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REVITALIZATION

February 18, 2015

Mr. Lucas Berresford
Project Manager, State Remediation Section
Division of Site Assessment and Remediation
Bureau of Land and Waste Management
SCDHEC
2600 Bull Street
Columbia, SC 29201

RE: Status Update - Removal Action Decision
Congaree River Sediments
SCE&G Huger St. VCC #02-4295-RP
Columbia, South Carolina

Dear Mr. Berresford:

The intent of this letter is to provide a status update regarding the Congaree River Sediment Removal project located in Columbia, South Carolina. More specifically, it is to document the problems and concerns identified during review of the current design via the permitting process with the regulatory agencies. As discussed at the meeting on January 14, 2015, the problems and concerns are directly related to how the selected removal action alternative was going to be implemented (i.e., installing a stone-filled cofferdam in phases to isolate the known occurrence of tar-like material [TLM] to facilitate removal).

Because there are lingering concerns and issues that cannot be resolved regarding the design as submitted to SCDHEC for approval and the United States Army Corps of Engineers (USACE) for a permit to work in the River, South Carolina Electric and Gas Company (SCE&G) is requesting that the SCDHEC consider a modified approach for completing the removal action. We believe that a "Modified Removal Action" will still fulfill the intent and objectives of the selected removal alternative and be protective of human health and the environment.

Background

In correspondence dated May 8, 2013, the SCDHEC approved SCE&G, to "begin the design and permit process" for implementing Alternative 4, Removal of Impacted Sediment with Off-Site Disposal as the anticipated official remedy selection for the site. Even before that time SCE&G has been diligently working on numerous design issues associated with this complex project. The following paragraphs briefly describe the original approach for removing the TLM from the river, how the approach evolved given the constraints associated with the possible presence of historical artifacts, and specifically identifies the potentially adverse effects associated with the implementation method.

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Original Approach

Based on previously completed field investigations, TLM-impacted sediment was delineated adjacent to the eastern bank of the Congaree River, generally located between the Gervais Street and Blossom Street bridges. The original approach for implementing the removal action was to build a temporary cofferdam in phases around the known extent of the contiguous TLM-impacted sediment. The cofferdam would serve to isolate the work area so that excavation and removal could be accomplished "in-the-dry". Due to the relatively large scale of operations and limited construction season window (as determined by historical higher water levels and migratory fish spawning seasons), multiple phases of construction were planned to occur over a period of three years.

The footprint of the cofferdam was set forth in the conceptual design and permit documents as shown on Figure 1. The primary objective of this approach was to remove impacted sediment to the maximum extent practicable while accommodating potential artifact recovery. The size, location and materials of construction would allow SCE&G to thoroughly address the isolated area. The physical characteristics of the river in the project area, as well as the significant variation in river elevations and flow, proved to be formidable design challenges.

Temporary Cofferdam – Evaluation of Options

The actual details of the cofferdam construction have evolved as the design process continued over the last few years. Physical challenges with completing this project include an uneven river bottom consisting of rock under the shallow sediments, highly variable water levels and swift currents. To address these challenges, ten various options or types of cofferdam approaches were initially evaluated. From these ten options, three types of cofferdams were selected for further evaluation (i.e., rock filled berm with liner, portadam system and cellular sheet pile).

In summary, it was recommended in a Letter Report prepared by Paul C. Rizzo Associates, Inc. [Rizzo] (dated February 6, 2012, page 6) that:

> *"The rockfill berm, portadam, and cellular sheetpile cofferdams could all be constructed at the Site. The rockfill berm would be the easiest to construct and remove and is also the most cost effective. The Portadam system would require some fill and leveling of the streambed prior to installation. Construction of the cellular sheetpile cofferdam would likely require additional measures such as temporary forms to construct the cells since the sheets could not be driven into the streambed, and the sheets would not seal well with the irregular streambed.*
>
> *We recommend that the design for the rockfill berm cofferdam is developed in additional detail."*

Temporary Cofferdam – Evaluation of Design Height (or Elevation)

The next design criterion that had to be evaluated was to determine the appropriate top elevation of the temporary cofferdam. It is important to note that the height (and correspondingly the size and width at the base of the cofferdam) needed to be balanced with the number of times it may be overtopped by high water. As the design elevation of the cofferdam is increased, so does its footprint at the base and its encroachment into the river.

Some basic information to keep in mind as we review the cofferdam design height:

1. All elevations discussed in this letter refer to this datum (NGVD '29).
2. The United States Geological Survey (USGS) has a gaging station (No. 02169500) conveniently located on the western side of the Congaree River across from the project area (approximately mid-span of the proposed two-phased cofferdams). The gage height is at elevation 113.02'. Reference from the National Weather Service Advance Hydrologic Prediction Service for the Congaree River at Columbia is attached.
3. "Normal Flow Condition" was determined to be a gage height of 3.207 feet and therefore, for design purposes, the normal flow condition elevation (or the water surface elevation at normal pool height) is 116.3 (113.02+3.207).
4. Top of cofferdam - Design Elevation = 123.5 [selection process is explained below]
5. "Minor Flood Stage" is at elevation 132.02, approximately 16 feet above normal pool height (per Rizzo) [see attached].
6. "Major Flood Stage" is at elevation 143.02, approximately 27 feet above normal pool height (per Rizzo) [see attached].

Figure 2 illustrates the relationship between various water elevations (including flood elevations) of the Congaree River and the corresponding height of a proposed cofferdam. Note that a structure designed to accommodate a "Major Flood Event" would result in cofferdam height that is 27 feet higher than the normal flow water elevation. What's more, a cofferdam would have to be approximately 37 feet higher than the normal flow elevation to accommodate the 1908 flood crest elevation. Therefore, installing a cofferdam configuration that could withstand all potential flooding events is not feasible nor practical.

SCE&G's approach to address this very critical issue was to review recent historical flow data collected by the USGS and identify "lower flow periods" where, a reasonable top of cofferdam elevation could minimize the potential for overtopping. Based on a review of the last ten years of hydrologic data (available at the time of the evaluation, February 2012) from the nearby USGS monitoring station, a design elevation of 119.5 was originally selected for evaluating the three types of cofferdams listed above.

Based on concerns for experiencing too many overtopping events at the 119.5 elevation, as initially recommended by Rizzo, SCE&G conservatively decided to increase the top elevation to 123.5 feet to minimize the potential for overtopping. An overtopping event is defined as an event where rising river water would exceed the top of the cofferdam and flood the inside isolated area. From SCE&G's perspective, an overtopping event would be a time-consuming, unfortunate event, but not a "failure" since the dam was designed to be overtopped. The proposed design anticipated overtopping events and incorporated a drainage structure within the southern cofferdam wall to allow drainage of accumulated water after an overtopping event.

In summary, the design and permit documents were prepared and submitted based on a cofferdam elevation of 123.5 feet.

Permitting Process - Overview

SCE&G has been working with the United States Army Corps of Engineers (USACE) since January 2012 to obtain the appropriate permits to implement the Removal Action Alternative. Numerous meetings, submittals, work products, comments, responses, etc. have been exchanged regarding this complex project. In lieu of detailing out these numerous communications and interactions over the last few years

regarding the permit process with the USACE, we offer the following summary of significant details related to the risks and concerns that were identified during the design and permitting process directly associated with the rock-filled cofferdam approach.

Permitting Process - Approach

From the beginning, SCE&G's approach to implementation of Alternative 4 was to remove impacted sediment from the delineated area, to the maximum extent practicable. As discussed above, the approach to implementation generally consisted of isolating the known horizontal extent of the contiguous project area (in phases), dewatering the areas and subsequently removing the impacted sediment "in-the-dry". Based on internal engineering evaluations, the preferred method for isolating the TLM areas or phases consisted of constructing a rock-filled cofferdam around the perimeter. An advantage of this approach was its ability to accommodate the proper handling of potential historical artifacts.

Permitting Process - Risks/Concerns

Obviously, there are many risks and concerns with completing a project of this size and magnitude within a fluctuating river environment. While working through the permit process for constructing the cofferdam, the identified risks and concerns were evaluated. Some of the concerns could be adequately addressed, while others could not. The insurmountable concerns associated with the cofferdam approach include:

- Risk of potentially increasing shoreline erosion on the west bank;
- Risk of creating flooding on the west bank (although a no-rise certification in the 100-year flood event has been demonstrated);
- Risk of an overtopping event or events;
- Concern of a catastrophic overtopping event where the cofferdam material and exposed TLM would be washed downriver; and
- Concern with the constructability of the proposed cofferdam.

The following text briefly explains the hydrologic modeling completed in support of the project.

Hydrologic Models

While working through the design/permitting process, a hydrologic model using the Federal Emergency Management Agency (FEMA) protocol and data was developed to simulate the effects that the proposed cofferdam configuration would have on the river system. A top elevation of 123.5 was used for the modeling work. Initially, the modeling focused on the 100-year, 50-year and 10-year flood events for three phases of construction. As the modeling work progressed, the originally conceived three phases of work were reduced to two phases (i.e., the original Phase 2 and Phase 3 areas were combined). After review and comment from the USACE (and subsequently some modifications to the assumptions and input parameters), the model yielded a No-Rise Certification for the 100-year flood event. The No-Rise Certification indicated that the construction of a cofferdam of the size and configuration as planned, would not create a rise or backwater condition for the 100 year flood scenario. Referring back to Figure 2, a 100-year flood elevation would be in the vicinity of the 1908 flood crest where the top elevation of the proposed cofferdam would be approximately 30 feet below the 1908 flood crest. Therefore, there would be no significant rise attributed to the proposed cofferdam.

After evaluating the results of the 100, 50 and 10-year flood models based on FEMA requirements, the USACE requested modeling at much lower or more typical surface water elevations. Using the same approach as discussed above, SCE&G developed and submitted a Lower Flow Sensitivity Study (Rizzo, August 14, 2014). The objective of this study was to determine what impact installation of the cofferdam would have under more "normal" river conditions (e.g., much lower than the 100, 50 and 10-year flows previously evaluated) with consideration for the residential area located on the west bank of the river.

Based on the modeling data in the Lower Flow Sensitivity Study, the Phase 1 cofferdam would create an increased rise of 1.2 feet at a river flow elevation of 123, slightly below the top of the cofferdam on the western shore. For the same river flow elevation of 123, the Phase 2 cofferdam would create an additional rise of 6.4 feet on the western bank (based on the modeling data). The study concluded that the larger increase for Phase 2 "... *is likely due to the bottleneck occurring in the model at the downstream end of the cofferdam and the varying geometry of the channel bottom ...*" at that location. *The* study also concluded that, *"Based on the results of the sensitivity study, the flow conditions evaluated will not affect the housing community across the river from the proposed cofferdam."* However, the modeling does indicate that the water surface elevation would be increased on the western shoreline (1.2 feet for Phase 1 and 6.4 feet for Phase 2 at elevation 123).

Summary or Outcome of the Permit Process

In summary, given the physical characteristics of the river, the horizontal extent of the TLM-impacted area and based on the information developed during the design/permitting phase of the project, the risks and potentially negative impacts associated with constructing the requisite cofferdam, as currently designed, outweigh the benefits of removal using the cofferdam approach.

However, the "large" cofferdam approach was merely an option to facilitate a complete and effective removal action. Based on the information discussed above, SCE&G is requesting that SCDHEC consider a modified removal action of the TLM as described/proposed below.

Modified Approach

In reconsidering the removal alternative and in preliminary discussions between SCDHEC, USACE and SCE&G, a new approach that consists of a "Modified Removal Action" is emerging. The preliminary, conceptual approach is shown on Figure 3. Based on the EE/CA, the removal action alternative provides the best overall protection of human health and the environment, when compared to the other alternatives. From an environmental regulatory perspective, there is a preference for completing a removal action as opposed to the other alternatives. Given the concerns and limitations discussed above, a Modified Removal Action is a prudent approach that will accomplish multiple objectives, while potentially reducing or eliminating the negative attributes associated with the "large" cofferdam approach.

The revised Removal Action will consist of removing TLM-impacted material from "targeted" areas of the site. The areas to be removed will generally consist of the thicker deposits of impacted material that are generally located closer to the existing eastern shoreline (e.g., the boat launch area and the alluvial fan area). These are areas where potential human contact has a greater likelihood of occurring. The extent of the area to be removed is shown on Figure 3 but may change during the design and permitting process. Overall, the Modified Removal Action will be somewhat smaller than the original two-phase cofferdam approach because it is limited by the constraints of working in the River. The previous Phase 2 area, which created the highest backwater effect in the modeling discussed above, would be eliminated

from the proposed removal action area. Implementation of the Modified Removal Action will likely be completed using large sand bags or some other temporary means to isolate the work area. For presentation purposes, isolation and dewatering of a 50 by 100 foot area using large sand bags is depicted on Figure 3. The actual methods for isolating the removal "cells" will be determined in the design phase and incorporated into permit submittals. Many of the existing support plans will still be applicable and only require minor revisions.

Path Forward

SCE&G requests SCDHEC's approval to revise the scope of the Removal Action alternative currently reflected in the design and permit documents. In its place, a Modified Removal Action Plan will be developed as described above and submitted for SCDHEC review and approval. As with the original approach, there will be numerous design and permitting tasks that need to be completed.

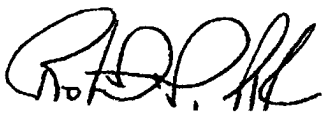
In separate correspondence addressed to the USACE, SCE&G will request that the individual permit application currently being reviewed by the USACE for this project be placed in abeyance while SCDHEC and SCE&G work to develop details associated with the modified approach.

If SCDHEC directs SCE&G to move forward with the Modified Removal Action approach, SCE&G will contact the USACE to set up a meeting to discuss the details and procedures for moving forward. Tasks to be completed with the USACE would include, but not be limited to, the following:

- Conduct a pre-application meeting;
- Develop and submit details pertaining to the revised approach;
- Complete the FEMA backflow studies - 100 Year Flood Event, lower flow sensitivity analysis (currently assumed to have no adverse impacts on flooding or erosion); and
- Address other design concerns as appropriate.

Should you have any questions or require additional information, please contact me at 919-819-2748. We would welcome an opportunity to discuss this information in further detail at your convenience. Thank you for your assistance with this project.

Sincerely,
SCANA Services, Inc.



Robert M. Apple
Remediation Project Manager

cc: T. Effinger - SCANA
B. McKoy, C Ridgeway - USACE
R. Contrael – Apex

NATIONAL WEATHER SERVICE
ADVANCED HYDROLOGIC PREDICTION SERVICE

USGS GAGE NO. 02169500
http://water.weather.gov/ahps2/hydrograph.php?wfo=cae&gage=cols1

National Weather Service
Advanced Hydrologic Prediction Service

weather.gov

Home News Organization Search for: NWS All NOAA Go BOOKMARK

Local weather forecast by "City, ST"
City, ST Go

National Observations WFO Observations Hydrograph

Weather Forecast Office Columbia, SC

Southeast River Forecast Center

National Conditions
Rivers
Satellite
Climate
Observed Precip

Hydrograph River at a Glance Download Probability Information

Auto Refresh is OFF

Local Conditions
Warnings
Weather
Forecast
Radar

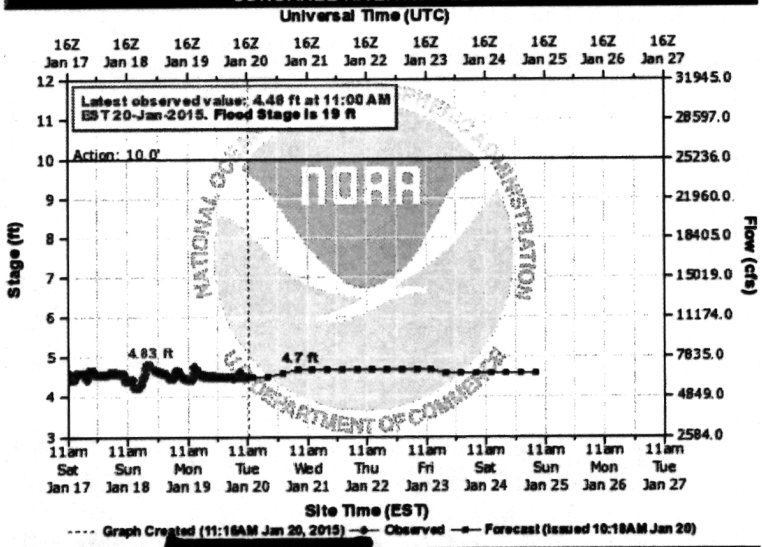
AHPS Documentation
User Guide
User Brochure

What is AHPS?
Facts
Our Partners

Feedback/Questions
Provide
Feedback
Ask Questions

FLOODSMART.GOV
USA.gov

CONGAREE RIVER AT COLUMBIA



COLS1(plotting HGIRG "Gage 0" Datum: 113.02'

Observations courtesy of US Geological Survey

Printable Image
About this graph
Tabular Data (UTC)
Tabular Data (EST)
XML
RSS
Datum: NGVD29
Metadata

NOTE: River forecasts for this location take into account past precipitation and the precipitation amounts expected approximately 48 hours into the future from the forecast issuance time.

Reliability of the Forecast: Based on current and forecast river, weather and reservoir conditions

NOTE: Forecasts for the Congaree River at Columbia are issued routinely year-round.

Default Hydrograph

Return to Area Map

Upstream Gauge Downstream Gauge

Flood Categories (in feet)

Major Flood Stage:	30
Moderate Flood Stage:	24
Flood Stage:	19
Action Stage:	10

Zoom Level:16

Switch Basemap

Historic Crests
(1) 39.80 ft on 08/27/1908
(2) 37.50 ft on 08/18/1928
(3) 37.10 ft on 10/03/1929
(4) 35.50 ft on 07/17/1916
(5) 34.50 ft on 03/17/1912
Show More Historic Crests

(P): Preliminary values subject to further review.

Recent Crests
(1) 24.39 ft on 05/08/2013
(2) 21.79 ft on 02/07/2010
(3) 21.30 ft on 01/27/2010
(4) 19.65 ft on 12/27/2009
(5) 22.00 ft on 03/04/2007
Show More Recent Crests

(P): Preliminary values subject to further review.

Low Water Records
(1) -2.10 ft on 09/08/1925
(2) -1.90 ft on 10/21/1923
(3) -1.70 ft on 08/30/1931
(4) -1.30 ft on 11/25/1934
(5) -1.30 ft on 12/10/1933
Show More Low Water Records

State of North Carolina DOT....

Gauge Location ● Disclaimer

Latitude/Longitude Disclaimer: The gauge location shown in the above map is the approximate location based on the latitude/longitude coordinates provided to the NWS by the gauge owner.

FEMA

For more information on your flood risk go to www.floodsmart.gov.

☐ Show FEMA's National Flood Hazard Layers

Flood Impacts & Photos

Collapse

If you notice any errors in the below information, please contact our Webmaster

30 The Essex Park Apartments along the Broad River and I-20 become flooded.

28 Flooding begins in low lying areas of the Riverland Park subdivision in Cayce.

24 The SCE&G Columbia Canal Hydroelectric Plant at the Gervais Street bridge becomes flooded. Flooding also occurs in the Palmetto Rock Quarry in Cayce.

21 Extensive swampland and large areas of farmland and pasture land downstream from Columbia are flooded.

19 Extensive swampland and large areas of farmland and pasture land downstream from Columbia become flooded.

16 Old State Road, SC 66, below Cayce becomes flooded.

14 Roads in low lying areas and swampland downstream from Columbia become flooded. Most of the Cayce and West Columbia river walk is flooded.

13 Flooding occurs in flood prone areas near and downstream from Columbia. Flooding also occurs over much of the Cayce and West Columbia river walk.

10 At 10 feet, flooding occurs in flood prone areas near and downstream from Columbia. Flooding also occurs on parts of the Cayce and West Columbia river walk.

About This Location

Collapse

Latitude: 33.993056° N, Longitude: 81.050000° W, Horizontal Datum: NAD27

River Stage Reference Frame	Gauge Height	Flood Stage	Uses
NWS stage	0 ft	19 ft	Interpreting hydrographs and NWS watch, warnings, and forecasts, and inundation maps
Vertical Datum	**Elevation (gauge height = 0)**	**Elevation (gauge height = flood stage)**	**Elevation information source**
NAVD88	Not Available	Not Available	Survey grade GPS equipment, FEMA flood plain maps, newer USGS topographic maps
NGVD 29	113.021 ft	132.021 ft	Older USGS topographic maps, NGVD29 benchmarks
MSL	Not Available	Not Available	Older USGS topographic maps, MSL benchmarks
Other	Not Available	Not Available	

Current/Historical Observations:

- U.S. Geological Survey (USGS) Data and Site Info for Columbia

Resources

Collapse

Hydrologic Resources

- Text Products
- Past Precipitatic
- Forecast Precip
- River Forecast (
- River Stage Sur
- Inundation Map
- WFO Columbia SC Drought Information Page

Additional Resources

- Southeast River Forecast Center
- Snow Information
- Weather Observations
- Precipitation Analysis

FIGURES

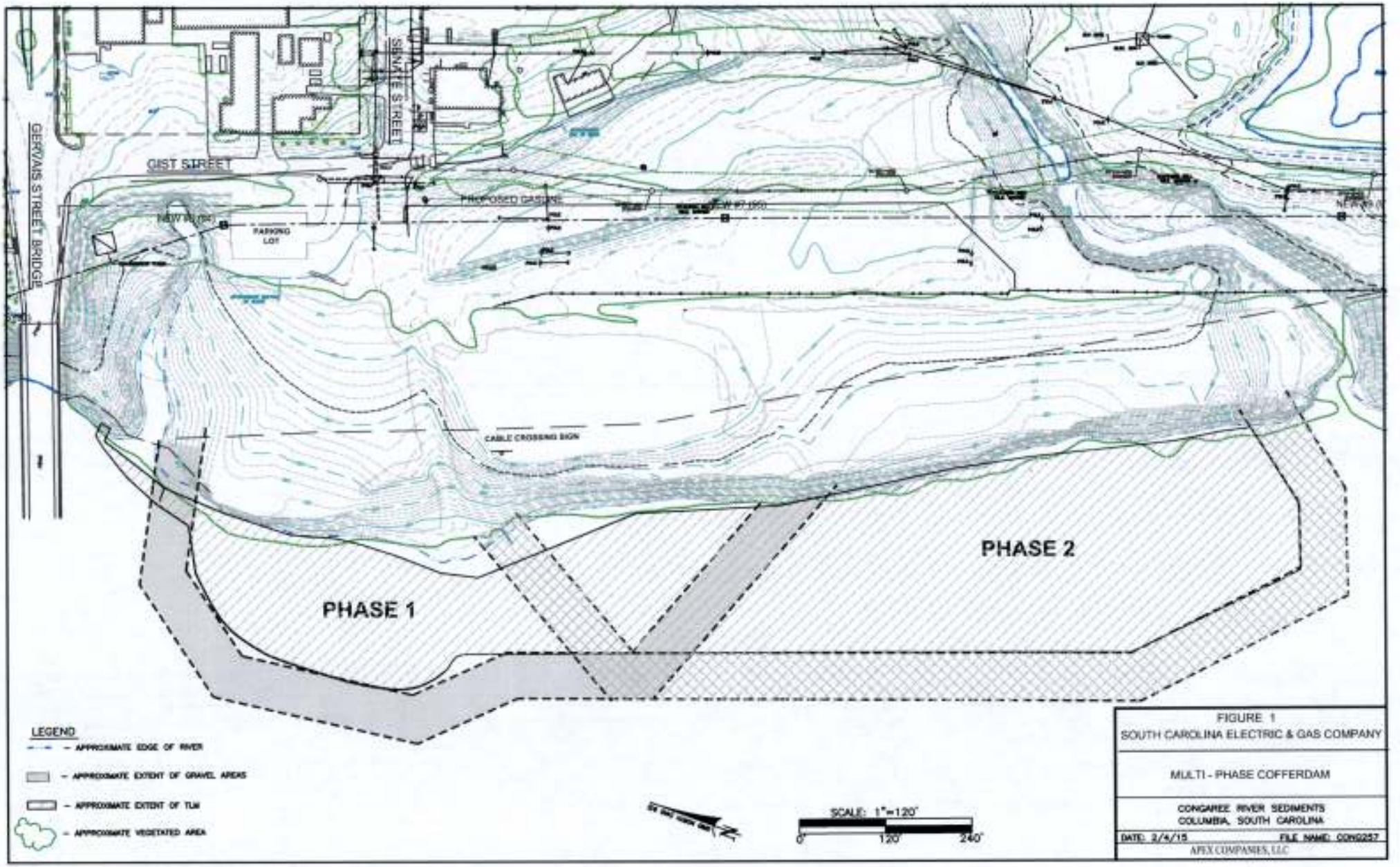


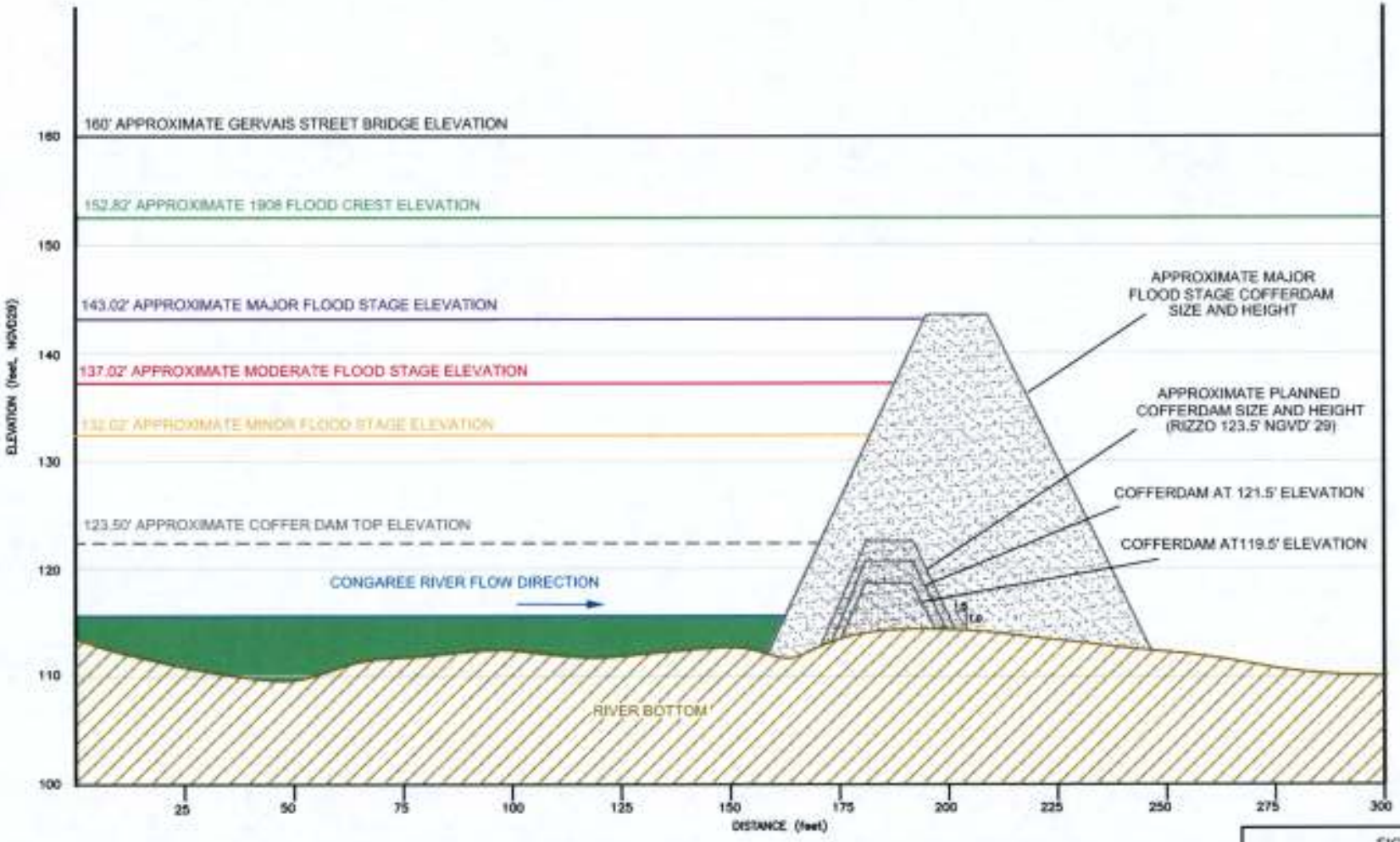
FIGURE 1
SOUTH CAROLINA ELECTRIC & GAS COMPANY

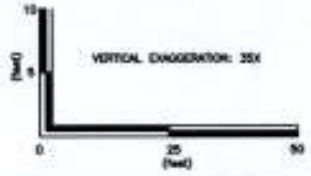
MULTI - PHASE COFFERDAM

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

DATE: 2/4/15 FILE NAME: CON0257

APEX COMPANIES, LLC





NOTES:

1) ELEVATION REFERENCED TO NGVD29.

2) FLOOD STAGE ELEVATION DATA TAKEN FROM NATIONAL WEATHER SERVICE ADVANCED HYDROLOGIC PREDICTION SERVICE FOR THE CONGAREE RIVER AT COLUMBIA.

FIGURE 2
SOUTH CAROLINA ELECTRIC & GAS COMPANY

COFFERDAM DESIGN SCENARIOS

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

DATE: 2/4/15 FILE NAME: CONG258

APEX COMPANIES, LLC

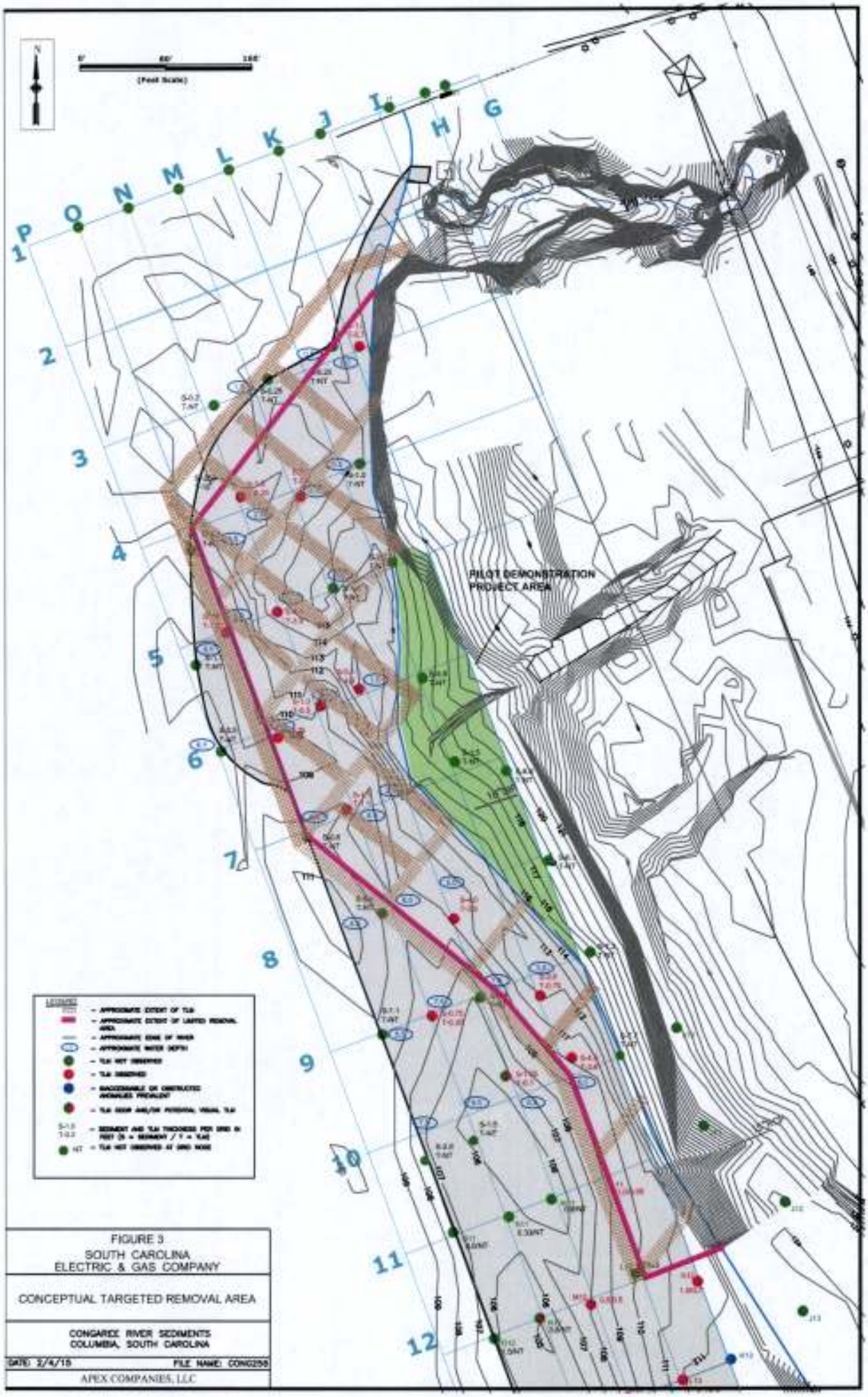


FIGURE 3
SOUTH CAROLINA ELECTRIC & GAS COMPANY

CONCEPTUAL TARGETED REMOVAL AREA

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

DATE: 2/4/15 FILE NAME: CONG250

APEX COMPANIES, LLC