



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

ROY COOPER  
GOVERNOR

JAMES H. TROGDON, III  
SECRETARY

October 17, 2017

Mr. David Edgar Bailey  
US Army Corps of Engineers  
3331 Heritage Trade Drive, Suite 105  
Wake Forest, North Carolina 27587

RE: Request for Preliminary Jurisdictional Determination  
U-2412 A New Location and Improvements to Greensboro-High Point Road (SR 4121) Guilford  
County, North Carolina

Dear Mr. Bailey

AECOM has completed a delineation of streams and wetlands for the above referenced project. The attached information, including required forms, tables, and figures, is submitted for your review and determination of jurisdiction under the Clean Water Act (CWA).

As shown in Figure 1, the New Location and Improvements to Greensboro-High Point Road (SR 4121) (TIP U-2412A) is located in Guilford County, NC within the Cape Fear River Basin (USGS HUC 03030003). This delineation was performed in compliance with methodology set forth in the U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual (USACE 1987) and subsequent guidance including the Eastern Mountains and Piedmont Regional Supplement. Streams were assessed for jurisdiction under the Clean Water Act using field indications of ordinary high water mark and the NC Division of Water Quality (NCDWQ) Stream Identification Form Version 4.11.

We respectfully request your review of this information, so that a preliminary jurisdictional determination under the CWA may be obtained. If you have any questions, or need additional information, please contact me at [maturchy@ncdot.gov](mailto:maturchy@ncdot.gov) at your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael Turchy".

Michael Turchy, Environmental Coordinator  
NCDOT Environmental Analysis Unit

Attachments:

- Jurisdictional Determination (JD) Request Form
- Preliminary Jurisdictional Determination Form
- Figure 1: Vicinity map
- Figure 2: USGS map
- Figure 3: Jurisdictional Features map
- Stream and Wetland Data Forms

# Jurisdictional Determination Request

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**US Army Corps  
of Engineers**  
Wilmington District

This form is intended for use by anyone requesting a jurisdictional determination (JD) from the U.S. Army Corps of Engineers, Wilmington District (Corps). Please include all supporting information, as described within each category, with your request. You may submit your request via mail, electronic mail, or facsimile. Requests should be sent to the appropriate project manager of the county in which the property is located. A current list of project managers by assigned counties can be found on-line at:

<http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram/Contact/CountyLocator.aspx>, by calling 910-251-4633, or by contacting any of the field offices listed below. Once your request is received you will be contacted by a Corps project manager.

## **ASHEVILLE & CHARLOTTE REGULATORY FIELD OFFICES**

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

## **WASHINGTON REGULATORY FIELD OFFICE**

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

## **RALEIGH REGULATORY FIELD OFFICE**

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

## **WILMINGTON REGULATORY FIELD OFFICE**

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

## **INSTRUCTIONS:**

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

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

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

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

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

## Jurisdictional Determination Request

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**A. PARCEL INFORMATION**

Street Address: U-2412 Improvements to SR 4131

City, State: Highpoint, NC

County: Guilford County

Parcel Index Number(s) (PIN): \_\_\_\_\_

**B. REQUESTOR INFORMATION**

Name: Michael Turchy

Mailing Address: 1598 Mail Service Center

Raleigh, NC 27699-1598

Telephone Number: 919-707-6157

Electronic Mail Address: maturchy@ncdot.gov

Select one:

I am the current property owner.

I am an Authorized Agent or Environmental Consultant<sup>1</sup>

Interested Buyer or Under Contract to Purchase

Other, please explain. NCDOT Project Manager

**C. PROPERTY OWNER INFORMATION<sup>2</sup>**

Name: N/A

Mailing Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Electronic Mail Address: \_\_\_\_\_

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<sup>1</sup> Must provide completed Agent Authorization Form/Letter.

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

## Jurisdictional Determination Request

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### D. PROPERTY ACCESS CERTIFICATION<sup>3,4</sup>

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

\_\_\_\_\_  
Print Name

Capacity:  Owner  Authorized Agent<sup>5</sup>

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

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

- I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.
- I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.
- I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.
- I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.
- I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 10 list and/or is subject to the ebb and flow of the tide.
- A Corps JD is required in order obtain my local/state authorization.
- I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.
- I believe that the site may be comprised entirely of dry land.
- Other: \_\_\_\_\_

<sup>3</sup> For NCDOT requests following the current NCDOT/USACE protocols, skip to Part E.

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

<sup>5</sup> Must provide agent authorization form/letter signed by owner(s).

## Jurisdictional Determination Request

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

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

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

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

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

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

### G. ALL REQUESTS

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

Size of Property or Review Area 155 acres.

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

# Jurisdictional Determination Request

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## H. REQUESTS FROM CONSULTANTS



Project Coordinates (Decimal Degrees): Latitude: 35.986218  
Longitude: -79.941675



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

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

### For Approved Jurisdictional Determinations:

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

### For Preliminary Jurisdictional Determinations:

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



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

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

## Jurisdictional Determination Request

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

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<sup>7</sup> [www.saw.usace.army.mil/Portals/59/docs/regulatory/regdocs/JD/RGL\\_08-02\\_App\\_A\\_Prelim\\_JD\\_Form\\_fillable.pdf](http://www.saw.usace.army.mil/Portals/59/docs/regulatory/regdocs/JD/RGL_08-02_App_A_Prelim_JD_Form_fillable.pdf)

<sup>8</sup> Please see <http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Jurisdiction/>

**Principal Purpose:** The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.

**Routine Uses:** This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USAGE website.

**Disclosure:** Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.





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

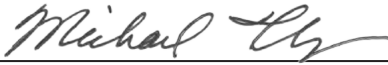
**SUPPORTING DATA. Data reviewed for PJD (check all that apply)**

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

- Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:  
Map: \_\_\_\_\_.
- Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - Office concurs with data sheets/delineation report.
  - Office does not concur with data sheets/delineation report. Rationale: \_\_\_\_\_.
- Data sheets prepared by the Corps: \_\_\_\_\_.
- Corps navigable waters' study: \_\_\_\_\_.
- U.S. Geological Survey Hydrologic Atlas: \_\_\_\_\_.
  - USGS NHD data.
  - USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: Highpoint East, NC 1:24000.
- Natural Resources Conservation Service Soil Survey. Citation: \_\_\_\_\_.
- National wetlands inventory map(s). Cite name: \_\_\_\_\_.
- State/local wetland inventory map(s): \_\_\_\_\_.
- FEMA/FIRM maps: \_\_\_\_\_.
- 100-year Floodplain Elevation is: \_\_\_\_\_.(National Geodetic Vertical Datum of 1929)
- Photographs:  Aerial (Name & Date): NC One Map Orthoimagery 2014.  
or  Other (Name & Date): \_\_\_\_\_.
- Previous determination(s). File no. and date of response letter: ID NO. 200021876, Feb 20, 2002.
- Other information (please specify): \_\_\_\_\_.

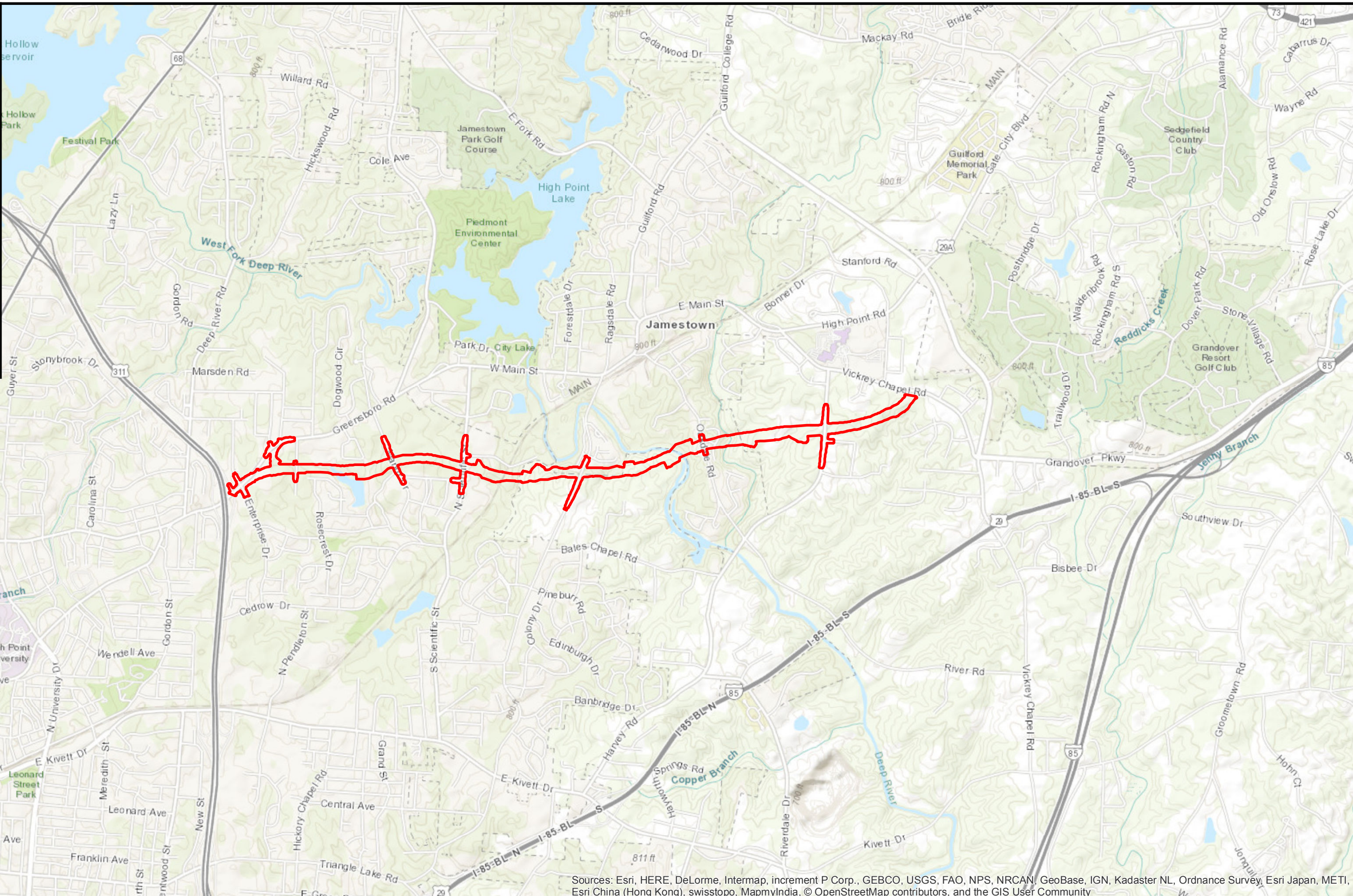
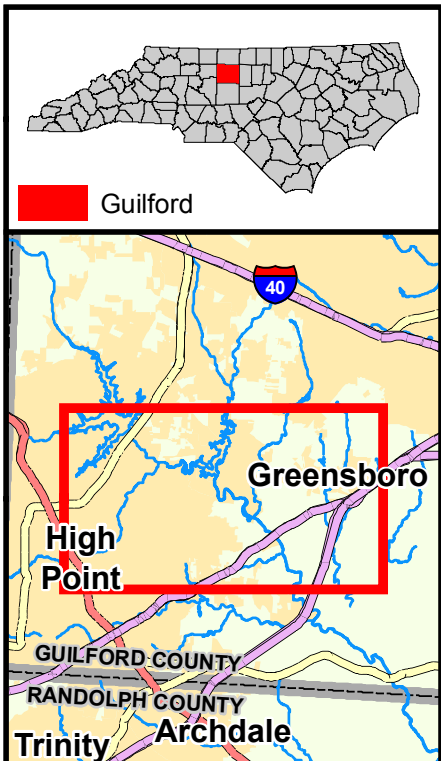
**IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.**

\_\_\_\_\_  
Signature and date of  
Regulatory staff member  
completing PJD

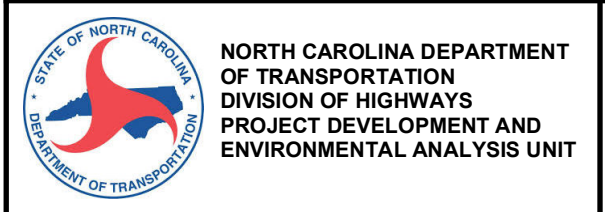
 10/16/2017  
\_\_\_\_\_  
Signature and date of  
person requesting PJD  
(REQUIRED, unless obtaining  
the signature is impracticable)<sup>1</sup>

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

Site Number	Latitude	Longitude	Cowardin Class	Estimated amount of aquatic resource in review area	Class of aquatic resource
Deep River	35.986673	-79.93132	R5UB	421' long x 85' wide	Non-Section 10, non-wetland
Bull Run	35.987484	-79.92663	R2SB1	383' long x 25' wide	Non-Section 10, non-wetland
SA (perennial)	35.985122	-79.96409	R2UB2	464' long x 5' wide	Non-Section 10, non-wetland
SB (perennial)	35.985011	-79.96042	R2UB2	120' long x 5' wide	Non-Section 10, non-wetland
SC (perennial)	35.985221	-79.96017	R2UB2	420' long x 3' wide	Non-Section 10, non-wetland
SD (perennial)	35.984309	-79.94886	R2UB2	374' long x 10' wide	Non-Section 10, non-wetland
SD (intermittent)	35.984975	-79.94957	R2SB3	95' long x 5' wide	Non-Section 10, non-wetland
SE (perennial)	35.984197	-79.9488	R2UB2	29' long x 3' wide	Non-Section 10, non-wetland
SF (intermittent)	35.984667	-79.94939	R2SB5	104' long x 4' wide	Non-Section 10, non-wetland
SG (perennial)	35.984489	-79.94631	R2UB1	211' long x 25' wide	Non-Section 10, non-wetland
SH (intermittent)	35.984893	-79.94302	R2SB3	321' long x 3' wide	Non-Section 10, non-wetland
SI (perennial)	35.984889	-79.93753	R2UB2	466' long x 5' wide	Non-Section 10, non-wetland
SJ (intermittent)	35.985134	-79.93745	R2SB4	55' long x 3' wide	Non-Section 10, non-wetland
SK (perennial)	35.987203	-79.92565	R2UB2	33' long x 9' wide	Non-Section 10, non-wetland
SL (perennial)	35.988774	-79.9184	R2UB2	367' long x 10' wide	Non-Section 10, non-wetland
SM (perennial)	35.989714	-79.91746	R2UB2	293' long x 1' wide	Non-Section 10, non-wetland
WA	35.985584	-79.96958	PFO	0.02 acres	Wetland
WB	35.985219	-79.9649	PFO	0.3 acres	Wetland
WC	35.985435	-79.93704	PEM	0.7 acres	Wetland
WD	35.986841	-79.93143	PFO	0.8 acres	Wetland
WE	35.987859	-79.92049	PFO	0.1 acres	Wetland
WF	35.988518	-79.91883	PFO	0.2 acres	Wetland



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

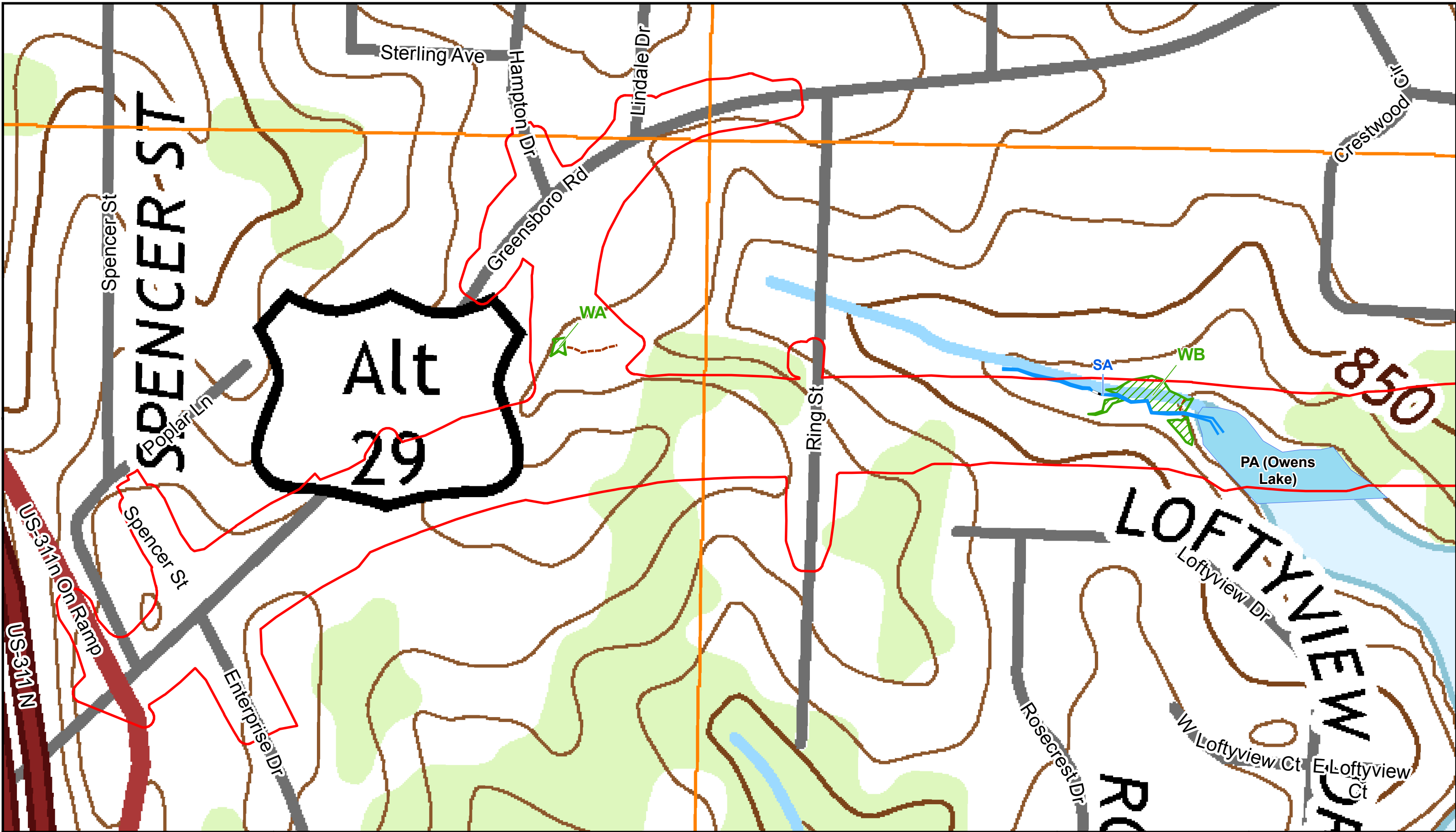


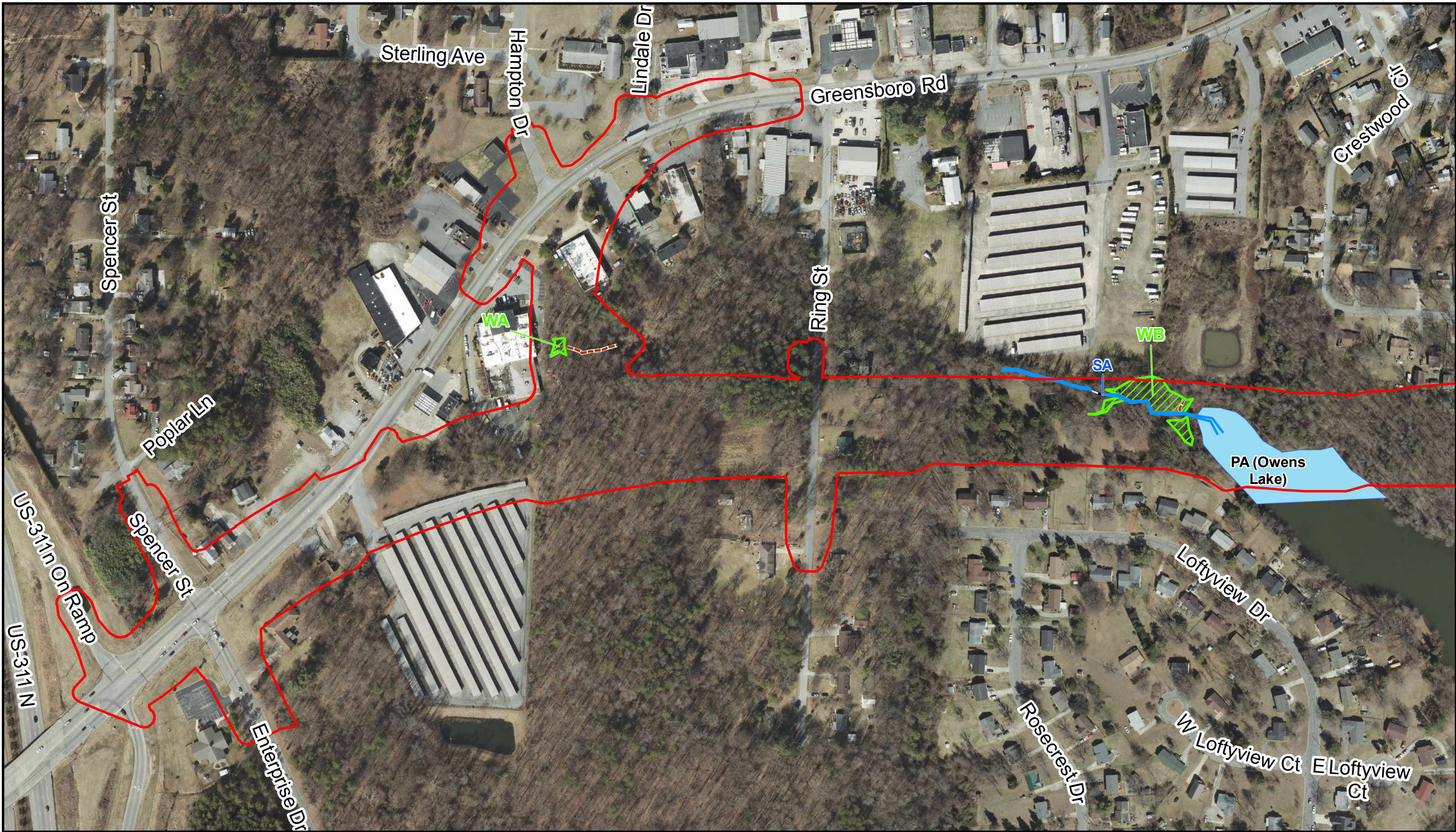
**VICINITY MAP**  
**Improvements to SR 4121 (Greensboro-High Point Road) US 311 to Vickrey Chapel Road in Guilford County**  
 TIP Project U-2412 A

**Legend**  
 Study Area

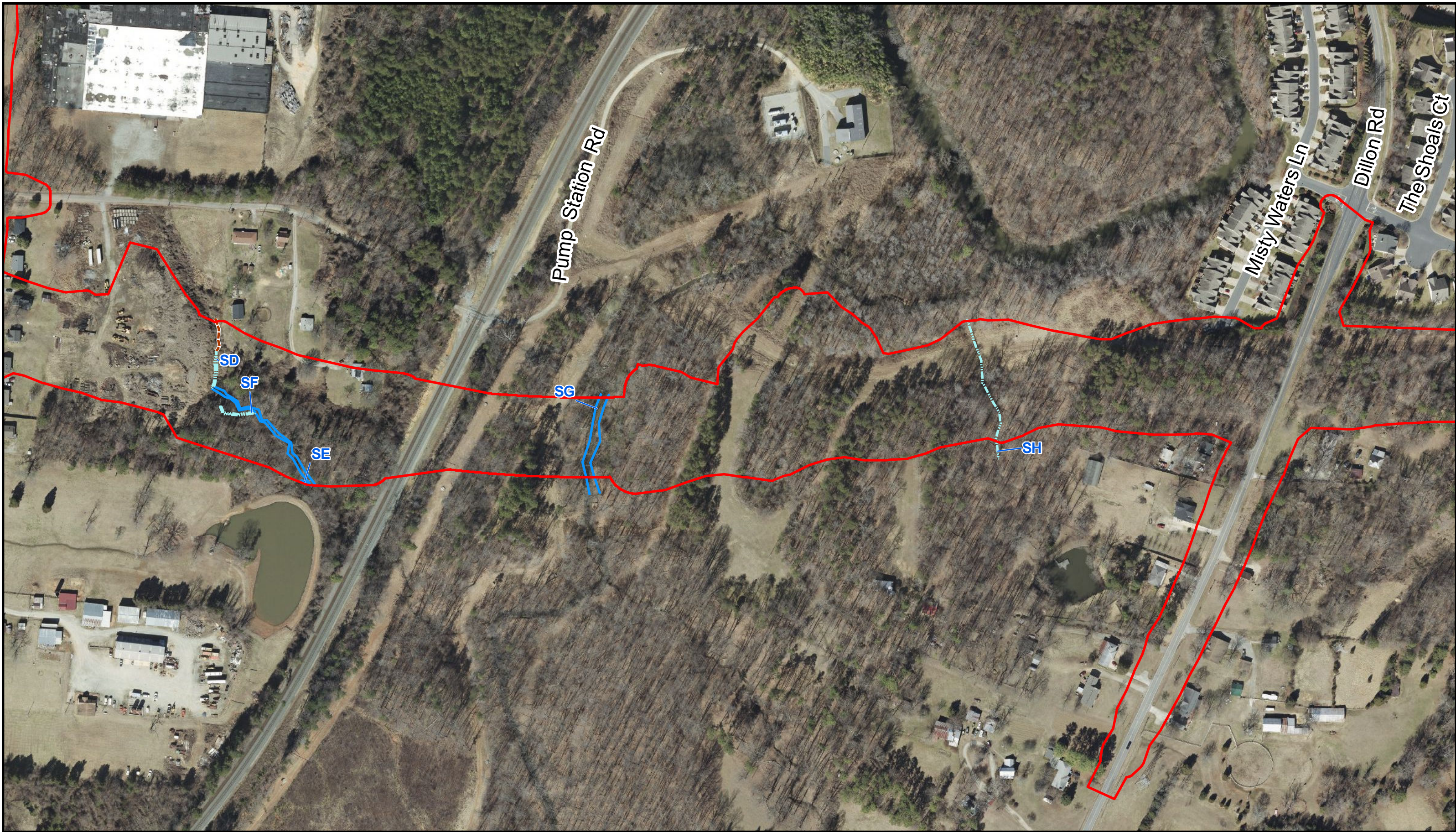
**Deep River/Randleman Lake**  
**HUC 03030003**  
 Miles

Div: 7	TIP# U-2412 A	<b>Figure</b> <b>1</b>
Date: June 2017		

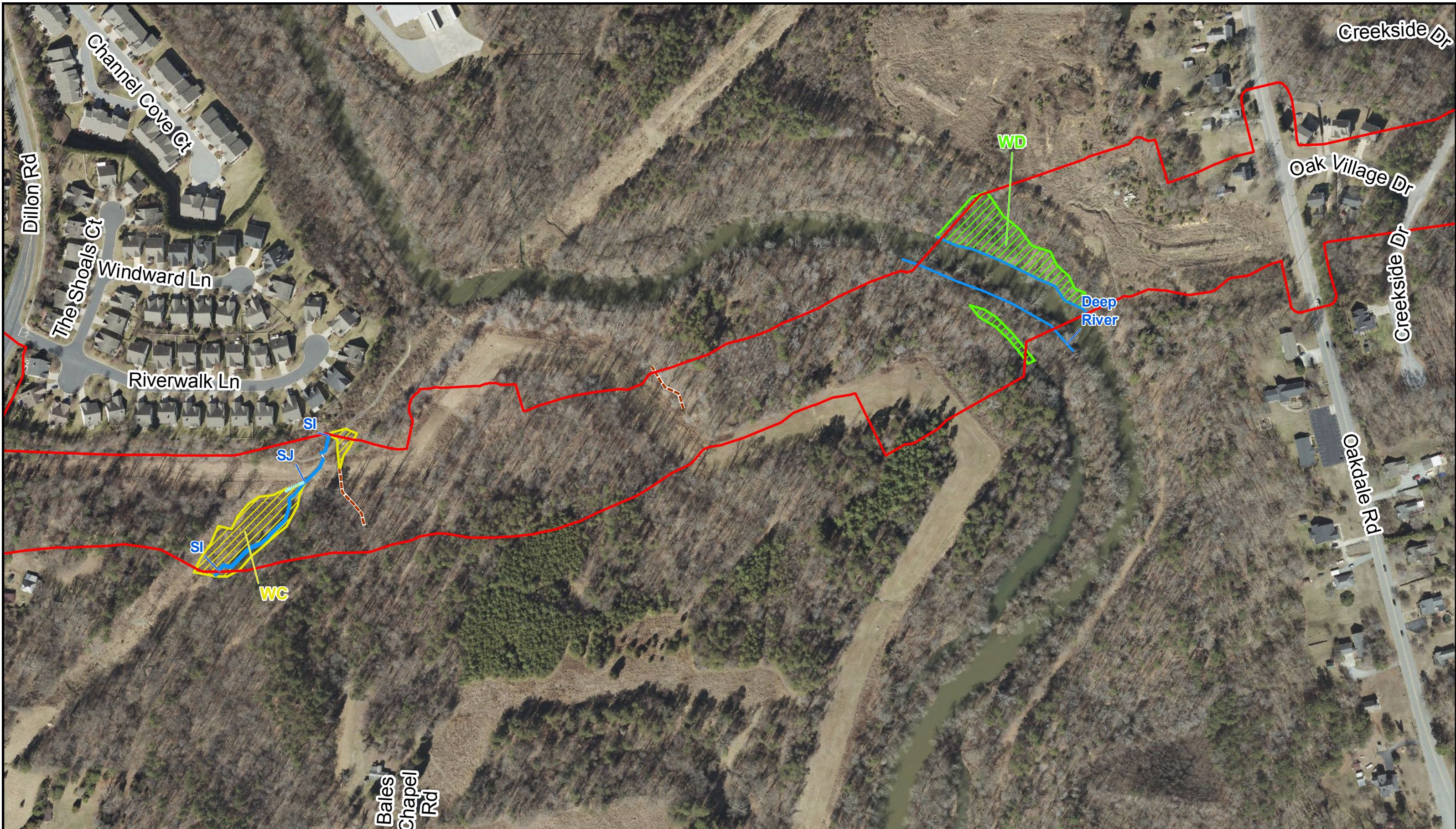






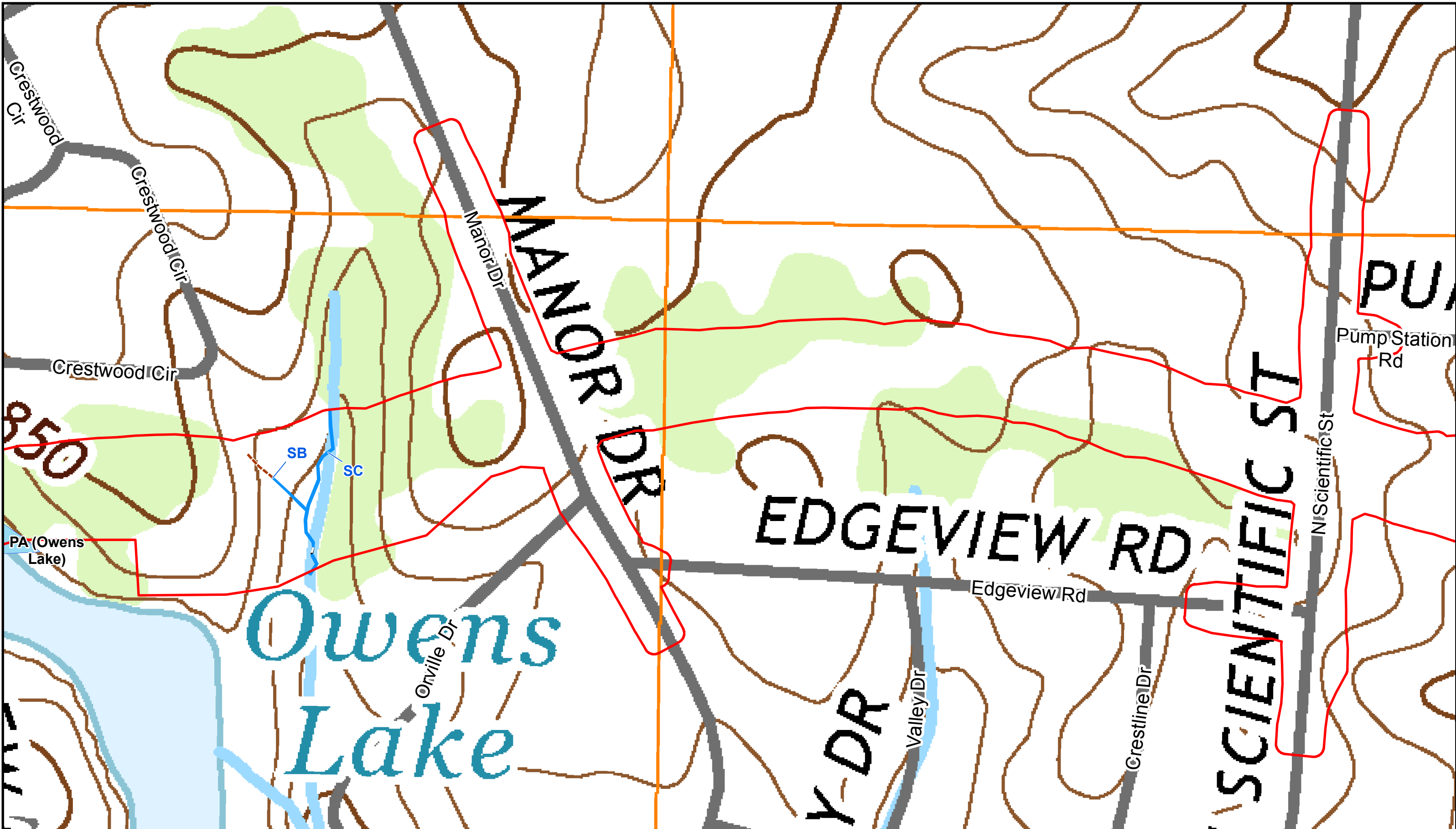




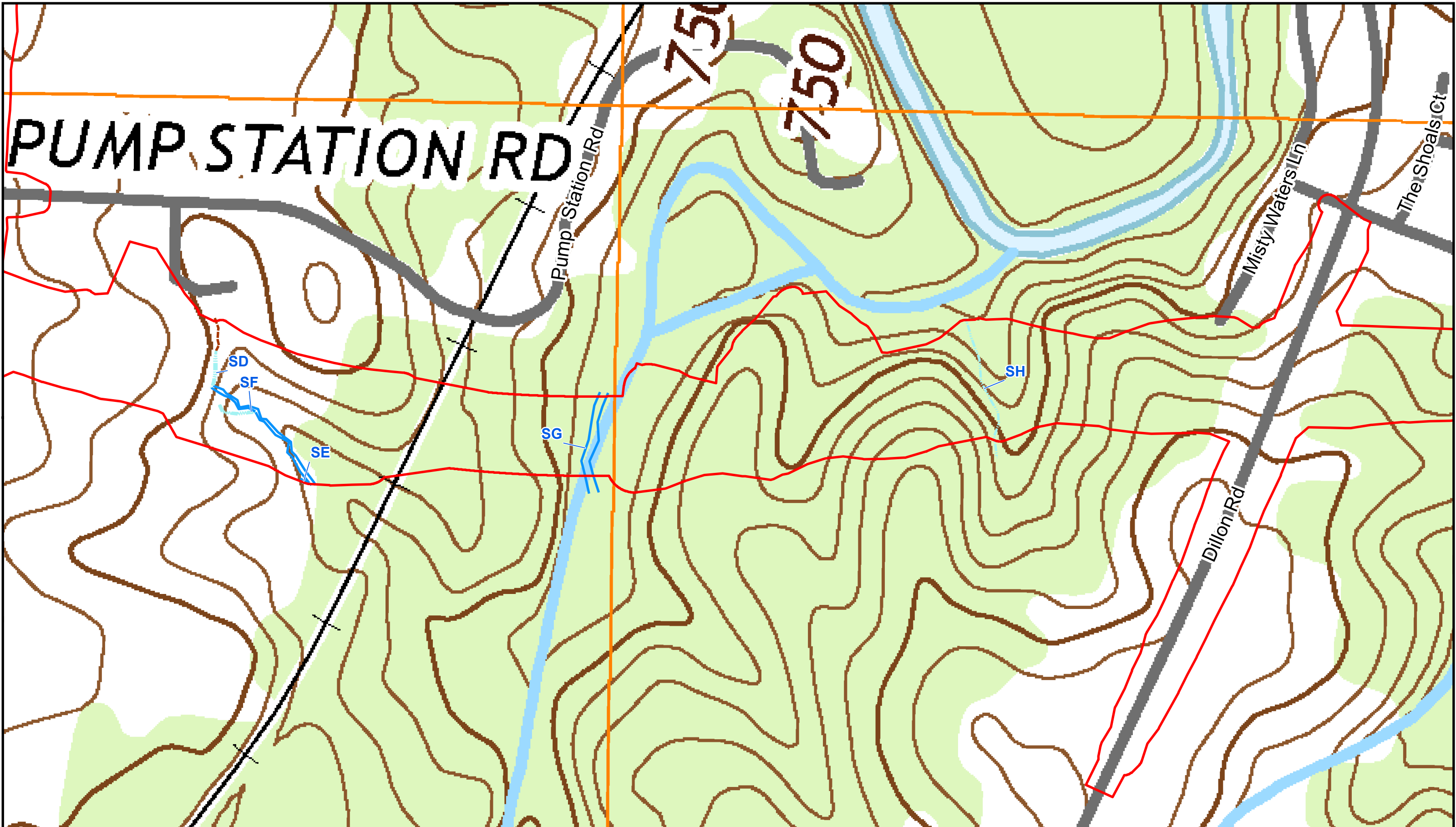








# PUMP STATION RD



**JURISDICTIONAL FEATURES TOPO MAP**  
**Improvements to SR 4121 (Greensboro-High Point Road) US 311 to Vickrey Chapel Road in Guilford County**  
 TIP Project U-2412 A

**Legend**

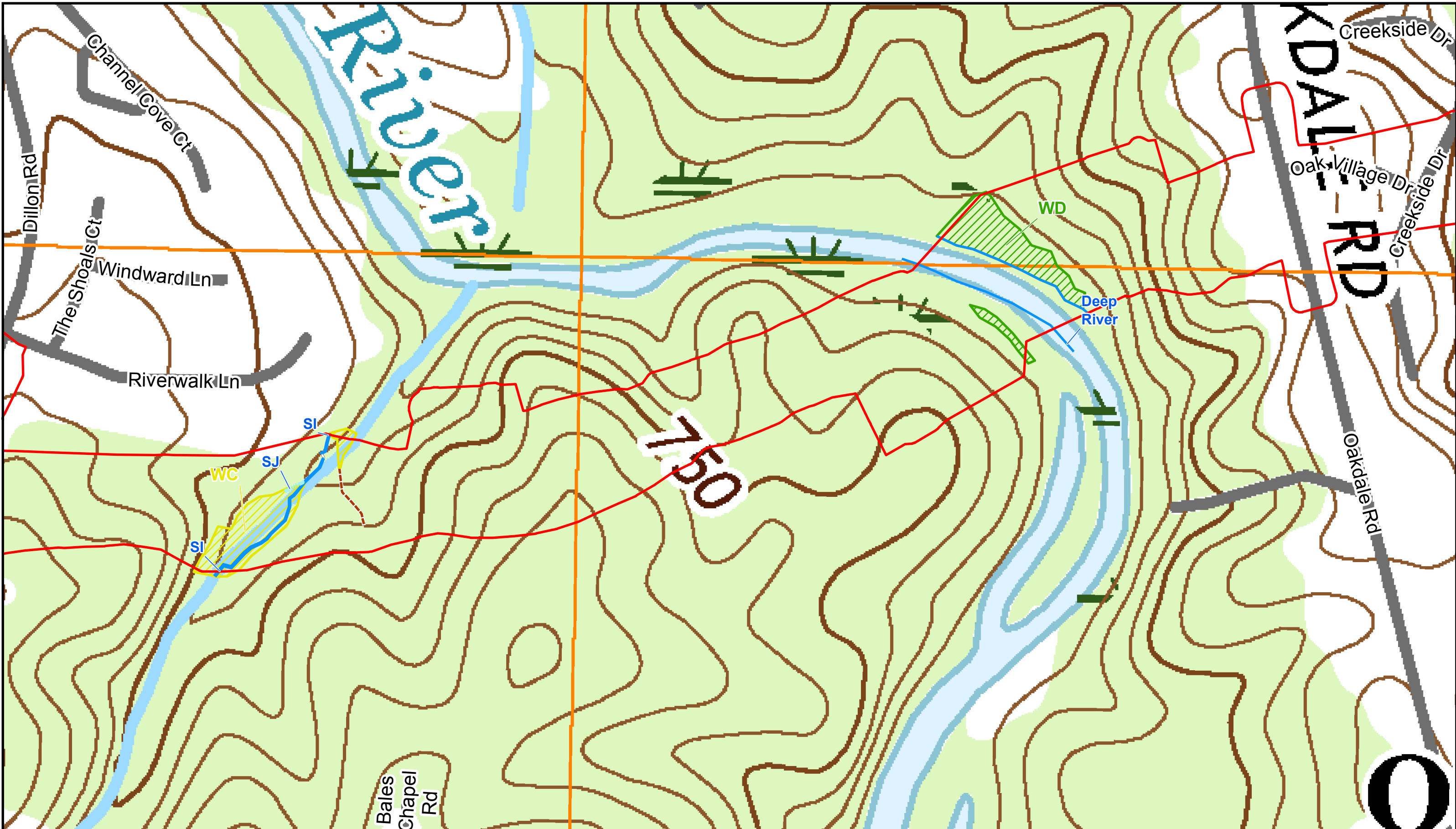
Study Area	Pond	Palustrine Emergent Wetland (PEM)
Culvert	Intermittent Stream	Palustrine Forested Wetland (PFO)
Ephemeral Channel	Perennial Stream	

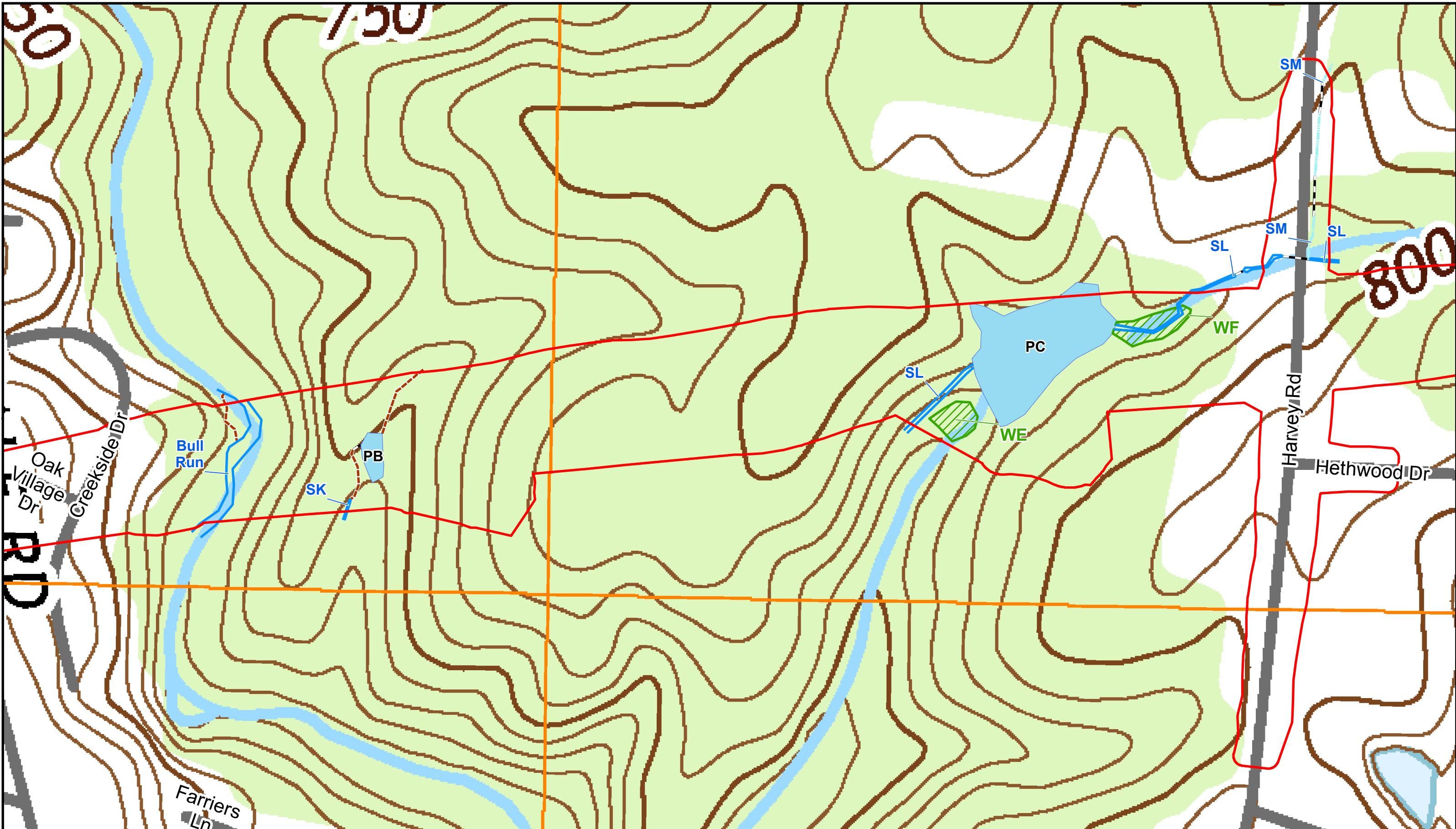
Source: USGS Topographic Map, High Point - East, NC 2016

**Deep River/Randleman Lake**  
**HUC 03030003**

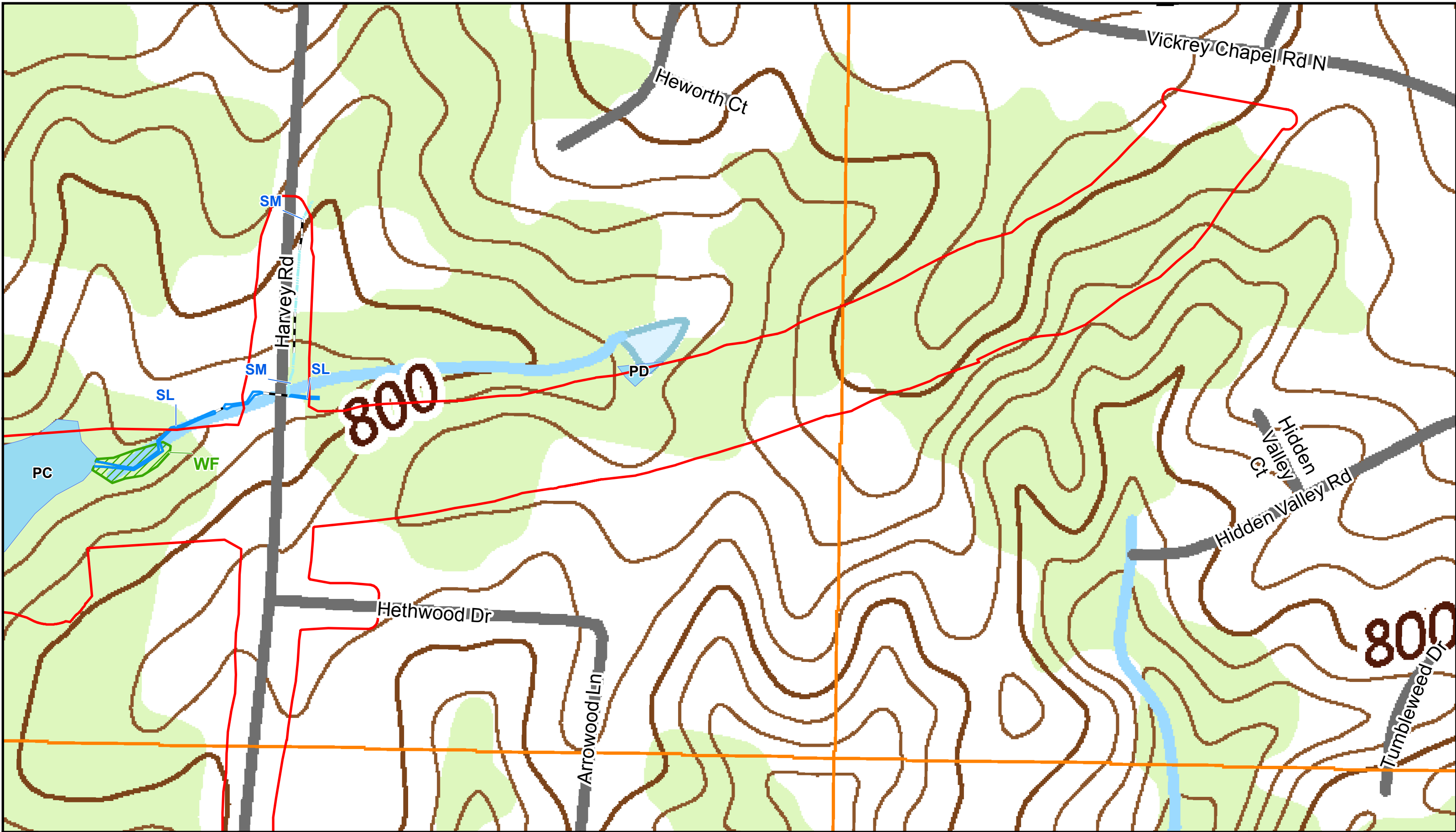
0 100 200 Feet

Div: 7	TIP# U-2412 A	<b>Figure</b> <b>2-3</b>
Date: June 2017		





Source: USGS Topographic Map, High Point - East, NC 2016





## SA – UT to Deep River

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/11/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.985279
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.964833
<b>Total Points:</b> <i>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30</math>*</i> <b>33.75</b>	<b>Stream Determination (circle one)</b> Ephemeral Intermittent <input type="checkbox"/> <b>Perennial</b> <input checked="" type="checkbox"/>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>21</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	<input checked="" type="checkbox"/> 3
2. Sinuosity of channel along thalweg	0	1	<input checked="" type="checkbox"/> 2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<input checked="" type="checkbox"/> 2	3
4. Particle size of stream substrate	0	1	2	<input checked="" type="checkbox"/> 3
5. Active/relict floodplain	0	1	<input checked="" type="checkbox"/> 2	3
6. Depositional bars or benches	0	1	<input checked="" type="checkbox"/> 2	3
7. Recent alluvial deposits	0	1	<input checked="" type="checkbox"/> 2	3
8. Headcuts	0	1	2	<input checked="" type="checkbox"/> 3
9. Grade control	0	0.5	1	<input checked="" type="checkbox"/> 1.5
10. Natural valley	0	<input checked="" type="checkbox"/> 0.5	1	1.5
11. Second or greater order channel	<input checked="" type="checkbox"/> No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8.5</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<input checked="" type="checkbox"/> 2	3
13. Iron oxidizing bacteria	0	1	<input checked="" type="checkbox"/> 2	3
14. Leaf litter	1.5	1	0.5	<input checked="" type="checkbox"/> 0
15. Sediment on plants or debris	0	<input checked="" type="checkbox"/> 0.5	1	1.5
16. Organic debris lines or piles	0	0.5	<input checked="" type="checkbox"/> 1	1.5
17. Soil-based evidence of high water table?	No = 0		<input checked="" type="checkbox"/> Yes = 3	

C. Biology (Subtotal = <u>4.25</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	1	<input checked="" type="checkbox"/> 0
19. Rooted upland plants in streambed	3	2	<input checked="" type="checkbox"/> 1	0
20. Macroinvertebrates (note diversity and abundance)	0	<input checked="" type="checkbox"/> 1	2	3
21. Aquatic Mollusks	<input checked="" type="checkbox"/> 0	1	2	3
22. Fish	<input checked="" type="checkbox"/> 0	0.5	1	1.5
23. Crayfish	0	0.5	<input checked="" type="checkbox"/> 1	1.5
24. Amphibians	0	<input checked="" type="checkbox"/> 0.5	1	1.5
25. Algae	<input checked="" type="checkbox"/> 0	0.5	1	1.5
26. Wetland plants in streambed	<input checked="" type="checkbox"/> FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:**

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**Sketch:**

## SB – UT to Deep River

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/11/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.98501
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.960418
<b>Total Points:</b> <i>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30</math>*</i> <b>25.75</b>	<b>Stream Determination (circle one)</b> Ephemeral <input type="checkbox"/> <b>Intermittent</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>13.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	<input checked="" type="checkbox"/> 3
2. Sinuosity of channel along thalweg	0	1	<input checked="" type="checkbox"/> 2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<input checked="" type="checkbox"/> 1	2	3
4. Particle size of stream substrate	0	<input checked="" type="checkbox"/> 1	2	3
5. Active/relict floodplain	0	1	<input checked="" type="checkbox"/> 2	3
6. Depositional bars or benches	0	<input checked="" type="checkbox"/> 1	2	3
7. Recent alluvial deposits	0	<input checked="" type="checkbox"/> 1	2	3
8. Headcuts	0	<input checked="" type="checkbox"/> 1	2	3
9. Grade control	0	<input checked="" type="checkbox"/> 0.5	1	1.5
10. Natural valley	0	0.5	<input checked="" type="checkbox"/> 1	1.5
11. Second or greater order channel	<input checked="" type="checkbox"/> No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>7.5</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<input checked="" type="checkbox"/> 1	2	3
13. Iron oxidizing bacteria	0	<input checked="" type="checkbox"/> 1	2	3
14. Leaf litter	1.5	1	<input checked="" type="checkbox"/> 0.5	0
15. Sediment on plants or debris	0	0.5	<input checked="" type="checkbox"/> 1	1.5
16. Organic debris lines or piles	0	0.5	<input checked="" type="checkbox"/> 1	1.5
17. Soil-based evidence of high water table?	No = 0		<input checked="" type="checkbox"/> Yes = 3	

C. Biology (Subtotal = <u>4.75</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<input checked="" type="checkbox"/> 1	0
19. Rooted upland plants in streambed	3	<input checked="" type="checkbox"/> 2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<input checked="" type="checkbox"/> 1	2	3
21. Aquatic Mollusks	<input checked="" type="checkbox"/> 0	1	2	3
22. Fish	<input checked="" type="checkbox"/> 0	0.5	1	1.5
23. Crayfish	<input checked="" type="checkbox"/> 0	0.5	1	1.5
24. Amphibians	<input checked="" type="checkbox"/> 0	0.5	1	1.5
25. Algae	<input checked="" type="checkbox"/> 0	0.5	1	1.5
26. Wetland plants in streambed	<input checked="" type="checkbox"/> FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** Small perennial stream that begins as ephemeral channel and flows into SC.

Sketch:

## SC – UT to Deep River

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/12/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.985015
<b>Evaluator:</b>	<b>County:</b> Guilford County	<b>Longitude:</b> -79.960209
<b>Total Points:</b> <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> <b>37.5</b>	<b>Stream Determination (circle one)</b> Ephemeral Intermittent <input type="checkbox"/> <b>Perennial</b> <input checked="" type="checkbox"/>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>20</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	<input checked="" type="checkbox"/> 3
2. Sinuosity of channel along thalweg	0	1	2	<input checked="" type="checkbox"/> 3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<input type="checkbox"/> 2	3
4. Particle size of stream substrate	0	<input type="checkbox"/> 1	2	3
5. Active/relict floodplain	0	1	<input type="checkbox"/> 2	3
6. Depositional bars or benches	0	1	2	<input checked="" type="checkbox"/> 3
7. Recent alluvial deposits	0	<input type="checkbox"/> 1	2	3
8. Headcuts	<input type="checkbox"/> 0	1	2	3
9. Grade control	0	<input type="checkbox"/> 0.5	1	1.5
10. Natural valley	0	0.5	1	<input type="checkbox"/> 1.5
11. Second or greater order channel	No = 0		<input type="checkbox"/> Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>9.5</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	2	<input checked="" type="checkbox"/> 3
13. Iron oxidizing bacteria	0	<input type="checkbox"/> 1	2	3
14. Leaf litter	1.5	1	<input type="checkbox"/> 0.5	0
15. Sediment on plants or debris	0	0.5	<input type="checkbox"/> 1	1.5
16. Organic debris lines or piles	0	0.5	<input type="checkbox"/> 1	1.5
17. Soil-based evidence of high water table?	No = 0		<input type="checkbox"/> Yes = 3	

C. Biology (Subtotal = <u>8</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	<input type="checkbox"/> 3	2	1	0
19. Rooted upland plants in streambed	<input type="checkbox"/> 3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<input type="checkbox"/> 1	2	3
21. Aquatic Mollusks	<input type="checkbox"/> 0	1	2	3
22. Fish	<input type="checkbox"/> 0	0.5	1	1.5
23. Crayfish	0	<input type="checkbox"/> 0.5	1	1.5
24. Amphibians	0	<input type="checkbox"/> 0.5	1	1.5
25. Algae	<input type="checkbox"/> 0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5		<input type="checkbox"/> Other = 0	

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:**

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**Sketch:**

## SD-int – UT to Deep River

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/12/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.984975
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.949553
<b>Total Points:</b> <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> <b>21.5</b>	<b>Stream Determination (circle one)</b> Ephemeral <input type="checkbox"/> <b>Intermittent</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>7</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	<input checked="" type="checkbox"/> 2	3
2. Sinuosity of channel along thalweg	0	<input checked="" type="checkbox"/> 1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<input checked="" type="checkbox"/> 1	2	3
4. Particle size of stream substrate	0	<input checked="" type="checkbox"/> 1	2	3
5. Active/relict floodplain	<input checked="" type="checkbox"/> 0	1	2	3
6. Depositional bars or benches	0	<input checked="" type="checkbox"/> 1	2	3
7. Recent alluvial deposits	<input checked="" type="checkbox"/> 0	1	2	3
8. Headcuts	<input checked="" type="checkbox"/> 0	1	2	3
9. Grade control	<input checked="" type="checkbox"/> 0	0.5	1	1.5
10. Natural valley	0	0.5	<input checked="" type="checkbox"/> 1	1.5
11. Second or greater order channel	<input checked="" type="checkbox"/> No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<input checked="" type="checkbox"/> 1	2	3
13. Iron oxidizing bacteria	0	1	2	<input checked="" type="checkbox"/> 3
14. Leaf litter	1.5	<input checked="" type="checkbox"/> 1	0.5	0
15. Sediment on plants or debris	<input checked="" type="checkbox"/> 0	0.5	1	1.5
16. Organic debris lines or piles	<input checked="" type="checkbox"/> 0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		<input checked="" type="checkbox"/> Yes = 3	

C. Biology (Subtotal = <u>6.5</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	<input checked="" type="checkbox"/> 3	2	1	0
19. Rooted upland plants in streambed	<input checked="" type="checkbox"/> 3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<input checked="" type="checkbox"/> 0	1	2	3
21. Aquatic Mollusks	<input checked="" type="checkbox"/> 0	1	2	3
22. Fish	<input checked="" type="checkbox"/> 0	0.5	1	1.5
23. Crayfish	0	<input checked="" type="checkbox"/> 0.5	1	1.5
24. Amphibians	<input checked="" type="checkbox"/> 0	0.5	1	1.5
25. Algae	<input checked="" type="checkbox"/> 0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <input checked="" type="checkbox"/> Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** Upper intermittent portion of SD, at the base of a steep man made hill. Stream is deeply incised and there are lots of obstructions in the channel such as old farm equipment and tires.

Sketch:

## SD-per – UT to Deep River

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/12/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.984634
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.949189
<b>Total Points:</b> <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> <b>34.5</b>	<b>Stream Determination (circle one)</b> Ephemeral Intermittent <input type="checkbox"/> <b>Perennial</b> <input checked="" type="checkbox"/>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>19</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	<input checked="" type="checkbox"/> 3
2. Sinuosity of channel along thalweg	0	1	2	<input checked="" type="checkbox"/> 3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<input type="checkbox"/> 2	3
4. Particle size of stream substrate	0	1	2	<input checked="" type="checkbox"/> 3
5. Active/relict floodplain	0	1	<input type="checkbox"/> 2	3
6. Depositional bars or benches	0	1	<input type="checkbox"/> 2	3
7. Recent alluvial deposits	<input type="checkbox"/> 0	1	2	3
8. Headcuts	0	1	<input type="checkbox"/> 2	3
9. Grade control	0	<input type="checkbox"/> 0.5	1	1.5
10. Natural valley	0	0.5	1	<input type="checkbox"/> 1.5
11. Second or greater order channel	<input type="checkbox"/> No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<input type="checkbox"/> 2	3
13. Iron oxidizing bacteria	0	1	<input type="checkbox"/> 2	3
14. Leaf litter	1.5	<input type="checkbox"/> 1	0.5	0
15. Sediment on plants or debris	<input type="checkbox"/> 0	0.5	1	1.5
16. Organic debris lines or piles	<input type="checkbox"/> 0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		<input type="checkbox"/> Yes = 3	

C. Biology (Subtotal = <u>7.5</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	<input type="checkbox"/> 3	2	1	0
19. Rooted upland plants in streambed	<input type="checkbox"/> 3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<input type="checkbox"/> 1	2	3
21. Aquatic Mollusks	<input type="checkbox"/> 0	1	2	3
22. Fish	<input type="checkbox"/> 0	0.5	1	1.5
23. Crayfish	0	<input type="checkbox"/> 0.5	1	1.5
24. Amphibians	<input type="checkbox"/> 0	0.5	1	1.5
25. Algae	<input type="checkbox"/> 0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <input type="checkbox"/> Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** Lower perennial portion of SD, stream is moderately incised.

Sketch:

## SE – UT to Deep River

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/12/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.984203
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.948799
<b>Total Points:</b> <i>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30</math>*</i> <b>28</b>	<b>Stream Determination (circle one)</b> Ephemeral Intermittent <b>Perennial</b>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>12</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	<b>3</b>
2. Sinuosity of channel along thalweg	0	<b>1</b>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	<b>0</b>	1	2	3
4. Particle size of stream substrate	0	<b>1</b>	2	3
5. Active/relict floodplain	0	1	<b>2</b>	3
6. Depositional bars or benches	<b>0</b>	1	2	3
7. Recent alluvial deposits	0	1	<b>2</b>	3
8. Headcuts	0	1	<b>2</b>	3
9. Grade control	<b>0</b>	0.5	1	1.5
10. Natural valley	0	0.5	<b>1</b>	1.5
11. Second or greater order channel	<b>No = 0</b>		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>10</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<b>2</b>	3
13. Iron oxidizing bacteria	0	1	2	<b>3</b>
14. Leaf litter	1.5	1	<b>0.5</b>	0
15. Sediment on plants or debris	0	0.5	<b>1</b>	1.5
16. Organic debris lines or piles	0	<b>0.5</b>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<b>Yes = 3</b>	

C. Biology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	<b>3</b>	2	1	0
19. Rooted upland plants in streambed	<b>3</b>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<b>0</b>	1	2	3
21. Aquatic Mollusks	<b>0</b>	1	2	3
22. Fish	<b>0</b>	0.5	1	1.5
23. Crayfish	<b>0</b>	0.5	1	1.5
24. Amphibians	<b>0</b>	0.5	1	1.5
25. Algae	<b>0</b>	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <b>Other = 0</b>			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** Very short stream that appears to have an underground source beneath a hill, possibly from the pond outside the study area on top of the ridge. This stream flows into SD.

Sketch:

## SF – UT to Deep River

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/12/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.984665
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.949363
<b>Total Points:</b> <i>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30</math>*</i> 19	<b>Stream Determination (circle one)</b> Ephemeral <input type="checkbox"/> <b>Intermittent</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>5.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	<input type="checkbox"/> 1	2	3
2. Sinuosity of channel along thalweg	0	<input type="checkbox"/> 1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	<input type="checkbox"/> 0	1	2	3
4. Particle size of stream substrate	0	<input type="checkbox"/> 1	2	3
5. Active/relict floodplain	0	<input type="checkbox"/> 1	2	3
6. Depositional bars or benches	<input type="checkbox"/> 0	1	2	3
7. Recent alluvial deposits	<input type="checkbox"/> 0	1	2	3
8. Headcuts	<input type="checkbox"/> 0	1	2	3
9. Grade control	0	<input type="checkbox"/> 0.5	1	1.5
10. Natural valley	0	0.5	<input type="checkbox"/> 1	1.5
11. Second or greater order channel	<input type="checkbox"/> No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>7.5</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<input type="checkbox"/> 1	2	3
13. Iron oxidizing bacteria	0	1	2	<input type="checkbox"/> 3
14. Leaf litter	1.5	1	<input type="checkbox"/> 0.5	0
15. Sediment on plants or debris	<input type="checkbox"/> 0	0.5	1	1.5
16. Organic debris lines or piles	<input type="checkbox"/> 0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		<input type="checkbox"/> Yes = 3	

C. Biology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	<input type="checkbox"/> 3	2	1	0
19. Rooted upland plants in streambed	<input type="checkbox"/> 3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<input type="checkbox"/> 0	1	2	3
21. Aquatic Mollusks	<input type="checkbox"/> 0	1	2	3
22. Fish	<input type="checkbox"/> 0	0.5	1	1.5
23. Crayfish	<input type="checkbox"/> 0	0.5	1	1.5
24. Amphibians	<input type="checkbox"/> 0	0.5	1	1.5
25. Algae	<input type="checkbox"/> 0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <input type="checkbox"/> Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** SF has almost no flow and appears to be almost a stagnant pool of iron oxidizing bacteria. SF flows underground and then into SD.

Sketch:

## SH – UT to Deep River

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/12/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.984941
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.943049
<b>Total Points:</b> <i>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30</math>*</i> <b>19.5</b>	<b>Stream Determination (circle one)</b> Ephemeral <input type="checkbox"/> <b>Intermittent</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>13.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	<input checked="" type="checkbox"/> 3
2. Sinuosity of channel along thalweg	0	1	<input checked="" type="checkbox"/> 2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<input checked="" type="checkbox"/> 1	2	3
4. Particle size of stream substrate	0	1	2	<input checked="" type="checkbox"/> 3
5. Active/relict floodplain	0	<input checked="" type="checkbox"/> 1	2	3
6. Depositional bars or benches	<input checked="" type="checkbox"/> 0	1	2	3
7. Recent alluvial deposits	<input checked="" type="checkbox"/> 0	1	2	3
8. Headcuts	0	<input checked="" type="checkbox"/> 1	2	3
9. Grade control	0	0.5	<input checked="" type="checkbox"/> 1	1.5
10. Natural valley	0	0.5	1	<input checked="" type="checkbox"/> 1.5
11. Second or greater order channel	<input checked="" type="checkbox"/> No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>0</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	<input checked="" type="checkbox"/> 0	1	2	3
13. Iron oxidizing bacteria	<input checked="" type="checkbox"/> 0	1	2	3
14. Leaf litter	1.5	1	0.5	<input checked="" type="checkbox"/> 0
15. Sediment on plants or debris	<input checked="" type="checkbox"/> 0	0.5	1	1.5
16. Organic debris lines or piles	<input checked="" type="checkbox"/> 0	0.5	1	1.5
17. Soil-based evidence of high water table?	<input checked="" type="checkbox"/> No = 0		Yes = 3	

C. Biology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	<input checked="" type="checkbox"/> 3	2	1	0
19. Rooted upland plants in streambed	<input checked="" type="checkbox"/> 3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<input checked="" type="checkbox"/> 0	1	2	3
21. Aquatic Mollusks	<input checked="" type="checkbox"/> 0	1	2	3
22. Fish	<input checked="" type="checkbox"/> 0	0.5	1	1.5
23. Crayfish	<input checked="" type="checkbox"/> 0	0.5	1	1.5
24. Amphibians	<input checked="" type="checkbox"/> 0	0.5	1	1.5
25. Algae	<input checked="" type="checkbox"/> 0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <input checked="" type="checkbox"/> Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** Intermittent stream that flows into Deep River. Middle section of stream was not restored properly when sewer easement was installed.

Sketch:



## SI – UT to Deep River

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/18/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.985239
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.937275
<b>Total Points:</b> <i>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30</math>*</i> <b>33</b>	<b>Stream Determination (circle one)</b> Ephemeral Intermittent <b>Perennial</b>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>16.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	2	<u>3</u>
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	1	2	<u>3</u>
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	<u>0</u>	1	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>9.5</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	2	<u>3</u>
13. Iron oxidizing bacteria	0	1	<u>2</u>	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	<u>0</u>	0.5	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>7</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	<u>3</u>	2	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	<u>0</u>	0.5	1	1.5
25. Algae	0	0.5	<u>1</u>	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <u>Other = 0</u>			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** SI is a small intermittent channel that flows from wetland WC and into stream SJ.

Sketch:

## SJ – UT to Deep River

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/18/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.985132
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.937455
<b>Total Points:</b> <i>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30</math>*</i> <b>14.5</b>	<b>Stream Determination (circle one)</b> Ephemeral <input type="checkbox"/> <b>Intermittent</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	<input type="checkbox"/> 1	2	3
2. Sinuosity of channel along thalweg	0	<input type="checkbox"/> 1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<input type="checkbox"/> 1	2	3
4. Particle size of stream substrate	0	<input type="checkbox"/> 1	2	3
5. Active/relict floodplain	0	<input type="checkbox"/> 1	2	3
6. Depositional bars or benches	<input type="checkbox"/> 0	1	2	3
7. Recent alluvial deposits	<input type="checkbox"/> 0	1	2	3
8. Headcuts	<input type="checkbox"/> 0	1	2	3
9. Grade control	<input type="checkbox"/> 0	0.5	1	1.5
10. Natural valley	0	0.5	<input type="checkbox"/> 1	1.5
11. Second or greater order channel	<input type="checkbox"/> No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<input type="checkbox"/> 2	3
13. Iron oxidizing bacteria	<input type="checkbox"/> 0	1	2	3
14. Leaf litter	1.5	<input type="checkbox"/> 1	0.5	0
15. Sediment on plants or debris	<input type="checkbox"/> 0	0.5	1	1.5
16. Organic debris lines or piles	<input type="checkbox"/> 0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		<input type="checkbox"/> Yes = 3	

C. Biology (Subtotal = <u>2.5</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<input type="checkbox"/> 1	0
19. Rooted upland plants in streambed	3	2	<input type="checkbox"/> 1	0
20. Macroinvertebrates (note diversity and abundance)	<input type="checkbox"/> 0	1	2	3
21. Aquatic Mollusks	<input type="checkbox"/> 0	1	2	3
22. Fish	<input type="checkbox"/> 0	0.5	1	1.5
23. Crayfish	<input type="checkbox"/> 0	0.5	1	1.5
24. Amphibians	<input type="checkbox"/> 0	0.5	1	1.5
25. Algae	0	<input type="checkbox"/> 0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <input type="checkbox"/> Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** SJ is a small intermittent stream that flows through wetland WC in a managed transmission line right-of-way.

Sketch:

## SK – UT to Bull Run

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/20/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.987207
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.925664
<b>Total Points:</b> <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> <b>36.5</b>	<b>Stream Determination (circle one)</b> Ephemeral Intermittent <input type="checkbox"/> <b>Perennial</b> <input checked="" type="checkbox"/>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>20.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	<input checked="" type="checkbox"/> 3
2. Sinuosity of channel along thalweg	0	1	2	<input checked="" type="checkbox"/> 3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<input type="checkbox"/> 2	3
4. Particle size of stream substrate	0	1	2	<input checked="" type="checkbox"/> 3
5. Active/relict floodplain	0	1	<input type="checkbox"/> 2	3
6. Depositional bars or benches	0	1	<input type="checkbox"/> 2	3
7. Recent alluvial deposits	0	<input type="checkbox"/> 1	2	3
8. Headcuts	0	1	<input type="checkbox"/> 2	3
9. Grade control	0	0.5	<input type="checkbox"/> 1	1.5
10. Natural valley	0	0.5	1	<input checked="" type="checkbox"/> 1.5
11. Second or greater order channel	<input checked="" type="checkbox"/> No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8.5</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<input type="checkbox"/> 2	3
13. Iron oxidizing bacteria	0	1	<input type="checkbox"/> 2	3
14. Leaf litter	1.5	1	<input type="checkbox"/> 0.5	0
15. Sediment on plants or debris	<input type="checkbox"/> 0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	<input type="checkbox"/> 1	1.5
17. Soil-based evidence of high water table?	No = 0		<input checked="" type="checkbox"/> Yes = 3	

C. Biology (Subtotal = <u>7.5</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	<input checked="" type="checkbox"/> 3	2	1	0
19. Rooted upland plants in streambed	<input checked="" type="checkbox"/> 3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<input type="checkbox"/> 1	2	3
21. Aquatic Mollusks	<input type="checkbox"/> 0	1	2	3
22. Fish	<input type="checkbox"/> 0	0.5	1	1.5
23. Crayfish	0	<input type="checkbox"/> 0.5	1	1.5
24. Amphibians	<input type="checkbox"/> 0	0.5	1	1.5
25. Algae	<input type="checkbox"/> 0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <input checked="" type="checkbox"/> Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

## SL-downstream – UT to Bull Run

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/20/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.988075
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.920559
<b>Total Points:</b> <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> <b>30.5</b>	<b>Stream Determination (circle one)</b> Ephemeral Intermittent <b>Perennial</b>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>18</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	<b>3</b>
2. Sinuosity of channel along thalweg	0	1	<b>2</b>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<b>2</b>	3
4. Particle size of stream substrate	0	1	2	<b>3</b>
5. Active/relict floodplain	0	1	<b>2</b>	3
6. Depositional bars or benches	0	1	<b>2</b>	3
7. Recent alluvial deposits	<b>0</b>	1	2	3
8. Headcuts	0	1	<b>2</b>	3
9. Grade control	0	<b>0.5</b>	1	1.5
10. Natural valley	0	0.5	1	<b>1.5</b>
11. Second or greater order channel	<b>No = 0</b>		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<b>1</b>	2	3
13. Iron oxidizing bacteria	0	<b>1</b>	2	3
14. Leaf litter	1.5	<b>1</b>	0.5	0
15. Sediment on plants or debris	<b>0</b>	0.5	1	1.5
16. Organic debris lines or piles	<b>0</b>	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		<b>Yes = 3</b>	

C. Biology (Subtotal = <u>6.5</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	<b>3</b>	2	1	0
19. Rooted upland plants in streambed	<b>3</b>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<b>0</b>	1	2	3
21. Aquatic Mollusks	<b>0</b>	1	2	3
22. Fish	<b>0</b>	0.5	1	1.5
23. Crayfish	0	<b>0.5</b>	1	1.5
24. Amphibians	<b>0</b>	0.5	1	1.5
25. Algae	<b>0</b>	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <b>Other = 0</b>			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** The downstream portion of SL is deeply incised and little flow was observed. SL and pond PC have been impacted by a beaver dam, which recently washed out.

Sketch:

## SL-upstream – UT to Bull Run

### NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/20/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.988783
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.918387
<b>Total Points:</b> <i>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30</math>*</i> <b>26.5</b>	<b>Stream Determination (circle one)</b> <b>Ephemeral Intermittent</b> <span style="border: 1px solid black; padding: 2px;">Perennial</span>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>14</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	<span style="border: 1px solid black; padding: 2px;">2</span>	3
2. Sinuosity of channel along thalweg	0	1	<span style="border: 1px solid black; padding: 2px;">2</span>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<span style="border: 1px solid black; padding: 2px;">1</span>	2	3
4. Particle size of stream substrate	0	<span style="border: 1px solid black; padding: 2px;">1</span>	2	3
5. Active/relict floodplain	0	1	<span style="border: 1px solid black; padding: 2px;">2</span>	3
6. Depositional bars or benches	0	<span style="border: 1px solid black; padding: 2px;">1</span>	2	3
7. Recent alluvial deposits	0	<span style="border: 1px solid black; padding: 2px;">1</span>	2	3
8. Headcuts	0	1	<span style="border: 1px solid black; padding: 2px;">2</span>	3
9. Grade control	0	0.5	<span style="border: 1px solid black; padding: 2px;">1</span>	1.5
10. Natural valley	0	0.5	<span style="border: 1px solid black; padding: 2px;">1</span>	1.5
11. Second or greater order channel	<span style="border: 1px solid black; padding: 2px;">No = 0</span>		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>9</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<span style="border: 1px solid black; padding: 2px;">2</span>	3
13. Iron oxidizing bacteria	0	1	<span style="border: 1px solid black; padding: 2px;">2</span>	3
14. Leaf litter	1.5	<span style="border: 1px solid black; padding: 2px;">1</span>	0.5	0
15. Sediment on plants or debris	0	<span style="border: 1px solid black; padding: 2px;">0.5</span>	1	1.5
16. Organic debris lines or piles	0	<span style="border: 1px solid black; padding: 2px;">0.5</span>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<span style="border: 1px solid black; padding: 2px;">Yes = 3</span>	

C. Biology (Subtotal = <u>3.5</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<span style="border: 1px solid black; padding: 2px;">1</span>	0
19. Rooted upland plants in streambed	3	2	<span style="border: 1px solid black; padding: 2px;">1</span>	0
20. Macroinvertebrates (note diversity and abundance)	<span style="border: 1px solid black; padding: 2px;">0</span>	1	2	3
21. Aquatic Mollusks	<span style="border: 1px solid black; padding: 2px;">0</span>	1	2	3
22. Fish	<span style="border: 1px solid black; padding: 2px;">0</span>	0.5	1	1.5
23. Crayfish	0	<span style="border: 1px solid black; padding: 2px;">0.5</span>	1	1.5
24. Amphibians	0	<span style="border: 1px solid black; padding: 2px;">0.5</span>	1	1.5
25. Algae	0	<span style="border: 1px solid black; padding: 2px;">0.5</span>	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <span style="border: 1px solid black; padding: 2px;">Other = 0</span>			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** The upstream portion of SL flows from pond PD, under Harvey Rd and into a pasture with horses. The horses have markedly impacted portions of the stream. SL then flows through wetland WF and into pond PC.

Sketch:

# SM – UT to Bull Run

## NC DWQ Stream Identification Form Version 4.11

<b>Date:</b> 4/18/2017	<b>Project/Site:</b> U-2412A	<b>Latitude:</b> 35.989131
<b>Evaluator:</b> R. Johnson/ AECOM	<b>County:</b> Guilford County	<b>Longitude:</b> -79.917501
<b>Total Points:</b> <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> <b>19</b>	<b>Stream Determination (circle one)</b> Ephemeral <input type="checkbox"/> <b>Intermittent</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/>	<b>Other</b> e.g. Quad Name: High Point East

A. Geomorphology (Subtotal = <u>7.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	<input checked="" type="checkbox"/> 2	3
2. Sinuosity of channel along thalweg	0	<input checked="" type="checkbox"/> 1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<input checked="" type="checkbox"/> 1	2	3
4. Particle size of stream substrate	0	<input checked="" type="checkbox"/> 1	2	3
5. Active/relict floodplain	<input checked="" type="checkbox"/> 0	1	2	3
6. Depositional bars or benches	0	<input checked="" type="checkbox"/> 1	2	3
7. Recent alluvial deposits	<input checked="" type="checkbox"/> 0	1	2	3
8. Headcuts	0	<input checked="" type="checkbox"/> 1	2	3
9. Grade control	<input checked="" type="checkbox"/> 0	0.5	1	1.5
10. Natural valley	0	<input checked="" type="checkbox"/> 0.5	1	1.5
11. Second or greater order channel	<input checked="" type="checkbox"/> No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<input checked="" type="checkbox"/> 2	3
13. Iron oxidizing bacteria	0	1	<input checked="" type="checkbox"/> 2	3
14. Leaf litter	1.5	<input checked="" type="checkbox"/> 1	0.5	0
15. Sediment on plants or debris	<input checked="" type="checkbox"/> 0	0.5	1	1.5
16. Organic debris lines or piles	<input checked="" type="checkbox"/> 0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		<input checked="" type="checkbox"/> Yes = 3	

C. Biology (Subtotal = <u>3.5</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<input checked="" type="checkbox"/> 2	1	0
19. Rooted upland plants in streambed	3	2	<input checked="" type="checkbox"/> 1	0
20. Macroinvertebrates (note diversity and abundance)	<input checked="" type="checkbox"/> 0	1	2	3
21. Aquatic Mollusks	<input checked="" type="checkbox"/> 0	1	2	3
22. Fish	<input checked="" type="checkbox"/> 0	0.5	1	1.5
23. Crayfish	<input checked="" type="checkbox"/> 0	0.5	1	1.5
24. Amphibians	<input checked="" type="checkbox"/> 0	0.5	1	1.5
25. Algae	0	<input checked="" type="checkbox"/> 0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <input checked="" type="checkbox"/> Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** SM is an intermittent stream on a roadside (Harvey Rd) that is highly manipulated. Some portions have large amounts of granite cobble and vegetation where it flows in front of a residence.

Sketch:

NC SAM FIELD ASSESSMENT FORM  
Accompanies User Manual Version 2.1

USACE AID #:

NCDWR #:

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/11/2017  
3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
5. County: Guilford 6. Nearest named water body  
7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep River  
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.985279; -79.964833

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SA 10. Length of assessment reach evaluated (feet): 591  
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1  Unable to assess channel depth.  
12. Channel width at top of bank (feet): 5 13. Is assessment reach a swamp stream?  Yes  No  
14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

**1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

- A Water throughout assessment reach.  
 B No flow, water in pools only.  
 C No water in assessment reach.

**2. Evidence of Flow Restriction – assessment reach metric**

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).  
 B Not A

**3. Feature Pattern – assessment reach metric**

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).  
 B Not A.

**4. Feature Longitudinal Profile – assessment reach metric**

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).  
 B Not A

**5. Signs of Active Instability – assessment reach metric**

**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable  
 B 10 to 25% of channel unstable  
 C > 25% of channel unstable

**6. Streamside Area Interaction – streamside area metric**

**Consider for the Left Bank (LB) and the Right Bank (RB).**

- LB RB  
 A  A Little or no evidence of conditions that adversely affect reference interaction  
 B  B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])  
 C  C Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching] or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |   |                                    |   |
|---|------------------------------------|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input checked="" type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal Marsh Streams only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|---|------------------------------------|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bedrock/saprolite
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Boulder (256 – 4096 mm)
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cobble (64 – 256 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Gravel (2 – 64 mm)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Sand (.062 – 2 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Silt/clay (< 0.062 mm)
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Detritus
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)



- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midge/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB RB

- A  A Little or no alteration to water storage capacity over a majority of the streamside area
- B  B Moderate alteration to water storage capacity over a majority of the streamside area
- C  C Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB RB

- A  A Majority of streamside area with depressions able to pond water  $\geq$  6 inches deep
- B  B Majority of streamside area with depressions able to pond water 3 to 6 inches deep
- C  C Majority of streamside area with depressions able to pond water < 3 inches deep

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB RB

- Y  Y Are wetlands present in the streamside area?
- N  N

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated Wooded

LB RB LB RB

- A  A  A  A  $\geq$  100-feet wide or extends to the edge of the watershed
- B  B  B  B From 50 to < 100-feet wide
- C  C  C  C From 30 to < 50-feet wide
- D  D  D  D From 10 to < 30-feet wide
- E  E  E  E < 10-feet wide or no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB RB

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	Row crops
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	Maintained turf
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	Pasture (no livestock)/commercial horticulture
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Medium to high stem density  |
| <input type="radio"/> B            | <input type="radio"/> B            | Low stem density   |
| <input type="radio"/> C            | <input type="radio"/> C            | No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground |

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

- | LB                                 | RB                                 |   |
|------------------------------------|------------------------------------|---|
| <input type="radio"/> A            | <input type="radio"/> A            | The total length of buffer breaks is < 25 percent.              |
| <input type="radio"/> B            | <input type="radio"/> B            | The total length of buffer breaks is between 25 and 50 percent. |
| <input checked="" type="radio"/> C | <input checked="" type="radio"/> C | The total length of buffer breaks is > 50 percent.              |

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input type="radio"/> A            | <input type="radio"/> A            | Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.   |
| <input type="radio"/> B            | <input checked="" type="radio"/> B | Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees. |
| <input checked="" type="radio"/> C | <input type="radio"/> C            | Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.  |

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

- A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Perennial stream that flows into Owens Lake (PA).

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A  
 Stream Category Pa1

Date of Evaluation 4/11/2017  
 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	HIGH	
(3) Stream Stability	MEDIUM	
(4) Channel Stability	LOW	
(4) Sediment Transport	MEDIUM	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	HIGH	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	MEDIUM	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	HIGH	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	MEDIUM	
(3) Baseflow	HIGH	
(3) Substrate	MEDIUM	
(3) Stream Stability	LOW	
(3) In-stream Habitat	MEDIUM	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	MEDIUM	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
<b>Overall</b>	<b>HIGH</b>	

**NC SAM FIELD ASSESSMENT FORM**  
Accompanies User Manual Version 2.1

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: \_\_\_\_\_  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep River  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.985011, -79.960417

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SB 10. Length of assessment reach evaluated (feet): 120  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 5 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

- Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
  - A Water throughout assessment reach.
  - B No flow, water in pools only.
  - C No water in assessment reach.
- Evidence of Flow Restriction – assessment reach metric**
  - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
  - B Not A
- Feature Pattern – assessment reach metric**
  - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
  - B Not A.
- Feature Longitudinal Profile – assessment reach metric**
  - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
  - B Not A
- Signs of Active Instability – assessment reach metric**  
**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
  - A < 10% of channel unstable
  - B 10 to 25% of channel unstable
  - C > 25% of channel unstable
- Streamside Area Interaction – streamside area metric**  
**Consider for the Left Bank (LB) and the Right Bank (RB).**

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input type="radio"/> B	<input type="radio"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="radio"/> C	<input type="radio"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input checked="" type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal<br>Marsh Streams<br>only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|--|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bedrock/saprolite
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Boulder (256 – 4096 mm)
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cobble (64 – 256 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Gravel (2 – 64 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sand (.062 – 2 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Silt/clay (< 0.062 mm)
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Detritus
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
  - Aquatic reptiles
  - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midge/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB RB

- A  A Little or no alteration to water storage capacity over a majority of the streamside area
- B  B Moderate alteration to water storage capacity over a majority of the streamside area
- C  C Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB RB

- A  A Majority of streamside area with depressions able to pond water  $\geq$  6 inches deep
- B  B Majority of streamside area with depressions able to pond water 3 to 6 inches deep
- C  C Majority of streamside area with depressions able to pond water < 3 inches deep

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB RB

- Y  Y Are wetlands present in the streamside area?
- N  N

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated Wooded

LB RB LB RB

- A  A  A  A  $\geq$  100-feet wide or extends to the edge of the watershed
- B  B  B  B From 50 to < 100-feet wide
- C  C  C  C From 30 to < 50-feet wide
- D  D  D  D From 10 to < 30-feet wide
- E  E  E  E < 10-feet wide or no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB RB

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

- | Abuts                   |                                    | < 30 feet               |                         | 30-50 feet                         |                         |  |
|-------------------------|------------------------------------|-------------------------|-------------------------|------------------------------------|-------------------------|--|
| LB                      | RB                                 | LB                      | RB                      | LB                                 | RB                      |  |
| <input type="radio"/> A | <input type="radio"/> A            | <input type="radio"/> A | <input type="radio"/> A | <input type="radio"/> A            | <input type="radio"/> A | Row crops                                      |
| <input type="radio"/> B | <input type="radio"/> B            | <input type="radio"/> B | <input type="radio"/> B | <input type="radio"/> B            | <input type="radio"/> B | Maintained turf                                |
| <input type="radio"/> C | <input checked="" type="radio"/> C | <input type="radio"/> C | <input type="radio"/> C | <input checked="" type="radio"/> C | <input type="radio"/> C | Pasture (no livestock)/commercial horticulture |
| <input type="radio"/> D | <input type="radio"/> D            | <input type="radio"/> D | <input type="radio"/> D | <input type="radio"/> D            | <input type="radio"/> D | Pasture (active livestock use)                 |

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input type="radio"/> A            | <input type="radio"/> A            | Medium to high stem density  |
| <input checked="" type="radio"/> B | <input type="radio"/> B            | Low stem density   |
| <input type="radio"/> C            | <input checked="" type="radio"/> C | No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground |

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

- | LB                                 | RB                                 |   |
|------------------------------------|------------------------------------|---|
| <input checked="" type="radio"/> A | <input type="radio"/> A            | The total length of buffer breaks is < 25 percent.              |
| <input type="radio"/> B            | <input type="radio"/> B            | The total length of buffer breaks is between 25 and 50 percent. |
| <input type="radio"/> C            | <input checked="" type="radio"/> C | The total length of buffer breaks is > 50 percent.              |

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input type="radio"/> A            | <input type="radio"/> A            | Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.   |
| <input checked="" type="radio"/> B | <input type="radio"/> B            | Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees. |
| <input type="radio"/> C            | <input checked="" type="radio"/> C | Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.  |

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

- A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

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**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A  
 Stream Category Pa1

Date of Evaluation \_\_\_\_\_  
 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) NO  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	LOW	
(4) Microtopography	HIGH	
(3) Stream Stability	HIGH	
(4) Channel Stability	HIGH	
(4) Sediment Transport	MEDIUM	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	LOW	
(3) Upland Pollutant Filtration	LOW	
(3) Thermoregulation	LOW	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	LOW	
(3) Baseflow	HIGH	
(3) Substrate	MEDIUM	
(3) Stream Stability	HIGH	
(3) In-stream Habitat	LOW	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	LOW	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
Overall	LOW	



**NC SAM FIELD ASSESSMENT FORM**  
Accompanies User Manual Version 2.1

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/12/2017  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep River  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.985015, -79.960209

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SC 10. Length of assessment reach evaluated (feet): 438  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 0.5-3  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 1-3 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

**1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

- A Water throughout assessment reach.  
 B No flow, water in pools only.  
 C No water in assessment reach.

**2. Evidence of Flow Restriction – assessment reach metric**

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).  
 B Not A

**3. Feature Pattern – assessment reach metric**

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).  
 B Not A.

**4. Feature Longitudinal Profile – assessment reach metric**

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).  
 B Not A

**5. Signs of Active Instability – assessment reach metric**

- Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).  
 A < 10% of channel unstable  
 B 10 to 25% of channel unstable  
 C > 25% of channel unstable

**6. Streamside Area Interaction – streamside area metric**

**Consider for the Left Bank (LB) and the Right Bank (RB).**

- |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---|
| LB                                    | RB                                    |   |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access  |

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? **If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).**

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. Check all that occur (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- |  |                                    |   |
|--|------------------------------------|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal Marsh Streams only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|------------------------------------|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams).** Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Bedrock/saprolite
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Boulder (256 – 4096 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Cobble (64 – 256 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Gravel (2 – 64 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sand (.062 – 2 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Silt/clay (< 0.062 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Detritus
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? **(skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB                                 | RB                                 |   |
|------------------------------------|------------------------------------|---|
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> C            | <input type="radio"/> C            | Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Majority of streamside area with depressions able to pond water $\geq$ 6 inches deep |
| <input type="radio"/> B            | <input type="radio"/> B            | Majority of streamside area with depressions able to pond water 3 to 6 inches deep   |
| <input type="radio"/> C            | <input type="radio"/> C            | Majority of streamside area with depressions able to pond water < 3 inches deep      |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input checked="" type="radio"/> Y | <input checked="" type="radio"/> Y | Are wetlands present in the streamside area? |
| <input type="radio"/> N            | <input type="radio"/> N            |  |

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

- | Vegetated                          |                                    | Wooded                  |                         |   |
|------------------------------------|------------------------------------|-------------------------|-------------------------|---|
| LB                                 | RB                                 | LB                      | RB                      |   |
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | <input type="radio"/> A | <input type="radio"/> A | $\geq$ 100-feet wide <u>or</u> extends to the edge of the watershed |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B | <input type="radio"/> B | From 50 to < 100-feet wide  |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C | <input type="radio"/> C | From 30 to < 50-feet wide   |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D | <input type="radio"/> D | From 10 to < 30-feet wide   |
| <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E | <input type="radio"/> E | < 10-feet wide <u>or</u> no trees                                   |

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB
----	----

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Perennial stream surrounded by fallow pasture with small tree buffer.

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A  
 Stream Category Pa1

Date of Evaluation 4/12/2017  
 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>HIGH</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Flood Flow	<b>HIGH</b>	
(3) Streamside Area Attenuation	<b>HIGH</b>	
(4) Floodplain Access	<b>HIGH</b>	
(4) Wooded Riparian Buffer	<b>MEDIUM</b>	
(4) Microtopography	<b>HIGH</b>	
(3) Stream Stability	<b>HIGH</b>	
(4) Channel Stability	<b>HIGH</b>	
(4) Sediment Transport	<b>MEDIUM</b>	
(4) Stream Geomorphology	<b>HIGH</b>	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	<b>LOW</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Streamside Area Vegetation	<b>MEDIUM</b>	
(3) Upland Pollutant Filtration	<b>MEDIUM</b>	
(3) Thermoregulation	<b>MEDIUM</b>	
(2) Indicators of Stressors	<b>NO</b>	
(2) Aquatic Life Tolerance	<b>LOW</b>	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	<b>LOW</b>	
(2) In-stream Habitat	<b>LOW</b>	
(3) Baseflow	<b>HIGH</b>	
(3) Substrate	<b>MEDIUM</b>	
(3) Stream Stability	<b>HIGH</b>	
(3) In-stream Habitat	<b>LOW</b>	
(2) Stream-side Habitat	<b>MEDIUM</b>	
(3) Stream-side Habitat	<b>MEDIUM</b>	
(3) Thermoregulation	<b>MEDIUM</b>	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
<b>Overall</b>	<b>LOW</b>	

**NC SAM FIELD ASSESSMENT FORM**  
Accompanies User Manual Version 2.1

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/12/2017  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep River  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.984634, -79.949189

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SD 10. Length of assessment reach evaluated (feet): 487  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 5-10 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
  - A Water throughout assessment reach.
  - B No flow, water in pools only.
  - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
  - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
  - B Not A
3. **Feature Pattern – assessment reach metric**
  - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
  - B Not A.
4. **Feature Longitudinal Profile – assessment reach metric**
  - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
  - B Not A
5. **Signs of Active Instability – assessment reach metric**  
**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
  - A < 10% of channel unstable
  - B 10 to 25% of channel unstable
  - C > 25% of channel unstable
6. **Streamside Area Interaction – streamside area metric**  
**Consider for the Left Bank (LB) and the Right Bank (RB).**

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input type="radio"/> B	<input type="radio"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="radio"/> C	<input type="radio"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching] or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |  |                                    |   |
|--|------------------------------------|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input checked="" type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal Marsh Streams only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|------------------------------------|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bedrock/saprolite
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Boulder (256 – 4096 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cobble (64 – 256 mm)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Gravel (2 – 64 mm)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Sand (.062 – 2 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Silt/clay (< 0.062 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Detritus
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
  - Aquatic reptiles
  - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB RB

- A  A Little or no alteration to water storage capacity over a majority of the streamside area
- B  B Moderate alteration to water storage capacity over a majority of the streamside area
- C  C Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB RB

- A  A Majority of streamside area with depressions able to pond water  $\geq$  6 inches deep
- B  B Majority of streamside area with depressions able to pond water 3 to 6 inches deep
- C  C Majority of streamside area with depressions able to pond water < 3 inches deep

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB RB

- Y  Y Are wetlands present in the streamside area?
- N  N

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated Wooded

LB RB LB RB

- A  A  A  A  $\geq$  100-feet wide or extends to the edge of the watershed
- B  B  B  B From 50 to < 100-feet wide
- C  C  C  C From 30 to < 50-feet wide
- D  D  D  D From 10 to < 30-feet wide
- E  E  E  E < 10-feet wide or no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB RB



- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	Row crops
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	Maintained turf
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	Pasture (no livestock)/commercial horticulture
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Medium to high stem density
<input type="radio"/> B	<input type="radio"/> B	Low stem density
<input type="radio"/> C	<input type="radio"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	The total length of buffer breaks is < 25 percent.
<input type="radio"/> B	<input type="radio"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="radio"/> C	<input type="radio"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="radio"/> A	<input type="radio"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="radio"/> B	<input checked="" type="radio"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="radio"/> C	<input type="radio"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Intermittent stream that becomes perennial approximately at woodline. The intermittent portion is at the base of a very steep and large man made berm. The channel in this area is extremely channelized and downcut with various pieces of equipment and trash in the channel.

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A  
 Stream Category Pa1

Date of Evaluation 4/12/2017  
 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>HIGH</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Flood Flow	<b>HIGH</b>	
(3) Streamside Area Attenuation	<b>HIGH</b>	
(4) Floodplain Access	<b>HIGH</b>	
(4) Wooded Riparian Buffer	<b>HIGH</b>	
(4) Microtopography	<b>HIGH</b>	
(3) Stream Stability	<b>HIGH</b>	
(4) Channel Stability	<b>HIGH</b>	
(4) Sediment Transport	<b>MEDIUM</b>	
(4) Stream Geomorphology	<b>HIGH</b>	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	<b>MEDIUM</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Streamside Area Vegetation	<b>HIGH</b>	
(3) Upland Pollutant Filtration	<b>HIGH</b>	
(3) Thermoregulation	<b>HIGH</b>	
(2) Indicators of Stressors	<b>NO</b>	
(2) Aquatic Life Tolerance	<b>LOW</b>	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	<b>LOW</b>	
(2) In-stream Habitat	<b>LOW</b>	
(3) Baseflow	<b>HIGH</b>	
(3) Substrate	<b>MEDIUM</b>	
(3) Stream Stability	<b>HIGH</b>	
(3) In-stream Habitat	<b>LOW</b>	
(2) Stream-side Habitat	<b>HIGH</b>	
(3) Stream-side Habitat	<b>HIGH</b>	
(3) Thermoregulation	<b>HIGH</b>	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
<b>Overall</b>	<b>MEDIUM</b>	

NC SAM FIELD ASSESSMENT FORM  
Accompanies User Manual Version 2.1

USACE AID #:

NCDWR #:

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/12/2017  
3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
5. County: Guilford 6. Nearest named water body  
7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep River  
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.984203, -79.948799

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SE 10. Length of assessment reach evaluated (feet): 30  
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1  Unable to assess channel depth.  
12. Channel width at top of bank (feet): 3 13. Is assessment reach a swamp stream?  Yes  No  
14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

**1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

- A Water throughout assessment reach.  
 B No flow, water in pools only.  
 C No water in assessment reach.

**2. Evidence of Flow Restriction – assessment reach metric**

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).  
 B Not A

**3. Feature Pattern – assessment reach metric**

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).  
 B Not A.

**4. Feature Longitudinal Profile – assessment reach metric**

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).  
 B Not A

**5. Signs of Active Instability – assessment reach metric**

**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable  
 B 10 to 25% of channel unstable  
 C > 25% of channel unstable

**6. Streamside Area Interaction – streamside area metric**

**Consider for the Left Bank (LB) and the Right Bank (RB).**

- LB RB  
 A  A Little or no evidence of conditions that adversely affect reference interaction  
 B  B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])  
 C  C Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access)

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |  |                                    |   |
|--|------------------------------------|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input checked="" type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal Marsh Streams only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|------------------------------------|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bedrock/saprolite
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Boulder (256 – 4096 mm)
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cobble (64 – 256 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Gravel (2 – 64 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sand (.062 – 2 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Silt/clay (< 0.062 mm)
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Detritus
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midge/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB RB

- A  A Little or no alteration to water storage capacity over a majority of the streamside area
- B  B Moderate alteration to water storage capacity over a majority of the streamside area
- C  C Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB RB

- A  A Majority of streamside area with depressions able to pond water  $\geq$  6 inches deep
- B  B Majority of streamside area with depressions able to pond water 3 to 6 inches deep
- C  C Majority of streamside area with depressions able to pond water < 3 inches deep

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB RB

- Y  Y Are wetlands present in the streamside area?
- N  N

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated Wooded

LB RB LB RB

- A  A  A  A  $\geq$  100-feet wide or extends to the edge of the watershed
- B  B  B  B From 50 to < 100-feet wide
- C  C  C  C From 30 to < 50-feet wide
- D  D  D  D From 10 to < 30-feet wide
- E  E  E  E < 10-feet wide or no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB RB

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	Row crops
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	Maintained turf
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	Pasture (no livestock)/commercial horticulture
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Medium to high stem density
<input type="radio"/> B	<input type="radio"/> B	Low stem density
<input type="radio"/> C	<input type="radio"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	The total length of buffer breaks is < 25 percent.
<input type="radio"/> B	<input type="radio"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="radio"/> C	<input type="radio"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="radio"/> B	<input type="radio"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="radio"/> C	<input type="radio"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Small perennial stream that flows into SD, originates from seep upslope.

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A  
 Stream Category Pa1

Date of Evaluation 4/12/2017  
 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>HIGH</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Flood Flow	<b>HIGH</b>	
(3) Streamside Area Attenuation	<b>HIGH</b>	
(4) Floodplain Access	<b>HIGH</b>	
(4) Wooded Riparian Buffer	<b>HIGH</b>	
(4) Microtopography	<b>HIGH</b>	
(3) Stream Stability	<b>HIGH</b>	
(4) Channel Stability	<b>HIGH</b>	
(4) Sediment Transport	<b>MEDIUM</b>	
(4) Stream Geomorphology	<b>HIGH</b>	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	<b>MEDIUM</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Streamside Area Vegetation	<b>HIGH</b>	
(3) Upland Pollutant Filtration	<b>HIGH</b>	
(3) Thermoregulation	<b>HIGH</b>	
(2) Indicators of Stressors	<b>NO</b>	
(2) Aquatic Life Tolerance	<b>LOW</b>	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	<b>LOW</b>	
(2) In-stream Habitat	<b>LOW</b>	
(3) Baseflow	<b>HIGH</b>	
(3) Substrate	<b>MEDIUM</b>	
(3) Stream Stability	<b>HIGH</b>	
(3) In-stream Habitat	<b>LOW</b>	
(2) Stream-side Habitat	<b>HIGH</b>	
(3) Stream-side Habitat	<b>HIGH</b>	
(3) Thermoregulation	<b>HIGH</b>	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
<b>Overall</b>	<b>MEDIUM</b>	

**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/12/2017  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep River  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.984665, -79.949363

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SF 10. Length of assessment reach evaluated (feet): 104  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 0.5  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 4 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed ( I  II  III  IV  V)  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
  - A Water throughout assessment reach.
  - B No flow, water in pools only.
  - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
  - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
  - B Not A
3. **Feature Pattern – assessment reach metric**
  - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
  - B Not A.
4. **Feature Longitudinal Profile – assessment reach metric**
  - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
  - B Not A
5. **Signs of Active Instability – assessment reach metric**  
**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
  - A < 10% of channel unstable
  - B 10 to 25% of channel unstable
  - C > 25% of channel unstable
6. **Streamside Area Interaction – streamside area metric**  
**Consider for the Left Bank (LB) and the Right Bank (RB).**

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input type="radio"/> B	<input type="radio"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="radio"/> C	<input type="radio"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access



[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? **If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).**

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. Check all that occur (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input checked="" type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal<br>Marsh Streams<br>only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|--|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row **(skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bedrock/saprolite
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Boulder (256 – 4096 mm)
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cobble (64 – 256 mm)
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Gravel (2 – 64 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sand (.062 – 2 mm)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Silt/clay (< 0.062 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Detritus
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? **(skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
  - Aquatic reptiles
  - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midge/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB RB

- A  A Little or no alteration to water storage capacity over a majority of the streamside area
- B  B Moderate alteration to water storage capacity over a majority of the streamside area
- C  C Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB RB

- A  A Majority of streamside area with depressions able to pond water  $\geq$  6 inches deep
- B  B Majority of streamside area with depressions able to pond water 3 to 6 inches deep
- C  C Majority of streamside area with depressions able to pond water < 3 inches deep

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB RB

- Y  Y Are wetlands present in the streamside area?
- N  N

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated Wooded

LB RB LB RB

- A  A  A  A  $\geq$  100-feet wide or extends to the edge of the watershed
- B  B  B  B From 50 to < 100-feet wide
- C  C  C  C From 30 to < 50-feet wide
- D  D  D  D From 10 to < 30-feet wide
- E  E  E  E < 10-feet wide or no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB RB

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	Row crops
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	Maintained turf
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	Pasture (no livestock)/commercial horticulture
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Medium to high stem density
<input type="radio"/> B	<input type="radio"/> B	Low stem density
<input type="radio"/> C	<input type="radio"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	The total length of buffer breaks is < 25 percent.
<input type="radio"/> B	<input type="radio"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="radio"/> C	<input type="radio"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="radio"/> A	<input type="radio"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="radio"/> B	<input checked="" type="radio"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="radio"/> C	<input type="radio"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Small intermittent stream that drains to SD. Stream had almost no flow, was very mucky, and had large amounts of iron oxidizing bacteria.

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A  
 Stream Category Pa1

Date of Evaluation 4/12/2017  
 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>HIGH</b>	<b>HIGH</b>
(2) Baseflow	<b>HIGH</b>	<b>HIGH</b>
(2) Flood Flow	<b>HIGH</b>	<b>HIGH</b>
(3) Streamside Area Attenuation	<b>HIGH</b>	<b>HIGH</b>
(4) Floodplain Access	<b>HIGH</b>	<b>HIGH</b>
(4) Wooded Riparian Buffer	<b>HIGH</b>	<b>HIGH</b>
(4) Microtopography	<b>HIGH</b>	<b>HIGH</b>
(3) Stream Stability	<b>HIGH</b>	<b>HIGH</b>
(4) Channel Stability	<b>HIGH</b>	<b>HIGH</b>
(4) Sediment Transport	<b>LOW</b>	<b>LOW</b>
(4) Stream Geomorphology	<b>HIGH</b>	<b>HIGH</b>
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	<b>MEDIUM</b>	<b>MEDIUM</b>
(2) Baseflow	<b>HIGH</b>	<b>HIGH</b>
(2) Streamside Area Vegetation	<b>HIGH</b>	<b>HIGH</b>
(3) Upland Pollutant Filtration	<b>HIGH</b>	<b>HIGH</b>
(3) Thermoregulation	<b>HIGH</b>	<b>HIGH</b>
(2) Indicators of Stressors	<b>NO</b>	<b>NO</b>
(2) Aquatic Life Tolerance	<b>LOW</b>	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	<b>LOW</b>	<b>HIGH</b>
(2) In-stream Habitat	<b>LOW</b>	<b>MEDIUM</b>
(3) Baseflow	<b>HIGH</b>	<b>HIGH</b>
(3) Substrate	<b>LOW</b>	<b>LOW</b>
(3) Stream Stability	<b>HIGH</b>	<b>HIGH</b>
(3) In-stream Habitat	<b>LOW</b>	<b>HIGH</b>
(2) Stream-side Habitat	<b>HIGH</b>	<b>HIGH</b>
(3) Stream-side Habitat	<b>HIGH</b>	<b>HIGH</b>
(3) Thermoregulation	<b>HIGH</b>	<b>HIGH</b>
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone Habitat	NA	NA
<b>Overall</b>	<b>MEDIUM</b>	<b>HIGH</b>

**NC SAM FIELD ASSESSMENT FORM**  
Accompanies User Manual Version 2.1

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412 A 2. Date of evaluation: 4/12/2017  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep River  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.984489, -79.946309

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SG 10. Length of assessment reach evaluated (feet): 265  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 25 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

**1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

- A Water throughout assessment reach.  
 B No flow, water in pools only.  
 C No water in assessment reach.

**2. Evidence of Flow Restriction – assessment reach metric**

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).  
 B Not A

**3. Feature Pattern – assessment reach metric**

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).  
 B Not A.

**4. Feature Longitudinal Profile – assessment reach metric**

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).  
 B Not A

**5. Signs of Active Instability – assessment reach metric**

**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable  
 B 10 to 25% of channel unstable  
 C > 25% of channel unstable

**6. Streamside Area Interaction – streamside area metric**

**Consider for the Left Bank (LB) and the Right Bank (RB).**

- LB RB  
 A  A Little or no evidence of conditions that adversely affect reference interaction  
 B  B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])  
 C  C Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access)

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]] or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |  |                                    |   |
|--|------------------------------------|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input checked="" type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input checked="" type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal Marsh Streams only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|------------------------------------|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bedrock/saprolite
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Boulder (256 – 4096 mm)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Cobble (64 – 256 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Gravel (2 – 64 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sand (.062 – 2 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Silt/clay (< 0.062 mm)
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Detritus
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB RB

- A  A Little or no alteration to water storage capacity over a majority of the streamside area
- B  B Moderate alteration to water storage capacity over a majority of the streamside area
- C  C Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB RB

- A  A Majority of streamside area with depressions able to pond water  $\geq$  6 inches deep
- B  B Majority of streamside area with depressions able to pond water 3 to 6 inches deep
- C  C Majority of streamside area with depressions able to pond water < 3 inches deep

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB RB

- Y  Y Are wetlands present in the streamside area?
- N  N

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated Wooded

LB RB LB RB

- A  A  A  A  $\geq$  100-feet wide or extends to the edge of the watershed
- B  B  B  B From 50 to < 100-feet wide
- C  C  C  C From 30 to < 50-feet wide
- D  D  D  D From 10 to < 30-feet wide
- E  E  E  E < 10-feet wide or no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB RB

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	Row crops
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	Maintained turf
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	Pasture (no livestock)/commercial horticulture
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Medium to high stem density
<input type="radio"/> B	<input type="radio"/> B	Low stem density
<input type="radio"/> C	<input type="radio"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	The total length of buffer breaks is < 25 percent.
<input type="radio"/> B	<input type="radio"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="radio"/> C	<input type="radio"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="radio"/> B	<input type="radio"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="radio"/> C	<input type="radio"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Large perennial stream that drains into the deep river.



**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412 A  
 Stream Category Pa3

Date of Evaluation 4/12/2017  
 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>HIGH</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Flood Flow	<b>HIGH</b>	
(3) Streamside Area Attenuation	<b>HIGH</b>	
(4) Floodplain Access	<b>HIGH</b>	
(4) Wooded Riparian Buffer	<b>HIGH</b>	
(4) Microtopography	<b>LOW</b>	
(3) Stream Stability	<b>HIGH</b>	
(4) Channel Stability	<b>HIGH</b>	
(4) Sediment Transport	<b>MEDIUM</b>	
(4) Stream Geomorphology	<b>HIGH</b>	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	<b>HIGH</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Streamside Area Vegetation	<b>HIGH</b>	
(3) Upland Pollutant Filtration	<b>HIGH</b>	
(3) Thermoregulation	<b>HIGH</b>	
(2) Indicators of Stressors	<b>NO</b>	
(2) Aquatic Life Tolerance	<b>MEDIUM</b>	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	<b>HIGH</b>	
(2) In-stream Habitat	<b>HIGH</b>	
(3) Baseflow	<b>HIGH</b>	
(3) Substrate	<b>MEDIUM</b>	
(3) Stream Stability	<b>HIGH</b>	
(3) In-stream Habitat	<b>HIGH</b>	
(2) Stream-side Habitat	<b>HIGH</b>	
(3) Stream-side Habitat	<b>HIGH</b>	
(3) Thermoregulation	<b>HIGH</b>	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
<b>Overall</b>	<b>HIGH</b>	

**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/12/2017  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep River  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.984941, -79.943049

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SH 10. Length of assessment reach evaluated (feet): 369  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 0.5  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 3 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
  - A Water throughout assessment reach.
  - B No flow, water in pools only.
  - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
  - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
  - B Not A
3. **Feature Pattern – assessment reach metric**
  - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
  - B Not A.
4. **Feature Longitudinal Profile – assessment reach metric**
  - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
  - B Not A
5. **Signs of Active Instability – assessment reach metric**  
**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
  - A < 10% of channel unstable
  - B 10 to 25% of channel unstable
  - C > 25% of channel unstable
6. **Streamside Area Interaction – streamside area metric**  
**Consider for the Left Bank (LB) and the Right Bank (RB).**

LB	RB	
<input type="radio"/> A	<input type="radio"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input checked="" type="radio"/> B	<input checked="" type="radio"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="radio"/> C	<input type="radio"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input checked="" type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal<br>Marsh Streams<br>only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|--|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bedrock/saprolite
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Boulder (256 – 4096 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cobble (64 – 256 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Gravel (2 – 64 mm)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Sand (.062 – 2 mm)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Silt/clay (< 0.062 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Detritus
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
  - Aquatic reptiles
  - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB RB

- A  A Little or no alteration to water storage capacity over a majority of the streamside area
- B  B Moderate alteration to water storage capacity over a majority of the streamside area
- C  C Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB RB

- A  A Majority of streamside area with depressions able to pond water  $\geq$  6 inches deep
- B  B Majority of streamside area with depressions able to pond water 3 to 6 inches deep
- C  C Majority of streamside area with depressions able to pond water  $<$  3 inches deep

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB RB

- Y  Y Are wetlands present in the streamside area?
- N  N

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated Wooded

LB RB LB RB

- A  A  A  A  $\geq$  100-feet wide or extends to the edge of the watershed
- B  B  B  B From 50 to  $<$  100-feet wide
- C  C  C  C From 30 to  $<$  50-feet wide
- D  D  D  D From 10 to  $<$  30-feet wide
- E  E  E  E  $<$  10-feet wide or no trees

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB RB

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	Row crops
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	Maintained turf
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	Pasture (no livestock)/commercial horticulture
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Medium to high stem density
<input type="radio"/> B	<input type="radio"/> B	Low stem density
<input type="radio"/> C	<input type="radio"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	The total length of buffer breaks is < 25 percent.
<input type="radio"/> B	<input type="radio"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="radio"/> C	<input type="radio"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="radio"/> A	<input type="radio"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="radio"/> B	<input checked="" type="radio"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="radio"/> C	<input type="radio"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Intermittent stream that drains into Deep River.

The stream was not properly restored within the easement. There is little to no channel and upland vegetation is growing within the channel.

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A Date of Evaluation 4/12/2017  
 Stream Category Pa1 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>MEDIUM</b>	<b>MEDIUM</b>
(2) Baseflow	<b>HIGH</b>	<b>HIGH</b>
(2) Flood Flow	<b>MEDIUM</b>	<b>MEDIUM</b>
(3) Streamside Area Attenuation	<b>HIGH</b>	<b>HIGH</b>
(4) Floodplain Access	<b>MEDIUM</b>	<b>MEDIUM</b>
(4) Wooded Riparian Buffer	<b>HIGH</b>	<b>HIGH</b>
(4) Microtopography	<b>HIGH</b>	<b>HIGH</b>
(3) Stream Stability	<b>LOW</b>	<b>LOW</b>
(4) Channel Stability	<b>HIGH</b>	<b>HIGH</b>
(4) Sediment Transport	<b>LOW</b>	<b>LOW</b>
(4) Stream Geomorphology	<b>LOW</b>	<b>LOW</b>
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	<b>MEDIUM</b>	<b>MEDIUM</b>
(2) Baseflow	<b>HIGH</b>	<b>HIGH</b>
(2) Streamside Area Vegetation	<b>HIGH</b>	<b>HIGH</b>
(3) Upland Pollutant Filtration	<b>HIGH</b>	<b>HIGH</b>
(3) Thermoregulation	<b>HIGH</b>	<b>HIGH</b>
(2) Indicators of Stressors	<b>NO</b>	<b>NO</b>
(2) Aquatic Life Tolerance	<b>LOW</b>	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	<b>LOW</b>	<b>LOW</b>
(2) In-stream Habitat	<b>LOW</b>	<b>LOW</b>
(3) Baseflow	<b>HIGH</b>	<b>HIGH</b>
(3) Substrate	<b>LOW</b>	<b>LOW</b>
(3) Stream Stability	<b>MEDIUM</b>	<b>MEDIUM</b>
(3) In-stream Habitat	<b>LOW</b>	<b>LOW</b>
(2) Stream-side Habitat	<b>HIGH</b>	<b>HIGH</b>
(3) Stream-side Habitat	<b>HIGH</b>	<b>HIGH</b>
(3) Thermoregulation	<b>HIGH</b>	<b>HIGH</b>
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone Habitat	NA	NA
<b>Overall</b>	<b>MEDIUM</b>	<b>MEDIUM</b>

**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/18/2017  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep River  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.985239, -79.937275

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SI 10. Length of assessment reach evaluated (feet): 486  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1-2  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 3-5 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
  - A Water throughout assessment reach.
  - B No flow, water in pools only.
  - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
  - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
  - B Not A
3. **Feature Pattern – assessment reach metric**
  - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
  - B Not A.
4. **Feature Longitudinal Profile – assessment reach metric**
  - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
  - B Not A
5. **Signs of Active Instability – assessment reach metric**  
**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
  - A < 10% of channel unstable
  - B 10 to 25% of channel unstable
  - C > 25% of channel unstable
6. **Streamside Area Interaction – streamside area metric**  
**Consider for the Left Bank (LB) and the Right Bank (RB).**

LB	RB	
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input type="radio"/> B	<input type="radio"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="radio"/> C	<input type="radio"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input checked="" type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal<br>Marsh Streams<br>only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|--|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bedrock/saprolite
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Boulder (256 – 4096 mm)
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cobble (64 – 256 mm)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Gravel (2 – 64 mm)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Sand (.062 – 2 mm)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Silt/clay (< 0.062 mm)
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Detritus
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
  - Aquatic reptiles
  - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)



- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midge/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- |                                    |                                    |   |
|------------------------------------|------------------------------------|---|
| LB                                 | RB                                 |   |
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> C            | <input type="radio"/> C            | Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**  
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- |                                    |                                    |  |
|------------------------------------|------------------------------------|--|
| LB                                 | RB                                 |  |
| <input type="radio"/> A            | <input type="radio"/> A            | Majority of streamside area with depressions able to pond water $\geq$ 6 inches deep |
| <input checked="" type="radio"/> B | <input checked="" type="radio"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep   |
| <input type="radio"/> C            | <input type="radio"/> C            | Majority of streamside area with depressions able to pond water < 3 inches deep      |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- |                                    |                                    |  |
|------------------------------------|------------------------------------|--|
| LB                                 | RB                                 |  |
| <input checked="" type="radio"/> Y | <input checked="" type="radio"/> Y | Are wetlands present in the streamside area? |
| <input type="radio"/> N            | <input type="radio"/> N            |  |

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

- |                                    |                                    |                                    |                                    |   |
|------------------------------------|------------------------------------|------------------------------------|------------------------------------|---|
| Vegetated                          |                                    | Wooded                             |                                    |   |
| LB                                 | RB                                 | LB                                 | RB                                 |   |
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | <input type="radio"/> A            | <input checked="" type="radio"/> A | $\geq$ 100-feet wide <u>or</u> extends to the edge of the watershed |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | From 50 to < 100-feet wide  |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | From 30 to < 50-feet wide   |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | From 10 to < 30-feet wide   |
| <input type="radio"/> E            | <input type="radio"/> E            | <input checked="" type="radio"/> E | <input type="radio"/> E            | < 10-feet wide <u>or</u> no trees                                   |

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

- |    |    |
|----|----|
| LB | RB |
|----|----|

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	Row crops
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	Maintained turf
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	Pasture (no livestock)/commercial horticulture
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input type="radio"/> A	<input checked="" type="radio"/> A	Medium to high stem density
<input type="radio"/> B	<input type="radio"/> B	Low stem density
<input checked="" type="radio"/> C	<input type="radio"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

LB	RB	
<input type="radio"/> A	<input checked="" type="radio"/> A	The total length of buffer breaks is < 25 percent.
<input type="radio"/> B	<input type="radio"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input checked="" type="radio"/> C	<input type="radio"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="radio"/> A	<input type="radio"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="radio"/> B	<input checked="" type="radio"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="radio"/> C	<input type="radio"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Perennial stream that drains into Deep River, runs through PEM wetland WC. Within powerline ROW.

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A  
 Stream Category Pa2

Date of Evaluation 4/18/2017  
 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>HIGH</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Flood Flow	<b>HIGH</b>	
(3) Streamside Area Attenuation	<b>HIGH</b>	
(4) Floodplain Access	<b>HIGH</b>	
(4) Wooded Riparian Buffer	<b>MEDIUM</b>	
(4) Microtopography	<b>MEDIUM</b>	
(3) Stream Stability	<b>HIGH</b>	
(4) Channel Stability	<b>HIGH</b>	
(4) Sediment Transport	<b>LOW</b>	
(4) Stream Geomorphology	<b>HIGH</b>	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	<b>LOW</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Streamside Area Vegetation	<b>LOW</b>	
(3) Upland Pollutant Filtration	<b>LOW</b>	
(3) Thermoregulation	<b>LOW</b>	
(2) Indicators of Stressors	<b>NO</b>	
(2) Aquatic Life Tolerance	<b>LOW</b>	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	<b>LOW</b>	
(2) In-stream Habitat	<b>LOW</b>	
(3) Baseflow	<b>HIGH</b>	
(3) Substrate	<b>LOW</b>	
(3) Stream Stability	<b>HIGH</b>	
(3) In-stream Habitat	<b>LOW</b>	
(2) Stream-side Habitat	<b>MEDIUM</b>	
(3) Stream-side Habitat	<b>MEDIUM</b>	
(3) Thermoregulation	<b>MEDIUM</b>	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
<b>Overall</b>	<b>LOW</b>	

**NC SAM FIELD ASSESSMENT FORM**  
Accompanies User Manual Version 2.1

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/18/2017  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep River  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.985132, -79.937455

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SJ 10. Length of assessment reach evaluated (feet): 55  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1-2  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 3 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

**1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

**2. Evidence of Flow Restriction – assessment reach metric**

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
- B Not A

**3. Feature Pattern – assessment reach metric**

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A.

**4. Feature Longitudinal Profile – assessment reach metric**

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

**5. Signs of Active Instability – assessment reach metric**

**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

**6. Streamside Area Interaction – streamside area metric**

**Consider for the Left Bank (LB) and the Right Bank (RB).**

- |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---|
| LB                                    | RB                                    |   |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction   |
| <input type="checkbox"/> B            | <input type="checkbox"/> B            | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input type="checkbox"/> C            | <input type="checkbox"/> C            | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access  |

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? **If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).**

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. Check all that occur (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input checked="" type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal<br>Marsh Streams<br>only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|--|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row **(skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Bedrock/saprolite
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Boulder (256 – 4096 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Cobble (64 – 256 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Gravel (2 – 64 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sand (.062 – 2 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Silt/clay (< 0.062 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Detritus
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? **(skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- |                                    |                                    |   |
|------------------------------------|------------------------------------|---|
| LB                                 | RB                                 |   |
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> C            | <input type="radio"/> C            | Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**  
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- |                                    |                                    |  |
|------------------------------------|------------------------------------|--|
| LB                                 | RB                                 |  |
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep    |
| <input type="radio"/> B            | <input type="radio"/> B            | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="radio"/> C            | <input type="radio"/> C            | Majority of streamside area with depressions able to pond water < 3 inches deep    |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- |                                    |                                    |  |
|------------------------------------|------------------------------------|--|
| LB                                 | RB                                 |  |
| <input checked="" type="radio"/> Y | <input checked="" type="radio"/> Y | Are wetlands present in the streamside area? |
| <input type="radio"/> N            | <input type="radio"/> N            |  |

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

- |                                    |                                    |                                    |                                    |  |
|------------------------------------|------------------------------------|------------------------------------|------------------------------------|--|
| Vegetated                          |                                    | Wooded                             |                                    |  |
| LB                                 | RB                                 | LB                                 | RB                                 |  |
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | ≥ 100-feet wide <u>or</u> extends to the edge of the watershed |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | From 50 to < 100-feet wide                                     |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | From 30 to < 50-feet wide                                      |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | From 10 to < 30-feet wide                                      |
| <input type="radio"/> E            | <input type="radio"/> E            | <input checked="" type="radio"/> E | <input checked="" type="radio"/> E | < 10-feet wide <u>or</u> no trees                              |

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

- |    |    |
|----|----|
| LB | RB |
|----|----|

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Small intermittent channel flowing out of wetland WC into perennial stream SI.

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A Date of Evaluation 4/18/2017  
 Stream Category Pa1 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Intermittent

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>HIGH</b>	<b>HIGH</b>
(2) Baseflow	<b>HIGH</b>	<b>HIGH</b>
(2) Flood Flow	<b>HIGH</b>	<b>HIGH</b>
(3) Streamside Area Attenuation	<b>HIGH</b>	<b>HIGH</b>
(4) Floodplain Access	<b>HIGH</b>	<b>HIGH</b>
(4) Wooded Riparian Buffer	<b>LOW</b>	<b>LOW</b>
(4) Microtopography	<b>HIGH</b>	<b>HIGH</b>
(3) Stream Stability	<b>HIGH</b>	<b>HIGH</b>
(4) Channel Stability	<b>HIGH</b>	<b>HIGH</b>
(4) Sediment Transport	<b>LOW</b>	<b>LOW</b>
(4) Stream Geomorphology	<b>HIGH</b>	<b>HIGH</b>
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	<b>HIGH</b>	<b>HIGH</b>
(2) Baseflow	<b>HIGH</b>	<b>HIGH</b>
(2) Streamside Area Vegetation	<b>MEDIUM</b>	<b>MEDIUM</b>
(3) Upland Pollutant Filtration	<b>HIGH</b>	<b>HIGH</b>
(3) Thermoregulation	<b>LOW</b>	<b>LOW</b>
(2) Indicators of Stressors	<b>NO</b>	<b>NO</b>
(2) Aquatic Life Tolerance	<b>HIGH</b>	NA
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	<b>LOW</b>	<b>LOW</b>
(2) In-stream Habitat	<b>LOW</b>	<b>LOW</b>
(3) Baseflow	<b>HIGH</b>	<b>HIGH</b>
(3) Substrate	<b>LOW</b>	<b>LOW</b>
(3) Stream Stability	<b>HIGH</b>	<b>HIGH</b>
(3) In-stream Habitat	<b>LOW</b>	<b>LOW</b>
(2) Stream-side Habitat	<b>LOW</b>	<b>LOW</b>
(3) Stream-side Habitat	<b>LOW</b>	<b>LOW</b>
(3) Thermoregulation	<b>LOW</b>	<b>LOW</b>
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone Habitat	NA	NA
<b>Overall</b>	<b>HIGH</b>	<b>HIGH</b>



**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/20/2017  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: \_\_\_\_\_ on USGS 7.5-minute quad: Bull Run  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.987207; -79.925664

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SK 10. Length of assessment reach evaluated (feet): 57  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 8  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 9 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**  
 A Water throughout assessment reach.  
 B No flow, water in pools only.  
 C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**  
 A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).  
 B Not A
3. **Feature Pattern – assessment reach metric**  
 A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).  
 B Not A.
4. **Feature Longitudinal Profile – assessment reach metric**  
 A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).  
 B Not A
5. **Signs of Active Instability – assessment reach metric**  
**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).  
 A < 10% of channel unstable  
 B 10 to 25% of channel unstable  
 C > 25% of channel unstable
6. **Streamside Area Interaction – streamside area metric**  
**Consider for the Left Bank (LB) and the Right Bank (RB).**  

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="checkbox"/> C	<input type="checkbox"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching] or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9 Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |  |                                    |   |
|--|------------------------------------|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input checked="" type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal Marsh Streams only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|------------------------------------|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Bedrock/saprolite
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Boulder (256 – 4096 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Cobble (64 – 256 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Gravel (2 – 64 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sand (.062 – 2 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Silt/clay (< 0.062 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Detritus
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
  - Aquatic reptiles
  - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midge/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB                                 | RB                                 |   |
|------------------------------------|------------------------------------|---|
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> C            | <input type="radio"/> C            | Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**  
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep    |
| <input type="radio"/> B            | <input type="radio"/> B            | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="radio"/> C            | <input type="radio"/> C            | Majority of streamside area with depressions able to pond water < 3 inches deep    |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input checked="" type="radio"/> Y | <input checked="" type="radio"/> Y | Are wetlands present in the streamside area? |
| <input type="radio"/> N            | <input type="radio"/> N            |  |

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

- | Vegetated                          |                                    | Wooded                             |                                    |  |
|------------------------------------|------------------------------------|------------------------------------|------------------------------------|--|
| LB                                 | RB                                 | LB                                 | RB                                 |  |
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | ≥ 100-feet wide <u>or</u> extends to the edge of the watershed |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | From 50 to < 100-feet wide                                     |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | From 30 to < 50-feet wide                                      |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | From 10 to < 30-feet wide                                      |
| <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E            | < 10-feet wide <u>or</u> no trees                              |

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

- | LB | RB |
|----|----|
|----|----|

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Ephemeral channel from pond PB flows into this stream via a 5 ft headcut. Banks are severely downcut in the assessment reach.

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A  
 Stream Category Pa1

Date of Evaluation 4/20/2017  
 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>HIGH</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Flood Flow	<b>HIGH</b>	
(3) Streamside Area Attenuation	<b>HIGH</b>	
(4) Floodplain Access	<b>MEDIUM</b>	
(4) Wooded Riparian Buffer	<b>HIGH</b>	
(4) Microtopography	<b>HIGH</b>	
(3) Stream Stability	<b>MEDIUM</b>	
(4) Channel Stability	<b>HIGH</b>	
(4) Sediment Transport	<b>LOW</b>	
(4) Stream Geomorphology	<b>MEDIUM</b>	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	<b>MEDIUM</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Streamside Area Vegetation	<b>HIGH</b>	
(3) Upland Pollutant Filtration	<b>HIGH</b>	
(3) Thermoregulation	<b>HIGH</b>	
(2) Indicators of Stressors	<b>NO</b>	
(2) Aquatic Life Tolerance	<b>LOW</b>	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	<b>HIGH</b>	
(2) In-stream Habitat	<b>MEDIUM</b>	
(3) Baseflow	<b>HIGH</b>	
(3) Substrate	<b>HIGH</b>	
(3) Stream Stability	<b>MEDIUM</b>	
(3) In-stream Habitat	<b>LOW</b>	
(2) Stream-side Habitat	<b>HIGH</b>	
(3) Stream-side Habitat	<b>HIGH</b>	
(3) Thermoregulation	<b>HIGH</b>	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
<b>Overall</b>	<b>HIGH</b>	

**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/20/2017  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: Cape Fear on USGS 7.5-minute quad: Deep Run  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.988075, -79.920559

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SL 10. Length of assessment reach evaluated (feet): 810  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1-2  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 5-10 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**  
 A Water throughout assessment reach.  
 B No flow, water in pools only.  
 C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**  
 A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).  
 B Not A
3. **Feature Pattern – assessment reach metric**  
 A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).  
 B Not A.
4. **Feature Longitudinal Profile – assessment reach metric**  
 A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).  
 B Not A
5. **Signs of Active Instability – assessment reach metric**  
**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).  
 A < 10% of channel unstable  
 B 10 to 25% of channel unstable  
 C > 25% of channel unstable
6. **Streamside Area Interaction – streamside area metric**  
**Consider for the Left Bank (LB) and the Right Bank (RB).**  

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="checkbox"/> C	<input type="checkbox"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching] or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |   |                                    |   |
|---|------------------------------------|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input checked="" type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal Marsh Streams only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|---|------------------------------------|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Bedrock/saprolite
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Boulder (256 – 4096 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Cobble (64 – 256 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Gravel (2 – 64 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sand (.062 – 2 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Silt/clay (< 0.062 mm)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Detritus
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midge/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB                                 | RB                                 |   |
|------------------------------------|------------------------------------|---|
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> C            | <input type="radio"/> C            | Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**  
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input type="radio"/> A            | <input type="radio"/> A            | Majority of streamside area with depressions able to pond water ≥ 6 inches deep    |
| <input checked="" type="radio"/> B | <input checked="" type="radio"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="radio"/> C            | <input type="radio"/> C            | Majority of streamside area with depressions able to pond water < 3 inches deep    |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input checked="" type="radio"/> Y | <input checked="" type="radio"/> Y | Are wetlands present in the streamside area? |
| <input type="radio"/> N            | <input type="radio"/> N            |  |

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

- | Vegetated                          |                                    | Wooded                             |                                    |  |
|------------------------------------|------------------------------------|------------------------------------|------------------------------------|--|
| LB                                 | RB                                 | LB                                 | RB                                 |  |
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | ≥ 100-feet wide <u>or</u> extends to the edge of the watershed |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | From 50 to < 100-feet wide                                     |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | From 30 to < 50-feet wide                                      |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | From 10 to < 30-feet wide                                      |
| <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E            | < 10-feet wide <u>or</u> no trees                              |

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

- | LB | RB |
|----|----|
|----|----|



- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Perennial that flows into pond PC and flows out of PC via a concrete damn.

A portion of the northern reach is impacted by horses which have direct access to the channel. This has caused the channel to lose definition in places and to become braided.

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A Date of Evaluation 4/20/2017  
 Stream Category Pa2 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	MEDIUM	
(3) Stream Stability	HIGH	
(4) Channel Stability	HIGH	
(4) Sediment Transport	MEDIUM	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	LOW	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	MEDIUM	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	MEDIUM	
(3) Baseflow	HIGH	
(3) Substrate	MEDIUM	
(3) Stream Stability	HIGH	
(3) In-stream Habitat	MEDIUM	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
Overall	HIGH	

**NC SAM FIELD ASSESSMENT FORM**  
**Accompanies User Manual Version 2.1**

USACE AID #: \_\_\_\_\_ NCDWR #: \_\_\_\_\_

**INSTRUCTIONS:** Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

**NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).**

**PROJECT / SITE INFORMATION:**

1. Project name (if any): U-2412A 2. Date of evaluation: 4/18/2017  
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: C. Inscore/AECOM  
 5. County: Guilford 6. Nearest named water body \_\_\_\_\_  
 7. River Basin: Cape Fear on USGS 7.5-minute quad: Bull Run  
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.989131, -79.917501

**STREAM INFORMATION: (depth and width can be approximations)**

9. Site number (show on attached map): SM 10. Length of assessment reach evaluated (feet): 319  
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 0.5  Unable to assess channel depth.  
 12. Channel width at top of bank (feet): 1 13. Is assessment reach a swamp stream?  Yes  No  
 14. Feature type:  Perennial flow  Intermittent flow  Tidal Marsh Stream

**STREAM RATING INFORMATION:**

15. NC SAM Zone:  Mountains (M)  Piedmont (P)  Inner Coastal Plain (I)  Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):  a (more sinuous stream, flatter valley slope)  b (less sinuous stream, steeper valley slope)  
 17. Watershed size: (skip for Tidal Marsh Stream)  Size 1 (< 0.1 mi<sup>2</sup>)  Size 2 (0.1 to < 0.5 mi<sup>2</sup>)  Size 3 (0.5 to < 5 mi<sup>2</sup>)  Size 4 (≥ 5 mi<sup>2</sup>)

**ADDITIONAL INFORMATION:**

18. Were regulatory considerations evaluated?  Yes  No If Yes, check all that apply to the assessment area.  
 Section 10 water  Classified Trout Waters  Water Supply Watershed (  I  II  III  IV  V )  
 Essential Fish Habitat  Primary Nursery Area  High Quality Waters/Outstanding Resource Waters  
 Publicly owned property  NCDWR riparian buffer rule in effect  Nutrient Sensitive Waters  
 Anadromous fish  303(d) List  CAMA Area of Environmental Concern (AEC)  
 Documented presence of a federal and/or state listed protected species within the assessment area.  
 List species: \_\_\_\_\_  
 Designated Critical Habitat (list species): \_\_\_\_\_

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached?  Yes  No

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**  
 A Water throughout assessment reach.  
 B No flow, water in pools only.  
 C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**  
 A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).  
 B Not A
3. **Feature Pattern – assessment reach metric**  
 A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).  
 B Not A.
4. **Feature Longitudinal Profile – assessment reach metric**  
 A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).  
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5. **Signs of Active Instability – assessment reach metric**  
**Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).  
 A < 10% of channel unstable  
 B 10 to 25% of channel unstable  
 C > 25% of channel unstable
6. **Streamside Area Interaction – streamside area metric**  
**Consider for the Left Bank (LB) and the Right Bank (RB).**  

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="checkbox"/> C	<input type="checkbox"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access)

[examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching] or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

**7. Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: \_\_\_\_\_ (explain in "Notes/Sketch" section)
- J Little to no stressors

**8. Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

**9. Large or Dangerous Stream – assessment reach metric**

Yes  No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

**10. Natural In-stream Habitat Types – assessment reach metric**

10a.  Yes  No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- |  |                                    |   |
|--|------------------------------------|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)</li> <li><input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation</li> <li><input type="checkbox"/> C Multiple snags and logs (including lap trees)</li> <li><input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter</li> <li><input checked="" type="checkbox"/> E Little or no habitat</li> </ul> | Check for Tidal Marsh Streams only | <ul style="list-style-type: none"> <li><input type="checkbox"/> F 5% oysters or other natural hard bottoms</li> <li><input type="checkbox"/> G Submerged aquatic vegetation</li> <li><input type="checkbox"/> H Low-tide refugia (pools)</li> <li><input type="checkbox"/> I Sand bottom</li> <li><input type="checkbox"/> J 5% vertical bank along the marsh</li> <li><input type="checkbox"/> K Little or no habitat</li> </ul> |
|--|------------------------------------|---|

\*\*\*\*\*REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS\*\*\*\*\*

**11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a.  Yes  No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bedrock/saprolite
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Boulder (256 – 4096 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cobble (64 – 256 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gravel (2 – 64 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sand (.062 – 2 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Silt/clay (< 0.062 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Detritus
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d.  Yes  No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

**12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a.  Yes  No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.  No Water  Other: \_\_\_\_\_

12b.  Yes  No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)

- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

**13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)**

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB                                 | RB                                 |   |
|------------------------------------|------------------------------------|---|
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Moderate alteration to water storage capacity over a majority of the streamside area  |
| <input type="radio"/> C            | <input type="radio"/> C            | Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

**14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)**  
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Majority of streamside area with depressions able to pond water $\geq$ 6 inches deep |
| <input type="radio"/> B            | <input type="radio"/> B            | Majority of streamside area with depressions able to pond water 3 to 6 inches deep   |
| <input type="radio"/> C            | <input type="radio"/> C            | Majority of streamside area with depressions able to pond water < 3 inches deep      |

**15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)**

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB                                 | RB                                 |  |
|------------------------------------|------------------------------------|--|
| <input checked="" type="radio"/> Y | <input checked="" type="radio"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="radio"/> N | <input checked="" type="radio"/> N |  |

**16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)**

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

**17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)**

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream ( $\geq$  24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

**18. Shading – assessment reach metric (skip for Tidal Marsh Streams)**

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

**19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)**

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

- | Vegetated                          |                                    | Wooded                             |                                    |   |
|------------------------------------|------------------------------------|------------------------------------|------------------------------------|---|
| LB                                 | RB                                 | LB                                 | RB                                 |   |
| <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | $\geq$ 100-feet wide <u>or</u> extends to the edge of the watershed |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | From 50 to < 100-feet wide  |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | From 30 to < 50-feet wide   |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | From 10 to < 30-feet wide   |
| <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E            | < 10-feet wide <u>or</u> no trees                                   |

**20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

- | LB | RB |
|----|----|
|----|----|

- A  A Mature forest
- B  B Non-mature woody vegetation or modified vegetation structure
- C  C Herbaceous vegetation with or without a strip of trees < 10 feet wide
- D  D Maintained shrubs
- E  E Little or no vegetation

**21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)**

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

**22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)**

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

**23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)**

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-foot wide.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

**24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)**

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

**25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)**

25a.  Yes  No Was a conductivity measurement recorded?

If No, select one of the following reasons.  No Water  Other: \_\_\_\_\_

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A <46  B 46 to < 67  C 67 to < 79  D 79 to < 230  E ≥ 230

Notes/Sketch:

Perennial stream that resembles roadside ditch throughout most of assessment reach. Channel has been modified and rip-rap added. Flows into perennial stream SL.

**NC SAM Stream Rating Sheet**  
**Accompanies User Manual Version 2.1**

Stream Site Name U-2412A  
 Stream Category Pa1

Date of Evaluation 4/18/2017  
 Assessor Name/Organization C. Inscore/AECOM

Notes of Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Additional stream information/supplementary measurements included (Y/N) YES  
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

<b>Function Class Rating Summary</b>	<b>USACE/ All Streams</b>	<b>NCDWR Intermittent</b>
(1) Hydrology	<b>MEDIUM</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Flood Flow	<b>MEDIUM</b>	
(3) Streamside Area Attenuation	<b>HIGH</b>	
(4) Floodplain Access	<b>HIGH</b>	
(4) Wooded Riparian Buffer	<b>MEDIUM</b>	
(4) Microtopography	<b>HIGH</b>	
(3) Stream Stability	<b>LOW</b>	
(4) Channel Stability	<b>MEDIUM</b>	
(4) Sediment Transport	<b>LOW</b>	
(4) Stream Geomorphology	<b>MEDIUM</b>	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	<b>LOW</b>	
(2) Baseflow	<b>HIGH</b>	
(2) Streamside Area Vegetation	<b>LOW</b>	
(3) Upland Pollutant Filtration	<b>LOW</b>	
(3) Thermoregulation	<b>LOW</b>	
(2) Indicators of Stressors	<b>NO</b>	
(2) Aquatic Life Tolerance	<b>LOW</b>	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	<b>LOW</b>	
(2) In-stream Habitat	<b>LOW</b>	
(3) Baseflow	<b>HIGH</b>	
(3) Substrate	<b>LOW</b>	
(3) Stream Stability	<b>MEDIUM</b>	
(3) In-stream Habitat	<b>LOW</b>	
(2) Stream-side Habitat	<b>LOW</b>	
(3) Stream-side Habitat	<b>MEDIUM</b>	
(3) Thermoregulation	<b>LOW</b>	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
<b>Overall</b>	<b>LOW</b>	

## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/11/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WA-up  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope (%): 2-5  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: \_\_\_\_\_ 35.985449 Long: \_\_\_\_\_ -79.969498 Datum: WGS84  
 Soil Map Unit Name: VuB - Vance-Urban land complex, 2 to 10 percent slopes NWI classification: Upland

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

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

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b> Yes _____ No <input checked="" type="checkbox"/>
Remarks: Upland data point adjacent to WA.	

### HYDROLOGY

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



**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point:WA-up

	Absolute % Cover	Dominant Species?	Indicator Status	
<b>Tree Stratum</b> (Plot size: _____ )				
1. <u>Liriodendron tulipifera, Tuliptree</u>	25	Yes	FACU	
2. <u>Quercus falcata, Southern Red Oak</u>	20	Yes	FACU	
3. <u>Carya tomentosa, Mockernut Hickory</u>	10	No	UPL	
4. <u>Acer rubrum, Red Maple</u>	10	No	FAC	
5. _____				
6. _____				
	65 = Total Cover			
	50% of total cover: 32.5		20% of total cover: 13	
<b>Sapling Stratum</b> (Plot size: _____ )				
1. <u>Acer rubrum, Red Maple</u>	10	Yes	FAC	
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
	10 = Total Cover			
	50% of total cover: 5		20% of total cover: 2	
<b>Shrub Stratum</b> (Plot size: _____ )				
1. <u>Acer rubrum, Red Maple</u>	30	Yes	FAC	
2. <u>Ligustrum sinense, Chinese Privet</u>	20	Yes	FACU	
3. _____				
4. _____				
5. _____				
6. _____				
	50 = Total Cover			
	50% of total cover: 25		20% of total cover: 10	
<b>Herb Stratum</b> (Plot size: _____ )				
1. <u>Lonicera japonica, Japanese Honeysuckle</u>	20	Yes	FAC	
2. <u>Vitis rotundifolia, Muscadine</u>	15	Yes	FAC	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
	35 = Total Cover			
	50% of total cover: 17.5		20% of total cover: 7	
<b>Woody Vine Stratum</b> (Plot size: _____ )				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
	0 = Total Cover			
	50% of total cover: 0		20% of total cover: 0	
Remarks: (Include photo numbers here or on a separate sheet.)				

<b>Dominance Test worksheet:</b>	
Number of Dominant Species That Are OBL, FACW, or FAC:	4 (A)
Total Number of Dominant Species Across All Strata:	7 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	57.1% (A/B)
<b>Prevalence Index worksheet:</b>	
Total % Cover of:	Multiply by:
OBL species 0	x 1 = 0
FACW species 0	x 2 = 0
FAC species 85	x 3 = 255
FACU species 45	x 4 = 180
UPL species 65	x 5 = 325
Column Totals: 195 (A)	760 (B)
Prevalence Index = B/A = 3.90	
<b>Hydrophytic Vegetation Indicators:</b>	
<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation	
<input checked="" type="checkbox"/> 2 - Dominance Test is >50%	
<input type="checkbox"/> 3 - Prevalence Index is ≤3.0 <sup>1</sup>	
<input type="checkbox"/> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)	
<input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
<b>Definitions of Five Vegetation Strata:</b>	
<b>Tree</b> – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).	
<b>Sapling</b> – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.	
<b>Shrub</b> – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.	
<b>Herb</b> – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.	
<b>Woody vine</b> – All woody vines, regardless of height.	
<b>Hydrophytic Vegetation Present?</b>	Yes _____ No <sup>x</sup> _____



## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/11/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WA-wet  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Forested depression Local relief (concave, convex, none): Concave Slope (%): 0-2  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: 35.985567 Long: -79.969574 Datum: WGS84  
 Soil Map Unit Name: VuB - Vance-Urban land complex, 2 to 10 percent slopes NWI classification: PFO

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

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	<b>Is the Sampled Area within a Wetland?</b> Yes <input checked="" type="checkbox"/> No _____
Remarks: Small wetland located in forested depression below parking lots and impervious surfaces. Possible headwaters of stream system.	

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1)      ___ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2)      ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3)      ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1)      ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2)      ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3)      ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4)      ___ Other (Explain in Remarks) ___ Iron Deposits (B5)      ___ ___ Inundation Visible on Aerial Imagery (B7)      ___ ___ Water-Stained Leaves (B9)      ___ ___ Aquatic Fauna (B13)      ___	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>10</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Manganese staining in soil	

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point: WA-wet

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer rubrum, Red Maple</u>	80	Yes	FAC
2. <u>Liriodendron tulipifera, Tuliptree</u>	15	No	FACU
3. _____			
4. _____			
5. _____			
6. _____			
	95 = Total Cover		
	50% of total cover: 47.5		20% of total cover: 19

Sapling Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer rubrum, Red Maple</u>	10	Yes	FAC
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
	10 = Total Cover		
	50% of total cover: 5		20% of total cover: 2

Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Ligustrum sinense, Chinese Privet</u>	10	Yes	FACU
2. <u>Ilex opaca, American Holly</u>	5	Yes	FACU
3. _____			
4. _____			
5. _____			
6. _____			
	15 = Total Cover		
	50% of total cover: 7.5		20% of total cover: 3

Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Lonicera japonica, Japanese Honeysuckle</u>	25	Yes	FAC
2. <u>Microstegium vimineum, Japanese Stilt Grass</u>	20	Yes	FAC
3. <u>Trillium undulatum, Painted Trillium</u>	5	No	FACU
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			
	50 = Total Cover		
	50% of total cover: 25		20% of total cover: 10

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Smilax laurifolia, Laurel-Leaf Greenbrier</u>	10	Yes	OBL
2. <u>Vitis rotundifolia, Muscadine</u>	5	Yes	FAC
3. _____			
4. _____			
5. _____			
	15 = Total Cover		
	50% of total cover: 7.5		20% of total cover: 3

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

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.0% (A/B)

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species <u>10</u>	x 1 = <u>10</u>
FACW species <u>0</u>	x 2 = <u>0</u>
FAC species <u>140</u>	x 3 = <u>420</u>
FACU species <u>15</u>	x 4 = <u>60</u>
UPL species <u>35</u>	x 5 = <u>175</u>
Column Totals: <u>200</u> (A)	<u>665</u> (B)
Prevalence Index = B/A = <u>3.33</u>	

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
  - 2 - Dominance Test is >50%
  - 3 - Prevalence Index is ≤3.0<sup>1</sup>
  - 4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
  - Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)
- <sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Five Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

**Woody vine** – All woody vines, regardless of height.

**Hydrophytic Vegetation Present?** Yes x No \_\_\_\_\_



## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/11/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WB-up  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Forested depression Local relief (concave, convex, none): Convex Slope (%): 0  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: 35.985389 Long: -79.964797 Datum: WGS84  
 Soil Map Unit Name: VuB - Vance-Urban land complex, 2 to 10 percent slopes NWI classification: Upland  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes  No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b> Yes _____ No <input checked="" type="checkbox"/>
Remarks: Upland data point located adjacent to wetland WB.	

### HYDROLOGY

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

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point:WB-up

	Absolute % Cover	Dominant Species?	Indicator Status	
<b>Tree Stratum</b> (Plot size: _____ )				
1. <u>Acer negundo, Ash-Leaf Maple</u>	30	Yes	FAC	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A)  Total Number of Dominant Species Across All Strata: <u>10</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50.0%</u> (A/B)
2. <u>Liriodendron tulipifera, Tuliptree</u>	30	Yes	FACU	
3. _____				
4. _____				
5. _____				
6. _____				
60 = Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>5</u> x 2 = <u>10</u> FAC species <u>95</u> x 3 = <u>285</u> FACU species <u>30</u> x 4 = <u>120</u> UPL species <u>85</u> x 5 = <u>425</u> Column Totals: <u>215</u> (A) <u>840</u> (B)  Prevalence Index = B/A = <u>3.91</u>
50% of total cover: <u>30</u>		20% of total cover: <u>12</u>		
<b>Sapling Stratum</b> (Plot size: _____ )				
1. <u>Acer negundo, Ash-Leaf Maple</u>	10	Yes	FAC	<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
10 = Total Cover				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
50% of total cover: <u>5</u>		20% of total cover: <u>2</u>		
<b>Shrub Stratum</b> (Plot size: _____ )				
1. <u>Acer negundo, Ash-Leaf Maple</u>	20	Yes	FAC	<b>Definitions of Five Vegetation Strata:</b>  <b>Tree</b> – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).  <b>Sapling</b> – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.  <b>Shrub</b> – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.  <b>Herb</b> – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.  <b>Woody vine</b> – All woody vines, regardless of height.
2. <u>Acer floridanum, Florida Maple</u>	10	Yes	FACU	
3. <u>Lonicera morrowii, Morrow's Honeysuckle</u>	10	Yes	FACU	
4. <u>Ulmus americana, American Elm</u>	5	No	FACW	
5. _____				
6. _____				
45 = Total Cover				<b>Hydrophytic Vegetation Present?</b> Yes _____ No <u>x</u>
50% of total cover: <u>22.5</u>		20% of total cover: <u>9</u>		
<b>Herb Stratum</b> (Plot size: _____ )				
1. <u>Fagus grandifolia, American Beech</u>	30	Yes	FACU	(This section is part of the form grid and contains no text)
2. <u>Viola sp., Violet</u>	25	Yes	FAC	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
55 = Total Cover				
50% of total cover: <u>27.5</u>		20% of total cover: <u>11</u>		
<b>Woody Vine Stratum</b> (Plot size: _____ )				
1. <u>Lonicera japonica, Japanese Honeysuckle</u>	10	Yes	FAC	(This section is part of the form grid and contains no text)
2. <u>Hedera helix, English Ivy</u>	5	Yes	FACU	
3. _____				
4. _____				
5. _____				
15 = Total Cover				
50% of total cover: <u>7.5</u>		20% of total cover: <u>3</u>		
Remarks: (Include photo numbers here or on a separate sheet.)				





## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/11/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WB-wet  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Forested depression Local relief (concave, convex, none): Concave Slope (%): 0  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: 35.985094 Long: -79.964285 Datum: WGS84  
 Soil Map Unit Name: VuB - Vance-Urban land complex, 2 to 10 percent slopes NWI classification: PFO

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

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	<b>Is the Sampled Area within a Wetland?</b> Yes <input checked="" type="checkbox"/> No _____
Remarks: Small wetland located adjacent to SA and PA (Owens Lake).	

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1)      ___ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2)      ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3)      ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1)      ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2)      ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3)      ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4)      ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point:WB-wet

Tree Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer negundo, Ash-Leaf Maple</u>	30	Yes	FAC
2. <u>Liquidambar styraciflua, Sweet-Gum</u>	30	Yes	FAC
3. <u>Acer floridanum, Florida Maple</u>	25	Yes	FACU
4. <u>Salix nigra, Black Willow</u>	15	No	OBL
5. _____	_____	_____	_____
6. _____	_____	_____	_____
_____ 100 = Total Cover			
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>			

Sapling Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Alnus serrulata, Brookside Alder</u>	15	Yes	OBL
2. <u>Salix nigra, Black Willow</u>	10	Yes	OBL
3. <u>Acer negundo, Ash-Leaf Maple</u>	10	Yes	FAC
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
_____ 35 = Total Cover			
50% of total cover: <u>17.5</u> 20% of total cover: <u>7</u>			

Shrub Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Lonicera morrowii, Morrow's Honeysuckle</u>	15	Yes	FACU
2. <u>Alnus serrulata, Brookside Alder</u>	10	Yes	OBL
3. <u>Fraxinus pennsylvanica, Green Ash</u>	5	No	FACW
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
_____ 30 = Total Cover			
50% of total cover: <u>15</u> 20% of total cover: <u>6</u>			

Herb Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Gramineae spp., Grasses</u>	5	Yes	FAC
2. <u>Fraxinus pennsylvanica, Green Ash</u>	2	Yes	FACW
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
_____ 7 = Total Cover			
50% of total cover: <u>3.5</u> 20% of total cover: <u>1.4</u>			

Woody Vine Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Lonicera japonica, Japanese Honeysuckle</u>	10	Yes	FAC
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
_____ 10 = Total Cover			
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>			

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

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 11 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 81.8% (A/B)

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species <u>50</u>	x 1 = <u>50</u>
FACW species <u>7</u>	x 2 = <u>14</u>
FAC species <u>85</u>	x 3 = <u>255</u>
FACU species <u>25</u>	x 4 = <u>100</u>
UPL species <u>40</u>	x 5 = <u>200</u>
Column Totals: <u>207</u> (A)	<u>619</u> (B)
Prevalence Index = B/A = <u>2.99</u>	

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
  - 2 - Dominance Test is >50%
  - 3 - Prevalence Index is ≤3.0<sup>1</sup>
  - 4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
  - Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)
- <sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Five Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

**Woody vine** – All woody vines, regardless of height.

**Hydrophytic Vegetation Present?** Yes x No \_\_\_\_\_



## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/18/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WC-up  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope (%): 5  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: \_\_\_\_\_ 35.985373 Long: \_\_\_\_\_ -79.936811 Datum: WGS84  
 Soil Map Unit Name: WkD - Wilkes-Poindexter-Wynott complex, 10 to 15 percent slopes NWI classification: Upland

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

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

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b> Yes _____ No <input checked="" type="checkbox"/>
Remarks: Upland point adjacent to WC.	

### HYDROLOGY

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

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point: WC-up

	Absolute % Cover	Dominant Species?	Indicator Status	
<b>Tree Stratum</b> (Plot size: _____ )				
1. <u>Quercus alba, Northern White Oak</u>	35	Yes	FACU	
2. <u>Fagus grandifolia, American Beech</u>	25	Yes	FACU	
3. <u>Pinus virginiana, Virginia Pine</u>	15	No	FACU	
4. <u>Liriodendron tulipifera, Tuliptree</u>	5	No	FACU	
5. _____				
6. _____				
	80 = Total Cover			
	50% of total cover: 40	20% of total cover: 16		
<b>Sapling Stratum</b> (Plot size: _____ )				
1. <u>Fagus grandifolia, American Beech</u>	20	Yes	FACU	
2. <u>Carya tomentosa, Mockernut Hickory</u>	5	No	UPL	
3. <u>Cornus florida, Flowering Dogwood</u>	5	No	FACU	
4. <u>Acer floridanum, Florida Maple</u>	5	No	FACU	
5. <u>Pinus virginiana, Virginia Pine</u>	5	No	FACU	
6. _____				
	40 = Total Cover			
	50% of total cover: 20	20% of total cover: 8		
<b>Shrub Stratum</b> (Plot size: _____ )				
1. <u>Carya tomentosa, Mockernut Hickory</u>	10	Yes	UPL	
2. <u>Acer floridanum, Florida Maple</u>	5	Yes	FACU	
3. <u>Pinus virginiana, Virginia Pine</u>	5	Yes	FACU	
4. _____				
5. _____				
6. _____				
	20 = Total Cover			
	50% of total cover: 10	20% of total cover: 4		
<b>Herb Stratum</b> (Plot size: _____ )				
1. <u>Dichanthelium aciculare, Needle-Leaf Rosette Grass</u>	15	Yes	FACU	
2. <u>Chasmanthium laxum, Slender Wood-Oats</u>	15	Yes	FAC	
3. <u>Vaccinium sp., Blueberry</u>	10	Yes	FAC	
4. <u>Viburnum acerifolium, Maple-Leaf Arrow-Wood</u>	2	No	UPL	
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
	42 = Total Cover			
	50% of total cover: 21	20% of total cover: 8.4		
<b>Woody Vine Stratum</b> (Plot size: _____ )				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
	0 = Total Cover			
	50% of total cover: 0	20% of total cover: 0		

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 22.2% (A/B)

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>0</u>	x 2 = <u>0</u>
FAC species <u>25</u>	x 3 = <u>75</u>
FACU species <u>80</u>	x 4 = <u>320</u>
UPL species <u>140</u>	x 5 = <u>700</u>
Column Totals: <u>245</u> (A)	<u>1095</u> (B)

Prevalence Index = B/A = 4.47

**Hydrophytic Vegetation Indicators:**

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0<sup>1</sup>

4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Five Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

**Woody vine** – All woody vines, regardless of height.

**Hydrophytic Vegetation Present?** Yes  No  x

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

**SOIL**

Sampling Point: WC-up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-2	10YR 3/2	100%					Sandy clay loam	
2-12+	10YR 5/6	100%					Loamy Sand	coarse sand

## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/18/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WC-wet  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Crenulation Local relief (concave, convex, none): Concave Slope (%): 0-2  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: 35.984929 Long: -79.937863 Datum: WGS84  
 Soil Map Unit Name: WkD - Wilkes-Poindexter-Wynott complex, 10 to 15 percent slopes NWI classification: PEM

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

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: PEM wetland in transmission right-of-way.	

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1)      _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2)      _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3)      _____ Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1)      _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2)      _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3)      _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4)      _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ Inundation Visible on Aerial Imagery (B7) _____ Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>1</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point: WC-wet

	Absolute % Cover	Dominant Species?	Indicator Status	
<b>Tree Stratum</b> (Plot size: _____ )				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
<b>Sapling Stratum</b> (Plot size: _____ )				
1. <i>Alnus serrulata</i> , Brookside Alder	10	Yes	OBL	
2. <i>Sambucus nigra</i> , Black Elder	10	Yes	FAC	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
<b>Shrub Stratum</b> (Plot size: _____ )				
1. <i>Rubus argutus</i> , Saw-Tooth Blackberry	30	Yes	FACU	
2. <i>Solidago</i> sp., Solidago	20	Yes	FAC	
3. <i>Elaeagnus angustifolia</i> , Russian-Olive	2	No	FACU	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
<b>Herb Stratum</b> (Plot size: _____ )				
1. <i>Juncus effusus</i> , Lamp Rush	30	Yes	FACW	
2. <i>Caryx</i> sp., Sedge	10	Yes	FACW	
3. <i>Impatiens capensis</i> , Spotted Touch-Me-Not	5	No	FACW	
4. <i>Liriodendron tulipifera</i> , Tuliptree	5	No	FACU	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
<b>Woody Vine Stratum</b> (Plot size: _____ )				
1. <i>Lonicera japonica</i> , Japanese Honeysuckle	10	Yes	FAC	
2. <i>Toxicodendron radicans</i> , Eastern Poison Ivy	5	Yes	FAC	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Remarks: (Include photo numbers here or on a separate sheet.)				

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87.5% (A/B)

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**Prevalence Index worksheet:**

<u>0</u> = Total % Cover of:	<u>3.07</u> = Multiply by:
OBL species <u>10</u> x 1 = <u>10</u>	
FACW species <u>45</u> x 2 = <u>90</u>	
FAC species <u>45</u> x 3 = <u>135</u>	
FACU species <u>0</u> x 4 = <u>0</u>	
UPL species <u>37</u> x 5 = <u>185</u>	
Column Totals: <u>137</u> (A)	<u>420</u> (B)

Prevalence Index = B/A = 3.07

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**Hydrophytic Vegetation Indicators:**

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0<sup>1</sup>

4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

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**Definitions of Five Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

**Woody vine** – All woody vines, regardless of height.

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**Hydrophytic Vegetation Present?** Yes x No \_\_\_\_\_





## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/12/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WD-up  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope (%): 2-4  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: 35.986707 Long: -79.930916 Datum: WGS84  
 Soil Map Unit Name: ChA - Chewacla loam, 0 to 2 percent slopes, frequently flooded NWI classification: Upland

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

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Upland data point located adjacent to WD.	

### HYDROLOGY

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

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point:WD-up

	Absolute % Cover	Dominant Species?	Indicator Status	
<b>Tree Stratum</b> (Plot size: _____ )				
1. <u>Carya tomentosa, Mockernut Hickory</u>	15	Yes	UPL	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>7</u> (A)  Total Number of Dominant Species Across All Strata: <u>13</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>53.8%</u> (A/B)
2. <u>Liquidambar styraciflua, Sweet-Gum</u>	5	Yes	FAC	
3. <u>Platanus occidentalis, American Sycamore</u>	5	Yes	FACW	
4. <u>Quercus falcata, Southern Red Oak</u>	5	Yes	FACU	
5. <u>Acer rubrum, Red Maple</u>	5	Yes	FAC	
6. _____				
_____ = Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>5</u> x 2 = <u>10</u> FAC species <u>55</u> x 3 = <u>165</u> FACU species <u>5</u> x 4 = <u>20</u> UPL species <u>55</u> x 5 = <u>275</u> Column Totals: <u>120</u> (A) <u>470</u> (B)  Prevalence Index = B/A = <u>3.92</u>
50% of total cover: <u>17.5</u>		20% of total cover: <u>7</u>		
<b>Sapling Stratum</b> (Plot size: _____ )				
1. <u>Carya tomentosa, Mockernut Hickory</u>	15	Yes	UPL	<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
2. <u>Acer negundo, Ash-Leaf Maple</u>	5	Yes	FAC	
3. _____				
4. _____				
5. _____				
6. _____				
_____ = Total Cover				<b>Definitions of Five Vegetation Strata:</b>  <b>Tree</b> – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).  <b>Sapling</b> – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.  <b>Shrub</b> – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.  <b>Herb</b> – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.  <b>Woody vine</b> – All woody vines, regardless of height.
50% of total cover: <u>10</u>		20% of total cover: <u>4</u>		
<b>Shrub Stratum</b> (Plot size: _____ )				
1. <u>Lonicera morrowii, Morrow's Honeysuckle</u>	25	Yes	FACU	<b>Hydrophytic Vegetation Present?</b> Yes <u>x</u> No _____
2. <u>Ligustrum sinense, Chinese Privet</u>	10	Yes	FACU	
3. <u>Cornus florida, Flowering Dogwood</u>	5	No	FACU	
4. _____				
5. _____				
6. _____				
_____ = Total Cover				
50% of total cover: <u>20</u>		20% of total cover: <u>8</u>		
<b>Herb Stratum</b> (Plot size: _____ )				
1. <u>Gramineae spp., Grasses</u>	20	Yes	FAC	<b>Hydrophytic Vegetation Present?</b> Yes <u>x</u> No _____
2. <u>Lonicera japonica, Japanese Honeysuckle</u>	10	Yes	FAC	
3. <u>Ligustrum sinense, Chinese Privet</u>	10	Yes	FACU	
4. <u>Daucus carota, Queen Anne's-Lace</u>	5	No	UPL	
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
_____ = Total Cover				
50% of total cover: <u>22.5</u>		20% of total cover: <u>9</u>		
<b>Woody Vine Stratum</b> (Plot size: _____ )				
1. <u>Smilax rotundifolia, Horsebrier</u>	10	Yes	FAC	<b>Hydrophytic Vegetation Present?</b> Yes <u>x</u> No _____
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover				
50% of total cover: <u>5</u>		20% of total cover: <u>2</u>		
Remarks: (Include photo numbers here or on a separate sheet.)				

**SOIL**

Sampling Point: WD-up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-2	<u>10YR 3/2</u>	<u>100%</u>					Sandy clay loam	
2-10	<u>10YR 3/4</u>	<u>100%</u>					Sandy clay	
10-12+	<u>10YR 4/6</u>	<u>100%</u>					Sandy clay	

## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/12/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WD-wet  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0-2  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: 35.986872 Long: -79.931359 Datum: WGS84  
 Soil Map Unit Name: ChA - Chewacla loam, 0 to 2 percent slopes, frequently flooded NWI classification: PFO  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes  No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	<b>Is the Sampled Area within a Wetland?</b> Yes <input checked="" type="checkbox"/> No _____
Remarks: Wetland located on the floodplain adjacent to Deep River.	

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ _____ Inundation Visible on Aerial Imagery (B7) _____ _____ Water-Stained Leaves (B9) _____ _____ Aquatic Fauna (B13) _____	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>3</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: buttress swell on trees	

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point:WD-wet

Tree Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Liquidambar styraciflua, Sweet-Gum</u>	40	Yes	FAC
2. <u>Platanus occidentalis, American Sycamore</u>	15	Yes	FACW
3. <u>Ulmus americana, American Elm</u>	10	No	FACW
4. <u>Acer rubrum, Red Maple</u>	5	No	FAC
5. _____			
6. _____			
	70 = Total Cover		
	50% of total cover: 35		20% of total cover: 14
Sapling Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Liquidambar styraciflua, Sweet-Gum</u>	15	Yes	FAC
2. <u>Ulmus americana, American Elm</u>	15	Yes	FACW
3. <u>Acer rubrum, Red Maple</u>	5	No	FAC
4. <u>Carpinus caroliniana, American Hornbeam</u>	5	No	FAC
5. _____			
6. _____			
	40 = Total Cover		
	50% of total cover: 20		20% of total cover: 8
Shrub Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Liquidambar styraciflua, Sweet-Gum</u>	10	Yes	FAC
2. <u>Ulmus americana, American Elm</u>	10	Yes	FACW
3. <u>Carpinus caroliniana, American Hornbeam</u>	5	Yes	FAC
4. _____			
5. _____			
6. _____			
	25 = Total Cover		
	50% of total cover: 12.5		20% of total cover: 5
Herb Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Gramineae spp., Grasses</u>	70	Yes	FAC
2. <u>Juncus effusus, Lamp Rush</u>	10	No	FACW
3. <u>Sagittaria cuneata, Arum-Leaf Arrowhead</u>	5	No	OBL
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			
	85 = Total Cover		
	50% of total cover: 42.5		20% of total cover: 17
Woody Vine Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Lonicera japonica, Japanese Honeysuckle</u>	5	Yes	FAC
2. _____			
3. _____			
4. _____			
5. _____			
	5 = Total Cover		
	50% of total cover: 2.5		20% of total cover: 1

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species <u>5</u>	x 1 = <u>5</u>
FACW species <u>60</u>	x 2 = <u>120</u>
FAC species <u>160</u>	x 3 = <u>480</u>
FACU species <u>0</u>	x 4 = <u>0</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>225</u> (A)	<u>605</u> (B)

Prevalence Index = B/A = 2.69

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
  - 2 - Dominance Test is >50%
  - 3 - Prevalence Index is ≤3.0<sup>1</sup>
  - 4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
  - Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)
- <sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Five Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

**Woody vine** – All woody vines, regardless of height.

**Hydrophytic Vegetation Present?** Yes  No

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

**SOIL**

Sampling Point: WD-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-8	10YR 5/1	60%	7.5 YR 5/8	40%		M	Clay loam	
8-12	Gley1 6 5 GY	60%	7.5YR 5/6	40%		M	Sandy clay loam	

## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/20/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WE-up  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope (%): 0-5  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: \_\_\_\_\_ 35.987741 Long: \_\_\_\_\_ -79.920362 Datum: WGS84  
 Soil Map Unit Name: HeC - Helena sandy loam, 6 to 10 percent slopes NWI classification: Upland

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

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

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b> Yes _____ No <input checked="" type="checkbox"/>
Remarks: Upland point adjacent to WE. Located on an upland ridge.	

### HYDROLOGY

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



**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point: WE-up

	Absolute % Cover	Dominant Species?	Indicator Status	
<b>Tree Stratum</b> (Plot size: _____ )				
1. <u>Liriodendron tulipifera, Tuliptree</u>	40	Yes	FACU	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)  Total Number of Dominant Species Across All Strata: <u>8</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50.0%</u> (A/B)
2. <u>Prunus serotina, Black Cherry</u>	20	Yes	FACU	
3. <u>pinus echinata</u>	15	No	FAC	
4. <u>Acer rubrum, Red Maple</u>	10	No	FAC	
5. _____				
6. _____				
85 = Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>50</u> x 3 = <u>150</u> FACU species <u>60</u> x 4 = <u>240</u> UPL species <u>90</u> x 5 = <u>450</u> Column Totals: <u>200</u> (A) <u>840</u> (B)  Prevalence Index = B/A = <u>4.20</u>
50% of total cover: <u>42.5</u>		20% of total cover: <u>17</u>		
<b>Sapling Stratum</b> (Plot size: _____ )				
1. <u>Juniperus virginiana, Eastern Red-Cedar</u>	10	Yes	FACU	
2. <u>Liquidambar styraciflua, Sweet-Gum</u>	5	Yes	FAC	
3. <u>Quercus phellos, Willow Oak</u>	5	Yes	FAC	
4. _____				
5. _____				
6. _____				
20 = Total Cover				<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
50% of total cover: <u>10</u>		20% of total cover: <u>4</u>		
<b>Shrub Stratum</b> (Plot size: _____ )				
1. <u>Fagus grandifolia, American Beech</u>	5	Yes	FACU	
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
5 = Total Cover				<b>Definitions of Five Vegetation Strata:</b>  <b>Tree</b> – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).  <b>Sapling</b> – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.  <b>Shrub</b> – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.  <b>Herb</b> – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.  <b>Woody vine</b> – All woody vines, regardless of height.
50% of total cover: <u>2.5</u>		20% of total cover: <u>1</u>		
<b>Herb Stratum</b> (Plot size: _____ )				
1. <u>Microstegium vimineum, Japanese Stilt Grass</u>	20	Yes	FAC	
2. <u>Cornus florida, Flowering Dogwood</u>	5	No	FACU	
3. <u>Liquidambar styraciflua, Sweet-Gum</u>	5	No	FAC	
4. <u>Rosa multiflora, Rambler Rose</u>	5	No	FACU	
5. <u>Quercus falcata, Southern Red Oak</u>	5	No	FACU	
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
40 = Total Cover				<b>Hydrophytic Vegetation Present?</b> Yes _____ No <u>x</u>
50% of total cover: <u>20</u>		20% of total cover: <u>8</u>		
<b>Woody Vine Stratum</b> (Plot size: _____ )				
1. <u>Lonicera japonica, Japanese Honeysuckle</u>	5	Yes	FAC	
2. _____				
3. _____				
4. _____				
5. _____				
5 = Total Cover				
50% of total cover: <u>2.5</u>		20% of total cover: <u>1</u>		
Remarks: (Include photo numbers here or on a separate sheet.)				

**SOIL**

Sampling Point: WE-up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-2	<u>10YR 4/3</u>	<u>100%</u>					Sandy clay loam	
2-6	<u>10YR 4/4</u>	<u>100%</u>					Sandy loam	
6-12	<u>10YR 4/4</u>	<u>60%</u>	<u>7.5YR 5/8</u>	<u>40%</u>		<u>M</u>	Sandy clay loam	

## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/20/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WE-wet  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Ephemeral pool Local relief (concave, convex, none): Concave Slope (%): 0-2  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: 35.987961 Long: -79.920482 Datum: WGS84  
 Soil Map Unit Name: HeC - Helena sandy loam, 6 to 10 percent slopes NWI classification: PFO  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes  No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Small wetland located below pond.	

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1)      _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2)      _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3)      _____ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1)      _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2)      _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3)      _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4)      _____ Other (Explain in Remarks) _____ Iron Deposits (B5)      _____ _____ Inundation Visible on Aerial Imagery (B7)      _____ _____ Water-Stained Leaves (B9)      _____ _____ Aquatic Fauna (B13)      _____	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>2</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point: WE-wet

	Absolute % Cover	Dominant Species?	Indicator Status		
<b>Tree Stratum</b> (Plot size: _____ )					
1. <u>Liriodendron tulipifera, Tuliptree</u>	30	Yes	FACU	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>6</u> (A)  Total Number of Dominant Species Across All Strata: <u>10</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>60.0%</u> (A/B)	
2. <u>Pinus taeda, Loblolly Pine</u>	20	Yes	FAC		
3. <u>Platanus occidentalis, American Sycamore</u>	15	Yes	FACW		
4. <u>Liquidambar styraciflua, Sweet-Gum</u>	10	No	FAC		
5. _____					
6. _____					
_____ = Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>20</u> x 2 = <u>40</u> FAC species <u>45</u> x 3 = <u>135</u> FACU species <u>30</u> x 4 = <u>120</u> UPL species <u>50</u> x 5 = <u>250</u> Column Totals: <u>145</u> (A) <u>545</u> (B)  Prevalence Index = B/A = <u>3.76</u>	
50% of total cover: <u>37.5</u> 20% of total cover: <u>15</u>					
<b>Sapling Stratum</b> (Plot size: _____ )					
1. <u>Acer rubrum, Red Maple</u>	5	Yes	FAC	<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
_____ = Total Cover				<b>Definitions of Five Vegetation Strata:</b>  <b>Tree</b> – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).  <b>Sapling</b> – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.  <b>Shrub</b> – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.  <b>Herb</b> – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.  <b>Woody vine</b> – All woody vines, regardless of height.	
50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>					
<b>Shrub Stratum</b> (Plot size: _____ )					
1. <u>Ligustrum sinense, Chinese Privet</u>	10	Yes	FACU	<b>Hydrophytic Vegetation Present?</b> Yes <u>x</u> No _____	
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
_____ = Total Cover					
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>					
<b>Herb Stratum</b> (Plot size: _____ )					
1. <u>Juncus effusus, Lamp Rush</u>	5	Yes	FACW		
2. <u>Ligustrum sinense, Chinese Privet</u>	5	Yes	FACU		
3. <u>Rosa multiflora, Rambler Rose</u>	5	Yes	FACU		
4. <u>Microstegium vimineum, Japanese Stilt Grass</u>	5	Yes	FAC		
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
10. _____					
11. _____					
_____ = Total Cover					
50% of total cover: <u>10</u> 20% of total cover: <u>4</u>					
<b>Woody Vine Stratum</b> (Plot size: _____ )					
1. <u>Lonicera japonica, Japanese Honeysuckle</u>	5	Yes	FAC		
2. _____					
3. _____					
4. _____					
5. _____					
_____ = Total Cover					
50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>					
Remarks: (Include photo numbers here or on a separate sheet.)					



## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/20/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WF-up  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope (%): 2-5  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: 35.988296 Long: -79.918725 Datum: WGS84  
 Soil Map Unit Name: HeC - Helena sandy loam, 6 to 10 percent slopes NWI classification: Upland  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes  No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b> Yes _____ No <input checked="" type="checkbox"/>
Remarks: Upland point adjacent to WF.	

### HYDROLOGY

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

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point: WF-up

Tree Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Fagus grandifolia</i> , American Beech	60	Yes	FACU
2. <i>Quercus alba</i> , Northern White Oak	30	Yes	FACU
3. <i>Liquidambar styraciflua</i> , Sweet-Gum	10	No	FAC
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>			
Sapling Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Juniperus virginiana</i> , Eastern Red-Cedar	10	Yes	FACU
2. <i>Liquidambar styraciflua</i> , Sweet-Gum	10	Yes	FAC
3. <i>Acer rubrum</i> , Red Maple	10	Yes	FAC
4. <i>Quercus alba</i> , Northern White Oak	5	No	FACU
5. <i>Cornus florida</i> , Flowering Dogwood	2	No	FACU
6. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: <u>18.5</u> 20% of total cover: <u>7.4</u>			
Shrub Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Liquidambar styraciflua</i> , Sweet-Gum	10	Yes	FAC
2. <i>Pyrus calleryana</i> , Bradford Pear	5	Yes	FACU
3. <i>Ulmus alata</i> , Winged Elm	2	No	FACU
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: <u>8.5</u> 20% of total cover: <u>3.4</u>			
Herb Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Pyrus calleryana</i> , Bradford Pear	40	Yes	FACU
2. <i>Quercus alba</i> , Northern White Oak	40	Yes	FACU
3. <i>Campsis radicans</i> , Trumpet-Creeper	10	No	FAC
4. <i>Liquidambar styraciflua</i> , Sweet-Gum	5	No	FAC
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: <u>47.5</u> 20% of total cover: <u>19</u>			
Woody Vine Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Smilax rotundifolia</i> , Horsebrier	5	Yes	FAC
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>			

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40.0% (A/B)

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>0</u>	x 2 = <u>0</u>
FAC species <u>60</u>	x 3 = <u>180</u>
FACU species <u>90</u>	x 4 = <u>360</u>
UPL species <u>194</u>	x 5 = <u>970</u>
Column Totals: <u>344</u> (A)	<u>1510</u> (B)

Prevalence Index = B/A = 4.39

**Hydrophytic Vegetation Indicators:**

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0<sup>1</sup>

4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Five Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

**Woody vine** – All woody vines, regardless of height.

**Hydrophytic Vegetation Present?**    Yes     No  x

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





## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: U-2412A City/County: Guilford County Sampling Date: 4/20/2017  
 Applicant/Owner: NCDOT State: NC Sampling Point: WF-wet  
 Investigator(s): R. Johnson/ AECOM Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): Forested depression Local relief (concave, convex, none): Concave Slope (%): 0  
 Subregion (LRR or MLRA): LRR P MLRA 136 Lat: \_\_\_\_\_ 35.988535 Long: \_\_\_\_\_ -79.918775 Datum: WGS84  
 Soil Map Unit Name: HeC - Helena sandy loam, 6 to 10 percent slopes NWI classification: PFO

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

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	<b>Is the Sampled Area within a Wetland?</b> Yes <input checked="" type="checkbox"/> No _____
Remarks: Wetland possibly created by beaver dam failure on opposite side of PC.	

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1)      ___ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2)      ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3)      ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1)      ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2)      ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3)      ___ Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4)      ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>8</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point: WF-wet

Tree Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Liriodendron tulipifera</i> , Tuliptree	20	Yes	FACU
2. <i>Liquidambar styraciflua</i> , Sweet-Gum	10	Yes	FAC
3. <i>Acer rubrum</i> , Red Maple	5	No	FAC
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
_____ 35 = Total Cover			
50% of total cover: <u>17.5</u> 20% of total cover: <u>7</u>			
Sapling Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Acer rubrum</i> , Red Maple	5	Yes	FAC
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
_____ 5 = Total Cover			
50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>			
Shrub Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
_____ 0 = Total Cover			
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Herb Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Juncus effusus</i> , Lamp Rush	20	Yes	FACW
2. <i>Carex</i> sp., Sedge	15	Yes	FACW
3. <i>Liquidambar styraciflua</i> , Sweet-Gum	10	No	FAC
4. <i>Impatiens capensis</i> , Spotted Touch-Me-Not	5	No	FACW
5. <i>Ambrosia artemisiifolia</i> , Annual Ragweed	5	No	FACU
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
_____ 55 = Total Cover			
50% of total cover: <u>27.5</u> 20% of total cover: <u>11</u>			
Woody Vine Stratum (Plot size: _____ )	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
_____ 0 = Total Cover			
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80.0% (A/B)

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:	Result
OBL species <u>0</u>	x 1 =	<u>0</u>
FACW species <u>40</u>	x 2 =	<u>80</u>
FAC species <u>30</u>	x 3 =	<u>90</u>
FACU species <u>20</u>	x 4 =	<u>80</u>
UPL species <u>25</u>	x 5 =	<u>125</u>
Column Totals: <u>115</u> (A)		<u>375</u> (B)

Prevalence Index = B/A = 3.26

**Hydrophytic Vegetation Indicators:**

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0<sup>1</sup>

4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Five Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

**Woody vine** – All woody vines, regardless of height.

**Hydrophytic Vegetation Present?** Yes x No \_\_\_\_\_

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

**SOIL**

Sampling Point: WF-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-6	5Y 4/2	60%	7.5YR 4/6	40%	C		Loamy Sand	
6-12+	5Y 4/2	95%	7.5YR 4/6	5%	C		Loamy Sand	

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

USACE AID#:	NCDWR #:
Project Name <u>U-2412 A</u>	Date of Evaluation <u>4/11/2017</u>
Applicant/Owner Name <u>NCDOT</u>	Wetland Site Name <u>WA</u>
Wetland Type <u>Headwater Forest</u>	Assessor Name/Organization <u>C. Inscore/AECOM</u>
Level III Ecoregion <u>Piedmont</u>	Nearest Named Water Body <u>Deep River</u>
River Basin <u>Cape Fear</u>	USGS 8-Digit Catalogue Unit <u>0303003</u>
County <u>Guilford</u>	NCDWR Region <u>Winston-Salem</u>
<input type="radio"/> Yes <input checked="" type="radio"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)

**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="radio"/> A | <input checked="" type="radio"/> A | Not severely altered   |
| <input type="radio"/> B            | <input type="radio"/> 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="radio"/> A | <input checked="" type="radio"/> A | Water storage capacity and duration are not altered.   |
| <input type="radio"/> B            | <input type="radio"/> B            | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).  |
| <input type="radio"/> C            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | Majority of wetland with depressions able to pond water > 1 foot deep           |
|     | <input type="radio"/> B            | <input checked="" type="radio"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
|     | <input type="radio"/> C            | <input type="radio"/> C            | Majority of wetland with depressions able to pond water 3 to 6 inches deep      |
|     | <input checked="" type="radio"/> D | <input type="radio"/> D            | Depressions able to pond water < 3 inches deep                                  |
| 3b. | <input type="radio"/> A            |                                    | Evidence that maximum depth of inundation is greater than 2 feet                |
|     | <input type="radio"/> B            |                                    | Evidence that maximum depth of inundation is between 1 and 2 feet               |
|     | <input type="radio"/> 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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no evidence of pollutants or discharges entering the assessment area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area  |
| <input type="radio"/> C            | <input type="radio"/> 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 checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" 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 checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | <input checked="" 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="radio"/> A | <input type="radio"/> A            | ≥ 100 feet            |
| <input type="radio"/> B | <input checked="" type="radio"/> B | From 80 to < 100 feet |
| <input type="radio"/> C | <input type="radio"/> C            | From 50 to < 80 feet  |
| <input type="radio"/> D | <input type="radio"/> D            | From 40 to < 50 feet  |
| <input type="radio"/> E | <input type="radio"/> E            | From 30 to < 40 feet  |
| <input type="radio"/> F | <input type="radio"/> F            | From 15 to < 30 feet  |
| <input type="radio"/> G | <input type="radio"/> G            | From 5 to < 15 feet   |
| <input type="radio"/> H | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | <input type="radio"/> A            | ≥ 500 acres  |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | From 100 to < 500 acres                            |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | From 50 to < 100 acres                             |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | From 25 to < 50 acres                              |
| <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E            | From 10 to < 25 acres                              |
| <input type="radio"/> F            | <input type="radio"/> F            | <input type="radio"/> F            | From 5 to < 10 acres                               |
| <input checked="" type="radio"/> G | <input checked="" type="radio"/> G | <input checked="" type="radio"/> G | From 1 to < 5 acres                                |
| <input type="radio"/> H            | <input type="radio"/> H            | <input type="radio"/> H            | From 0.5 to < 1 acre                               |
| <input type="radio"/> I            | <input type="radio"/> I            | <input type="radio"/> I            | From 0.1 to < 0.5 acre                             |
| <input type="radio"/> J            | <input type="radio"/> J            | <input type="radio"/> J            | From 0.01 to < 0.1 acre                            |
| <input type="radio"/> K            | <input type="radio"/> K            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | ≥ 500 acres  |
| <input type="radio"/> B            | <input type="radio"/> B            | From 100 to < 500 acres  |
| <input type="radio"/> C            | <input checked="" type="radio"/> C | From 50 to < 100 acres   |
| <input type="radio"/> D            | <input type="radio"/> D            | From 10 to < 50 acres  |
| <input checked="" type="radio"/> E | <input type="radio"/> E            | < 10 acres   |
| <input type="radio"/> F            | <input type="radio"/> 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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | Canopy closed, or nearly closed, with natural gaps associated with natural processes |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Canopy present, but opened more than natural gaps                                    |
|           | <input type="radio"/> C            | <input type="radio"/> C            | Canopy sparse or absent  |
| Mid-Story | <input type="radio"/> A            | <input type="radio"/> A            | Dense mid-story/sapling layer  |
|           | <input checked="" type="radio"/> B | <input checked="" type="radio"/> B | Moderate density mid-story/sapling layer   |
|           | <input type="radio"/> C            | <input type="radio"/> C            | Mid-story/sapling layer sparse or absent   |
| Shrub     | <input type="radio"/> A            | <input type="radio"/> A            | Dense shrub layer  |
|           | <input type="radio"/> B            | <input checked="" type="radio"/> B | Moderate density shrub layer   |
|           | <input checked="" type="radio"/> C | <input type="radio"/> C            | Shrub layer sparse or absent   |
| Herb      | <input type="radio"/> A            | <input type="radio"/> A            | Dense herb layer   |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Moderate density herb layer  |
|           | <input checked="" type="radio"/> C | <input checked="" type="radio"/> 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.

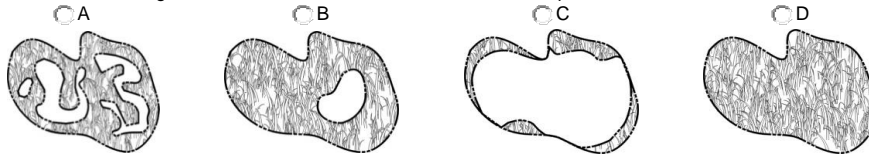
20. **Large Woody Debris – wetland type condition metric (skip for all marshes)**

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

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WA Date 4/11/2017  
 Wetland Type Headwater Forest Assessor Name/Organization C. Inscore/AECOM

Notes on Field Assessment Form (Y/N)	<u>NO</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>NO</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>NO</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<b>HIGH</b>
		Sub-Surface Storage and Retention	<b>HIGH</b>
Water Quality	Pathogen Change	Condition	<b>HIGH</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
	Particulate Change	Condition	<b>MEDIUM</b>
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	<b>MEDIUM</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
	Physical Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>LOW</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	<b>HIGH</b>
		Landscape Patch Structure	<b>HIGH</b>
		Vegetation Composition	<b>MEDIUM</b>

**Function Rating Summary**

Function	Metrics/Notes	Rating
Hydrology	Condition	<b>HIGH</b>
Water Quality	Condition	<b>MEDIUM</b>
	Condition/Opportunity	<b>HIGH</b>
	Opportunity Presence? (Y/N)	<b>YES</b>
Habitat	Condition	<b>HIGH</b>

**Overall Wetland Rating**           HIGH



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

USACE AID#:	NCDWR #:
Project Name <u>U-2412 A</u>	Date of Evaluation <u>4/11/2017</u>
Applicant/Owner Name <u>NCDOT</u>	Wetland Site Name <u>WB</u>
Wetland Type <u>Headwater Forest</u>	Assessor Name/Organization <u>C. Inscore/AECOM</u>
Level III Ecoregion <u>Piedmont</u>	Nearest Named Water Body <u>Deep River</u>
River Basin <u>Cape Fear</u>	USGS 8-Digit Catalogue Unit <u>03030003</u>
County <u>Guilford</u>	NCDWR Region <u>Winston-Salem</u>
<input type="radio"/> Yes <input checked="" type="radio"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)

**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="radio"/> A | <input checked="" type="radio"/> A | Not severely altered   |
| <input type="radio"/> B            | <input type="radio"/> 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="radio"/> A | <input checked="" type="radio"/> A | Water storage capacity and duration are not altered.   |
| <input type="radio"/> B            | <input type="radio"/> B            | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).  |
| <input type="radio"/> C            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | Majority of wetland with depressions able to pond water > 1 foot deep           |
|     | <input checked="" type="radio"/> B | <input checked="" type="radio"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
|     | <input type="radio"/> C            | <input type="radio"/> C            | Majority of wetland with depressions able to pond water 3 to 6 inches deep      |
|     | <input type="radio"/> D            | <input type="radio"/> D            | Depressions able to pond water < 3 inches deep                                  |
| 3b. | <input type="radio"/> A            |                                    | Evidence that maximum depth of inundation is greater than 2 feet                |
|     | <input type="radio"/> B            |                                    | Evidence that maximum depth of inundation is between 1 and 2 feet               |
|     | <input checked="" type="radio"/> 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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no evidence of pollutants or discharges entering the assessment area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area  |
| <input type="radio"/> C            | <input type="radio"/> 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 checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" 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 checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | <input checked="" 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 <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="radio"/> A | <input type="radio"/> A            | ≥ 100 feet            |
| <input type="radio"/> B | <input checked="" type="radio"/> B | From 80 to < 100 feet |
| <input type="radio"/> C | <input type="radio"/> C            | From 50 to < 80 feet  |
| <input type="radio"/> D | <input type="radio"/> D            | From 40 to < 50 feet  |
| <input type="radio"/> E | <input type="radio"/> E            | From 30 to < 40 feet  |
| <input type="radio"/> F | <input type="radio"/> F            | From 15 to < 30 feet  |
| <input type="radio"/> G | <input type="radio"/> G            | From 5 to < 15 feet   |
| <input type="radio"/> H | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | <input type="radio"/> A ≥ 500 acres  |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B From 100 to < 500 acres                            |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C From 50 to < 100 acres                             |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D From 25 to < 50 acres                              |
| <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E From 10 to < 25 acres                              |
| <input type="radio"/> F            | <input type="radio"/> F            | <input type="radio"/> F From 5 to < 10 acres                               |
| <input checked="" type="radio"/> G | <input checked="" type="radio"/> G | <input checked="" type="radio"/> G From 1 to < 5 acres                     |
| <input type="radio"/> H            | <input type="radio"/> H            | <input type="radio"/> H From 0.5 to < 1 acre                               |
| <input type="radio"/> I            | <input type="radio"/> I            | <input type="radio"/> I From 0.1 to < 0.5 acre                             |
| <input type="radio"/> J            | <input type="radio"/> J            | <input type="radio"/> J From 0.01 to < 0.1 acre                            |
| <input type="radio"/> K            | <input type="radio"/> K            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | ≥ 500 acres  |
| <input type="radio"/> B            | <input type="radio"/> B            | From 100 to < 500 acres  |
| <input type="radio"/> C            | <input type="radio"/> C            | From 50 to < 100 acres   |
| <input type="radio"/> D            | <input checked="" type="radio"/> D | From 10 to < 50 acres  |
| <input checked="" type="radio"/> E | <input type="radio"/> E            | < 10 acres   |
| <input type="radio"/> F            | <input type="radio"/> 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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | Canopy closed, or nearly closed, with natural gaps associated with natural processes |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Canopy present, but opened more than natural gaps                                    |
|           | <input type="radio"/> C            | <input type="radio"/> C            | Canopy sparse or absent  |
| Mid-Story | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Dense mid-story/sapling layer  |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Moderate density mid-story/sapling layer   |
|           | <input type="radio"/> C            | <input type="radio"/> C            | Mid-story/sapling layer sparse or absent   |
| Shrub     | <input type="radio"/> A            | <input type="radio"/> A            | Dense shrub layer  |
|           | <input checked="" type="radio"/> B | <input checked="" type="radio"/> B | Moderate density shrub layer   |
|           | <input type="radio"/> C            | <input type="radio"/> C            | Shrub layer sparse or absent   |
| Herb      | <input type="radio"/> A            | <input type="radio"/> A            | Dense herb layer   |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Moderate density herb layer  |
|           | <input checked="" type="radio"/> C | <input checked="" type="radio"/> 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.

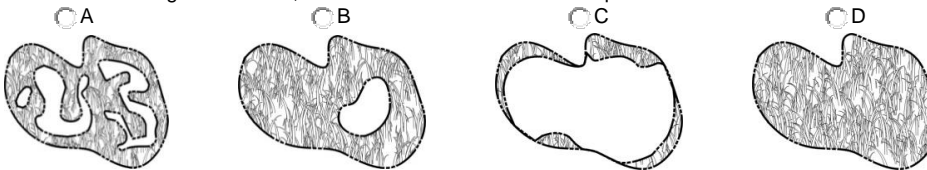
**20. Large Woody Debris – wetland type condition metric (skip for all marshes)**

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

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WB Date 4/11/2017  
 Wetland Type Headwater Forest Assessor Name/Organization C. Inscore/AECOM

Notes on Field Assessment Form (Y/N) NO  
 Presence of regulatory considerations (Y/N) YES  
 Wetland is intensively managed (Y/N) NO  
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES  
 Assessment area is substantially altered by beaver (Y/N) NO  
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO  
 Assessment area is on a coastal island (Y/N) NO

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<b>HIGH</b>
	Sub-Surface Storage and Retention	Condition	<b>MEDIUM</b>
Water Quality	Pathogen Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>MEDIUM</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
	Particulate Change	Condition	<b>HIGH</b>
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	<b>HIGH</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
	Physical Change	Condition	<b>MEDIUM</b>
		Condition/Opportunity	<b>MEDIUM</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	<b>MEDIUM</b>
	Landscape Patch Structure	Condition	<b>HIGH</b>
	Vegetation Composition	Condition	<b>MEDIUM</b>

**Function Rating Summary**

Function	Metrics/Notes	Rating
Hydrology	Condition	<b>HIGH</b>
Water Quality	Condition	<b>HIGH</b>
	Condition/Opportunity	<b>HIGH</b>
	Opportunity Presence? (Y/N)	<b>YES</b>
Habitat	Condition	<b>HIGH</b>

**Overall Wetland Rating** HIGH

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

USACE AID#: _____		NCDWR #: _____	
Project Name <u>U-2412 A</u>		Date of Evaluation <u>4/11/2017</u>	
Applicant/Owner Name <u>NCDOT</u>		Wetland Site Name <u>WC</u>	
Wetland Type <u>Bottomland Hardwood Forest</u>		Assessor Name/Organization <u>C. Inscore/AECOM</u>	
Level III Ecoregion <u>Piedmont</u>		Nearest Named Water Body <u>Deep River</u>	
River Basin <u>Cape Fear</u>		USGS 8-Digit Catalogue Unit <u>03030003</u>	
County <u>Guilford</u>		NCDWR Region <u>Winston-Salem</u>	
<input type="radio"/> Yes <input checked="" type="radio"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) <u>35.985219; -79.964902</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="radio"/> A | <input type="radio"/> A            | Not severely altered   |
| <input type="radio"/> B            | <input checked="" type="radio"/> 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="radio"/> A | <input checked="" type="radio"/> A | Water storage capacity and duration are not altered.   |
| <input type="radio"/> B            | <input type="radio"/> B            | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).  |
| <input type="radio"/> C            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | Majority of wetland with depressions able to pond water > 1 foot deep           |
|     | <input checked="" type="radio"/> B | <input checked="" type="radio"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
|     | <input type="radio"/> C            | <input type="radio"/> C            | Majority of wetland with depressions able to pond water 3 to 6 inches deep      |
|     | <input type="radio"/> D            | <input type="radio"/> D            | Depressions able to pond water < 3 inches deep                                  |
| 3b. | <input type="radio"/> A            |                                    | Evidence that maximum depth of inundation is greater than 2 feet                |
|     | <input type="radio"/> B            |                                    | Evidence that maximum depth of inundation is between 1 and 2 feet               |
|     | <input checked="" type="radio"/> 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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no evidence of pollutants or discharges entering the assessment area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area  |
| <input type="radio"/> C            | <input type="radio"/> 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="radio"/> A            | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | ≥ 10% impervious surfaces  |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B            | Confined animal operations (or other local, concentrated source of pollutants)   |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C            | ≥ 20% coverage of pasture  |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D            | ≥ 20% coverage of agricultural land (regularly plowed land)  |
| <input checked="" type="radio"/> E | <input checked="" type="radio"/> E | <input checked="" type="radio"/> E | ≥ 20% coverage of maintained grass/herb  |
| <input type="radio"/> F            | <input type="radio"/> F            | <input type="radio"/> F            | ≥ 20% coverage of clear-cut land   |
| <input type="radio"/> G            | <input type="radio"/> G            | <input type="radio"/> 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 <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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | ≥ 100 feet            |
| <input type="radio"/> B            | <input type="radio"/> B            | From 80 to < 100 feet |
| <input type="radio"/> C            | <input type="radio"/> C            | From 50 to < 80 feet  |
| <input type="radio"/> D            | <input type="radio"/> D            | From 40 to < 50 feet  |
| <input type="radio"/> E            | <input type="radio"/> E            | From 30 to < 40 feet  |
| <input type="radio"/> F            | <input type="radio"/> F            | From 15 to < 30 feet  |
| <input type="radio"/> G            | <input type="radio"/> G            | From 5 to < 15 feet   |
| <input type="radio"/> H            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | <input type="radio"/> A ≥ 500 acres  |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B From 100 to < 500 acres                            |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C From 50 to < 100 acres                             |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D From 25 to < 50 acres                              |
| <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E From 10 to < 25 acres                              |
| <input type="radio"/> F            | <input type="radio"/> F            | <input type="radio"/> F From 5 to < 10 acres                               |
| <input type="radio"/> G            | <input type="radio"/> G            | <input type="radio"/> G From 1 to < 5 acres                                |
| <input checked="" type="radio"/> H | <input checked="" type="radio"/> H | <input type="radio"/> H From 0.5 to < 1 acre                               |
| <input type="radio"/> I            | <input type="radio"/> I            | <input type="radio"/> I From 0.1 to < 0.5 acre                             |
| <input type="radio"/> J            | <input type="radio"/> J            | <input checked="" type="radio"/> J From 0.01 to < 0.1 acre                 |
| <input type="radio"/> K            | <input type="radio"/> K            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | ≥ 500 acres  |
| <input checked="" type="radio"/> B | <input type="radio"/> B            | From 100 to < 500 acres  |
| <input type="radio"/> C            | <input type="radio"/> C            | From 50 to < 100 acres   |
| <input type="radio"/> D            | <input checked="" type="radio"/> D | From 10 to < 50 acres  |
| <input type="radio"/> E            | <input type="radio"/> E            | < 10 acres   |
| <input type="radio"/> F            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | Canopy closed, or nearly closed, with natural gaps associated with natural processes |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Canopy present, but opened more than natural gaps                                    |
|           | <input checked="" type="radio"/> C | <input checked="" type="radio"/> C | Canopy sparse or absent  |
| Mid-Story | <input type="radio"/> A            | <input type="radio"/> A            | Dense mid-story/sapling layer  |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Moderate density mid-story/sapling layer   |
|           | <input checked="" type="radio"/> C | <input checked="" type="radio"/> C | Mid-story/sapling layer sparse or absent   |
| Shrub     | <input type="radio"/> A            | <input type="radio"/> A            | Dense shrub layer  |
|           | <input checked="" type="radio"/> B | <input checked="" type="radio"/> B | Moderate density shrub layer   |
|           | <input type="radio"/> C            | <input type="radio"/> C            | Shrub layer sparse or absent   |
| Herb      | <input checked="" type="radio"/> A | <input checked="" type="radio"/> A | Dense herb layer   |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Moderate density herb layer  |
|           | <input type="radio"/> C            | <input type="radio"/> 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.

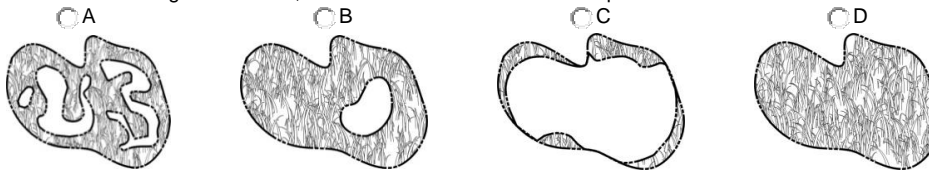
**20. Large Woody Debris – wetland type condition metric (skip for all marshes)**

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

PEM wetland in transmission line right-of-way.

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WC Date 4/11/2017  
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization C. Inscore/AECOM

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>YES</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>YES</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>NO</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<b>MEDIUM</b>
		Sub-Surface Storage and Retention	<b>MEDIUM</b>
Water Quality	Pathogen Change	Condition	<b>HIGH</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
	Particulate Change	Condition	<b>MEDIUM</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
	Soluble Change	Condition	<b>MEDIUM</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
	Physical Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>LOW</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	<b>LOW</b>
		Landscape Patch Structure	<b>LOW</b>
		Vegetation Composition	<b>MEDIUM</b>

**Function Rating Summary**

Function	Metrics/Notes	Rating
Hydrology	Condition	<b>MEDIUM</b>
Water Quality	Condition	<b>MEDIUM</b>
	Condition/Opportunity	<b>HIGH</b>
	Opportunity Presence? (Y/N)	<b>YES</b>
Habitat	Condition	<b>LOW</b>

**Overall Wetland Rating** **MEDIUM**

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

USACE AID#:	NCDWR #:
Project Name <u>U-2412 A</u>	Date of Evaluation <u>4/12/2017</u>
Applicant/Owner Name <u>NCDOT</u>	Wetland Site Name <u>WD</u>
Wetland Type <u>Bottomland Hardwood Forest</u>	Assessor Name/Organization <u>C. Inscore/AECOM</u>
Level III Ecoregion <u>Piedmont</u>	Nearest Named Water Body <u>Deep River</u>
River Basin <u>Cape Fear</u>	USGS 8-Digit Catalogue Unit <u>03030003</u>
County <u>Guilford</u>	NCDWR Region <u>Winston-Salem</u>
<input type="radio"/> Yes <input checked="" type="radio"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) <u>35.986841; -79.931428</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="radio"/> A | <input checked="" type="radio"/> A | Not severely altered   |
| <input type="radio"/> B            | <input type="radio"/> 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="radio"/> A | <input checked="" type="radio"/> A | Water storage capacity and duration are not altered.   |
| <input type="radio"/> B            | <input type="radio"/> B            | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).  |
| <input type="radio"/> C            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | Majority of wetland with depressions able to pond water > 1 foot deep           |
|     | <input checked="" type="radio"/> B | <input checked="" type="radio"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
|     | <input type="radio"/> C            | <input type="radio"/> C            | Majority of wetland with depressions able to pond water 3 to 6 inches deep      |
|     | <input type="radio"/> D            | <input type="radio"/> D            | Depressions able to pond water < 3 inches deep                                  |
| 3b. | <input type="radio"/> A            |                                    | Evidence that maximum depth of inundation is greater than 2 feet                |
|     | <input type="radio"/> B            |                                    | Evidence that maximum depth of inundation is between 1 and 2 feet               |
|     | <input checked="" type="radio"/> 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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no evidence of pollutants or discharges entering the assessment area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area  |
| <input type="radio"/> C            | <input type="radio"/> 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 checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" 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 checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | <input checked="" 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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | ≥ 100 feet            |
| <input type="radio"/> B            | <input type="radio"/> B            | From 80 to < 100 feet |
| <input type="radio"/> C            | <input type="radio"/> C            | From 50 to < 80 feet  |
| <input type="radio"/> D            | <input type="radio"/> D            | From 40 to < 50 feet  |
| <input type="radio"/> E            | <input type="radio"/> E            | From 30 to < 40 feet  |
| <input type="radio"/> F            | <input type="radio"/> F            | From 15 to < 30 feet  |
| <input type="radio"/> G            | <input type="radio"/> G            | From 5 to < 15 feet   |
| <input type="radio"/> H            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | <input type="radio"/> A ≥ 500 acres  |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B From 100 to < 500 acres                            |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C From 50 to < 100 acres                             |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D From 25 to < 50 acres                              |
| <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E From 10 to < 25 acres                              |
| <input checked="" type="radio"/> F | <input checked="" type="radio"/> F | <input checked="" type="radio"/> F From 5 to < 10 acres                    |
| <input type="radio"/> G            | <input type="radio"/> G            | <input type="radio"/> G From 1 to < 5 acres                                |
| <input type="radio"/> H            | <input type="radio"/> H            | <input type="radio"/> H From 0.5 to < 1 acre                               |
| <input type="radio"/> I            | <input type="radio"/> I            | <input type="radio"/> I From 0.1 to < 0.5 acre                             |
| <input type="radio"/> J            | <input type="radio"/> J            | <input type="radio"/> J From 0.01 to < 0.1 acre                            |
| <input type="radio"/> K            | <input type="radio"/> K            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | ≥ 500 acres  |
| <input checked="" type="radio"/> B | <input type="radio"/> B            | From 100 to < 500 acres  |
| <input type="radio"/> C            | <input checked="" type="radio"/> C | From 50 to < 100 acres   |
| <input type="radio"/> D            | <input type="radio"/> D            | From 10 to < 50 acres  |
| <input type="radio"/> E            | <input type="radio"/> E            | < 10 acres   |
| <input type="radio"/> F            | <input type="radio"/> 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 checked="" type="radio"/> A	<input checked="" type="radio"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="radio"/> B	<input type="radio"/> B	Canopy present, but opened more than natural gaps
	<input type="radio"/> C	<input type="radio"/> C	Canopy sparse or absent
Mid-Story	<input type="radio"/> A	<input type="radio"/> A	Dense mid-story/sapling layer
	<input checked="" type="radio"/> B	<input checked="" type="radio"/> B	Moderate density mid-story/sapling layer
	<input type="radio"/> C	<input type="radio"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="radio"/> A	<input type="radio"/> A	Dense shrub layer
	<input checked="" type="radio"/> B	<input checked="" type="radio"/> B	Moderate density shrub layer
	<input type="radio"/> C	<input type="radio"/> C	Shrub layer sparse or absent
Herb	<input type="radio"/> A	<input type="radio"/> A	Dense herb layer
	<input checked="" type="radio"/> B	<input checked="" type="radio"/> B	Moderate density herb layer
	<input type="radio"/> C	<input type="radio"/> 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.

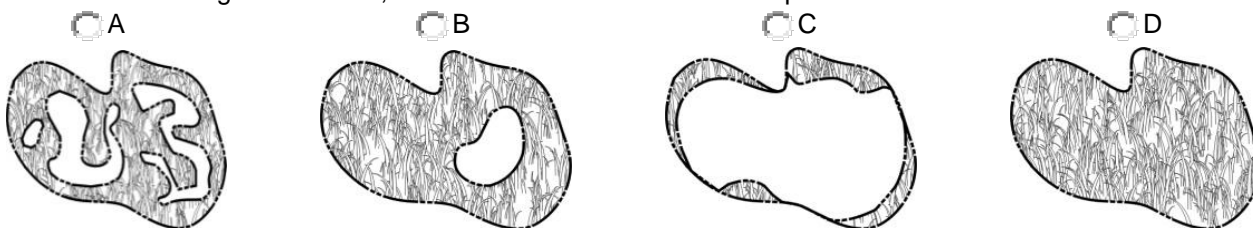
**20. Large Woody Debris – wetland type condition metric (skip for all marshes)**

Include both natural debris and man-placed 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**

Wetland located on the floodplain adjacent to Deep River,

**NC WAM Wetland Rating Sheet**  
**Accompanies User Manual Version 5.0**

Wetland Site Name WD Date 4/12/2017  
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization C. Inscore/AECOM

Notes on Field Assessment Form (Y/N)	YES
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	NO
Assessment area is on a coastal island (Y/N)	NO

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<b>HIGH</b>
	Sub-Surface Storage and Retention	Condition	<b>LOW</b>
Water Quality	Pathogen Change	Condition	<b>HIGH</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
	Particulate Change	Condition	<b>HIGH</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
	Soluble Change	Condition	<b>HIGH</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
	Physical Change	Condition	<b>HIGH</b>
		Condition/Opportunity	<b>HIGH</b>
		Opportunity Presence? (Y/N)	<b>YES</b>
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	<b>HIGH</b>
	Landscape Patch Structure	Condition	<b>LOW</b>
	Vegetation Composition	Condition	<b>HIGH</b>

**Function Rating Summary**

Function	Metrics/Notes	Rating
Hydrology	Condition	<b>HIGH</b>
Water Quality	Condition	<b>HIGH</b>
	Condition/Opportunity	<b>HIGH</b>
	Opportunity Presence? (Y/N)	<b>YES</b>
Habitat	Condition	<b>HIGH</b>

**Overall Wetland Rating**           **HIGH**

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

USACE AID#:	NCDWR #:
Project Name <u>U-2412 A</u>	Date of Evaluation <u>4/20/2017</u>
Applicant/Owner Name <u>NCDOT</u>	Wetland Site Name <u>WE</u>
Wetland Type <u>Seep</u>	Assessor Name/Organization <u>C. Inscore/AECOM</u>
Level III Ecoregion <u>Piedmont</u>	Nearest Named Water Body <u>Bull Run</u>
River Basin <u>Cape Fear</u>	USGS 8-Digit Catalogue Unit <u>03030003</u>
County <u>Guilford</u>	NCDWR Region <u>Winston-Salem</u>
<input type="radio"/> Yes <input checked="" type="radio"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) <u>35.987859; -79.920492</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="radio"/> A | <input checked="" type="radio"/> A | Not severely altered   |
| <input type="radio"/> B            | <input type="radio"/> 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="radio"/> A | <input checked="" type="radio"/> A | Water storage capacity and duration are not altered.   |
| <input type="radio"/> B            | <input type="radio"/> B            | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).  |
| <input type="radio"/> C            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | Majority of wetland with depressions able to pond water > 1 foot deep           |
|     | <input checked="" type="radio"/> B | <input checked="" type="radio"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
|     | <input type="radio"/> C            | <input type="radio"/> C            | Majority of wetland with depressions able to pond water 3 to 6 inches deep      |
|     | <input type="radio"/> D            | <input type="radio"/> D            | Depressions able to pond water < 3 inches deep                                  |
| 3b. | <input type="radio"/> A            |                                    | Evidence that maximum depth of inundation is greater than 2 feet                |
|     | <input type="radio"/> B            |                                    | Evidence that maximum depth of inundation is between 1 and 2 feet               |
|     | <input checked="" type="radio"/> 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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no evidence of pollutants or discharges entering the assessment area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area  |
| <input type="radio"/> C            | <input type="radio"/> 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 checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" 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 checked="" type="checkbox"/> F | <input checked="" 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 <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="radio"/> A | <input type="radio"/> A | ≥ 100 feet            |
| <input type="radio"/> B | <input type="radio"/> B | From 80 to < 100 feet |
| <input type="radio"/> C | <input type="radio"/> C | From 50 to < 80 feet  |
| <input type="radio"/> D | <input type="radio"/> D | From 40 to < 50 feet  |
| <input type="radio"/> E | <input type="radio"/> E | From 30 to < 40 feet  |
| <input type="radio"/> F | <input type="radio"/> F | From 15 to < 30 feet  |
| <input type="radio"/> G | <input type="radio"/> G | From 5 to < 15 feet   |
| <input type="radio"/> H | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | <input type="radio"/> A ≥ 500 acres  |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B From 100 to < 500 acres                            |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C From 50 to < 100 acres                             |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D From 25 to < 50 acres                              |
| <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E From 10 to < 25 acres                              |
| <input type="radio"/> F            | <input type="radio"/> F            | <input type="radio"/> F From 5 to < 10 acres                               |
| <input type="radio"/> G            | <input type="radio"/> G            | <input type="radio"/> G From 1 to < 5 acres                                |
| <input type="radio"/> H            | <input type="radio"/> H            | <input type="radio"/> H From 0.5 to < 1 acre                               |
| <input checked="" type="radio"/> I | <input checked="" type="radio"/> I | <input checked="" type="radio"/> I From 0.1 to < 0.5 acre                  |
| <input type="radio"/> J            | <input type="radio"/> J            | <input type="radio"/> J From 0.01 to < 0.1 acre                            |
| <input type="radio"/> K            | <input type="radio"/> K            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | ≥ 500 acres  |
| <input type="radio"/> B            | <input type="radio"/> B            | From 100 to < 500 acres  |
| <input type="radio"/> C            | <input checked="" type="radio"/> C | From 50 to < 100 acres   |
| <input checked="" type="radio"/> D | <input type="radio"/> D            | From 10 to < 50 acres  |
| <input type="radio"/> E            | <input type="radio"/> E            | < 10 acres   |
| <input type="radio"/> F            | <input type="radio"/> 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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | Canopy closed, or nearly closed, with natural gaps associated with natural processes |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Canopy present, but opened more than natural gaps                                    |
|           | <input type="radio"/> C            | <input type="radio"/> C            | Canopy sparse or absent  |
| Mid-Story | <input type="radio"/> A            | <input type="radio"/> A            | Dense mid-story/sapling layer  |
|           | <input checked="" type="radio"/> B | <input checked="" type="radio"/> B | Moderate density mid-story/sapling layer   |
|           | <input type="radio"/> C            | <input type="radio"/> C            | Mid-story/sapling layer sparse or absent   |
| Shrub     | <input type="radio"/> A            | <input type="radio"/> A            | Dense shrub layer  |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Moderate density shrub layer   |
|           | <input checked="" type="radio"/> C | <input checked="" type="radio"/> C | Shrub layer sparse or absent   |
| Herb      | <input type="radio"/> A            | <input type="radio"/> A            | Dense herb layer   |
|           | <input type="radio"/> B            | <input type="radio"/> B            | Moderate density herb layer  |
|           | <input checked="" type="radio"/> C | <input checked="" type="radio"/> 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.

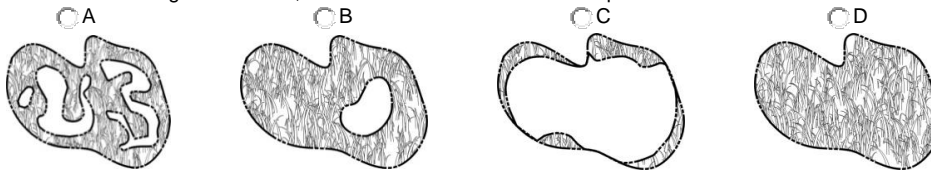
20. **Large Woody Debris – wetland type condition metric (skip for all marshes)**

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

Small seep wetland located below pond damn and adjacent to Stream SL

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WE Date 4/20/2017  
 Wetland Type Seep Assessor Name/Organization C. Inscore/AECOM

Notes on Field Assessment Form (Y/N) YES  
 Presence of regulatory considerations (Y/N) YES  
 Wetland is intensively managed (Y/N) NO  
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES  
 Assessment area is substantially altered by beaver (Y/N) NO  
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO  
 Assessment area is on a coastal island (Y/N) NO

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<u>NA</u>
	Sub-Surface Storage and Retention	Condition	<u>NA</u>
Water Quality	Pathogen Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Particulate Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Soluble Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Physical Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
Pollution Change	Condition	<u>NA</u>	
	Condition/Opportunity	<u>NA</u>	
	Opportunity Presence? (Y/N)	<u>NA</u>	
Habitat	Physical Structure	Condition	<u><b>HIGH</b></u>
	Landscape Patch Structure	Condition	<u><b>MEDIUM</b></u>
	Vegetation Composition	Condition	<u><b>HIGH</b></u>

**Function Rating Summary**

Function	Metrics/Notes	Rating
Hydrology	Condition	<u><b>HIGH</b></u>
Water Quality	Condition	<u><b>HIGH</b></u>
	Condition/Opportunity	<u>NA</u>
	Opportunity Presence? (Y/N)	<u>NA</u>
Habitat	Condition	<u><b>HIGH</b></u>

**Overall Wetland Rating** **HIGH**

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

USACE AID#:	NCDWR #:
Project Name <u>U-2412 A</u>	Date of Evaluation <u>4/20/2017</u>
Applicant/Owner Name <u>NCDOT</u>	Wetland Site Name <u>WF</u>
Wetland Type <u>Non-Tidal Freshwater Marsh</u>	Assessor Name/Organization <u>C. Inscore/AECOM</u>
Level III Ecoregion <u>Piedmont</u>	Nearest Named Water Body <u>Bull Run</u>
River Basin <u>Cape Fear</u>	USGS 8-Digit Catalogue Unit <u>03030003</u>
County <u>Guilford</u>	NCDWR Region <u>Winston-Salem</u>
<input type="radio"/> Yes <input checked="" type="radio"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) <u>35.988518; -79.918835</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="radio"/> A | <input checked="" type="radio"/> A | Not severely altered   |
| <input type="radio"/> B            | <input type="radio"/> 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="radio"/> A            | <input checked="" type="radio"/> A | Water storage capacity and duration are not altered.   |
| <input type="radio"/> B            | <input type="radio"/> B            | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).  |
| <input checked="" type="radio"/> C | <input type="radio"/> 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="radio"/> A | <input type="radio"/> A | Majority of wetland with depressions able to pond water > 1 foot deep           |
|     | <input type="radio"/> B | <input type="radio"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
|     | <input type="radio"/> C | <input type="radio"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep      |
|     | <input type="radio"/> D | <input type="radio"/> D | Depressions able to pond water < 3 inches deep                                  |
| 3b. | <input type="radio"/> A |                         | Evidence that maximum depth of inundation is greater than 2 feet                |
|     | <input type="radio"/> B |                         | Evidence that maximum depth of inundation is between 1 and 2 feet               |
|     | <input type="radio"/> 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 checked="" type="radio"/> A | <input checked="" type="radio"/> A | Little or no evidence of pollutants or discharges entering the assessment area  |
| <input type="radio"/> B            | <input type="radio"/> B            | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area  |
| <input type="radio"/> C            | <input type="radio"/> 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 checked="" type="checkbox"/> A | <input checked="" 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 checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | <input checked="" 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 <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 checked="" type="radio"/> A | <input type="radio"/> A | ≥ 100 feet            |
| <input type="radio"/> B            | <input type="radio"/> B | From 80 to < 100 feet |
| <input type="radio"/> C            | <input type="radio"/> C | From 50 to < 80 feet  |
| <input type="radio"/> D            | <input type="radio"/> D | From 40 to < 50 feet  |
| <input type="radio"/> E            | <input type="radio"/> E | From 30 to < 40 feet  |
| <input type="radio"/> F            | <input type="radio"/> F | From 15 to < 30 feet  |
| <input type="radio"/> G            | <input type="radio"/> G | From 5 to < 15 feet   |
| <input type="radio"/> H            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | <input type="radio"/> A ≥ 500 acres  |
| <input type="radio"/> B            | <input type="radio"/> B            | <input type="radio"/> B From 100 to < 500 acres                            |
| <input type="radio"/> C            | <input type="radio"/> C            | <input type="radio"/> C From 50 to < 100 acres                             |
| <input type="radio"/> D            | <input type="radio"/> D            | <input type="radio"/> D From 25 to < 50 acres                              |
| <input type="radio"/> E            | <input type="radio"/> E            | <input type="radio"/> E From 10 to < 25 acres                              |
| <input type="radio"/> F            | <input type="radio"/> F            | <input type="radio"/> F From 5 to < 10 acres                               |
| <input type="radio"/> G            | <input type="radio"/> G            | <input type="radio"/> G From 1 to < 5 acres                                |
| <input checked="" type="radio"/> H | <input checked="" type="radio"/> H | <input type="radio"/> H From 0.5 to < 1 acre                               |
| <input type="radio"/> I            | <input type="radio"/> I            | <input type="radio"/> I From 0.1 to < 0.5 acre                             |
| <input type="radio"/> J            | <input type="radio"/> J            | <input type="radio"/> J From 0.01 to < 0.1 acre                            |
| <input type="radio"/> K            | <input type="radio"/> K            | <input type="radio"/> 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="radio"/> A            | <input type="radio"/> A            | ≥ 500 acres  |
| <input type="radio"/> B            | <input type="radio"/> B            | From 100 to < 500 acres  |
| <input type="radio"/> C            | <input checked="" type="radio"/> C | From 50 to < 100 acres   |
| <input checked="" type="radio"/> D | <input type="radio"/> D            | From 10 to < 50 acres  |
| <input type="radio"/> E            | <input type="radio"/> E            | < 10 acres   |
| <input type="radio"/> F            | <input type="radio"/> 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="radio"/> A | <input type="radio"/> A | Canopy closed, or nearly closed, with natural gaps associated with natural processes |
|           | <input type="radio"/> B | <input type="radio"/> B | Canopy present, but opened more than natural gaps                                    |
|           | <input type="radio"/> C | <input type="radio"/> C | Canopy sparse or absent  |
| Mid-Story | <input type="radio"/> A | <input type="radio"/> A | Dense mid-story/sapling layer  |
|           | <input type="radio"/> B | <input type="radio"/> B | Moderate density mid-story/sapling layer   |
|           | <input type="radio"/> C | <input type="radio"/> C | Mid-story/sapling layer sparse or absent   |
| Shrub     | <input type="radio"/> A | <input type="radio"/> A | Dense shrub layer  |
|           | <input type="radio"/> B | <input type="radio"/> B | Moderate density shrub layer   |
|           | <input type="radio"/> C | <input type="radio"/> C | Shrub layer sparse or absent   |
| Herb      | <input type="radio"/> A | <input type="radio"/> A | Dense herb layer   |
|           | <input type="radio"/> B | <input type="radio"/> B | Moderate density herb layer  |
|           | <input type="radio"/> C | <input type="radio"/> 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.

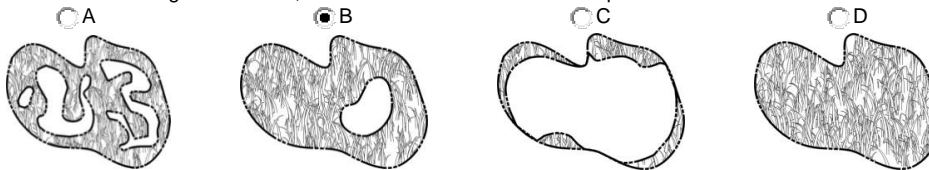
**20. Large Woody Debris – wetland type condition metric (skip for all marshes)**

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**

Wetland previously inundated due to beavers raising level of Pond PC. Beaver damn was washed away during a flood event, this area is no longer inundated, however all canopy trees have perished.



**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WF Date 4/20/2017  
 Wetland Type Non-Tidal Freshwater Marsh Assessor Name/Organization C. Inscore/AECOM

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>YES</u>
Assessment area is substantially altered by beaver (Y/N)	<u>YES</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>NO</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<u>NA</u>
		Sub-Surface Storage and Retention	<u>NA</u>
Water Quality	Pathogen Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Particulate Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Soluble Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Physical Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
Pollution Change	Condition	<u>NA</u>	
	Condition/Opportunity	<u>NA</u>	
	Opportunity Presence? (Y/N)	<u>NA</u>	
Habitat	Physical Structure	Condition	<b><u>MEDIUM</u></b>
	Landscape Patch Structure	Condition	<b><u>HIGH</u></b>
	Vegetation Composition	Condition	<b><u>HIGH</u></b>

**Function Rating Summary**

Function	Metrics/Notes	Rating
Hydrology	Condition	<b><u>MEDIUM</u></b>
Water Quality	Condition	<b><u>LOW</u></b>
	Condition/Opportunity	<b><u>LOW</u></b>
	Opportunity Presence? (Y/N)	<b><u>YES</u></b>
Habitat	Condition	<b><u>HIGH</u></b>

**Overall Wetland Rating** **MEDIUM**