# IMPLEMENTATION PLANS

# APPENDIX E

# SITE OPERATIONS PLAN

# SITE OPERATIONS PLAN

## CONGAREE RIVER MODIFIED REMOVAL ACTION
## COLUMBIA, SOUTH CAROLINA

September 2020

*Prepared for:*

**Dominion Energy South Carolina, Inc.**
400 Otarre Parkway
Cayce, SC 29033

*Prepared by:*

**Apex Companies, LLC**
1600 Commerce Circle
Trafford, PA 15085

**SITE OPERATIONS PLAN**

**CONGAREE RIVER MODIFIED REMOVAL ACTION**
**COLUMBIA, SOUTH CAROLINA**

## INTRODUCTION

Dominion Energy South Carolina, Inc. (DESC), formerly South Carolina Electric and Gas Company (SCE&G), plans to complete a Modified Removal Action (MRA) to address the occurrence of a tar-like material (TLM) that is commingled with sediment along the eastern shoreline of the Congaree River, just south of the Gervais Street Bridge in Columbia, South Carolina. The project area location is shown on Figure 1. The TLM is believed to be a coal tar material that originated from the Huger Street former manufactured gas plant (MGP) site, located approximately 1,000 feet to the northeast of the project area. The proposed work is being performed by DESC at the direction of South Carolina Department of Health and Environmental Control (SCDHEC) and is subject to permits and approvals from the U.S. Army Corps of Engineers (USACE) and other agencies.

The overall objective of this project is to remove impacted sediment from the Congaree River within two areas. The current plan is to construct temporary cofferdams around each area to facilitate removal of the impacted sediment. As currently envisioned, the temporary cofferdams will be constructed sequentially and the MRA will occur over several years. The construction and active remediation season will occur from approximately May through October of each year. Figure 2 illustrates the current site operations plan scenario and the landside support zone components. After each cofferdam is constructed, the isolated area will be dewatered, and the impacted sediment removed and transported off-site for disposal. Following completion of the removal activities in Area 1, the cofferdam will be removed, and a cofferdam will be constructed around Area 2. After the removal activities are completed in Area 2, the cofferdam materials will be removed from the river.

This Site Operations Plan provides a description of the planned general procedures to safely and effectively support the proposed sediment removal activities within the river. Several site preparation activities will take place prior to initiating the cofferdam construction and removal work. The conceptual approach to the Site Operations Plan is summarized on Figure 2. Some variations to the plan may occur, depending on site conditions encountered at the time MRA activities are initiated. The actual layout for site operations will be finalized at the discretion of remediation personnel provided DESC, SCDHEC and the landside property owner concur with any significant modifications.

The project will involve two main site operational areas:

- Landside Support Zone – includes the site entrances, roadways, office structures, material and equipment storage areas, excavated material management areas and water management system.
- Riverside Removal Areas – includes the cofferdam structures and excavation areas within the river.

Site operations components associated with the landside support activities are described in this Plan. The riverside activities are described in attachments to the Joint application submittal to the ACE and include:

- . Cofferdam Design Drawings (Attachment B);
- . Project Description (Attachment C);
- . Draft Navigation Plan (Attachment G);
- . Mussel Relocation Plan (Attachment H);
- . Artifact Recovery Plan (Attachment M);
- . UXO Management Plans (Attachment N); and
- . Restoration Operation, Maintenance and Monitoring Plan (Attachment P).

## LANDSIDE SUPPORT ZONE COMPONENTS

### Support Zone Construction

As currently envisioned, establishment of the access points and associated improvements will be one of the first components completed in the field. The currently planned landside support zone roadways and temporary structures scenario is provided on Figure 2. This scenario may be modified, as needed, to best utilize the space available. Landside site operations components will be placed and constructed in such a manner as to require as little clearing and grading activities as possible. The primary planned location for the majority of site operations is the power line right-of-way, which is already cleared. DESC relocated the overhead wires that were previously located within the right-of-way to accommodate future site operations. This scenario will reduce disturbance of currently forested land and further preserve the riparian corridor.

Road construction will be completed as well as placement of temporary site office trailers, storage trailers, temporary structures and installation of electrical and communication utility connections as described further in this Plan.

### Utility Clearance and Management

A number of utilities are present within the planned project area. For the landside support zone, the overhead high voltage electrical transmission lines were relocated by DESC to provide more clearance for site operations and the temporary structures. Underground utilities within the landside support zone footprint include buried fiber optic communication lines, a sanitary sewer and an underground gas line. DESC believes that all underground utilities have been identified and located. However, to be consistent with the applicable regulations and confirm current locations, a request for clearing and identifying potential underground utilities at the site will be submitted to South Carolina 811 (Palmetto Utility Protection Services, Inc.) prior to initiating landside support zone construction activities. On-site personnel will be made aware of the buried utility locations. Support zone construction activities will consist of mainly relatively shallow surficial grading activities, which are not expected to impact buried utilities. If deeper excavations are required, they will be conducted in areas free of buried utilities.

A sign indicating a “cable crossing” is located on the eastern shoreline of the river just south of the current access road. A group of metallic anomalies was detected extending out into the river from this point during completion of the investigative phase of this project. Despite previous attempts, DESC has not been able to determine the owner, type, construction or current status of the cable crossing. Additional attempts to identify the cable crossing will be made and appropriate safeguards will be taken based on available information.

**Demarcation of Historic and Archaeological Sites**

An archaeologist will locate historic and archaeological site locations within the landside operations area and they will be sufficiently demarcated and avoided to the extent practicable during implementation of the project. Should disturbance of these areas become necessary, proper precautions will be undertaken similar to the plans developed for the protection of other locations of historical significance.

**Evaluation and Demarcation of Plant Species of Concern Locations**

The power line corridor is a potential habitat for the smooth coneflower and Georgia Aster, and portions are currently planned for use for landside support activities. During site operations setup activities, the corridor will be evaluated for the presence of smooth coneflower and Georgia Aster. If identified, their location will be demarcated and avoided to the extent practicable during implementation of the project. Should disturbance of these locations become necessary, these plants will be protected or relocated to the extent practical.

**Site Office Location**

Multiple mobile office and storage trailers will serve as the site offices and meeting/break areas during the MRA activities. The locations of the office and storage trailers will vary based on their functions and the currently envisioned locations are provided on Figure 2. These functions include office and meeting areas, break rooms, restroom and shower facilities and equipment storage. Several trailers will likely be placed near the temporary structures in order to provide office and shower facilities for the artifact recovery and impacted material handling personnel. Storage trailers may be located near the water management system to house equipment, pumps, etc. The main group of office trailers will be located near the entrance at the corner of Senate and Gist Streets and serve as general work and meeting locations. A final trailer(s) location will be near the work area and will provide meeting and break locations for remediation, UXO and other personnel near the actual work zones. The final number and locations of the trailers will be finalized prior to implementation and utility connection. The trailers will be provided with utilities as necessary including electric power, internet service, air conditioning, heating, a supply of drinking water and adjacent sanitary facilities. Cellular telephones will be utilized for site communications. If practical, the shower trailers will be connected to the City of Columbia municipal potable water system and also connected to the sanitary sewer.

**Site Security**

An important component of the overall project will be site security. The primary method for securing the site will be the installation of a temporary chain link fence around the perimeter of the landside support zone. “Restricted Area” signs will be posted at regular intervals along the fence and also posted on the cofferdam structure. The approximate fence location is shown on Figure 2. One locking gate, located at the corner of Senate and Gist Streets, will restrict vehicular traffic into and away from the project area.

Man gates will be positioned at regular intervals along the perimeter of the fence to permit site personnel to access the exterior of the fenced area when necessary.

To prevent the unauthorized or unknowing entry of third parties onto the site, access gates will remain closed during active site operations to the extent practical. The gates will remain locked during non-working hours.

Once site operations are initiated, DESC will also post security guards on-site during non-working hours. DESC has previously successfully utilized off-duty City of Columbia police officers as security guards during implementation of the Field Demonstration Project in 2015 and at other local sites. These guards will conduct regular patrols of the property during non-working hours and at times of low site activity when a minimal number of site personnel are present. The guards and fence will serve to keep unauthorized and untrained personnel out of the active project area.

**Stormwater Management and Sediment Controls**

Erosion and sediment (E&S) control best management practices (BMPs) for the landside portion of the project will be identified in the Comprehensive Site Stormwater Pollution Prevention Plan (C-SWPPP), which will be included with the Notice of Intent (NOI) for coverage under the South Carolina National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Construction Activities. The NOI and C-SWPPP will be reviewed and approved by the City of Columbia prior to initiation of land disturbance activities. The C-SWPPP will include Stormwater Management and Sediment Control Plan (SMSCP) drawings. The draft SMSCP is provided as Attachment K in the Joint Application submittal to ACE. The NPDES and C-SWPPP requirements will be maintained throughout completion of the project. The C-SWPPP and NPDES permit as well as other pertinent documentation will be available for review on-site at all times.

In general, the E&S BMPs specified in the C-SWPPP will be the first construction components installed and the last to be removed. The E&S controls will include the use of silt fence or sediment socks or similar devices, drainage structures, sufficient access and roadway construction, and other measures as may be required. Temporary roadways will be constructed, as needed, to prevent the spread or release of sediments from the work area. No tracking of mud or soil will be permitted beyond the site access gates. Any such impacts will be addressed immediately through the use of street-sweepers or power brooms that will be stationed on-site at all times during completion of the project. Silt fence or sediment socks or similar devices will be deployed and maintained, as required, to prevent sediment run-off from all disturbed areas. Remediation personnel will install and periodically inspect and repair the E&S BMPs identified in the C-SWPPP in accordance with the Plan's requirements. Deficiencies will be documented and corrected as soon as practical.

**Work Zones**

The exclusion zones will contain the specific areas where intrusive work is being conducted or TLM-impacted material is being handled. These areas will include the active sediment removal areas within the cofferdam and the temporary structure where impacted material screening will be completed. Access to the exclusion zones will be limited to trained environmental remediation personnel. Decontamination procedures will be implemented whenever equipment or personnel leave the exclusion zones on an as-needed basis to control the potential migration of constituents of concern from the work area. Equipment decontamination facilities will be available in the general work area. As necessary, a boot wash area will

also be maintained at the exclusion zone boundary to control tracking of potentially impacted material across the site.

Other work zones will be determined in the field, as necessary. These areas are expected to include:

- Traffic zones for loading of trucks, construction material drop-off/delivery, delivery/pickup of roll-off boxes, etc.;
- Staging areas for equipment and material;
- Water management area; and
- Support zones outside of the primary work areas.

**Traffic Control**

Only authorized remediation personnel will be allowed access to the work areas during the sediment removal activities. It is anticipated that most work traffic in support of the MRA activities will be routed through the site entrance at the corner of Senate and Gist Streets. Specific routes into and away from the project area will be established and followed by all project related vehicles.

On-site traffic patterns will be restricted to the site roads. Trucks transporting sediment from the removal areas to the temporary structure will be inspected before they leave the river area to ensure that the tires have not contacted impacted material or the impacted material has been removed. Similar inspections will be conducted before the trucks leave the temporary structure in order to return to the removal area or to travel off-site to the disposal facility. As an alternative, dedicated trucks may be utilized for on-site transport of material to further minimize the potential for tracking of impacted material off-site. Plastic-lined loading areas will be utilized for roll-off box or truck loading operations at both the river and temporary structure. This will prevent potential migration of impacted material from the removal and material handling areas.

**Staging Areas**

Staging areas for the gravel road construction or cofferdam material components will be established, as needed. These will be strategically located in order to provide an efficient means of moving construction material from the staging area to the road or cofferdam construction locations. Staging of excavated sediment outside of the active river work area or outside of the designated material handling areas (e.g., the temporary structure) will not be permitted. Any accumulated debris along the outbound surface of the cofferdams will be managed as needed. If necessary, the debris will be removed and temporarily staged for off-site disposal with excavated sediment.

Currently, DESC plans to prepare the surface of the temporary structure by clearing the current surface vegetation and grading and compacting the planned floor area. The surface will be constructed by placing a heavy mil plastic or HDPE liner over the subgrade as a containment barrier, covering the liner with geotextile for protection against punctures and creating the work surface out of compacted gravel. Concrete or asphalt may also be utilized as a work surface within the structures, if required. Either construction method will effectively contain the impacted sediment, provide an area where it can be further processed and prevent constituent migration. The surface material will be removed and transported to the landfill for disposal at the end of the project.

The currently planned location for the water management system is shown on Figure 2. The specific details pertaining to the system, the types of water and the management methods are provided in the Water Management Plan (Project Description - Appendix D). The water management system's primary role is to collect, filter and prepare for POTW discharge the water that comes into contact with impacted sediment. The water management system will be sized accordingly to minimize the potential for downtime due to dewatering requirements. The system will be operated as required to maintain an acceptable discharge rate. The components of the water management system will likely consist of water storage tanks (e.g., 20,000 gallon frac tanks and/or larger volume modular tanks), filtration equipment such as bag filters and/or activated carbon vessels, associated piping and hoses and a totalizing flow meter. The storage tanks will provide flow equalization and provide residence time to allow for settling of solids. The final design for the water management system will be submitted to the City of Columbia for review as part of the industrial discharge permit request. For illustrative purposes, the general water management scenario for Area 1 is provided on Figure 3. A similar scenario is expected to be utilized for water management in Area 2. The planned discharge location is a sanitary sewer manhole located near the eastern perimeter of the landside support zone shown on Figure 3.

As a contingency measure, DESC may construct an off-site material processing facility at the final disposal location for the excavated sediment, which is currently planned at the Waste Management Richland County landfill. The primary purpose of the facility would be to provide a secondary location where sediment containing a significant amount of TLM can be screened for artifacts and further processed. If utilized, this contingency location will provide the following benefits to the project:

1. Increased material processing capacity, which will allow for more expedient removal of the sediment within the isolated areas and reduction in the overall project completion time which will also reduce the project's exposure to costly overtopping events;
2. Reduction in the potential for constituent migration from heavily impacted material in the landside support zone;
3. Reduction in the potential for odor and air monitoring related issues from the more heavily impacted material; and
4. Provide an environment where more thorough screening of excavated material for artifacts can be accomplished.

In order to accomplish this two-pronged material processing and screening activity, the sediment containing significant amounts of TLM will be segregated as much as practical at the point of excavation, adequately stabilized and loaded directly into roll-off boxes or designated trucks that will carry it to the off-site processing facility. Sediment with TLM content that is manageable on-site will also be stabilized and loaded into roll-off boxes or trucks for transport to the landside support zone temporary structure for additional screening for artifact recovery. Segregation will be based on visual inspection at the point of excavation and determination of on-site vs. off-site processing will be made by field personnel. The Historical Artifacts Management Plan (Attachment M of the Joint Application submittal) provides the specific details pertaining to the further screening and processing of the sediment material that will occur after removed from the river.

**ATTACHMENT A**

**Figures**

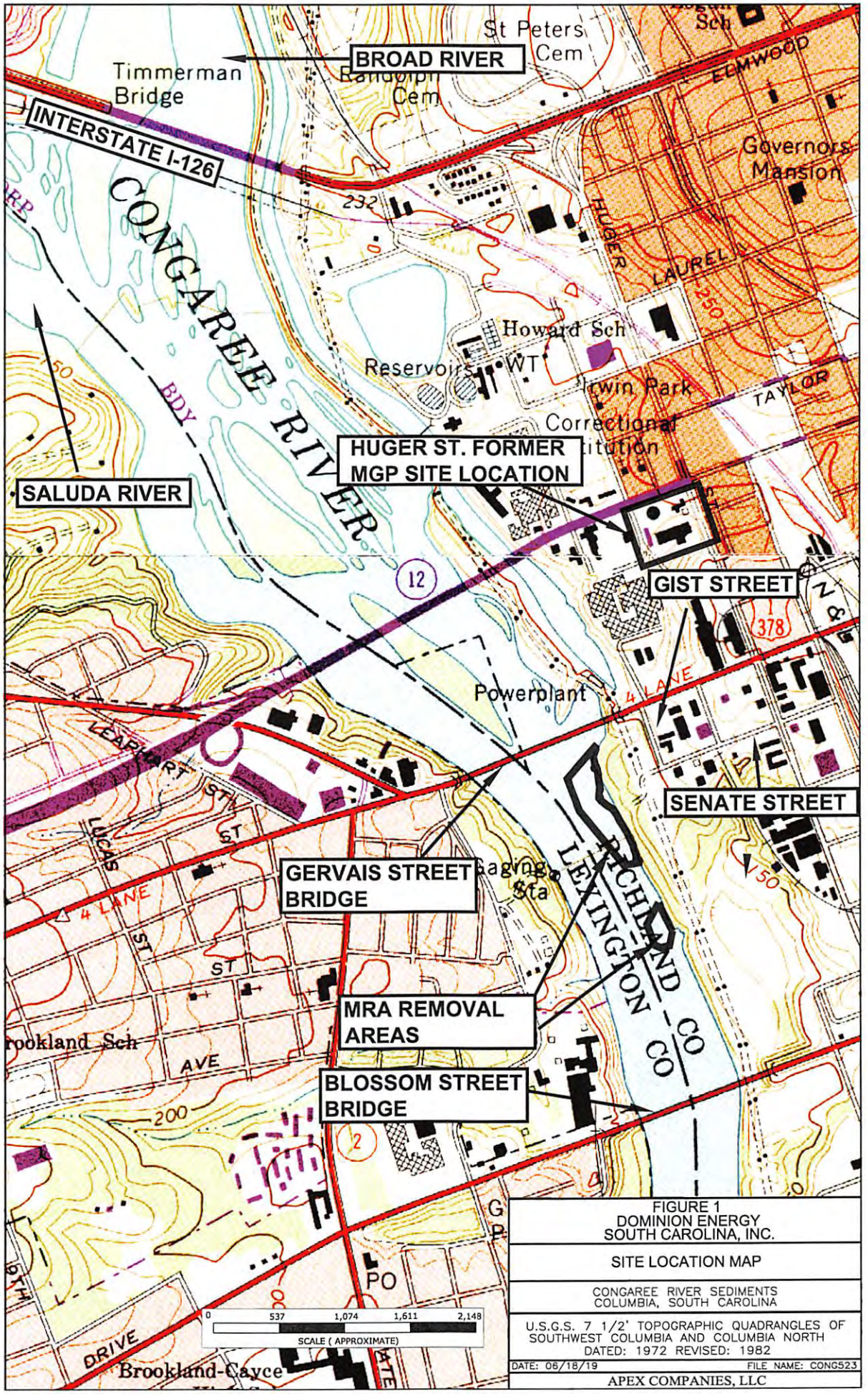



FIGURE 1
DOMINION ENERGY
SOUTH CAROLINA, INC.

SITE LOCATION MAP

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

U.S.G.S. 7 1/2' TOPOGRAPHIC QUADRANGLES OF
SOUTHWEST COLUMBIA AND COLUMBIA NORTH
DATED: 1972 REVISED: 1982

DATE: 06/18/19 FILE NAME: CONG523

APEX COMPANIES, LLC

LEGEND

– STREAM/RIVER/WETLAND EDGE
– TREELINE
– 5 FOOT CONTOUR INTERVALS
– REMOVAL AREAS FROM STAKEHOLDER DEVELOPED MRA PLAN
– SITE PERIMETER FENCE
– APPROXIMATE EXTENT OF GRAVEL AREAS
– APPROXIMATE LEASE AREA

NOTES:
1) LAND TOPOGRAPHY BASED ON LIDAR SURVEY CONDUCTED ON APRIL 18, 2018.
2) CONGAREE RIVER GAGE (02169500) HEIGHT DURING LIDAR SURVEY WAS 6.18' (119.20' ELEVATION NGVD 29).
3) RIVER BOTTOM CONTOURS BASED ON BATHYMETRIC SURVEYS CONDUCTED MAY 7 THRU JULY 17, 2018.

0' 180' 360'

N

GERVAIS STREET BRIDGE
GIST STREET
SENATE STREET
JOB TRAILERS
OFFICE AREA
SITE ACCESS ROAD
GATE
SITE ACCESS ROAD
TEMPORARY STRUCTURE MATERIAL HANDLING AND STORAGE
POTENTIAL FILTERED WATER DISCHARGE POINT
ADDITIONAL OFFICE/STORAGE TRAILERS
AREA 1
SITE ACCESS ROAD
PRIMARY SETTLING
ADDITIONAL SETTLING/STORAGE TANKS
CONTACT WATER TRANSFER LINE
FILTRATION UNITS
DISCHARGE TANKS
SITE ACCESS ROAD
SITE ACCESS ROAD
CONGAREE RIVER
AREA 2

FIGURE 2
DOMINION ENERGY
SOUTH CAROLINA, INC.

CONCEPTUAL SITE OPERATIONS PLAN

COLUMBIA, SOUTH CAROLINA

DATE: 5/19/20 FILE NAME: CONG545

APEX COMPANIES, LLC

LEGEND

– GRAVEL AREA

– CONTACT WATER MANAGEMENT COMPONENT

– LEAKAGE WATER MANAGEMENT COMPONENT

NOTES:

1) ACTUAL LOCATIONS OF COLLECTION AND DISCHARGE POINTS WILL BE DETERMINED IN THE FIELD DURING IMPLEMENTATION.
2) SEDIMENT WILL BE REMOVED FROM THE LEAKAGE CONTROL DRAINAGE AND COLLECTION AREAS PRIOR TO CONSTRUCTION OF THE CURB.
3) LEAKAGE CONTROL WATER WILL BE VISUALLY INSPECTED PRIOR TO DISCHARGE.
4) IMPACTED WATER WILL BE TRANSFERRED TO WATER MANAGEMENT SYSTEM PRIOR TO DISCHARGE TO THE SANITARY SEWER SYSTEM.
5) OUTLET STRUCTURE WILL BE UTILIZED FOR INITIAL DISCHARGE OF WATER FOLLOWING COFFERDAM CONSTRUCTION OR OVERTOPPING EVENT.

N

JOB TRAILERS

OFFICE AREA

SENATE STREET

GATE

SITE ACCESS ROAD

SITE ACCESS ROAD

ACTIVE EXCAVATION AREA

COFFERDAM

EXCAVATED MATERIAL

TRUCK LOADING AREA

EDGE OF EXCAVATION

POTENTIAL TREATED WATER DISCHARGE POINT

CONTACT WATER FLOW

CONTACT WATER COLLECTION POINT

LEAKAGE RETURN DISCHARGE POINT

LEAKAGE CONTROL PUMP

LEAKAGE CONTROL COLLECTION POINT

CONTACT WATER PUMP

TEMPORARY SPRUNG STRUCTURE MATERIAL HANDLING AND STORAGE

CONTACT WATER TRANSFER LINE

CONTACT WATER PUMP

CONTACT WATER COLLECTION POINT

LEAKAGE CONTROL PUMP

LEAKAGE CONTROL COLLECTION POINT

CONTACT WATER TRANSFER LINE

LEAKAGE RETURN DISCHARGE POINT

SITE ACCESS ROAD

ADDITIONAL SETTLING/STORAGE TANKS

FILTRATION UNITS

PRIMARY SETTLING TANK

ADDITIONAL OFFICE/STORAGE TRAILERS

DISCHARGE TANKS

0' 100' 200' 300'

AREA 1

FIGURE 3
DOMINION ENERGY SOUTH CAROLINA, INC.

WATER MANAGEMENT SCENERIO

COLUMBIA, SOUTH CAROLINA

DATE: 6/18/20 FILE NAME: CONG559

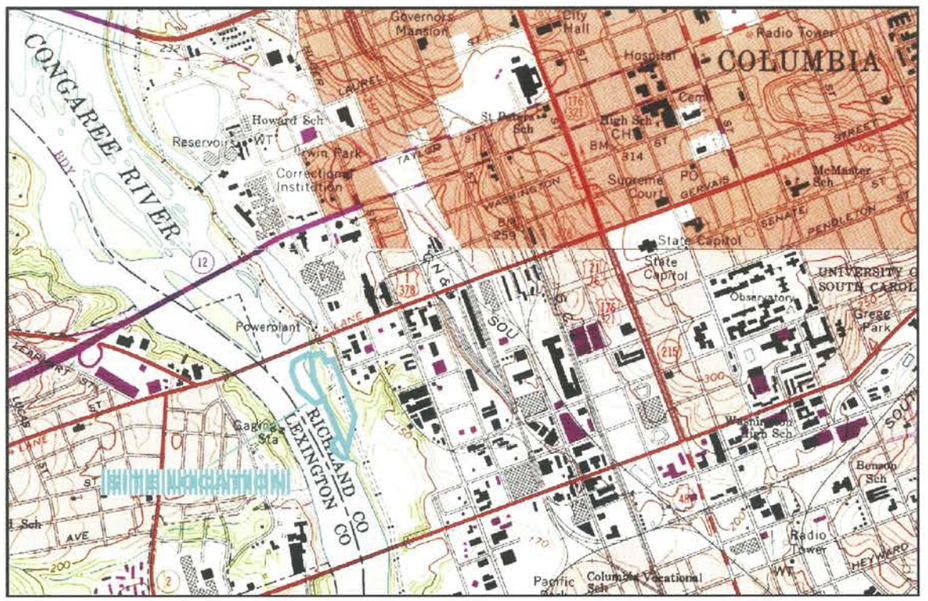
APEX COMPANIES, LLC

# APPENDIX F

# STORMWATER MANAGEMENT AND SEDIMENT CONTROL PLAN

# STORMWATER MANAGEMENT AND SEDIMENT CONTROL PLAN
# FOR
# MODIFIED REMOVAL ACTION

## CONGAREE RIVER
## COLUMBIA, SOUTH CAROLINA




**SEPTEMBER 2021**
**REVISED MARCH 2022**

INDEX:



**CERTIFICATION STATEMENT**

**I HAVE PLACED MY SIGNATURE AND SEAL ON THIS PLAN SIGNIFYING THAT I ACCEPT RESPONSIBILITY FOR THE DESIGN OF THE CONTROL MEASURES. FURTHER, I CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THE PLAN IS CONSISTENT WITH THE REQUIREMENTS OF TITLE 48, CHAPTER 14 OF THE CODE OF LAWS OF SC, 1976 AS AMENDED, PURSUANT TO REGULATION 72-300 et seq. (IF APPLICABLE), AND IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF SCR100000.**

William Zeli 3/29/22
**SIGNATURE AND DATE**

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 13998 WILLIAM J. ZELI

SOUTH CAROLINA APEX COMPANIES, LLC No. 3954 CERTIFICATE OF AUTHORIZATION

**PREPARED FOR:**

**DOMINION ENERGY SOUTH CAROLINA, INC.**
**400 OTARRE PARKWAY**
**CAYCE, SOUTH CAROLINA 29033**

**PREPARED BY:**

APEX

N

GIST STREET

SENATE STREET

CONGAREE RIVER

**LEGEND**

- — APPROXIMATE EDGE OF RIVER
- — TREELINE
- — EXISTING GRAVEL AREAS (APPROXIMATE)
- — PLANNED GRAVEL AREAS (APPROXIMATE)
- — EXISTING ASPHALT
- — LIMITS OF POTENTIAL LAND DISTURBANCE
- — POTENTIAL AREA OF RIVERBANK DISTURBANCE

NOTES:
1) LAND TOPOGRAPHY BASED ON LIDAR SURVEY CONDUCTED ON APRIL 18, 2018.
2) CONGAREE RIVER GAGE (02169500) HEIGHT DURING LIDAR SURVEY WAS 6.18' (119.20' ELEVATION NGVD 29).

0' 120' 240'

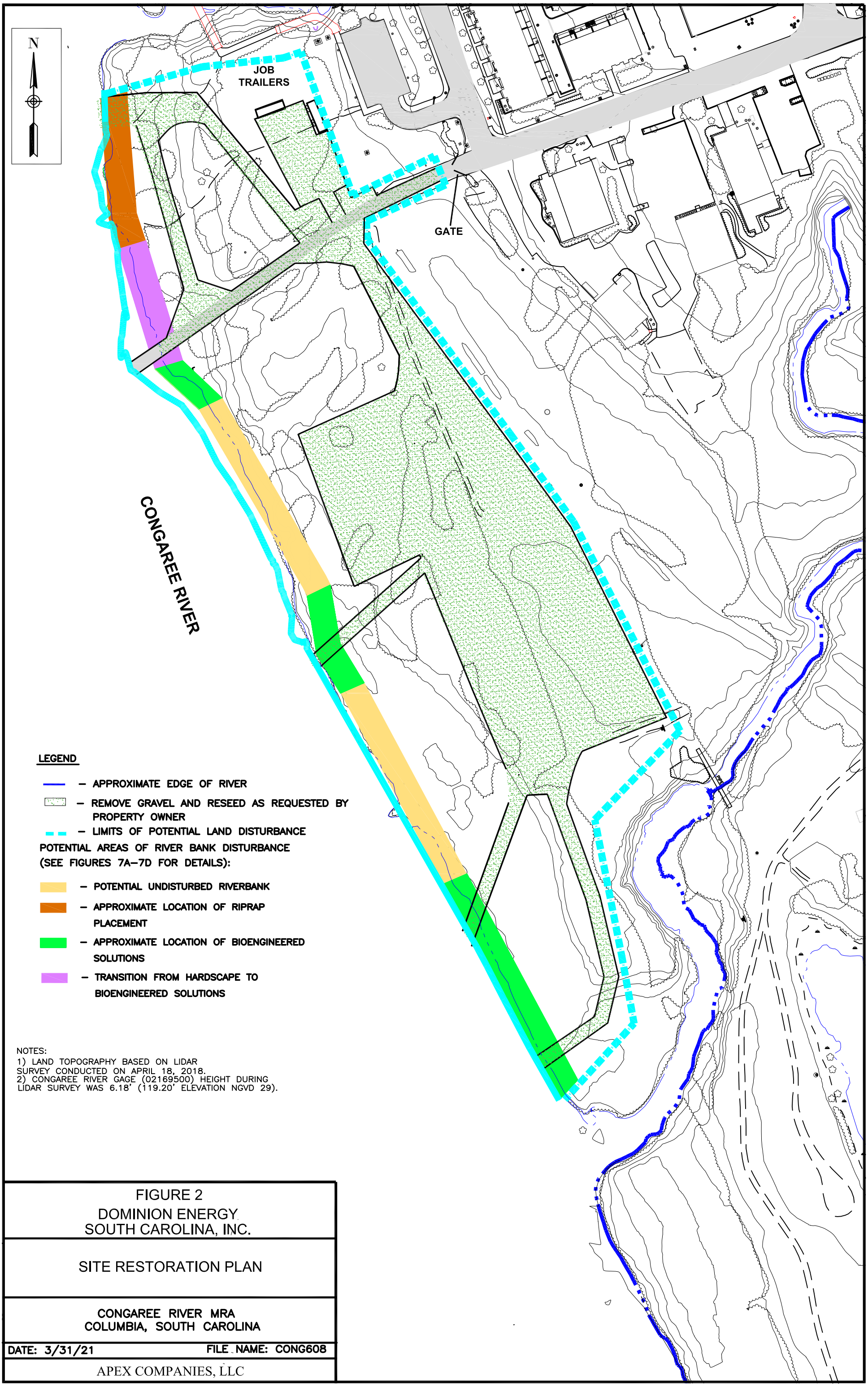
FIGURE 1
DOMINION ENERGY SOUTH CAROLINA, INC.

LIMITS OF POTENTIAL LAND DISTURBANCE

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 2/10/21 FILE NAME: CONG613

APEX COMPANIES, LLC




LEGEND

- — APPROXIMATE EDGE OF RIVER
- — REMOVE GRAVEL AND RESEED AS REQUESTED BY PROPERTY OWNER
- — LIMITS OF POTENTIAL LAND DISTURBANCE

POTENTIAL AREAS OF RIVER BANK DISTURBANCE (SEE FIGURES 7A–7D FOR DETAILS):

- — POTENTIAL UNDISTURBED RIVERBANK
- — APPROXIMATE LOCATION OF RIPRAP PLACEMENT
- — APPROXIMATE LOCATION OF BIOENGINEERED SOLUTIONS
- — TRANSITION FROM HARDSCAPE TO BIOENGINEERED SOLUTIONS

NOTES:
1) LAND TOPOGRAPHY BASED ON LIDAR SURVEY CONDUCTED ON APRIL 18, 2018.
2) CONGAREE RIVER GAGE (02169500) HEIGHT DURING LIDAR SURVEY WAS 6.18' (119.20' ELEVATION NGVD 29).

FIGURE 2

DOMINION ENERGY SOUTH CAROLINA, INC.

SITE RESTORATION PLAN

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 3/31/21 FILE NAME: CONG608

APEX COMPANIES, LLC

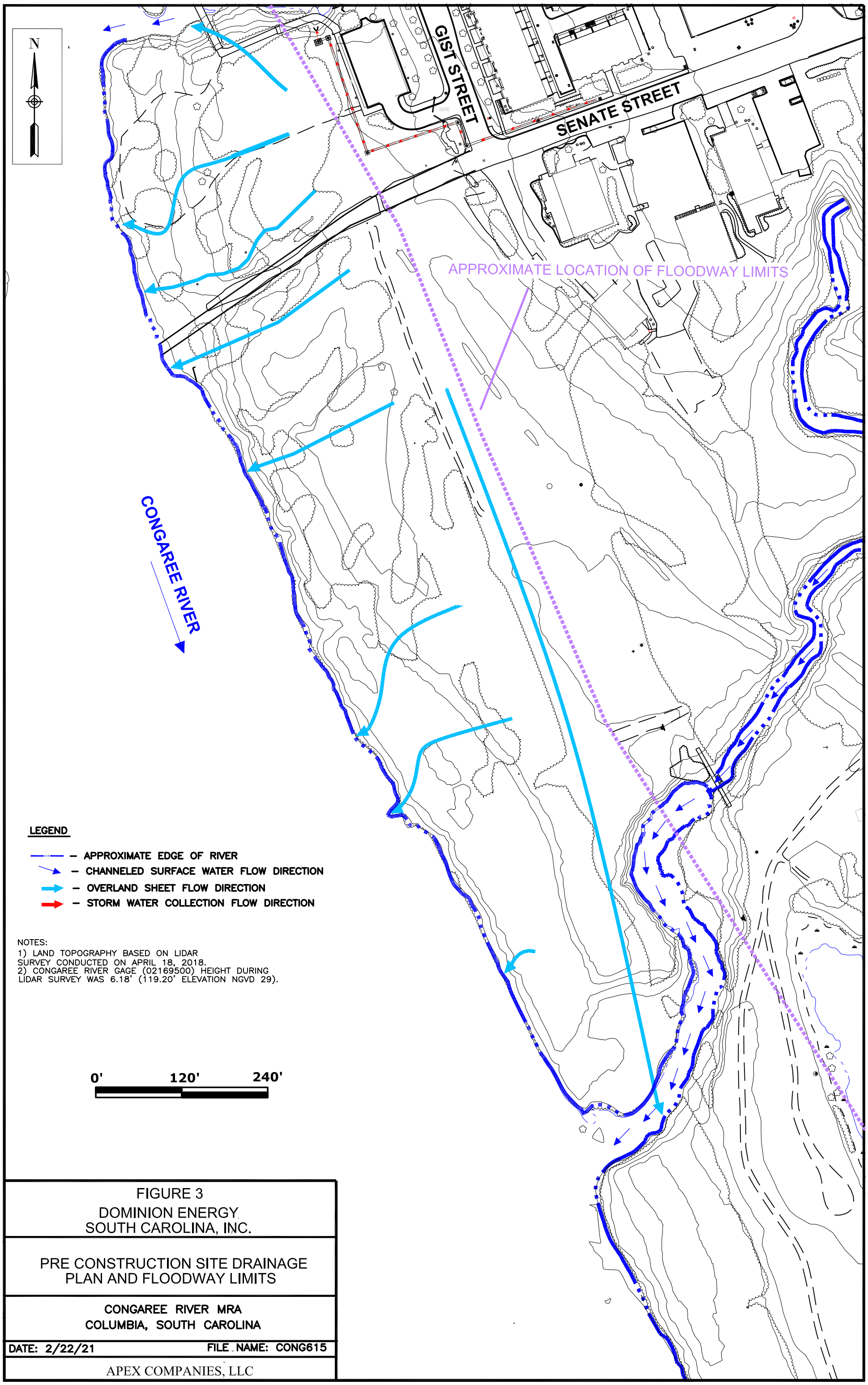



FIGURE 3

DOMINION ENERGY SOUTH CAROLINA, INC.

PRE CONSTRUCTION SITE DRAINAGE PLAN AND FLOODWAY LIMITS

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 2/22/21 FILE NAME: CONG615

APEX COMPANIES, LLC

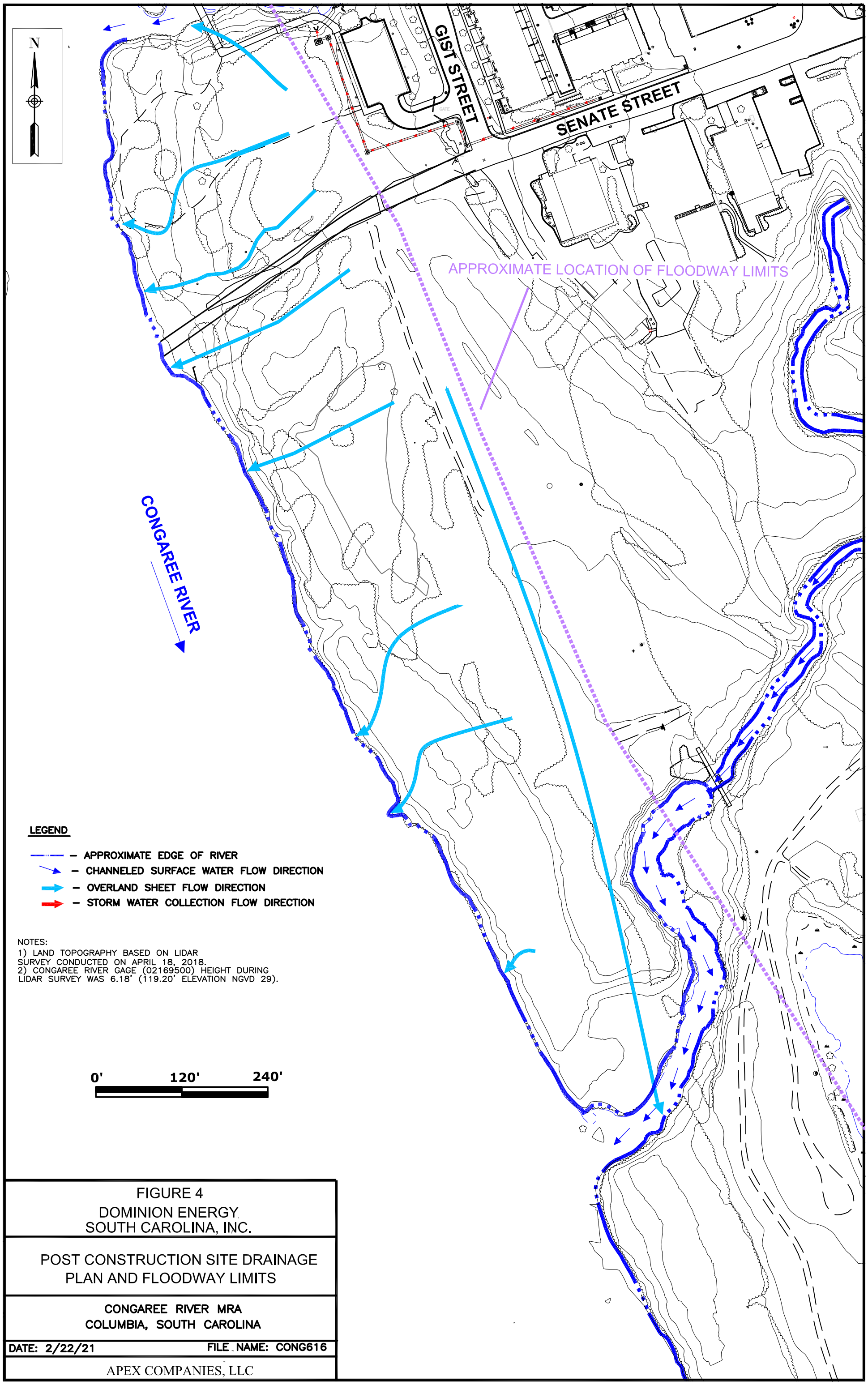



FIGURE 4

DOMINION ENERGY SOUTH CAROLINA, INC.

POST CONSTRUCTION SITE DRAINAGE PLAN AND FLOODWAY LIMITS

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 2/22/21 FILE NAME: CONG616

APEX COMPANIES, LLC

LEGEND

- STREAM/RIVER/WETLAND EDGE
- TREELINE
- 5 FOOT CONTOUR INTERVALS
- REMOVAL AREAS FROM STAKEHOLDER DEVELOPED MRA PLAN
- EXTENT OF COFFERDAM (APPROX.)
- SITE PERIMETER FENCE
- APPROXIMATE EXTENT OF GRAVEL AREAS
- APPROXIMATE LEASE AREA
- SEDIMENT TUBE OR SILT FENCE, AS NEEDED BASED ON TOPOGRAPHY
- SEDIMENT TUBE OR SILT FENCE, AS NEEDED BASED ON TOPOGRAPHY AND TIMING OF ACCESS ROAD INSTALLATION
- DIVERSION BERMS, AS NEEDED
- CHECK DAM LOCATION AS NEEDED

N

NOTES

1) LAND TOPOGRAPHY BASED ON LIDAR SURVEY CONDUCTED ON APRIL 18, 2018.
2) CONGAREE RIVER GAGE (02169500) HEIGHT DURING LIDAR SURVEY WAS 6.18' (119.20' ELEVATION NGVD 29).
3) RIVER BOTTOM CONTOURS BASED ON BATHYMETRIC SURVEYS CONDUCTED MAY 7 THRU JULY 17, 2018.
4) DIVERSION BERMS MAY ALSO BE USED FOR LANDSIDE RUN-ON CONTROL.

0' 140' 280'

GERVAIS STREET BRIDGE

GIST STREET

SENATE STREET

JOB TRAILERS

GATE

CONSTRUCTION ENTRANCE

APPROXIMATE EXTENT OF GRAVEL IMPROVEMENT AREAS AND ACCESS ROADS

MATERIAL AND WATER MANAGEMENT AREA

AS NEEDED FOR RUN-ON CONTROL

AREA 1

COFFERDAM

CONGAREE RIVER

AS NEEDED FOR RUN-ON CONTROL

AREA 2

COFFERDAM

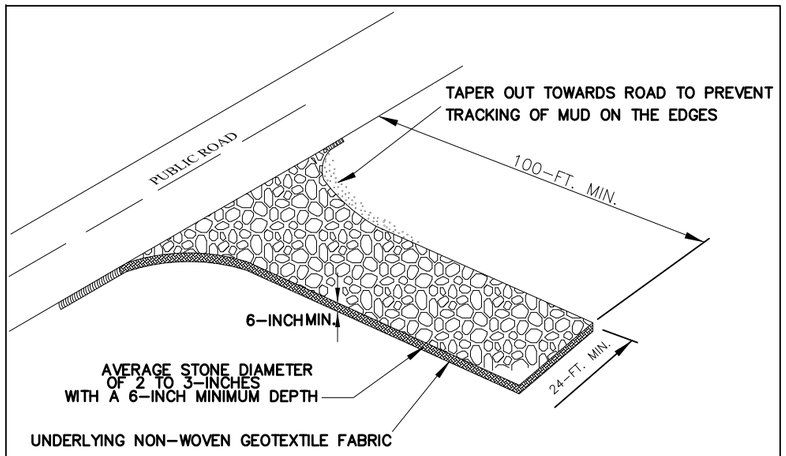
FIGURE 5
DOMINION ENERGY
SOUTH CAROLINA, INC.

LANDSIDE OPERATIONS AREA
AND E&S BMP LOCATIONS

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 3/28/22 FILE NAME: CONG632

APEX COMPANIES, LLC




| SPECIFICATION | SIZE |
|---|---|
| ROCK PAD THICKNESS | 6 INCHES |
| ROCK PAD WIDTH | 24 FEET |
| ROCK PAD LENGTH | 100 FEET |
| ROCK PAD STONE SIZE | D50 = 2-3 INCHES |

INSTALL A CULVERT PIPE ACCROSS THE ENTRANCE WHEN NEEDED TO PROVIDE POSITIVE DRAINAGE.

DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE STONE PAD TO A SEDIMENT TRAP OR BASIN OR OTHER SEDIMENT TRAPPING STRUCTURE.

# STABILIZED CONSTRUCTION ENTRANCE

STABILIZED CONSTRUCTION ENTRANCE

When and Where to Use It

Stabilized construction entrances should be used at all points where traffic will be leaving a construction site and moving directly onto a public road.

Important Considerations

If washing is used, provisions must be made to intercept the wash water and trap the sediment before it is carried offsite. Washdown facilities shall be required as directed by SCDHEC as needed. Washdown areas in general must be established with crushed gravel and drain into a sediment trap or sediment basin. Construction entrances should be used in conjunction with the stabilization of construction roads to reduce the amount of mud picked up by vehicles.

Installation:

Remove all vegetation and any objectionable material from the foundation area.

Divert all surface runoff and drainage from stones to a sediment trap or basin.

Install a non-woven geotextile fabric prior to placing any stone.

Install a culvert pipe across the entrance when needed to provide positive drainage.

The entrance shall consist of 2-inch to 3-inch D50 stone placed at a minimum depth of 6-inches.

Minimum dimensions of the entrance shall be 24-feet wide by 100-feet long, and may be modified as necessary to accommodate site constraints.

The edges of the entrance shall be tapered out towards the road to prevent tracking of mud at the edge of the entrance.

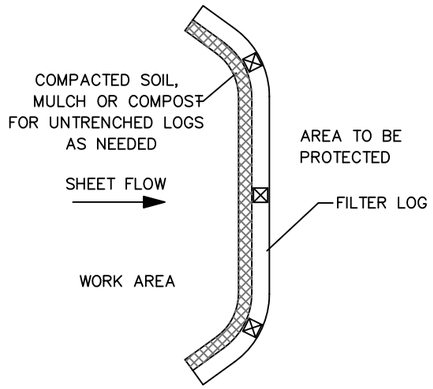
Inspection and Maintenance:

Inspect construction entrances every seven (7) calendar days and within 24-hours after each rainfall event that produces ½-inches or more of precipitation, or after heavy use. Check for mud and sediment buildup and pad integrity. Make daily inspections during periods of wet weather. Maintenance is required more frequently in wet weather conditions. Reshape the stone pad as needed for drainage and runoff control.

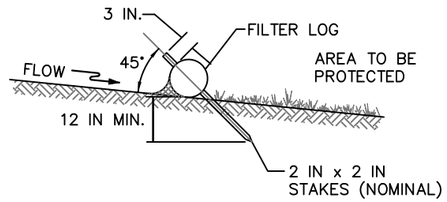
Wash or replace stones as needed and as directed by the inspector. The stone in the entrance should be washed or replaced whenever the entrance fails to reduce mud being carried off-site by vehicles. Frequent washing will extend the useful life of stone.

Immediately remove mud and sediment tracked or washed onto public roads by brushing or sweeping. Flushing should only be used when the water can be discharged to a sediment trap or basin.

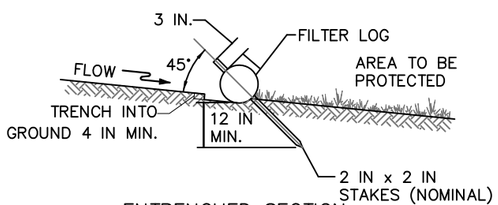
Repair any broken pavement immediately.



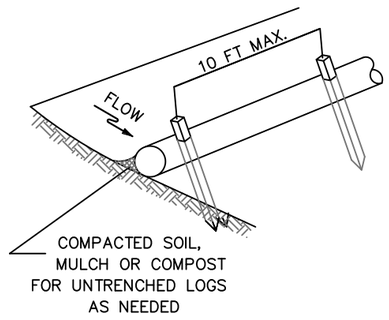

PLAN VIEW




UNTRENCHED SECTION

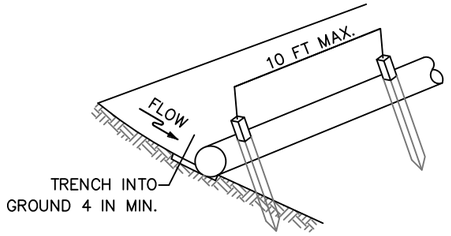



ENTRENCHED SECTION




UNTRENCHED INSTALLATION

OR




ENTRENCHED INSTALLATION

*THIS APPLICATION MAY NOT BE USED WITH LOGS SMALLER THAN 12 IN.

# SEDIMENT TUBE / FILTER LOG INSTALLATION

CONSTRUCTION SPECIFICATIONS

1. PRIOR TO INSTALLATION, CLEAR ALL OBSTRUCTIONS INCLUDING ROCKS, CLODS, AND DEBRIS GREATER THAN ONE INCH THAT MAY INTERFERE WITH PROPER FUNCTION OF FILTER LOG.
2. FILL LOG NETTING UNIFORMLY WITH COMPOST OR OTHER APPROVED BIODEGRADABLE MATERIAL SUCH THAT LOGS DO NOT DEFORM.
3. INSTALL FILTER LOGS PERPENDICULAR TO THE FLOW DIRECTION AND PARALLEL TO THE SLOPE WITH THE BEGINNING AND END OF THE INSTALLATION POINTING SLIGHTLY UP THE SLOPE CREATING A "J" SHAPE AT EACH END TO PREVENT BYPASS.
4. FOR UNTRENCHED INSTALLATION, BLOW OR HAND PLACE MATERIAL ON UPHILL SIDE OF THE SLOPE ALONG LOG AS NEEDED TO PREVENT UNDERCUTTING, AND STAKE EVERY 10 FEET OR CLOSER.
5. FOR ENTRENCHED INSTALLATION, TRENCH LOG INTO GROUND A MINIMUM OF 4 INCHES AND STAKE LOG EVERY 10 FEET OR CLOSER.
6. USE STAKES WITH A MINIMUM NOMINAL CROSS SECTION OF 2X2 INCH AND OF SUFFICIENT LENGTH TO ATTAIN A MINIMUM OF 12 INCHES INTO THE GROUND AND 3 INCHES PROTRUDING ABOVE LOG. ALSO CONSULT MANUFACTURER RECOMMENDATION FOR MINIMUM STAKE LENGTH.
7. WHEN MORE THAN ONE LOG IS NEEDED, OVERLAP ENDS 12 INCHES MINIMUM AND STAKE.
8. REMOVE SEDIMENT WHEN IT HAS ACCUMULATED TO A DEPTH OF ½ THE EXPOSED HEIGHT OF LOG AND REPLACE MULCH. REPLACE FILTER LOG IF TORN. REINSTALL FILTER LOG IF UNDERMINING OR DISLODGING OCCURS. REPLACE CLOGGED FILTER LOGS.

MINIMUM SIZE CHART

| DRAINAGE AREA | SEDIMENT TUBE | SILT FENCE |
|---|---|---|
| TRIBUTARY 1 | 4 | 18 |
| RIVER | 8 | 18 |
| TRIBUTARY 2 | 12 | 24 |

# ACCESS GRAVEL ROAD DETAIL

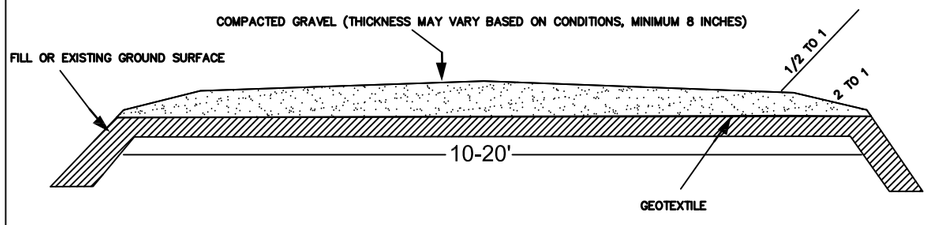



FIGURE 6A

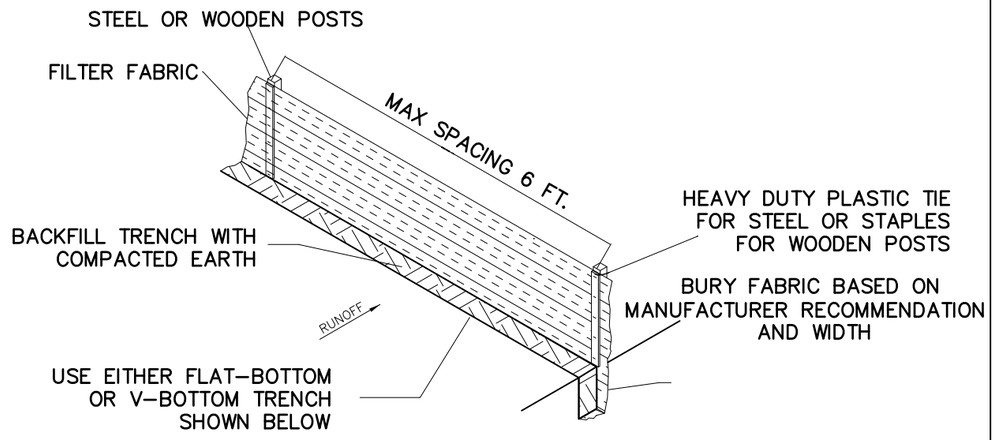
DOMINION ENERGY SOUTH CAROLINA, INC.

E&S CONTROL DETAILS

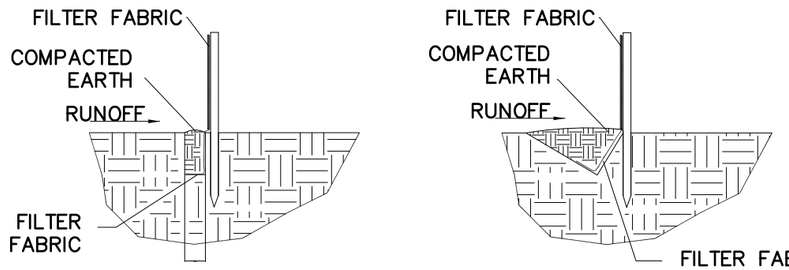
CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 3/28/22 FILE NAME: CONG633

APEX COMPANIES, LLC




## SILT FENCE INSTALLATION




FLAT–BOTTOM TRENCH DETAIL




V–SHAPED TRENCH DETAIL

NOTES:

1. REFER TO MINIMUM SIZE CHART ON FIGURE 6A.

SILT FENCE DETAIL

When and Where to Use It
Silt fence is applicable in areas:

Where the maximum sheet or overland flow path length to the fence is 100–feet.
Where the maximum slope steepness (normal [perpendicular] to fence line) is 2H:1V.
That do not receive concentrated flows greater than 0.5 cfs.

Do not place silt fence across channels or use it as a velocity control BMP.

Materials

Geotextile Filter Fabric

Filter fabric is:
Composed of fibers consisting of long chain synthetic polymers composed of at least 85% by weight of polyolefins, polyesters, or polyamides.

Formed into a network such that the filaments or yarns retain dimensional stability relative to each other.

Free of any treatment or coating which might adversely alter its physical properties after installation. Free of defects or flaws that significantly affect its physical and/or filtering properties.

Use only fabric appearing on SCDOT Approval Sheet #34 meeting the requirements of the most current edition of the SCDOT Standard Specifications for Highway Construction.

Posts

Posts used for installation of the filter fabric shall be of wood or steel composition and meet industry standards.

SILT FENCE DETAIL (CONTINUED)

Installation (Typical)
Excavate a trench approximately 6–inches wide and 6–inches deep when placing fabric by hand. Place 12–inches of the geotextile fabric into the 6–inch deep trench, extending the remaining 6–inches towards the upslope side of the trench. Backfill the trench with soil or gravel and compact

Bury 12–inches of fabric into the ground when pneumatically installing silt fence with a slicing method.

Purchase fabric in continuous rolls and cut to the length of the barrier to avoid joints. When joints are necessary, wrapped the fabric together at a support post with both ends fastened to the post, with a 6–inch minimum overlap.

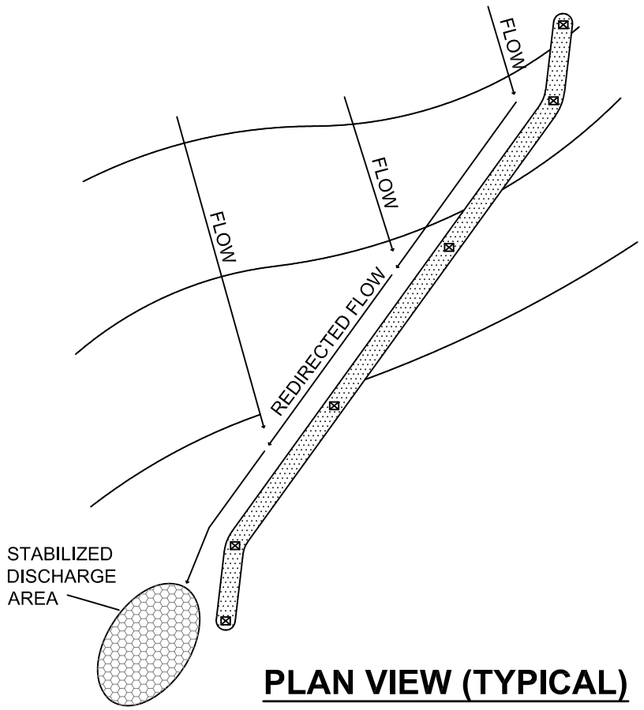
Install posts to a minimum depth of 12–inches, with no more than 3–feet of the post above the ground. Space posts to maximum 10–feet centers.

Attach fabric to wood posts using staples made of heavy–duty wire at least 1½–inch long, spaced a maximum of 6–inches apart. Staple a 2–inch wide lathe over the filter fabric to securely fasten it to the upslope side of wooden posts. Attach fabric to steel posts using heavy–duty plastic ties that are evenly spaced and placed in a manner to prevent sagging or tearing of the fabric. In call cases, ties should be affixed in no less than 4 places.

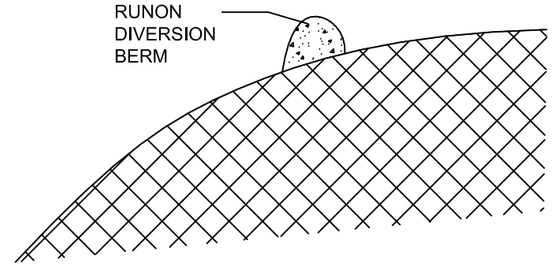
Install the fabric the minimum specified distance above the ground. When necessary, the height of the fence above ground may be greater than the minimum. In tidal areas, extra silt fence height may be required.

Install the fence perpendicular to the direction of flow and place the fence the proper distance from the toe of steep slopes to provide sediment storage and access for maintenance and cleanout.

Inspection and Maintenance
Inspect every seven calendar days and within 24–hours after each rainfall event that produces ½–inches or more of precipitation. Check for sediment buildup and fence integrity. Check where runoff has eroded a channel beneath the fence, or where the fence has sagged or collapsed by fence overtopping.
If the fence fabric tears, begins to decompose, or in any way becomes ineffective, replace the section of fence immediately.
Remove sediment accumulated along the fence when it reaches 1/3 the height of the fence, especially if heavy rains are expected.
Remove trapped sediment from the site or stabilize it on site.
Remove silt fence within 30 days after final stabilization is achieved or after temporary best management practices (BMPs) are no longer needed.
Permanently stabilize disturbed areas resulting from fence removal.




**PLAN VIEW (TYPICAL)**




**SECTION VIEW (TYPICAL)**

## RUNON DIVERSION BERM

NOTES:

1. Diversion berms shall be placed, maintained and adjusted as needed to control excess run–on from stormwater drainage.

2. Berms shall be composed of compost filter socks designed for runoff diversion (e.g., FILTREXX SILTSOXX), compacted soil, sandbags, plastic piping or other suitable material. Typical minimum height is 4 inches, adjust as needed to prevent overtopping.

3. Runoff shall be directed to suitably stabilized areas or conveyance systems to prevent erosion.

FIGURE 6B
DOMINION ENERGY SOUTH CAROLINA, INC.

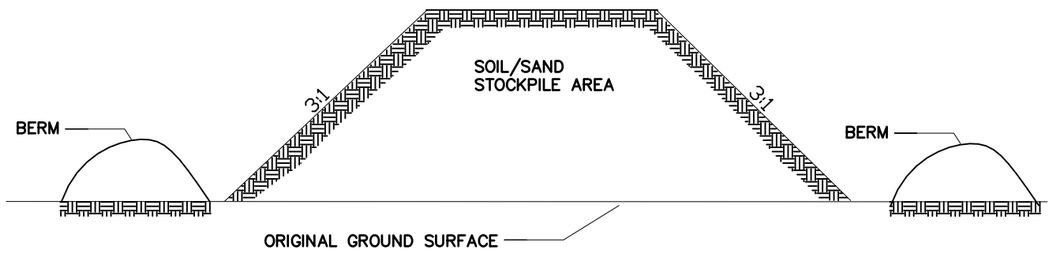
E&S CONTROL DETAILS

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 3/28/22 FILE NAME: CONG634

APEX COMPANIES, LLC

# TYPICAL CLEAN MATERIAL
# TEMPORARY STOCKPILE AREA




NOTES:

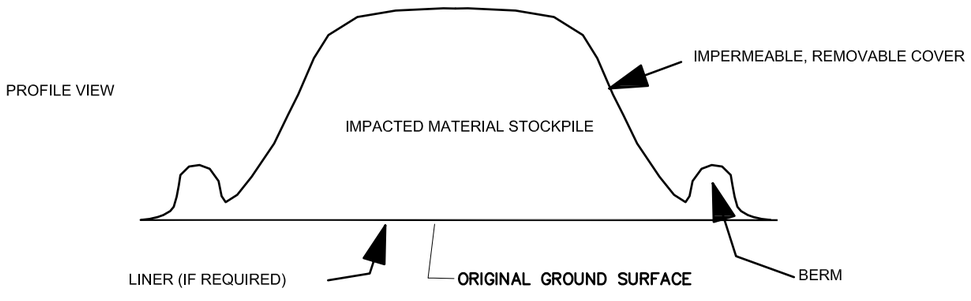
1. BERM TO EXTEND AROUND ENTIRE PERIMETER OF STOCKPILE, OR IF STOCKPILE AREA IS LOCATED ON/NEAR A SLOPE THE BERM IS TO EXTEND ALONG CONTOURS OF THE DOWN-GRADIENT AREA.

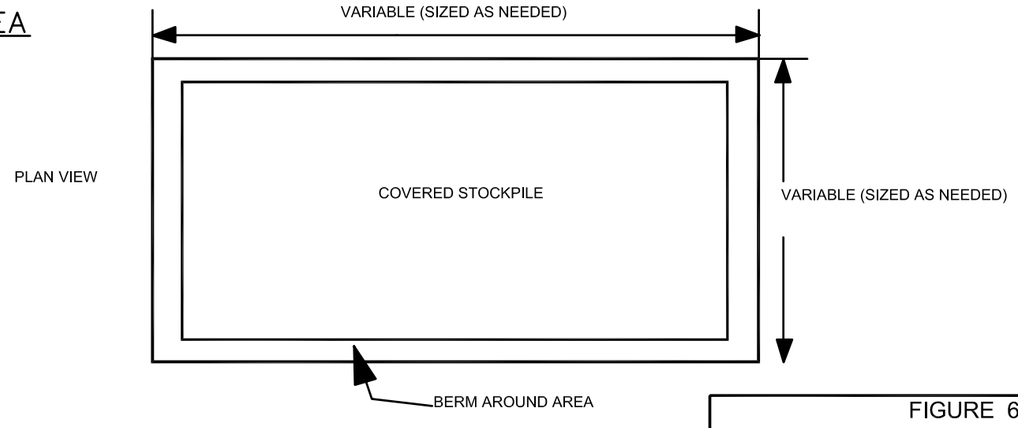
2. BERMS MAY BE CONSTRUCTED USING UNIMPACTED MATERIAL (NATIVE OR IMPORTED), PLASTIC PIPES, LUMBER, HAY BALES, SEDIMENT TUBE/FILTER SOCK, SAND BAGS OR OTHER SUITABLE MATERIAL, DEPENDING ON THE SIZE OF THE STAGING AREA.

3. BERM SHALL BE MAINTAINED UNTIL STOCKPILE AREA HAS EITHER BEEN REMOVED OR PERMANENTLY STABILIZED.

4. THE KEY TO FUNCTIONAL TEMPORARY STOCKPILE AREAS IS WEEKLY INSPECTIONS, ROUTINE MAINTENANCE, AND REGULAR SEDIMENT REMOVAL.

# TYPICAL IMPACTED
# MATERIAL TEMPORARY STOCKPILE AREA




NOTES:

1. TO THE EXTENT POSSIBLE, USE OF TEMPORARY STOCKPILES ON UNDISTURBED AREAS FOR IMPACTED MATERIAL SHOULD BE AVOIDED.
2. TEMPORARY STOCKPILES ON EXISTING GRADE MUST INCLUDE A BERM AND COVER TO CONTROL POTENTIAL MIGRATION OF IMPACTED MATERIAL.
3. STOCKPILES PLACED ON UNIMPACTED SURFACES THAT WILL NOT BE SUBSEQUENTLY EXCAVATED MUST INCLUDE A LINER (E.G., PLASTIC SHEETING), WITH PROPER GRADING OF THE SURFACE TO PROTECT THE LINER INTEGRITY.
4. COVERS MUST BE USED AT THE END OF EACH WORKDAY OR AS WEATHER CONDITIONS WARRANT TO PREVENT PRECIPITATION RUNOFF FROM THE IMPACTED MATERIAL. COVERS MUST BE SECURED AS NECESSARY, AND CONSIST OF A REMOVABLE, IMPERMEABLE MATERIAL (E.G., PLASTIC SHEETING).
5. BERMS MAY BE CONSTRUCTED USING UNIMPACTED MATERIAL (NATIVE OR IMPORTED), PLASTIC PIPES, LUMBER, SAND BAGS, HAY BALES, SEDIMENT TUBES/FILTER SOCKS OR OTHER SUITABLE MATERIAL DEPENDING ON THE SIZE OF THE STAGING AREA.
6. INSPECTION AND MAINTENANCE OF TEMPORARY IMPACTED MATERIAL STOCKPILES IS REQUIRED THROUGHOUT THE PROJECT.

FIGURE 6C
DOMINION ENERGY SOUTH CAROLINA, INC.

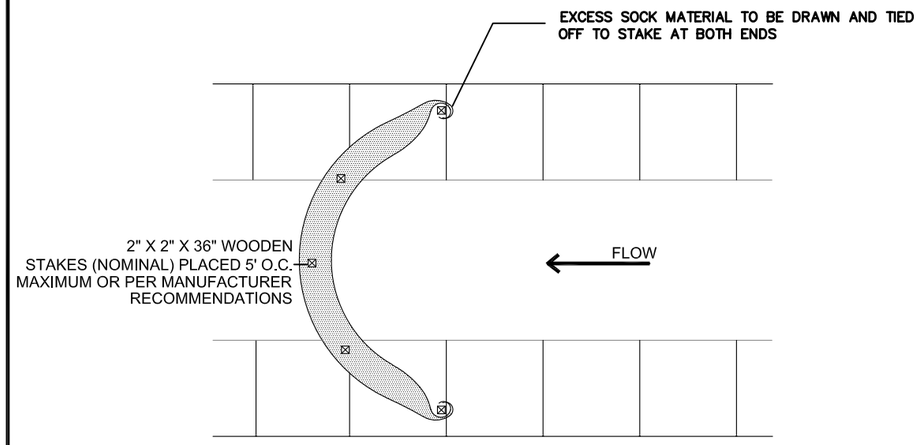
E&S CONTROL DETAILS

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 8/18/20 FILE NAME: CONG568

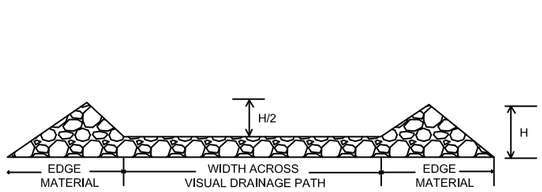
APEX COMPANIES, LLC

# CHECK DAM DETAILS

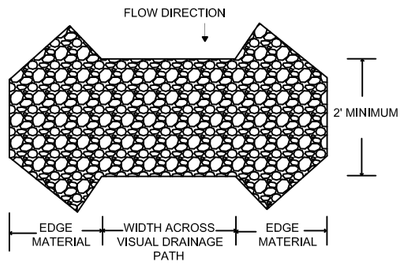



NOTE: MINIMUM HEIGHT SHALL BE 18 INCHES.

SILT SOCK INSTALLATION




SECTION VIEW




PLAN VIEW

ROCK CHECK DAM NOTES:

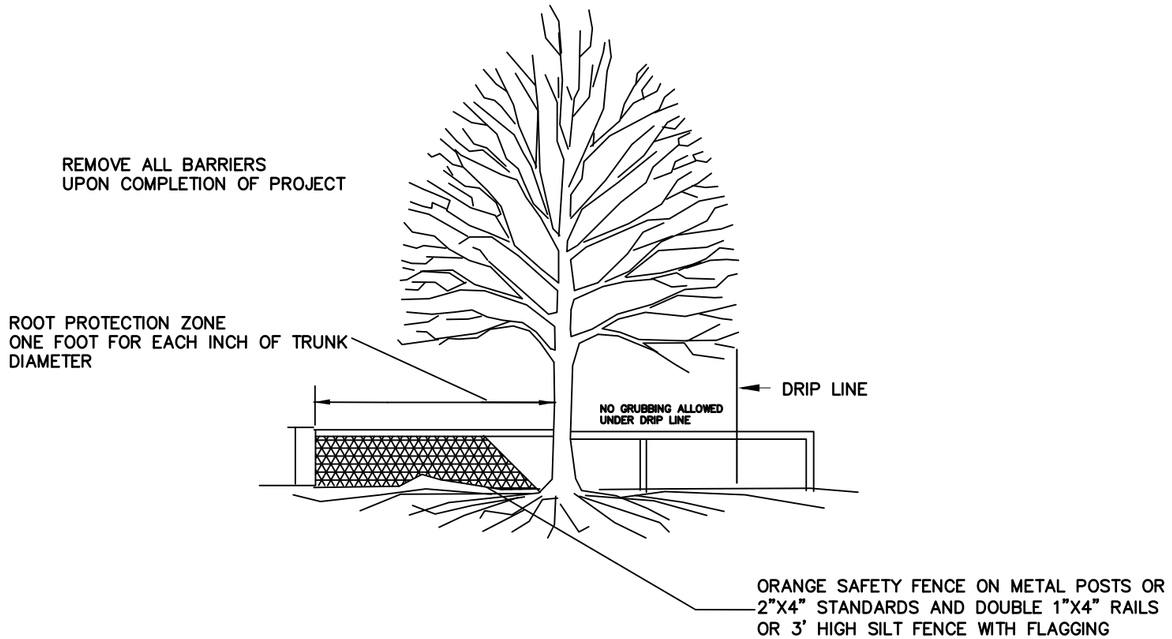
1. CONSTRUCT CHECK DAM ACROSS DRAINAGE PATH AS NECESSARY TO CONTROL SEDIMENT TRANSPORT.
2. CENTER SECTION OF CHECK DAM MUST BE LOWER THAN EDGES.
3. MAXIMUM SLOPE OF CHECK DAM MATERIAL IS 1:2.
4. ADJUST EDGES AS NEEDED FOR INSTALLATIONS ALONG ROADWAYS.
5. BODY OF DAM SHALL BE 12–INCH D50 RIPRAP. UPSTREAM FACE MAY BE 1–INCH D50 WASHED STONE.
6. REMOVE SEDIMENT IF HEIGHT EXCEEDS 1/2 THE ORIGINAL CHECK HEIGHT.
7. MINIMUM HEIGHT SHALL BE 12 INCHES.

ROCK CHECK DAM INSTALLATION

GENERAL CHECK DAM NOTES

1. CHECK DAMS SHOULD BE USED IN AREAS THAT DRAIN 10 ACRES OR LESS.
2. SEDIMENT SHOULD BE REMOVED FROM BEHIND CHECK DAM ONCE THE ACCUMULATED HEIGHT HAS REACHED 1/2 THE HEIGHT OF THE CHECK DAM.

# TREE PROTECTION DETAILS




GENERAL TREE PROTECTION NOTES:

1. NO GRADING WITHIN THE TREE PROTECTION ZONE.
2. NO PARKING, MATERIAL STORAGE, BURY PITS, CONCRETE WASHOUT, BURNING OF DEBRIS, OR OTHER SIMILAR CONSTRUCTION SITE ACTIVITIES THAT COULD DISTURB OR COMPACT THE SOIL WITHIN THE TREE PROTECTION ZONE.
3. INSTALL APPROVED TREE PROTECTION BARRIERS PRIOR TO ANY LAND DISTURBANCE OR CONSTRUCTION ACTIVITY. THESE INCLUDE:
   a. FOUR–FOOT TALL WOODEN POST AND RAIL FENCING OF 2X4 POSTS AND DOUBLE 1X4 RAIL.
   b. ORANGE POLYETHYLENE LAMINAR FENCING MOUNTED ON WOODEN OR STEEL POSTS.
4. PLACE TREE PROTECTION BARRIERS AROUND THE TREES IN A RADIUS OF NO LESS THAN ONE FOOT (1') FOR EVERY ONE INCH (1") OF TREE TRUNK DIAMETER.

FIGURE 6D

DOMINION ENERGY SOUTH CAROLINA, INC.

E&S CONTROL DETAILS

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 3/28/22 FILE NAME: CONG635

APEX COMPANIES, LLC

SEEDING SCHEDULE

1. All excavated areas will be seeded using a perennial and nurse crop mix within 14 days of construction activities ceasing.
2. Establishing a stand of perennial grasses is critical to controlling runoff and erosion of areas disturbed by construction and maintenance activities. Once the permanent grasses begin to establish underneath the nurse crop, a mowing may be required to prevent shading and to release them.
3. Seeding application rates and time frames are listed below.
4. If construction activities must temporarily cease for 14 days or more, then seeding must be initiated. If temporary seeding is required, apply only the nurse crops listed below at double the below listed application rates.

SEEDING PROCEDURES

1. Sub–soil/chisel plow/disk disturbed areas, as necessary
2. Apply lime, as necessary (based on soil sample) (2,000 lb./acre if soil sample not taken)
3. Disk in lime to incorporate into the soil
4. Apply seed based on application rates below (permanent grass and nurse crop mix)
5. Acquire a firm seed bed by rolling with cultipacker or equivalent
6. Apply hay straw at approximately 2,000 lb./acre and crimp into soil or hydramulch at approximately 1,200 lbs/acre
7. Once seed germinates, apply fertilizer as necessary (based on soil sample)

(Hydroseeding with the appropriate rates of lime, mulch, fertilizer, and seed may be applied if a well established seed bed is present (i.e. uncompacted and loosely disked soils)

Permanent Seeding Application Rates
Common Name of Seed / Planting Rate (pounds per acre) / Planting Dates

Warm Season (Spring and Summer)
Hulled Common Bermuda / 25 / March – August
Browntop Millet (nurse crop) / 20 / Mid March – September

Cool Season (Fall and Winter)
Unhulled Common Bermuda/ 30 / September – February
Annual Rye or Rye Grain (no rye grass) (nurse crop)/ 25 / October – Mid March

NOTE:
For significant slopes greater than 5 feet in height, add 10 lb./acre of Weeping Lovegrass and 50 lb./acre of sericea lespedeza to above rates.

For applications in the upper state (northwest of I–20 and US 1 (I–20 and US 1 meet in Columbia)) of SC, add 50 lb./acre of Kentucky 31 Fescue to above rates.

For wetland areas, only apply a light amount of nurse crop seed and no Bermuda or Kentucky 31 Fescue seed. Do not apply lime or fertilizer to wetland areas. These areas will rapidly revegetate in native wetland vegetation without seeding.

(deviations from these seed mixes allowed with prior approval)

TEMPORARY MULCHING DETAILS

1. Temporary mulching or seeding will be conducted in areas where construction activities may cease for 14 days or more.
2. See seeding schedule for temporary ands permanent seeding details.
3. Mulch materials can include clean, weed free hay or straw, wood chips or wood fibers.
4. Hay/straw application rates are approximately 2,000 lb./acre. There must be adequate mulch coverage to prevent erosion, washout and poor plant establishment.
5. Grading is not necessary before mulching but may be required if vegetation is expected to grow.
6. Straw or hay must be anchored on the surface via application of a tackifier, stapling netting over top, or crimping with a mulch crimping tool. Materials heavy enough to stay in place in low slope areas, such as bark and wood fibers, do not need anchoring.
7. Mechanical crimping is preferred for slopes less than 3:1. For slopes greater than 3:1 erosion control mats, blankets or nets are recommended. If netting and matting material is used, firm continuous contact between the materials and the soil is required to prevent erosion.
8. Rock can also be used as mulch. An aggregate base course can be spread on disturbed areas for temporary or permanent stabilization. The rock mulch layer should be thick enough to provide full coverage of exposed soil on the area it is applied.
9. Mulched areas will be regularly inspected as part of the E&S inspection routine (minimum every 7 calendar days and after rainfall event that produces 1/2–inch or more of precipitation).
10. Damaged areas will be repaired or replaced as soon as practicable.

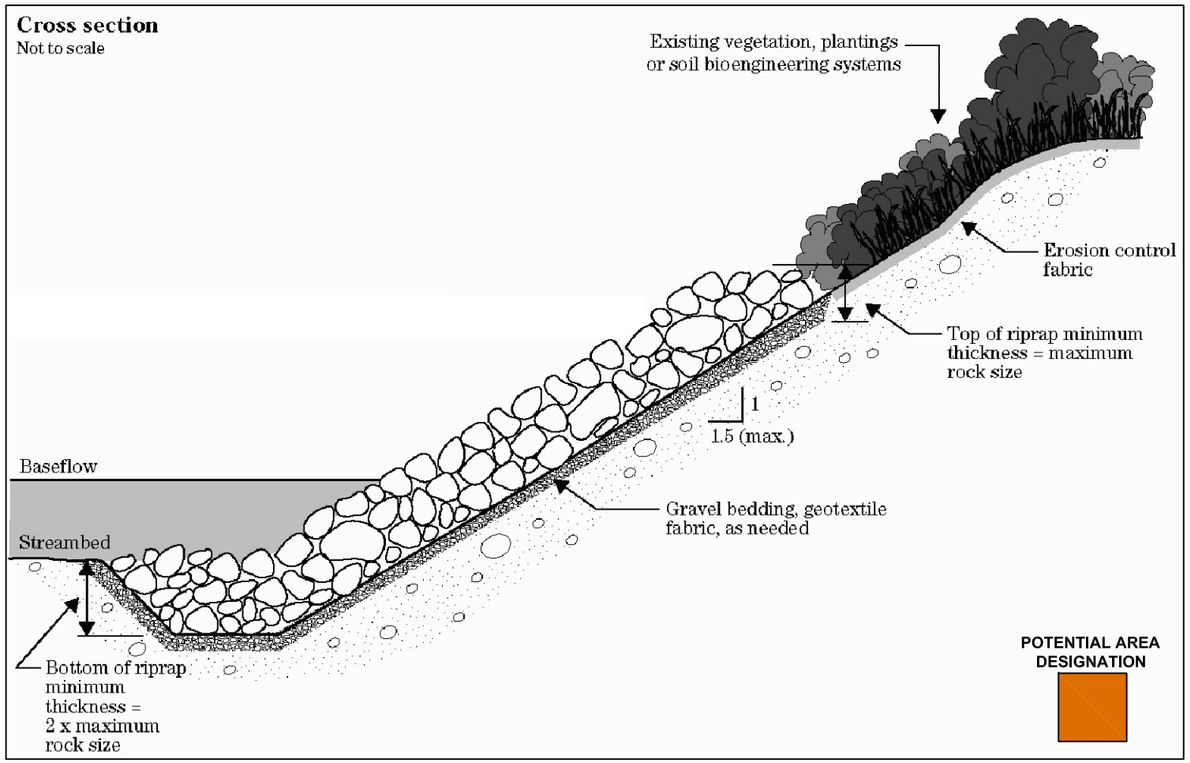
FIGURE 6E
DOMINION ENERGY
SOUTH CAROLINA, INC.

E&S CONTROL DETAILS

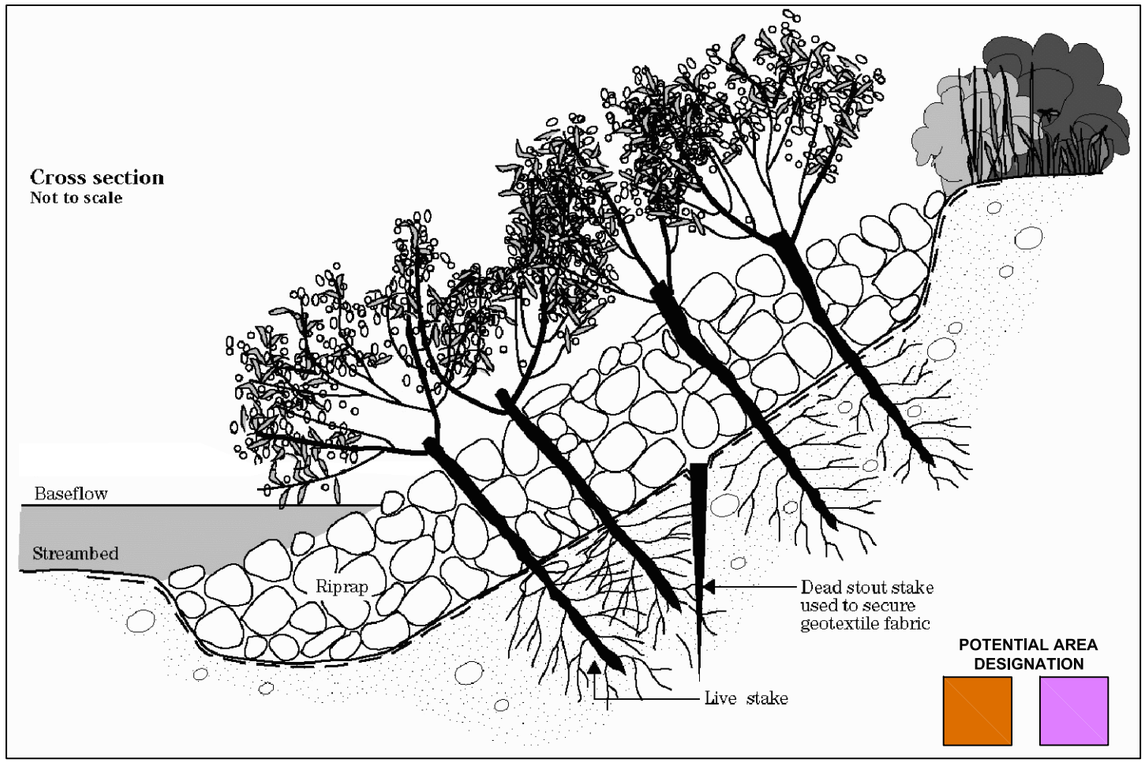
CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 1/28/21 FILE NAME: CONG601

APEX COMPANIES, LLC




7A-1 TYPICAL RIPRAP RIVER BANK STABILIZATION
(OR OTHER HARDSCAPE MATERIAL)




7A-2 TYPICAL RIPRAP RIVER BANK STABILIZATION WITH JOINT PLANTING
(OR OTHER HARDSCAPE MATERIAL)

NOTES:
1. RIPRAP BANK STABILIZATION WILL BE UTILIZED IN AREAS WITH HIGH VELOCITY AND OR TURBULENT RIVER FLOWS TO GUARD AGAINST FUTURE RIVERBANK EROSION.
2. JOINT PLANTING (DETAIL 7A-2) WILL BE CONDUCTED, IF FEASIBLE, TO PROVIDE VEGETATIVE COVER IN RIPRAP AREAS AND TO PROVIDE A TRANSITION TO OTHER BIOENGINEERED AREAS.
3. DETAILS OBTAINED FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE ENGINEERING FIELD HANDBOOK (ISSUED 1996) - PART 650 - CHAPTER 16 STREAMBANK AND SHORELINE PROTECTION.
4. INSTALLATION OF SHORELINE RESTORATION COMPONENTS WILL BE CONDUCTED IN ACCORDANCE WITH ESTABLISHED STANDARDS AS OUTLINE IN THE ABOVE REFERENCE ENGINEERING FIELD HANDBOOK.
5. TABLES 1, 2 AND 3 ON FIGURE 7D PROVIDE PLANT SPECIFICATIONS.

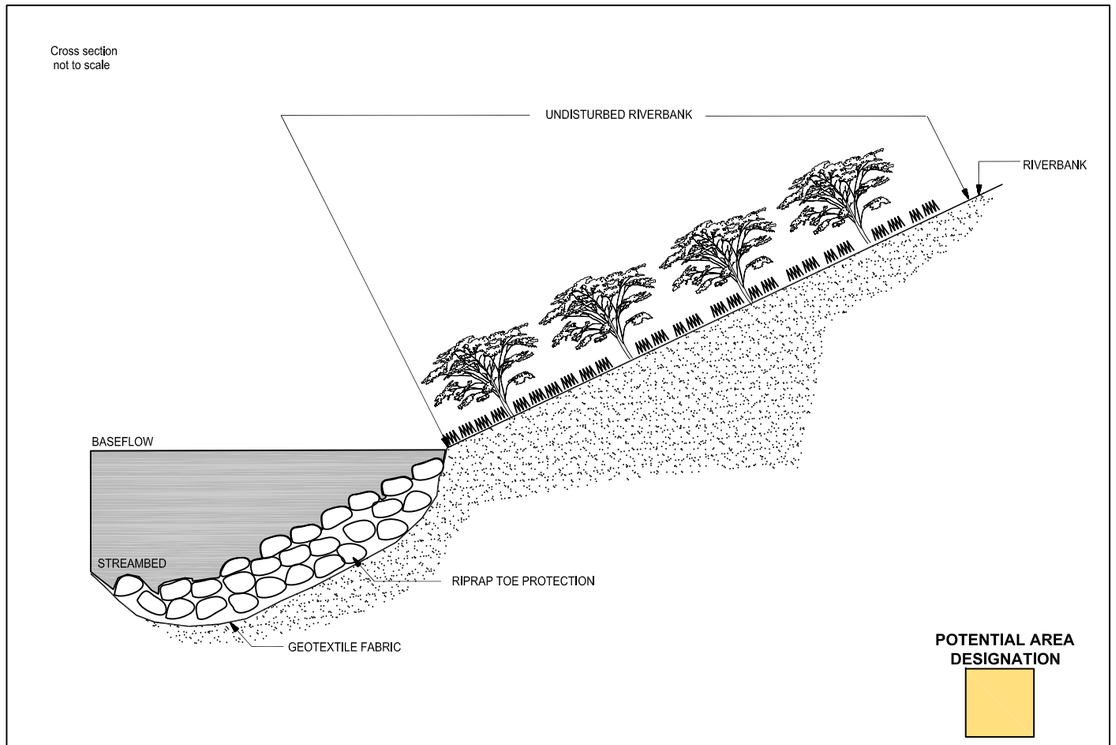
FIGURE 7A
DOMINION ENERGY
SOUTH CAROLINA, INC.

RIVERBANK STABILIZATION
DETAILS

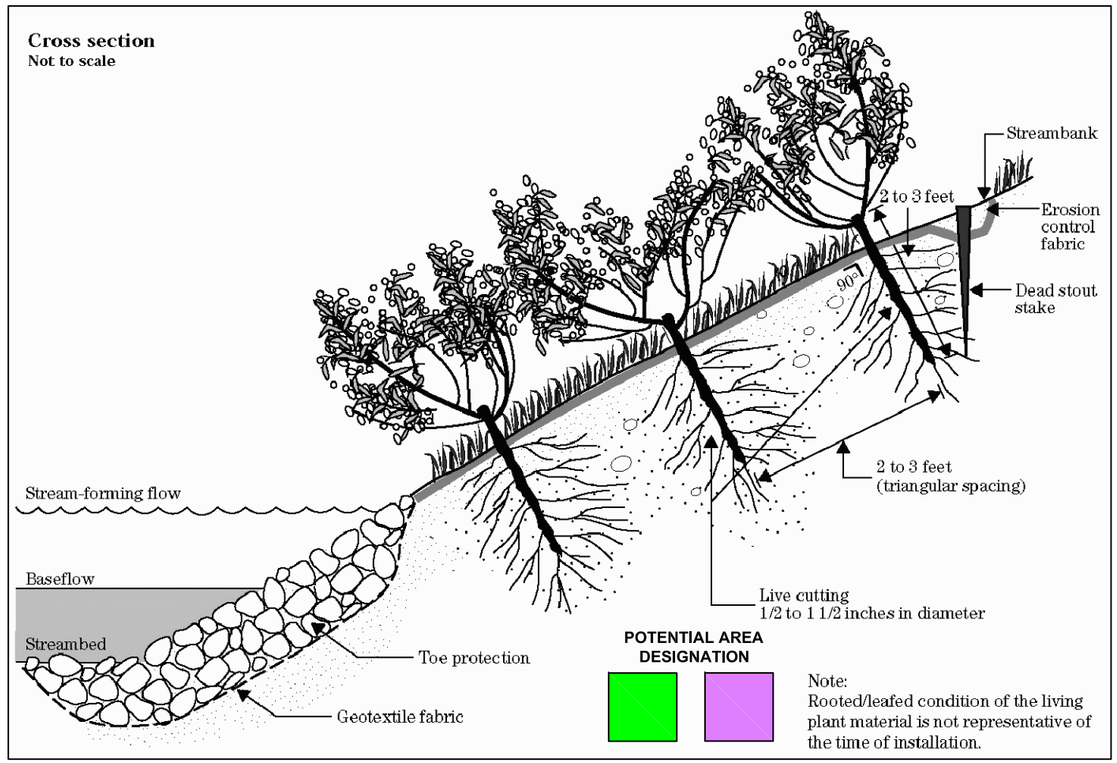
CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 9/10/20 FILE NAME: CONG581

APEX COMPANIES, LLC




7B-1 UNDISTURBED RIVER BANK TOE STABILIZATION




7B-2 JOINT PLANTING BIOENGINEERED BANK STABILIZATION OPTION DETAIL

NOTES:

1. GEOTEXTILE AND RIPRAP (DETAIL 7B-1) WILL BE UTILIZED TO STABILIZE EXCAVATED AREAS AT THE TOE OF RIVERBANK SLOPES TO PREVENT SLOUGHING OR COLLAPSING. RIPRAP PLACEMENT WILL TERMINATE AT OR BELOW THE APPROXIMATE NORMAL WATERLINE.
2. LIVE STAKES (DETAIL 7B-2) WILL POTENTIALLY BE UTILIZED IN CONJUNCTION WITH OTHER BIOENGINEERED SOLUTIONS, AS NEEDED, IN AREAS WHERE RIVERBANK DISTURBANCE EXTENDS SIGNIFICANTLY ABOVE THE NORMAL WATERLINE AND RIVER FLOW VELOCITY AND TURBULENCE CONDITIONS DO NOT REQUIRE ADDITIONAL STABILIZATION MEASURES.
3. DETAILS OBTAINED FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE ENGINEERING FIELD HANDBOOK (ISSUED 1996) - PART 650 - CHAPTER 16 STREAMBANK AND SHORELINE PROTECTION.
4. INSTALLATION OF SHORELINE RESTORATION COMPONENTS WILL BE CONDUCTED IN ACCORDANCE WITH ESTABLISHED STANDARDS AS OUTLINE IN THE ABOVE REFERENCE ENGINEERING FIELD HANDBOOK.
5. TABLES 1, 2 AND 3 ON FIGURE 7D PROVIDE PLANT SPECIFICATIONS.

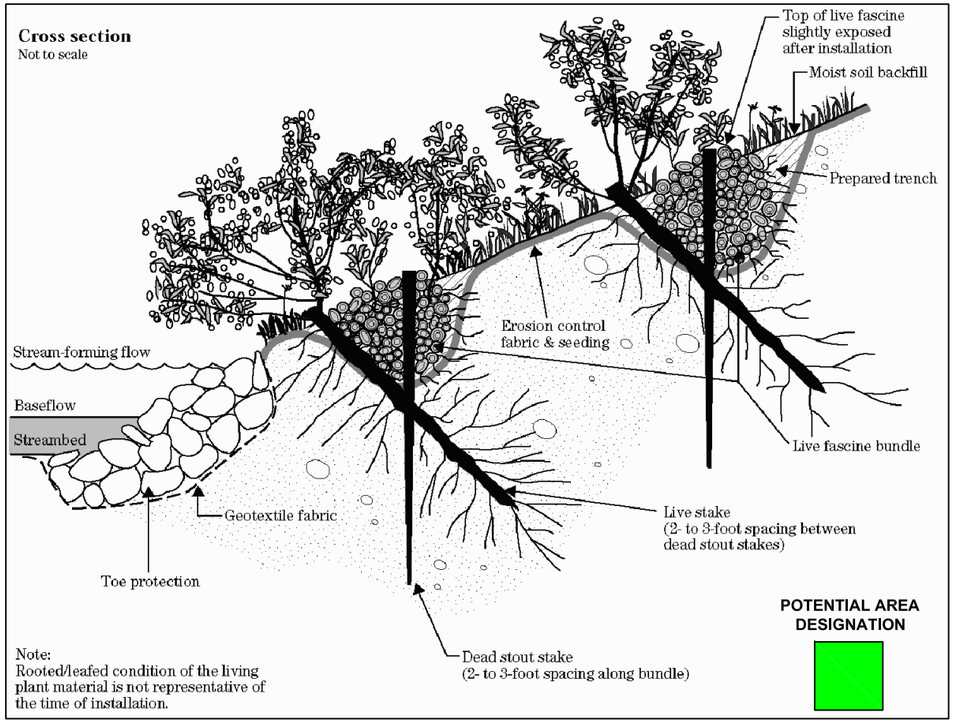
FIGURE 7B
DOMINION ENERGY
SOUTH CAROLINA, INC.

RIVERBANK TOE STABILIZATION
AND BIOENGINEERING OPTION DETAILS

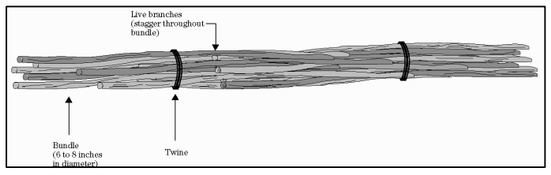
CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 2/22/21 FILE NAME: CONG582

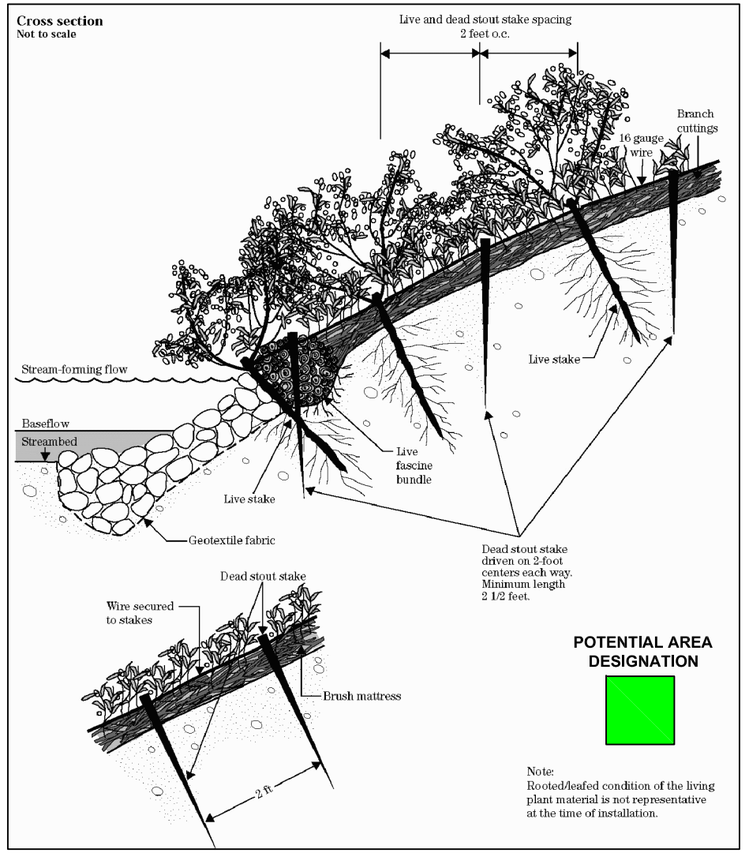
APEX COMPANIES, LLC




7C-1 LIVE FASCINE STABILIZATION OPTION




7C-2 LIVE FASCINE DETAIL




7C-3 BRUSHMATTRESS BANK STABILIZATION OPTION DETAIL

NOTES:

1. LIVE FASCINES (DETAIL 7C-1) ARE AN OPTION FOR FLATTER SLOPE (3:1 OR FLATTER) STABILIZATION IN AREAS WHERE RIVER VELOCITY AND TURBULENCE CONDITIONS DO NOT REQUIRE ADDITIONAL STABILIZATION MEASURES.
2. LIVE FASCINES (DETAIL 7C-2) ARE LONG BUNDLES OF BRANCH CUTTINGS THAT CONTAIN SOME LIVE BRANCHES.
3. BRUSHMATTRESS (DETAIL 7C-3) PROVIDE A COMBINATION OF LIVE STAKES, LIVE FASCINES AND BRANCH CUTTINGS AND PROVIDE MORE PROTECTION FROM EROSION OF STEEPER SLOPES OR AREAS OF HIGHER VELOCITY RIVER FLOW.
4. DETAILS OBTAINED FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE ENGINEERING FIELD HANDBOOK (ISSUED 1996) - PART 650 - CHAPTER 16 STREAMBANK AND SHORELINE PROTECTION.
5. INSTALLATION OF SHORELINE RESTORATION COMPONENTS WILL BE CONDUCTED IN ACCORDANCE WITH ESTABLISHED STANDARDS AS OUTLINE IN THE ABOVE REFERENCE ENGINEERING FIELD HANDBOOK.
6. TABLES 1, 2 AND 3 ON FIGURE 7D PROVIDE PLANT SPECIFICATIONS.

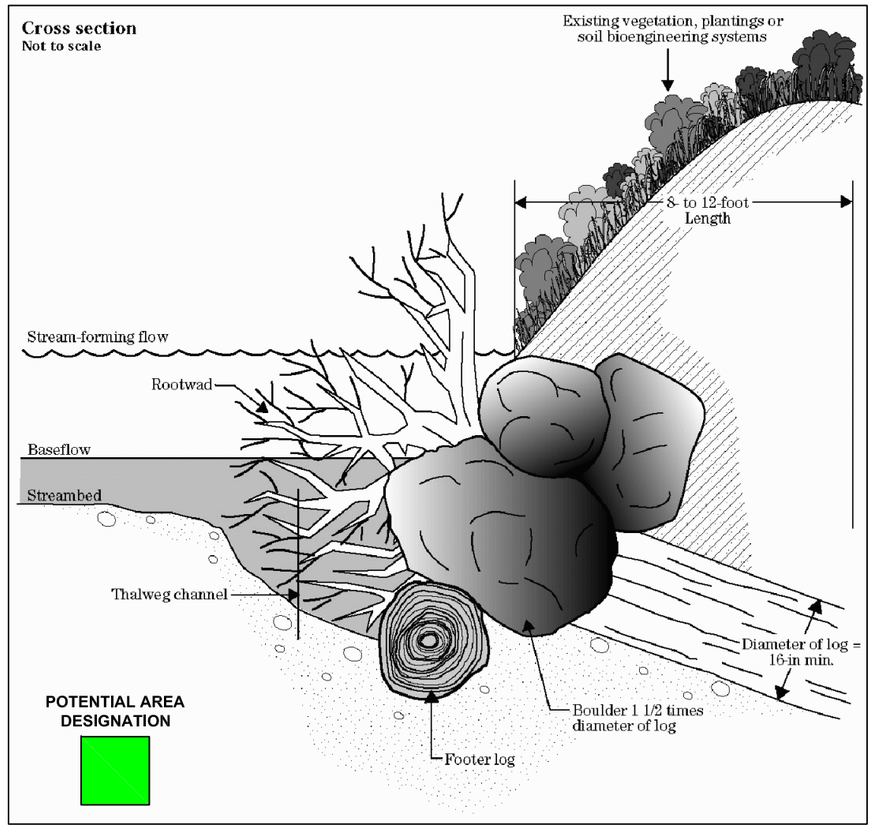
FIGURE 7C
DOMINION ENERGY
SOUTH CAROLINA, INC.

BIOENGINEERED STABILIZATION
OPTION DETAILS

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 2/22/21 FILE NAME: CONG583

APEX COMPANIES, LLC




7D-1 LOG, ROOTWAD AND BOULDER REVETMENT STABILIZATION OPTION DETAIL

**TABLE 1**
**GRASSES AND FORBES**

| Schientific Name | Common Name | Soil Preference | Drought Tolerance | Shade Tolerance | Flood Tolerance |
|---|---|---|---|---|---|
| *Ammophila breviligulata* | American beachgrass | sands | fair | poor | |
| *Andropogon gerardii* | Big bluestem | loams | good | poor | fair |
| *Arundo donax* | Giant reed | sandy | good | poor | poor |
| *Heraithria altissima* | Limpograss | sandy | poor | poor | good |
| *Panicum amarulum* | Coastal panicgrass | sands to loams | good | poor | good |
| *Panicum virgatum* | Switchgrass | loams to sands | good | poor | good |
| *Paspalum vaginatum* | Seashore paspalum | sandy | | poor | good |
| *Pennisetum purpureum* | Elephant grass | | | poor | |
| *Spartina pectinata* | Prairie cordgrass | sands to loams | good | fair | fair |
| *Zizaniopsis miliacea* | Giant cutgrass | loam | poor | poor | good |

**TABLE 2**
**PLANTS SUITABLE FOR ROOTING**

| Scientific Name | Common Name | Plant Type | Rooting Ability (from cutting) |
|---|---|---|---|
| *Acer negundo* | Boxelder | | |
| *Asimina triloba* | Pawpaw | small tree | poor to fair |
| *Baccharis balimifolia* | Groundsel bush | medium shrub | good |
| *Cephalanthus occidentalis* | Buttonbush | large shrub | fair to good |
| *Cornus amomum* | Silky dogwood | small shrub | fair |
| *Cornus sericia* | Red osier dogwood | | |
| *Gleditsia triacanthos* | Honeylocust | medium tree | poor to fair |
| *Populus deltoides* | Eastern cottonwood | tall tree | very good |
| *Robinia sp.* | Black locust | | |
| *Salix discolor* | Pussy willow | large shrub | very good |
| *Salix nigra* | Black willow | small to large tree | good to excel |
| *Salix purpurea* | Purpleosier willow | medium tree | excel |
| *Sambucus canadensis* | American elder | medium shrub | good |
| *Viburnum dentatum* | Arrowwood | medium to tall shrub | good |
| *Viburnum lentago* | Nannyberry | large shrub | fair to good |

**TABLE 3**
**WOODY PLANTS**

| Scientific Name | Common Name | Plant Type | Establishment Speed |
|---|---|---|---|
| *Acer negundo* | Boxelder | small to medium tree | fast |
| *Acer rubrum* | Red maple | medium tree | fast |
| *Alnus serrulata* | Smooth alder | large shrub | medium |
| *Amorpha fruitcosa* | False indigo | shrub | fast |
| *Aronia arbutifolia* | Red Chokeberry | shrub | fast |
| *Asimina triloba* | Pawpaw | small tree | |
| *Betula nigra* | River birch | medium to large tree | fast |
| *Carpinis caroliniana* | American hornbeam | small tree | slow |
| *Carya cordiformis* | Bitternut hickory | tree | |
| *Catalpa bignonioides* | Southern catalpa | tree | fair |
| *Celtis laevigata* | Sugarberry | medium tree | slow |
| *Celtis occidentalis* | Hackberry | medium tree | slow |
| *Cephalanthus occidentalis* | Buttonbush | large shrub | medium |
| *Chionanthus virginicus* | Fringe tree | small tree | |
| *Clethera ainifolia* | Sweet Pepperbush | shrub | |
| *Cornus amomum* | Silky dogwood | small shrub | medium |
| *Cornus florida* | Flowering dogwood | small tree | fair |
| *Diospyros virginiana* | Persimmon | medium tree | fair |
| *Fraxinus pennsylvanica* | Green ash | medium tree | fast |
| *Gleditsia triacanthos* | Honeylocust | medium tree | fast |
| *Ilex decidua* | Possomhaw | large shrub to small tree | |
| *Ilex opaca* | American holly | small tree | medium |
| *Ilex verticillata* | Winterberry | small to large shrub | |
| *Juglans nigra* | Balck walnut | medium tree | fair |
| *Juniperus virginiana* | Eastern redcedar | large tree | medium |
| *Liquidambar styraciflua* | Sweetgum | large tree | |
| *Liriodendron tulipifera* | Tulip poplar | large tree | fast |
| *Magnolia virginiana* | Sweetbay | small tree | |
| *Nyssa sylcatica* | Blackgum | tall tree | slow |
| *Ostrya virginiana* | Hophornbean | small tree | slow |
| *Platanus occidentalis* | Sycamore | large tree | fast |
| *Populus deltoides* | Eastern cottonwood | tall tree | fast |
| *Quercus alba* | White oak | large tree | slow |
| *Quercus lyrata* | Overcup oak | medium tree | slow |
| *Quercus michauxii* | Swamp chestnut oak | medium tree | fair |
| *Quercus nigra* | Water oak | medium tree | slow |
| *Quercus phellos* | Willow oak | medium to large tree | medium |
| *Quercus shumardii* | Shumard oak | large tree | slow |
| *Rhododenron atlanticum* | Coast azalea | small shrub | |
| *Rhododendron viscosum* | Swamp azalea | shrub | |
| *Salix nigra* | Black willow | small to large tree | fast |
| *Viburnum nudum* | Swamp haw | large shrub | |

NOTES:
1. LOG, ROOTWAD AND BOULDER REVETMENTS MAY BE UTILIZED SPORADICALLY TO PROVIDE OVERHEAD COVER AND HABITAT IMPROVEMENT ALONG THE DISTURBED SHORELINE.
2. DETAILS OBTAINED FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE ENGINEERING FIELD HANDBOOK (ISSUED 1996) - PART 650 - CHAPTER 16 STREAMBANK AND SHORELINE PROTECTION.
3. INSTALLATION OF SHORELINE RESTORATION COMPONENTS WILL BE CONDUCTED IN ACCORDANCE WITH ESTABLISHED STANDARDS AS OUTLINE IN THE ABOVE REFERENCE ENGINEERING FIELD HANDBOOK.
6. PLANTING OPTIONS OBTAINED FROM THE "STREAMBANK AND SHORELINE STABILIZATION TECHNIQUES TO CONTROL EROSION AND PROTECT PROPERTY" - GEORGIA DEPARTMENT OF NATURAL RESOURCES.

FIGURE 7D
DOMINION ENERGY
SOUTH CAROLINA, INC.

BIOENGINEERED STABILIZATION
OPTION DETAILS

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 9/8/20 FILE NAME: CONG584

APEX COMPANIES, LLC

# CONSTRUCTION SEQUENCE

1. Receive approval from City of Columbia for NPDES coverage under SCDHEC General Permit.

2. Hold a pre-construction meeting on-site with DESC, contractor, engineer and City of Columbia Stormwater Management Staff.

3. Notify City of Columbia Utilities and Engineering Staff 48 hours prior to beginning land disturbing activities.

4. Mobilize office trailers to the site and place them in the same locations as utilized for previous site activities and reconnect utilities. Utility connections are already present for the trailers and should require minimal to no additional land disturbance to reestablish the connections.

5. Identify historical areas, plant species of concern areas, and other areas of the site that will be safeguarded from being disturbed by construction activities and demarcate them with high visibility fencing or equivalent visual barrier.

6. Install temporary perimeter fencing and access gate for site security.

7. Install initial perimeter control and other sediment and erosion control BMPs associated with the laydown area improvements, including the stabilized construction entrance.

8. Conduct clearing and grading activities in order to construct the material and water management area, laydown area(s) and access road(s). Stabilize disturbed areas through the addition of geotextile overlain by gravel (crusher run or similar material).

9. Grade and reseed with approved seed mixture any disturbed areas not stabilized via geotextile and gravel.

10. Identify additional access points to the river that will be required, if any, for the Area 1 removal area. Install sediment and erosion control BMPs in these areas to permit construction of the additional access road(s). The final road locations will be chosen in the field during implementation and will be based on field conditions, project requirements and the intent to minimize land disturbance and tree removal activities as much as practicable.

11. Demarcate the portions of the riverbank that are intended to be left undisturbed to limit the potential for disturbance during construction and sediment removal activities.

12. Mobilize cofferdam construction personnel and equipment and begin Area 1 cofferdam construction activities. Total Suspended Solids monitoring will be conducted in the river during active river construction operations.

13. Complete landside support zone construction including erecting temporary structure(s) and installing the water management system components.

14. Install run-on diversion controls, as necessary, to control run-on of stormwater from landside support zone into the Area 1 removal area.

15. After cofferdam is in place, dewater planned removal area and begin sediment removal operations. Utilize the river-based removal area for initial draining of entrained water within the excavated sediment and the water management system for collection and filtration of impacted water.

16. Move excavated material from river removal area to temporary structure for additional screening, conditioning and offsite transport to disposal location.

17. Complete Area 1 excavation activities and remove Area 1 cofferdam materials from the river.

18. Reconstruct disturbed areas of riverbank and remove the Area 1 access roads (except where left in place at request of landowner and contingent upon City of Columbia approval). Grade and reseed the areas with an approved seed mixture.

19. Complete items 8 through 19 for the Area 2 removal area.

20. Following reconstruction of the riverbank in Area 2, the landside support zone will be restored to pre-project conditions (except gravel roads left in place at request of landowner and contingent upon City of Columbia approval) by removing the temporary structures, geotextile and gravel from the access roads and laydown areas, and grading and reseeding the areas with an approved seed mixture.

21. Remove office trailer(s).

22. After stabilization has been achieved, DESC will submit the Notice of Termination (NOT) to City of Columbia.

FIGURE 8
DOMINION ENERGY SOUTH CAROLINA, INC.

CONSTRUCTION SEQUENCE

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

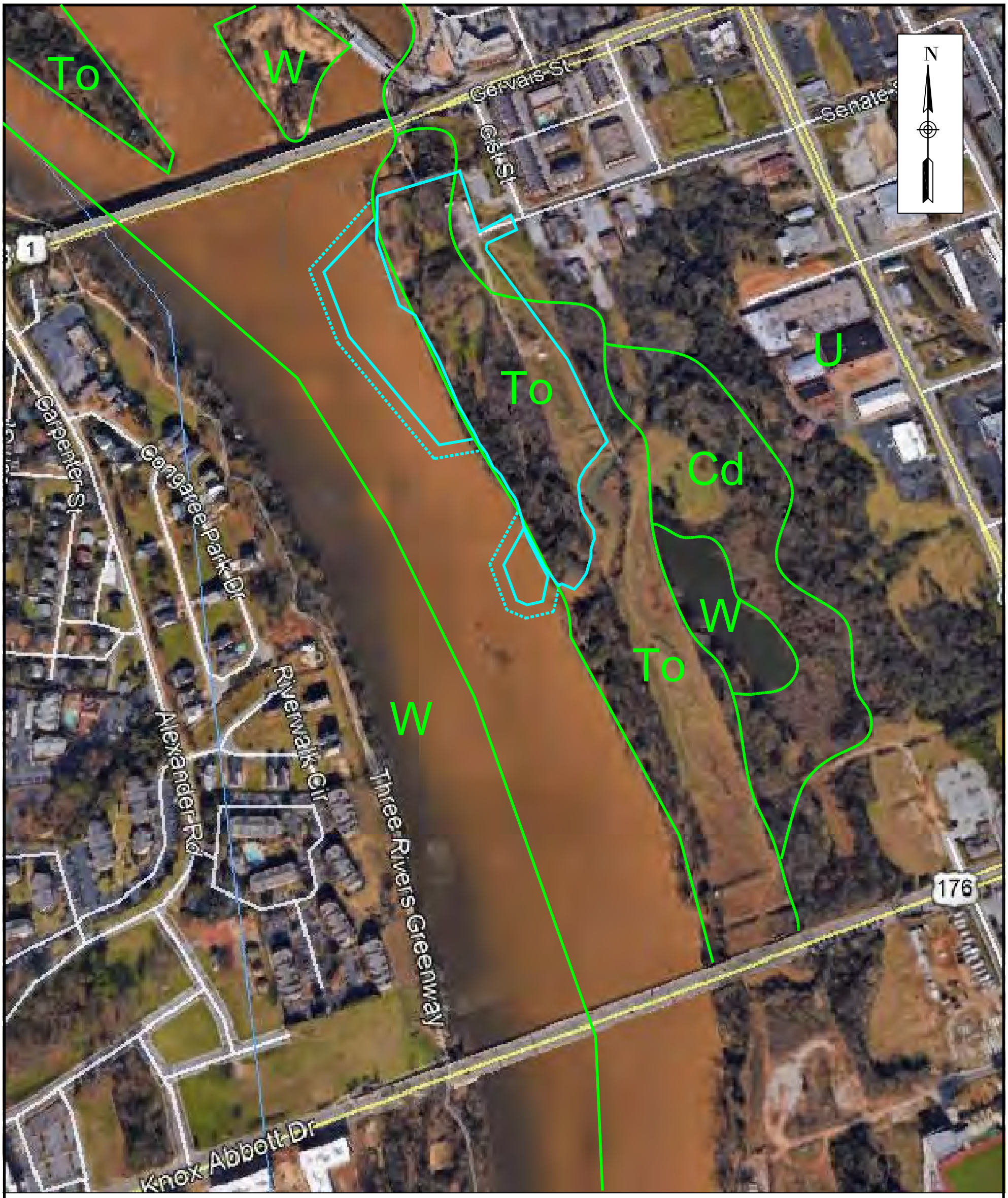
DATE: 3/28/22 FILE NAME: CONG636

APEX COMPANIES, LLC

# STANDARD NOTES

1. If necessary, slopes, which exceed eight (8) vertical feet should be stabilized with synthetic or vegetative mats, in addition to hydroseeding. It may be necessary to install temporary slope drains during construction. Temporary berms may be needed until the slope is brought to grade.
2. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen (14) days after work has ceased, except as stated below.
    a. Where stabilization by the 14th day is precluded by snow or frozen ground conditions stabilization measures must be initiated as soon as practicable.
    b. Where construction activity on a portion of the Site is temporarily ceased, and earth-disturbing activities will be resumed within 14 days, temporary stabilization measures do not have to be initiated on that portion of the Site.
3. All sediment and erosion control devices shall be inspected once every calendar week. If periodic inspections or other information indicated that a BMP has been inappropriately or incorrectly installed, the Permittee must address the necessary replacement or modification required to correct the BMP within 48 hours of identification.
4. Provide silt fence and/or other control devices, as may be required, to control soil erosion during utility construction. All disturbed areas shall be cleaned, graded, and stabilized with grassing immediately after the utility installation. Fill, cover, and temporary seeding at the end of each day are recommended. If water is encountered while trenching, the water should be filtered to remove any sediments before being pumped back into any waters of the State.
5. All erosion control devices shall be properly maintained during all phases of construction until the completion of all construction activities and all disturbed areas have been stabilized. Additional control devices may be required during construction in order to control erosion and/or offsite sedimentation. All temporary control devices shall be removed once construction is complete and the site is stabilized.
6. The contractor must take necessary action to minimize the tracking of mud onto paved roadway(s) from construction areas and the generation of dust. The contractor shall daily remove mud/soil from pavement, as may be required.
7. Temporary diversion berms and/or ditches will be provided as needed during construction to protect work areas from upslope runoff and/or to divert sediment-laden water to appropriate traps or stable outlets.
8. All waters of the State (WoS), including wetlands, are to be flagged or otherwise clearly marked in the field. A double row of silt fence is to be installed in all areas where a 50-foot buffer can't be maintained between the disturbed area and all WoS. A 10-foot buffer should be maintained between the last row of silt fence and all WoS.
9. Litter, construction debris, oils, fuel and building products with significant potential for impact (such as stockpiles of freshly treated lumber) and construction chemicals that could be exposed to storm water must be prevented from becoming a pollutant source in storm water discharges.
10. A copy of the SWPPP, inspection records and rainfall data must be retained at the construction site or nearby location easily accessible during normal business hours, from the date of commencement of construction activities to the date that final stabilization has been reached.
11. Initiate stabilization measures on any exposed steep slope (3H:1V or greater) where land-disturbing activities have permanently or temporarily ceased, and will not resume from a period of 7 calendar days.
12. Minimize soil compaction and, unless infeasible, preserve topsoil.
13. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge.
14. Minimize the discharge of pollutants from dewatering of trenches and excavated areas. These discharges are to be routed through appropriate BMPs (sediment basin, filter bags, etc.).
15. The following discharges from sites are prohibited:
    a. Wastewater from washout of concrete, unless managed by appropriate control;
    b. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
    c. Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance; and
    d. Soaps or solvents used in vehicle and equipment washing.
16. After construction activities begin, inspections must be conducted at a minimum of at least once every calendar week and must be conducted until final stabilization is reached on all areas of the construction site.
17. If existing BMPs need to be modified or if additional BMPs are necessary to comply with the requirements of this permit and/or SC's Water Quality Standards, implementation must be completed before the next storm event whenever practicable. If implementation before the next storm event is impracticable, the situation must be documented in the SWPPP and alternative BMPs must be implemented as soon as reasonably possible.
18. A Pre-Construction Conference must be held for each construction site with an approved On-site SWPPP prior to the implementation of construction activities. For non-linear projects that disturb 10 acres or more, this conference must be held on-site unless the Department (State) has approved otherwise.

FIGURE 9
DOMINION ENERGY SOUTH CAROLINA, INC.
STANDARD NOTES
CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA
DATE: 2/22/21 FILE NAME: CONG571
APEX COMPANIES, LLC




LEGEND

| | |
|---|---|
| | – APPROXIMATE PROJECT LOCATION |
| Cd | – CHASTAIN SILTY CLAY LOAM |
| To | – TOCCOA LOAM |
| U | – URBAN |
| W | – WATER |

NOTES:

1) REFERENCE DRAWING – SOIL MAP, RICHLAND COUNTY SOUTH CAROLINA, CREATED USING WEB SOIL SURVEY NATIONAL COOPERATIVE SOIL SURVEY DATA FROM NATURAL RESOURCES CONSERVATION SERVICE.

2) DRAWING SCALE AND SITE LOCATION OUTLINE ARE APPROXIMATE.

3) THE NORTH EAST AREA OUTSIDE OF THE TOCCOA LOAM IS DESIGNATED AS URBAN LAND.

FIGURE 10
DOMINION ENERGY
SOUTH CAROLINA, LLC.

SOIL TYPE SURVEY

CONGAREE RIVER MRA
COLUMBIA, SOUTH CAROLINA

DATE: 3/31/21 FILE NAME: CONG600

APEX COMPANIES, LLC

# APPENDIX G

# MUSSEL RELOCATION PLAN

**MUSSEL RELOCATION PLAN**

**CONGAREE RIVER SEDIMENTS**
**COLUMBIA, SOUTH CAROLINA**

*Elliptio complanata*

*Elliptio roanokensis*

August 2020

*Prepared for:*

**Dominion Energy South Carolina, Inc.**
400 Otarre Parkway Cayce, SC 29033

*Prepared by:*

**Apex Companies, LLC**
1600 Commerce Circle
Trafford, PA 15085

**MUSSEL RELOCATION PLAN**

**CONGAREE RIVER SEDIMENTS**
**COLUMBIA, SOUTH CAROLINA**

## INTRODUCTION

Dominion Energy South Carolina, Inc. (DESC), formerly South Carolina Electric and Gas Company (SCE&G), plans to complete a Modified Removal Action (MRA) to address the occurrence of a tar-like material (TLM) that is commingled with sediment along the eastern shoreline of the Congaree River, just south of the Gervais Street Bridge in Columbia, South Carolina. The project area location is shown on Figure 1. The TLM is believed to be a coal tar material that originated from the Huger Street former manufactured gas plant (MGP) site, located approximately 1,000 feet to the northeast of the project area. The proposed work is being performed by DESC at the direction of South Carolina Department of Health and Environmental Control (SCDHEC) and is subject to permits and approvals from the U.S. Army Corps of Engineers (USACE) and other agencies.

The overall objective of this project is to remove the impacted sediment from the Congaree River. The current plan is to construct two temporary cofferdams to facilitate removal of the impacted sediment. As currently envisioned, the temporary cofferdams would be constructed in two separate phases over two or three construction seasons. The construction seasons will range from approximately May through October of each year. Figure 2 illustrates the phased approach and the proposed cofferdam locations. After the temporary cofferdam is constructed for each phase, the isolated area will be dewatered and the impacted sediment removed and transported off-site for disposal. Following completion of the impacted sediment removal activities, the cofferdam materials will be completely removed from the river.

## PROJECT AREA PREVIOUS MUSSEL SURVEY RESULTS

In 2006 a reconnaissance survey was conducted by Alderman Environmental Services, Inc. to assess the freshwater mussel populations within Lake Murray and the lower Saluda and upper Congaree Rivers in support of the Saluda Hydroelectric Project (FERC No. 516). The findings of the survey were summarized in the “Reconnaissance Survey of the Freshwater Mussel Fauna of the Lower Saluda and Congaree Rivers, Lake Murray, and Selected Tributaries (Alderman Environmental Services, Inc. 2006). The survey included two locations in the upper Congaree River that were within or directly adjacent to (downstream) the planned project area. Figure 2 shows these locations and Appendix B provides the applicable survey report excerpts taken from the Alderman Report.

The first survey area (Station: 20060711.5) was located in the vicinity of the Senate Street alluvial fan, which is within the planned Area 1 removal area. This location will be impacted by project operations. The second survey area (Station: 20060712.5) was located directly south (downstream) and outside of the planned Area 2 removal activities and is not expected to be impacted by the planned project activities.

Table 1 provides a summary of the live mussels encountered at these two locations and their current global and state NatureServe ranks as listed on the South Carolina Department of Natural Resources (SCDNR) Heritage Trust Program Rare, Threatened and Endangered Species and Communities List (Appendix C). No federal or state threatened, endangered or candidate mussel species were identified

within the Congaree River during completion of the survey. A combined total of five mussel species classified as rare by the SCDNR Heritage Trust Program were identified at the two survey locations that were within or adjacent to the project area. These rare species have no legal protection under the federal or state endangered species laws but are tracked by the SCDNR Heritage Trust Program at the request of the Program's biologists.

A total of 33 live mussels of four different species were observed at the first location (Station: 20060711.5). Of the four species, three (*Elliptio congaraea*, *Elliptio angustata and Elliptio roanokensis*) are considered rare by SCDNR. The most abundant species identified at this location (*Elliptio complananta*) is not on the Heritage Trust list.

A total of 21 live mussels of six different species were observed at the second location (Station: 20060712.5). Five of the six species observed (*Elliptio angustata, Elliptio congaraea, Elliptio icterina, Lampsilis splendida,* and *Elliptio roanokensis*) are designated as rare by SCDNR. Again, the unlisted *Elliptio complananta* was also identified.

## MUSSEL RELOCATION PLAN

As a result of the previous findings from the Alderman survey conducted in 2006, DESC recognizes that no threatened or endangered mussels are likely present within the project area. However, a number of sensitive mussel species are likely located within the cofferdam locations and planned removal areas. In order to complete the project with as minimal of a negative impact to the Congaree River resources as practicable, DESC plans to conduct mussel relocation operations prior to initiating "in-river" construction activities. The mussel relocation activities will include:

- Utilizing qualified personnel to conduct mussel survey activities, finalize project details and complete/supervise the relocation field work;
- Conducting an initial reconnaissance and assessment of the planned project area (the planned footprint of each phase plus a small buffer zone) and immediately downstream;
- Locating a suitable relocation area(s) with acceptable habitat characteristics within the Congaree River as near as possible to the project site;
- Collecting and relocating the mussels identified within the footprint of each phase of the project, to the extent practicable; and
- Providing a summary of completed mussel relocation activities in the Removal Action Report (RAR).

The assessment and relocation activities will be conducted in phases by planned removal area in order to properly time the work with the actual construction windows.

### Consultant Selection

DESC will procure the services of a qualified consultant with proven experience in successfully completing freshwater mussel surveys, habitat assessment and relocation activities. Once selected, this consultant will review project details and finalize the overall plan for mussel relocation.

**Initial Reconnaissance and Assessment of the Project Area**

The selected consultant will conduct an initial assessment of the project area to determine the approximate number, species and other characteristics of the mussels that can be realistically relocated prior to initiation of "in-river" construction activities. This initial assessment will likely be restricted to the area that will be impacted by the upcoming phase of work and will likely be conducted on at least two occasions. The surveyed project area will include the planned cofferdam footprint, the interior removal area and a small buffer on the outboard side of the cofferdam. This buffer will account for small changes in the final cofferdam shape or location and for changes in river currents and hydraulic characteristics that are expected to result from construction of the structure. The assessment will be extended some distance downstream of the phased project areas to account for changes in river hydraulics in these areas while the cofferdam is in place and for potential disturbance during cofferdam construction.

The initial assessments will be conducted during warmer months (generally April or later, prior to cofferdam installation). The information gathered from the assessment will be utilized to determine appropriate relocation areas and other logistical components associated with the collection/relocation phase of the project.

**Determine Suitable Relocation Areas**

Relocation site investigation will also take place during the warmer months. The relocation site(s) will be within the Congaree River and as near to the project area as possible. Selection will be based on a number of criteria, including:

- The presence and abundance of other mussels;
- Specific habitat characteristics such as substrate and adjacent land uses;
- Flow and gradient characteristics; and
- Potential for future threats.

The Alderman survey area (Station: 20060712.5) located directly downstream of the project area contains the same species of mussels found within the project area and may be a suitable relocation point for some or all of the project area mussels. This location would be ideal, if suitable, due to its close proximity to the project area.

Once the initial reconnaissance survey and relocation site identification have been completed, the consultant will prepare a brief report that outlines the results of the initial survey activities and describes the chosen relocation sites. This report will also contain the general plan for collecting and relocating the mussels. Separate reports for each MRA area are anticipated. The reports will be provided to the agencies for review.

**Collect and Relocate Mussels**

As stated above, the mussel relocation efforts will likely be conducted in phases corresponding with each MRA area. As currently envisioned, one of two potential scenarios will be implemented based on project logistical considerations. The first scenario includes conducting the mussel collection and relocation in one mobilization per construction phase following determination of a suitable relocation site. A

combination of wading and diving will be necessary in order to adequately survey the majority of the project area.

The second scenario includes mobilizing the collection and relocation team and removing the mussels from the approximate footprint of the planned cofferdam and the outboard buffer zone (see Figure 2). Again, a combination of wading and diving would be required to cover the area to be impacted by the cofferdam. The relocation team would then demobilize until the cofferdam is constructed and the isolated area is partially dewatered. As dewatering operations lower the water level, the team would remobilize and complete the collection and relocation of the mussels within the isolated area. With this scenario, the partial dewatering will facilitate access to the mussels and potentially increase the effectiveness and overall efficiency of the process. With the water level sufficiently lowered the isolated area could be better surveyed through wading, visibility would most likely be improved in most areas and potentially more mussels will be collected.

Warmer months of the year are preferred for relocation and the mussel relocation expert will determine the appropriate timeframe for completion of these operations based on the specific requirements of the mussels identified in the project area. Spawning and glochidia release timeframes will be avoided.

DESC plans to conduct as complete of a relocation effort as possible. Several factors may limit the potential relocation activities. They include:

- The presence of significant TLM in the substrate surrounding mussel locations may necessitate not disturbing these locations;
- Mussels that are coated with TLM will most likely be left in place because adequate decontamination may not be feasible or will overly stress the animal. Tar coated mussels can not be relocated to new unimpacted areas; and
- Other project related constraints (logistical, safety, etc.) may limit the overall relocation effort.

The mussel relocation expert will conduct and supervise the collection of the mussels from within the specified area. An effort will be made to adequately survey all areas that will be impacted by the project. More than one pass will likely be conducted depending on the expert's recommendations and other project constraints.

The mussels will be gently removed, kept cool and moist and quickly transported to the relocation area. Extreme fluctuations in temperature or other environmental factors will be avoided. Mussels will be correctly placed within the relocation area. The number and species of mussels will be documented.

**Reporting**

The details of the mussel relocation activities will be provided in the Removal Action Report (RAR), which will document the entire sediment removal operations. The documented activities will include:

- Results of the initial project area surveying activities;
- The relocation area characteristics and details from the relocation area decision process;
- Mussel collection, transport and relocation activities; and
- Limiting factors, if any.

Progress reports for each phase of work may also be provided, if requested by the agencies.

**Post Project Completion Activities**

DESC plans on removing all sediment and gravel, small rocks, etc. (both visually impacted with TLM and visually unimpacted material) from the removal areas to the extent practicable. Large rocks that are visually unimpacted may be temporarily relocated within the work area to facilitate sediment removal and then returned to their approximate original locations.

Current plans do not include replacing any removed material with backfill. The impacted sediment will be removed down to the top of the underlying bedrock. In many areas, this will only require removal of several inches of sediment. Following completion of the removal activities, the cofferdam will be removed and over time, the natural depositional processes of the river will restore the river bottom to natural conditions. This process will allow for natural re-deposition of sediment within the removal area based on current river hydraulics. Not replacing the impacted sediment with fill material will also eliminate the potential for backfill materials to be washed downstream and deposited in other areas or degrade other habitats through siltation, etc.

DESC anticipates that the same river hydraulic characteristics that created the current mussel habitat within the project area will naturally recreate similar habitat characteristics given an appropriate amount of time. As a result, mussel repopulation of the project area is expected to occur naturally as the project area substrate is reestablished.

## REFERENCES

Alderman Environmental Services, Inc. 2006. Reconnaissance Survey of the Freshwater Mussel Fauna of the Lower Saluda and Congaree Rivers, Lake Murray, and Selected Tributaries. Alderman Survey Report.

Luzier, C. and S. Miller. 2009. Pacific Northwest Native Freshwater Mussel Workgroup. Freshwater Mussel Relocation Guidelines.

U.S. Fish and Wildlife Services and Virginia Dept. of Game and Inland Fisheries. 2013. Freshwater Mussel Guidelines for Virginia.

## APPENDICES

A Tables and Figures

B Excerpts taken from “Reconnaissance Survey of the Freshwater Mussel Fauna of the Lower Saluda and Congaree Rivers, Lake Murray, and Selected Tributaries (Alderman Environmental Services, Inc. 2006)

C Tracked Rare, Threatened and Endangered Species Communities List

## APPENDIX A

Tables and Figures

**TABLE 1**

**2006 FRESHWATER MUSSEL SURVEY RESULTS FOR PROJECT AREA***

**Congaree River Sediments**
**Columbia, South Carolina**

| Station | Species | Common Name | Number Identified | NatureServe Ranking | |
|---|---|---|---|---|---|
| | | | | Global Rank | State Rank |
| 20060711.5 | *Elliptio complanata* | Common Elliptio | 23 | G5 - Secure | -- |
| | *Elliptio congaraea* | Carolina Slabshell | 1 | G3 - Vulnerable | S3 - Vulnerable |
| | *Elliptio roanokensis* | Roanoke Slabshell | 1 | G3 - Vulnerable | S2 - Imperiled |
| | *Elliptio angustata* | Carolina Lance | 8 | G4 - Apparently Secure | S3 - Vulnerable |
| 20060712.5 | *Elliptio angustata* | Carolina Lance | 2 | G4 - Apparently Secure | S3 - Vulnerable |
| | *Elliptio congaraea* | Carolina Slabshell | 1 | G3 - Vulnerable | S3 - Vulnerable |
| | *Elliptio icterina* | Variable Spike | 1 | G5Q - Secure | S4 - Apparently Secure |
| | *Elliptio complanata* | Common Elliptio | 3 | G5 - Secure | -- |
| | *Lampsilis splendida* | Rayed Pink Fatmucket | 1 | G3 - Vulnerable | S2 - Imperiled |
| | *Elliptio roanokensis* | Roanoke Slabshell | 13 | G3 - Vulnerable | S2 - Imperiled |

**Notes:**

* - Information obtained from Reconnaissance Survey of the Freshwater Mussel Fauna of the Lower Saluda and Congaree Rivers, Lake Murray and Selected Tributaries by John M. Alderman, Alderman Environmental Services, Inc. (October 2006).
- NatureServe Ranks taken from Rare, Threatened and Endangered Species Communities Tracked by the SCDNR Heritage Trust Program (June 11, 2014). Verified on NatureServe website on 8/6/2020.
- No federal or state threatened, endangered or candidate species were identified in the Congaree River during the survey.
- Elliptio complanata is not included on the SCDNR Heritage Trust Program list.
- The "Q" qualifier for Elliptio icterina represents "questionable taxonomy that may reduce conservation priority."

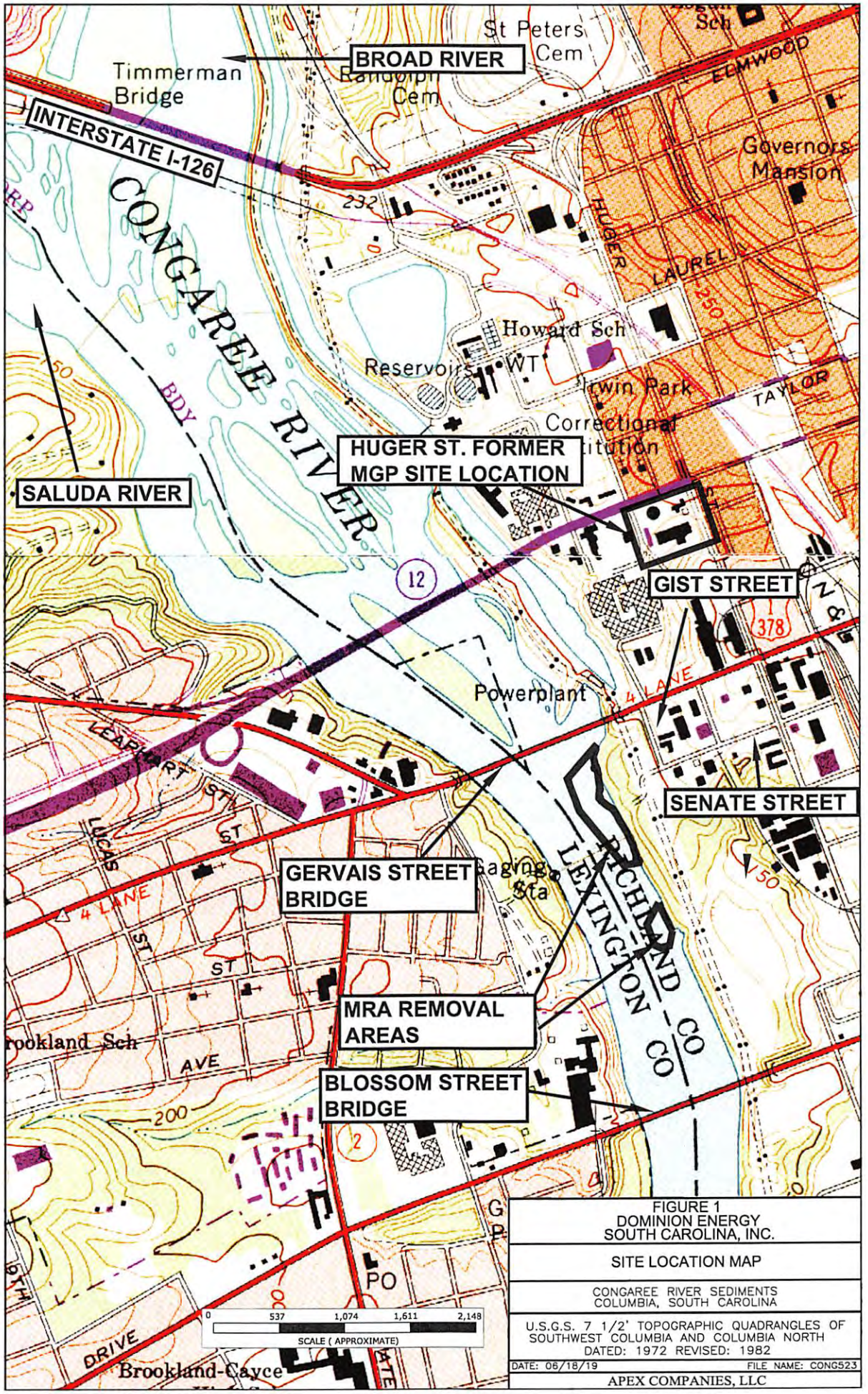



FIGURE 1
DOMINION ENERGY
SOUTH CAROLINA, INC.

SITE LOCATION MAP

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

U.S.G.S. 7 1/2' TOPOGRAPHIC QUADRANGLES OF
SOUTHWEST COLUMBIA AND COLUMBIA NORTH
DATED: 1972 REVISED: 1982

DATE: 06/18/19 FILE NAME: CONG523

APEX COMPANIES, LLC

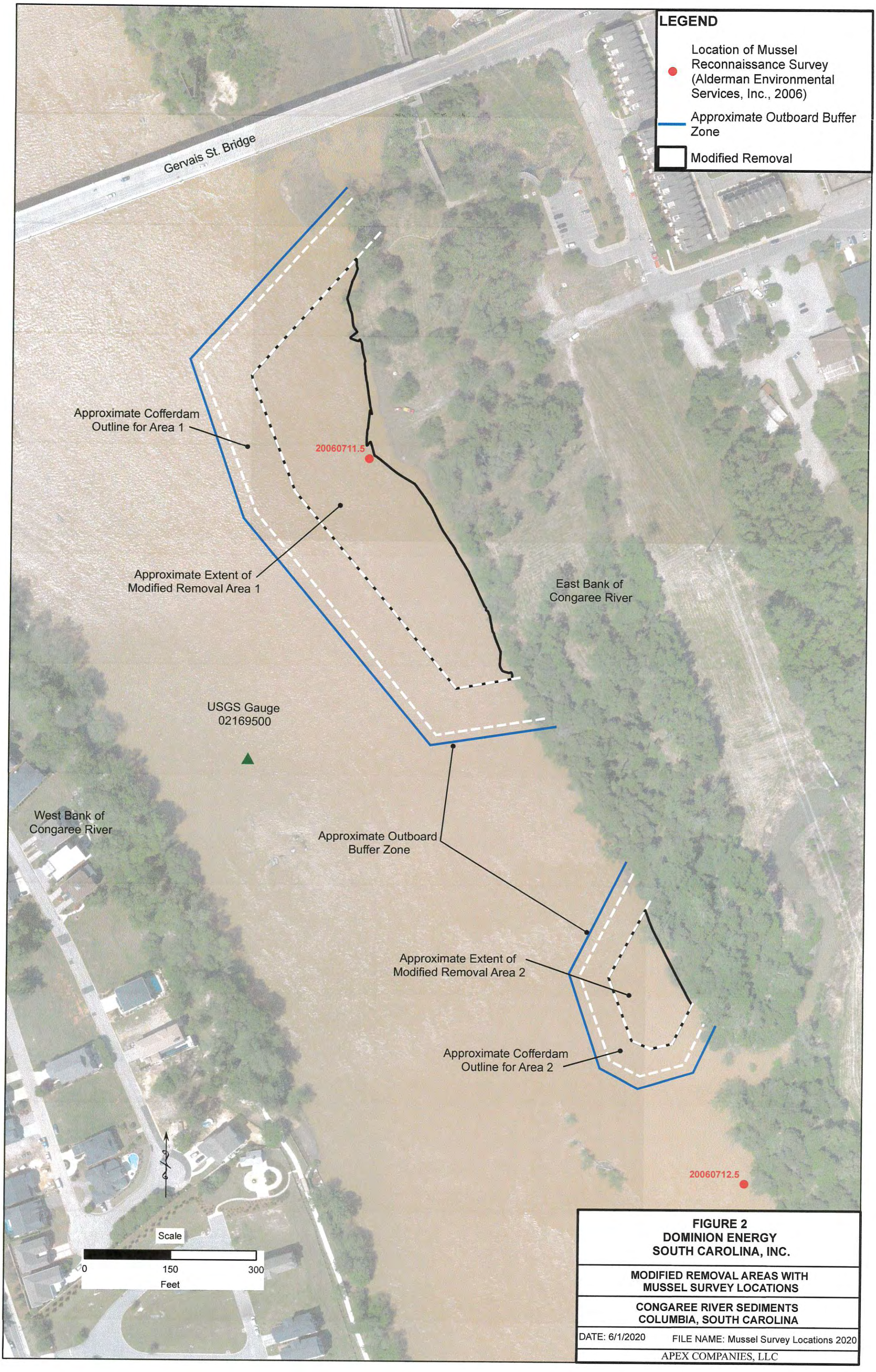



**FIGURE 2**
**DOMINION ENERGY SOUTH CAROLINA, INC.**

**MODIFIED REMOVAL AREAS WITH MUSSEL SURVEY LOCATIONS**

**CONGAREE RIVER SEDIMENTS COLUMBIA, SOUTH CAROLINA**

DATE: 6/1/2020 FILE NAME: Mussel Survey Locations 2020

APEX COMPANIES, LLC

## APPENDIX B

Excerpts taken from “Reconnaissance Survey of the Freshwater Mussel Fauna of the Lower Saluda and Congaree Rivers, Lake Murray, and Selected Tributaries” (Alderman Environmental Services, Inc. 2006)

**Table 3.** Freshwater mussels of the Saluda River (below L. Murray Dam), lower Broad River, and upper Congaree River

| Station | Latitude Longitude | Species | Live, Shells | Substrate* |
|---|---|---|---|---|
| | | | | |
| 20060711.1 Saluda R. | 34.05037 N 81.20573 W | None | | sa,g,Co,Bo |
| 20060711.2 Saluda R. | 34.04843 N 81.19653 W | None | | s,Sa,G,co,bo,b |
| 20060711.3 Saluda R. | 34.02978 N 81.13944 W | None | | s,Sa,G,co,bo |
| 20060711.4 Saluda R. | 34.00969 N 81.07800 W | None | | s,sa,g,co,bo,b |
| 20060712.1 Saluda R. | 34.00639 N 81.06508 W | None | | s,sa,g,co |
| 20060712.2 Broad R. | 34.00714 N 81.06232 W | *Elliptio roanokensis*<br>*Elliptio complanata*<br>*Villosa delumbis*<br>*Elliptio angustata*<br>*Lampsilis cariosa* | 0,2<br>0,5<br>0,1<br>1,1<br>1,0 | s,sa,g,co,bo,b |
| 20060712.3 Saluda R. (Broad R. washout area) | 34.00541 N 81.06282 W | *Elliptio angustata*<br>*Villosa delumbis*<br>*Strophitus undulatus* | 1,2<br>0,2<br>0,1 | s,Sa,g |
| 20060712.4 Congaree R. (Saluda R. side) | 33.98949 N 81.04859 W | *Elliptio complanata* | 1,0 | s,sa,g,co,bo,b |
| 20060711.5 Congaree R. (Broad R. side) | 33.99461 N 81.04913 W | *Elliptio complanata*<br>*Elliptio congaraea*<br>*Elliptio roanokensis*<br>*Villosa delumbis*<br>*Elliptio angustata* | 23,--<br>1,0<br>1,0<br>0,1<br>8,-- | s,sa,g,co,bo |

**Table 3 (continued).** Freshwater mussels of the Saluda River (below L. Murray Dam), lower Broad River, and upper Congaree River

| Station | Latitude Longitude | Species | Live, Shells | Substrate* |
|---|---|---|---|---|
| | | | | |
| 20060712.5 Congaree R. (Broad R. side) | 33.99111 N 81.04692 W | *Elliptio angustata*<br>*Elliptio congaraea*<br>*Elliptio icterina*<br>*Elliptio complanata*<br>*Lampsilis splendida*<br>*Elliptio roanokensis* | 2,0<br>1,0<br>1,0<br>3,0<br>1,0<br>13,0 | s,sa,go,co,bo,b |
| 20060712.6 Congaree R. (Saluda R. side) | 33.97967 N 81.04757 W | *Elliptio roanokensis*<br>*Elliptio angustata* | 2,0<br>1,0 | s,Sa,G,co,bo |
| 20060712.7 Congaree R. (Borad R. side) | 33.98031 N 81.04546 W | *Elliptio complanata*<br>*Elliptio congaraea*<br>*Strophitus undulatus*<br>*Elliptio roanokensis*<br>*Elliptio angustata*<br>*Lampsilis splendida*<br>*Lampsilis cariosa*<br>*Villosa delumbis* | 5,0<br>2,0<br>1,0<br>19,0<br>9,0<br>1,0<br>2,0<br>0,1 | S,Sa,G,co,bo |
| 20060712.8 Congaree R. (Saluda R. side) | 33.96535 N 81.03777 W | None | -- | s,sa,g |
| 20060804.1 Saluda R. | 34.02287 N 81.10009 W | None | -- | s,sa,g,co,bo,B |
| 20060804.2 Saluda R. | 34.01835 N 81.09807 W | None | -- | s,sa,g,co,bo,b |
| 20060804.3 Rawls Cr. | 34.07949 N 81.20251 W | None | -- | c,s,sa,g,co,bo,b |
| 20060804.4 12 Mile Cr. | 34.03275 N 81.16173 W | None | -- | s,sa,g,co,bo |

* s-silt, sa- sand, c-clay, co-cobble, b-bedrock, bo-boulder, g-gravel, r-roots, v-vegetation, d-detritus, m-mud

**PROJECT: Reconnaissance Survey of the Freshwater Mussel Fauna of the Lower Saluda and Congaree River, Lake Murray, and Selected Tributaries**

**STATION: 20060711.5jma**

**BIOLOGISTS**: **John M. Alderman**
**Joseph D. Alderman**
**Jennifer M. Summerlin**

**U.S. FISH AND WILDLIFE SERVICE ES PERMIT**: **TE065756-0**

**S.C. DEPARTMENT OF NATURAL RESOURCES AUTHORIZATION: November 25, 2002**

**LOCATION:** Congaree River, Lexington/Richland county line, South Carolina; 33.99461 N, 81.04913 W; **see Figure 4**

**SURVEY DATE:** July 11, 2006

**SITE COMMENTS:** -

**HABITAT:**

| | |
|---|---|
| WATERBODY TYPE: | River |
| FLOW: | Run, slack, pool |
| RELATIVE DEPTH: | Very shallow |
| DEPTH (%<2 FEET): | 90 |
| SUBSTRATE: | Silt, sand, gravel, cobble, boulder |
| COMPACTNESS: | Compact and normal |
| SAND/GRAVEL BARS: | Present |
| WOODY DEBRIS: | Low |
| BEAVER ACTIVITY: | None |
| WINDTHROW: | Low |
| TEMPORARY POOLS: | None |
| CHANNEL WIDTH: | 300+ meters |
| BANK HEIGHT: | Varies |

**HABITAT (cont.):**

| | |
|---|---|
| BANK STABILITY: | Very stable |
| BUFFER WIDTH: | Narrow to moderate |
| RIPARIAN VEGETATION: | Wooded, shrub-brush, grass |
| LAND USE: | Urban |
| PERCENT COVER: | 0 |
| WOODLAND EXTENT: | Not extensive |
| NATURAL LEVEES: | - |
| VISIBILITY: | Slightly turbid |
| WATER LEVEL: | Low |
| WEATHER: | Sun-Cloud, hot |

**TECHNIQUES AND SURVEY TIME:**

| | |
|---|---|
| TECHNIQUES: | Visual |
| SURVEY TIME: | 0.5 person-hours |

**FRESHWATER MUSSELS:**

*Elliptio roanokensis* – 1 live (93 mm)
*Elliptio complanata* – 23 live (78, 74, 71, 53, 66, 76, 60, 58, 63, 56, 55, 61, 62, 53, 55, 59, 58, 56, 58, 62, 48, 50, 36 mm)
*Elliptio congaraea* – 1 live (55 mm)
*Elliptio angustata* – 8 live (80, 69, 58, 67, 67, 58, 57, 58 mm)
*Villosa delumbis* – 1 old shell

**OTHER DOCUMENTED TAXA:**

*Elimia catenaria* - common
*Corbicula fluminea*

**PROJECT: Reconnaissance Survey of the Freshwater Mussel Fauna of the Lower Saluda and Congaree River, Lake Murray, and Selected Tributaries**

**STATION: 20060712.5jma**

**BIOLOGISTS**: **John M. Alderman**
**Jeffrey West**
**Joseph D. Alderman**
**Christopher S. Boring**
**Jennifer M. Summerlin**

**U.S. FISH AND WILDLIFE SERVICE ES PERMIT**: **TE065756-0**

**S.C. DEPARTMENT OF NATURAL RESOURCES AUTHORIZATION: November 25, 2002**

**LOCATION:** Congaree River, Lexington/Richland county line, South Carolina; 33.99111 N, 81.04692 W; **see Figure 4**

**SURVEY DATE:** July 12, 2006

**SITE COMMENTS:** Broad River side of Congaree River

**HABITAT:**

| | |
|---|---|
| WATERBODY TYPE: | River |
| FLOW: | Run, slack |
| RELATIVE DEPTH: | Very shallow |
| DEPTH (%<2 FEET): | 75 |
| SUBSTRATE: | Silt, sand, gravel, cobble, boulder, bedrock |
| COMPACTNESS: | Normal |
| SAND/GRAVEL BARS: | Present |
| WOODY DEBRIS: | Low |
| BEAVER ACTIVITY: | Evidence (gnawed sticks) |
| WINDTHROW: | Low |
| TEMPORARY POOLS: | - |
| CHANNEL WIDTH: | 300+ meters |
| BANK HEIGHT: | 2.5+ meters |

**HABITAT (cont.):**

| | |
|---|---|
| BANK STABILITY: | Very stable |
| BUFFER WIDTH: | Moderate to wide |
| RIPARIAN VEGETATION: | Wooded, shrub-brush |
| LAND USE: | Urban |
| PERCENT COVER: | 1 |
| WOODLAND EXTENT: | Intermediate |
| NATURAL LEVEES: | - |
| VISIBILITY: | Slightly turbid |
| WATER LEVEL: | Low |
| WEATHER: | Sun-Cloud, hot |

**TECHNIQUES AND SURVEY TIME:**

| | |
|---|---|
| TECHNIQUES: | Visual |
| SURVEY TIME: | 0.83 person-hours |

**FRESHWATER MUSSELS:**

*Elliptio roanokensis* – 13 live (100, 111, 89, 91, 95, 108, 105, 95, 102, 107, 110, 89, 91 mm)
*Elliptio complanata* –3 live (93, 78, 73 mm)
*Elliptio congaraea* – 1 live (61 mm)
*Elliptio angustata* –2 live (63, 66 mm)
*Elliptio icterina* – 1 live (72 mm)
*Lampsilis splendida* – 1 live male (67 mm)
*Villosa delumbis* – 1 old shell

**OTHER DOCUMENTED TAXA:**

*Elimia catenaria* - common
*Corbicula fluminea*

**APPENDIX C**

Tracked Rare, Threatened and Endangered Species Communities List

# Rare, Threatened and Endangered Species and Communities Tracked by the SC DNR Heritage Trust Program

**June 11, 2014**

| Scientific Name | Common Name | USESA Status | State Protection | GRank | SRank |
|---|---|---|---|---|---|
| *Procambarus enoplosternum* | | | | G4G5 | SNR |
| *Procambarus hirsutus* | a Crayfish | | | G4 | S4 |
| *Procambarus lepidodactylus* | Pee Dee Lotic Crayfish | | | G4 | S4 |
| *Procambarus lunzi* | a Crayfish | | | G4 | S2S3 |
| *Procambarus pearsei* | Sandhills Crayfish | | | G4 | S3 |
| *Procambarus pubescens* | a Crayfish | | | G4G5 | S3? |
| Insects | | | | | |
| *Agarodes griseus* | a Caddisfly | | | G5 | SNR |
| *Amblyscirtes reversa* | Reversed Roadside Skipper | | | G3G4 | SNR |
| *Atrytone arogos* | Arogos Skipper | | | G3 | SNR |
| *Autochton cellus* | Golden-banded Skipper | | | G4 | S2S4 |
| *Cicindela dorsalis media* | White Tiger Beetle | | | G3G4T3T4 | S3S4 |
| *Dolania americana* | American Sand Burrowing Mayfly | | | G4 | S3 |
| *Macromia margarita* | Margaret's River Cruiser | | | G3 | SNR |
| *Megaleuctra williamsae* | Smokies Needlefly | | | G2 | SNR |
| *Polycentropus carlsoni* | Carlson's Polycentropus Caddisfly | | | G2G3 | S1S3 |
| *Protoptila morettii* | Moretti's Caddisfly | | | G1G2 | SNR |
| *Pseudogoera singularis* | | | | G2G3 | SNR |
| *Psilotreta frontalis* | | | | G5 | SNR |
| *Somatochlora calverti* | Calvert's Emerald | | | G3 | SNR |
| *Speyeria diana* | Diana Fritillary | | | G3G4 | S3? |
| *Stylurus townesi* | Townes' Clubtail | | | G3 | S1S3 |
| *Wormaldia thyria* | | | | G3 | SNR |
| Spiders | | | | | |
| *Sphodros coylei* | Coyle's Purseweb Spider | | | G4? | SNR |
| Mollusks | | | | | |
| *Alasmidonta undulata* | Triangle Floater | | | G4 | S1 |
| *Alasmidonta varicosa* | Brook Floater | | | G3 | SNR |
| *Anodonta couperiana* | Barrel Floater | | | G4 | S1 |
| *Elimia catenaria* | Gravel Elimia | | | G4 | SNR |
| *Elliptio "angustata-producta"* complex | Carolina Lance-Atlantic Spike complex | | | G3 | S3 |
| *Elliptio angustata* | Carolina Lance | | | G4 | S3 |
| *Elliptio congaraea* | Carolina Slabshell | | | G3 | S3 |

# Rare, Threatened and Endangered Species and Communities Tracked by the SC DNR Heritage Trust Program

**June 11, 2014**

| Scientific Name | Common Name | USESA Status | State Protection | GRank | SRank |
|---|---|---|---|---|---|
| *Elliptio fisheriana* | Northern Lance | | | G4 | SNR |
| *Elliptio folliculata* | Pod Lance | | | G2G3Q | S2S3 |
| *Elliptio fraterna* | Brother Spike | | SE-Endangered | G1G2 | S1 |
| *Elliptio icterina* | Variable Spike | | | G5Q | S4 |
| *Elliptio producta* | Atlantic Spike | | | G3Q | S3 |
| *Elliptio roanokensis* | Roanoke Slabshell | | | G3 | S2 |
| *Elliptio waccamawensis* | Waccamaw Spike | | | G2G3Q | S1 |
| *Fusconaia masoni* | Atlantic Pigtoe | | SE-Endangered | G2 | SH |
| *Gillia altilis* | Buffalo Pebblesnail | | | G5 | S1 |
| *Lampsilis cariosa* | Yellow Lampmussel | | | G3G4 | S2 |
| *Lampsilis radiata* | Eastern Lampmussel | | | G5 | S2 |
| *Lampsilis splendida* | Rayed Pink Fatmucket | | | G3 | S2 |
| *Lasmigona decorata* | Carolina Heelsplitter | LE: Endangered | SE: Endangered | G1 | S1 |
| *Leptodea ochracea* | Tidewater Mucket | | | G3G4 | S2 |
| *Ligumia nasuta* | Eastern Pondmussel | | | G4 | S2 |
| *Lioplax subcarinata* | Ridged Lioplax | | | G4G5 | S1 |
| *Pyganodon cataracta* | Eastern Floater | | | G5 | SNR |
| *Somatogyrus virginicus* | Panhandle Pebblesnail | | | G2G3 | SNR |
| *Strophitus undulatus* | Creeper | | | G5 | S2 |
| *Toxolasma pullus* | Savannah Lilliput | | | G2 | S1 |
| *Uniomerus caroliniana* | Florida Pondhorn | | | G4 | S3 |
| *Utterbackia imbecillis* | Paper Pondshell | | | G5 | SNR |
| *Villosa constricta* | Notched Rainbow | | | G3 | S1 |
| *Villosa delumbis* | Eastern Creekshell | | | G4 | S4 |
| *Villosa vaughaniana* | Carolina Creekshell | | | G2 | S1 |
| *Villosa vibex* | Southern Rainbow | | | G5Q | S2 |
| **Animal Assemblage** | | | | | |
| Waterbird Colony | | | | GNR | SNR |
| **Vascular Plants** | | | | | |
| Dicots | | | | | |
| *Acer pensylvanicum* | Striped Maple | | | G5 | S2 |
| *Aconitum uncinatum* | Blue Monkshood | | | G4 | S2 |
| *Aesculus parviflora* | Small-flowered Buckeye | | | G3 | S1 |
| *Agalinis aphylla* | Coastal Plain False-foxglove | | | G3G4 | S1 |

# APPENDIX H

# WATER MANAGEMENT PLAN

# WATER MANAGEMENT PLAN

# CONGAREE RIVER MODIFIED REMOVAL ACTION
# COLUMBIA, SOUTH CAROLINA

September 2020

*Prepared for:*

**Dominion Energy South Carolina, Inc.**
400 Otarre Parkway
Cayce, SC 29033

*Prepared by:*

**Apex Companies, LLC**
1600 Commerce Circle
Trafford, PA 15085

**WATER MANAGEMENT PLAN**

**CONGAREE RIVER MODIFIED REMOVAL ACTION**
**COLUMBIA, SOUTH CAROLINA**

## INTRODUCTION

Dominion Energy South Carolina, Inc. (DESC), formerly South Carolina Electric and Gas Company (SCE&G), plans to complete a Modified Removal Action (MRA) to address the occurrence of a tar-like material (TLM) that is commingled with sediment along the eastern shoreline of the Congaree River, just south of the Gervais Street Bridge in Columbia, South Carolina. The project area location is shown on Figure 1. The TLM is believed to be a coal tar material that originated from the Huger Street former manufactured gas plant (MGP) site, located approximately 1,000 feet to the northeast of the project area. The proposed work is being performed by DESC at the direction of South Carolina Department of Health and Environmental Control (SCDHEC) and is subject to permits and approvals from the U.S. Army Corps of Engineers (USACE) and other agencies.

The overall objective of this project is to remove impacted sediment from the Congaree River within two areas. The current plan is to construct temporary cofferdams around each area to facilitate removal of the impacted sediment. As currently envisioned, the temporary cofferdams will be constructed sequentially and the MRA will occur over several years. The construction and active remediation season will occur from approximately May through October of each year. Figure 2 illustrates the current site operations plan scenario and the landside support zone components. After each cofferdam is constructed, the isolated area will be dewatered, and the impacted sediment removed and transported off-site for disposal. Following completion of the removal activities in Area 1, the cofferdam will be removed, and a cofferdam will be constructed around Area 2. After the removal activities are completed in Area 2, the cofferdam materials will be removed from the river.

## WATER MANAGEMENT

Management of water will be a major component of the overall remediation project. This Water Management Plan provides details on the anticipated procedures to be implemented during remediation activities. For implementation purposes, water to be managed has been divided into two categories: non-contact water and contact water. Non-contact water is visually unimpacted water that has not been in contact with TLM or impacted sediments. It includes water from initial dewatering or overtopping events, cofferdam leakage, landside stormwater run-on, and non-contact removal area water including precipitation within the cofferdams. Contact water has been in contact with TLM or impacted sediments or appears to be visually impacted (e.g., contains large amounts of suspended solids, exhibits a sheen, or has TLM particles suspended within the water column). The area of origin of the water will be a primary consideration in determining which mode of water management will be used, along with a visual evaluation by site personnel.

Figure 3 presents a typical water management scenario for the routine handing of non-contact leakage water from the cofferdam and contact water from within the removal area (either at active work areas or other areas where visual impacts are observed). Other non-contact water will be either diverted to or managed similar to the cofferdam leakage water system. Figure 4 presents conceptual leakage control

details and typical outlet structure details. The outlet structure will be located at the downriver end of each cofferdam and used to lower the water surface inside the cofferdam to the river level during initial dewatering or following overtopping events. The following sections provide additional information on the planned water management activities.

**Non-Contact Water From Initial Dewatering**

Initial removal area water will be the river water left inside the isolated area following completion of the cofferdam construction. This water may also be left behind following an overtopping event, where the river levels temporarily exceed the height of the cofferdam and result in a flood of the previously dewatered area. This water will be considered "non-contact" as it will not have been in direct contact with impacted sediment and will be visually unimpacted. Currently two methods are planned for removing the initial water from the removal areas. These include the use of an outlet structure and/or pumps. The outlet structure will consist of a pipe installed as part of the cofferdam that will permit gravity flow of river water from inside the cofferdam to the outside river, while preventing backflow into the dewatered area with a check valve. The outlet structure will be located on the downstream end of the cofferdam.

The outlet structure will be the primary method for dewatering if initial water levels are elevated and following overtopping events. It will be supplemented with pumps stationed on the cofferdam or the adjacent riverbank that will be utilized to further dewater the area and permit access to the sediment. These pumps will also be used to remove the additional few feet of water located below the outlet structure intake but above the water column that is in contact with the impacted sediment. Project personnel will visually monitor the initial removal area water prior to and during discharge activities to ensure that it is free of sheens or excess turbidity. Downstream real-time total suspended solids (TSS) monitoring will be conducted during completion of riverside construction activities to ensure that the project does not contribute to elevated TSS levels within the river.

The time required for initial dewatering or dewatering following overtopping events will be a function of the river level outside the cofferdam and the pumping rate from inside the cofferdam to the river. For reference, at a river elevation of 116 feet (NGVD 29) and pumping rate of 1,000 gallons per minute (gpm), Areas 1 and 2 would require approximately 67 hours and 24 hours, respectively.

**Non-Contact Leakage Water**

Leakage or seepage water will result from the anticipated continuous movement of river water from outside of the cofferdam into the dewatered area. Water is expected to constantly move through and under the constructed cofferdam. Cofferdam leakage was previously estimated for a non-reinforced cofferdam (RIZZO, March 2013) at 0.37 to 1.42 gpm per foot (best estimate to upper bound estimate). For Area 1, this equates to approximately 450 gpm to an upper bound of 1,725 gpm. For Area 2, this equates to approximately 200 gpm to an upper bound of 785 gpm.

The leakage water is expected to be similar to the initial dewatering water in that it will be considered "non-contact" as it will not have been in direct contact with impacted sediment and will be visually unimpacted and sediment free. In order to collect the seepage water, a concrete berm, sandbag dike or other structure will be constructed roughly parallel to the interior toe of the cofferdam slope, as shown on Figure 3. This berm (detail provided on Figure 4) will be located in an unimpacted or previously excavated area and will be used to direct the leakage water to collection points where it will be pumped back over the structure. Management of the leakage water will likely be an around-the-clock activity and

redundant pumps will likely be present to provide a safeguard against mechanical failures or routine maintenance. The leakage water collection points will be visually monitored by project personnel for evidence of impacts such as sheens or the presence of sediment. If impacts are observed in the leakage water, changes will be made to eliminate the cause of the impacts.

The number of leakage water collection points will be based on the volume of water to be managed, sediment removal operations, and the overall topography of the dewatered removal area. The final design of the leakage water collection system will be determined by remediation personnel and will depend on field conditions, bedrock elevations and topography, etc.

**Non-Contact Landside Stormwater Run-On**

The project area includes the planned construction of the landside support zone as well as activities within the river. Since the landside support zone is currently undeveloped and vegetated, no stormwater inlets or conveyances are currently present and no increase in stormwater discharges to the municipal storm sewer from current conditions are anticipated during completion of the landside construction and operation activities. Figure 2 provides the currently anticipated landside support zone scenario. The major components will be placed and constructed in such a manner as to minimize clearing and grading activities. The primary planned location for the majority of site operations is the power line right-of-way, which has already been cleared of large vegetation. DESC has relocated the overhead wires from within the right-of-way to accommodate the landside operations. This scenario will reduce disturbance of currently forested land and further preserve the riparian corridor.

The stormwater associated with the landside operations will include precipitation and runoff from non-impacted areas. This stormwater will be controlled to prevent erosion and potential run-on of landside stormwater into the removal areas will be diverted and minimized to the extent practical. As currently planned, impacted sediment conditioning will be conducted within a temporary structure, which will minimize the potential for stormwater to contact the impacted sediment. Contact water generated at the landside operations, including stormwater if necessary, will be transferred to the water management system.

Newly cleared and graded areas such as site roads and material storage and lay down areas will be stabilized by the addition of geotextile material and gravel. Some minimal grading in the form of drainage swales, berms or other measures may be employed to direct stormwater runoff from the landside area away from the removal areas. Specific details pertaining to the management of stormwater and the planned erosion and sediment control measures will be addressed in the Comprehensive Stormwater Pollution Prevention Plan (C-SWPPP) to be submitted to the City of Columbia as part of the Notice of Intent for coverage under the South Carolina National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Construction Activities. Landside stormwater management activities will be conducted in accordance with the NPDES Permit and C-SWPPP. A draft Stormwater Management and Sediment Control Plan, which is a component of the C-SWPPP and provides the planned stormwater management and erosion and sediment control measures, is included with the Joint application submittal as Attachment K.

To minimize run-on into the removal areas, stormwater runoff from the landside operations area will be diverted toward surface areas with higher infiltration capacities to the extent practical. Diversion features (e.g., berms, sandbags, etc.) will be utilized to control flows as necessary. A conservative estimate of

potential run-on into the removal areas has been developed for planning purposes. Run-on resulting from an annual design storm event is estimated at approximately 241,000 gallons for Area 1 and 97,000 gallons for Area 2. These volumes are expected to be mitigated through diversion and infiltration measures, although the pumping capacities available within the removal areas to handle non-contact water management will be sufficient, if needed.

**Non-Contact Removal Area Water**

After initial dewatering, non-contact water within the removal areas is expected to be present in addition to cofferdam leakage and potential landside run-on. This water primarily includes residual water and potential upflow following initial dewatering and accumulations from precipitation events. Diversion features within the removal areas (berms, sandbags, etc.) will be utilized as needed to segregate non-contact water from contact water. This water will be collected and pumped to the river, either in conjunction with or in a manner similar to the leakage water expected along the inboard cofferdam toe.

The water will be visually monitored at collection points by project personnel for evidence of impacts such as sheens or the presence of sediment. If impacts are observed, changes will be made to eliminate the cause of the impacts. Other than residual amounts remaining after initial dewatering of the area, the majority of this non-contact water within the cofferdams is expected to accumulate from precipitation events. For planning purposes, the volume of precipitation resulting from an annual design storm event is estimated at approximately 186,000 gallons for Area 1 and 45,000 gallons for Area 2. The pumping capacities available to handle non-contact water will be sufficient to manage precipitation within the removal areas.

**Contact Water**

The onsite water management system will be used to contain, filter and discharge contact water. Contact water is expected to include:

- Entrained water that seeps from the sediment once it is excavated or disturbed in active removal areas;
- Precipitation that contacts the exposed impacted sediment; and
- Residual water following dewatering and accumulations from precipitation events within areas that exhibit impacts prior to impacted sediment removal.

Contact water will be collected and pumped to the water management system located in the landside support zone where it will be managed for disposal via discharge to the City of Columbia publicly owned treatment works (POTW) under an approved industrial wastewater discharge permit. A similar permit was obtained for the previously completed Huger Street MGP removal action and DESC is familiar with the City of Columbia permit and discharge requirements. The planned discharge location is a sanitary sewer manhole located near the eastern perimeter of the landside support zone shown on Figure 3. In some instances, as a contingency measure, the contact water may be transferred to tanker trucks and disposed of off-site at an approved treatment and disposal facility.

Following receipt of the POTW approval, the water will be managed and discharged in accordance with the permit requirements. The water management system's primary role is to collect and filter (i.e., remove solids from) the water that comes into contact with the impacted sediment. It will be sized

accordingly to minimize the potential for excavation downtime due to dewatering requirements. The system will be operated as required to maintain an acceptable discharge rate to the City of Columbia POTW sewer system. The components of the water management system will most likely consist of water storage tanks (e.g., 20,000 gallon frac tanks and/or larger volume modular tanks), filtration equipment such as bag filters and/or activated carbon vessels, associated piping and hoses and a totalizing flow meter. The storage tanks will provide flow equalization and provide residence time to allow for settling of solids. The final design for the water management system will be submitted to the City of Columbia for review as part of the industrial discharge permit request. For illustrative purposes, the general water storage tank and filtration/discharge scenario is provided on Figure 3. The total gallons discharged from the site will be tracked and sampling and analysis of the discharge water will be conducted as required by the POTW permit.

Excavation operations will likely begin at the highest point within the dewatered area and progress toward the lower lying areas. Water that has contacted impacted material will be directed to the lower lying unexcavated areas and pumped to the on-site water management system located in the landside support zone. Current excavation plans include temporarily staging extremely wet sediment within the confines of the open excavation and allowing the entrained water to drain out and collect in a low area where it will be pumped to the water management system. This technique will reduce the amount of material conditioning required to transport the impacted sediment to the disposal facility and the amount of water released from the sediment once it is transported to the landside support zone. Any contact water collected on the landside will also be transferred to the water management system.

The volume of contact water to be pumped and subsequently managed will be minimized to the extent possible by limiting the amount of open excavation area available for contact with precipitation, by proactively controlling leakage water, and by directing landside stormwater runoff away from open excavation areas.

**ATTACHMENT A**

**FIGURES**

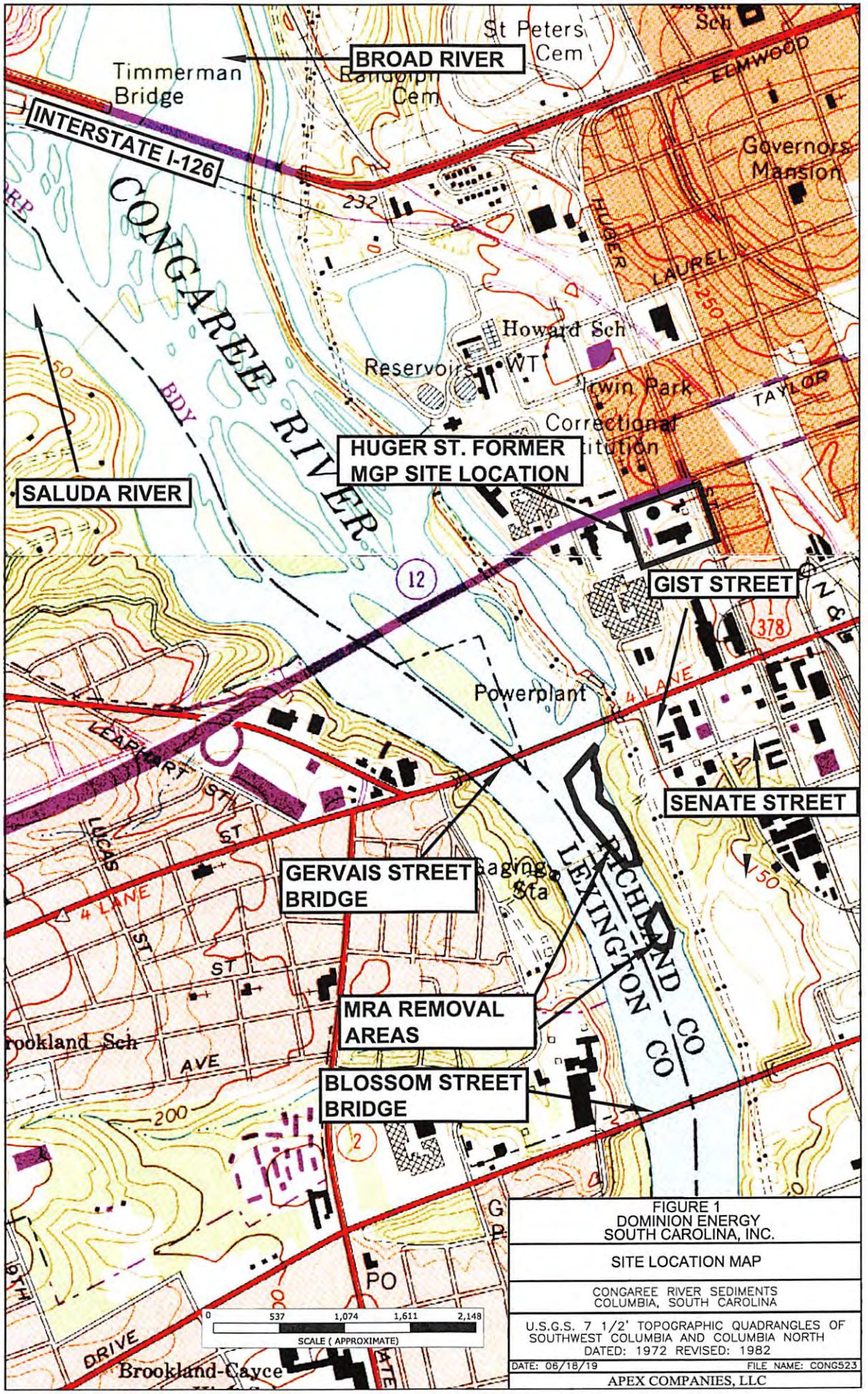



FIGURE 1
DOMINION ENERGY
SOUTH CAROLINA, INC.

SITE LOCATION MAP

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

U.S.G.S. 7 1/2' TOPOGRAPHIC QUADRANGLES OF
SOUTHWEST COLUMBIA AND COLUMBIA NORTH
DATED: 1972 REVISED: 1982

DATE: 06/18/19 FILE NAME: CONG523

APEX COMPANIES, LLC

LEGEND

– STREAM/RIVER/WETLAND EDGE
– TREELINE
– 5 FOOT CONTOUR INTERVALS
– REMOVAL AREAS FROM STAKEHOLDER DEVELOPED MRA PLAN
– SITE PERIMETER FENCE
– APPROXIMATE EXTENT OF GRAVEL AREAS
– APPROXIMATE LEASE AREA

NOTES:
1) LAND TOPOGRAPHY BASED ON LIDAR SURVEY CONDUCTED ON APRIL 18, 2018.
2) CONGAREE RIVER GAGE (02169500) HEIGHT DURING LIDAR SURVEY WAS 6.18' (119.20' ELEVATION NGVD 29).
3) RIVER BOTTOM CONTOURS BASED ON BATHYMETRIC SURVEYS CONDUCTED MAY 7 THRU JULY 17, 2018.

0' 180' 360'

N

GERVAIS STREET BRIDGE
GIST STREET
SENATE STREET
JOB TRAILERS
OFFICE AREA
SITE ACCESS ROAD
GATE
SITE ACCESS ROAD
TEMPORARY STRUCTURE MATERIAL HANDLING AND STORAGE
POTENTIAL FILTERED WATER DISCHARGE POINT
ADDITIONAL OFFICE/STORAGE TRAILERS
AREA 1
SITE ACCESS ROAD
PRIMARY SETTLING
ADDITIONAL SETTLING/STORAGE TANKS
CONTACT WATER TRANSFER LINE
FILTRATION UNITS
DISCHARGE TANKS
SITE ACCESS ROAD
SITE ACCESS ROAD
CONGAREE RIVER
AREA 2

FIGURE 2
DOMINION ENERGY
SOUTH CAROLINA, INC.

CONCEPTUAL SITE OPERATIONS PLAN

COLUMBIA, SOUTH CAROLINA

DATE: 5/19/20 FILE NAME: CONG545

APEX COMPANIES, LLC

LEGEND

– GRAVEL AREA

– CONTACT WATER MANAGEMENT COMPONENT

– LEAKAGE WATER MANAGEMENT COMPONENT

NOTES:

1) ACTUAL LOCATIONS OF COLLECTION AND DISCHARGE POINTS WILL BE DETERMINED IN THE FIELD DURING IMPLEMENTATION.
2) SEDIMENT WILL BE REMOVED FROM THE LEAKAGE CONTROL DRAINAGE AND COLLECTION AREAS PRIOR TO CONSTRUCTION OF THE CURB.
3) LEAKAGE CONTROL WATER WILL BE VISUALLY INSPECTED PRIOR TO DISCHARGE.
4) IMPACTED WATER WILL BE TRANSFERRED TO WATER MANAGEMENT SYSTEM PRIOR TO DISCHARGE TO THE SANITARY SEWER SYSTEM.
5) OUTLET STRUCTURE WILL BE UTILIZED FOR INITIAL DISCHARGE OF WATER FOLLOWING COFFERDAM CONSTRUCTION OR OVERTOPPING EVENT.

N

JOB TRAILERS

OFFICE AREA

SENATE STREET

GATE

SITE ACCESS ROAD

SITE ACCESS ROAD

ACTIVE EXCAVATION AREA

COFFERDAM

EXCAVATED MATERIAL

TRUCK LOADING AREA

EDGE OF EXCAVATION

POTENTIAL TREATED WATER DISCHARGE POINT

CONTACT WATER FLOW

CONTACT WATER COLLECTION POINT

LEAKAGE RETURN DISCHARGE POINT

LEAKAGE CONTROL PUMP

LEAKAGE CONTROL COLLECTION POINT

CONTACT WATER PUMP

TEMPORARY SPRUNG STRUCTURE MATERIAL HANDLING AND STORAGE

CONTACT WATER TRANSFER LINE

CONTACT WATER PUMP

CONTACT WATER COLLECTION POINT

LEAKAGE CONTROL PUMP

LEAKAGE CONTROL COLLECTION POINT

CONTACT WATER TRANSFER LINE

LEAKAGE RETURN DISCHARGE POINT

SITE ACCESS ROAD

ADDITIONAL SETTLING/STORAGE TANKS

FILTRATION UNITS

PRIMARY SETTLING TANK

ADDITIONAL OFFICE/STORAGE TRAILERS

DISCHARGE TANKS

0' 100' 200' 300'

AREA 1

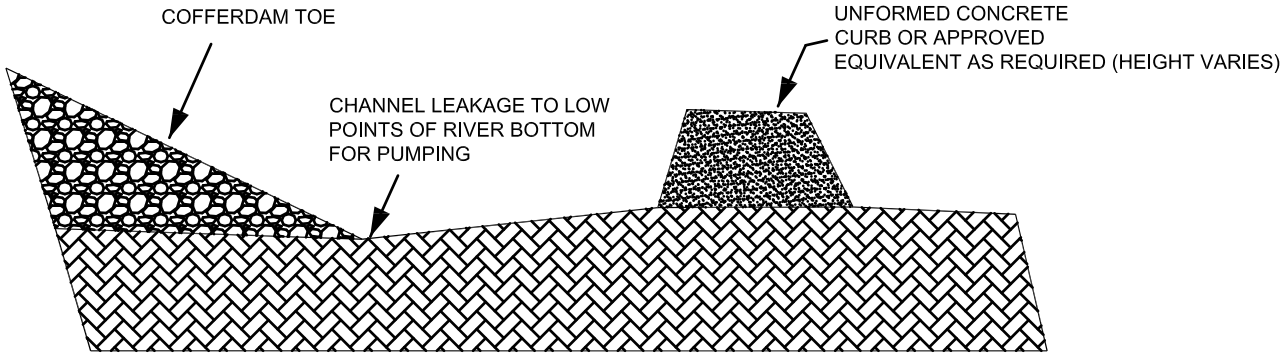
FIGURE 3
DOMINION ENERGY SOUTH CAROLINA, INC.

WATER MANAGEMENT SCENERIO

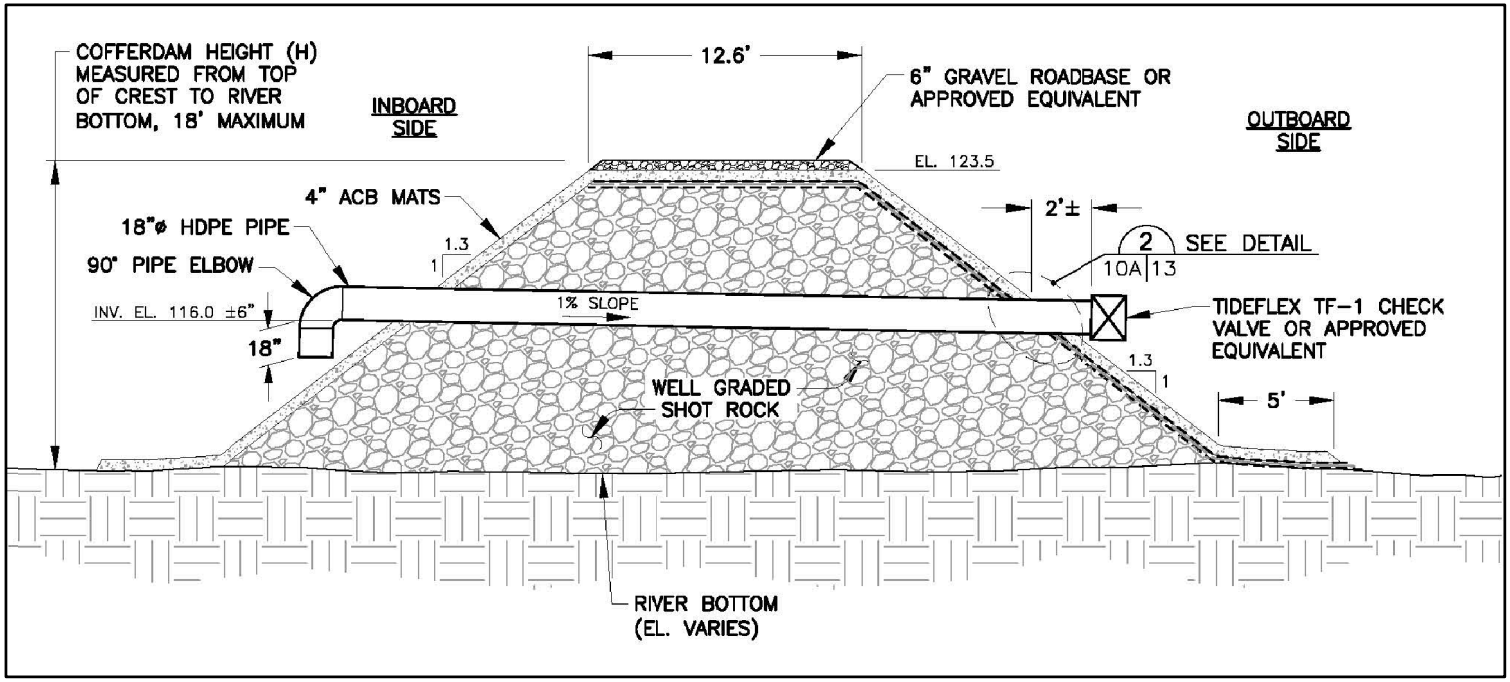
COLUMBIA, SOUTH CAROLINA

DATE: 6/18/20 FILE NAME: CONG559

APEX COMPANIES, LLC




LEAKAGE CONTROL




TYPICAL OUTLET STRUCTURE

| |
|---|
| FIGURE 4 |
| DOMINION ENERGY SOUTH CAROLINA, INC. |
| CONCEPTUAL LEAKAGE CONTROL AND OUTLET STRUCTURE DETAILS |
| COLUMBIA, SOUTH CAROLINA |
| DATE: 8/3/20 FILE NAME: CONG573 |
| APEX COMPANIES, LLC |

# APPENDIX I

# COFFERDAM INSPECTION AND MAINTENANCE PLAN

# COFFERDAM INSPECTION AND MAINTENANCE PLAN

## CONGAREE RIVER MODIFIED REMOVAL ACTION
## COLUMBIA, SOUTH CAROLINA

September 2020

*Prepared for:*

**Dominion Energy South Carolina, Inc.**
400 Otarre Parkway
Cayce, South Carolina 29033

*Prepared by:*

**Apex Companies, LLC**
1600 Commerce Circle
Trafford, PA 15085

**COFFERDAM INSPECTION AND MAINTENANCE PLAN**

**CONGAREE RIVER MODIFIED REMOVAL ACTION**
**COLUMBIA, SOUTH CAROLINA**

## INTRODUCTION

Dominion Energy South Carolina, Inc. (DESC), formerly South Carolina Electric and Gas Company (DESC), plans to complete a Modified Removal Action (MRA) to address the occurrence of a tar-like material (TLM) that is commingled with sediment along the eastern shoreline of the Congaree River, just south of the Gervais Street Bridge in Columbia, South Carolina. The project area location is shown on Figure 1. The TLM is believed to be a coal tar material that originated from the Huger Street former manufactured gas plant (MGP) site, located approximately 1,000 feet to the northeast of the project area. The proposed work is being performed by DESC at the direction of South Carolina Department of Health and Environmental Control (SCDHEC) and is subject to permits and approvals from the U.S. Army Corps of Engineers (USACE) and other agencies.

The overall objective of this project is to remove impacted sediment from the Congaree River within two areas. The current plan is to construct temporary cofferdams around each area to facilitate removal of the impacted sediment. As currently envisioned, the temporary cofferdams will be constructed sequentially and the MRA will occur over several years. The construction and active remediation season will occur from approximately May through October of each year. Figure 2 shows the current site operations plan scenario and the landside support zone components. Figure 3 illustrates the proposed cofferdam locations. After each cofferdam is constructed, the isolated area will be dewatered, and the impacted sediment removed and transported off-site for disposal. Following completion of the removal activities in Area 1, the cofferdam will be removed, and a cofferdam will be constructed around Area 2. After the removal activities are completed in Area 2, the cofferdam materials will be removed from the river.

## COFFERDAM DESIGN AND STABILITY ANALYSIS

The cofferdam design was completed by WSP USA Inc. (WSP). The design drawings are provided as an attachment to the Joint Application submittal to the USACE. Some key elements of the cofferdam design that are applicable to this Plan include:

- Two reinforced cofferdam structures, to be installed separately around each removal area;
- Reinforcement of the structures using articulated concrete block (ACB) mats;
- An outlet structure, which provides drainage from inside the cofferdam following an overtopping event; and
- An overtopping structure for the Area 2 cofferdam, which is not required to be fully reinforced on the inboard side of the cofferdam due to more limited sediment thicknesses, that is intended to mitigate the impact of overtopping events.

The outlet structure will provide a significant means of dewatering the cofferdam area after an overtopping event. The outlet structure is an 18-inch diameter pipe that extends from within the cofferdam, through the wall of the cofferdam on the downgradient side, and into the river. A Tideflex (or equivalent) check valve will be installed at the discharge point.

A stability analysis was also completed by WSP and is included with the Joint Application submittal to the USACE. The stability analysis was prepared to analyze the stability of the proposed cofferdam as constructed with the planned materials above the river bottom, which consists of varying thicknesses of sediment overlying as rock bottom. The stability analysis was performed for flood loading conditions where the water level is assumed to be at the crest of the cofferdam. As shown in the calculations, the cofferdam design meets the required factor of safety.

As stated in the stability analysis, no additional analyses are required if the cofferdam is constructed as indicated and the design of the cofferdam is considered suitable for the conditions analyzed. As a supplement to that analysis, an evaluation of potential overtopping scenarios is provided in this Plan.

## INSPECTION AND MAINTENANCE

### Overview

Initial project activities will consist of constructing the landside support zone and installing the cofferdam around the Area 1 removal area. Area 2 will be addressed following the completion of activities within Area 1. Figure 2 shows the cofferdam locations, current site operations plan scenario and the landside support zone components. The landside support zone will consist of a series of gravel roads and equipment/material storage areas and temporary structures.

The cofferdams will be constructed around each removal area to isolate it from the remainder of the river and allow dewatering and removal of the impacted sediment. After the cofferdam is in place and the area dewatered, the sediment removal activities will commence. The cofferdam is designed to significantly restrict the flow of water into the planned work area, although it is not anticipated to be watertight. As a result, leakage water is expected to penetrate the cofferdam and will require management by remediation personnel on a daily basis.

During construction and use of the cofferdam, a number of factors will need to be routinely monitored to ensure that remediation personnel complete the project safely and that the cofferdam structure functions as intended. Two main factors that could adversely impact the cofferdam and the remediation process are leakage and overtopping events. Leakage will need to be closely monitored to ensure that dewatering activities are sufficient and that the water management system capacity is adequate. Overtopping events are situations when the river level will rise above the top of the cofferdam and flood the interior of the structure. A reinforced cofferdam structure was ultimately selected for this project due to its resistance to damage from overtopping events. In addition, the design elevation for the crest of the cofferdam (123.5 feet NGVD 29) will be sufficient to contain a significant increase in the river water height. However, overtopping is anticipated and advance notice will be important in order to evacuate personnel and equipment and secure exposed impacted material prior to being overtopped.

**Real Time Inspections**

Visual observations by on-site personnel will be the primary means for inspection of the cofferdam. During working hours, on-site personnel will serve as routine visual monitors to provide real time observations and detect any potential problems as they may arise. For non-working hours, site security officers will provide oversight and contact remediation personnel in the event of uncontrolled leakage or an overtopping event. Depending upon the actual leakage rate, remediation personnel may be required to staff the dewatering equipment 24 hours per day.

Personnel working at the site will maintain an awareness of the river conditions and the potential for overtopping events. As the river rises or the forecast is for additional precipitation, on-site personnel will increase their vigilance for monitoring the effects on the cofferdam.

**Routine Inspections – Active Construction/Remediation Season**

To ensure that the integrity of the cofferdam structure remains intact and that it adequately performs its intended functions, a competent member of the project team will conduct visual inspections of both the structure and surrounding area each workday during the active construction/remediation season. The inspections will initiate at the onset of the cofferdam construction activities and conclude after the final portion of the cofferdam is removed. Findings and observations will be documented, and the contractor will be advised on any recommended/required repairs. Specific components of the cofferdam and the MRA that will be evaluated during the inspections will include:

- Inspecting the exterior (riverside) of the cofferdam for damage, erosion or a buildup of debris such as logs or other items deposited by the river;
- Inspection of the two riverbank tie-in locations where the cofferdam structure meets the shoreline for erosion or other potential issues;
- Obtaining photographs of potential problem areas in need of repairs and post-repair documentation;
- Inspection of the navigational aids (e.g., restricted access signage, solar powered lights, river buoy locations) installed to ensure that the general public and other river users are aware of the cofferdam and its specific access restrictions and navigational requirements;
- Observation of the river height and comparison of this height to the gauge readings published by the USGS for gauge 02169500 located across the river (Figure 3);
- Review of the USGS projected river flows for that specific date and the next 5 days to obtain advance notice of any river height fluctuations that may impact the project;
- Monitoring of planned flow modifications from the Saluda River Hydroelectric Dam located approximately 12 miles upriver to determine if a change in release volumes is planned within the next several days;
- Qualitatively assessing the volume of leakage water and comparing this volume to the previous few days to determine if the leakage volume is increasing, decreasing or remaining relatively constant; and
- Identifying areas of significant leakage.

The cofferdam and removal area will be visually inspected each workday. An inspection form will be completed on each date and any potential areas in need of repairs will be documented. An example inspection form is provided as Attachment B. The daily form and a description/photographs of any area in

need of repairs will be provided to the contractor to be addressed as soon as practical. The form may be revised, if required, after the project begins to better meet the needs of the inspection/contractor personnel. Completion of the inspection activities and use of the inspection form/checklist will result in:

- Resolving potential issues with the cofferdam structure or work area in a timely manner; and
- Providing a means for tracking river level fluctuations in order to help prepare for potential overtopping events.

Inspections will also be undertaken following an overtopping event and will continue as the river levels subside. Potential cofferdam damage resulting from an overtopping event will be rectified as soon as practical to allow for efficient dewatering of the isolated area and continuation of sediment removal activities.

**Routine Inspections – "Standby Mode"**

After constructed, the cofferdam will remain in place until sediment removal activities are completed in that area. The active in-the-river construction season will be May through October. Cofferdam construction/relocation activities will be limited to this period. DESC has also requested permission to leave the cofferdam in-place and work behind the cofferdam year-round [if required and feasible], with minimal site activity projected during the months of December through April due to anticipated river levels.

Overtopping events are much more likely to occur in the "winter months" (e.g., December thru April), thereby limiting productivity. In the event that the cofferdam is overtopped during the winter months or the risk of overtopping becomes significantly increased, the project may enter a "standby mode". When in standby mode, routine inspections (e.g., weekly, at a minimum) will still occur and the findings and observations will be documented, to the extent feasible given the cofferdam may be submerged under multiple feet of water. After the water has receded from overtopping events, the integrity of the cofferdam structure will be re-evaluated. With consideration of the long-range forecast, the decision will be made to either remain in standby mode or resume work activities within the cofferdam.

## COFFERDAM OVERTOPPING EVALUATION

A summary of cofferdam overtopping scenarios is presented in Table 1. Three types of overtopping are considered:

- Minor overtopping event;
- Major overtopping event; and
- Catastrophic event.

Table 1 presents some additional information relative to each type of overtopping listed above and correlates the overtopping event to a general river elevation. The summary table evaluates the likely extent of impacts and provides an estimate of lost productivity.

## LIST OF ATTACHMENTS

## ATTACHMENT A

## TABLES AND FIGURES

**TABLE 1**

**SUMMARY OF COFFERDAM OVERTOPPING SCENARIOS**
**COFFERDAM INSPECTION AND MAINTENANCE PLAN**

**Congaree River MRA**
**Columbia, South Carolina**

| Type of Overtopping | General River Elevation (feet NGVD 29) | Overtopping Height (feet) | Anticipated Extent of Impacts |
|---|---|---|---|
| Minor Overtopping Event | > 123.5 to 124.5 | 0 to 1 | Minor erosion at the top of the cofferdam<br>Minimal damage due to installation of reinforcement and drainage outlet structure<br>Dewatering efforts would be significant, but manageable<br>Minor damage to aids to navigation<br>Estimated 1 week of lost productivity |
| Major Overtopping Event | > 124.5 to 130.5 | 1 to 7 | Likely more impacts than a minor event, with more erosion at the top of the cofferdam<br>The interface of the cofferdam and shoreline may be more susceptible to erosion<br>Dewatering efforts would be substantial, but manageable<br>Aids to navigation will likely be damaged or potentially lost and will need replacements<br>Access roads into the removal area would likely sustain moderate damage<br>Estimated 2 weeks of lost productivity |
| Catastrophic Event | > 130.5 and above | >7 | More impacts than a major event, with more erosion at the top of the cofferdam<br>The reinforcement is expected to keep the overall cofferdam structure in place<br>The interface of the cofferdam and shoreline may be susceptible to erosion<br>Drainage of support areas and dewatering efforts would be substantial<br>Aids to navigation will likely be damaged or potentially lost and will need replacements<br>Access roads into the removal area would likely sustain moderate damage<br>Site support facilities could be inundated/damaged<br>Estimated 3 weeks of lost productivity |

**Notes:**

Comparisons are relative and actual conditions may vary.

The rate of increase in the Congaree River may affect the impact on the cofferdam.

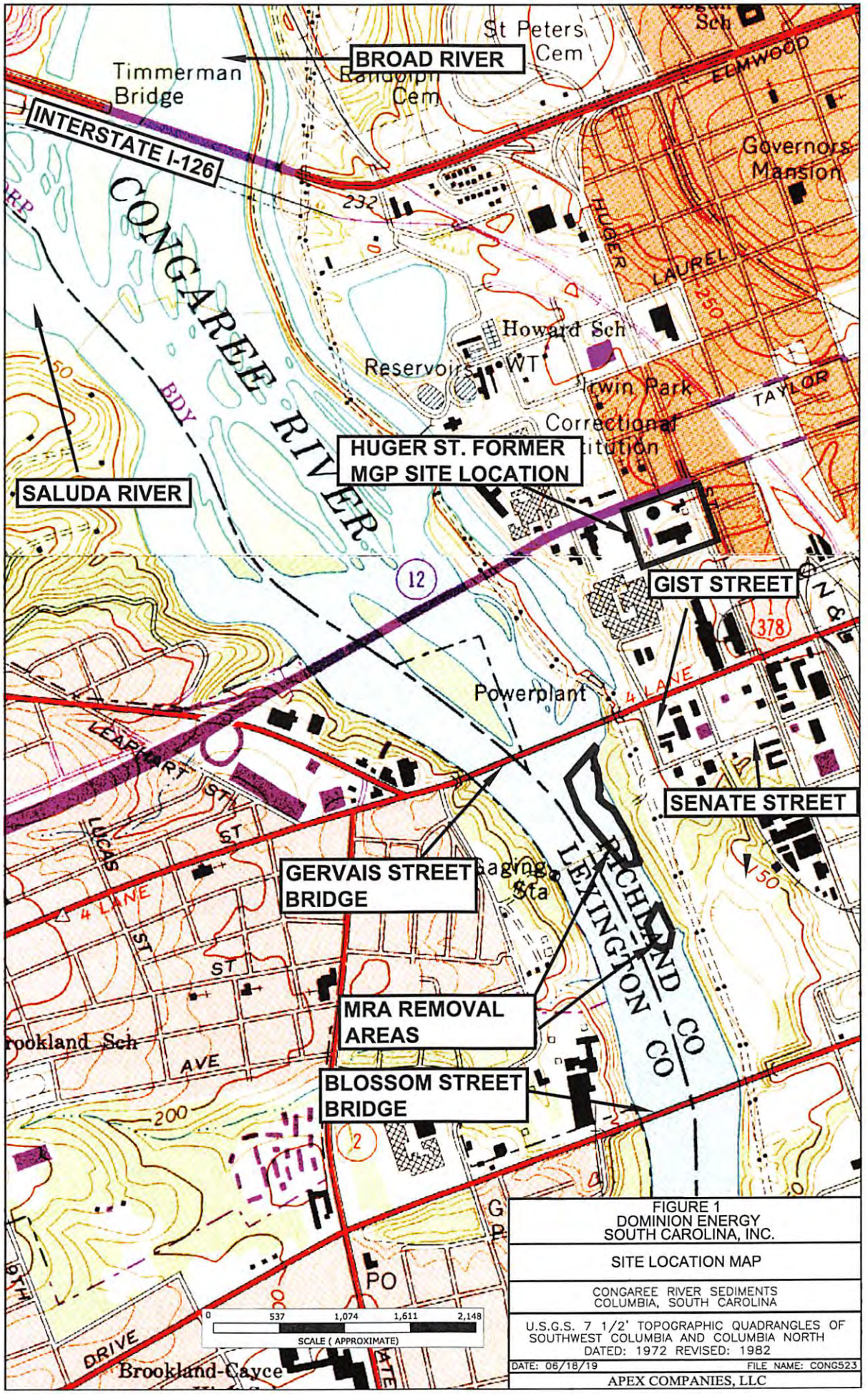



FIGURE 1
DOMINION ENERGY
SOUTH CAROLINA, INC.

SITE LOCATION MAP

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

U.S.G.S. 7 1/2' TOPOGRAPHIC QUADRANGLES OF
SOUTHWEST COLUMBIA AND COLUMBIA NORTH
DATED: 1972 REVISED: 1982

DATE: 06/18/19 FILE NAME: CONG523

APEX COMPANIES, LLC

LEGEND

– STREAM/RIVER/WETLAND EDGE
– TREELINE
– 5 FOOT CONTOUR INTERVALS
– REMOVAL AREAS FROM STAKEHOLDER DEVELOPED MRA PLAN
– SITE PERIMETER FENCE
– APPROXIMATE EXTENT OF GRAVEL AREAS
– APPROXIMATE LEASE AREA

NOTES:
1) LAND TOPOGRAPHY BASED ON LIDAR SURVEY CONDUCTED ON APRIL 18, 2018.
2) CONGAREE RIVER GAGE (02169500) HEIGHT DURING LIDAR SURVEY WAS 6.18' (119.20' ELEVATION NGVD 29).
3) RIVER BOTTOM CONTOURS BASED ON BATHYMETRIC SURVEYS CONDUCTED MAY 7 THRU JULY 17, 2018.

0' 180' 360'

N

GERVAIS STREET BRIDGE
GIST STREET
SENATE STREET
JOB TRAILERS
OFFICE AREA
SITE ACCESS ROAD
GATE
SITE ACCESS ROAD
TEMPORARY STRUCTURE MATERIAL HANDLING AND STORAGE
POTENTIAL FILTERED WATER DISCHARGE POINT
ADDITIONAL OFFICE/STORAGE TRAILERS
AREA 1
SITE ACCESS ROAD
PRIMARY SETTLING
ADDITIONAL SETTLING/STORAGE TANKS
CONTACT WATER TRANSFER LINE
FILTRATION UNITS
DISCHARGE TANKS
SITE ACCESS ROAD
SITE ACCESS ROAD
CONGAREE RIVER
AREA 2

FIGURE 2
DOMINION ENERGY
SOUTH CAROLINA, INC.

CONCEPTUAL SITE OPERATIONS PLAN

COLUMBIA, SOUTH CAROLINA

DATE: 5/19/20 FILE NAME: CONG545

APEX COMPANIES, LLC

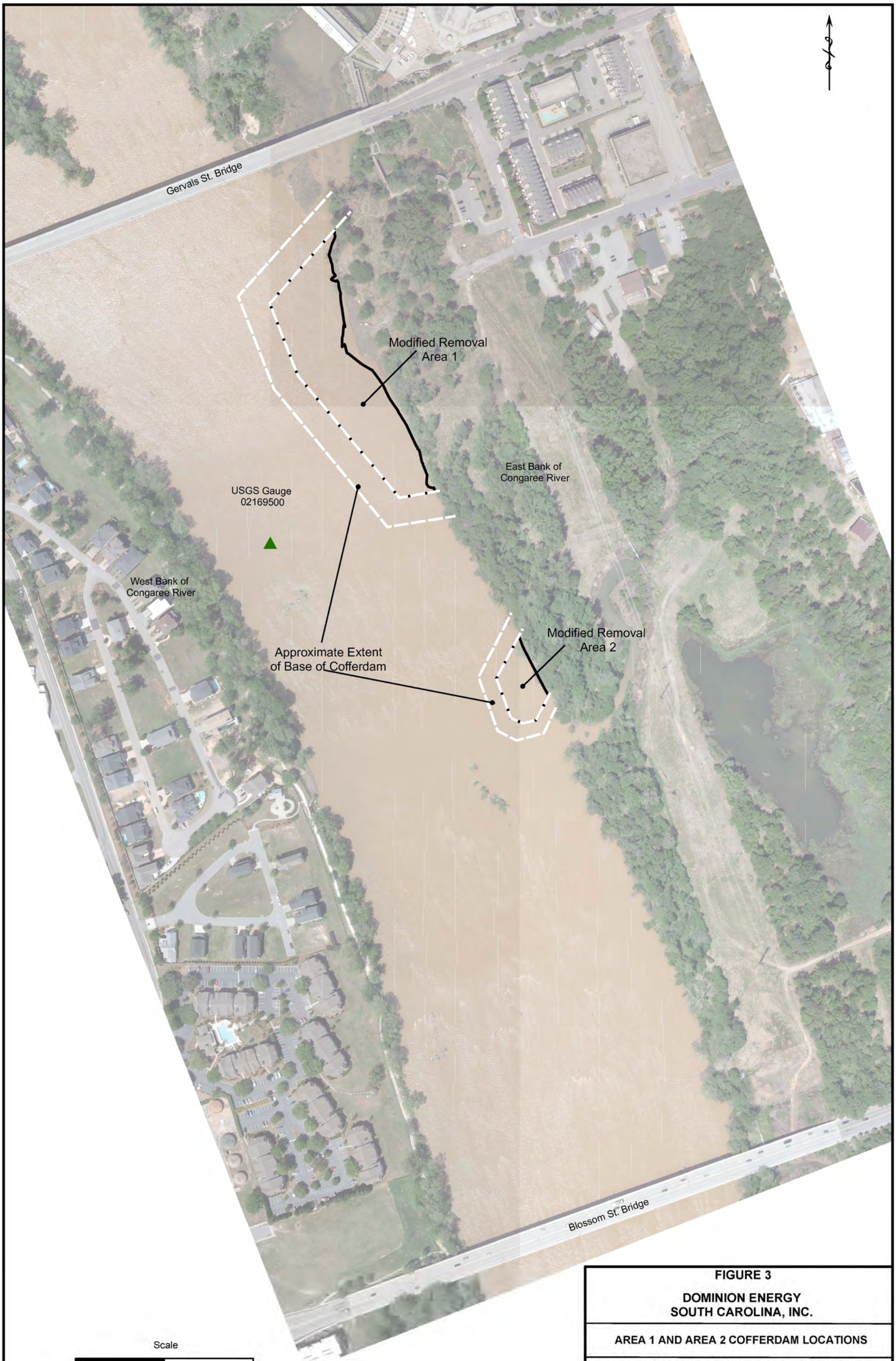



**FIGURE 3**

**DOMINION ENERGY SOUTH CAROLINA, INC.**

**AREA 1 AND AREA 2 COFFERDAM LOCATIONS**

**CONGAREE RIVER MODIFIED REMOVAL ACTION COLUMBIA, SOUTH CAROLINA**

DATE: 7/10/2020 FILE NAME: FIGURE 3

APEX COMPANIES, LLC

P:\GIS\Projects\SCE&G Congaree\MXDs\Water Quality\CSB-001L.mxd

**ATTACHMENT B**

**COFFERDAM INSPECTION FORM**

**DAILY COFFERDAM INSPECTION**

**Congaree River Sediments**
**Columbia, South Carolina**

Date: _____

Excavation Area: _____

Cofferdam exterior (riverside) intact and free of debris: _____

_____

_____

Shoreline and tie-in locations conditions: _____

_____

_____

Warning signs/buoys intact: _____

_____

Areas of significant leakage: _____

_____

Is leakage water volume: increasing / decreasing / constant (circle one)

Total Suspended (TSS) measurements completed this date: Yes / No

TSS mitigation activities completed:

USGS River Gauge Reading: _____ (Gage "0" datum is 113.02')

NOAA river elevation prediction for next 5 days: _____

Planned changes in Saluda River Hydroelectric Dam release (next 5 days): _____

Additional notes/observations:

_____

_____

_____

_____

Signature of APEX Representative: _____

# APPENDIX J

# TOTAL SUSPENDED SOLIDS MONITORING PLAN

# TOTAL SUSPENDED SOLIDS (TSS) MONITORING PLAN

## CONGAREE RIVER MODIFIED REMOVAL ACTION COLUMBIA, SOUTH CAROLINA

September 2020

*Prepared for:*

**Dominion Energy South Carolina, Inc.**
400 Otarre Parkway
Cayce, SC 29033

*Prepared by:*

**Apex Companies, LLC**
1600 Commerce Circle
Trafford, PA 15085

**TOTAL SUSPENDED SOLIDS (TSS)**
**MONITORING PLAN**

**CONGAREE RIVER MODIFIED REMOVAL ACTION**
**COLUMBIA, SOUTH CAROLINA**

## INTRODUCTION

Dominion Energy South Carolina, Inc. (DESC), formerly South Carolina Electric and Gas Company (SCE&G) plans to complete a Modified Removal Action (MRA) to address the occurrence of a tar-like material (TLM) that is commingled with sediment along the eastern shoreline of the Congaree River, just south of the Gervais Street Bridge in Columbia, South Carolina. The project area location is shown on Figure 1. The TLM is believed to be a coal tar material that originated from the Huger Street former manufactured gas plant (MGP) site located approximately 1,000 feet to the northeast of the project area (Figure 1). The proposed work is being performed by DESC at the direction of South Carolina Department of Health and Environmental Control (SCDHEC) and is subject to permits and approvals from the U.S. Army Corps of Engineers (USACE) and other agencies.

The overall objective of this project is to remove impacted sediment from the Congaree River within two areas. The current plan is to construct temporary cofferdams around each area to facilitate removal of the impacted sediment. As currently envisioned, the temporary cofferdams will be constructed sequentially and the MRA will occur over several years. The construction and active remediation season will occur from approximately May through October of each year. Figure 2 illustrates the proposed cofferdam locations. After each cofferdam is constructed, the isolated area will be dewatered, and the impacted sediment removed and transported off-site for disposal. Following completion of the removal activities in Area 1, the cofferdam will be removed, and a cofferdam will be constructed around Area 2. After the removal activities are completed in Area 2, the cofferdam materials will be removed from the river.

Construction activities are designed to be conducted with the intent of limiting and/or controlling the amount of sediment generated during the project. The cofferdam structure will contain any sediment released during sediment removal activities within the structure. The construction and removal of the cofferdam is anticipated to generate suspended solids that will be mostly attributable to the cofferdam material and not the existing river sediment. The amount of suspended solids within the project area will be monitored and mitigated through the implementation of this Plan. Areas of liberated sediment or construction materials (i.e., rock dust and/or fine particles from the shotrock used to construct the cofferdam) will be mainly located directly downstream of the cofferdam structure and impacts will be temporary. Primary sediment controls will involve deployment of a floating silt curtain and/or large sand bags to act as a barrier to downstream movement of sediment, adjacent to the active cofferdam construction area. Also, a critical element of this Plan is incorporation of a mixing zone approach. The mixing zone will provide a designated area for the short-term effects from constructing the cofferdam to subside as described further below.

## TSS MONITORING PLAN OBJECTIVE

The objective of this Total Suspended Solids (TSS) Monitoring Plan is to ensure that the cofferdam construction and MRA operations do not directly cause the addition of significant or uncontrolled amounts of suspended solids within the Congaree River. Implementation of this Plan will provide a means to measure, collect and document real-time TSS information and compare the results to conservative action levels, as described herein. This Plan also establishes the appropriate contingency measures to be implemented in the event that elevated readings are observed during construction activities within the river.

## TSS MONITORING PLAN CONTENTS

DESC plans to conduct TSS monitoring during operations that have the potential to generate or liberate sediment within the river, primarily during construction or removal of the cofferdam structures. Project-related TSS increases will result from:

- Placement or removal of cofferdam material on the river bottom which may liberate sediments;
- Placement or removal of cofferdam material as the cofferdam is built to design height or removed, which may release rock dust or small rock particles from shotrock material; and
- Disturbance of the shoreline during cofferdam tie-in construction and removal operations.

The planned locations of the cofferdams are shown on Figure 2. No TLM constituents of concern were identified in the riverbank soil. The cofferdam material (shotrock) will be from an off-site, borrow source and will be free of contamination. However, the cofferdam will be constructed around areas where deposits of TLM are known to exist, and the release of impacted sediment as well as particles from the cofferdam material during construction will pose a potential for migration of suspended solids downriver. The cofferdam will serve as a containment structure for work inside the structure. Implementation of this Plan will minimize the potential for increased TSS within the river due to cofferdam construction activities.

After the cofferdam is fully constructed and the only intrusive work is occurring within the isolated area, DESC may discontinue TSS monitoring. In the unlikely event that unplanned activities will pose a potential to liberate sediment, DESC will re-initiate monitoring activities, as required.

The TSS Monitoring Plan consists of the following:

- Identification of TSS controls;
- Establishment of “bench mark” level;
- Establishment of a mixing zone;
- Description of real-time field measurements of TSS;
- Determination of action levels for TSS exceedances;
- TSS monitoring instrumentation;
- Measurement frequency;
- Contingency measures; and

- Reporting.

**TSS CONTROLS - SILT CURTAIN AND/OR SAND BAG BERM**

TSS controls will involve deployment of a floating silt curtain and/or large sand bags to act as a barrier to downstream movement of sediment. For example, a silt curtain will be deployed downstream of the active work area prior to any construction activities to mitigate downstream migration of sediment. A berm made of large sand bags may also be utilized instead of, or in addition to, the silt curtain depending on river conditions. The sand bag berm would be placed downstream of the active work area, perpendicular to the flow direction and serve the same function as the silt curtain, which is to contain released sediment within the general work area. It is envisioned that multiple silt curtains and/or a row of large sand bags will be deployed as construction of the Area 1 cofferdam progresses downriver as shown on Figure 3. Only 1 silt curtain or sand bag berm will be required downriver of the Area 2 cofferdam.

**TSS "BENCH MARK" LEVEL FOR THE PROJECT AREA**

Table 1 provides historical analytical results for TSS measured by SCDHEC from January 1999 to December 2000 at water quality monitoring stations CSB-001L and CSB-001R (located just south of the Blossom Street Bridge). These water quality monitoring locations are shown on Figure 2. This is the most recent TSS data available at the time of plan development.

The historical data was utilized to develop an average TSS concentration for that timeframe and will serve as an initial "bench mark" concentration level for the project. The Congaree River exhibits highly variable flow rates and corresponding TSS concentrations based on factors including: the large drainage basin; upstream precipitation events; and runoff from upstream sources for both the Broad River and the Saluda River. During the timeframe noted above, the TSS measurements ranged from 1.2 mg/L to 42 mg/L with an average concentration of 7.3 mg/L. This bench mark value may be adjusted during the project if regularly measured background readings or pre-project monitoring establishes a more recent set of data for comparison to data collected during the project.

Due to the variability of TSS levels, exceedance of the bench mark level (TSS > 7.3 mg/L) likely occurs on a regular basis. Therefore, DESC proposes to utilize this average concentration as the bench mark level that will trigger more frequent TSS monitoring activities at pre-defined locations within the project area, as discussed below.

In addition to the bench mark criterion, "background" TSS readings will also be collected and utilized to evaluate action levels and exceedances as discussed in the following paragraphs.

**MIXING ZONE**

Directly downstream of the silt curtain and/or sandbag berm used for TSS control will be a mixing zone where a limited amount of disturbed sediment and cofferdam rock dust will likely pass through the control measures and migrate downstream. The TSS controls will be maintained to prevent any significant releases, but due to the nature of the project area and the river flow, some minor sediment or construction material movement from the work area is expected. Therefore, two separate mixing zones of approximately 725 feet in length for Area 1 (one mid-way thru the cofferdam [northern Area 1] and one at

the southern end [southern Area 1]) and one approximately 700 feet in length for Area 2 will be established downstream of the active work zone. The mixing zone lengths are based on the average river width at Areas 1 and 2. TSS levels in the work zone and the mixing zone will be monitored but periodic elevated levels and spikes will be acceptable as long as the downstream monitoring location does not exceed the action level. Collection of data periodically at these locations will provide insight into the appropriate corrective measures should action levels be triggered at the downstream location. It is anticipated that suspended solids will settle out within the mixing zone during movement downriver with the current.

**MEASUREMENT OF REAL-TIME TSS LEVELS**

DESC plans to conduct real-time monitoring of TSS concentrations in the vicinity of the project area during construction activities that have the potential to liberate sediments. Figure 3 provides TSS monitoring scenarios during construction of the Area 1 and Area 2 cofferdams. Monitoring during construction of the northern portion of northern Area 1 is represented. Similar monitoring scenarios will be established for completion of southern Area 1, as necessary. Monitoring locations include background (upstream), active work zone, mixing zone and downstream locations.

It is anticipated that the downstream location will be utilized for comparison to the action level and will be evaluated first. If the TSS readings are less than the bench mark value, then no additional monitoring is required for that period. If the readings are greater than the bench mark value, additional measurements will be obtained as discussed in this Plan.

**ACTION LEVELS FOR TSS EXCEEDANCES**

The Congaree River exhibits highly variable flow rates and corresponding TSS concentrations based on a factors including; the large drainage basin, upstream precipitation events, runoff from upstream sources for both the Broad River and the Saluda River. Due to this variability, natural exceedances of the bench mark occur on a regular basis, as seen on Table 1. Generally, as the river elevation increases so does TSS due to these upstream effects. Therefore, the objective of this Plan is to determine when the increase in TSS levels are due to MRA activities that result in “action level” triggers. Subsequently, a “background” reading will be collected directly upstream of the project area when the initial bench mark level of 7.3 mg/L is exceeded. Background level measurements may not be collected if readings downstream of the work area are below 7.3 mg/L. This data will be critical in determining if an elevated TSS reading is due to project-related activities. Measurements of TSS in the work zone and mixing zone may also be helpful in determining the source of the elevated TSS concentrations at the downstream location. As a side note, when river levels are significantly elevated, and sediment loads are heavy, there will likely be no in-the-river construction activities due to adverse working conditions.

For the purposes of this project, DESC proposes that an “action level” or significant increase in TSS concentration is defined as a reading of 25% higher than the “background” monitoring results. In summary, upstream (background) data will be compared with downstream monitoring results, measured after the mixing zone. If downstream TSS concentrations are less than 1.25 times the upstream results, then work can proceed. If the downstream TSS levels are sustained at greater than 1.25 times the upstream background measurement, then work will cease (i.e., a Stop Work Order will be issued) and contingency measures will be employed.

If a significant increase is noted between comparison of the upstream (background) and downstream concentrations, then mitigation/control measures will be implemented as described below. Exceedance of the action level below the mixing zone must be a sustained reading for at least 15 minutes. Transient readings, or intermittent "spikes" will not constitute a Stop Work Order. Also, if an action level exceedance can be attributed to a non-project-related condition, or unusual, natural or man-made event, the exceedance will be recorded in the field notes and no contingency measures will be employed and work may continue.

The following scenarios are provided to illustrate the potential monitoring and mitigation activities.

**Scenario 1 – Downstream Readings < 7.3 mg/L**

If the downstream TSS monitoring activities produce results below the bench mark of 7.3 mg/L, work will continue as planned without mitigation measures. Continued real-time monitoring and visual observations of river conditions directly downstream of the active work zone and the mixing zone will continue to be conducted on a daily basis as the project progresses. Background monitoring will not be necessary.

**Scenario 2 – Downstream > 7.3 mg/L but <1.25 X Background**

Exceedance of the bench mark level will trigger background monitoring (upstream of the project area) for comparison to the downstream monitoring data. If the downstream TSS monitoring activities produce results above 7.3 mg/L, but below 1.25 times the background level, work will continue as planned without mitigation measures. Continued real-time monitoring and visual observations of river conditions directly downstream of the active work zone and the mixing zone will be conducted daily as the project progresses.

**Scenario 3 – Downstream Readings > than 1.25 X Background**

If the downstream TSS monitoring activities produce consistent (sustained for 15 minutes) results above 1.25 times the background (upstream of the work area) level, a Stop Work Order will be implemented, and mitigation/control measures will be employed, as described below. Downstream and background monitoring will continue, and mitigation measures will remain in place until TSS concentrations below the mixing zone are reduced to less than 1.25 times the background concentration or below 7.3 mg/L for a period of two hours.

## TSS MONITORING INSTRUMENTATION

To fulfill the monitoring requirements and objectives, DESC currently anticipates utilizing a combination of instruments and techniques. Measurements will be obtained by either a hand-held instrument and/or remote monitoring equipment positioned in the river. If the river is readily accessible from the shoreline, site personnel may be able to wade into the shallow water and collect readings via a hand-held TSS meter. The data will be downloaded or manually recorded. If the water is too deep, site personnel may use a small boat or kayak to collect the data. As a third option, a wireless buoy system may be employed. Examples of the proposed monitoring instruments are described below, and additional information is provided in Attachment B.

**Hand-Held Instrumentation**

As currently planned, the Royce Model 711 portable Suspended Solids / Interface Level analyzer or similar hand-held instrument will be used to collect real-time measurements in the river. The instrument is a rugged and waterproof device that provides reliable operation in rivers, lakes and other aqueous environments. DESC has utilized this instrument to conduct TSS monitoring at previous sediment remediation projects. Readings will be periodically obtained by project oversight personnel by lowering the instrument's probe into the water column and recording the results in a field logbook or daily monitoring form.

**Remote Buoy Mounted Instrumentation**

Project personnel may utilize the buoy system when the hand-held instrument will not provide representative TSS information and/or the appropriate monitoring location is not readily accessible. The remote buoy will contain a portable monitoring instrument capable of conducting continuous TSS monitoring and transmitting the real-time data to shore where it can be viewed and compared to the applicable action level.

Currently DESC envisions utilizing the YSI EXO1 Sonde multiparameter portable instrument and the EXO Turbidity Sensor with TSS functionality. The EXO1 can continuously collect data and store it onboard the instrument, transfer it to a data collection platform (DCP), or relay it directly to a PC or EXO handheld device. Communication to the instrument is accomplished by using a field cable, Bluetooth® wireless connection, or a USB connection. Since the instrumentation will likely be staged or moored within the Congaree River and access may be limited or difficult, the Bluetooth® wireless connection will be the likely method for data transmission.

If the remote system is utilized, the data will be downloaded or collected on a periodic basis throughout the day by oversight personnel and compared to the action level. For both handheld and the remote system, an effort will be made to place the sensor at approximately the midpoint of the water column to obtain a representative sample.

The same instrumentation and techniques will be employed to conduct the background monitoring, if required. Handheld devices will likely be utilized, if possible, and the remote system will be installed if adequate and representative background TSS concentrations cannot be obtained using the handheld device.

**MEASUREMENT FREQUENCY**

Pre-construction readings will be taken to document river TSS levels prior to commencement of activities. After construction activities begin for the day, the TSS readings will be obtained at approximate two-hour intervals. Either handheld readings will be conducted by field personnel or the remote buoy will be deployed, and the data downloaded or checked on the two-hour intervals. Monitoring will continue at this frequency while work is being conducted and one final reading will be obtained after activities are completed for the day to document post-construction conditions. If the action level is exceeded at any point during the day, background monitoring will be initiated, and the results compared to determine if mitigation measures are required.

If the downstream readings are less than the 1.25 times background threshold, work will continue, and downstream monitoring frequencies will remain at the approximate two-hour frequency. If the 1.25 times background threshold is exceeded, the appropriate mitigation measures will be employed, and monitoring will be conducted on an hourly basis until work is completed for the day or the action levels are no longer exceeded.

## CONTINGENCY MEASURES

After an exceedance of the action level has been observed and it can be readily attributed to project activities, the following contingency measures will be implemented:

- A Stop Work Order will be issued to the construction/remediation contractor;
- An immediate inspection of the silt curtain and/or sand bag berm will be performed, and repairs or replacement will be made as appropriate;
- If the exceedance can be attributed to a damaged or dislocated silt curtain and repairs or redeployment are completed to the satisfaction of on-site personnel (QA/QC, regulatory agency representatives, or others) – work can then continue;
- If required, a second silt curtain will be deployed (outside of the first) and work will continue; and
- If the action level exceedance persists after the above measures have been implemented, another Stop Work Order will be issued, and the situation will be re-evaluated by field personnel in conjunction with DESC and regulatory agency representatives to determine additional contingency measures.

## REPORTING

Daily reports of TSS monitoring results will be maintained on-site. Sustained action level exceedances, should they occur, and any subsequently implemented contingency measures will be communicated to the appropriate SCDHEC representative.

## ATTACHMENTS

A Tables and Figures

| | |
|---|---|
| Table 1 | TSS Concentrations at SCDHEC Water Quality Monitoring Stations |
| Figure 1 | Project Area Location |
| Figure 2 | Project Area and Location of SCDHEC Water Monitoring Stations CSB-001L and CSB-001R |
| Figure 3 | TSS Monitoring Scenarios |

B Proposed Monitoring Instruments Information

**ATTACHMENT A**

**Table and Figures**

**TABLE 1**

**TSS CONCENTRATIONS IN MG/L AT**
**SCDHEC WATER QUALITY MONITORING STATIONS**
**LOCATED DOWNSTREAM OF THE BLOSSOM STREET BRIDGE**
**JANUARY 1999 THROUGH DECEMBER 2000**

**Congaree River Sediments**
**Columbia, South Carolina**

| Date Sampled | Monitoring Station | |
|---|---|---|
| | CSB-001L | CSB-001R |
| 01/05/99 | NA(1) | 28 |
| 02/10/99 | 5.4 | 8 |
| 03/10/99 | 3 | 4.6 |
| 04/07/99 | NA | 7.2 |
| 05/12/99 | 3.9 | 5.6 |
| 06/24/99 | 3.6 | 3.9 |
| 07/07/99 | 3.9 | 3.2 |
| 08/31/99 | 5.9 | 6.6 |
| 09/30/99 | 4.2 | 7.1 |
| 10/21/99 | 1.7 | 4.2 |
| 11/08/99 | 4.2 | 8.2 |
| 12/16/99 | 2 | 3.8 |
| 01/05/00 | NA | 5.2 |
| 02/09/00 | 3 | 5.1 |
| 03/29/00 | 6.6 | 3.1 |
| 04/12/00 | 2.7 | 4.3 |
| 05/16/00 | 3.1 | 4 |
| 06/15/00 | 42 | 5.8 |
| 07/19/00 | 2.8 | 2.8 |
| 08/10/00 | 2.1 | 1.5 |
| 09/20/00 | 4.2 | 4 |
| 10/25/00 | 1.2 | 1.8 |
| 11/15/00 | 3.2 | 14 |
| 12/13/00 | 39 | 39 |

**Average of both stations (mg/L): 7.3**

**Note:**
(1) NA - not analyzed

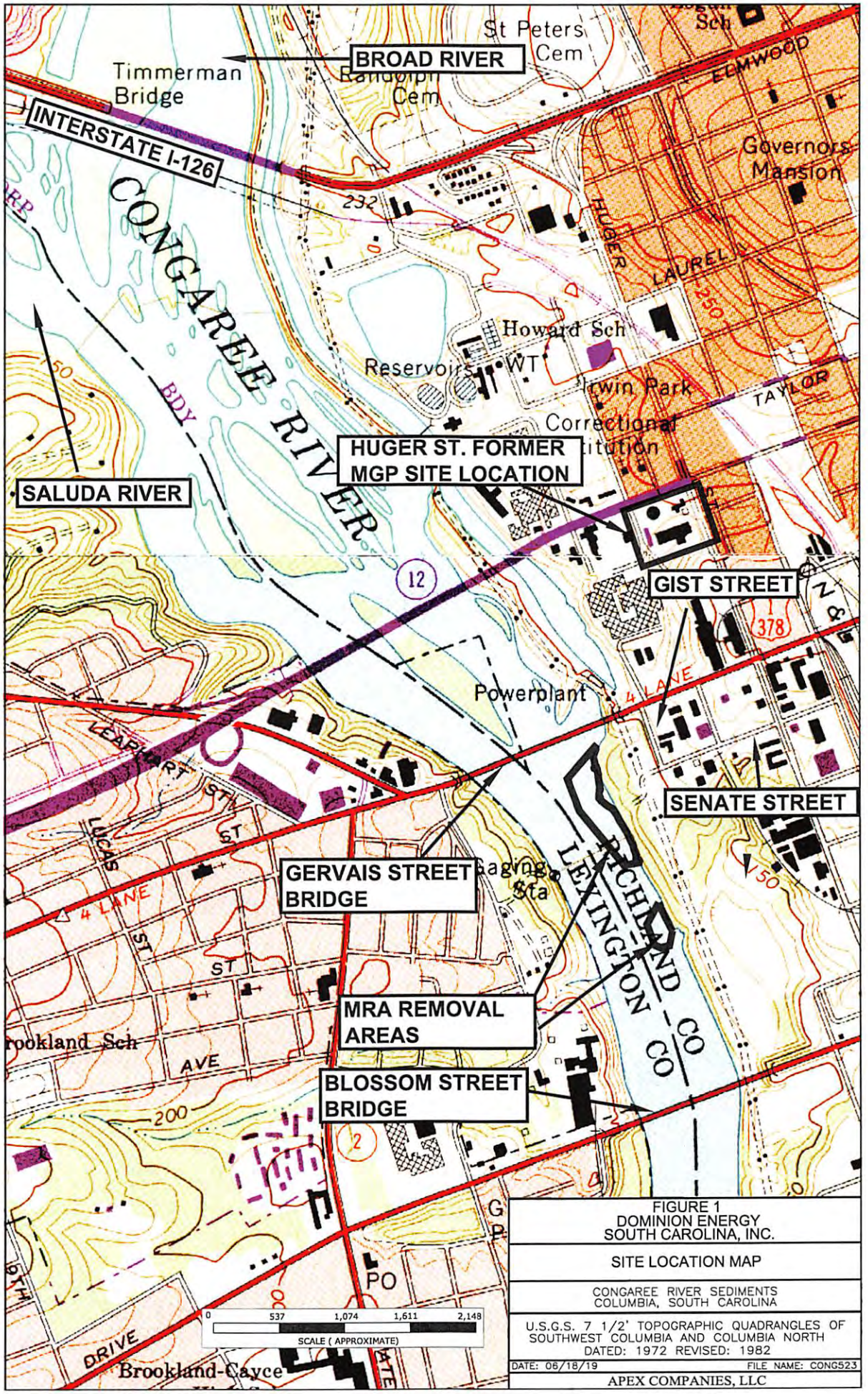



FIGURE 1
DOMINION ENERGY
SOUTH CAROLINA, INC.

SITE LOCATION MAP

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

U.S.G.S. 7 1/2' TOPOGRAPHIC QUADRANGLES OF
SOUTHWEST COLUMBIA AND COLUMBIA NORTH
DATED: 1972 REVISED: 1982

DATE: 06/18/19 FILE NAME: CONG523

APEX COMPANIES, LLC

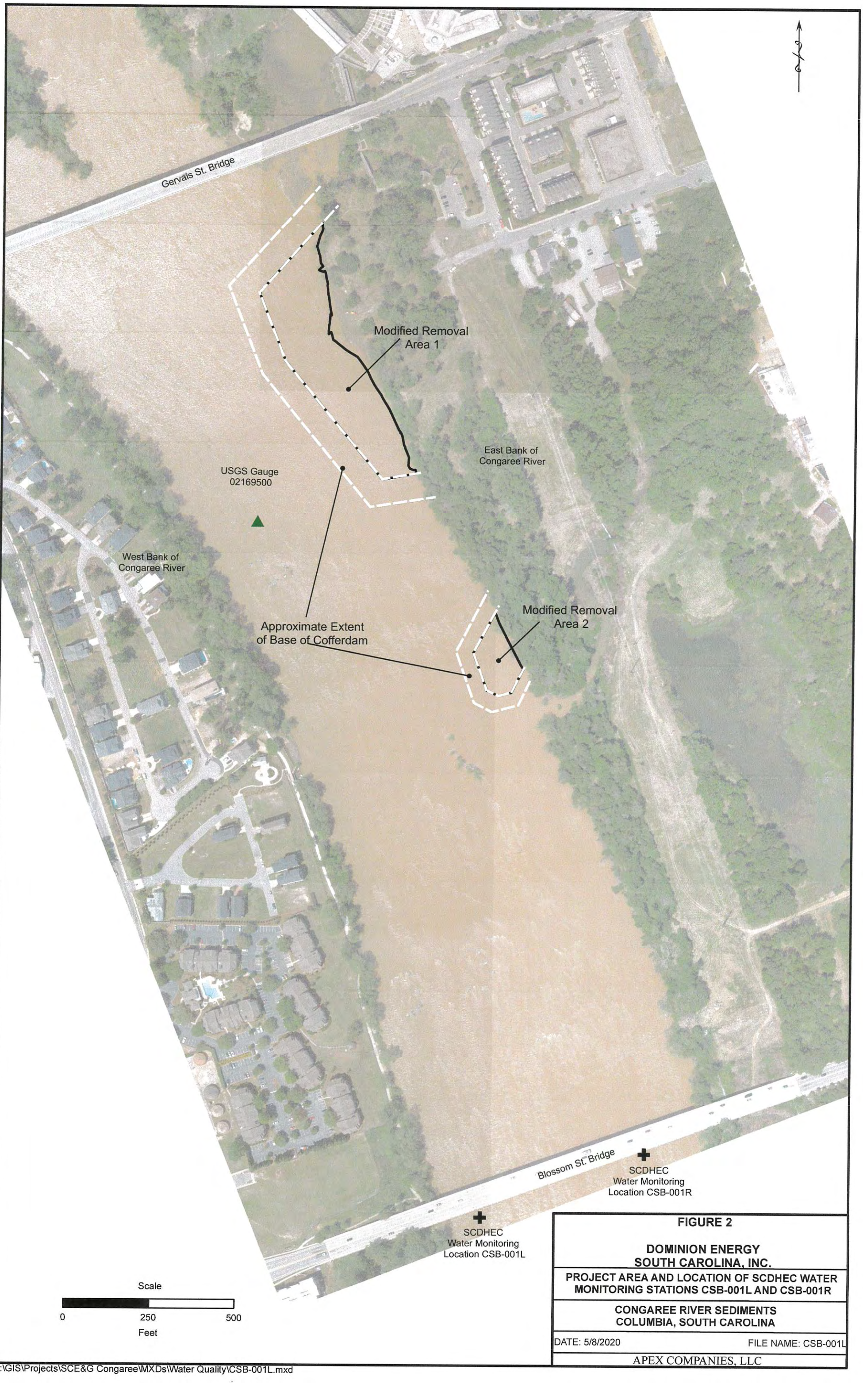



**FIGURE 2**

**DOMINION ENERGY SOUTH CAROLINA, INC.**

**PROJECT AREA AND LOCATION OF SCDHEC WATER MONITORING STATIONS CSB-001L AND CSB-001R**

**CONGAREE RIVER SEDIMENTS COLUMBIA, SOUTH CAROLINA**

DATE: 5/8/2020 FILE NAME: CSB-001L

APEX COMPANIES, LLC

P:\GIS\Projects\SCE&G Congaree\MXDs\Water Quality\CSB-001L.mxd

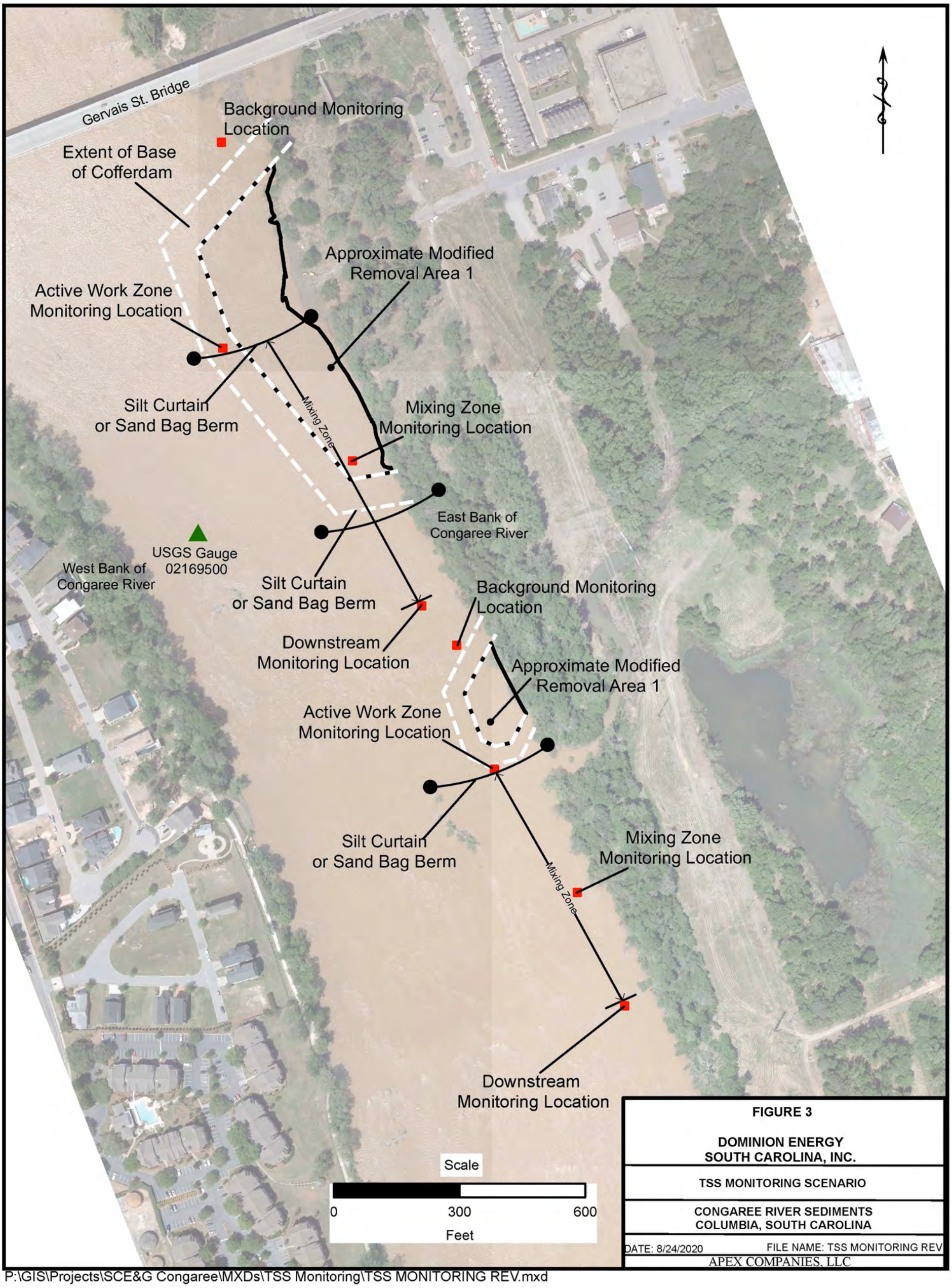



**FIGURE 3**

**DOMINION ENERGY SOUTH CAROLINA, INC.**

**TSS MONITORING SCENARIO**

**CONGAREE RIVER SEDIMENTS COLUMBIA, SOUTH CAROLINA**

DATE: 8/24/2020 FILE NAME: TSS MONITORING REV

APEX COMPANIES, LLC

P:\GIS\Projects\SCE&G Congaree\MXDs\TSS Monitoring\TSS MONITORING REV.mxd

# ATTACHMENT B

## Proposed Monitoring Instruments Information

# Enhance Data Collection with these EXO Components

## EXO Handheld

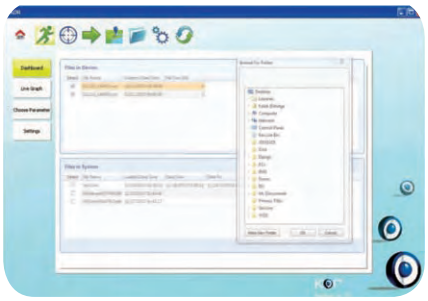
The EXO handheld provides an extremely durable, portable, weather-proof interface to the EXO sondes. The handheld uses a mobile version of the KOR interface software.

Additional standard features:

- GPS
- Temperature-compensated barometer
- Backlit alphanumeric keypad
- Microphone/speaker
- Wet-mate wireless connector
- Bluetooth communication
- Color LED screen
- 2 GB of storage
- Rechargeable battery capable

*Interface with the EXO Sonde using the EXO Handheld Display*

## KOR Interface Software



The KOR Software offers users the capability to easily manage, visualize, and organize large amounts of field data. KOR also provides an interface to the EXO products for fast calibration, configuration, QA/QC or data collection.

- New calibration processes for long-term monitoring
- Graphical user interface for quick data analysis
- Multiple languages

## Multiple Data Output Options

Sonde output is readable by YSI handheld instruments, interface software, and data telemetry modules. In addition to the cable (standard), these communication interfaces are also available:

DCP Signal Output Adapter

Wires into the end of the YSI field cable via flying leads and converts signal to RS-232 or SDI-12 for datalogger applications.

*DCP Signal Output Adapter*

USB Adapter

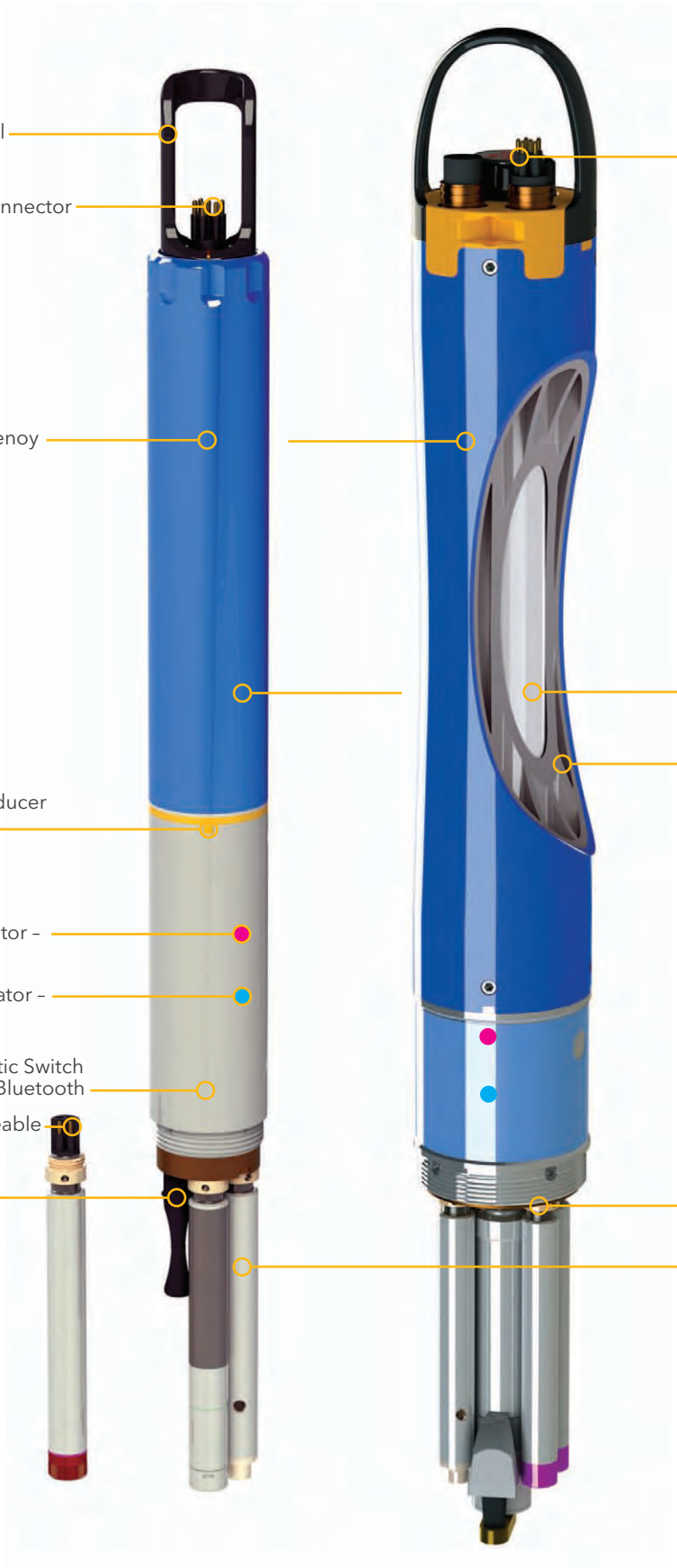
Allows connections between an EXO sonde and a PC.

*USB Adapter*

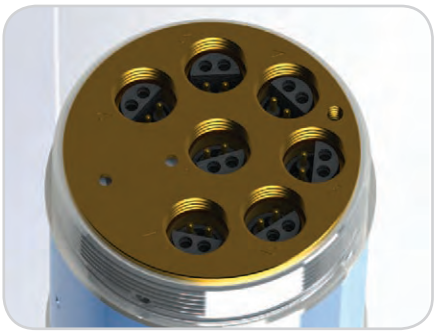
Bluetooth Wireless Technology

Enables communication between a sonde and a user in the lab and pre-deployment in the field.

# Sondes: EXO1 EXO2

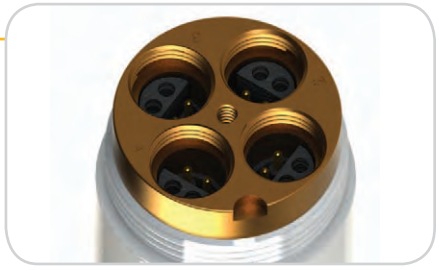



Cable connector, battery valve, and expansion port for an additional sensor



EXO2 sonde contains 6 universal sensor ports plus a central port for an anti-fouling wiper

Wiper keeps sensors clear of biofouling



EXO1 sonde contains 4 universal sensor ports

## Instrument Specifications*

| | | |
|---|---|---|
| **EXO1 Sonde** | | |
| Ports | 4 sensor ports<br>Peripheral port: 1 power communication port | |
| Size | Diameter: 4.70 cm (1.85 in)<br>Length: 64.77 cm (25.50 in) | |
| Weight | 1.42 kg (3.15 lbs) with 4 probes, guard and batteries installed | |
| **EXO2 Sonde** | | |
| Ports | 7 sensor ports (6 ports available when central wiper used)<br>Peripheral ports: 1 power communication port; 1 auxiliary expansion port | |
| Size | Diameter: 7.62 cm (3.00 in)<br>Length: 71.10 cm (28.00 in) | |
| Weight | 3.60 kg (7.90 lbs) with 5 probes, guard and batteries installed | |
| **Sondes** | | |
| Operating Temperature | -5 to 50˚C | |
| Storage Temperature | -20 to 80˚C (except 0 to 60˚C for pH and pH/ORP sensors) | |
| Depth Rating | 0 to 250 m (0 to 820 ft) | |
| Communications | Computer Interface: Bluetooth wireless technology, RS-485, USB<br>Output Options: USB with signal output adapter (SOA); RS-232 & SDI-12 with DCP-SOA | |
| Sample Rate | Up to 4 Hz | |
| Battery Life | 90 days** | |
| Data Memory | 512 MB total memory; >1,000,000 logged readings | |
| **Sensors** | | **Calculated Parameters** |
| Ammonium** | ORP | Salinity |
| Chloride** | pH | Specific Conductance |
| Conductivity | Temperature | Total Dissolved Solids |
| Depth | Total Algae (Chlorophyll + BGA-PC or PE**) | Total Suspended Solids |
| Dissolved Oxygen | Turbidity | |
| Fluorescent Dissolved Organic Matter (fDOM) | Vented Level** | |
| Nitrate** | | |
| **EXO Handheld** | | |
| Size | Width: 12.00 cm (4.72 in)<br>Height: 25.00 cm (9.84 in) | |
| Weight | 0.71 kg (1.56 lbs) without batteries | |
| Operating System | Windows CE 5.0 | |
| Operating Temperature | -10 to 50˚C | |
| Storage Temperature | -20 to 80˚C | |
| IP Rating | IP-67 | |
| Data Memory | 2 GB total memory; >2,000,000 data sets | |
| **Accessories** | | |
| Cables (non-vented) | Flow cells | Sonde/sensor guard |
| Carrying case | KOR software | Calibration cup |
| DCP Signal Output Adapter | USB Signal Output Adapter | Anti-fouling components |
| **Warranty** | | |
| 1 Year | pH, ORP, and optical DO membranes | |
| 2 Years | Cables, sondes (bulkheads), handheld, and the following sensors: conductivity, temperature, depth, and optical sensors | |

* Specifications indicate typical performance and are subject to change. Please check EXOwater.com for up-to-date information.

** Typically 90 days at 20˚C at 15-minute logging interval; temperature/conductivity, pH/ORP, DO, and turbidity sensors installed on EXO1; or temperature/conductivity, pH/ORP, DO, total algae, and turbidity sensors installed with central wiper that rotates once per logging interval on EXO2. Battery life is heavily dependent on sensor configuration.

EXO Bluetooth modules comply with Part 15C of FCC Rules and have FCC, CE Mark and C-tick approval. Bluetooth-type approvals and regulations can be country specific. Check local laws and regulations to insure that the use of wireless products purchased from Xylem are in full compliance.

** Release in 2013. BGA-PE specs TBD.

## Sensor Specifications*

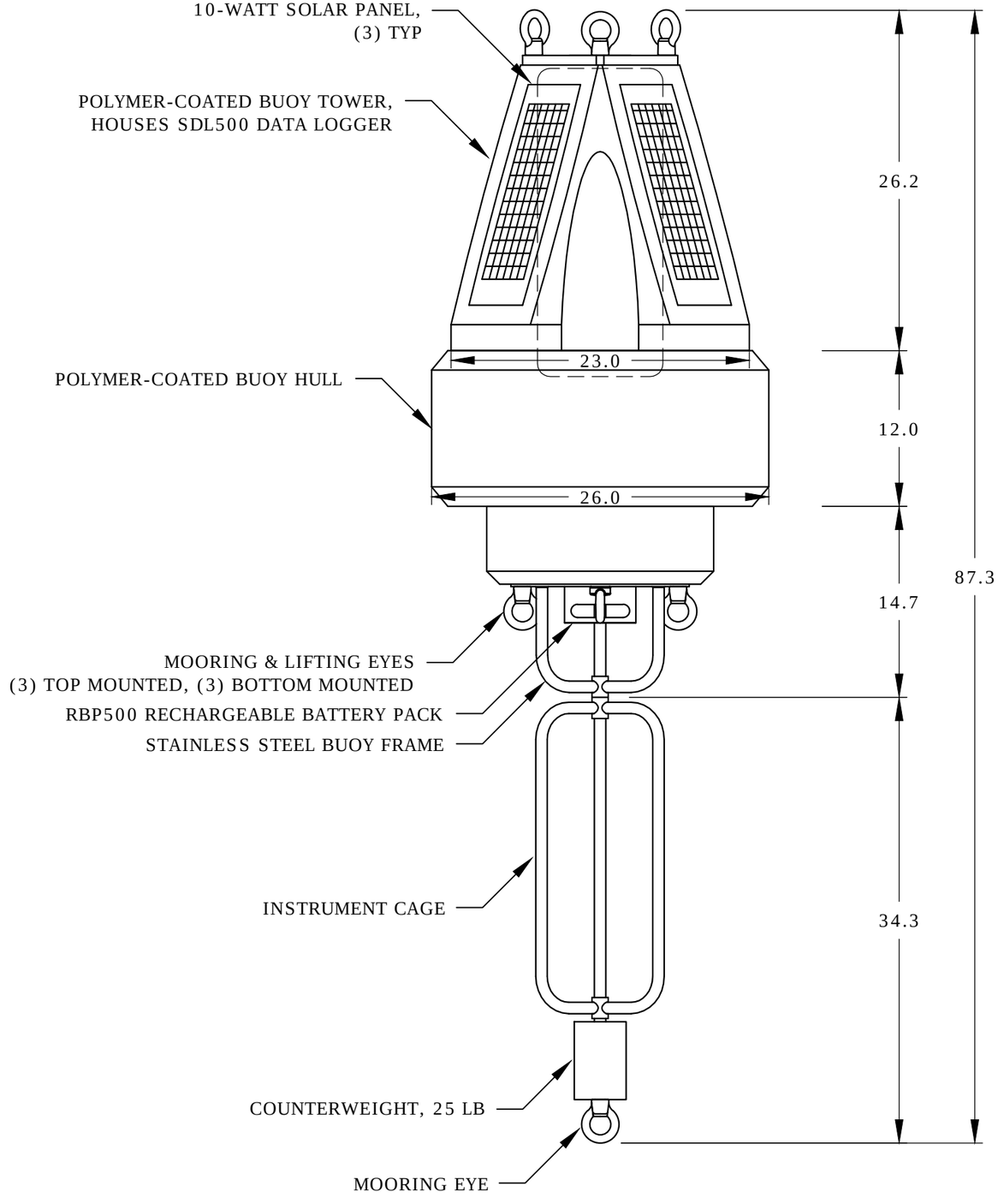
| Sensor | Range | Accuracy* | Response | Resolution |
|---|---|---|---|---|
| Ammonium** [11] (ammonia with pH sensor) | 0 to 200 mg/L [1] | ±10% of reading or 2 mg/L-N, w.i.g. | - | 0.01 mg/L |
| Barometer | 375 to 825 mmHg | ±1.5 mmHg from 0 to 50°C | – | 0.1 mmHg |
| Blue-green Algae Phycocyanin (PC) or Phycoerythrin (PE)** (part of Total Algae sensor) | 0 to 100 µg/L PC; 0 to 100 RFU | Linearity: $R^2$ > 0.999 for serial dilution of Rhodamine WT solution from 0 to 100 µg/mL PC equivalents Detection Limit: 0.04 µg/L PC | T63<2 sec | 0.01 µg/L PC; 0.01 RFU |
| Chloride** [11] | 0 to 1000 mg/L [2] | ±15% of reading or 5 mg/L, w.i.g. | – | 0.01 mg/L |
| Chlorophyll (part of Total Algae sensor) | 0 to 400 µg/L Chl; 0 to 100 RFU | Linearity: $R^2$ > 0.999 for serial dilution of Rhodamine WT solution from 0 to 400 µg/L Chl equivalents Detection Limit: 0.09 µg/L Chl | T63<2 sec | 0.01 µg/L Chl; 0.01 RFU |
| Conductivity [3] | 0 to 200 mS/cm | 0 to 100: ±0.5% of reading or 0.001 mS/cm, w.i.g.; 100 to 200: ±1% of reading | T63<2 sec | 0.0001 to 0.01 mS/cm (range dependent) |
| Depth [4] (non-vented) | 0 to 10 m (0 to 33 ft) | ±0.04% FS (±0.004 m or ±0.013 ft) | T63<2 sec | 0.001 m (0.001 ft) (auto-ranging) |
| | 0 to 100 m (0 to 328 ft) | ±0.04% FS (±0.04 m or ±0.13 ft) | | |
| | 0 to 250 m (0 to 820 ft) | ±0.04% FS (±0.10 m or ±0.33 ft) | | |
| Vented Level** | 0 to 10 m (0 to 33 ft) | ±0.03% FS (±0.003 m or ±0.010 ft) | | |
| Dissolved Oxygen Optical | 0 to 500% air saturation | 0 to 200%: ±1% of reading or 1% saturation, w.i.g.; 200 to 500%: ±5% of reading [5] | T63<5 sec [6] | 0.1% air saturation |
| | 0 to 50 mg/L | 0 to 20 mg/L: ±0.1 mg/L or 1% of reading, w.i.g.; 20 to 50 mg/L: ±5% of reading [5] | | 0.01 mg/L |
| fDOM | 0 to 300 ppb Quinine Sulfate equivalents (QSE) | Linearity: $R^2$ > 0.999 for serial dilution of 300 ppb QS solution Detection Limit: 0.07 ppb QSE | T63<2 sec | 0.01 ppb QSE |
| Nitrate** [11] | 0 to 200 mg/L-N [1] | ±10% of reading or 2 mg/L-N, w.i.g. | – | 0.01 mg/L |
| ORP | -999 to 999 mV | ±20 mV in Redox standard solutions | T63<5 sec [7] | 0.1 mV |
| pH | 0 to 14 units | ±0.1 pH units within ±10°C of calibration temp; ±0.2 pH units for entire temp range [8] | T63<3 sec [9] | 0.01 units |
| Salinity (Calculated from Conductivity and Temperature) | 0 to 70 ppt | ±1.0% of reading or 0.1 ppt, w.i.g. | T63<2 sec | 0.01 ppt |
| Specific Conductance (Calculated from Conductivity and Temperature) | 0 to 200 mS/cm | ±0.5% of reading or .001 mS/cm, w.i.g. | – | 0.001, 0.01, 0.1 mS/cm (auto-scaling) |
| Temperature | -5 to 50°C | -5 to 35°C: ±0.01°C [10] 35 to 50°C: ±0.05°C [10] | T63<1 sec | 0.001 °C |
| Total Dissolved Solids (TDS) (Calculated from Conductivity and Temperature) | 0 to 100,000 g/L Cal constant range 0.30 to 1.00 (0.64 default) | Not Specified | – | variable |
| Total Suspended Solids (TSS) (Calculated from Turbidity and TDS) | 0 to 1500 mg/L | Not Specified | T63<2 sec | variable |
| Turbidity [11] | 0 to 4000 FNU | 0 to 999 FNU: 0.3 FNU or ±2% of reading, w.i.g.; 1000 to 4000 FNU: ±5% of reading [12] | T63<2 sec | 0 to 999 FNU: 0.01 FNU; 1000 to 4000 FNU: 0.1 FNU |

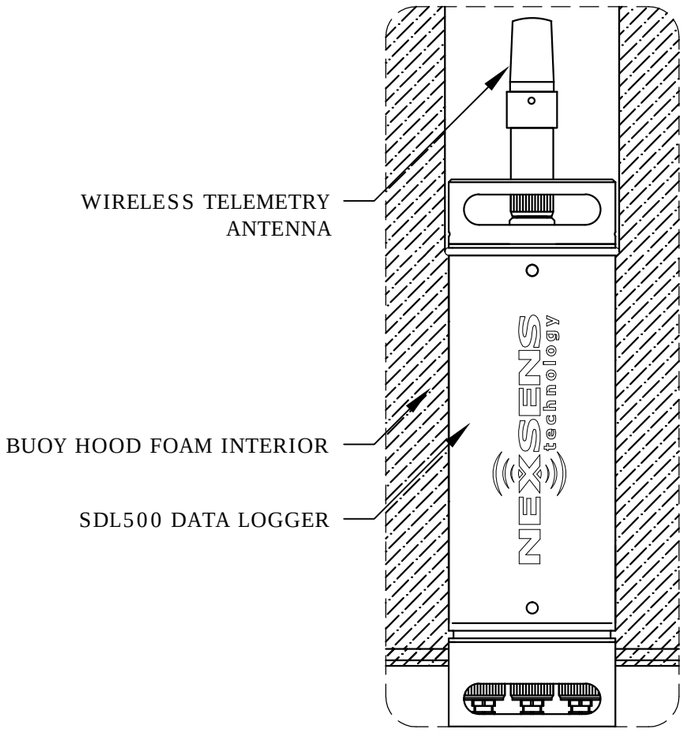
All sensors have a depth rating to 250 m (820 ft), except shallow and medium depth sensors and ISEs. EXO sensors are not backward compatible with 6-Series sondes.

* Specifications indicate typical performance and are subject to change. Please check EXOwater.com for up-to-date information.
Accuracy specification is attained immediately following calibration under controlled and stable environmental conditions. Performance in the natural environment may vary from quoted specification.

[1] 0-30°C [2] 0-40°C w.i.g. = whichever is greater
[3] Outputs of specific conductance (conductivity corrected to 25°C) and total dissolved solids are also provided. The values are automatically calculated from conductivity according to algorithms found in *Standard Methods for the Examination of Water and Wastewater* (Ed. 1989).
[4] Accuracy specifications apply to conductivity levels of 0 to 100,000 µS/cm.
[5] Relative to calibration gases
[6] When transferred from air-saturated water to stirred deaerated water
[7] When transferred from water-saturated air to Zobell solution
[8] Within the environmental pH range of pH 4 to pH 10
[9] On transfer from water-saturated air to rapidly stirred air-saturated water at a specific conductance of 800 µS/cm at 20°C; T63<5 seconds on transfer from water-saturated air to slowly-stirred air-saturated water.
[10] Temperature accuracy traceable to NIST standards
[11] Calibration: 1-, 2-, or 3-point, user-selectable
[12] Specification is defined in AMCO-AEPA Standards

** Release in 2013. BGA-PE specs TBD.




BUOY HOOD SECTION CUT
(2X SCALE)

# CB-200 DATA BUOY DIMENSIONAL VIEW

SCALE: 1:10

NEXSENS technology

DRAWN BY: MHD
DATE: 8/6/13
SHEET: 1 of 1

ITEM: NEXSENS CB-200 COASTAL DATA BUOY
SHEET TITLE: DATA BUOY DIMENSIONAL VIEW
DRAWING NUMBER: NEX177
REV: 01

# *Model 711 Portable*
# *Suspended Solids and Interface Level Analyzer*

## *Model 711 Specific Features*

- **Two analyzers in one package:**
  Switch from Solids measurement to Interface level without losing calibration.
- **Automatic ranging:**
  Goes completely over the operating range of the analyzer with manual adjustment.
- **Simple, insitu calibration:**

The Royce **Model 711** Portable Suspended Solids/ Interface Level Analyzer is a rugged, waterproof instrument designed for the rigors of remote sampling. The meter provides reliable operation in waste treatment plants, rivers, lakes and other aqueous systems. the meter will read in either grams per liter when in the suspended solids mode or relative density percentage while in the interface level mode of operation.

The **Model 711** stores the calibration values for suspended solids and interface level in two separate non-volitale memory locations allowing the user to switch between operational modes without having to recalibrate. The net effect is two analyzers in one.

Due to the full utilization of the microprocessor, calibration values are stored so that recalibration is not required on a daily basis. If the sensoris cleaned after use, monthly calibration is usualyy more than sufficient for proper operation in eithermode of calibration.

The **Model 711** analyzer utilizes the **Model 71** medium range sensor. The **Model 71** is a rugged, reliable sensing element that has polymer optical grade lenses. It was designed specifically to meet the rigorous demands that are a requirement for a portable sensor.

## *Model 711 / 71 Specifications*

**Range:**
0 - 10 grams per liter (o to 10,000 mg/l)
**Readout Device:**
Harsh environment, 1/2" LCD digital display
**Input Power:**
Standard 9V battery
**Enclosure:**
Waterproof
**Size:**
7 inches long
3.2 inches wide
1.5 inches deep
**Weight:**
1.5 pounds (.68 kgms)

**Type:**
Single Gap, Optical
**Accuracy:** ± 5% of reading or ± 100 mg/l, whichever is greater
**Repeatability:**
± 1% of reading or ± 20 mg/l, whichever is greater
**Range:**
0 - 10 g/l
**Operating Limits:**
Temperature, 0 - 65° C
Pressure, o - 50 PSIG
**Size:**
4 inches long
2 inches diameter
**Weight:**
1 pound (.45 kgms)
**Construction:**
Polyurethane body
Optical grade ploymer lenses

## *Supplied Standard with Model 711 System*

- **Model 711** rugged Suspended Solids analyzer
- **Model 71** rugged SS sensor with 8 meters or 25 feet of cable and waterproof, military connector.
  Cable is scaled in one foot increments.
- Velcro "grip strap" which can convert to a handy belt holder.
- 9V battery.
- Detailed instruction manual.

# APPENDIX K

# RESTORATION OPERATION, MAINTENANCE AND MONITORING PLAN

**RESTORATION OPERATION, MAINTENANCE AND MONITORING PLAN**

**CONGAREE RIVER SITE**
**COLUMBIA, SOUTH CAROLINA**

September 2020

*Prepared for:*

**Dominion Energy South Carolina, Inc.**
400 Otarre Parkway
Cayce, SC 29033

*Prepared by:*

**Apex Companies, LLC**
1600 Commerce Circle
Trafford, PA 15085

**RESTORATION OPERATION, MAINTENANCE AND MONITORING PLAN**

**CONGAREE RIVER SITE**
**COLUMBIA, SOUTH CAROLINA**

## INTRODUCTION

Dominion Energy South Carolina, Inc. (DESC) plans to complete a Stakeholder-Developed Modified Removal Action (MRA) to address the occurrence of a tar-like material (TLM) that is commingled with sediment along the eastern shoreline of the Congaree River, just south of the Gervais Street Bridge in Columbia, South Carolina. The project area location is shown on Figure 1. The TLM is believed to be a coal tar material that originated from the Huger Street former Manufactured Gas Plant (MGP) site, located approximately 1,000 feet to the northeast of the project area. The proposed work is being performed by DESC at the direction of South Carolina Department of Health and Environmental Control (SCDHEC) and is subject to permits and approvals from the U.S. Army Corps of Engineers (USACE) and other agencies.

The overall objective of this project is to remove impacted sediment from the Congaree River. The current plan is to complete an MRA that consists of the removal of impacted sediment from two separate areas as depicted in Figure 2. The removal areas are close to the shoreline and therefore more susceptible to human dermal contact or exposure, and include locations where more concentrated or thicker deposits of TLM are known to exist. A temporary cofferdam will be constructed for each area to facilitate removal of the impacted sediment in phases. After the temporary cofferdam is constructed, the isolated area will be dewatered, and the impacted sediment removed and transported off-site for disposal. Following completion of the impacted sediment removal activities in each phase and removal of the cofferdam, this Restoration Operation, Maintenance and Monitoring Plan will be implemented.

The active, or in-the-river construction season for building or relocating the cofferdam will be from May through October of each year. DESC has also requested permission to work behind the cofferdam year-round, with minimal site activity projected during the months of December through April.

This Plan was developed to provide additional details regarding restoration activities, in particular the planned riverbank and shoreline restoration activities that will be completed. This Plan includes the use of bio-restoration techniques for the riverbank and riparian areas disturbed by MRA activities. Due to unknown factors such as the exact extent and depth of TLM impacts immediately adjacent to the shoreline, and the resulting uncertainty of slope stability while removing the impacted sediment, the actual approach, locations and techniques for shoreline protection are assumed and may need modified during installation. This plan will serve as a guide for the planned restoration techniques and recognizes that actual site conditions will dictate the exact extent, location, and materials of construction for the shoreline restoration.

## REMOVAL ACTION ACTIVITIES

Initial project activities will consist of constructing the landside support zone prior to installing the cofferdam around each MRA area. Figure 2 shows the MRA areas and conceptual site operations layout

with landside support zone components. The landside support zone will consist of a series of gravel roads and equipment/material storage areas and temporary structures.

The cofferdams will be constructed to isolate the planned work areas from the remainder of the river and facilitate dewatering and excavation of the impacted sediment. After the cofferdam is in place and the area dewatered, the sediment removal activities will commence. To the extent practical, the existing riverbank will remain undisturbed. However, many areas of the existing shoreline/riverbank will be impacted and require restoration. After sediment removal in each area is completed, the cofferdam components will be completely removed from the river and disturbed portions of the riverbank will be restored. Landside support zone equipment and structures will be demobilized after sediment removal is completed and the landside operations area will be restored to pre-MRA conditions. Specific site restoration activities associated with the river, landside operations, and riverbank and shoreline areas are described below.

## RESTORATION PLANS

### River Restoration

DESC plans on removing all sediment and gravel, small rocks, etc. (both visually impacted with TLM and visually unimpacted material) from the removal areas to the extent practical. Large rocks that are visually unimpacted may be temporarily relocated within the work area to facilitate sediment removal and then returned to their approximate original locations. As an additional measure, DESC plans to pressure wash the exposed bedrock bottom of the river where necessary. Water generated during the pressure washing stage will be collected and removed from the excavation for treatment and discharge to the City of Columbia Public Owned Treatment Works (POTW). The intent is to remove any residual staining or impacts due to the presence of TLM, if practical.

Current plans do not include replacing any removed material with backfill. The impacted sediment will be removed down to the top of the underlying bedrock. In many areas, this will only require removal of several inches of sediment. Following completion of the removal activities, the cofferdam will be removed and over time, the natural depositional processes of the river will restore the river bottom to natural conditions. This process will allow for natural re-deposition of sediment within the removal area based on current river hydraulics. Not replacing the impacted sediment with fill material will also eliminate the potential for backfill materials to be washed downstream and deposited in other areas or degrade other habitats through siltation, etc.

### Landside Restoration

Prior to mobilization, a Notice of Intent will be submitted to the City of Columbia for coverage under South Carolina NPDES General Permit For Stormwater Discharges From Construction Activities SC100000. This submittal will include a Comprehensive Stormwater Pollution Prevention Plan which includes a Stormwater Management and Sediment Control Plan (SMSCP). The SMSCP provides details on erosion and sediment control methods to be established, maintained and inspected at the site during active operations, as well as plans for final restoration following completion of landside activities. The general approach to final restoration of the landside operations areas is to restore the locations to pre-MRA conditions to the extent practical.

**Riverbank and Shoreline Restoration**

Figure 2 provides the site operations plan scenario and highlights the approximate areas where the eastern shoreline of the riverbank will likely be disturbed as a result of MRA activities. It is estimated that approximately 1,300 linear feet of the project area shoreline may be impacted by MRA activities. Shoreline disturbances will be limited to the extent practical. These locations include access roads and cofferdam/riverbank tie-in locations. Available delineation data suggest that TLM is not located within the riverbank soil and as a result, much of the riverbank and riparian corridor may be left undisturbed.

Areas where disturbance may not be necessary will be demarcated with flagging or fencing to ensure they are not impacted by removal operations or heavy equipment movement unless required. Oversight personnel will routinely monitor these areas in order to prevent unnecessary impacts. In areas where shoreline impacts are necessary, and/or the removal of impacted sediment results in slope failure, DESC will conduct restoration activities. Restoration will include recreating the approximate shoreline slope, stabilization of the bank via riprap and/or bioengineered solutions, and restoration of vegetative cover where practical. DESC's goals are to minimize riverbank disturbance where possible, to restore disturbed areas to natural pre-MRA conditions, and to utilize bioengineering techniques and structures to the extent practical when repairing impacted shoreline. Figure 2 provides the currently envisioned shoreline restoration scenario. Figures 3 through 6 show details of riverbank restoration/stabilization alternatives and examples of potential techniques that will be utilized. The restoration approach consists of four major components:

1. Minimization of impacts and protection of areas where disturbance is not required (Figure 2);
2. Use of "hardscaping" or riprap type stabilization measures in high velocity/high turbulence areas to safeguard against future bank erosion (primarily limited to northern portion of Area 1) [refer to details on Figure 3];
3. Use of riprap to stabilize the transition area between the excavated area and the undisturbed shoreline at and below normal water level (refer to Detail 4-1 on Figure 4); and
4. Use of bioengineered solutions in areas less susceptible to future erosion (refer to details on Figures 4 through 6).

As stated above, portions of the riparian corridor where disturbance may not be necessary will be demarcated to ensure that they are not impacted unless required. This preservation technique will be a key component of the overall project. In high water velocity or turbulent areas, stabilization of the shoreline will take priority over re-establishing vegetative cover. As a result, in some areas it will be necessary to utilize restoration techniques and material that is more resistant to erosion (i.e., hardscape) in order to ensure that the bank is capable of withstanding high velocity and turbulent flows. Typical techniques utilized in these areas include placement of geotextile and riprap, which will serve to fortify the bank and resist future erosion over time (Figure 3). As currently envisioned, these stabilization practices will likely be necessary in the northern portion of Area 1.

Removal operations will necessitate creation of a small cut at the toe of the existing riverbank slope where excavation of material is discontinued. Geotextile and riprap will be placed in this transition zone in order to support and protect the riverbank from sloughing or collapsing. The specific detail for this technique is provided as Detail 4-1 on Figure 4. The riprap placement will be minimized to the extent practical and should not significantly extend above the normal waterline in most areas. Over time,

sediment will likely accumulate in the voids within the riprap placement area and serve to re-establish the current shoreline aesthetic characteristics.

In areas where river flow characteristics are more conducive, bioengineered solutions, such as those shown on Figures 4 through 6, will be employed. These alternatives primarily focus on incorporating vegetative restoration with stabilization. Shoreline cover recreation such as staging partially submerged trees (Figure 5) or other habitat enhancements will also be conducted, as feasible. In some areas, it may be appropriate to plant native southeastern shrubs, grasses and forbs (Figure 6) secured by a biodegradable mat. As currently envisioned, the disturbed shoreline downstream of the Senate Street alluvial fan can be restored using these techniques (Figure 2).

Following completion of the MRA sediment removal and restoration activities, the riverbank and shoreline area will be monitored to assure restoration was successful. Periodic inspections will occur on a monthly basis or following significant weather-related events for a period of one year, unless property owner redevelopment plans result in an earlier change to restored conditions. Should issues be identified during inspections that warrant mitigation, DESC will implement repairs to the affected area(s), as necessary, to assure sufficient stabilization.

As project plans are further developed, certain details or specifications regarding restoration may be modified in order to reflect minor changes or input from applicable experts and/or the property owner. The USACE, SCDHEC and other agencies, as may be appropriate, will be made aware of any major modifications to planned activities prior to implementation.

**Attachment A**

**Table and Figures**

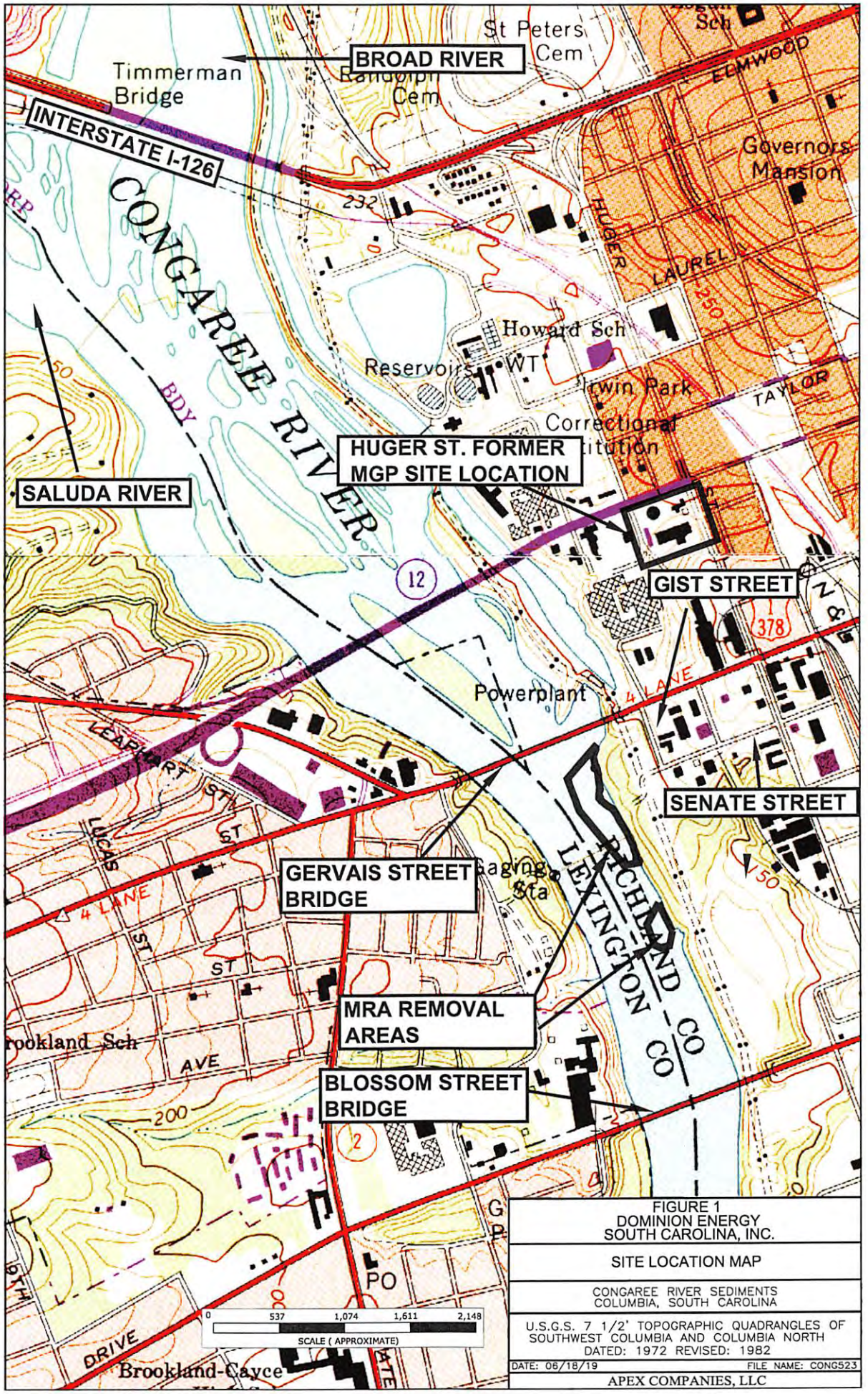



FIGURE 1
DOMINION ENERGY
SOUTH CAROLINA, INC.

SITE LOCATION MAP

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

U.S.G.S. 7 1/2' TOPOGRAPHIC QUADRANGLES OF
SOUTHWEST COLUMBIA AND COLUMBIA NORTH
DATED: 1972 REVISED: 1982

DATE: 06/18/19 FILE NAME: CONG523

APEX COMPANIES, LLC

LEGEND

- STREAM/RIVER/WETLAND EDGE
- TREELINE
- 5 FOOT CONTOUR INTERVALS
- REMOVAL AREAS FROM STAKEHOLDER DEVELOPED MRA PLAN
- SITE PERIMETER FENCE
- APPROXIMATE EXTENT OF GRAVEL AREAS
- POTENTIAL UNDISTURBED RIVERBANK
- APPROXIMATE LOCATION OF RIPRAP PLACEMENT
- APPROXIMATE LOCATION OF BIOENGINEERED SOLUTIONS
- TRANSITION FROM HARDSCAPE TO BIOENGINEERED SOLUTIONS

NOTES:
1) LAND TOPOGRAPHY BASED ON LIDAR SURVEY CONDUCTED ON APRIL 18, 2018.
2) CONGAREE RIVER GAGE (02169500) HEIGHT DURING LIDAR SURVEY WAS 6.18' (119.20' ELEVATION NGVD 29).
3) RIVER BOTTOM CONTOURS BASED ON BATHYMETRIC SURVEYS CONDUCTED MAY 7 THRU JULY 17, 2018.

0' 180' 360'

N

GERVAIS STREET BRIDGE

GIST STREET

SENATE STREET

JOB TRAILERS

OFFICE AREA

GATE

MATERIAL AND WATER MANAGEMENT AREA

AREA 1

AREA 2

CONGAREE RIVER

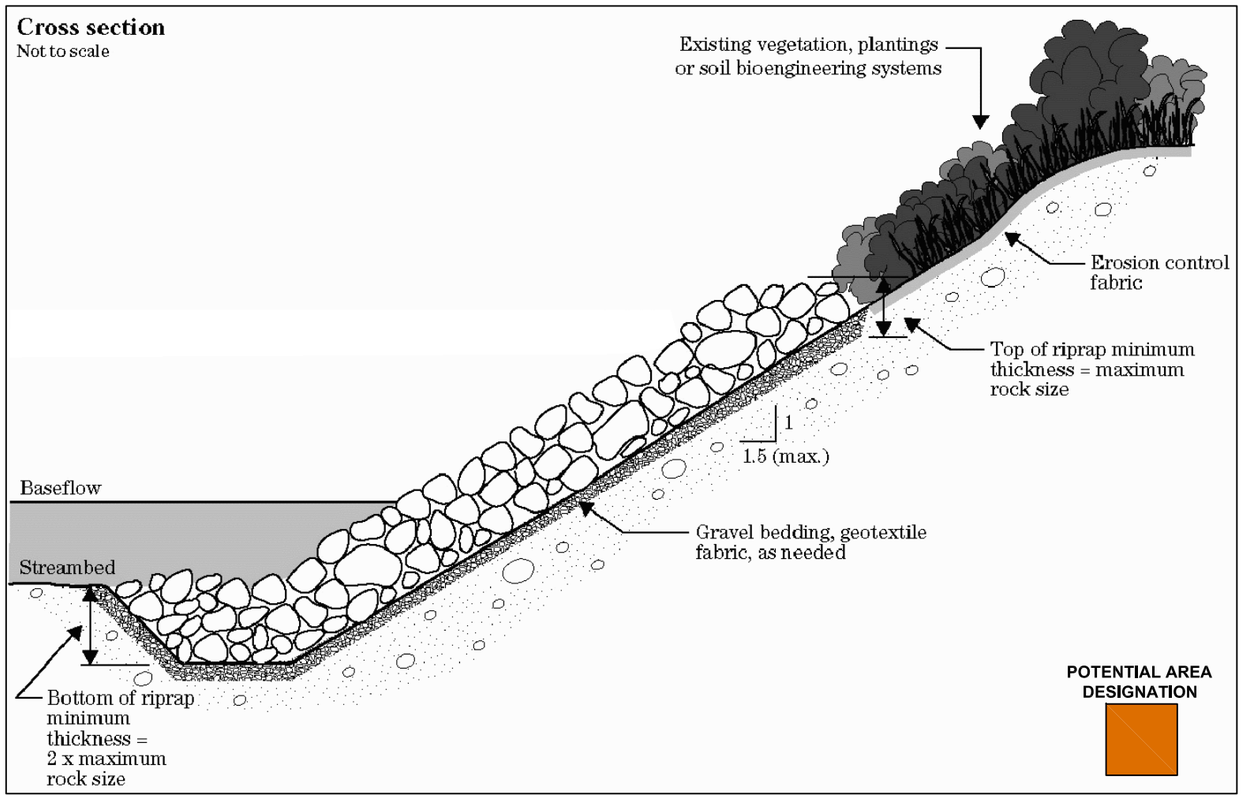
FIGURE 2
DOMINION ENERGY
SOUTH CAROLINA, INC.

CONCEPTUAL SITE OPERATIONS PLAN
WITH SHORELINE RESTORATION SCENARIO

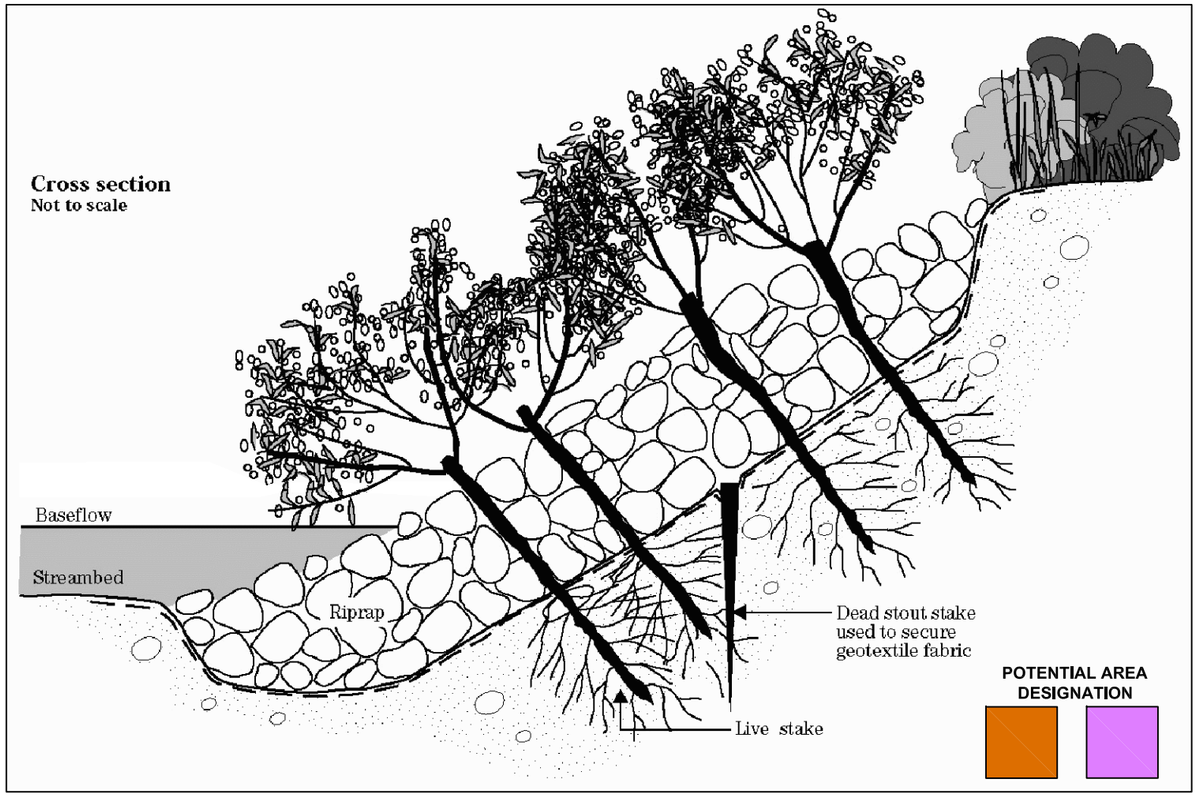
COLUMBIA, SOUTH CAROLINA

DATE: 5/19/20 FILE NAME: CONG552

APEX COMPANIES, LLC




3-1 TYPICAL RIPRAP RIVER BANK STABILIZATION
(OR OTHER HARDSCAPE MATERIAL)




3-2 TYPICAL RIPRAP RIVER BANK STABILIZATION WITH JOINT PLANTING
(OR OTHER HARDSCAPE MATERIAL)

NOTES:
1. RIPRAP BANK STABILIZATION WILL BE UTILIZED IN AREAS WITH HIGH VELOCITY AND OR TURBULENT RIVER FLOWS TO GUARD AGAINST FUTURE RIVERBANK EROSION.
2. JOINT PLANTING (DETAIL 3-2) WILL BE CONDUCTED, IF FEASIBLE, TO PROVIDE VEGETATIVE COVER IN RIPRAP AREAS AND TO PROVIDE A TRANSITION TO OTHER BIOENGINEERED AREAS.
3. DETAILS OBTAINED FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE ENGINEERING FIELD HANDBOOK (ISSUED 1996) - PART 650 - CHAPTER 16 STREAMBANK AND SHORELINE PROTECTION.
4. INSTALLATION OF SHORELINE RESTORATION COMPONENTS WILL BE CONDUCTED IN ACCORDANCE WITH ESTABLISHED STANDARDS AS OUTLINE IN THE ABOVE REFERENCE ENGINEERING FIELD HANDBOOK.
5. TABLES 1, 2 AND 3 ON FIGURE 6 PROVIDE PLANT SPECIFICATIONS.

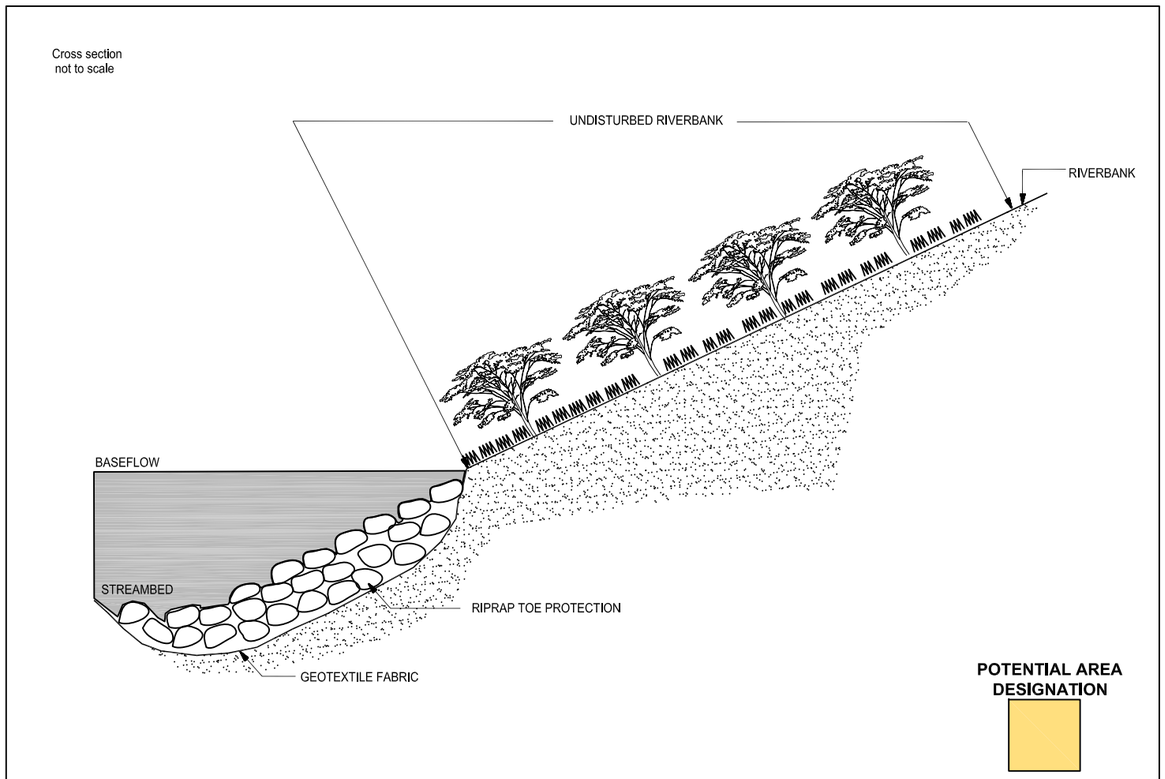
FIGURE 3
DOMINION ENERGY
SOUTH CAROLINA, INC.

RIVERBANK STABILIZATION
DETAILS

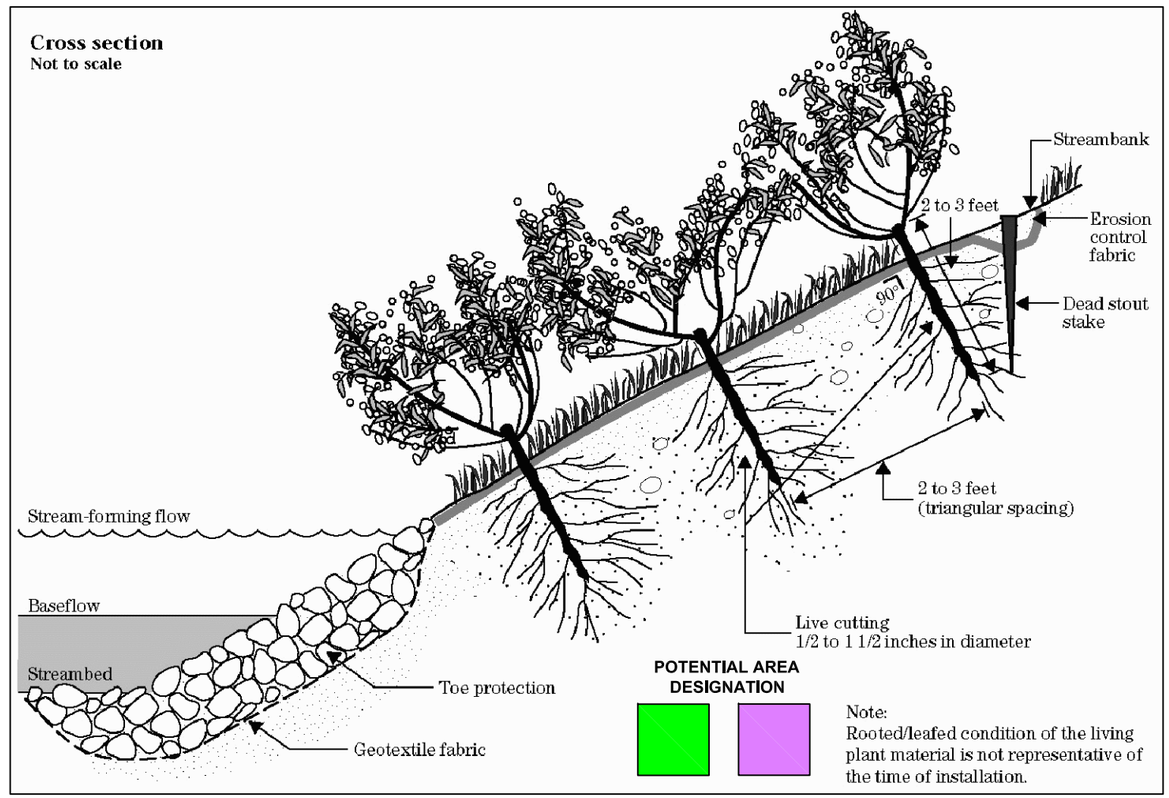
CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

DATE: 5/4/20 FILE NAME: CONG547

APEX COMPANIES, LLC




4-1 UNDISTURBED RIVER BANK TOE STABILIZATION




4-2 JOINT PLANTING BIOENGINEERED BANK STABILIZATION OPTION DETAIL

NOTES:

1. GEOTEXTILE AND RIPRAP (DETAIL 4-1) WILL BE UTILIZED TO STABILIZE EXCAVATED AREAS AT THE TOE OF RIVERBANK SLOPES TO PREVENT SLOUGHING OR COLLAPSING. RIPRAP PLACEMENT WILL TERMINATE AT OR BELOW THE APPROXIMATE NORMAL WATERLINE.
2. LIVE STAKES (DETAIL 4-2) WILL POTENTIALLY BE UTILIZED IN CONJUNCTION WITH OTHER BIOENGINEERED SOLUTIONS, AS NEEDED, IN AREAS WHERE RIVERBANK DISTURBANCE EXTENDS SIGNIFICANTLY ABOVE THE NORMAL WATERLINE AND RIVER FLOW VELOCITY AND TURBULENCE CONDITIONS DO NOT REQUIRE ADDITIONAL STABILIZATION MEASURES.
3. DETAILS OBTAINED FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE ENGINEERING FIELD HANDBOOK (ISSUED 1996) - PART 650 - CHAPTER 16 STREAMBANK AND SHORELINE PROTECTION.
4. INSTALLATION OF SHORELINE RESTORATION COMPONENTS WILL BE CONDUCTED IN ACCORDANCE WITH ESTABLISHED STANDARDS AS OUTLINE IN THE ABOVE REFERENCE ENGINEERING FIELD HANDBOOK.
5. TABLES 1, 2 AND 3 ON FIGURE 5 PROVIDE PLANT SPECIFICATIONS.

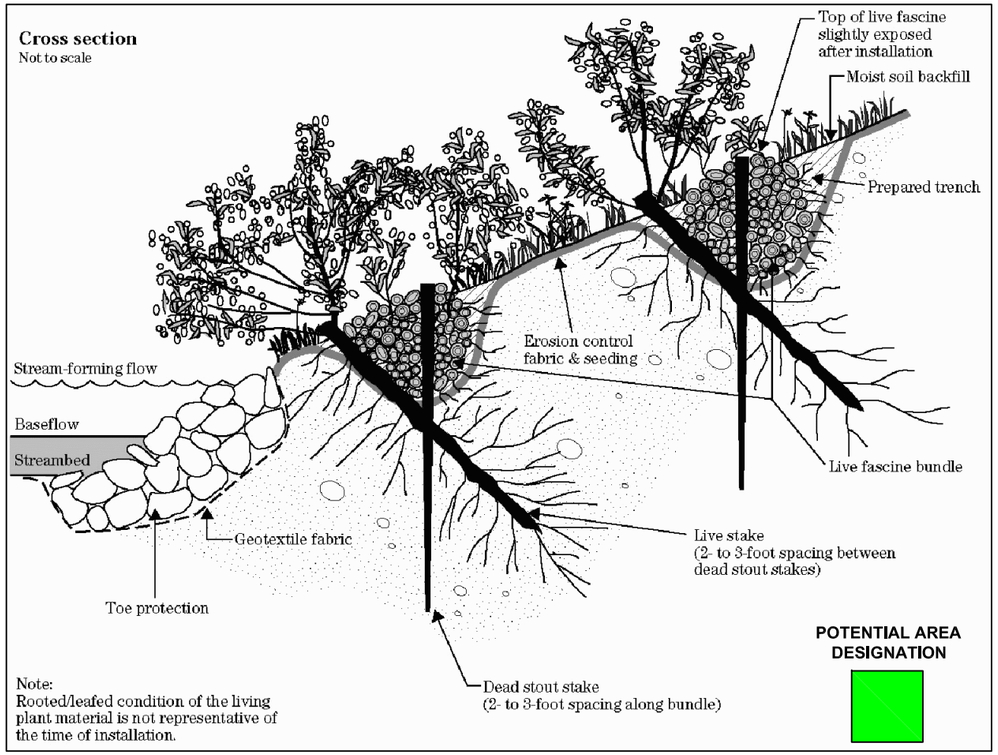
FIGURE 4
DOMINION ENERGY
SOUTH CAROLINA, INC.

RIVERBANK TOE STABILIZATION
AND BIOENGINEERING OPTION DETAILS

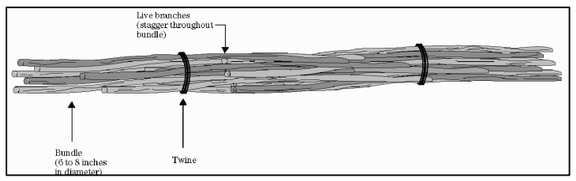
CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

DATE: 5/4/20 FILE NAME: CONG547

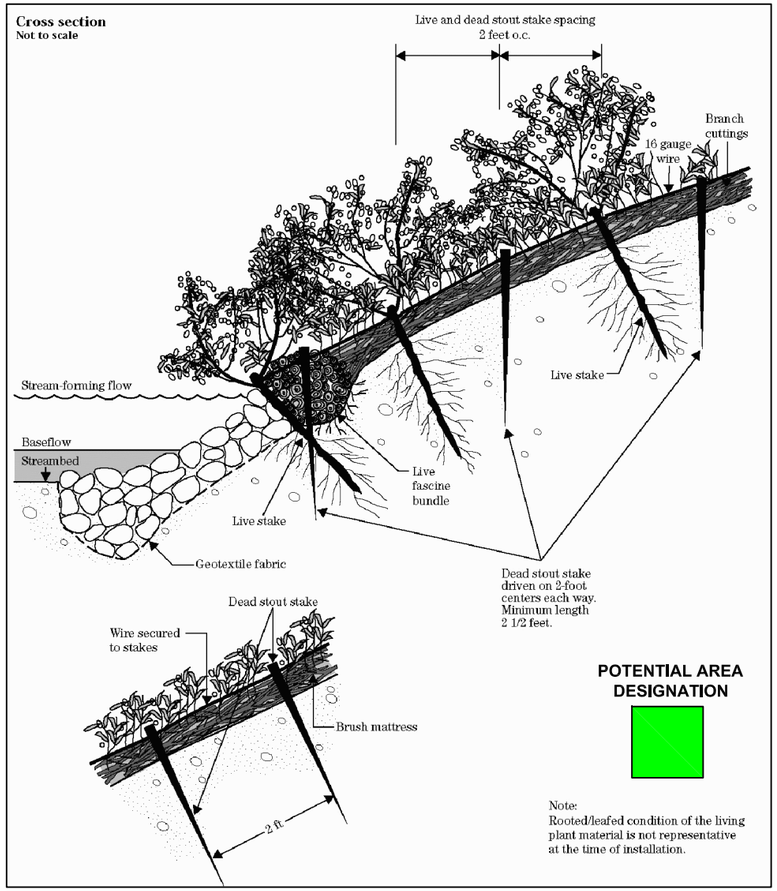
APEX COMPANIES, LLC




5-1 LIVE FASCINE STABILIZATION OPTION




5-2 LIVE FASCINE DETAIL




5-3 BRUSHMATTRESS BANK STABILIZATION OPTION DETAIL

NOTES:

1. LIVE FASCINES (DETAIL 5-1) ARE AN OPTION FOR FLATTER SLOPE (3:1 OR FLATTER) STABILIZATION IN AREAS WHERE RIVER VELOCITY AND TURBULENCE CONDITIONS DO NOT REQUIRE ADDITIONAL STABILIZATION MEASURES.
2. LIVE FASCINES (DETAIL 5-2) ARE LONG BUNDLES OF BRANCH CUTTINGS THAT CONTAIN SOME LIVE BRANCHES.
3. BRUSHMATTRESS PROVIDE A COMBINATION OF LIVE STAKES, LIVE FASCINES AND BRANCH CUTTINGS AND PROVIDE MORE PROTECTION FROM EROSION OF STEEPER SLOPES OR AREAS OF HIGHER VELOCITY RIVER FLOW.
4. DETAILS OBTAINED FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE ENGINEERING FIELD HANDBOOK (ISSUED 1996) - PART 650 - CHAPTER 16 STREAMBANK AND SHORELINE PROTECTION.
5. INSTALLATION OF SHORELINE RESTORATION COMPONENTS WILL BE CONDUCTED IN ACCORDANCE WITH ESTABLISHED STANDARDS AS OUTLINE IN THE ABOVE REFERENCE ENGINEERING FIELD HANDBOOK.
6. TABLES 1, 2 AND 3 ON FIGURE 6 PROVIDE PLANT SPECIFICATIONS.

FIGURE 5

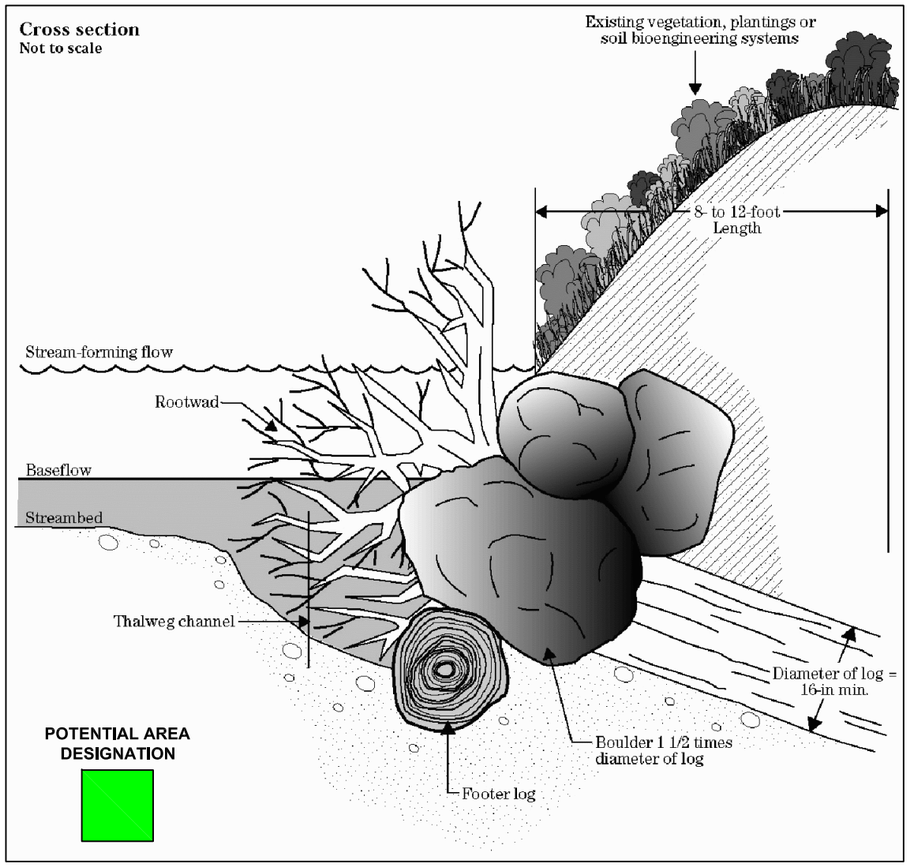
DOMINION ENERGY
SOUTH CAROLINA, INC.

BIOENGINEERED STABILIZATION OPTION DETAILS

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

DATE: 5/4/20 FILE NAME: CONG547

APEX COMPANIES, LLC




6-1 LOG, ROOTWAD AND BOULDER REVETMENT STABILIZATION OPTION DETAIL

**TABLE 1**
**GRASSES AND FORBES**

| Schientific Name | Common Name | Soil Preference | Drought Tolerance | Shade Tolerance | Flood Tolerance |
|---|---|---|---|---|---|
| *Ammophila breviligulata* | American beachgrass | sands | fair | poor | |
| *Andropogon gerardii* | Big bluestem | loams | good | poor | fair |
| *Arundo donax* | Giant reed | sandy | good | poor | poor |
| *Heraithria altissima* | Limpograss | sandy | poor | poor | good |
| *Panicum amarulum* | Coastal panicgrass | sands to loams | good | poor | good |
| *Panicum virgatum* | Switchgrass | loams to sands | good | poor | good |
| *Paspalum vaginatum* | Seashore paspalum | sandy | | poor | good |
| *Pennisetum purpureum* | Elephant grass | | | poor | |
| *Spartina pectinata* | Prairie cordgrass | sands to loams | good | fair | fair |
| *Zizaniopsis miliacea* | Giant cutgrass | loam | poor | poor | good |

**TABLE 2**
**PLANTS SUITABLE FOR ROOTING**

| Scientific Name | Common Name | Plant Type | Rooting Ability (from cutting) |
|---|---|---|---|
| *Acer negundo* | Boxelder | | |
| *Asimina triloba* | Pawpaw | small tree | poor to fair |
| *Baccharis balimifolia* | Groundsel bush | medium shrub | good |
| *Cephalanthus occidentalis* | Buttonbush | large shrub | fair to good |
| *Cornus amomum* | Silky dogwood | small shrub | fair |
| *Cornus sericia* | Red osier dogwood | | |
| *Gleditsia triacanthos* | Honeylocust | medium tree | poor to fair |
| *Populus deltoides* | Eastern cottonwood | tall tree | very good |
| *Robinia sp.* | Black locust | | |
| *Salix discolor* | Pussy willow | large shrub | very good |
| *Salix nigra* | Black willow | small to large tree | good to excel |
| *Salix purpurea* | Purpleosier willow | medium tree | excel |
| *Sambucus canadensis* | American elder | medium shrub | good |
| *Viburnum dentatum* | Arrowwood | medium to tall shrub | good |
| *Viburnum lentago* | Nannyberry | large shrub | fair to good |

**TABLE 3**
**WOODY PLANTS**

| Scientific Name | Common Name | Plant Type | Establishment Speed |
|---|---|---|---|
| *Acer negundo* | Boxelder | small to medium tree | fast |
| *Acer rubrum* | Red maple | medium tree | fast |
| *Alnus serrulata* | Smooth alder | large shrub | medium |
| *Amorpha fruitcosa* | False indigo | shrub | fast |
| *Aronia arbutifolia* | Red Chokeberry | shrub | fast |
| *Asimina triloba* | Pawpaw | small tree | |
| *Betula nigra* | River birch | medium to large tree | fast |
| *Carpinis caroliniana* | American hornbeam | small tree | slow |
| *Carya cordiformis* | Bitternut hickory | tree | |
| *Catalpa bignonioides* | Southern catalpa | tree | fair |
| *Celtis laevigata* | Sugarberry | medium tree | slow |
| *Celtis occidentalis* | Hackberry | medium tree | slow |
| *Cephalanthus occidentalis* | Buttonbush | large shrub | medium |
| *Chionanthus virginicus* | Fringe tree | small tree | |
| *Clethera ainifolia* | Sweet Pepperbush | shrub | |
| *Cornus amomum* | Silky dogwood | small shrub | medium |
| *Cornus florida* | Flowering dogwood | small tree | fair |
| *Diospyros virginiana* | Persimmon | medium tree | fair |
| *Fraxinus pennsylvanica* | Green ash | medium tree | fast |
| *Gleditsia triacanthos* | Honeylocust | medium tree | fast |
| *Ilex decidua* | Possomhaw | large shrub to small tree | |
| *Ilex opaca* | American holly | small tree | medium |
| *Ilex verticillata* | Winterberry | small to large shrub | |
| *Juglans nigra* | Balck walnut | medium tree | fair |
| *Juniperus virginiana* | Eastern redcedar | large tree | medium |
| *Liquidambar styraciflua* | Sweetgum | large tree | |
| *Liriodendron tulipifera* | Tulip poplar | large tree | fast |
| *Magnolia virginiana* | Sweetbay | small tree | |
| *Nyssa sylcatica* | Blackgum | tall tree | slow |
| *Ostrya virginiana* | Hophornbean | small tree | slow |
| *Platanus occidentalis* | Sycamore | large tree | fast |
| *Populus deltoides* | Eastern cottonwood | tall tree | fast |
| *Quercus alba* | White oak | large tree | slow |
| *Quercus lyrata* | Overcup oak | medium tree | slow |
| *Quercus michauxii* | Swamp chestnut oak | medium tree | fair |
| *Quercus nigra* | Water oak | medium tree | slow |
| *Quercus phellos* | Willow oak | medium to large tree | medium |
| *Quercus shumardii* | Shumard oak | large tree | slow |
| *Rhododenron atlanticum* | Coast azalea | small shrub | |
| *Rhododendron viscosum* | Swamp azalea | shrub | |
| *Salix nigra* | Black willow | small to large tree | fast |
| *Viburnum nudum* | Swamp haw | large shrub | |

NOTES:
1. LOG, ROOTWAD AND BOULDER REVETMENTS MAY BE UTILIZED SPORADICALLY TO PROVIDE OVERHEAD COVER AND HABITAT IMPROVEMENT ALONG THE DISTURBED SHORELINE.
2. DETAILS OBTAINED FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE ENGINEERING FIELD HANDBOOK (ISSUED 1996) - PART 650 - CHAPTER 16 STREAMBANK AND SHORELINE PROTECTION.
3. INSTALLATION OF SHORELINE RESTORATION COMPONENTS WILL BE CONDUCTED IN ACCORDANCE WITH ESTABLISHED STANDARDS AS OUTLINE IN THE ABOVE REFERENCE ENGINEERING FIELD HANDBOOK.
6. PLANTING OPTIONS OBTAINED FROM THE "STREAMBANK AND SHORELINE STABILIZATION TECHNIQUES TO CONTROL EROSION AND PROTECT PROPERTY" - GEORGIA DEPARTMENT OF NATURAL RESOURCES.

FIGURE 6
DOMINION ENERGY
SOUTH CAROLINA, INC.

BIOENGINEERED STABILIZATION
OPTION DETAILS

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

DATE: 5/4/20 FILE NAME: CONG547

APEX COMPANIES, LLC