PIN: 441304511017
DB 1672 PG 678

M R HOGS
PARCEL # 30–174.2
PIN: 441304809497
DB 1687 PG 917

*** JD IS FOR THE EXISTING JONES ***
PROPERTY (BEAR BASIN) LABELED AS
STUDY AREA AND DOES NOT EXTEND ONTO
ADJACENT PROPERTIES


VICINITY MAP
NOT TO SCALE

N
W
E
S

LINEAR FEET OF JURISDICTIONAL
TRIBUTARY – 3,348'

JURISDICTIONAL
TRIBUTARY – 9,223 S.F.
(0.21 ACRES)

GRAPHIC SCALE
0 75 150 300
1 INCH = 150 FEET

JURISDICTIONAL TRIBUTARY
DELINEATION MAP
FOR
BEAR BASIN NON–RIPARIAN WETLAND
RESTORATION SITE
RICHLANDS TWP, ONSLOW COUNTY
NORTH CAROLINA

| DATE: | SCALE: | SHEET: |
|---|---|---|
| AUGUST 20, 2012 | 1" = 150' | 1 OF 1 |

KCI ASSOCIATES OF N.C.
ENGINEERS, SURVEYORS AND PLANNERS
4601 SIX FORKS ROAD, SUITE 220
RALEIGH, NC 27609
PHONE (919) 783–9214 * FAX (919) 783–9266
KCI ASSOCIATES OF NORTH CAROLINA
C–0764

20122266

## 14.5 Appendix C. Mitigation Work Plan Data and Analyses

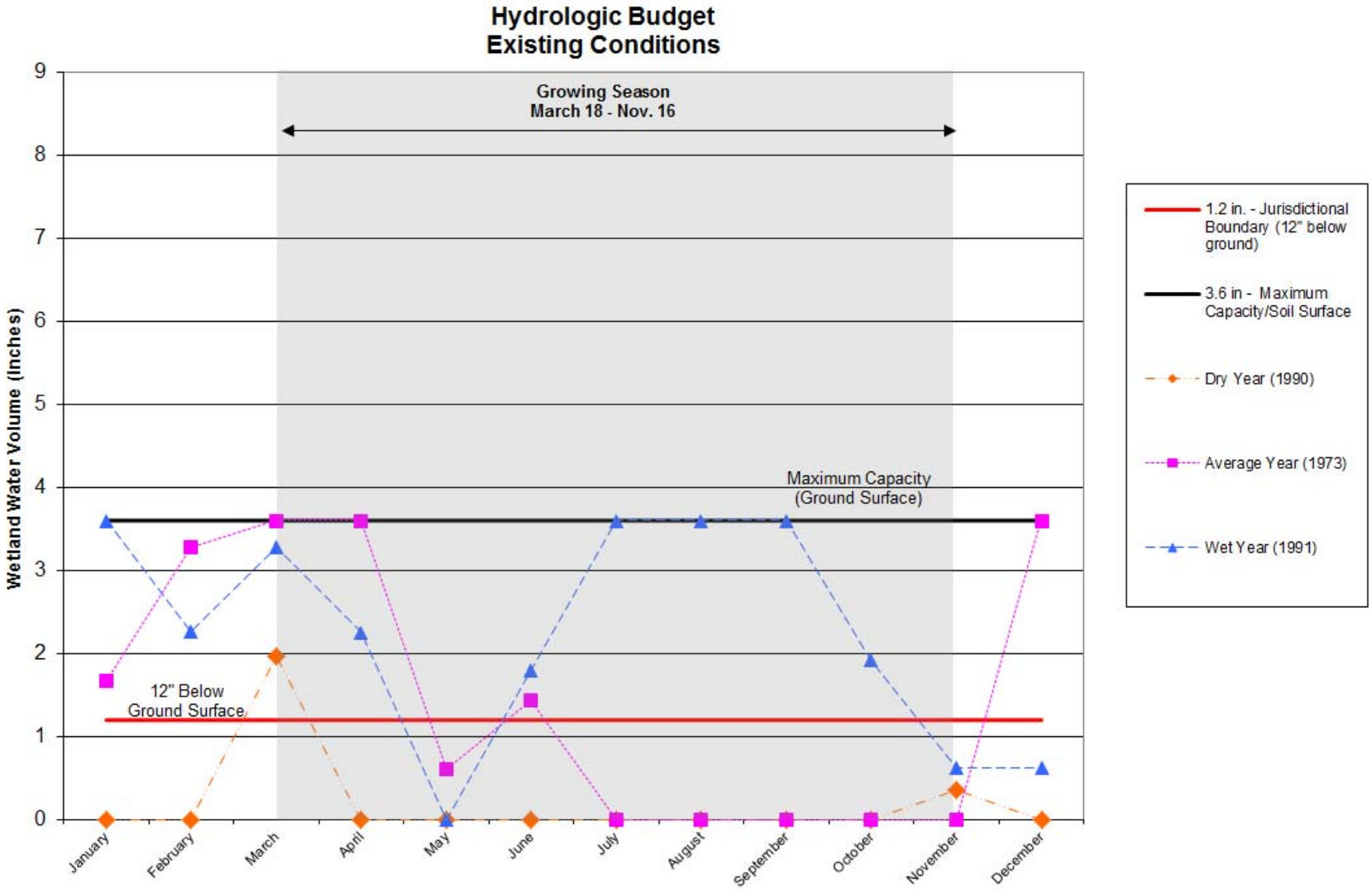
**Groundwater Modeling/Hydrologic Budget**

## Bear Basin Restoration Site - Existing Conditions

| *Dry Year* | *Water Inputs* | | | *Water Outputs* | | | Change in Storage | Excess Water | Wetland Volume |
|---|---|---|---|---|---|---|---|---|---|
| **1990** | **P** | **Si *** | **Gi** | **PET** | **So** | **Go** | | | |
| January | 2.07 | 0.00 | 0.00 | 0.80 | 0.00 | 2.40 | -1.13 | 0.00 | 0.00 |
| February | 1.86 | 0.05 | 0.00 | 1.25 | 0.05 | 2.40 | -1.79 | 0.00 | 0.00 |
| March | 5.96 | 0.30 | 0.00 | 1.60 | 0.30 | 2.40 | 1.96 | 0.00 | 1.96 |
| April | 2.50 | 0.04 | 0.00 | 2.39 | 0.04 | 2.40 | -2.29 | 0.00 | 0.00 |
| May | 5.95 | 0.10 | 0.00 | 3.84 | 0.10 | 2.40 | -0.29 | 0.00 | 0.00 |
| June | 0.86 | 0.00 | 0.00 | 5.99 | 0.00 | 2.40 | -7.53 | 0.00 | 0.00 |
| July | 2.21 | 0.00 | 0.00 | 6.82 | 0.00 | 2.40 | -7.01 | 0.00 | 0.00 |
| August | 5.72 | 0.04 | 0.00 | 5.99 | 0.04 | 2.40 | -2.67 | 0.00 | 0.00 |
| September | 0.33 | 0.00 | 0.00 | 4.22 | 0.00 | 2.40 | -6.29 | 0.00 | 0.00 |
| October | 3.64 | 0.04 | 0.00 | 2.71 | 0.04 | 2.40 | -1.47 | 0.00 | 0.00 |
| November | 3.91 | 0.60 | 0.00 | 1.15 | 0.60 | 2.40 | 0.36 | 0.00 | 0.36 |
| December | 1.60 | 0.05 | 0.00 | 0.90 | 0.05 | 2.40 | -1.70 | 0.00 | 0.00 |
| **Annual Totals** | 36.61 | 1.21 | 0.00 | 37.66 | 1.21 | 28.80 | | | |

| *Avg. Year* | *Water Inputs* | | | *Water Outputs* | | | Change in Storage | Excess Water | Wetland Volume |
|---|---|---|---|---|---|---|---|---|---|
| **1973** | **P** | **Si *** | **Gi** | **PET** | **So** | **Go** | | | |
| January | 4.51 | 0.01 | 0.00 | 0.45 | 0.01 | 2.40 | 1.66 | 0.00 | 1.66 |
| February | 4.34 | 0.06 | 0.00 | 0.32 | 0.06 | 2.40 | 1.62 | 0.00 | 3.28 |
| March | 4.97 | 0.00 | 0.00 | 1.84 | 0.00 | 2.40 | 0.73 | 0.42 | 3.60 |
| April | 5.53 | 0.13 | 0.00 | 2.19 | 0.13 | 2.40 | 0.94 | 0.94 | 3.60 |
| May | 3.06 | 0.01 | 0.00 | 3.65 | 0.01 | 2.40 | -2.99 | 0.00 | 0.61 |
| June | 8.70 | 0.64 | 0.00 | 5.48 | 0.64 | 2.40 | 0.82 | 0.00 | 1.43 |
| July | 3.96 | 0.08 | 0.00 | 5.65 | 0.08 | 2.40 | -4.09 | 0.00 | 0.00 |
| August | 7.71 | 0.11 | 0.00 | 5.53 | 0.11 | 2.40 | -0.22 | 0.00 | 0.00 |
| September | 3.70 | 0.39 | 0.00 | 4.43 | 0.39 | 2.40 | -3.13 | 0.00 | 0.00 |
| October | 1.05 | 0.02 | 0.00 | 2.41 | 0.02 | 2.40 | -3.76 | 0.00 | 0.00 |
| November | 0.47 | 0.00 | 0.00 | 1.26 | 0.00 | 2.40 | -3.19 | 0.00 | 0.00 |
| December | 7.84 | 0.18 | 0.00 | 0.58 | 0.18 | 2.40 | 4.86 | 1.26 | 3.60 |
| **Annual Totals** | 55.84 | 1.63 | 0.00 | 33.79 | 1.63 | 28.80 | | | |

| *Wet Year* | *Water Inputs* | | | *Water Outputs* | | | Change in Storage | Excess Water | Wetland Volume |
|---|---|---|---|---|---|---|---|---|---|
| **1991** | **P** | **Si *** | **Gi** | **PET** | **So** | **Go** | | | |
| January | 7.8 | 0.01 | 0.00 | 0.62 | 0.01 | 2.40 | 4.78 | 0.00 | 3.60 |
| February | 1.97 | 0.01 | 0.00 | 0.90 | 0.01 | 2.40 | -1.33 | 0.00 | 2.27 |
| March | 5.06 | 0.05 | 0.00 | 1.65 | 0.05 | 2.40 | 1.01 | 0.00 | 3.28 |
| April | 4.45 | 0.26 | 0.00 | 3.07 | 0.26 | 2.40 | -1.02 | 0.00 | 2.26 |
| May | 3.13 | 0.01 | 0.00 | 5.31 | 0.01 | 2.40 | -4.58 | 0.00 | 0.00 |
| June | 9.39 | 0.48 | 0.00 | 5.19 | 0.48 | 2.40 | 1.80 | 0.00 | 1.80 |
| July | 14.35 | 1.51 | 0.00 | 6.29 | 1.51 | 2.40 | 5.66 | 3.86 | 3.60 |
| August | 9.75 | 0.09 | 0.00 | 5.33 | 0.09 | 2.40 | 2.02 | 2.02 | 3.60 |
| September | 6.65 | 0.16 | 0.00 | 3.83 | 0.16 | 2.40 | 0.42 | 0.42 | 3.60 |
| October | 2.8 | 0.01 | 0.00 | 2.08 | 0.01 | 2.40 | -1.68 | 0.00 | 1.92 |
| November | 2.04 | 0.01 | 0.00 | 0.95 | 0.01 | 2.40 | -1.31 | 0.00 | 0.62 |
| December | 3.04 | 0.05 | 0.00 | 0.63 | 0.05 | 2.40 | 0.01 | 0.00 | 0.63 |
| **Annual Totals** | 70.43 | 2.65 | 0.00 | 35.84 | 2.65 | 28.80 | | | |


Hydrologic Budget
Existing Conditions
Growing Season
March 18 - Nov. 16
Wetland Water Volume (Inches)
9
8
7
6
5
4
3
2
1
0
Maximum Capacity
(Ground Surface)
12" Below
Ground Surface
January
February
March
April
May
June
July
August
September
October
November
December
1.2 in. - Jurisdictional Boundary (12" below ground)
3.6 in - Maximum Capacity/Soil Surface
Dry Year (1990)
Average Year (1973)
Wet Year (1991)

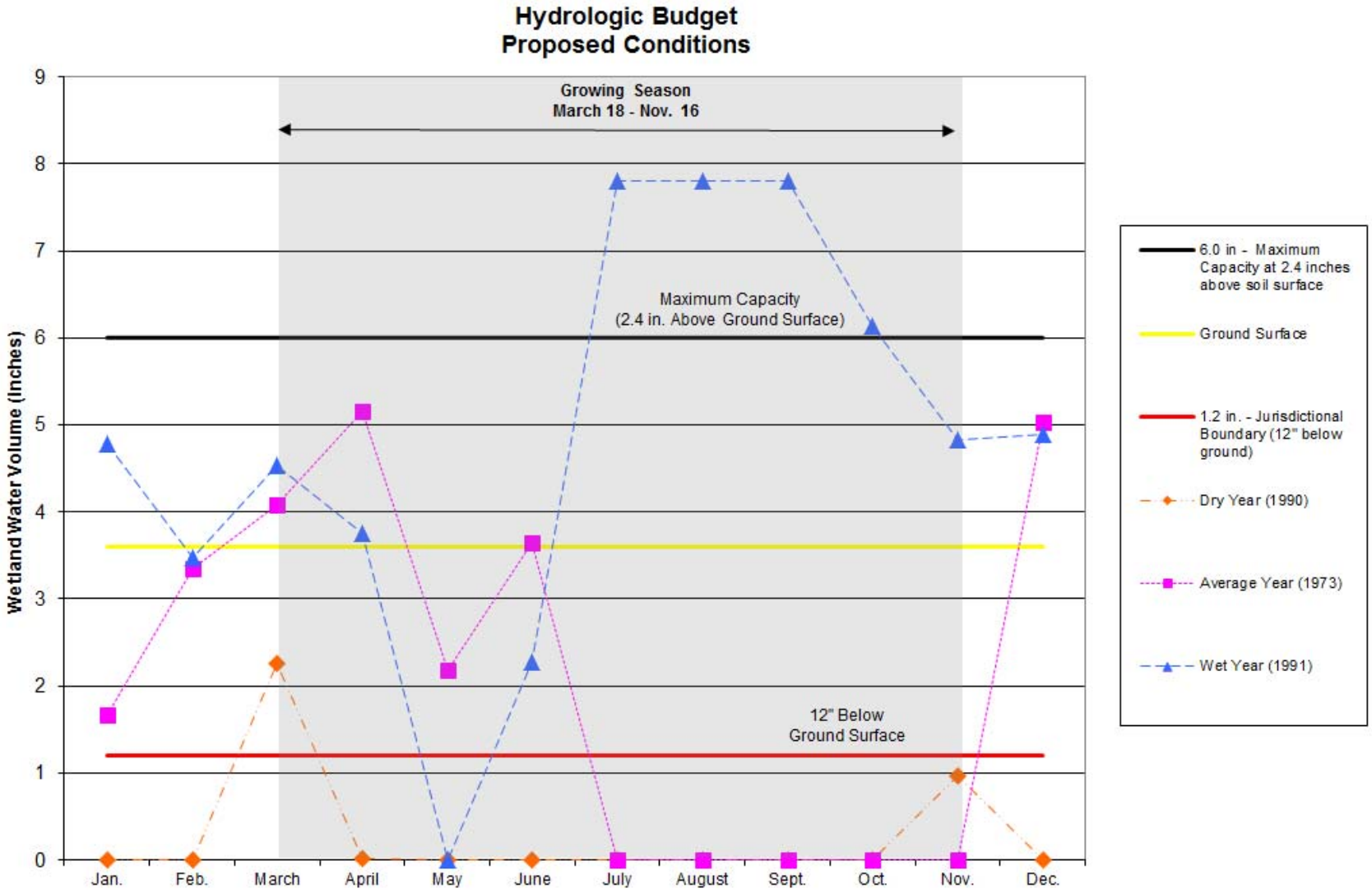
## Bear Basin Restoration Site - Proposed Conditions

| *Dry Year* | *Water Inputs* | | | *Water Outputs* | | | Change in | Excess | |
|---|---|---|---|---|---|---|---|---|---|
| 1990 | P | Si * | Gi | PET | So | Go | Storage | Water | Wetland Volume |
| January | 2.07 | 0.00 | 0.00 | 0.80 | 0.00 | 2.40 | -1.13 | 0.00 | 0.00 |
| February | 1.86 | 0.05 | 0.00 | 1.25 | 0.00 | 2.40 | -1.75 | 0.00 | 0.00 |
| March | 5.96 | 0.30 | 0.00 | 1.60 | 0.00 | 2.40 | 2.26 | 0.00 | 2.26 |
| April | 2.50 | 0.04 | 0.00 | 2.39 | 0.00 | 2.40 | -2.25 | 0.00 | 0.02 |
| May | 5.95 | 0.10 | 0.00 | 3.84 | 0.00 | 2.40 | -0.19 | 0.00 | 0.00 |
| June | 0.86 | 0.00 | 0.00 | 5.99 | 0.00 | 2.40 | -7.53 | 0.00 | 0.00 |
| July | 2.21 | 0.00 | 0.00 | 6.82 | 0.00 | 2.40 | -7.01 | 0.00 | 0.00 |
| August | 5.72 | 0.04 | 0.00 | 5.99 | 0.00 | 2.40 | -2.63 | 0.00 | 0.00 |
| September | 0.33 | 0.00 | 0.00 | 4.22 | 0.00 | 2.40 | -6.29 | 0.00 | 0.00 |
| October | 3.64 | 0.04 | 0.00 | 2.71 | 0.00 | 2.40 | -1.42 | 0.00 | 0.00 |
| November | 3.91 | 0.60 | 0.00 | 1.15 | 0.00 | 2.40 | 0.96 | 0.00 | 0.96 |
| December | 1.60 | 0.05 | 0.00 | 0.90 | 0.00 | 2.40 | -1.66 | 0.00 | 0.00 |
| **Annual Totals** | 36.61 | 1.21 | 0.00 | 37.66 | 0.00 | 28.80 | | | |

| *Avg. Year* | *Water Inputs* | | | *Water Outputs* | | | Change in | Excess | |
|---|---|---|---|---|---|---|---|---|---|
| 1973 | P | Si * | Gi | PET | So | Go | Storage | Water | Wetland Volume |
| January | 4.51 | 0.01 | 0.00 | 0.45 | 0.00 | 2.40 | 1.67 | 0.00 | 1.67 |
| February | 4.34 | 0.06 | 0.00 | 0.32 | 0.00 | 2.40 | 1.68 | 0.00 | 3.35 |
| March | 4.97 | 0.00 | 0.00 | 1.84 | 0.00 | 2.40 | 0.74 | 0.00 | 4.09 |
| April | 5.53 | 0.13 | 0.00 | 2.19 | 0.00 | 2.40 | 1.07 | 0.00 | 5.16 |
| May | 3.06 | 0.01 | 0.00 | 3.65 | 0.00 | 2.40 | -2.98 | 0.00 | 2.18 |
| June | 8.70 | 0.64 | 0.00 | 5.48 | 0.00 | 2.40 | 1.47 | 0.00 | 3.64 |
| July | 3.96 | 0.08 | 0.00 | 5.65 | 0.00 | 2.40 | -4.01 | 0.00 | 0.00 |
| August | 7.71 | 0.11 | 0.00 | 5.53 | 0.00 | 2.40 | -0.11 | 0.00 | 0.00 |
| September | 3.70 | 0.39 | 0.00 | 4.43 | 0.00 | 2.40 | -2.74 | 0.00 | 0.00 |
| October | 1.05 | 0.02 | 0.00 | 2.41 | 0.00 | 2.40 | -3.73 | 0.00 | 0.00 |
| November | 0.47 | 0.00 | 0.00 | 1.26 | 0.00 | 2.40 | -3.19 | 0.00 | 0.00 |
| December | 7.84 | 0.18 | 0.00 | 0.58 | 0.00 | 2.40 | 5.03 | 0.00 | 5.03 |
| **Annual Totals** | 55.84 | 1.63 | 0.00 | 33.79 | 0.00 | 28.80 | | | |

| *Wet Year* | *Water Inputs* | | | *Water Outputs* | | | Change in | Excess | |
|---|---|---|---|---|---|---|---|---|---|
| 1991 | P | Si * | Gi | PET | So | Go | Storage | Water | Wetland Volume |
| January | 7.8 | 0.01 | 0.00 | 0.62 | 0.00 | 2.40 | 4.79 | 0.00 | 4.79 |
| February | 1.97 | 0.01 | 0.00 | 0.90 | 0.00 | 2.40 | -1.32 | 0.00 | 3.47 |
| March | 5.06 | 0.05 | 0.00 | 1.65 | 0.00 | 2.40 | 1.06 | 0.00 | 4.53 |
| April | 4.45 | 0.26 | 0.00 | 3.07 | 0.00 | 2.40 | -0.77 | 0.00 | 3.76 |
| May | 3.13 | 0.01 | 0.00 | 5.31 | 0.00 | 2.40 | -4.57 | 0.00 | 0.00 |
| June | 9.39 | 0.48 | 0.00 | 5.19 | 0.00 | 2.40 | 2.28 | 0.00 | 2.28 |
| July | 14.35 | 1.51 | 0.00 | 6.29 | 0.00 | 2.40 | 7.17 | 1.64 | 7.80 |
| August | 9.75 | 0.09 | 0.00 | 5.33 | 0.00 | 2.40 | 2.12 | 2.12 | 7.80 |
| September | 6.65 | 0.16 | 0.00 | 3.83 | 0.00 | 2.40 | 0.59 | 0.59 | 7.80 |
| October | 2.8 | 0.01 | 0.00 | 2.08 | 0.00 | 2.40 | -1.66 | 0.00 | 6.14 |
| November | 2.04 | 0.01 | 0.00 | 0.95 | 0.00 | 2.40 | -1.30 | 0.00 | 4.84 |
| December | 3.04 | 0.05 | 0.00 | 0.63 | 0.00 | 2.40 | 0.06 | 0.00 | 4.90 |
| **Annual Totals** | 70.43 | 2.65 | 0.00 | 35.84 | 0.00 | 28.80 | | | |

Note: An increase in capacity of 0.2 feet (2.4 inches) of surface water is assumed based on the creation of microtopography during wetland restoration.


Hydrologic Budget
Proposed Conditions
Growing Season
March 18 - Nov. 16
Maximum Capacity
(2.4 in. Above Ground Surface)
12" Below
Ground Surface
Wetland Water Volume (Inches)
0
1
2
3
4
5
6
7
8
9
Jan.
Feb.
March
April
May
June
July
August
Sept.
Oct.
Nov.
Dec.
6.0 in - Maximum Capacity at 2.4 inches above soil surface
Ground Surface
1.2 in. - Jurisdictional Boundary (12" below ground)
Dry Year (1990)
Average Year (1973)
Wet Year (1991)

**Soil Delineation and Characterization**

A detailed soils investigation at the BB was conducted by a licensed soil scientist (# 187) to determine the extent and distribution of the hydric soils and to classify the predominate soils to the soil series level. The investigation consisted of delineating the hydric soil boundaries with pink flagging and wooden survey stakes in accordance with the US Army Corps of Engineers, Wetland Delineation Manual (1987) and the USDA Field Indicators of Hydric Soils in the United States: A Guide for Identifying and Delineating Hydric Soils, Version 7.0 (2010). Areas that were identified as possible hydric soil mapping units were surveyed at a higher intensity until the edge of the mapping unit was identified. The boundary of the hydric and non-hydric soil mapping units were then followed by continual sampling and observations as the boundary line was identified and delineated. In those areas where the boundary was found to be a broad gradient rather than a distinct break, microtopography, landscape position, soil textural changes, redoximorphic features, and depleted matrices were additionally considered to identify the extent of the hydric soils.

In developing a detailed soils map, several soil borings were advanced on the site in the general hydric soil areas identified by landscape position, vegetation and slope. Once the hydric soil borings were identified, the soil scientist marked the points and established a visual line to the next auger boring where again hydric soil conditions were confirmed by additional borings. The soil scientist moved along the edges of the mapping unit and marked each point along the line. To confirm the hydric soil mapping unit and taxonomic classification, soil borings were advanced to a depth of 50 inches. The soil profile descriptions identified the individual horizons in the topsoil and upper subsoil as well as the depth, color, texture, structure, boundary, and evidence of restrictive horizons and redoximorphic features. Delineated hydric soils boundaries were in contrast to those mapped in the Soil Survey of Onslow County, North Carolina. The delineated hydric soil boundaries are shown in the following figure, Detailed Soils Map.

*Taxonomic Classification*

The predominant soils identified on the site were of the Pantego (Fine-loamy, siliceous, semiactive, thermic Umbric Paleaquults) soil series. Inclusions of the Lynchburg (Fine-loamy, siliceous, semiactive, thermic Aeric Paleaquults) soil series were also identified. The Pantego and Lynchburg series are listed as hydric soils in Onslow County, North Carolina. They are defined as hydric due to saturation for a significant period during the growing season. These two soils are listed as hydric on the federal, state and local lists. The Pantego and Lynchburg series are also listed by the Natural Resources Conservation Service (NRCS) as hydric soils.

*Profile Description*

The Pantego series is described as very deep, very poorly drained, moderately permeable soils typically found on uplands. They are formed in moderately fine textured sediments with slopes ranging from 0 to 1 percent. The Lynchburg series is described as very deep, somewhat poorly drained, moderately permeable soils found on uplands. They are formed in moderately fine textured sediments with slopes of less than 2 percent. These soils are very strongly acidic or strongly acidic throughout unless the surface has been limed.

Typical Pedon Description of the Pantego mapping unit:

**PANTEGO SERIES**

**TAXONOMIC CLASS:** Fine-loamy, siliceous, semiactive, thermic Umbric Paleaquults

**TYPICAL PEDON:** Pantego loam--cultivated field. (Colors are for moist soil unless otherwise stated.)

**Ap**--0 to 10 inches; black (10YR 2/1) loam; weak fine granular structure; very friable; many fine roots; very strongly acid; gradual wavy boundary. (0 to 12 inches thick)

**A**--10 to 18 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable; very strongly acid; clear smooth boundary. (4 to 14 inches thick)

**Bt**--18 to 27 inches; very dark gray (10YR 3/1) sandy clay loam; weak fine subangular blocky structure; friable; few faint clay films on faces of peds and in pores; very strongly acid; gradual wavy boundary. (0 to 18 inches thick)

**Btg1**--27 to 42 inches; gray (10YR 5/1) sandy clay loam; few fine and medium distinct mottles of brownish yellow (10YR 6/6); weak fine and medium subangular blocky structure; friable; slightly sticky; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

**Btg2**--42 to 55 inches; gray (10YR 6/1) sandy clay loam; few medium and coarse distinct mottles of yellowish brown (10YR 5/6); weak fine subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

**Btg3**--55 to 65 inches; gray (10YR 6/1) sandy clay loam; weak coarse subangular blocky structure; friable; few faint clay films on faces of peds; very strongly acid. (Combined thickness of the Btg horizons is 30 to more than 60 inches.)

**TYPE LOCATION:** Pitt County, North Carolina; 1/2 mile south of Winterville, North Carolina, on Highway 11, 100 feet west from road.

**RANGE IN CHARACTERISTICS:** Solum thickness is greater than 60 inches. The soil is strongly acid, very strongly acid, or extremely acid except where the surface has been limed. Some pedons have an Oa horizon that has hue of 10YR, value of 2 or 3, and chroma of 1; or it is neutral and has value of 2. It is less than 8 inches thick.

The A or Ap horizon has hue of 10YR or 2.5Y or is neutral, value of 2 or 3, and chroma of 0 to 2. It is loamy fine sand, loamy sand, fine sandy loam, sandy loam, loam, or mucky analogues of these textures. Some pedons have an Eg horizon that has hue of 10YR or 2.5Y or is neutral, value of 4 to 6, and chroma of 0 to 2. It is loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam. Some pedons have a BEg horizon that has hue of 10YR or 2.5Y, value of 4 or 6, and chroma of 1 or 2. It is loam, sandy loam, fine sandy loam, or sandy clay loam.

The Bt horizon, where present, has hue of 10YR or 2.5Y, value of 3, and chroma of 1 or 2. It has the same textures as the Btg horizon. The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2

with few to common mottles of higher chroma. The Btg horizon is sandy clay loam, sandy loam, sandy clay, or clay loam, fine sandy loam, or sandy loam. Some pedons have a BCg horizon that has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It is sandy clay loam, clay loam, sandy clay, sandy loam, or fine sandy loam.

The Cg horizon, where present, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2 with higher chroma mottles. It is sandy clay loam, clay loam, sandy loam, fine sandy loam, loamy fine sand, fine sand, loamy sand, or sand.

Typical Pedon Description of the Lynchburg mapping unit:

**LYNCHBURG SERIES**

**TAXONOMIC CLASS:** Fine-loamy, siliceous, semiactive, thermic Aeric Paleaquults

**TYPICAL PEDON:** Lynchburg loamy fine sand--cultivated. (Colors are for moist soil.)

**Ap**--0 to 6 inches; very dark gray (10YR 3/1) loamy fine sand; weak medium granular structure; very friable; common fine roots, few medium roots; very strongly acid; clear smooth boundary. (3 to 11 inches thick)

**E**--6 to 10 inches; light olive brown (2.5Y 5/4) loamy fine sand; weak medium subangular blocky structure; very friable; common fine roots; few fine pores; common medium distinct dark gray (10YR 4/1) iron depletions; very strongly acid; clear smooth boundary. (0 to 10 inches thick)

**Bt**--10 to 17 inches; light olive brown (2.5Y 5/4) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; few fine pores; few faint clay films on faces of some peds; common medium distinct light brownish gray (2.5Y 6/2) iron depletions and many medium distinct yellowish brown (10YR 5/6), and few fine medium prominent red (2.5YR 4/8) masses of oxidized iron; very strongly acid; clear wavy boundary.

**Btg1**--17 to 30 inches; light brownish gray (2.5Y 6/2) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine pores; common faint clay films on faces of some peds; many medium prominent yellowish brown (10YR 5/6) and common medium prominent red (2.5YR 4/6) masses of oxidized iron; very strongly acid; gradual smooth boundary.

**Btg2**--30 to 65 inches; gray (10YR 6/1) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; common faint clay films on faces of peds; many medium prominent yellowish brown and many medium prominent red (2.5YR 4/8) masses of oxidized iron; very strongly acid; gradual smooth boundary.

**Btg3**--65 to 80 inches; gray (10YR 5/1) clay; weak medium subangular structure; firm; few fine roots; few faint clay films on faces of peds; many medium prominent strong brown (7.5YR 5/8) and few fine prominent red (2.5YR) masses of oxidized iron and few medium faint greenish gray (5BG 6/1) iron depletions; very strongly acid. (Combined thickness of the Bt horizons are more than 40 inches.)

**TYPE LOCATION:** Colleton County, South Carolina, 3,000 feet southwest of junction of U.S. Highway 21 and Seaboard Coastline Railroad in Ruffin; 4 southwest of junction of U.S. Highway 21 and South Carolina Secondary Road 272; 100 feet north of U.S. Highway 21.

**RANGE IN CHARACTERISTICS:** Solum thickness is 60 to more than 80 inches. Depth to bedrock is more than 6 feet. Content of pebbles range from 0 to 10 percent by volume. The soil is strongly acid, very strongly acid, or extremely acid except where the surface has been limed.

Ap horizon or A horizon (where present) has a hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 to 2, or is neutral with value of 2 to 5. It is sand, fine sand, loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam.

The E horizon has a hue of 10YR or 2.5Y, value of 4 to 7, chroma of 1 to 4. It is sand, fine sand, loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam. Redoximorphic features (where present) have masses of oxidized iron in shades of red, yellow, or brown and iron depletions in shades of brown, yellow, olive, or gray.

The Bt horizon has a hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is sandy clay loam, but ranges to sandy loam, fine sandy loam, loam or clay loam. The particle size control section contains less than 30 percent silt. Redoximorphic features (where present) have masses of oxidized iron in shades of red, yellow, or brown and iron depletions in shades of brown, yellow, olive, or gray.

The Btg horizon has a hue of 10YR to 5Y, value of 4 to 7, chroma of 1 to 2, or is neutral with value of 4 to 7. It is sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam. Some pedons are sandy clay or clay at a depth of 40 inches or more. Redoximorphic features (where present) have masses of oxidized iron in shades of red, yellow, or brown and iron depletions in shades of brown, yellow, olive, or gray.

The BCg horizon has a hue of 10YR to 5Y, value of 4 to 7, chroma of 1 or 2, or is neutral with value of 4 to 7. It is sandy loam, fine sandy loam, loam, sandy clay loam, clay loam, sandy clay, or clay. Redoximorphic features (where present) have masses of oxidized iron in shades of red, yellow, or brown and iron depletions in shades of brown, yellow, olive, or gray.

KCI ASSOCIATES OF NORTH CAROLINA, PA

# SOIL PROFILE DESCRIPTION

**Client:** KCI Associates of North Carolina, P.A. **Date:** September 12, 2011
**Project:** Bear Basin Wetland Restoration Site **Project #:** 20110659P-WO_01
**County:** Onslow **State:** NC
**Location:** US HWY 258 **Site/Lot:** Boring # 23
**Soil Series:** Pantego
**Soil Classification:** Fine-loamy, siliceous, semiactive, thermic Umbric Paleaquults
**AWT:** >60 **SHWT:** 0-12 **Slope:** 0-2% **Aspect:**
**Elevation:** **Drainage:** Very Poorly Drained **Permeability:** Moderate
**Vegetation:** Cane
**Borings terminated at** 60 **Inches**

| HORIZON | DEPTH (IN) | MATRIX | MOTTLES | TEXTURE | STRUCTURE | CONSISTENCE | BOUNDARY | NOTES |
|---|---|---|---|---|---|---|---|---|
| Ap | 0-11 | 10YR 3/1 | | fsl | 1fgr | mfr | gw | |
| Eg | 11-13 | 10YR 6/2 | | fsl | 1fgr | mfr | cw | |
| Btg1 | 13-16 | 10YR6/2 | 10YR 6/4c2d | sl | 1fsbk | mfr | cw | |
| Btg2 | 16-24 | 10YR 6/2 | 7.5YR 5/6f1p | sl | 1msbk | mfr | gw | |
| | | | 10YR 6/4c2d | | | | | |
| Btg3 | 24-48 | | 10YR 6/2 | scl | 2msbk | mfr | gw | |
| | | | 7.5YR 5/6 | | | | | |
| | | | 10YR 6/4 | | | | | |
| Btg4 | 48-60 | 10YR 5/1 | 10YR 6/4c2d | scl | 1csbk | mfr | gw | |
| | | | 10YR 6/8c2d | | | | | |
| | | | 7.5YR 6/8c2d | | | | | |
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COMMENTS.
The Pantego series consists of very deep, very poorly drained soils formed in thick loamy deposits in nearly level and slightly depressional areas of the Southern Coastal Plain and Atlantic Coast Flatwoods.
This Pantego series is a drained hydric soil by ditching.
The Pantego soil is ponded to very slow runoff and the seasonally high water table is at or near the surface during wet seasons, typically between 0-12 inches.

DESCRIBED BY: SFS DATE: 9/12/2011

KCI ASSOCIATES OF NORTH CAROLINA, PA

# SOIL PROFILE DESCRIPTION

**Client:** KCI Associates of North Carolina, P.A. **Date:** September 12, 2011

**Project:** Bear Basin Wetland Restoration Site **Project #:** 20110659P-WO 01

**County:** Onslow **State:** NC

**Location:** US HWY 258 **Site/Lot:** Boring # 24

**Soil Series:** Pantego

**Soil Classification:** Fine-loamy, siliceous, semiactive, thermic Umbric Paleaquults

**AWT:** 20" **SHWT:** 0-12" **Slope:** 0-2% **Aspect:**

**Elevation:** **Drainage:** Very Poorly Drained **Permeability:** Moderate

**Vegetation:** Corn

**Borings terminated at** 60 **Inches**

| HORIZON | DEPTH (IN) | MATRIX | MOTTLES | TEXTURE | STRUCTURE | CONSISTENCE | BOUNDARY | NOTES |
|---|---|---|---|---|---|---|---|---|
| Ap | 0-11 | 10YR 3/1 | | fsl | 1fgr | mfr | gw | |
| Eg | 11-14 | 10YR 6/2 | | sl | 1fsbk | mfr | cw | |
| Btg1 | 14-30 | 10YR 6/1 | 10YR 6/6c2d | scl | 1msbk | mfr | gw | |
| Btg2 | 30-42 | 10YR 6/1 | 10YR 5/6c2d | scl | 2msbk | mfr | gw | |
| Btg3 | 42-60 | 10YR 5/1 | 10YR 5/6c2d | scl | 1csbk | mfr | | tending to massive |
| | | | 7.5YR 5/8c2p | | | | | |

COMMENTS

The Pantego series consists of very deep, very poorly drained soils formed in thick loamy deposits in nearly level and slightly depressional areas of the Southern Coastal Plain and Atlantic Coast Flatwoods.

This Pantego series is a drained hydric soil by ditching.

The Pantego soil is ponded to very slow runoff and the seasonally high water table is at or near the surface during wet seasons, typically between 0-12 inches.

DESCRIBED BY: SFS DATE: 9/12/2011

KCI ASSOCIATES OF NORTH CAROLINA, PA

# SOIL PROFILE DESCRIPTION

**Client:** KCI Associates of North Carolina, P.A. **Date:** September 12, 2011

**Project:** Bear Basin Wetland Restoration Site **Project #:** 20110659P-WO 01

**County:** Onslow **State:** NC

**Location:** US HWY 258 **Site/Lot:** Boring # 37

**Soil Series:** Pantego

**Soil Classification:** Fine-loamy, siliceous, semiactive, thermic Umbric Paleaquults

**AWT:** 12" **SHWT:** 0-12" **Slope:** 0-1% **Aspect:**

**Elevation:** **Drainage:** Very Poorly Drained **Permeability:** Moderate

**Vegetation:** Corn

**Borings terminated at** 60 **Inches**

| HORIZON | DEPTH (IN) | MATRIX | MOTTLES | TEXTURE | STRUCTURE | CONSISTENCE | BOUNDARY | NOTES |
|---|---|---|---|---|---|---|---|---|
| Ap | 0-10 | 10YR 3/1 | | fsl | 1fgr | mfr | cs | |
| Eg | 10-12 | 10YR 6/2 | | fsl | 1fsbk | mfr | cw | |
| Btg1 | 12-18 | 10YR 5/2 | 10YR 5/6c2d | sl | 1fsbk | mfr | gw | |
| Btg2 | 18-21 | 10YR 6/2 | 10YR 5/6c2d | scl | 2msbk | mfr | gw | |
| | | | 2.5YR 4/8c2p | | | | | |
| Btg3 | 21-33 | 10YR 6/1 | 2.5YR 4/8c2p | scl | 2msbk | mfr | gw | |
| Btg4 | 33-48 | 10YR 6/2 | 10YR 6/4c2f | scl | 1msbk | mfr | gw | |
| Btg5 | 48-60 | 10YR 6/2 | 10YR 6/4c2d | sl | 1msbk | mfr | | |
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COMMENTS:

The Pantego series consists of very deep, very poorly drained soils formed in thick loamy deposits in nearly level and slightly depressional areas of the Southern Coastal Plain and Atlantic Coast Flatwoods.

This Pantego series is a drained hydric soil by ditching.

The Pantego soil is ponded to very slow runoff and the seasonally high water table is at or near the surface during wet seasons, typically between 0-12 inches

DESCRIBED BY: SFS DATE 9/12/2011

KCI ASSOCIATES OF NORTH CAROLINA, PA

# SOIL PROFILE DESCRIPTION

**Client:** KCI Associates of North Carolina, P.A. **Date:** September 12, 2011

**Project:** Bear Basin Wetland Restoration Site **Project #:** 20110659P-WO_01

**County:** Onslow **State:** NC

**Location:** US HWY 258 **Site/Lot:** Boring # 12

**Soil Series:** Pantego

**Soil Classification:** Fine-loamy, siliceous, semiactive, thermic Umbric Paleaquults

**AWT:** 36" **SHWT:** 0-12" **Slope:** 0-1% **Aspect:**

**Elevation:** **Drainage:** Very Poorly Drained **Permeability:** Moderate

**Vegetation:** Corn

**Borings terminated at** 60 **Inches**

| HORIZON | DEPTH (IN) | MATRIX | MOTTLES | TEXTURE | STRUCTURE | CONSISTENCE | BOUNDARY | NOTES |
|---|---|---|---|---|---|---|---|---|
| Ap | 0-8 | 10YR 3/1 | | l | 1fgr | mfr | gw | |
| A | 8-11 | 10YR 4/2 | | l | 1fgr | mfr | cs | |
| Eg | 11-18 | 10YR 5/2 | | sl | 1fsbk | mfr | gw | |
| Btg1 | 18-26 | 10YR 5/2 | 10YR 5/6f2d | scl | 1fsbk | mfr | gw | |
| Btg2 | 26-38 | 10YR 5/2 | 10YR 5/6c2d | scl-cl | 2msbk | mfr | gw | |
| Btg3 | 38-46 | 10YR 5/2 | 10YR 5/6c2d | scl | 2msbk | mfr | gw | |
| | | | 10YR 4/2c2d | | | | | |
| Btg4 | 46-60 | 10YR 6/2 | 10YR 5/6c2d | scl | 1msbk | mfr | | sand lenses |

COMMENTS:

The Pantego series consists of very deep, very poorly drained soils formed in thick loamy deposits in nearly level and slightly depressional areas of the Southern Coastal Plain and Atlantic Coast Flatwoods.

This Pantego series is a drained hydric soil by ditching.

The Pantego soil is ponded to very slow runoff and the seasonally high water table is at or near the surface during wet seasons, typically between 0-12 inches.

DESCRIBED BY: SFS DATE: 9/15/2011

KCI ASSOCIATES OF NORTH CAROLINA, PA

# SOIL PROFILE DESCRIPTION

**Client:** KCI Associates of North Carolina, P.A. **Date:** September 13, 2011

**Project:** Bear Basin Wetland Restoration Site **Project #:** 20110659B-WO 01

**County:** Onslow **State:** NC

**Location:** US HWY 258 **Site/Lab:** Boring # 30

**Soil Series:** Pantego

**Soil Classification:** Fine-loamy, siliceous, semiactive, thermic Umbric Paleaquults

**AWT:** 31" **SHWT:** 0-12" **Slope:** 0-1% **Aspect:**

**Elevation:** **Drainage:** Very Poorly Drained **Permeability:** Moderately slow

**Vegetation:** Corn

**Borings terminated at** 60 **Inches**

| HORIZON | DEPTH (IN) | MATRIX | MOTTLES | TEXTURE | STRUCTURE | CONSISTENCE | BOUNDARY | NOTES |
|---|---|---|---|---|---|---|---|---|
| Ap | 0-10 | 10YR 3/1 | | l | 1fgr | mfr | gw | |
| A | 10-17 | 10YR 3/1 | | l | 1fgr | mfr | cs | |
| Btg1 | 17-21 | 10YR 5/2 | 10YR 5/6f1d | scl | 1fsbk | mfr | gw | |
| Btg2 | 21-38 | 10YR 5/2 | 10YR 5/8c2p | scl | 2msbk | mfr | gs | |
| Btg3 | 38-43 | 10YR 4/2 | 10YR 5/8c1p | scl | 2msbk | mfr | gw | |
| Btg4 | 43-48 | 10YR 4/2 | 10YR 5/8c1p | scl | 1msbk | mfr | gw | |
| Btg5 | 48-60 | 10YR 5/1 | 10YR 5/4f1d | sc | 1csbk | mfi | | |
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COMMENTS:

The Pantego series consists of very deep, very poorly drained soils formed in thick loamy deposits in nearly level and slightly depressional areas of the Southern Coastal Plain and Atlantic Coast Flatwoods.

This Pantego series is a drained hydric soil by ditching.

The Pantego soil is ponded to very slow runoff and the seasonally high water table is at or near the surface during wet seasons, typically between 0-12 inches.

DESCRIBED BY: SFS DATE: 9/15/2011

LICENSED SOIL SCIENTIST
STEVEN F. STOKES
1087
STATE OF NORTH CAROLINA

KCI ASSOCIATES OF NORTH CAROLINA, PA

# SOIL PROFILE DESCRIPTION

**Client:** KCI Associates of North Carolina, P.A. **Date:** September 12, 2011

**Project:** Bear Basin Wetland Restoration Site **Project #:** 20110659P-WO_01

**County:** Onslow **State:** NC

**Location:** US HWY 258 **Site/Lot:** Boring # 2

**Soil Series:** Lynchburg Variant

**Soil Classification:** Fine-loamy, siliceous, subactive, thermic Aeric Paleaquults

**AWT:** >60" **SHWT:** 18" **Slope:** 0-1% **Aspect:**

**Elevation:** **Drainage:** Somewhat Poorly Drained **Permeability:** Moderate

**Vegetation:** Corn

**Borings terminated at** 60 **Inches**

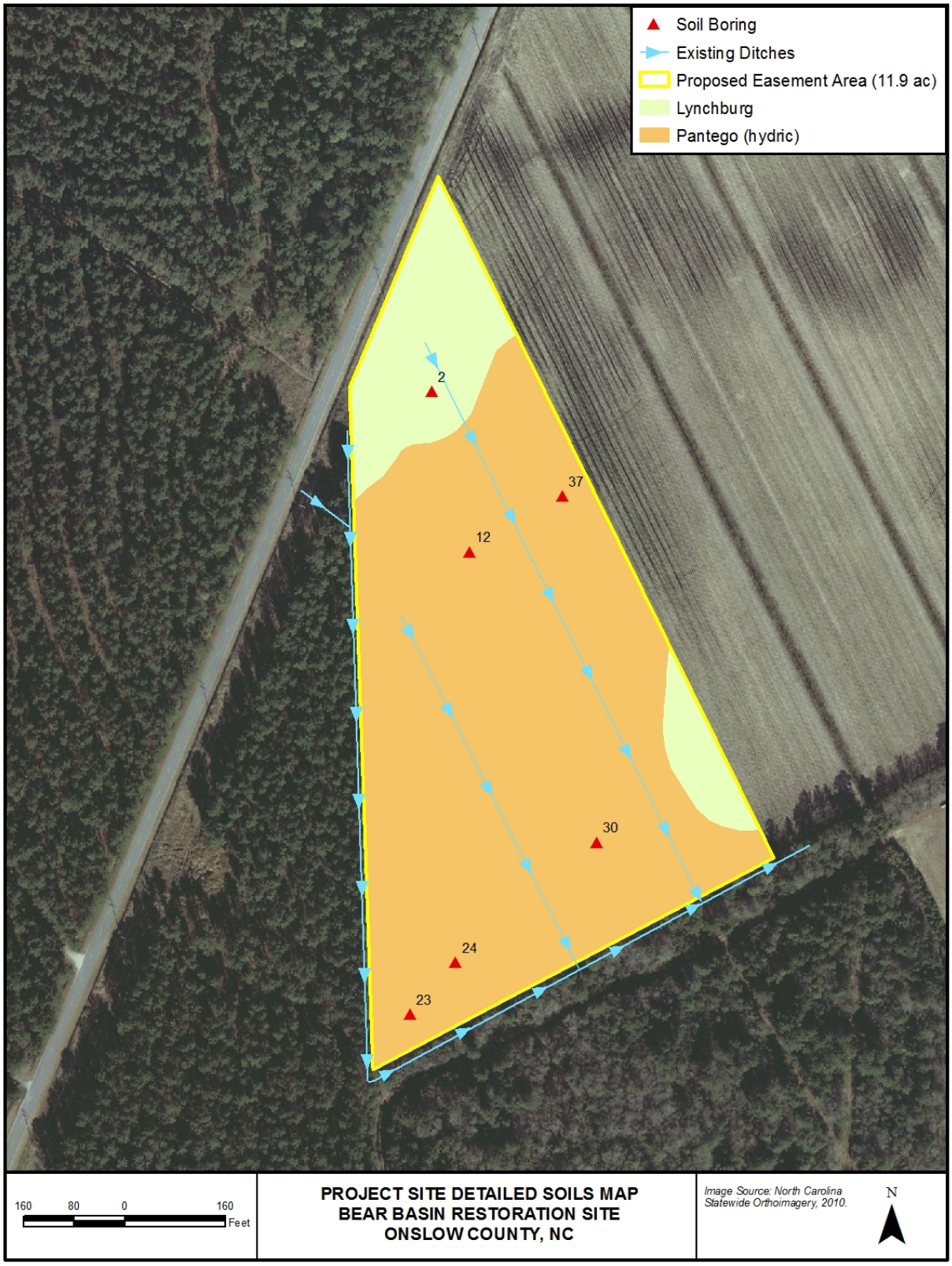
| HORIZON | DEPTH (IN) | MATRIX | MOTTLES | TEXTURE | STRUCTURE | CONSISTENCE | BOUNDARY | NOTES |
|---|---|---|---|---|---|---|---|---|
| Ap | 0-7 | 10YR 4/1 | | fsl | 1fgr | mvfr | cs | |
| AE | 7-10 | 10YR 4/1 | 10YR 5/2c1d | fsl | 1fgr | mvfr | cw | |
| E | 10-15 | 10YR 5/6 | 10YR 5/4c2f | vfsl-fsl | 1fsbk | mvfr | cs | |
| BE | 15-18 | 10YR 5/6 | 10YR 5/2c2d | vfsl-fsl | 1msbk | mvfr | cs | |
| Btg1 | 18-36 | 10YR 7/1 | 10YR 6/4c2d | fsl | 2msbk | mfr | gw | |
| | | | 7.5YR 5/8f1p | | | | | |
| Btg2 | 36-48 | | 10YR 6/8 | sl | 1msbk | mfr | gw | |
| | | | 10YR 7/1 | | | | | |
| Btg3 | 48-60 | 10YR 6/8 | 10YR 7/1m3d | scl-sl | 1msbk | mfr | | |

COMMENTS:

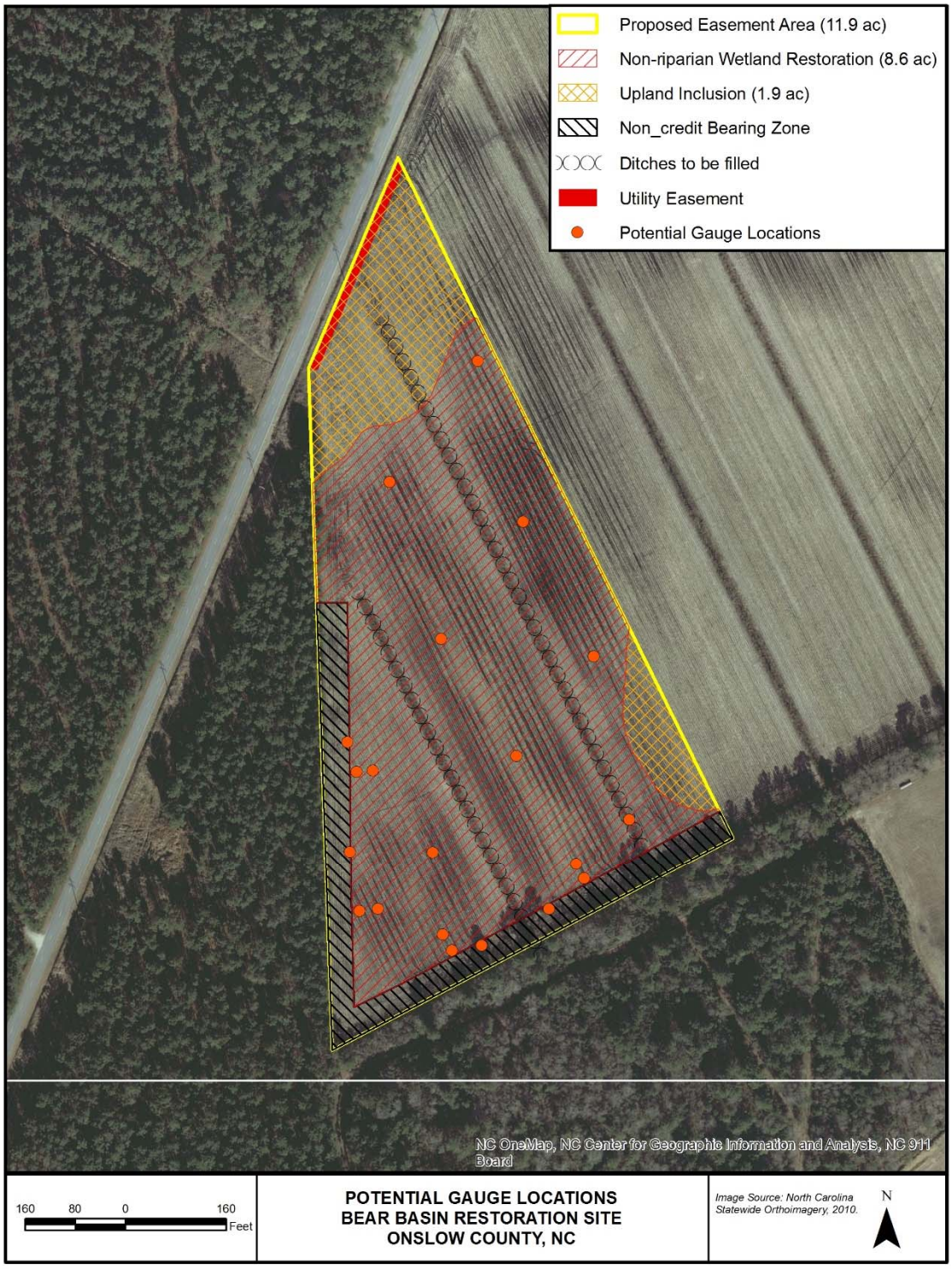
The Lynchburg series is a very deep somewhat poorly drained soil of the Lower and Upper Atlantic Coastal Plain that occur on Marine terraces and Flats.
Dominant chroma 2 matrix for this Lynchburg soil description ranges from 10 to 18 inches below the surface.
Seasonally high water table for the Lynchburg series typically ranges from 6 to 18 inches.

DESCRIBED BY: SFS DATE: 9/19/2011

LICENSED SOIL SCIENTIST
STEVEN F. STOKES
1087
STATE OF NORTH CAROLINA


Soil Boring
Existing Ditches
Proposed Easement Area (11.9 ac)
Lynchburg
Pantego (hydric)
2
37
12
30
24
23
160 80 0 160
Feet
PROJECT SITE DETAILED SOILS MAP
BEAR BASIN RESTORATION SITE
ONSLOW COUNTY, NC
Image Source: North Carolina Statewide Orthoimagery, 2010.
N

**Potential Wetland Gauge Locations**


Proposed Easement Area (11.9 ac)
Non-riparian Wetland Restoration (8.6 ac)
Upland Inclusion (1.9 ac)
Non_credit Bearing Zone
Ditches to be filled
Utility Easement
Potential Gauge Locations
NC OneMap, NC Center for Geographic Information and Analysis, NC 911 Board
160 80 0 160
Feet
POTENTIAL GAUGE LOCATIONS
BEAR BASIN RESTORATION SITE
ONSLOW COUNTY, NC
Image Source: North Carolina Statewide Orthoimagery, 2010.
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## 14.6 Appendix D. Project Plan Sheets

CONTRACT #: 004741

KCI JOB# : 20122266

# STATE OF NORTH CAROLINA
# ECOSYSTEM ENHANCEMENT PROGRAM

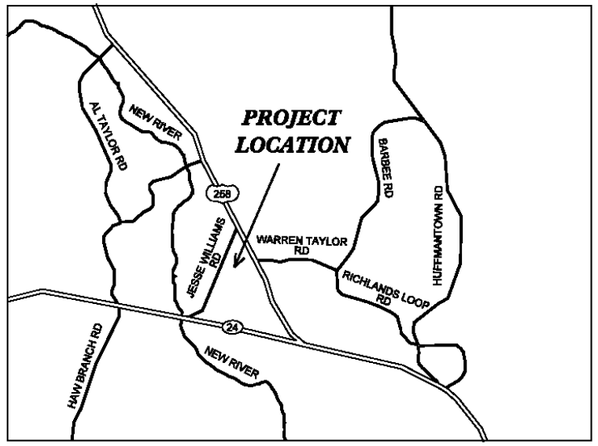
| STATE | EEP PROJECT NUMBER | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | 95362 | 1 | 10 |

| | | |
|---|---|---|
| A | SUBMITTED WITH MITIGATION PLAN | NOV 2012 |
| B | SUBMITTED FOR EROSION CONTROL PERMIT | MAR 2013 |
| C | REVISED FOR 401 / 404 PERMIT SUBMISSION | JULY 2014 |
| | | |
| | | |
| SYM. | DESCRIPTION | DATE |
| REVISIONS | | |

# *BEAR BASIN RESTORATION SITE*

## *ONSLOW COUNTY, NORTH CAROLINA*
## *WHITE OAK RIVER BASIN*

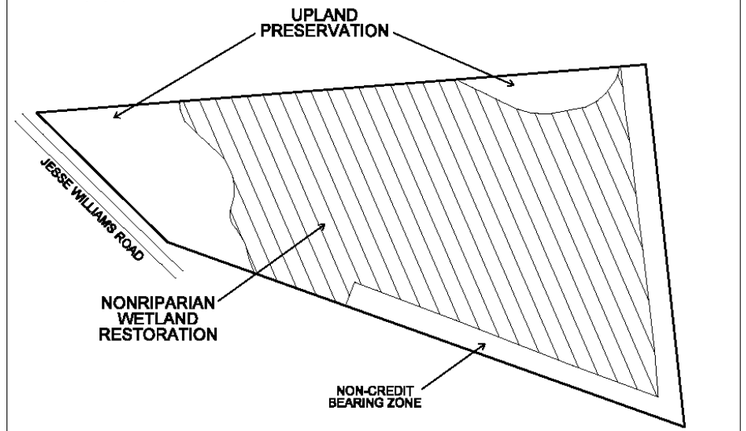
***UPPER NEW RIVER WATERSHED***
***03030001010010***




***VICINITY MAP***
***NOT TO SCALE***

DIRECTIONS FROM RALEIGH:
PROCEED EAST ON I-40 FOR APPROXIMATELY 74 MILES. THEN TAKE EXIT 373 FOR NC-24 E/ NC-903 TOWARDS KENANSVILLE. TAKE A LEFT OFF I-40 ONTO NC-24 E/ NC-903. AFTER 6 MILES TAKE A RIGHT TO STAY ONTO NC-24 E. IN 19 MILES TAKE A LEFT ONTO JESSE WILLIAMS RD. THE SITE WILL BE ON THE RIGHT APPROXIMATELY 0.6 MILES UP THE ROAD.

SHEET 4, 5, 6, 10

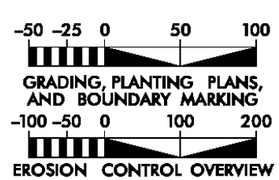




***INDEX OF SHEETS***



***GRAPHIC SCALES***




***PROJECT DATA***

WETLAND AREA 1
NONRIPARIAN WETLAND RESTORATION = 8.5 ACRES

PROJECT TOTAL AREA OF DISTURBANCE = 11.9 ACRES

Prepared in the Office of:


KCI Associates of North Carolina, P.A.
SUITE 220 LANDMARK CENTER II, 4601 SIX FORKS RD., RALEIGH, NC 27609
ENGINEERS • PLANNERS • ECOLOGISTS

GARY M. MRYNCZA, P.E.
*PROJECT ENGINEER*

TIM MORRIS
*WETLAND DESIGN*


***PROJECT ENGINEER***

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

*SIGNATURE:* *P.E.*

Prepared for:

Ecosystem PROGRAM

JEFF JUREK
*CONTRACT ADMINISTRATOR*

# GENERAL NOTES

BEARING AND DISTANCES:
ALL BEARINGS ARE NAD 1983 GRID BEARINGS.
ALL DISTANCES AND COORDINATES SHOWN ARE HORIZONTAL (GROUND) VALUES.
ALL INFORMATION IS BASED ON THE FOLLOWING KCI CONTROL POINTS.

| | NORTHING | EASTING | ELEVATION |
|---|---|---|---|
| KCI#1 | 431237.21 | 2417150.71 | 73.67 |
| KCI#2 | 431724.26 | 2417353.88 | 72.07 |
| KCI#4 | 431028.93 | 2417063.63 | 73.38 |
| KCI#5 | 430006.55 | 2417155.40 | 71.38 |
| KCI#6 | 429900.06 | 2417167.62 | 71.34 |
| KCI#7 | 429818.61 | 2417196.00 | 71.50 |
| KCI#8 | 429704.40 | 2417202.01 | 71.28 |
| KCI#9 | 429551.61 | 2417228.46 | 69.90 |
| KCI#10 | 429417.13 | 2417245.89 | 69.31 |

UTILITY/SUBSURFACE PLANS:
-NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. EXISTING UNDERGROUND UTILITIES HAVE NOT BEEN VERIFIED. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING A UTILITY LOCATOR AND ESTABLISHING THE EXACT LOCATION OF ANY AND ALL EXISTING UTILITIES IN THE PROJECT REACH.

# PROJECT LEGEND

## WETLAND MITIGATION

Proposed Filled Ditches

Proposed Ditch Plug

Proposed Stabilized Drainage Outlet

## TOPOGRAPHY

Minor Contour Line

Major Contour Line — 70 —

Proposed Contour

## SEDIMENTATION & EROSION

Stabilized Construction Entrance

Silt Fence — SF —

Limits of Disturbance — LOD —

Temporary Rock Silt Screen

Temporary Bridge Mat Crossing

## MISCELLANEOUS

Existing Overhead Wire

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MAYNCZA

| | | |
|---|---|---|
| A | SUBMITTED WITH MITIGATION PLAN | NOV 2012 |
| B | SUBMITTED FOR EROSION CONTROL PERMIT | MAR 2013 |
| C | REVISED FOR 401 / 404 PERMIT SUBMISSION | JULY 2014 |

SYM. DESCRIPTION DATE
REVISIONS

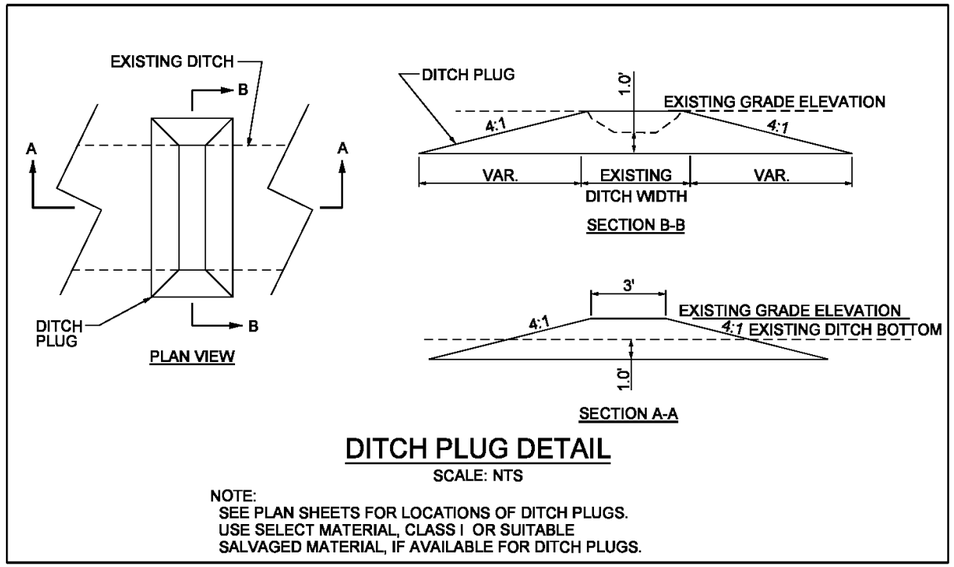
Ecosystem

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4601 SIX FORKS ROAD, SUITE 220
RALEIGH, NORTH CAROLINA 27609

BEAR BASIN
RESTORATION SITE
RICHLANDS, ONSLOW COUNTY, NORTH CAROLINA

DATE: JULY 2014
SCALE: N.T.S.

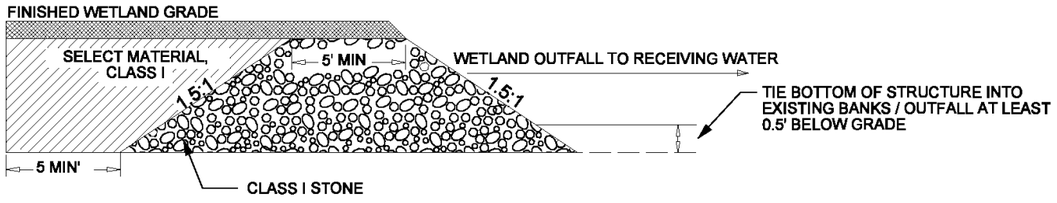
GENERAL NOTES & PROJECT LEGEND




## DITCH PLUG DETAIL

SCALE: NTS

NOTE:
SEE PLAN SHEETS FOR LOCATIONS OF DITCH PLUGS.
USE SELECT MATERIAL, CLASS I OR SUITABLE
SALVAGED MATERIAL, IF AVAILABLE FOR DITCH PLUGS.




PROFILE VIEW

## STABILIZED DRAINAGE OUTFALL

SCALE: NTS

NOTE:
IF AVAILABLE SUITABLE SALVAGED MATERIAL
MAY BE SUBSTITUTED FOR SELECT MATERIAL, CLASS I.

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

| | | |
|---|---|---|
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| C | REVISED FOR 401 / 404 PERMIT SUBMISSION | JULY 2014 |

| SYM. | DESCRIPTION | DATE |
|---|---|---|
| | REVISIONS | |

Ecosystem

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RALEIGH, NORTH CAROLINA 27609

BEAR BASIN
RESTORATION SITE
RICHLANDS, ONSLOW COUNTY, NORTH CAROLINA

DATE: JULY 2014
SCALE: N.T.S.

DETAILS

NC GRID NAD 83

-50 -25 0 50 100

GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MARYNCZA

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REVISIONS

CONSERVATION EASEMENT

JESSE WILLIAMS ROAD

ORHW

KCI#1

KCI#4

KCI#5

TS1

70.5

INSTALL DITCH PLUG (TYP.)

INSTALL ROCK STABILIZED OUTLET (TYP.)

CONSERVATION EASEMENT

CONSERVATION EASEMENT

NOTE: SURFACE ROUGHENING WILL OCCUR THROUGHOUT THE EASEMENT TO ALLEVIATE SOIL COMPACTION AND TO ENHANCE SURFACE WATER STORAGE.

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# BEAR BASIN RESTORATION SITE

RICHLANDS, ONSLOW COUNTY, NORTH CAROLINA

DATE: JULY 2014

SCALE: GRAPHIC

## GRADING PLAN

**WETLAND PLANTING ZONE**

NON-RIPARIAN WETLAND RESTORATION
HARDWOOD FLATS VEGETATIVE COMMUNITY
10.4 AC

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

| COMMON NAME | SCIENTIFIC NAME | WETLAND INDICATOR | % OF TOTAL | # OF PLANTS |
|---|---|---|---|---|
| RED MAPLE | ACER RUBRUM | FACW | 4 | 500 |
| SWEETBAY MAGNOLIA | MAGNOLIA VIRGINIANA | FACW | 4 | 500 |
| SWAMP RED BAY | PERSEA PALUSTRIS | FACW | 4 | 500 |
| TULIP POPLAR | LIRIODENDRON TULIPIFERA | FACW | 14 | 1500 |
| AMERICAN ELM | ULMUS AMERICANA | FACW | 7 | 750 |
| CHERRYBARK OAK | QUERCUS PAGODA | FAC | 24 | 2500 |
| SWAMP CHESTNUT OAK | QUERCUS MICHAUXII | FACW | 24 | 2500 |
| WATER OAK | QUERCUS NIGRA | FAC | 14 | 1500 |
| RED CHOKEBERRY | ARONIA ARBUTIFOLIA | FACW | 2.5 | 250 |
| HIGHBUSH BLUEBERRY | VACCINIUM CORYMBOSUM | FACW | 2.5 | 250 |
| | | | 100 | 10,500 |

NOTE: THE DISTRIBUTION OF THE STEMS MAY BE CHANGED AT THE ENGINEER'S DISCRETION. HOWEVER, ONE SPECIES MAY OCCUPY NO MORE THAN 25% OF THE TOTAL STEMS AND AT LEAST FIVE SPECIES MUST BE USED.

NC GRID NAD 83

–50 –25 0 50 100

GRAPHIC SCALE

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRAYNCZA

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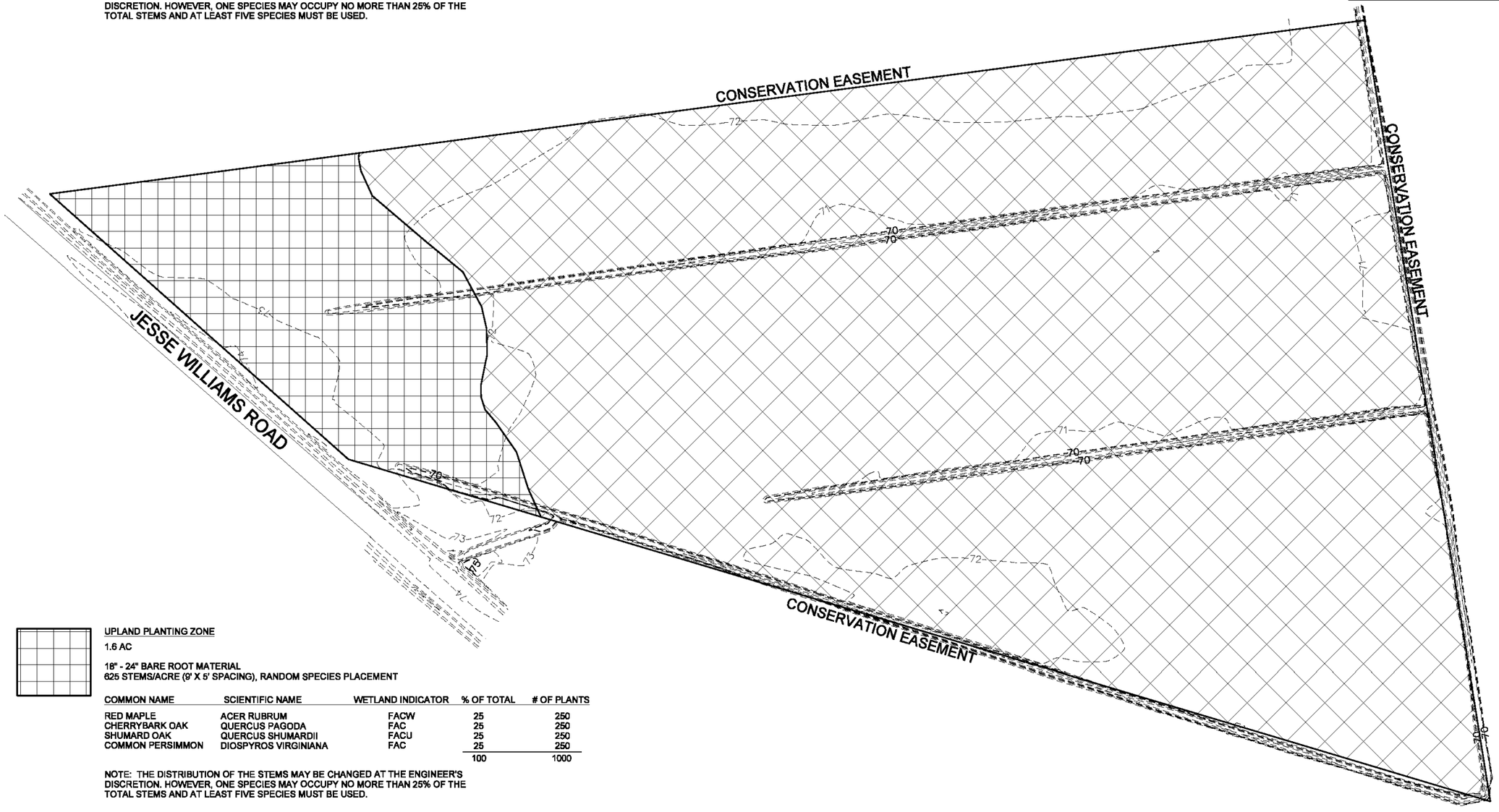


**UPLAND PLANTING ZONE**

1.6 AC

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

| COMMON NAME | SCIENTIFIC NAME | WETLAND INDICATOR | % OF TOTAL | # OF PLANTS |
|---|---|---|---|---|
| RED MAPLE | ACER RUBRUM | FACW | 25 | 250 |
| CHERRYBARK OAK | QUERCUS PAGODA | FAC | 25 | 250 |
| SHUMARD OAK | QUERCUS SHUMARDII | FACU | 25 | 250 |
| COMMON PERSIMMON | DIOSPYROS VIRGINIANA | FAC | 25 | 250 |
| | | | 100 | 1000 |

NOTE: THE DISTRIBUTION OF THE STEMS MAY BE CHANGED AT THE ENGINEER'S DISCRETION. HOWEVER, ONE SPECIES MAY OCCUPY NO MORE THAN 25% OF THE TOTAL STEMS AND AT LEAST FIVE SPECIES MUST BE USED.


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BEAR BASIN
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SCALE: GRAPHIC

PLANTING PLAN

SHEET 5 OF 10

## EASEMENT BOUNDARY MARKING

THE EASEMENT BOUNDARY WILL BE MARKED WITH METAL POSTS AND CONSERVATION EASEMENT SIGNS AT THE CORNERS AND AT A MINIMUM OF 200' INTERVALS ALONG THE BOUNDARY.

- 5/8" REBAR 30" IN LENGTH WITH 3-1/4" ALUMINUM CAPS ON ALL EASEMENT CORNERS. CAPS SHALL MEET EEP SPECIFICATIONS (BERNSTEN RBD5325 IMPRINTED WITH NC STATE LOGO #89087 OR EQUIVALENT). AFTER INSTALLATION, CAPS SHALL BE STAMPED WITH THE CORRESPONDING NUMBER.
- 6-FOOT TALL DURABLE WITNESS POST AT EACH CORNER IN THE CONSERVATION EASEMENT. POSTS SHALL BE MADE OF MATERIAL THAT WILL LAST A MINIMUM OF 20 YEARS. THE PROVIDER SHALL ATTACH A CONSERVATION EASEMENT SIGN TO EACH WITNESS POST AND PLACE ADDITIONAL SIGNS AT NO MORE THAN 200-FOOT INTERVALS ON BOUNDARY LINES.

NC GRID NAD 83

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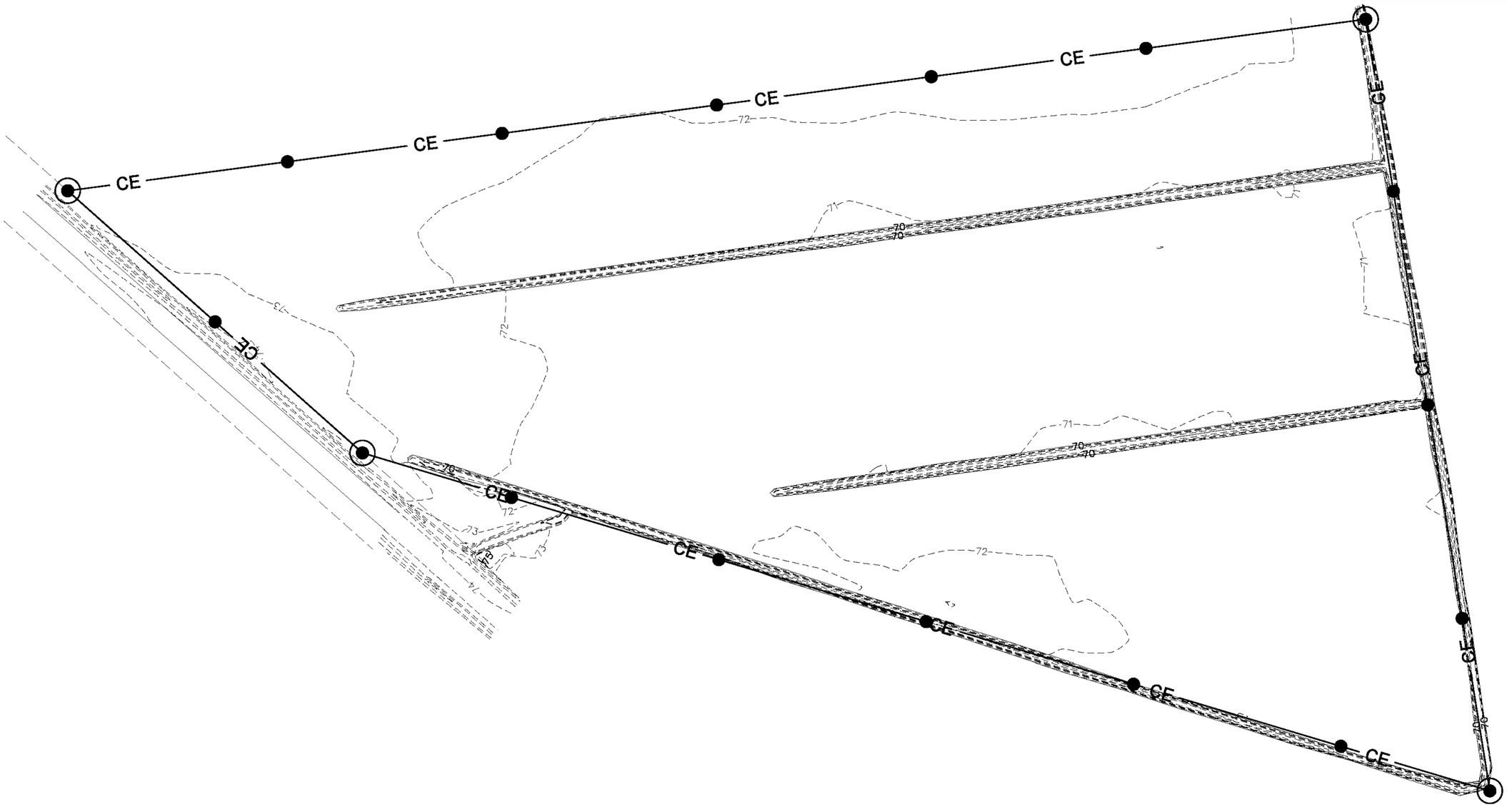
GRAPHIC SCALE




NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MAYNCZA

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BOUNDARY MARKING PLAN

SHEET 6 OF 10

## NOTES:

1. IT IS THE INTENT OF THESE PLANS THAT AS SOON AS AN AREA OF GRADING IS COMPLETE IT SHALL BE STABILIZED IN ACCORDANCE WITH THE EROSION CONTROL PRACTICES DESCRIBED IN THESE PLANS.DUE TO THE ANTICIPATED DURATION AND SEQUENCE OF THE CONSTRUCTION ACTIVITIES, THE CONTRACTOR IS REQUIRED TO MINIMIZE, AS MUCH AS POSSIBLE, THE AMOUNT 0F THE AREA THAT IS DISTURBED AT ONE TIME.
2. THE CONTRACTOR SHALL EXERCISE EVERY REASONABLE PRECAUTION THROUGHOUT THE CONSTRUCTION OF THE PROJECT TO PREVENT EROSION AND SEDIMENTATION. EROSION CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE PROJECT PLANS, NORTH CAROLINA SEDIMENT AND EROSION CONTROL GUIDELINES AND AS DIRECTED BY THE DESIGNER.
3. ALL EXCAVATED MATERIAL SHALL BE STOCKPILED WITHIN THE LIMITS OF DISTURBANCE FOR LATER USE AS EMBANKMENT MATERIAL. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING APPROPRIATE STABILIZATION MEASURES AROUND THE STOCKPILE AREA(S) AND ANY TEMPORARY OR PERMANENT SPOIL AND TOPSOIL PILES TO PREVENT EROSION AND SEDIMENTATION.
4. IN THE EVENT OF A STORM, THE CONTRACTOR WILL BE RESPONSIBLE FOR REMOVAL OR PROTECTION OF ANY EQUIPMENT, TOOLS, MATERIALS OR OTHER ITEMS NEEDED TO COMPLETE THE WORK THAT COULD BE AFFECTED BY STORMWATER.
5. AFTER THE WETLAND GRADING CALLED FOR IN THE PLANS IS COMPLETED, THE CONTRACTOR SHALL IMMEDIATELY INSTALL APPROPRIATE STABILIZATION MATERIALS AS CALLED FOR IN THE PLANS TO STABILIZE THE SOIL AND PROVIDE IMMEDIATE SEDIMENT/EROSION CONTROL.
6. EACH SEDIMENT CONTROL DEVICE WILL BE REMOVED AFTER ALL WORK IN THE CORRESPONDING CONSTRUCTION PHASE HAS BEEN COMPLETED AND THE AREAS HAVE BEEN STABILIZED.
7. THE CONSTRUCTION ENTRANCE AND STAGING AREA IDENTIFIED ON THE PLANS PROVIDE THE ONLY ACCESS POINTS INTO THE LIMITS OF DISTURBANCE. NO ADDITIONAL ACCESS POINTS SHALL BE USED WITHOUT APPROVAL OF THE DESIGNER.
8. SILT FENCE SHALL BE INSTALLED ON THE LOW SIDE OF ANY TEMPORARY OR PERMANENT SPOIL AND TOPSOIL PILES. THESE SPOIL PILES SHALL ALSO BE SEEDED AND MULCHED FOR VEGETATIVE STABILIZATION ON THE SAME DAY THEY ARE CREATED. ALL SPOIL MATERIAL SHALL STAY ON THE SITE AND SHALL NOT BE REMOVED FROM THE SUBJECT PROPERTY.
9. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CHECKED FOR STABILITY AND FUNCTIONAL OPERATION FOLLOWING EVERY RUNOFF PRODUCING RAIN EVENT AND/OR AT LEAST ONCE PER WEEK. ANY NEEDED MAINTENANCE OR REPAIRS SHALL BE MADE IMMEDIATELY TO MAINTAIN ALL MEASURES AS DESIGNED. ACCUMULATED SEDIMENT SHALL BE REMOVED FROM CONTROL MEASURES WHEN THEY REACH APPROXIMATELY 50% OF THEIR FUNCTIONAL CAPACITY. THESE MEASURES SHALL BE REPAIRED IF DISTURBED DURING MAINTENANCE. ALL SEEDED AREAS SHALL BE FERTILIZED, RESEEDED AND MULCHED, AS NECESSARY, TO PROMOTE THE ESTABLISHMENT OF VEGETATION COVER.
10. THE CONSTRUCTION MANAGER AND EROSION CONTROL CONTACT FOR THIS SITE IS TIM MORRIS. OFFICE PHONE - 919-783-9214 CELL PHONE - 919-793-6886

## SEQUENCE OF CONSTRUCTION:

THE CONTRACTOR IS RESPONSIBLE FOR FOLLOWING THE SEQUENCE OF CONSTRUCTION IN ACCORDANCE WITH THE PLANS AND THE FOLLOWING PROVISIONS, AS DIRECTED BY THE DESIGNER. CONSTRUCTION SHALL PROCEED IN THE SPECIFIED MANNER UNLESS OTHERWISE DIRECTED OR APPROVED BY THE DESIGNER. THE FOLLOWING PROVISIONS, ALONG WITH THE INSTRUCTIONS CONTAINED IN THE PLANS, CONSTITUTE THE SEQUENCE OF CONSTRUCTION.

PHASE 1: INITIAL SITE PREPARATION
- A. IDENTIFY PROJECT BOUNDARY, LIMITS OF DISTURBANCE, SENSITIVE AREAS, STAGING AREAS, STABILIZED ENTRANCES, AND ACCESS POINTS WITH THE DESIGNER.
- B. CONSTRUCT ENTRANCE AND STAGING AREAS AND THEIR ASSOCIATED SEDIMENT AND EROSION CONTROL DEVICES IN A MANNER TO SUPPORT EXECUTION OF THE WETLAND RESTORATION IN PHASES AS INDICATED IN THE PLANS AND AS DIRECTED BY THE DESIGNER.

PHASE 2: WETLAND RESTORATION GRADING
- A. FILLING EXISTING DITCHES/DEPRESSIONS
  - i. CLEAR VEGETATION AS NEEDED TO INSTALL SEDIMENT AND EROSION CONTROL MEASURES. INSTALL SEDIMENT AND EROSION CONTROL MEASURES AS DEPICTED ON THE PLANS.
  - ii. INSTALL PROPOSED OUTLET STABILIZATION STRUCTURES.
  - iii. FILL DITCHES/DEPRESSIONS AS INDICATED IN THE PLANS USING ADJACENT SPOIL MATERIAL, MAKING SURE TO DEWATER THE EXISTING DITCHES AS INDICATED ON THE PLANS.
  - iv. INSTALL ROCK SILT SCREENS AT OUTLET STABILIZATION STRUCTURES.
  - v. SEED AND MULCH COMPLETED WORK AREAS. THIS SHALL BE DONE WITHIN 72 HOURS OF REACHING FINAL GRADE WHEN FILLING DITCHES/PONDS/DEPRESSIONS AND MAY OCCUR PRIOR TO PHASE 2.A.iii.
- B. SURFACE ROUGHENING
  - i. BEGINNING ON THE NORTH SIDE OF THE WETLAND RESTORATION AREA AND PROGRESSING TOWARDS THE SOUTHERN SIDE OF THE SITE, ROUGHEN THE SOIL TO AN APPROXIMATE DEPTH OF 8" TO ALLEVIATE COMPACTION AND MIMIC NATURAL WETLAND MICROTOPOGRAPHY. THIS WILL INCREASE THE STORAGE OF SURFACE WATER IN THE WETLAND AND PROMOTE VEGETATION ESTABLISHMENT.
  - ii. SEED AND MULCH COMPLETED WORK AREAS. THIS SHALL BE DONE WITHIN 72 HOURS OF SURFACE ROUGHENING.

PHASE 3: TREE PLANTING
- A. PLANTS SHOULD BE PLANTED DURING THE DORMANT SEASON (NOVEMBER 17 - MARCH 17).
- B. PREPARE AND PLANT TREES IN ACCORDANCE WITH PLAN SHEETS 7-10 AND AS DIRECTED BY THE DESIGNER.

PHASE 4: COMPLETION OF PROJECT SITE
- A. PHASE 4 CAN BE INITIATED AFTER THE WETLAND GRADING WORK IS COMPLETED, AFTER THE SITE IS STABLIZED WITH REQUIRED VEGETATIVE COVER, AND PRIOR TO PHASE 3.
- B. REMOVE ALL REMAINING WASTE MATERIALS, AND THE EROSION CONTROL MEASURES AND RESTORE THE REMAINING STAGING AND STOCKPILING AREAS AND CONSTRUCTION ENTRANCES TO THEIR PRIOR CONDITION. SEED AND MULCH ALL DISTURBED AREAS UTILIZING THE SEED/MULCH MIXES SPECIFIED IN THE PLANS.

| GROUND STABILIZATION | |
|---|---|
| SITE AREA DESCRIPTION | STABILIZATION TIME FRAME |
| PERIMETER DIKES, SWALES, DITCHES AND SLOPES | 7 DAYS |
| HIGH QUALITY WATER (HQW) ZONES | 7 DAYS |
| SLOPES STEEPER THAN 3:1 | 7 DAYS |
| SLOPES 3:1 OR FLATTER | 7 DAYS |
| ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1 | 7 DAYS |

**INSPECTIONS**

WEEKLY INSPECTIONS REQUIRED.

RAIN GAUGE MUST BE PRESENT AT SITE. INSPECTIONS REQUIRED AFTER 0.5" RAIN EVENTS.

INSPECTIONS ARE ONLY REQUIRED DURING "NORMAL BUSINESS HOURS".

INSPECTION REPORTS MUST BE AVAILABLE ON-SITE DURING BUSINESS HOURS UNLESS A SITE SPECIFIC EXEMPTION IS APPROVED.

RECORD MUST BE KEPT FOR 3 YEARS AND AVAILABLE UPON REQUEST.

ELECTRONICALLY-AVAILABLE RECORDS MAY BE SUBSTITUTED UNDER CERTAIN CONDITIONS.

**SEDIMENTATION & EROSION CONTROL PLAN LEGEND**

DITCHES TO BE FILLED

STABILIZED CONSTRUCTION ENTRANCE

SILT FENCE — SF

LIMITS OF DISTURBANCE — LOD

BRIDGE MAT STREAM CROSSING

ROCK SILT SCREEN (STD. DRAWING 1636.01)

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MAYNCZA

TEMPORARY SEED MIX

THE CONTRACTOR SHALL UTILIZE THE FOLLOWING SEED/FERTILIZER MIX IN SEEDING ALL DISTURBED AREAS WITHIN THE PROJECT LIMITS:

SUMMER MIX (MAY 15 - AUGUST 15)
GERMAN MILLET..... SETARIA ITALICA ..... 20 LBS / ACRE
BROWNTOP MILLET.....UROCHLOA RAMOSA.... 20 LBS / ACRE

WINTER MIX (AUGUST 15 - MAY 15)
RYE GRAIN.....SECALE CEREALE.....120 LBS / ACRE

PERMANENT SEED MIX

SUMMER MIX (MAY 15 – AUGUST 15)

| SPECIES | APPLICATION RATE (IN MIX) % OF MIX | LBS / ACRE |
|---|---|---|
| REDTOPPANICGRASS - PANICUM RIGIDULUM | 28 | 5.6 |
| BEAKED PANICGRASS - PANICUM ANCEPS | 20 | 4.0 |
| RIVER OATS - CHASMANTHIUM LATIFOLIUM | 20 | 4.0 |
| VIRGINIA WILDRYE - ELYMUS VIRGINICUS | 20 | 4.0 |
| SWITCHGRASS - PANICUM VIRGANTUM | 10 | 2.0 |
| LEATHERY RUSH - JUNCUS CORIACEUS | 2 | 0.4 |
| NOTE: ADD 10 LBS/ACRE OF MILLET TO ABOVE MIXTURE FOR A TOTAL OF 30 LBS/ACRE | 100 | 20 |

WINTER MIX (AUGUST 15 -- MAY 15)

| SPECIES | APPLICATION RATE (IN MIX) % OF MIX | LBS / ACRE |
|---|---|---|
| REDTOPPANICGRASS - PANICUM RIGIDULUM | 28 | 5.6 |
| BEAKED PANICGRASS - PANICUM ANCEPS | 20 | 4.0 |
| RIVER OATS - CHASMANTHIUM LATIFOLIUM | 20 | 4.0 |
| VIRGINIA WILDRYE - ELYMUS VIRGINICUS | 20 | 4.0 |
| SWITCHGRASS - PANICUM VIRGANTUM | 10 | 2.0 |
| LEATHERY RUSH - JUNCUS CORIACEUS | 2 | 0.4 |
| NOTE: ADD 10 LBS/ACRE OF RYE TO ABOVE MIXTURE FOR A TOTAL OF 30 LBS/ACRE | 100 | 20 |

FERTILIZER..... 750 LBS / ACRE
LIMESTONE..... 2000 LBS / ACRE

FERTILIZER SHALL BE 10-10-10 ANALYSIS. UPON SOIL ANALYSIS A DIFFERENT RATIO OF FERTILIZER MAY BE USED.

SEEDBED PREPARATION
THE SEEDBED SHALL BE COMPRISED OF LOOSE SOIL AND NOT COMPACTED. THIS MAY REQUIRE MECHANICAL LOOSENING OF THE SOIL. SOIL AMENDMENTS SHOULD FOLLOW THE FERTILIZER AND LIMING DESCRIPTION IN THE ABOVE SECTIONS. FOLLOWING SEEDING, MULCHING SHALL FOLLOW THE BELOW APPLICATION METHODS AND AMOUNTS. AREAS CONTAINING SEVERE SOIL COMPACTION WILL BE SCARIFIED TO A DEPTH OF 8 INCHES.

MULCHING
SEEDED AREAS ARE TO BE PROTECTED BY SPREADING STRAW MULCH UNIFORMLY TO FORM A CONTINUOUS BLANKET (75% COVERAGE = 2 TONS/ACRE).

NOTE: FERTILIZER IS ONLY TO BE APPLIED ONCE. IF TEMPORARY SEED AND FERTILIZER IS APPLIED PRIOR TO PERMANENT SEED, THEN FERTILIZER SHALL NOT BE APPLIED WITH THE PERMANENT SEED.

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BEAR BASIN RESTORATION SITE
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DATE: JULY 2014
SCALE: N.T.S.

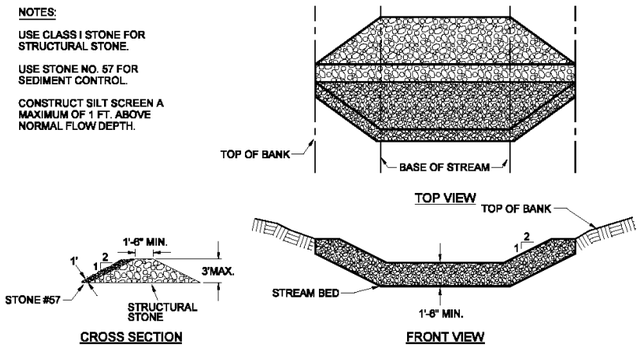
EROSION CONTROL PLAN

NOTES:

USE CLASS I STONE FOR STRUCTURAL STONE.

USE STONE NO. 57 FOR SEDIMENT CONTROL.

CONSTRUCT SILT SCREEN A MAXIMUM OF 1 FT. ABOVE NORMAL FLOW DEPTH.

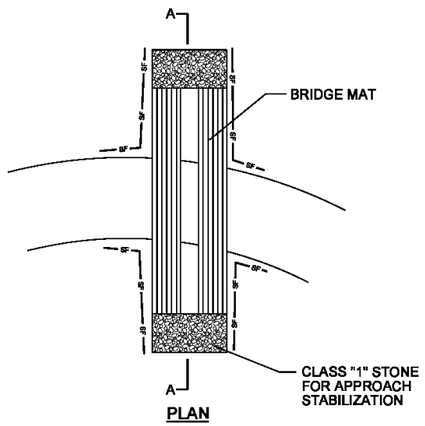



TEMPORARY ROCK SILT SCREEN

NOT TO SCALE

STREAM CROSSING MAINTENANCE:

1. INSPECT TEMPORARY CROSSING AFTER EACH RAINFALL EVENT FOR ACCUMULATION OF DEBRIS, BLOCKAGE, EROSION OF ABUTMENTS AND OVERFLOW AREAS, CHANNEL SCOUR, RIPRAP DISPLACEMENT, OR PIPING ALONG CULVERTS.
2. REMOVE DEBRIS, REPAIR AND REINFORCE DAMAGED AREAS IMMEDIATELY TO PREVENT FURTHER DAMAGE TO THE INSTALLATION.




PLAN

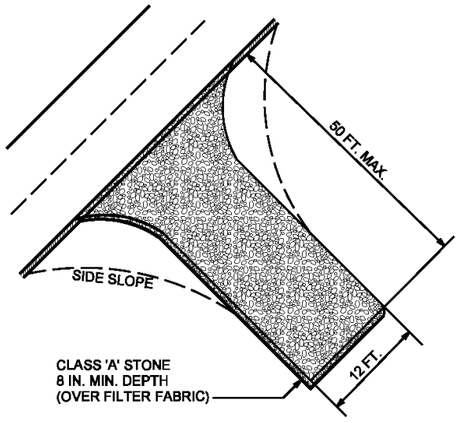

SECTION AA

NOT TO SCALE

1. BRIDGE LOCATIONS DEPICTED ON SITE PLANS ARE APPROXIMATE AND ARE SUBJECT TO CHANGE DEPENDING ON THE AREA THAT IS BEING WORKED UPON.
2. WIDTH OF EACH MAT IS DEPENDENT ON THE SIZE OF THE EQUIPMENT MEANT TO CROSS IT.
3. DISTANCE BETWEEN MATS IS DEPENDENT ON THE DISTANCE BETWEEN TRACKS ON THE EQUIPMENT MEANT TO CROSS IT.
4. APPROACH STABILIZATION, COMPOSED OF CLASS 1 STONE, WILL BE REQUIRED FOR EACH SECTION OF THE BRIDGE.

BRIDGE MAT CROSSING

PLACE AS SPECIFIED IN THE PLANS AND APPROVED BY THE DESIGNER

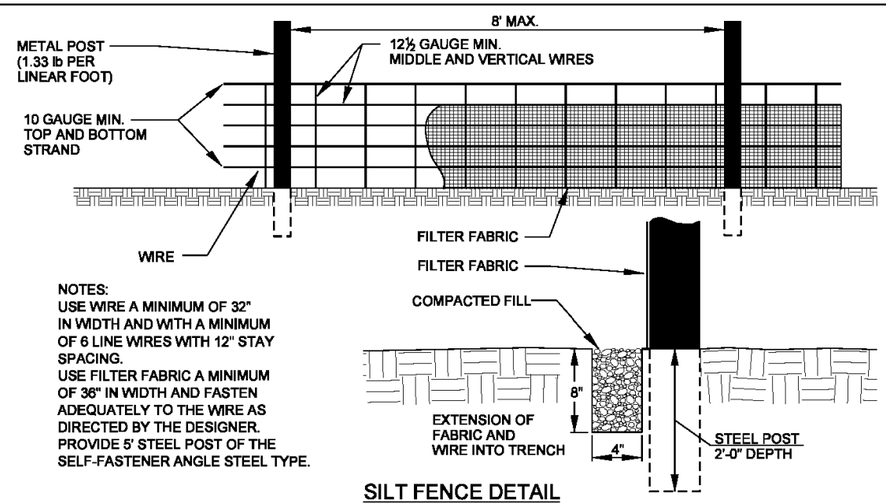



NOTES:

1. TURNING RADIUS SUFFICIENT TO ACCOMODATE LARGE TRUCKS SHALL BE PROVIDED.
2. ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
3. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOPDRESSING WITH STONE WILL BE NECESSARY.
4. ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED UP IMMEDIATELY.
5. GRAVEL CONSTRUCTION ENTRANCE SHALL BE LOCATED AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE MUST BE PROVIDED.
6. INSTALL A CULVERT IF NECESSARY TO ACCOMODATE ROADWAY DRAINAGE.
7. SIDE SLOPES FOR ENTRANCE MUST BE AT LEAST 2:1 SLOPE.

STABILIZED CONSTRUCTION ENTRANCE

SCALE: NTS




NOTES:
USE WIRE A MINIMUM OF 32" IN WIDTH AND WITH A MINIMUM OF 6 LINE WIRES WITH 12" STAY SPACING.
USE FILTER FABRIC A MINIMUM OF 36" IN WIDTH AND FASTEN ADEQUATELY TO THE WIRE AS DIRECTED BY THE DESIGNER.
PROVIDE 5' STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE.

SILT FENCE DETAIL

NOT TO SCALE

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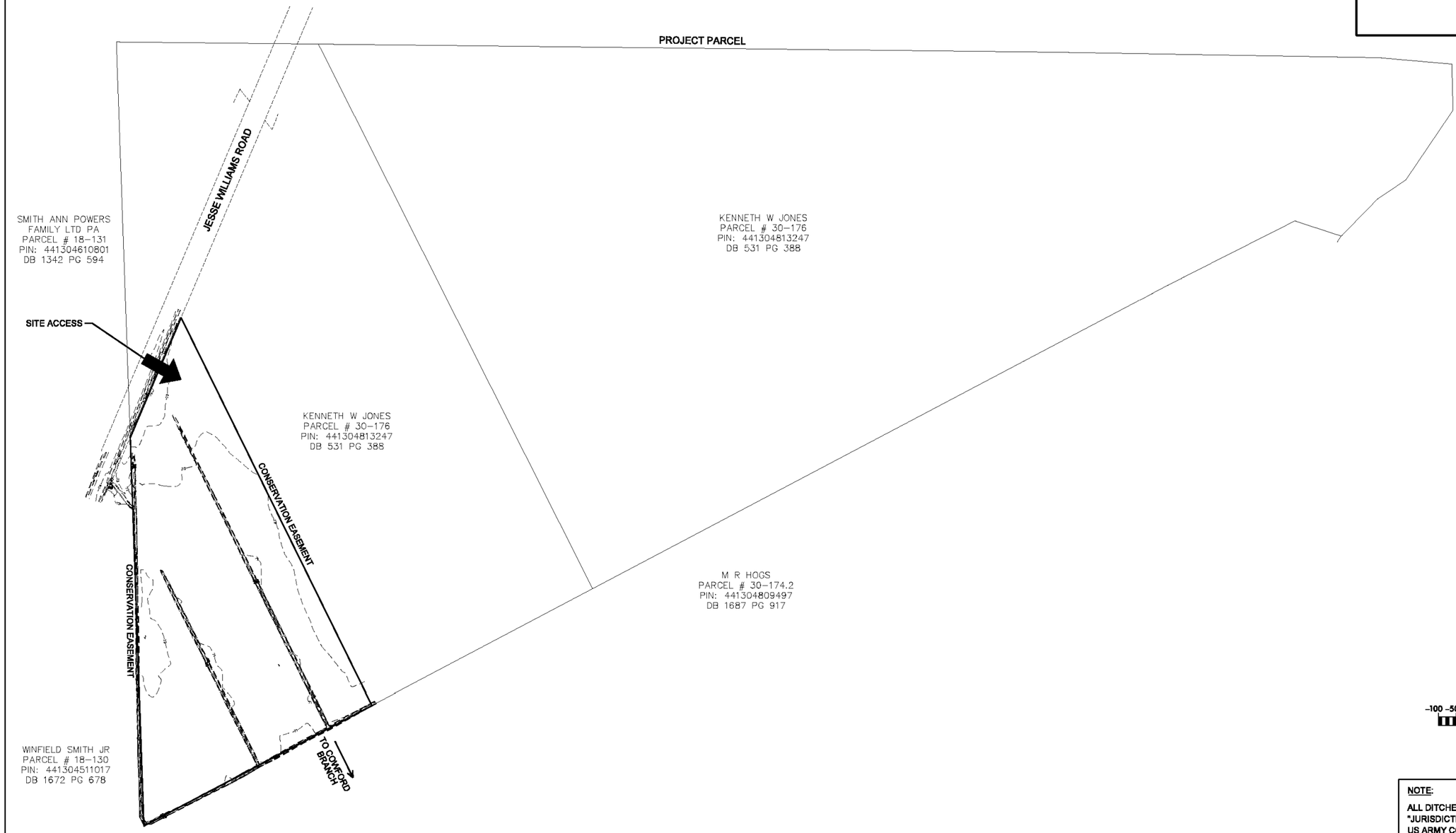
EROSION CONTROL PLAN

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**NOTE:**

ALL DITCHES WITHIN SITE ARE DEFINED "JURISDICTIONAL TRIBUTARIES" BY THE US ARMY CORPS OF ENGINEERS.

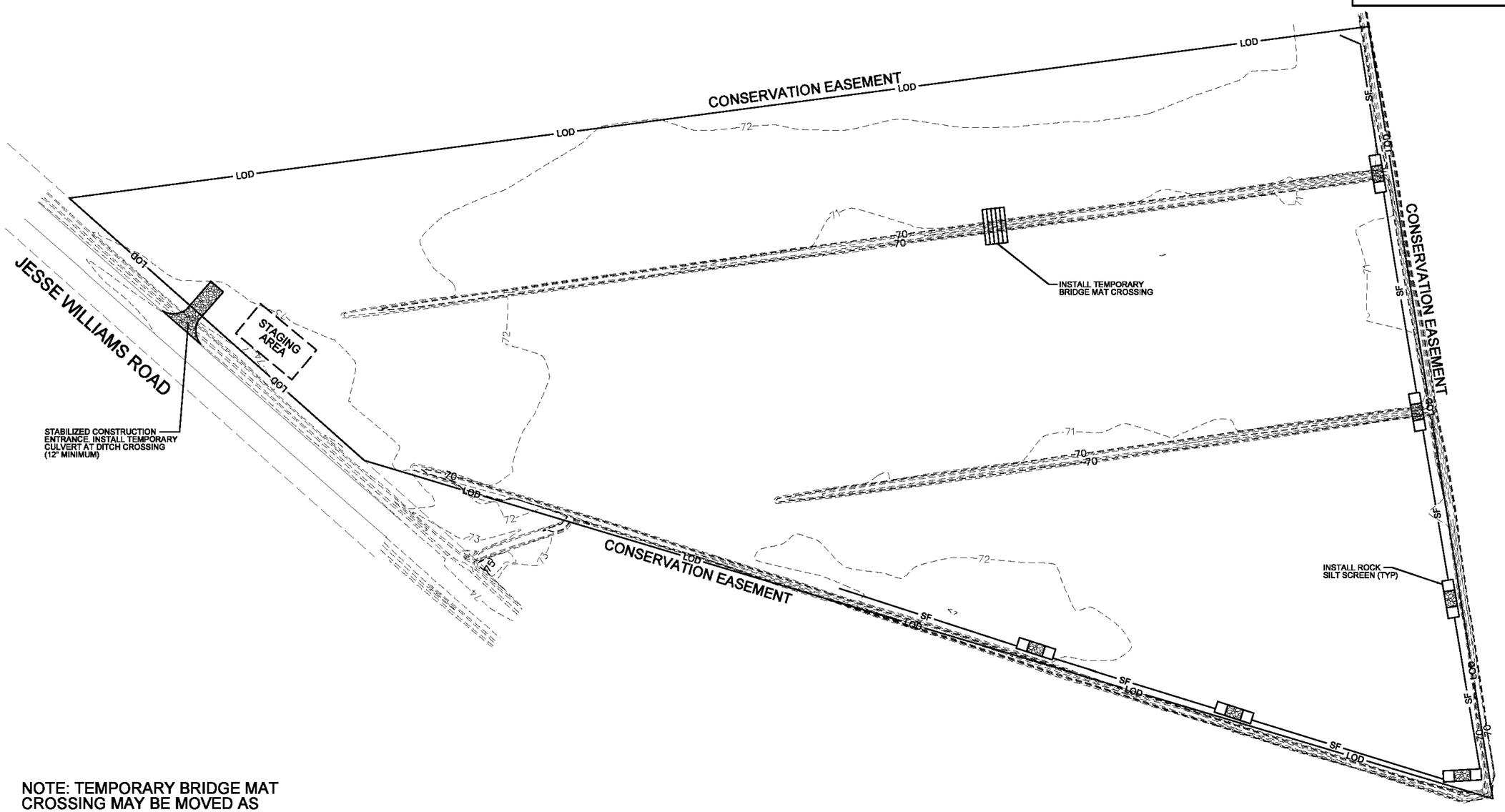
TOTAL DISTURBED AREA = 11.9 AC

# BEAR BASIN RESTORATION SITE

RICHLANDS, ONSLOW COUNTY, NORTH CAROLINA

DATE: JULY 2014
SCALE: GRAPHIC

## EROSION CONTROL PLAN




NOTE: TEMPORARY BRIDGE MAT CROSSING MAY BE MOVED AS NECESSARY AND AS APPROVED BY THE DESIGNER.

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MARYNCZA

| | | |
|---|---|---|
| A | SUBMITTED WITH MITIGATION PLAN | NOV 2012 |
| B | SUBMITTED FOR EROSION CONTROL PERMIT | MAR 2013 |
| C | REVISED FOR 401 / 404 PERMIT SUBMISSION | JULY 2014 |

| SYM. | DESCRIPTION | DATE |
|---|---|---|

REVISIONS

Ecosystem

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4601 SIX FORKS ROAD, SUITE 220
RALEIGH, NORTH CAROLINA 27609

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