HAR ER RAI 4.3.1-2 Attachment B
Summary of Wetlands Delineation (Preliminary Results)

Project Overview

Wetlands delineation and stream characterization activities were conducted from November 2008 through February 2009 to support the preparation of Progress Energy Carolinas, Inc.'s (PEC's) Combined License Application (COLA) for two Westinghouse Electric Company, LLC AP1000 generating units at the Shearon Harris Nuclear Power Plant Units 2 and 3 (HAR) site in Wake County, North Carolina. The delineation effort included an evaluation of areas that would be impacted by the HAR project. The final U.S. Army Corps of Engineers (USACE) verification visit has not been completed and these results should be considered preliminary until the USACE has approved the jurisdictional delineation.

As part of the HAR project, the current surface water elevation of Harris Lake would be raised from 220 feet above mean sea level (msl) to a future elevation of 240 feet above msl, inundating areas adjacent to the lake. These areas were evaluated during a wetland reconnaissance effort in 2006, with more detailed delineation and mapping of the delineation from November 2008 through February 2009. The 2008/2009 delineation included areas of ground-disturbing activities that were not part of the 2006 evaluation, such as laydown yards, roadways, parking lots, fire pond, cooling towers, a new wastewater treatment plant (WWTP) site, the makeup water line from Cape Fear River to Harris Lake, new dikes, and transportation improvement projects. The areas of ground-disturbing activities were identified in RFI 158 Construction Input for Makeup Water Line and HAR Units 2 and 3, the Transportation Impact Analysis (TIA), and RFI 346 Documents on Disturbed Areas. Areas that were delineated in 2008/2009 as part of this effort are identified on the figure included at the end of the text (delineated areas related to the HAR project).

Methodology

Stream and Wetland Delineation

Wetlands are defined jointly by the USACE and the U.S. Environmental Protection Agency (EPA) as:

> *…those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. (USACE, 1987)*

Wetlands include swamps, marshes, bogs, and similar areas. In the North Carolina piedmont region, the USACE uses the *Corps of Engineers Wetlands Delineation Manual* (USACE, 1987) to establish the process for identifying wetlands and uses the *U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (USACE, 2008a) to determine whether identified wetlands and other waters are subject to jurisdiction under

Section 404 of the Clean Water Act (CWA). In North Carolina, USACE accepts the classification of streams as perennial or intermittent based on the *Identification Methods for the Origins of Intermittent and Perennial Streams* (North Carolina Division of Water Quality, 2005).

Environmental biologists and licensed surveyors from CH2M HILL visited the probable impact areas, as outlined above, to delineate and map wetlands and other waters of the United States. The environmental biologists engaged in this effort have received specific training on wetlands delineation and have completed numerous wetlands delineations across the Southeast. Additionally task-specific training was conducted prior to commencement of field activities to explain the area to be delineated, as well as the specific field protocols described in this summary. Biologists evaluated soil, vegetation, and hydrologic conditions to identify wetlands and other waters in accordance with the procedures established in the previously referenced sources. When wetlands and streams were delineated, they were mapped using survey grade global positioning system (GPS) equipment with sub-meter (less than 3 feet) accuracy. Specific delineation methods, as agreed with the USACE in advance of the field effort, are described in the following sections.

Wetlands

Three types of wetlands were found surrounding Harris Lake: emergent wetlands, lacustrine fringe wetlands, and terrestrial forested and herbaceous wetlands. Emergent wetlands were defined by the presence of emergent wetland vegetation in the littoral zone. Lacustrine fringe wetlands were defined by their location on the landward edge of the lake with hydrology directly attributed to the water surface elevation of the lake. Terrestrial forested and herbaceous wetlands were located inland from the shoreline. A field team delineated the emergent wetlands in the littoral zone using a boat to access these areas. To locate the inland wetlands, multiple delineation teams walked the perimeter of the lake and delineated wetlands in the area that would be inundated by raising the elevation of the lake. The delineation teams also identified wetlands within the areas of probable ground disturbance. These are areas that would be impacted by construction activities at the HAR site; transportation corridors altered due to the increase in lake level or the need for increased vehicle capacity; or areas associated with the Cape Fear River water makeup line and pumphouse. Once the teams delineated wetland areas, surveyors recorded the wetland boundaries using survey grade, sub-meter accurate GPS.

The wetland delineation teams worked in separate, pre-determined areas to avoid confusion with naming conventions or duplication of effort. Each team was designated with a unique letter: A, B, C, or D. Identified wetlands were abbreviated by a "W-[team letter]-[unique numerical identifier]," such as WA-001. The field teams completed a 1987 USACE manual jurisdictional determination form for each wetland that was identified. Representative upland data points were also collected to characterize the upland areas adjacent to the delineated wetlands; upland data were not collected for every individual wetland area. Representative forms were used based on the relatively homogenous nature of the upland areas for each major region of the project area (for example, each of the named arms/drainages of Harris Lake). This methodology was confirmed to be sufficient for the USACE during the initial USACE field verification visit in December 2008. Additionally, a

limited number of USACE 1987 forms were completed for upland data points in representative areas throughout the study area.

The USACE 1987 Wetlands Delineation Manual was used as guidance for delineating the boundary of all wetlands areas for this effort. Several wetland areas that had hydrophytic vegetation and wetland hydrology did not meet the hydric soils criteria within the 1987 manual due to the presence of red parent material for soils. These wetland area soils were identified as hydric using the United States Department of Agriculture, Natural Resource Conservation Services (NRCS) publication "Field Indicators of Hydric Soils in the United States," Version 6.0 (2006). The two primary field indicators that were used for this effort included the following:

1. TF2 field indicator, Loamy and Clayey Soils - Red Parent Material: Used for soil samples with red parent material because the hue of the parent in some cases obscures the reduced soil matrix. This test indicator was designed to be used for soils that have parent material that has a hue of 7.5 YR or brighter and the soil sampled has a matrix value and chroma of 4 or less and 2 percent or more of redoximorphic (redox) concentrations.

2. F3 field indicator, Loamy and Clayey Soils - Depleted Matrix: Used for soil samples with a chroma of 2 but lacked any mottles (a hydric soil classification requirement in the 1987 manual). This test indicator was designed to be used for soils that have a depleted matrix with 60 percent or more chroma of 2 or less that has a minimum thickness of either:

    a. 5 centimeters (cm) (2 inches), if that 5 cm (2 inches) is entirely within the upper 15 cm (6 inches) of the soil, or

    b. 15 cm (6 inches), starting within 25 cm (10 inches) of the soil surface

    NOTE: Redox concentrations are required for soils with matrix colors of 4/1, 4/2, and 5/2.

Use of these indicators for wetland delineation is consistent with the methodology currently under development in the *Draft Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region* (USACE, 2008b).

Once the required forms and notes were completed, the team delineated the wetland with survey flagging that included the specific wetland identifier where individual flags were numbered sequentially (for example, W-A-001-001, W-A-001-002, etc.). The total number of flags and the sequential numbering were noted (for example, W-A-001-001 to W-A-001-012). The surveyors followed behind the wetland teams within 2 to 3 weeks of delineation and mapped wetland boundaries using survey grade GPS.

The USACE indicated that wetlands upstream of beaver dams could be identified by establishing the elevation at the top of beaver dams and then defining the wetland area by extending the corresponding contour rather than walking the perimeter of the impoundment. The delineation team marked the beaver dam with one (or more) survey flags labeled "B-[team letter]-[unique numerical identifier]," such as B-A-001. The surveyors followed behind and mapped the contour elevation that corresponded with the height of the beaver dam. It is important to note that some of the wetland features upstream of beaver

dams were delineated by flagging the entire boundary, so the prefix identifier of "B" does not include all of the beaver-influenced wetland areas. These areas are jurisdictional wetlands and the prefix "B" merely indicates a different method of delineation was used during the field work.

The delineation teams also identified ponds or ox-bow features within the defined survey areas. The team marked these feature with one or two survey flags labeled "P-[team letter]-[unique numerical identifier]," such as P-A-001. The pond and ox-bow features were large and easily recognizable, and the edge of the water of each feature was mapped by surveyors using survey grade GPS.

Emergent wetlands within the littoral zone of the reservoir were delineated and mapped by a delineation team deployed in a boat. The boat crew had a pole calibrated with marks set to a depth of 2 meters (6.6 feet). The 2-meter depth determined the point of change from emergent to submerged aquatic vegetation beds, as defined in the 1987 manual (USACE, 1987). The delineation team used survey grade GPS to locate and map the outer edge of emergent wetland areas at the time of delineation, as determined by depth or the limits of emergent vegetation. The inner boundary of the emergent wetland areas was established by the innermost 220-foot contour line. Fringe wetland areas that bordered individual emergent wetland areas were identified by field crews and mapped by using the areas between the 220-foot contour interval and the 221-foot contour interval. Surveyors used elevation checks in several areas around the lake to verify the location of the 220-foot and 221-foot contour lines adjacent to the lake margin. The boat crew labeled emergent wetlands as "ED-[unique numerical identifier]," such as ED-001, and fringe wetlands as "FD-[unique numerical identifier]," such as FD-001. The unique numerical identifier for the fringe wetland areas matched that of the paired emergent wetland areas.

Feature type Abbreviation	Description
ED	Emergent wetland feature delineated by Field Team D
FD	Fringe wetland feature delineated by Field Team D
PA	Pond feature delineated by Field Team A
PB	Pond feature delineated by Field Team B
PC	Pond feature delineated by Field Team C
WA	Wetland feature delineated by Field Team A
WB	Wetland feature delineated by Field Team B
WC	Wetland feature delineated by Field Team C
WD	Wetland feature delineated by Field Team D
BB	Wetland feature delineated by Field Team B using beaver dam as reference elevation
BC	Wetland feature delineated by Field Team C sing beaver dam as reference elevation

Isolated wetland areas were delineated in the same manner as jurisdictional wetlands. These wetlands will be excluded from the USACE jurisdiction using the Rapanos forms and subsequently will fall under the State Isolated Wetland permit program.

Streams

Teams A, B, C and D also delineated streams in their assigned survey areas. Streams were identified with "S-[team letter]-[unique numerical identifier]," such as SA-001. A North Carolina Division of Water Quality (NCDWQ) Stream Identification Form Version 3.1 was completed to determine if the streams were intermittent or perennial. The team also completed a USACE Stream Quality Assessment Worksheet for all intermittent and perennial streams. No forms were required for ephemeral streams, but teams completed a NCDWQ form for any stream that was borderline between ephemeral and intermittent, as well as representative ephemeral streams throughout the project area. After the forms were completed in the field, all stream score totals were checked to verify the correct total. Forms that had incorrect totals were corrected by use of a single strikethrough of the incorrect total and the correct total and reviewer initials were added to the data forms.

The score of a NCDWQ Stream Identification Form Version 3.1 classifies a stream as perennial, intermittent, or ephemeral. The form is separated into three sections: Geomorphology, Hydrology, and Biology. Each section is scored separately and then the three scores are added together to obtain a final score. A final score of less than 19 indicates an ephemeral stream; a score between 19 and 29 indicates an intermittent stream; and a score of 30 or more indicates a perennial stream. The stream form is used to evaluate the entire reach of a stream. If a stream changed classifications, a separate stream form was completed and a new unique name was used.

A stream scoring 29.5 on the NCDWQ form was classified as perennial if the stream supported biology typical of a perennial stream as specified in *Identification Methods for the Origins of Intermittent and Perennial Streams* (NCDWQ, 2005). Streams that scored between 17.25 and 19 were classified as intermittent, due to the following factors:

a. Presence of an ordinary high water mark (OHWM), per RGL 05-05: Ordinary High Water Mark (OHWM) Identification (USACE, 2005),

b. Presence of flow in stream channels greater than 48 hours after a rain event, and

c. Previous experience with stream calls with the USACE Wilmington District.

Many streams that scored under 19 on the NCDWQ form and that were identified as intermittent were streams that occurred high up in a drainage area that had been logged at some point in recent history (10 to 15 years). These streams were "cut" by accelerated runoff from these cleared watersheds down to the seasonal high water table for that drainage area. Similar drainages that had not been logged showed no channel cutting or development. Once these logged areas revegetated, the erosional forces on the stream were reduced and further channel development was limited, thus resulting in a stream that likely would flow for up to 3 months of the year but would not typically exceed base flow. Final determination as to whether or not these borderline streams will be jurisdictional will be made by the USACE as part of the field verification visit.

Additional field notes were recorded that included observations not captured by the standard forms. The notes usually included weather information, unusual field conditions, or notations on similar stream groupings. The additional field notes were labeled in the field book with "S-[group letter]-[unique numerical identifier]-[date of collection]," such as SA-001-11112008. The team photographed representative stream features and used the same naming convention as the additional field notes, for example, SA-001-11112008.

Once the required forms and notes were completed, the team marked the stream with survey flagging. The flags included the specific stream name and were numbered sequentially (for example, SA-001-001, SA-001-002, etc.). The total number of flags and the sequential numbering were noted (for example, SA-001-001 to SA-001-012). The surveyors followed behind the wetland teams and mapped stream locations using survey grade GPS.

Feature Type Abbreviation	Description
SA	Stream feature delineated by Field Team A
SB	Stream feature delineated by Field Team B
SC	Stream feature delineated by Field Team C
SD	Stream feature delineated by Field Team D

As part of the delineation effort, Rapanos forms were completed to establish whether a significant nexus to Traditionally Navigable Waters existed for streams and wetlands. Only those streams and wetlands with a significant nexus to Traditionally Navigable Waters are subject to USACE jurisdiction. The USACE indicated that they would accept and prefer that streams associated with specifically named drainages and smaller streams flowing directly into Harris Lake be grouped into distinct sets to minimize the number of Rapanos forms. A single Rapanos form would be completed for each distinct group of streams. This method of grouping resulted in six Rapanos forms for all streams and wetlands in the delineated area (forms will be finalized as part of the final USACE approval process). Additionally, all wetlands that are isolated or require an individual significant nexus determination to confirm USACE jurisdiction require their own Rapanos form, adding four additional forms. The USACE approval process may require additional Rapanos forms for these areas.

Results

Wetlands

Once the mapped stream and wetland areas are verified, a Jurisdictional Delineation map will be prepared from the surveyed locations. This map will show the boundaries of the areas that were delineated, as well as identified stream and wetland features. The map will contain tables of stream type and length as well as wetland type and area. Wetlands occurring in the littoral area of Harris Lake were classified as emergent wetlands. Lacustrine fringe wetlands are those wetlands that occur in areas adjacent to the lake with hydrology directly attributed to the water surface elevation of the lake. All other wetlands identified in the HAR project area were classified as forested or herbaceous. The figure included at the end of the text shows the approximate location and size of mapped wetlands and emergent

areas. Fringe areas are not shown on the map but generally are associated with emergent areas.

Feature Type	Approximate Number	Approximate Area (ac.)
Wetlands (Forested/Herbaceous)	58	180
Emergent Wetlands	280	340
Fringe Wetlands	250	60
Open Water (ponds)	16	15

Streams

Streams surrounding the Harris Lake were defined as ephemeral, intermittent, or perennial based on specific channel morphology and flow characteristics. Perennial streams have well-defined channels and flow most of the year under normal climatic conditions. Intermittent streams also have well-defined channels but flow only during wet seasons of the year. Ephemeral streams typically lack well-defined channels and flow only in direct response to precipitation with runoff.

The table below lists the summary of the results for streams identified by the delineation effort. Ephemeral streams were not mapped since they are not considered USACE jurisdictional waters under the CWA 404. The figure included at the end of the text shows the approximate location and length of mapped streams.

Stream Type	Approximate Count	Approximate Length (Total LF)	USACE Score Range	DWQ Score Range	Notes
Intermittent	120	65,600	21-35	14-29	Some steams that fell below the threshold for intermittent classification were classified as intermittent due to the rationale presented above
Perennial	30	70,200	32-80	29.5-50	

References

North Carolina Division of Water Quality. 2005. *Identification Methods for the Origins of Intermittent and Perennial Streams*, Version 3.1. North Carolina Department of Environment and Natural Resources, Division of Water Quality. Raleigh, NC.

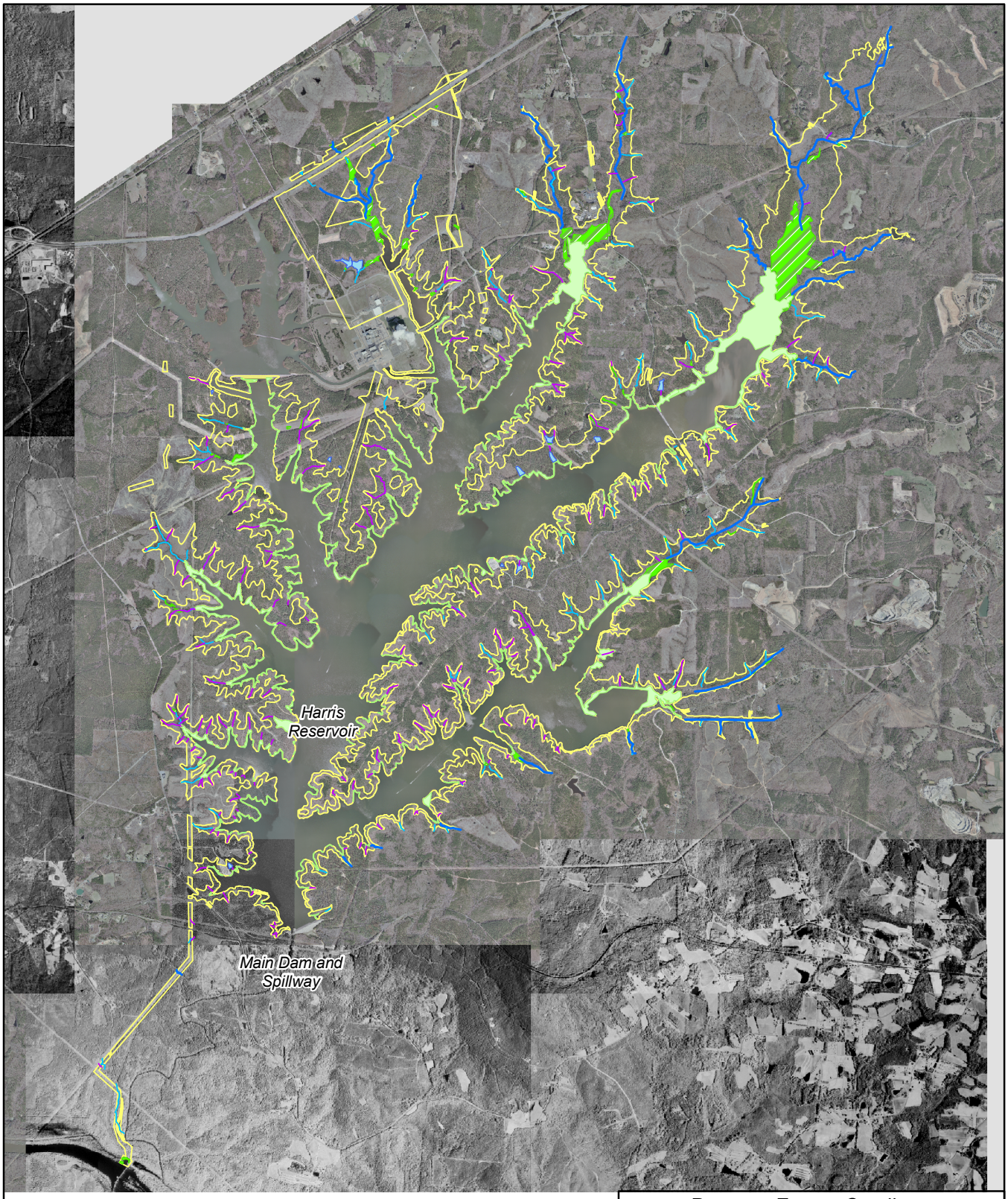
U.S. Army Corps of Engineers (USACE) Waterways Experiment Station. 1987. *Corps of Engineers Wetlands Delineation Manual*.

U.S. Army Corps of Engineers (USACE). 2005. Regulatory Guidance Letter, No. 05-05. *Ordinary High Water Mark (OHHM) Identification.*

U.S. Army Corps of Engineers (USACE). 2008a. *U.S. Army Corps of Engineers Jurisdictional Determination form Instructional Guidebook*.

U.S. Army Corps of Engineers (USACE). 2008b. *Draft Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region*. Wetlands Regulatory Assistance Program. Draft Initial Template.

United State Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS). 2006. *Field Indicators of Hydric Soils in the United States: A Guide to Identifying and Delineating Hydric Soils*. Version 6.0.



LEGEND

- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Delineated HAR Project Boundary
- Ponds
- Emergent Wetland
- Forested / Herbaceous Wetland

N
W E
S

0 0.5 1
Kilometers

0 0.5 1
Miles

Progress Energy Carolinas

Shearon Harris Nuclear Power Plant Units 2 and 3

New Hill, North Carolina

Delineated Areas Related to HAR Project

Attachment 4.3.1-2B