



**201 N. Front Street, Suite 307  
Wilmington, NC 28401  
(910) 251-9790**

February 11, 2019

Courtney A. Spears  
Assistant Major Permits Coordinator  
NC Department of Environmental Quality  
Division of Coastal Management  
127 Cardinal Drive Ext  
Wilmington, NC 28409

Re: NCSPA Turning Basin Extension letter (USACE Action ID No. SAW-2015-02235)

Dear Ms. Spears:

On behalf of the North Carolina State Ports Authority, please find attached a revised Compensatory Mitigation Plan, and our response to the January 14, 2019 letter from the Division of Water Resources. Since we last met in December 2018 to discuss the proposed project, the Port is now delaying construction until July 1 2019 so as to minimize potential adverse effects on fish during their annual migration up river for spawning. In addition, we have made substantive improvements to the proposed mitigation plan, taking into account the desire of the agencies to provide more compensation within PNA near the action area and to provide some associated water quality benefits considered desirable by DWR staff.

The proposed mitigation plan for wetland and PNA impacts now adequately compensates for the negative impacts associated with dredging and construction of a submerged wall. All of the proposed habitat and water quality enhancement measures will be performed within one-mile of the proposed action, while assisting with construction and monitoring of the Lock and Dam #1 Fish Passage modification, which serves to benefit the fish and fisheries resources in the entire watershed.

We look forward to meeting with you within a week to further discuss the proposed project and mitigation plan.

Sincerely,  
**Dial Cordy and Associates Inc.**



R. Steve Dial  
President

cc: Anne Deaton  
Doug Huggett  
Heather Coats  
Curt Weichert  
Paul Wojowski, DWR  
Liz Hair  
Fritz Rhode







**201 N. Front Street, Suite 307  
Wilmington, NC 28401  
(910) 251-9790 Fax (910) 251-9409**

February 11, 2019

Jeff Poupart  
Section Chief  
Water Quality Permitting  
NCDEQ DWR  
512 North Salisbury Street  
Raleigh, NC 27699-1617

Re: Response to Request for Additional Information  
NC State Ports Authority Port of Wilmington Turning Basin Expansion  
USACE Action ID. No. SAW-2015-02235

Dear Mr. Poupart;

Dial Cordy and Associates Inc. (DC&A), on behalf of the North Carolina State Ports Authority, is pleased to submit our response to the above RFI. In addition, please find attached a revised mitigation plan which includes significant changes in compensation proposed. The applicant also agrees to delay start of construction to July 1, 2019 to stay in the allowable dredging window.

1. Impacts - *The project proposes to impact 17.76 acres of Primary Nursery Area (PNA) habitat in waters of the Cape Fear River. These waters are also designated as Anadromous Fish Spawning Area and are Class SC Waters. Title 15A NCAC 02B.0220 outlines the water quality standards for Class SC waters:*

*(1) Best Usage of Waters: any usage except primary recreation or shellfishing for market purposes; usages include aquatic life propagation and maintenance of biological integrity (including fishing, fish and **functioning PNAs**), wildlife, and secondary recreation; [emphasis added]*

*(2) Conditions Related to Best Usage: the waters shall be suitable for aquatic life propagation and maintenance of biological integrity, wildlife, and secondary recreation. **Any source of water pollution that precludes any of these uses, including their functioning as PNAs, on either a short-term or a long-term basis shall be considered to be violating a water quality standard;** [emphasis added]*

*Please demonstrate how the proposed project complies with Class SC standards set forth in Title 15A NCAC 02B.0220.*

Although short term increases in turbidity would be expected during the active dredging process, the proposed project would not create any new sources of water pollution that would preclude the use of PNA habitats within the project area. Impacts to 16.08 acres of deepwater (>6 ft) softbottom PNA would not preclude the use of these habitats. These deep softbottom areas are located adjacent to the disturbed slope of the existing channel, as shown on the plans. The benthic communities associated with these PNA soft bottom habitats are dominated by opportunistic species that are adapted to frequent disturbance and the high energy conditions that prevail in this portion of the river. Although dredging impacts on benthic invertebrates would temporarily reduce the availability of benthic prey for estuarine fishes, it is expected that benthic community recovery will occur rapidly. Therefore, it is expected that effects on deepwater softbottom habitat function would be short term and localized.

Impacts to 1.01 acres of tidal salt marsh and 1.68 acres of shallow (<6 ft) bottom would impact the water quality functions of wetlands in PNA and the functions of important shallow softbottom/marsh edge PNA habitat within the project area; however, the attached revised mitigation plan incorporates substantial new mitigation both on-site (immediately south of action area) and on the Brunswick River to compensate for these impacts. The revised plan includes on-site enhancement of 1.75 acres of *Phragmites australis* dominated Section 404 wetland habitat to native coastal tidal marsh (1.25:1 ratio) and 4 acres of wetland enhancement via the conversion of non-native common reed (*Phragmites australis*) stands on dredge spoil to native tidal marsh wetlands (2.9:1 ratio, total of 4.1:1 ratio) on the port's Brunswick River/Eagle Island property. Additionally, mitigation will include 2.0 acres of tidal pool/marsh edge habitat creation via excavation of common reed/dredge spoil areas on the Brunswick River/Eagle Island property. In addition, the applicant agrees to perform monitoring of both compensatory mitigation projects for the required 5-year period or longer as needed to demonstrate success, with annual reports prepared and submitted. The proposed revisions to the plan, including tidal marsh enhancement both on-site and ~1 mile upstream of the project area and the creation of tidal pool marsh edge PNA habitat, will effectively mitigate for the losses of shallow softbottom/marsh edge PNA habitat function and tidal marsh water quality functions in PNA habitat. Thus, we believe the revisions to the mitigation plan address your concerns expressed above regarding compliance with SC water quality standards.

2. Mitigation Plan - *The Division is concerned that the proposed mitigation plan does not sufficiently demonstrate ecological compensation for the loss of functioning PNA. The proposed mitigation plan includes the creation of 3 acres of *Spartina alterniflora* marsh habitat adjacent to Shellbed Island near the mouth of the Cape Fear River and donation of \$650,000 towards the construction of Lock and Dam #1 Rock Ramp Fish Passage project.*

a. Shellbed Island

i. *The Division's understanding is this portion of the mitigation plan is for the proposed impacts to coastal and Section 404 wetlands as well as the general water quality impacts to the river outside of PNA. Please confirm or correct this understanding.*

ii. *The Division prefers mitigation that will improve water quality and habitat in the area in which the impacts are proposed; however this project will be farther*

*downstream. Are there options to improve or restore impaired tributaries or wetlands upstream of the project area?*

As described above, and in the attached revised compensatory mitigation plan, all proposed enhancement will occur adjacent to or within one-mile of the action area. The plan includes a total of 5.75 ac of on-site and off-site enhancement via the conversion of non-native common reed (*Phragmites australis*) dominated wetland to native tidal marsh wetlands (4.1:1 ratio). Additionally, mitigation will include 2.0 acres of tidal pool/marsh edge habitat creation via excavation of common reed/dredge spoil areas on the Brunswick River/Eagle Island property. The proposed revisions to the plan, including tidal marsh enhancement both onsite and approximately one mile upstream of the project area and the creation of tidal pool marsh edge PNA habitat, will effectively mitigate for the losses of shallow bottom/marsh edge PNA habitat function and tidal marsh water quality functions in PNA habitat. Thus, we believe the revisions to the mitigation plan address your concerns expressed above regarding the proximity of mitigation to the impact area.

b. Lock and Dam #1

*i. The Division's understanding is this portion of the mitigation plan is for the proposed impacts to PNA. Please confirm or correct this understanding.*

*ii. According to the Division of Marine Fisheries (DMF), PNA designation is not only based on factors like habitat, benthic composition and location, but also on the sampled presence of indicator fish species at various points in their lifecycles. During the 401 review of a 2015 POW project that included PNA impacts, DMF provided comments stating "a mitigation option should never become the norm to validate the loss of PNA or other highly valued habitat." Compensatory mitigation for PNA impacts creates a unique challenge in that habitat alone does not replace functioning PNA.*

*ii. It is undisputed that this Lock and Dam #1 Rock Ramp Fish Passage project would provide benefit to anadromous fish species but [it is] unclear how this project would compensate for loss of PNA or wetlands. Please demonstrate how the Lock and Dam #1 Rock Ramp Fish Passage project is compensatory to the PNA impacts of your proposed project.*

Support for construction of the Lock and Dam #1 Fish Passage, to be completed within a year of permit issuance, is intended to provide for the restoration of healthy, self-sustaining anadromous fish populations in the Cape Fear River system. A diverse assemblage of anadromous species undertake annual migrations from coastal waters to spawning grounds in the upper freshwater reaches of the Cape Fear River; including Atlantic and shortnose sturgeon, striped bass, American shad, hickory shad (*Alosa mediocris*), blueback herring (*A. aestivalis*), and alewife (*A. pseudoharengus*). In addition to anadromous species, elvers of the catadromous American eel (*Anguilla rostrata*) migrate upriver to freshwater juvenile nursery areas in the upper Cape Fear River each year to spend their early lives in the freshwater tributaries (USACE 2010). The restoration of self-sustaining anadromous fish populations has wide-ranging beneficial ecological implications that are essential to the overall restoration of the entire Cape Fear River ecosystem. Anadromous species play a critical role in sustaining the ecological integrity of major river systems through the transfer of ocean-derived primary production to a broad spectrum of higher trophic level organisms that are associated with estuaries and inland freshwater systems. We believe that the provision

of financial support for the restoration of anadromous fish populations will ultimately contribute to an enhanced Cape Fear River ecosystem, inclusive of the PNA habitats of the lower estuary and the full range of species that they support.

As described above, the attached revised compensatory mitigation plan includes substantial enhancement both onsite and approximately one mile upstream of the project area. We believe that the revisions to the mitigation plan in combination with the mitigation at Lock and Dam #1 will effectively mitigate impacts to PNA within the project area.

*iv. The proposed mitigation plan states that the applicant proposes to donate \$650,000 towards the construction of Lock and Dam #1 Rock Ramp Fish Passage project if the National Marine Fisheries Service (NMFS) can provide their Biological Opinion (BO) on the project to the US Army Corps of Engineers within 120 days of a permit application. If NMFS cannot complete the BO within the conditioned timeframe, will the financial contribution to the Lock and Dam project not be made? Will the applicant provide an alternative mitigation plan to compensate for the loss of PNA?*

We have revised this statement in the revised mitigation plan to the effect that this aspect of the proposed mitigation is not conditional to receipt of a BO from the NMFS. It is now a mitigation feature towards compensation for effects within PNA.

*v. The connection between the proposed dollar amount contributed to the Lock and Dam #1 Rock Ramp Fish Passage project and the area of impact is unclear. For example, as the applicant outlined in the proposed mitigation plan, the NC Division of Mitigation Services (DMS) in-Lieu Fee Program's current rate to purchase just one acre of [coastal] wetland is \$560,000. When this rate is applied to the proposed 17.76 acres of PNA impact, a figure of \$9,945,600 is reached. Since PNAs compromise multiple habitats and species, it could be argued that the price per acre would be considerably higher than the DMS coastal marsh fee. The Division understands coastal wetland credits are currently unavailable, this example is offered to draw a comparison with the economics of the applicant's mitigation proposal. Please explain how the dollar amount was determined.*

The balance of funds needed to complete construction of the proposed modification to Lock and Dam #1 Fish Passage is \$650,000 (personal communication Frank Yelverton, CFRW, October 2018). In addition, the Port has offered to cover one-year of post construction monitoring (Fish Egg Sampling – March-June, 2020) up to \$150,000. This monitoring will also cover annual egg sampling below the other two dams. Present funds for egg sampling and supporting DMF's telemetric monitoring will expire after the spring 2019 sampling event. Mitigation for loss of coastal and Section 404 wetlands was discussed in response to prior comments, with mitigation being provided for on-site and near the PNA affected. Since tidal wetland credits are not available, we do not see the relevancy of use of the DMS rate towards the cost of mitigation for compensation for impacts to PNA.

As described above, the attached revised compensatory mitigation plan includes substantial enhancement both onsite and ~1 mile upstream of the project area. We believe that the revisions to the mitigation plan in combination with the mitigation at Lock and Dam #1 will effectively mitigate impacts to PNA within the project area.

In summary, the planning level cost estimate for mitigating impacts to wetlands and shallow water soft bottom habitat within PNA is \$1,800,000, with all measures listed below.

Revised Wetland Compensation Plan (4.1: 1 ratio)

1. Wetland enhancement of *Phragmites* dominated habitat near –site (adjacent NCSPA owned property) – 1.75 acres enhanced to coastal tidal marsh (1.25:1 ratio)
2. Wetland enhancement of *Phragmites* dominated habitat on NSCPA owned land on Brunswick River – 4 acres enhanced to brackish tidal marsh (2.9:1 ratio)

Revised PNA Compensation Measures

1. Conservation easement and conveyance of ownership on 29.5 ac of Brunswick River property
2. For water quality and juvenile fish benefits in PNA- enhance 2.0 ac of *Phragmites* dominated habitat to shallow-water tidal pool habitat on Brunswick River property
3. Donate \$850,000 for construction and monitoring of Lock and Dam # 1 Rock Ramp Fish Passage modification.
4. In addition, the enhancement of tidal wetlands near the proposed project, also provides water quality benefits within PNA

Compliance Monitoring

1. Wetland and tidal pool enhancement measures to be monitored for 5 years or more as needed to meet success criteria, with annual reporting
2. Sturgeon monitoring during dredging can be performed if desired.

*vi. During a conference call on January 3, 2019, the applicant stated that extensive research had been conducted to classify tidal and other wetland sites in a search for viable mitigation sites in the Lower Cape Fear River and no adequate sites were located. Please provide documentation to the Division which other areas of the Lower Cape Fear were considered for mitigation and why there are no other viable mitigation sites suitable for restoration, enhancement or preservation that would improve water quality closer to the vicinity of the project and/or appropriately compensate the loss of functioning PNA. A mitigation search would include the following natural resource target areas:*

- *Submerged Aquatic Vegetation*
- *Shell Bottom*
- *Submerged Aquatic Vegetation and Shell Bottom*
- *Wetlands (freshwater)*
- *Wetlands (brackish or salt marsh)*
- *Streams (restoration only)*
- *Soft Bottom*

*The North Carolina Coastal Habitat Protection Plan (2016) and Strategic Habitat Area Nominations for Region 4: The Cape Fear River Basin in North Carolina (Final Report, May 2018), both published by the NC Division of Marine Fisheries, provide recommendations of priority habitats to consider. Using them to guide a search for, and evaluate the potential value of, mitigation sites is recommended. These reports are available on the NC DMF website.*



Please see revised mitigation plan, which includes mitigation measures on-site and within close proximity to the impacted PNA and coastal wetlands. A summary of these measures are included in the responses above.

3. *Cumulative Impacts - Title 15A NCAC 02H .0506(b)(4) directs the Division to consider a project's cumulative impacts based on past or reasonably anticipated future impacts. The current project comes as the latest request to modify Division of Coastal Management (DCM) State Permit 47-87 (the permit) that was issued in 1987 for maintenance, operation and expansion of the POW facilities. The Division has received an application from NCSPA to construct a multi-use terminal ("North Terminal") north of and adjacent to the existing Liquid Bulk Terminal, which proposes an additional 4.94 acres of PNA impacts and 8.56 acres of fill in Section 404 wetland (100% of wetlands on the parcel). Also, the Division is aware that the NCSPA is currently conducting studies to deepen the Cape Fear River to -50' feet MLW, which may result in additional water quality impacts and dredging in PNA.*

*The Division requires additional information regarding cumulative impacts. Please provide a qualitative cumulative impacts analysis, taking into consideration past and past and reasonably anticipated future impacts associated with the maintenance operation and expansion of the POW facilities.*

Cumulative effects analysis for the proposed project includes a review of the impacts of past, present, and reasonably anticipated future dredging actions on water quality, coastal wetlands and soft bottom benthic habitat. Past construction and maintenance projects will be considered back until 2000 to incorporate the Wilmington Harbor 96 Act project. Present projects include recent permits issued in the past year, and future projects will include continued maintenance dredging, the proposed multi-use terminal, the proposed Section 203 Wilmington Harbor Improvement Project, presently under study and the proposed action for the expansion to the turning basin. Table 1 includes a list of all projects and specific information associated with each project/action. It should be noted that since the Section 203 study is in progress, there is no information readily available on the selected plan and its effects on resources within the Cape Fear. In addition, the project design depth will be less than -50 ft MLLW.



**Table 1. Past, Present and Reasonably Foreseeable Future Projects**

<b>Project</b>	<b>Dates</b>	<b>Purpose</b>	<b>Tidal Wetland and/or Section 404 Wetlands</b>	<b>Soft Bottom Habitat within PNA</b>	<b>Water Quality</b>	<b>Mitigation Provided</b>	<b>Dredging within Environmental Window</b>
<b>Past Projects (2000-2016)</b>							
Wilmington Harbor Deepening	2000-2002	Dredging to -42 ft MLLW	No direct wetland impacts and no indirect projected	No direct impacts due to widening	Moderate	Yes	Yes
Maintenance Dredging Events	Annual	Maintenance of federal channel and berths	No	No	Minimal and short-term	N/A	Most of the time
Agitation Dredging Events	1-2x annually	Maintenance of berths	No	Minimal and short-term	Minimal	No	No
Turning Basin Expansion	2015	Expansion of basin for larger vessels	No	8.53 acres	Minimal, short-term	\$750k towards Lock and Dam 2/3 Fish Passage Design and Permitting	Yes
<b>Present (2017-2018)</b>							
Water Injection Dredging	2017	Maintenance of berths	No	Minimal and short-term	Minimal	No	No
Maintenance Dredging	Annual	Maintenance of federal channel and berths	No	N/A	Minimal and short-term	N/A	Most of the time
Agitation Dredging Events	1-2x annually	Maintenance of berths	No	Minimal and short-term	Minimal	N/A	No

Table 1. (concluded).

Project	Dates	Purpose	Tidal Wetland and/or Section 404 Wetlands	Soft Bottom Habitat within PNA	Water Quality	Mitigation Provided	Dredging within Environmental Window
<b>Future (2019-2022) Proposed</b>							
Multi-purpose Terminal	2020	Berthing and storage for break bulk	No direct impact to tidal wetlands, 0.06 ac of shading effect	4.94 acres	Minimal and short-term	Yes	Yes
Turning Basin Expansion	2019	Expand basin to accommodate larger vessels	1.4 ac of tidal wetland and Section 404 wetlands	17.76 ac (1.68 less than -6ft MLLW)	Minimal and short-term	<ul style="list-style-type: none"> <li>On-site and off-site enhancement of 5 ac of <i>Phragmites</i> habitat to tidal marsh</li> <li>Off-site tidal pool enhancement (2 ac)</li> <li>Donation for construction and monitoring of Lock and Dam #1 Fish Passage Mod (\$850K)</li> </ul>	Yes
Wilmington Harbor Improvement Study	2022-2024	Dredging to -47 ft MLLW	Not available	Not available	Not available	Not available	Unknown
Maintenance Dredging	Annual	Maintenance of federal channel and berths	No	N/A	Minimal and short-term	N/A	Most of the time

## Wetland Effects

The past 150 years of dredging and harbor improvements, as well as the conversion of wetlands to rice plantations, watershed development, and sea level rise; have greatly reduced the extent and altered the composition and distribution of tidal wetlands in the lower Cape Fear River estuary. There have been no direct impacts to tidal wetlands within the Cape Fear River associated with NCSPA port and federal harbor actions that have occurred since 2000. The last federal channel deepening project in the early 2000s did not directly impact any wetlands; and did not result in any adverse indirect effects on tidal wetlands, based on model-projected salinity changes and ten years of post-construction salinity and vegetation monitoring (USACE 2012). Maintenance dredging and agitation/water injection dredging of the federal channel and/or berths has not and will not impact wetlands in the future. No tidal wetlands were impacted by the 2015 turning basin expansion. Potential impacts associated with future dredging projects by the Port include impacts to 0.06 ac of coastal tidal marsh due to shading and 8.64 ac of impacts to Section 404 non-tidal freshwater wetlands for the proposed future multi-use terminal, and 1.4 acres of coastal and Section 404 wetland impacts for the currently proposed turning basin expansion. Mitigation has been proposed to compensate for unavoidable impacts to wetlands. Since the Wilmington Harbor Improvement Project Section 203 Study is in progress, there is currently no available information regarding potential indirect wetland effects due to potential increases in tidal range and salinity. In summary, a review of past, present and potential future projects indicates there has not been a cumulative loss of wetlands due to past and/or present port related activities. Assuming the proposed actions are permitted and constructed, a total of 1.07 acres of tidal marsh within PNA and a total of 9.03 ac of additional Section 404 wetlands could be affected. It is important to note that wetland impacts associated with these two proposed projects will be mitigated in accordance with state and federal mitigation rules and regulations.

## Water Quality Effects

Water quality degradation due to annual maintenance dredging and use of agitation and water injection dredging over the 20 year review period has and will likely continue to be short-term and minimal. The port has chosen to use water injection dredging as a means to reduce environmental effects and costs typically associated with use of hopper dredges for maintenance dredging. Moderate effects on water quality within the river likely occurred during the Wilmington Harbor Deepening Project of the early 2000s, simply due to the duration of the dredging events over a two-year period and will likely occur during the proposed Wilmington Harbor Improvement Project, if it is authorized and funded by Congress. However, use of a hydraulic cutterhead dredge does minimize suspended sediment loading, as compared to other dredge types. Dredging for past and future expansion of the turning basin was and will be short-term, and due to the past and proposed use of a mechanical excavator will result in only minor increases in turbidity. In summary, short term water quality degradation has and will continue to occur periodically, typically in association with larger federal harbor deepening projects as opposed to dredging activities associated with maintenance, turning basin expansion, or small terminal expansion projects.

## Soft Bottom Habitat Effects within PNA

This review does not take into account maintenance dredging of the federal channel, which does not encompass PNA habitat and has been maintained by the USACE for well over 70 years. No direct impacts on soft bottom PNA habitat resulted from widening and deepening the federal channel in the early 2000s. A total of 8.53 acres of soft bottom PNA habitat was dredged for expansion of the turning basin in 2015. For future proposed projects, temporary

impacts to soft bottom habitat may include dredging 17.76 acres (1.68 ac less than 6 ft deep) of soft bottom for the turning basin, 4.94 acres for the multi-use terminal, and an unknown area of soft bottom for the proposed harbor deepening project that is currently under study. Cumulative effects for past, present and foreseeable future projects assessed in this review include 15.15 ac of shallow water soft bottom habitat and 16.05 acres of deeper slope soft bottom habitat within PNA (Table 1).

It is important to note that soft bottom benthic infaunal communities are dominated by opportunistic species that are adapted to frequent disturbance and recover quickly following dredging, especially in the upper river reaches near the port where high energy conditions prevail. Although the impacts of agitation and/or water injection dredging on benthic invertebrates would reduce the availability of benthic prey for estuarine fishes, it is expected that benthic community recovery would occur rapidly. Therefore, it is expected that the majority of the effects on softbottom habitat function would be short term and localized.

### **Summary of Cumulative Effects**

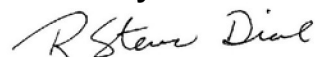
An analysis of dredging activities over the +/- 20 year review period (2000-2020), inclusive of those associated with the proposed action show no significant cumulative effect on tidal wetlands within PNA. Anticipated future impacts to coastal wetlands in PNA habitat would include 0.06 ac of impact associated with the multi-use terminal and 1.01 acres of impact associated with the currently proposed turning basin expansion. While the combined impacts of the two projects could potentially have minor cumulative effects on water quality and estuarine dependent species, the impacts of the proposed action will be effectively mitigated through onsite and upstream wetland enhancement and PNA softbottom habitat creation (i.e., tidal pools), as described in the attached revised mitigation plan. Therefore, is expected that any cumulative wetland effects would be minor and temporary.

Water quality effects due to dredging projects over the 20 year review period show periodic elevations in suspended sediments and turbidity during active dredging, however, there is no information to indicate that the effects of the proposed action would contribute to significant cumulative impacts when added to the effects of separate past, present and future actions.

Soft-bottom PNA habitat has been affected by dredging many times over the 20 year review period, however, much of this has been associated with habitat in the federal channel that is not designated PNA. Dredging has temporarily impacted or will impact 15.15 acres of shallow soft bottom habitat and 16.08 acres of deeper, slope habitat within PNA during the 20-year review period. Given that the functional benefits associated with much of the affected habitat has or will recover naturally from dredging, and considering that effective mitigation is proposed to offset the impacts of the proposed turning basin expansion, it is concluded that the effects of the proposed action; when added to the effects of separate past, present and future actions; will not result in significant cumulative effects.

Should you need any clarification on our above response to your comments, please do not hesitate to contact us directly.

Sincerely,  
**Dial Cordy and Associates Inc.**



R. Steve Dial  
President



NORTH CAROLINA  
Environmental Quality

ROY COOPER  
*Governor*  
  
MICHAEL S. REGAN  
*Secretary*  
  
BRAXTON DAVIS  
*Director, Division of Coastal  
Management*

February 14, 2019

**MEMORANDUM:**

**FROM:** Courtney Spears, Assistant Major Permits Coordinator  
NCDEQ - Division of Coastal Management  
127 Cardinal Drive Ext., Wilmington, NC 28405  
Fax: 910-395-3964 (**Courier 04-16-33**)  
[courtney.spears@ncdenr.gov](mailto:courtney.spears@ncdenr.gov)

**SUBJECT:** CAMA / Dredge & Fill Application Review

**Applicant:** N.C. State Ports Authority Major Mod. 47-87  
**Project Location:** 1 Shipyard Blvd., adjacent to the Cape Fear River, in Wilm., New Hanover County

**Proposed Project:** To improve and expand an existing turning basin

Please indicate below your agency's position or viewpoint on the proposed project and **return this form to Courtney Spears** at the address above by **March 8, 2019**. If you have any questions regarding the proposed project, contact Courtney Spears at (910) 796-7426 when appropriate, in-depth comments with supporting data is requested.

- 
- REPLY:** \_\_\_\_\_ This agency has no objection to the project as proposed.  
\*\*Additional comments may be attached\*\*
- \_\_\_\_\_ This agency has no comment on the proposed project.
- \_\_\_\_\_ This agency approves of the project only if the recommended changes are incorporated. See attached.
- \_\_\_\_\_ This agency objects to the project for reasons described in the attached comments.

**PRINT NAME** \_\_\_\_\_

**AGENCY** \_\_\_\_\_

**SIGNATURE** \_\_\_\_\_

**DATE** \_\_\_\_\_

# **WILMINGTON TERMINAL TURNING BASIN EXPANSION PROJECT COMPENSATORY MITIGATION PLAN**



February 11, 2019 Revised

Prepared for:  
North Carolina State Ports Authority  
PO Box 9002  
Wilmington, NC 28402

Prepared by:  
Dial Cordy and Associates Inc.  
201 North Front Street, Suite 307  
Wilmington, NC 28401



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## 1.0 INTRODUCTION

Dial Cordy and Associates Inc. (DC&A) was contracted to prepare this **revised** mitigation plan for the North Carolina State Ports Authority (NCSPA) as required by the North Carolina Department of Environmental Quality Division of Coastal Management (NCDEQ-DCM) and United States Army Corps of Engineers (USACE) for the subject project. Included within the plan are descriptions of the affected wetlands, results of a wetland functional assessment using North Carolina Wetland Assessment Method (NCWAM), an analysis of mitigation requirements, a review of wetland mitigation options and a conceptual plan for the selected wetland mitigation options. In addition, additional mitigation measures are included for impacts to soft-bottom habitat and water quality within state Primary Nursery Area (PNA).

## 2.0 PROJECT AREA WETLANDS DESCRIPTION

The project area encompasses salt and brackish marshes on the contiguous tidal floodplain of the Cape Fear River (CFR) (Figure 1). The tidal marshes form a continuous fringe along the project area river shoreline that is interrupted only by the mouth of Greenfield Creek. The landward boundary of tidal wetlands within the project area is marked by an existing man-made upland berm that extends continuously along the river shoreline and ties to a tidal gate across the mouth of Greenfield Creek. The berm functions as an artificial shoreline that has effectively reduced the width of the tidally influenced floodplain to approximately 100 feet. The normal high water mark and the Section 404 wetland-upland boundary are both located along the waterward toe of the berm. The tidal floodplain encompasses a mix of relatively natural salt/brackish marshes, disturbed brackish marshes consisting of dense common reed (*Phragmites australis*) stands on shallow fill deposits, and unvegetated tidal mud flats in shallow depressional areas. The entire area waterward of the berm toe, including the common reed stands, is inundated at high tide.

The natural tidal marshes consist predominantly of monospecific stands of smooth cordgrass (*Spartina alterniflora*). The smooth cordgrass marshes occur primarily on the relatively undisturbed lower portion of the tidal floodplain along the river. A few small areas of natural brackish marsh occur along the upper margins of the smooth cordgrass marshes. The brackish marshes are dominated by big cordgrass (*Spartina cynosuroides*) and other brackish species such as narrow-leaved cattail (*Typha angustifolia*), salt marsh aster (*Symphyotrichum tenuifolium*), bull-tongue arrowhead (*Sagittaria lancifolia*), and water primrose (*Ludwigia bonariensis*). Large dense monospecific stands of common reed occur on shallow fill deposits that generally extend waterward onto to the floodplain from the upland berm. The lower extent of the fill deposits and their associated common reed stands marks the boundary between Section 404 and Coastal Area Management Act (CAMA) coastal wetlands. Unvegetated tidal mud flats occur in very shallow linear depressions that appear to be natural features associated with tidal flow. Vegetation of the landward upland berm is a disturbed scrub-shrub assemblage consisting of live oak (*Quercus virginiana*), coastal red cedar (*Juniperus silicicola*), and dense woody vines such as trumpet vine (*Campsis radicans*), catbrier (*Smilax bona-nox*), and poison ivy (*Toxicodendron radicans*).

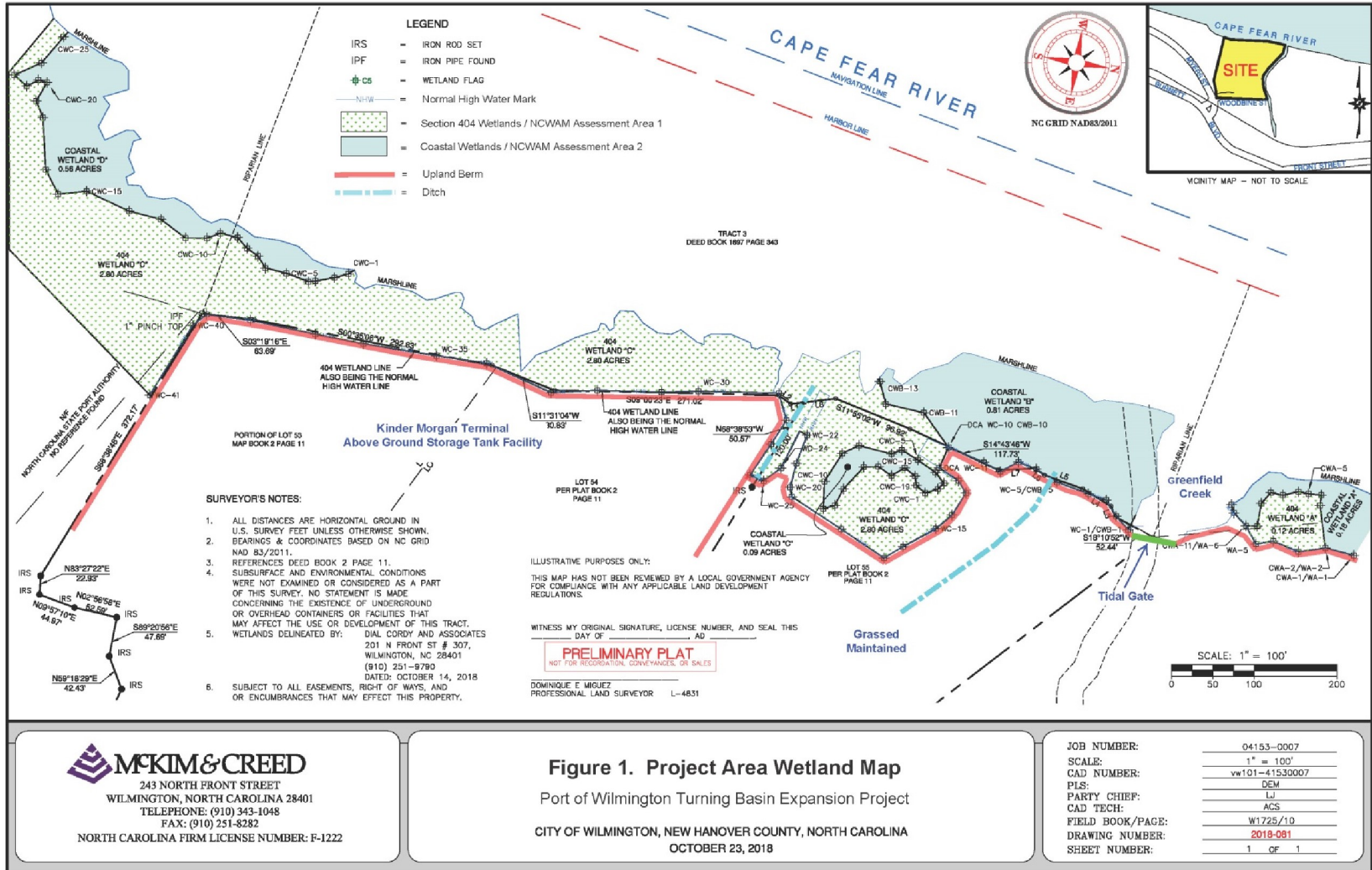


Figure 1. Project Area Wetland Map

### 3.0 PROPOSED IMPACTS AND WETLAND FUNCTIONAL ASSESSMENT

The proposed expansion of the existing turning basin via dredging would permanently impact a total of 1.4 acres of Section 404 jurisdictional salt/brackish marsh wetlands on the tidal floodplain of the CFR, including 1.01 acres of CAMA coastal wetlands (smooth cordgrass marsh) and 0.39 acre of non-coastal wetlands (common reed marsh) (Figure 2). The 1.4 acres of wetlands would be excavated and permanently converted to subtidal soft bottom. In order to facilitate the determination of compensatory wetland mitigation requirements, a functional assessment of the affected project area wetlands was performed using the NCWAM (NC Functional Assessment Team 2016). The NCWAM is a rapid assessment method that is based on the evaluation of field indicators of wetland functions. The NCWAM method ultimately generates an overall wetland rating of High, Medium, or Low. Separate NCWAM evaluations were completed for two assessment areas representing the principal wetland communities and conditions within the project area. Assessment Area 1 encompasses the natural smooth cordgrass marshes on the relatively undisturbed portion of the project area floodplain, and Assessment Area 2 encompasses the disturbed common reed marshes that occur on shallow fill deposits (Figure 1). Dial Cordy and Associates Inc. conducted the field assessment on 15 October 2018 in conjunction with the delineation of project area wetlands. The NCWAM Rating Calculator v5.0 (1) was used to complete the field assessment forms and wetland rating sheets (Appendix A). Assessment Area 1 received an overall wetland rating of “High” and Assessment Area 2 received an overall wetland rating of “Low.”

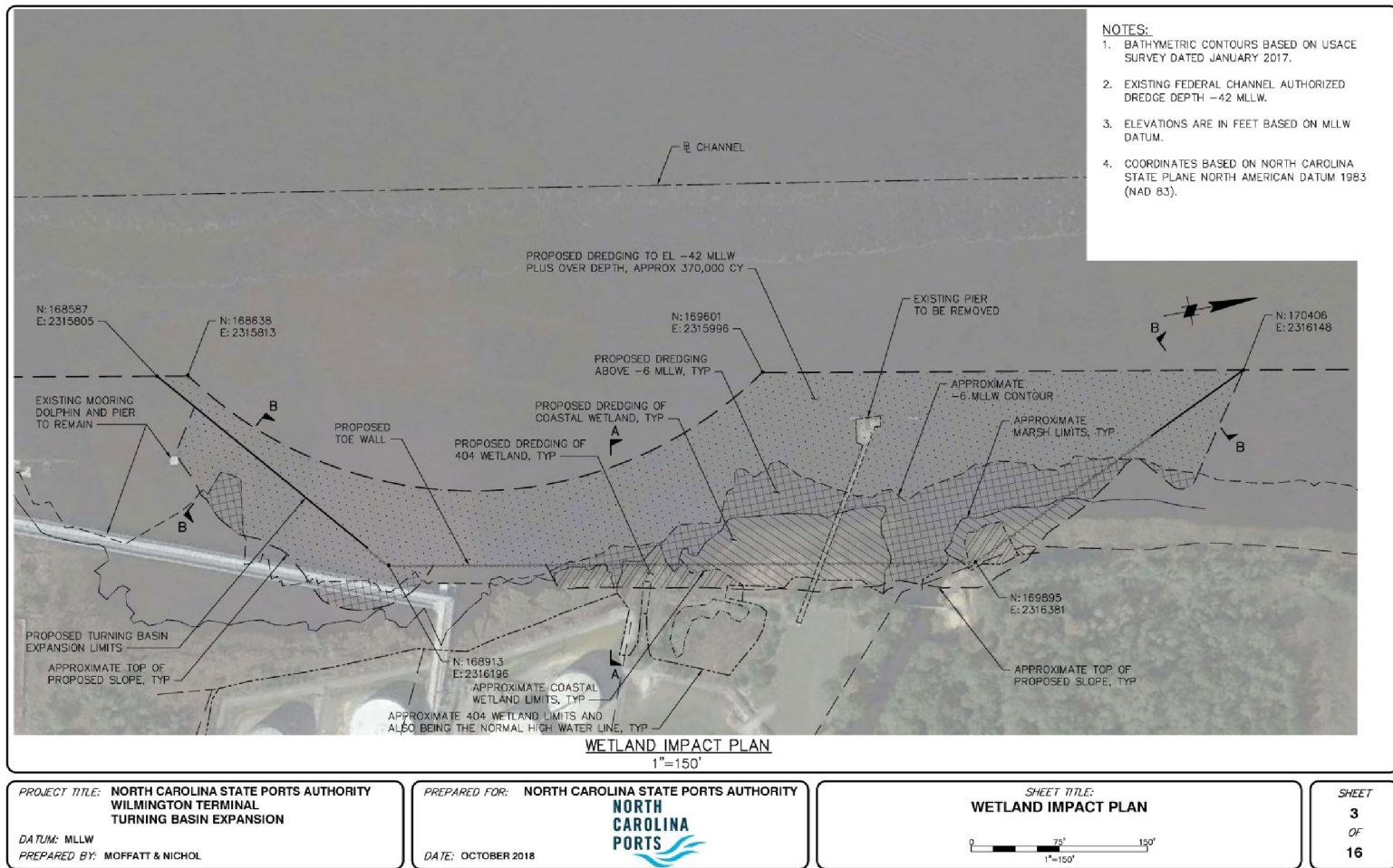
#### Supplemental Field Assessment Information

The overall wetland ratings are based on detailed field observations that are not necessarily captured by the completed NCWAM field assessment forms in Appendix A. The following sections describe additional information from the field assessment that factored heavily in the evaluation of the various field indicator metrics.

#### *Soils, Hydrology, and Vegetation*

The floodplain and associated tidal marshes experience unimpeded twice-daily (semidiurnal) tidal flooding directly from the CFR channel. Hydrologic connectivity via overbank/overland tidal flow are not been significantly altered. The entire area waterward of the berm toe was inundated at high tide during the field assessment. Assessment Area 1 is comprised predominantly of natural smooth cordgrass marshes on the relatively undisturbed lower portion of the tidal floodplain along the river. The predominantly dark brown (10 YR 2/1) muck soils of Area 1 appear to be those of the natural floodplain. Thus the ground surface condition, vegetation condition, and surface storage capacity of Assessment Area 1 are considered to be not altered. Assessment Area 2 is positioned on shallow fill deposits that extend waterward from the upland berm onto portions of the tidal floodplain. The fill deposits are presumed to have reduced the depth of tidal inundation and the water storage capacity of the affected floodplain within Area 2. The placement of fill and the associated reduction in the depth of tidal inundation have resulted in the displacement of the natural marsh plant communities by dense





**Figure 2. Wetland Impact Plan**



monospecific stands of non-native common reed. Thus the ground surface condition, vegetation condition, and surface storage capacity of Assessment Area 2 are considered to be severely altered.

#### *Discharges/Pollutants*

The area immediately landward of the upland berm contains an array of approximately 20 aboveground petroleum/chemical storage tanks that are part of the Kinder Morgan Terminal facility. The tanks are completely enclosed by a perimeter containment berm. Stormwater drainage across the surface of the tank area is west towards the river and then north along the landward toe of the berm to the northwest corner of the tank area. Although not visible during the field assessment, there appears to be a culvert or other structure that discharges stormwater through the northwest corner of the containment berm to a tidally influenced ditch that flows directly to the wetland assessment areas. Immediately north of the tank area, there are large maintained (mowed) grassy areas that are drained by a ditch that flows directly to the assessment areas through an open cut in the berm. No obvious discharges of pollutants via the ditches or subsurface flow were observed during the field survey. An oily sheen was observed several inches below ground on the surface of water in an auger hole at a location immediately waterward of the berm. However, no other indicators of surface or subsurface contaminants were observed in either of the assessment areas. No indicators of vegetation stress were observed during the field survey. The cordgrass and common reed marshes were both comprised of dense, tall, vigorous flowering stems. The adjoining CFR reach from Greenfield Creek to Barnards Creek is included on the 2016 Section 303d list of impaired waters based on exceedances of the criteria for copper, dissolved oxygen, and pH. Based on all of these factors, both of the assessment areas are considered to have noticeable evidence of pollutants or discharges that are not overwhelming the treatment capacity of the wetlands.

#### *Riparian Buffer Function and Connectivity to Other Natural Areas*

The assessment area tidal marshes provide an effective approximately (~) 100-foot-wide continuous riparian vegetative buffer along the entire project area shoreline. Based on the NCWAM User Manual v5, the evaluation of assessment area connectivity to other natural areas was limited to other natural marsh communities. Connectivity is lacking to the south, as there are no tidal marshes along the east bank of the ~1.3-mile river reach below the project area. To the north, the assessment area marshes are loosely connected to very narrow patches of fringing tidal marsh that occur intermittently along the ~1.0-mile river reach above the project area. Thus the assessment areas are considered to have poor connectivity to other natural areas.

## **4.0 REQUIRED WETLAND COMPENSATORY MITIGATION**

Based on the NCWAM evaluation, compensatory mitigation would be required to offset impacts to 1.01 acres of smooth cordgrass marsh with a “High” overall functional rating and 0.39 acre of common reed marsh with a “Low” overall functional rating.

## **5.0 MITIGATION OPTIONS CONSIDERED**

The following mitigation measures were evaluated as potential options to compensate for unavoidable wetland impacts.

### **5.1 Private Mitigation Banks and NCDCM In-Lieu Fee Mitigation Program**

There are currently no private mitigation banks that have available credits in the lower CFR. Furthermore, there are no approved coastal wetland mitigation banks that could potentially provide coastal wetland credits in the near future (NC Mitigation Bank Credit Availability List, Updated 16 Oct 2018). The North Carolina Division of Mitigation Services (NCDMS) In-Lieu Fee (ILF) Mitigation Program currently has no available coastal wetland credits or projects within the lower Cape Fear River; and should any credits become available, the going rate as of 1 July 2017 is \$560,000 per acre-credit.

### **5.2 Permittee Provided Mitigation**

#### **5.2.1 Alligator Creek Restoration on Eagle Island**

Until recently, a coordinated multi-year effort by federal agencies, State Trustees, and local conservation groups had been underway to restore Alligator Creek and its associated tidal wetlands on Eagle Island. Historical dredged material deposition has essentially filled in the stream channel and altered the hydrology of the floodplain, leading to the displacement of the natural tidal marshes by monospecific common reed stands. The project was the top priority by the National Oceanic and Atmospheric Administration grant and restoration plans were under development, with additional funding and approval from the state pending. As a fully funded project via assistance from the Port of Wilmington, the project could have met the compensatory mitigation requirements for the Turning Basin expansion project. The project would have restored more than 30 acres of tidal marsh and over 0.60 miles of tidal stream channel. However, a mitigation banking group made an offer to purchase the property from the current landowners in 2017, thus eliminating the site as a viable mitigation option for the current project.

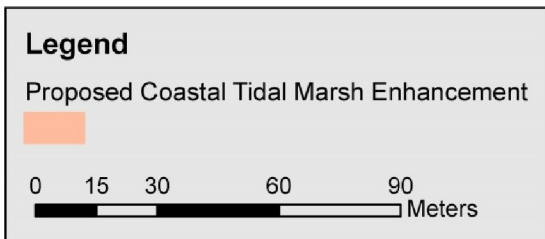
#### **5.2.2 Shellbed Island Site 1 Tidal Marsh Creation Site**

Dial Cordy and Associates Inc. is currently working with Audubon North Carolina (Audubon) on a lower Cape Fear River oyster restoration project funded through the National Fish and Wildlife Foundation by the North Carolina and Virginia Rivers and Waters Program. Dial Cordy and Associates Inc. has used geographic information system (GIS) based habitat assessment software to identify suitable sites for oyster restoration. The GIS software evaluates environmental parameters such as elevation, tide and wave energy, and proximity to channels, shorelines, and islands; which are also applicable to the evaluation of potential tidal marsh restoration sites. A number of the identified oyster restoration sites are associated with broad unvegetated tidal flats that are expanding through natural depositional processes, thus providing an opportunity for tidal marsh restoration. Tidal flats along the west side of Shellbed Island

encompass an area suitable for the restoration of ~25 acres of tidal marsh Audubon will be using ~1.0 acre of the ~25-acre tidal flat area for oyster restoration [see the Audubon web site for additional information (<http://nc.audubon.org/news/oyster-reef-project-underway-lower-cape-fear-river>)]. Existing salt marshes on the tidal flats have gradually colonized the area over the last 20-30 years, forming circular patches that are similar in shape to oyster reefs that have also naturally recruited to the area. Based on the natural marsh colonization pattern, restoring tidal marsh could involve planting small ~0.25-acre areas with 4-inch smooth cordgrass plugs to establish marsh patches similar to those currently present. A total of 12 planted 0.25-acre marsh areas would provide 3.0 acres of salt marsh, thus compensating for the turning basin wetland losses at a ratio exceeding 2:1. While the wetland mitigation project could be performed independently of the Audubon oyster restoration project, marsh construction would be coordinated with the Audubon effort to provide a marsh-oyster reef configuration that would both maximize the ecological functions of the estuarine complex and increase the likelihood of successful salt marsh establishment through tidal and wave energy dispersion.

### 5.2.3 Wetland Enhancement on NCSPA Property Adjacent to the Kinder Morgan Property (On-site)

To compensate for the unavoidable loss of 1.4 acres of coastal and Section 404 wetlands on the Kinder Morgan property, the applicant could enhance 1.75 acres of *Phragmites* dominated wetland to coastal marsh habitat (Figure 3). The design could include grading of the existing *Phragmites* dominated Section 404 wetland area to the elevation of existing coastal marsh and planting 4-inch plugs of *S. alterniflora* two-foot on center over the graded site. Monitoring would be required to achieve agreed upon success criteria over a five-year period.

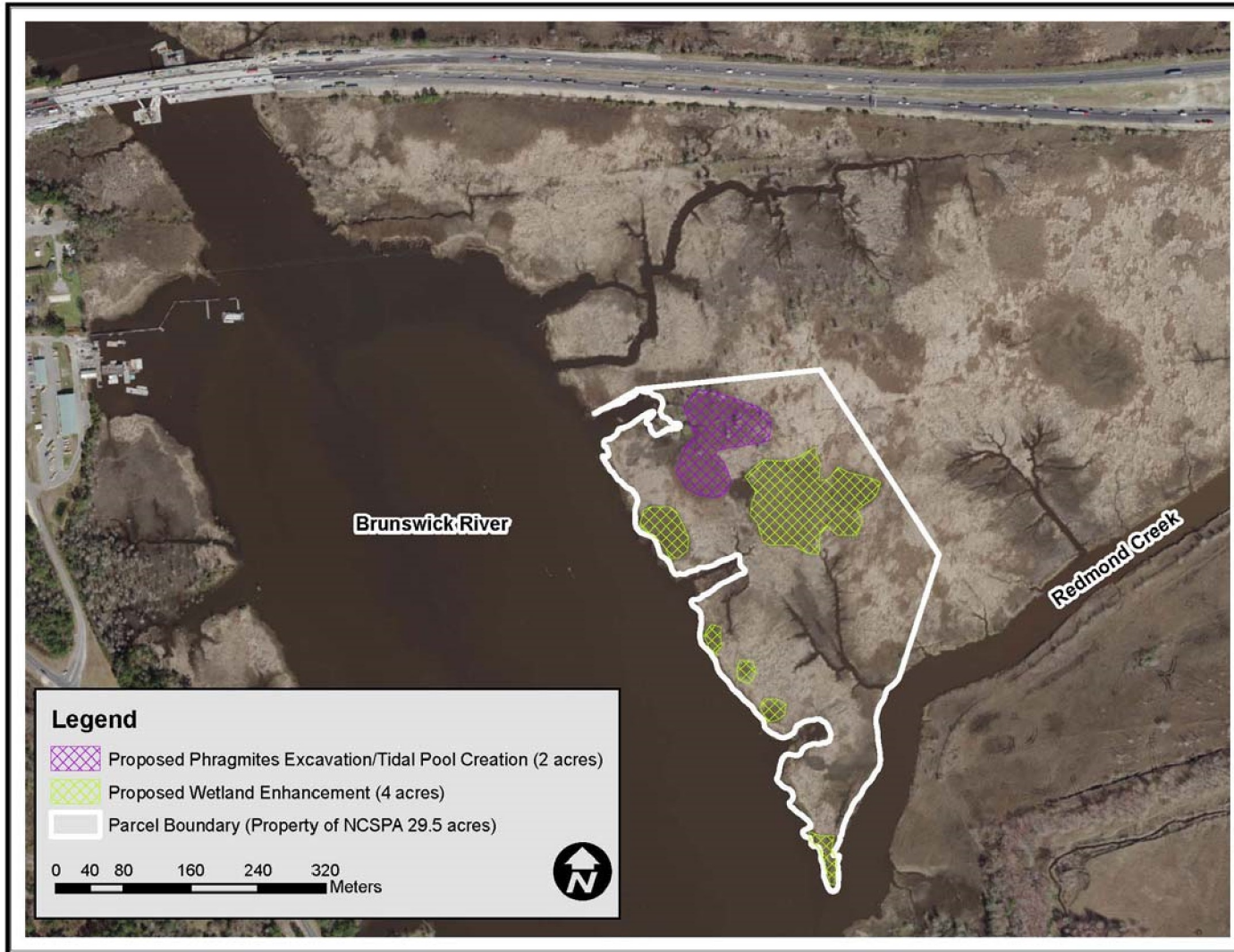


**Figure 3. Proposed Existing *Phragmites* Dominated Wetland to be Enhanced to Coastal Marsh**

#### 5.2.4 Enhancement of *Phragmites* Dominated Wetland to Tidal Marsh Habitat on the Brunswick River /Eagle Island Property

To complement the 1.75 acres of mitigation for the on-site option, the applicant could enhance 4.0 acres tidal marsh through treatment, burning, physical excavation of common reed, and lower the elevation of the site to support native brackish marsh species (Figure 4). Native marsh species would be planted three feet on center throughout the site. Temporary mats would be placed down to gain access from a landing craft with a small tracked excavator. Material would be placed on a barge/ vessel and transported to an accepted disposal area. Monitoring would be required to achieve agreed upon success criteria over a five-year period.





**Figure 4. Tidal Marsh Enhancement on Proposed Conservation Land**



### 5.3 Selected Wetland Mitigation Options

Based on the above options analysis and the comments received to date from NCDEQ-DCM, DMF and DWR staff, implementing the on-site tidal marsh enhancement option (Section 5.2.2) and enhancement of tidal marsh on the Brunswick River property (Section 5.2.3) are the two preferred measures which serve to provide adequate wetland mitigation within PNA in close proximity to the proposed impacts. The two options together would provide 5.75 acres of tidal marsh enhancement, with a total ratio of 4.1:1. Based on our review of mitigation options there are currently no private wetland mitigation banks or NCDMS ILF sites in the CFR basin that could potentially provide compensatory mitigation credits for coastal wetland impacts. In addition, private lands associated with Alligator Creek and closed dredged material disposal islands south of the port, are not available for use. The Shellbed Island marsh option was deemed to be too far from the area of impact by NCDEQ- DMF.

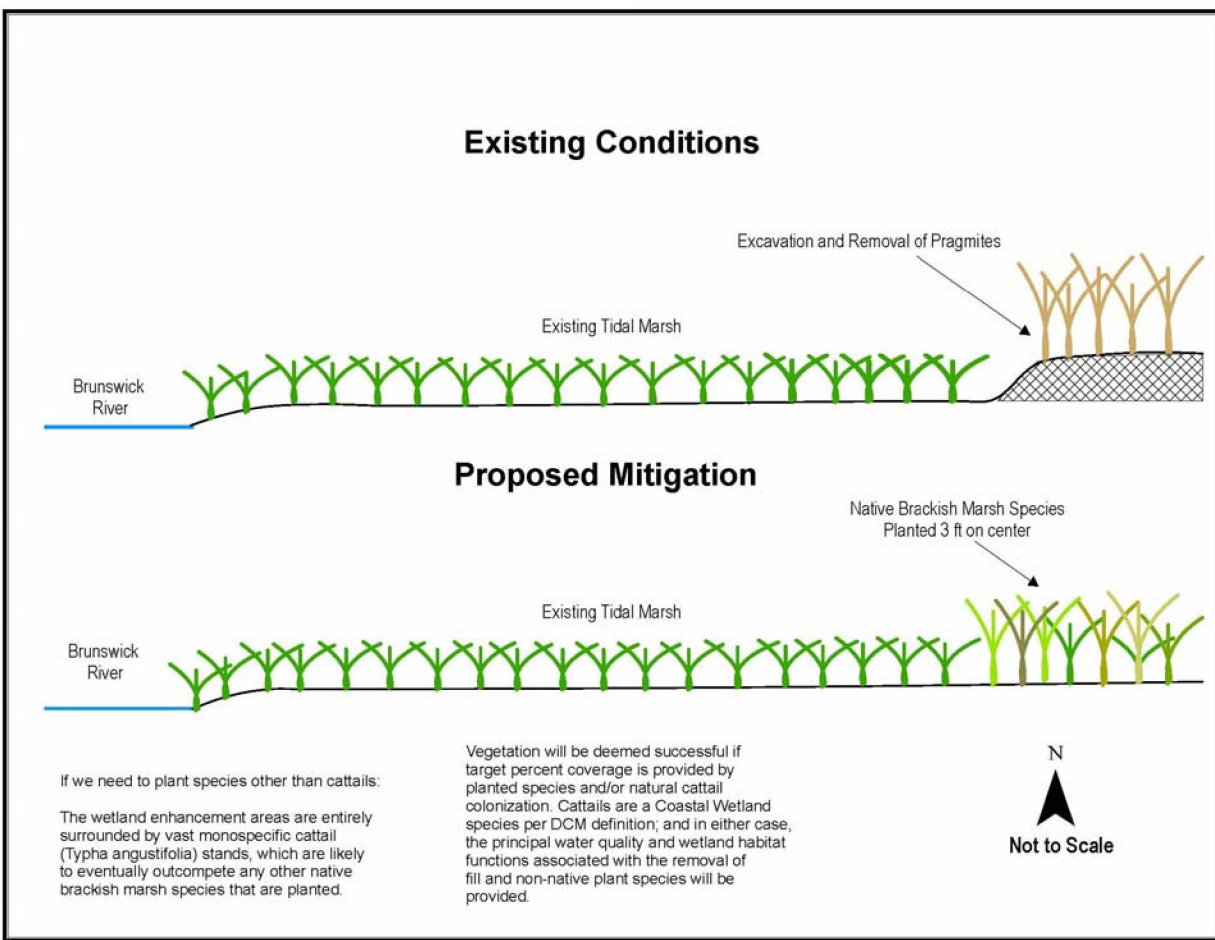
A detailed design and specifications document including a proposed eradication plan, grading plan, and planting plan would be submitted after permit issuance to the regulatory agencies for review and approval within 60 days. The detailed plans would include success criteria that are based on reference wetland conditions and a monitoring plan that incorporates field sampling of vegetation composition and density/percent cover within both mitigation and reference area marshes. Geographic information system analysis would also be used to monitor the overall areal coverage of the established and naturally occurring reference marsh patches. Tide gauge data would support analysis of the mitigation area composition or density deviations from reference wetland conditions. Monitoring would be performed for five years or more as needed, with annual reporting to the agencies and would include supplemental planting and maintenance where and when needed on an annual basis.

### 5.4 Proposed Tidal Marsh Enhancement

Enhancement measures are shown in Figures 3 and 4 for both the on-site measure and Brunswick River/Eagle Island property enhancement measure. On-site work would include enhancement of 1.75 acres of poor quality Section 404 wetland dominated by *Phragmites*. The on-site area would be graded from the eastern edge of the existing tidal marsh to the upper limit of disturbed wetland. Site work would include herbicide treatment, burning of *Phragmites* if needed, followed by grading and planting. Final elevations would match those of existing elevations of coastal wetlands. Planting units consisting of 4-inch plugs of *Spartina alterniflora* would be planted three feet on center across the entire 1.75-acre site. Given that the site is located along the river salt/brackish transitional zone, all or portions of the planted smooth cordgrass areas may eventually succeed to native brackish marsh. Vegetation will be deemed successful if target percent coverage is provided by *Spartina alterniflora* and/or other native Coastal Wetland species per DCM definition.

Within the Brunswick River Eagle Island property presently owned by the NCSPA, four acres of the common reed *Phragmites* habitat would be restored to tidal marsh (Figure 4). The enhancement process will include herbicide treatment, burning and removal of *Phragmites* from the site, excavation of the site to the present elevations of brackish tidal marsh, improvements

to existing channels to ensure tidal access, and planting with native brackish marsh species at three feet on center (Figure 5). The wetland enhancement areas are entirely surrounded by vast monospecific cattail (*Typha angustifolia*) stands, which are likely to eventually outcompete any other native brackish marsh species that are planted. Vegetation will be deemed successful if target percent coverage is provided by planted species and/or natural cattail colonization. Cattails are a Coastal Wetland species per DCM definition; and, in either case, the principal water quality and wetland habitat functions associated with the removal of fill and non-native plant species will be provided. Temporary mats will be used for secure access from shallow landing crafts to the enhancement area. A small tracked excavator will be used to remove sediment and plant material from the site. Material placed on small barges will be disposed of to an approved location. Temporary impacts to existing marsh due to construction will be restored to pre-existing conditions.



**Figure 5. Off-site Brunswick River Property Tidal Marsh Enhancement Typical Cross-section**

## **5.5 Success Criteria and Monitoring**

The planted sites would be surveyed biannually the first year and annually for four additional years to ensure meeting an 85% success in terms of plant survival and cover. In the event the success criteria were not met, site maintenance and monitoring would continue until the enhancement success criteria have been met. Replanting of any area not achieving success would be done within 30 days of completion of each monitoring event. Monitoring would include random measurement of success using a meter square quadrat over at least 20% of each site. A drone would be used to obtain vertical images of each site and would be used to assess overall site success and percent cover of each site by planted species and other species that have naturally recruited to the site. A list of plant species which have naturally recruited to the sites would also be recorded and accounted for in the quadrat surveys, as percent cover. Photographic documentation of all planted sites would also be completed to visually document that status of each site. Cover and density data would also be collected from a reference wetland located in close proximity to the site, which would be used for comparison to annual conditions at the planted sites. Signs of invertebrate, fish, and bird utilization would also be recorded. Monitoring reports would be submitted within 30 days of the completion of each monitoring event. The final report after five years would document whether the required success criteria have been met and what adaptive measures have been taken to enhance survival and vegetative success and wildlife utilization. Success would be measured based on achieving 85% plant survival based on quadrat surveys and spatial analysis of cover by vertical images taken by a drone for each event.

## **6.0 MITIGATION MEASURES FOR PNA IMPACTS**

The following mitigation measures are proposed as compensation to effectively mitigate for unavoidable impacts to 1.68 acres of shallow bottom/marsh edge PNA habitat function and tidal marsh water quality functions in PNA habitat. As described in the application narrative and response to the DWR RFI letter, impacts to 16.08 acres of deepwater (>6 ft) softbottom PNA would not preclude the use of these habitats. These deep softbottom areas are located adjacent to the disturbed slope of the existing channel, as shown on the plans. The benthic communities associated with these PNA soft bottom habitats are dominated by opportunistic species that are adapted to frequent disturbance and the high energy conditions that prevail in this portion of the river. Although dredging impacts on benthic invertebrates would temporarily reduce the availability of benthic prey for estuarine fishes, it is expected that benthic community recovery will occur rapidly. Therefore, it is expected that effects on deepwater softbottom habitat function would be short term and localized.

### **6.1 Donation of Funds for Construction and Monitoring of Lock and Dam #1 Fish Passage Modification**

The NCSPA will donate \$650,000 towards construction of the proposed modification to the Lock and Dam #1 Rock Ramp Fish Passage. This amount will fulfill the total cost required to move forward with construction in 2019. The project redesign will enhance the rock structures and increase the success rate for striped bass and other anadromous species to move through the

rock ramp and above the dam. In addition, \$150,000 will be contributed for post-construction monitoring. Funds will be provided to the NCDEQ for their use in contracting the construction of the project.

Support for construction of the Lock and Dam #1 Fish Passage, to be completed within a year of permit issuance, is intended to provide for the restoration of healthy, self-sustaining anadromous fish populations in the Cape Fear River system. A diverse assemblage of anadromous species undertake annual migrations from coastal waters to spawning grounds in the upper freshwater reaches of the Cape Fear River; including Atlantic and shortnose sturgeon, striped bass, American shad, hickory shad (*Alosa mediocris*), blueback herring (*A. aestivalis*), and alewife (*A. pseudoharengus*). In addition to anadromous species, elvers of the catadromous American eel (*Anguilla rostrata*) migrate upriver to freshwater juvenile nursery areas in the upper Cape Fear River each year to spend their early lives in the freshwater tributaries (USACE 2010). The restoration of self-sustaining anadromous fish populations has wide-ranging beneficial ecological implications that are essential to the overall restoration of the entire Cape Fear River ecosystem. Anadromous species play a critical role in sustaining the ecological integrity of major river systems through the transfer of ocean-derived primary production to a broad spectrum of higher trophic level organisms that are associated with estuaries and inland freshwater systems. We believe that the provision of financial support for the restoration of anadromous fish populations will ultimately contribute to an enhanced Cape Fear River ecosystem, inclusive of the PNA habitats of the lower estuary and the full range of species that they support.

## **6.2 Donation and Conservation Easement for Brunswick River/Eagle Island Property 29.5 acres)**

The NCSPA will convey ownership of 29.5 acres of their property owned east of the Brunswick River and south of US 74/76 (Figure 4) to an approved NGO. Most of the property is brackish tidal marsh and Section 404 wetlands and is located north of Redmond Creek. The property serves to enhance water quality by filtering runoff from US 74/76 and serves as habitat for a myriad of invertebrates, juvenile fish and birds.

## **6.3 Enhancement of *Phragmites* Dominated Wetland Habitat to Tidal Pool Habitat**

The applicant will create two-acres of tidal pool/marsh edge habitat via excavation of common reed/dredge spoil areas on the Brunswick River/Eagle Island property. Tidal pool /edge habitat will be excavated adjacent to tidally connected open water habitat (Figure 5) to enhance water quality and juvenile fish production within the state designated PNA. Monitoring of the success of the enhancement effort will be performed for five-years.

## 7.0 SUMMARY OF WETLAND AND PNA MITIGATION

In summary, the planning level cost estimate for mitigation for both proposed wetland enhancement and mitigation for PNA impacts is \$1,800,000. All measures included in the plan are summarized below.

The proposed mitigation plan for wetland and PNA impacts now adequately compensates for the negative impacts associated with dredging and construction of a submerged wall. All of the proposed habitat and water quality enhancement measures will be performed within one-mile of the proposed action, while assisting with construction and monitoring of the Lock and Dam #1 Fish Passage modification serves to benefit the fish and fisheries resources in the entire watershed.

### Revised Wetland Compensation Plan (4.1:1 ratio)

1. Wetland enhancement of *Phragmites* dominated habitat near –site (adjacent NCSPA owned property) – 1.75 acres enhanced to coastal tidal marsh (1.25:1 ratio)
2. Wetland enhancement of *Phragmites* dominated habitat on NSCPA owned land on Brunswick River – 4 acres enhanced to brackish tidal marsh (2.9:1 ratio)

### Revised PNA Compensation Measures

1. Conservation easement and conveyance of ownership on 29.5 ac of Brunswick River property
2. For water quality and juvenile fish benefits in PNA- enhance 2.0 ac of *Phragmites* dominated habitat to shallow-water tidal pool habitat on Brunswick River property
3. Donate \$850,000 for construction and monitoring of Lock and Dam # 1 Rock Ramp Fish Passage modification.
4. In addition, the enhancement of tidal wetlands near the proposed project, also provides water quality benefits within PNA

### Compliance Monitoring

1. Wetland and tidal pool enhancement measures to be monitored for 5 years or more as needed to meet success criteria, with annual reporting
2. Sturgeon monitoring during dredging can be performed if desired.



**APPENDIX A**

**NCWAM FIELD ASSESSMENT FORMS AND  
WETLAND RATING SHEETS**

**NC WAM WETLAND ASSESSMENT FORM**  
**Accompanies User Manual Version 5**

USACE AID#:	NCDWR #:
Project Name <u>Port of Wilmington Turning Basin Expansion</u>	Date of Evaluation <u>15 October 2018</u>
Applicant/Owner Name <u>NC State Ports Authority/Kinder Morgan</u>	Wetland Site Name <u>Wetland Assessment Area 1</u>
Wetland Type <u>Brackish/Salt Marsh</u>	Assessor Name/Organization <u>Rahlf Ingle (DCA)</u>
Level III Ecoregion <u>Middle Atlantic Coastal Plain</u>	Nearest Named Water Body <u>Cape Fear River</u>
River Basin <u>Cape Fear</u>	USGS 8-Digit Catalogue Unit <u>03030005</u>
County <u>New Hanover</u>	NCDWR Region <u>Wilmington</u>
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) <u>34.210087° -77.953815°</u>

**Evidence of stressors affecting the assessment area (may not be within the assessment area)**

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed?  Yes  No

**Regulatory Considerations** - Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

**What type of natural stream is associated with the wetland, if any? (check all that apply)**

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes)  Lunar  Wind  Both

Is the assessment area on a coastal island?  Yes  No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver?  Yes  No

Does the assessment area experience overbank flooding during normal rainfall conditions?  Yes  No

**1. Ground Surface Condition/Vegetation Condition – assessment area condition metric**

**Check a box in each column.** Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| GS                                    | VS                                    |  |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

**2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric**

**Check a box in each column.** Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| Surf                                  | Sub                                   |  |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered.   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).  |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

**3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)**

**Check a box in each column for each group below.** Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- |     |                                       |                            |   |
|-----|---------------------------------------|----------------------------|---|
|     | AA                                    | WT                         |   |
| 3a. | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep           |
|     | <input type="checkbox"/> B            | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
|     | <input type="checkbox"/> C            | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep      |
|     | <input type="checkbox"/> D            | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep                                  |
| 3b. | <input type="checkbox"/> A            |                            | Evidence that maximum depth of inundation is greater than 2 feet                |

- B Evidence that maximum depth of inundation is between 1 and 2 feet
- C Evidence that maximum depth of inundation is less than 1 foot

4. **Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

**Check a box from each of the three soil property groups below.** Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a.  A Sandy soil  
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)  
 C Loamy or clayey soils not exhibiting redoximorphic features  
 D Loamy or clayey gleyed soil  
 E Histosol or histic epipedon
- 4b.  A Soil ribbon < 1 inch  
 B Soil ribbon ≥ 1 inch
- 4c.  A No peat or muck presence  
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

**Check a box in each column.** Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf                                  | Sub                                   |   |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Little or no evidence of pollutants or discharges entering the assessment area  |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area  |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric (skip for non-riparian wetlands)**

**Check all that apply (at least one box in each column).** Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS                         | 5M                         | 2M                         |   |
|----------------------------|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces   |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants)  |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | ≥ 20% coverage of pasture   |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land)   |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb   |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land  |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?  
 Yes  No If Yes, continue to 7b. If No, skip to Metric 8.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)  
 A ≥ 50 feet  
 B From 30 to < 50 feet  
 C From 15 to < 30 feet  
 D From 5 to < 15 feet  
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.  
 ≤ 15-foot wide  > 15-foot wide  Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?  
 Yes  No
- 7e. Is tributary or other open water sheltered or exposed?  
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.  
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

**Check a box in each column.** Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | WT                                    | WC                                    |                       |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | ≥ 100 feet            |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | From 50 to < 80 feet  |
| <input type="checkbox"/> D            | <input type="checkbox"/> D            | From 40 to < 50 feet  |
| <input type="checkbox"/> E            | <input type="checkbox"/> E            | From 30 to < 40 feet  |
| <input type="checkbox"/> F            | <input type="checkbox"/> F            | From 15 to < 30 feet  |
| <input type="checkbox"/> G            | <input type="checkbox"/> G            | From 5 to < 15 feet   |
| <input type="checkbox"/> H            | <input type="checkbox"/> H            | < 5 feet              |

9. **Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)**

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. **Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)**

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. **Wetland Size – wetland type/wetland complex condition metric**

**Check a box in each column.** Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. **Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)**

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. **Connectivity to Other Natural Areas – landscape condition metric**

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input checked="" type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only.**

- Yes  No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. **Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)**

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear-cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. **Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)**

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. **Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)**

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).



**17. Vegetative Structure – assessment area/wetland type condition metric**

17a. Is vegetation present?

- Yes  No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation  
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

**18. Snags – wetland type condition metric (skip for all marshes)**

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).  
 B Not A

**19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)**

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.  
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.  
 C Majority of canopy trees are < 6 inches DBH or no trees.

**20. Large Woody Debris – wetland type condition metric (skip for all marshes)**

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).  
 B Not A

**21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)**

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



**22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)**

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

- A Overbank and overland flow are not severely altered in the assessment area.  
 B Overbank flow is severely altered in the assessment area.  
 C Overland flow is severely altered in the assessment area.  
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

See wetland mitigation plan

**NC WAM WETLAND ASSESSMENT FORM**  
**Accompanies User Manual Version 5**

USACE AID#:	NCDWR #:
Project Name <u>Port of Wilmington Turning Basin Expansion</u>	Date of Evaluation <u>15 October 2018</u>
Applicant/Owner Name <u>NC State Ports Authority/Kinder Morgan</u>	Wetland Site Name <u>Wetland Assessment Area 2</u>
Wetland Type <u>Brackish/Salt Marsh</u>	Assessor Name/Organization <u>Rahlf Ingle (DCA)</u>
Level III Ecoregion <u>Middle Atlantic Coastal Plain</u>	Nearest Named Water Body <u>Cape Fear River</u>
River Basin <u>Cape Fear</u>	USGS 8-Digit Catalogue Unit <u>03030005</u>
County <u>New Hanover</u>	NCDWR Region <u>Wilmington</u>
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) <u>34.210087° -77.953815°</u>

**Evidence of stressors affecting the assessment area (may not be within the assessment area)**

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed?  Yes  No

**Regulatory Considerations** - Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

**What type of natural stream is associated with the wetland, if any? (check all that apply)**

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes)  Lunar  Wind  Both

Is the assessment area on a coastal island?  Yes  No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver?  Yes  No

Does the assessment area experience overbank flooding during normal rainfall conditions?  Yes  No

**1. Ground Surface Condition/Vegetation Condition – assessment area condition metric**

**Check a box in each column.** Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| GS                                    | VS                                    |  |
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Not severely altered   |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

**2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric**

**Check a box in each column.** Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| Surf                                  | Sub                                   |  |
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Water storage capacity and duration are not altered.   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).  |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

**3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)**

**Check a box in each column for each group below.** Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- |     |                            |                            |   |
|-----|----------------------------|----------------------------|---|
|     | AA                         | WT                         |   |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep           |
|     | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
|     | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep      |
|     | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep                                  |
| 3b. | <input type="checkbox"/> A |                            | Evidence that maximum depth of inundation is greater than 2 feet                |

- B Evidence that maximum depth of inundation is between 1 and 2 feet
- C Evidence that maximum depth of inundation is less than 1 foot

4. **Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

**Check a box from each of the three soil property groups below.** Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a.  A Sandy soil  
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)  
 C Loamy or clayey soils not exhibiting redoximorphic features  
 D Loamy or clayey gleyed soil  
 E Histosol or histic epipedon
- 4b.  A Soil ribbon < 1 inch  
 B Soil ribbon ≥ 1 inch
- 4c.  A No peat or muck presence  
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

**Check a box in each column.** Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf                                  | Sub                                   |   |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | Little or no evidence of pollutants or discharges entering the assessment area  |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area  |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric (skip for non-riparian wetlands)**

**Check all that apply (at least one box in each column).** Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS                         | 5M                         | 2M                         |   |
|----------------------------|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces   |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants)  |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | ≥ 20% coverage of pasture   |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land)   |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb   |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land  |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?  
 Yes  No If Yes, continue to 7b. If No, skip to Metric 8.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)  
 A ≥ 50 feet  
 B From 30 to < 50 feet  
 C From 15 to < 30 feet  
 D From 5 to < 15 feet  
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.  
 ≤ 15-foot wide  > 15-foot wide  Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?  
 Yes  No
- 7e. Is tributary or other open water sheltered or exposed?  
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.  
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

**Check a box in each column.** Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | WT                                    | WC                                    |                       |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A            | <input type="checkbox"/> A            | ≥ 100 feet            |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | From 50 to < 80 feet  |
| <input type="checkbox"/> D            | <input type="checkbox"/> D            | From 40 to < 50 feet  |
| <input type="checkbox"/> E            | <input type="checkbox"/> E            | From 30 to < 40 feet  |
| <input type="checkbox"/> F            | <input type="checkbox"/> F            | From 15 to < 30 feet  |
| <input type="checkbox"/> G            | <input type="checkbox"/> G            | From 5 to < 15 feet   |
| <input type="checkbox"/> H            | <input type="checkbox"/> H            | < 5 feet              |

**9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)**

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

**10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)**

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

**11. Wetland Size – wetland type/wetland complex condition metric**

**Check a box in each column.** Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

**12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)**

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

**13. Connectivity to Other Natural Areas – landscape condition metric**

**13a. Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input checked="" type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

**13b. Evaluate for marshes only.**

- Yes  No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

**14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)**

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear-cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

**15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)**

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

**16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)**

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).



**17. Vegetative Structure – assessment area/wetland type condition metric**

17a. Is vegetation present?

- Yes  No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation  
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

**18. Snags – wetland type condition metric (skip for all marshes)**

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).  
 B Not A

**19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)**

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.  
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.  
 C Majority of canopy trees are < 6 inches DBH or no trees.

**20. Large Woody Debris – wetland type condition metric (skip for all marshes)**

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).  
 B Not A

**21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)**

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



**22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)**

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

- A Overbank and overland flow are not severely altered in the assessment area.  
 B Overbank flow is severely altered in the assessment area.  
 C Overland flow is severely altered in the assessment area.  
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

See wetland mitigation plan