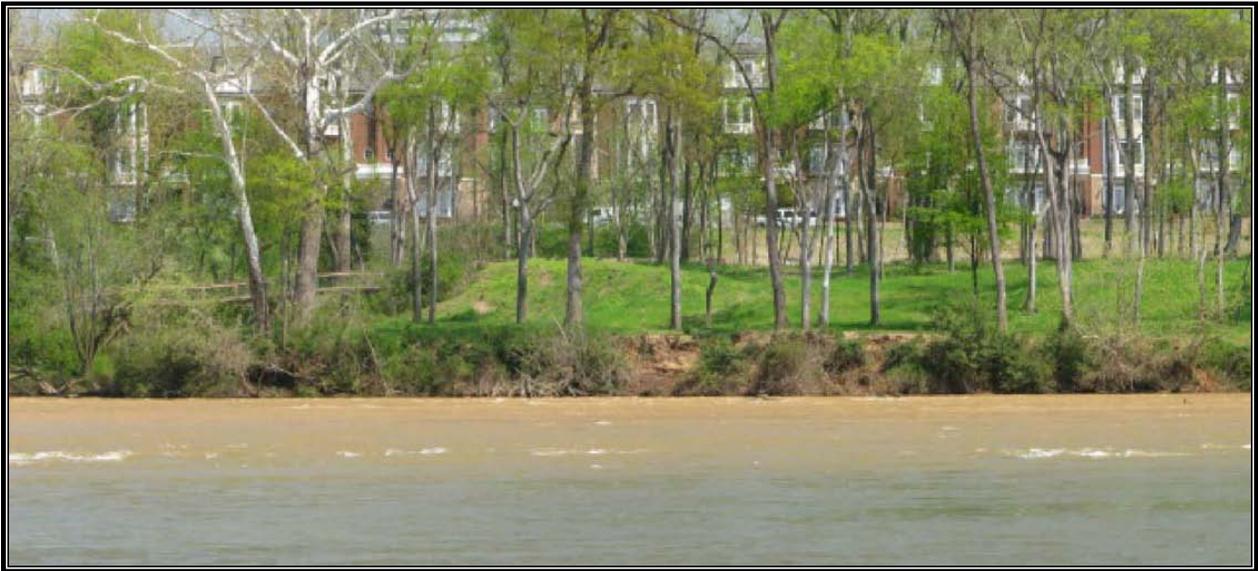


ATTACHMENT P

RESTORATION OPERATION, MAINTENANCE AND MONITORING PLAN

RESTORATION OPERATION, MAINTENANCE AND MONITORING PLAN

**CONGAREE RIVER SITE
COLUMBIA, SOUTH CAROLINA**



September 2020

Prepared for:

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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).

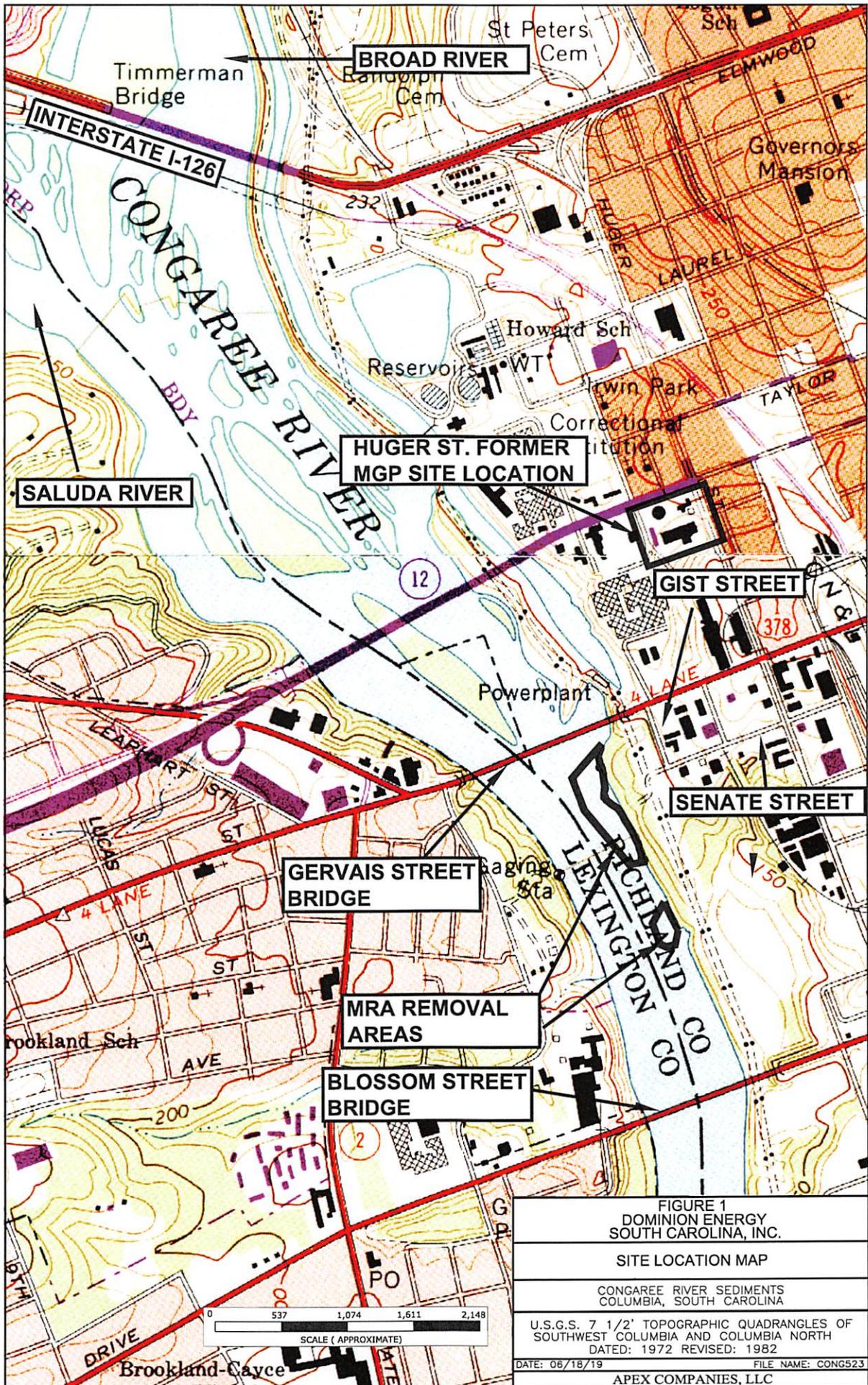
Following completion of the MRA sediment removal and restoration activities, the riverbank and shoreline area will be monitored to assure restoration was successful. Periodic inspections will occur on a monthly basis or following significant weather-related events for a period of one year, unless property 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.

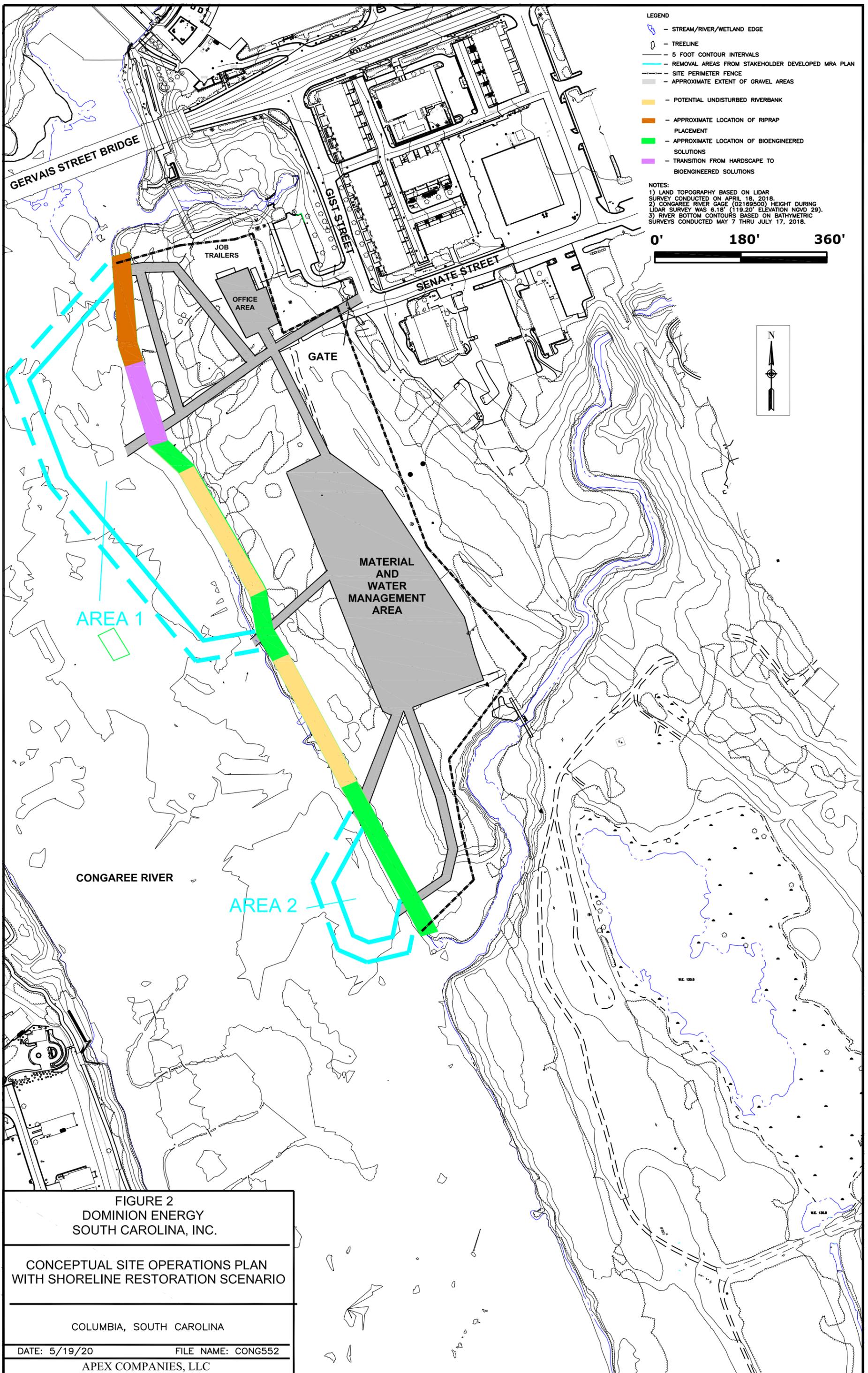
As project plans are further developed, certain details or specifications regarding restoration may be modified in order to reflect minor changes or input from applicable experts and/or the property owner. The USACE, SCDHEC and other agencies, as may be appropriate, will be made aware of any major modifications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

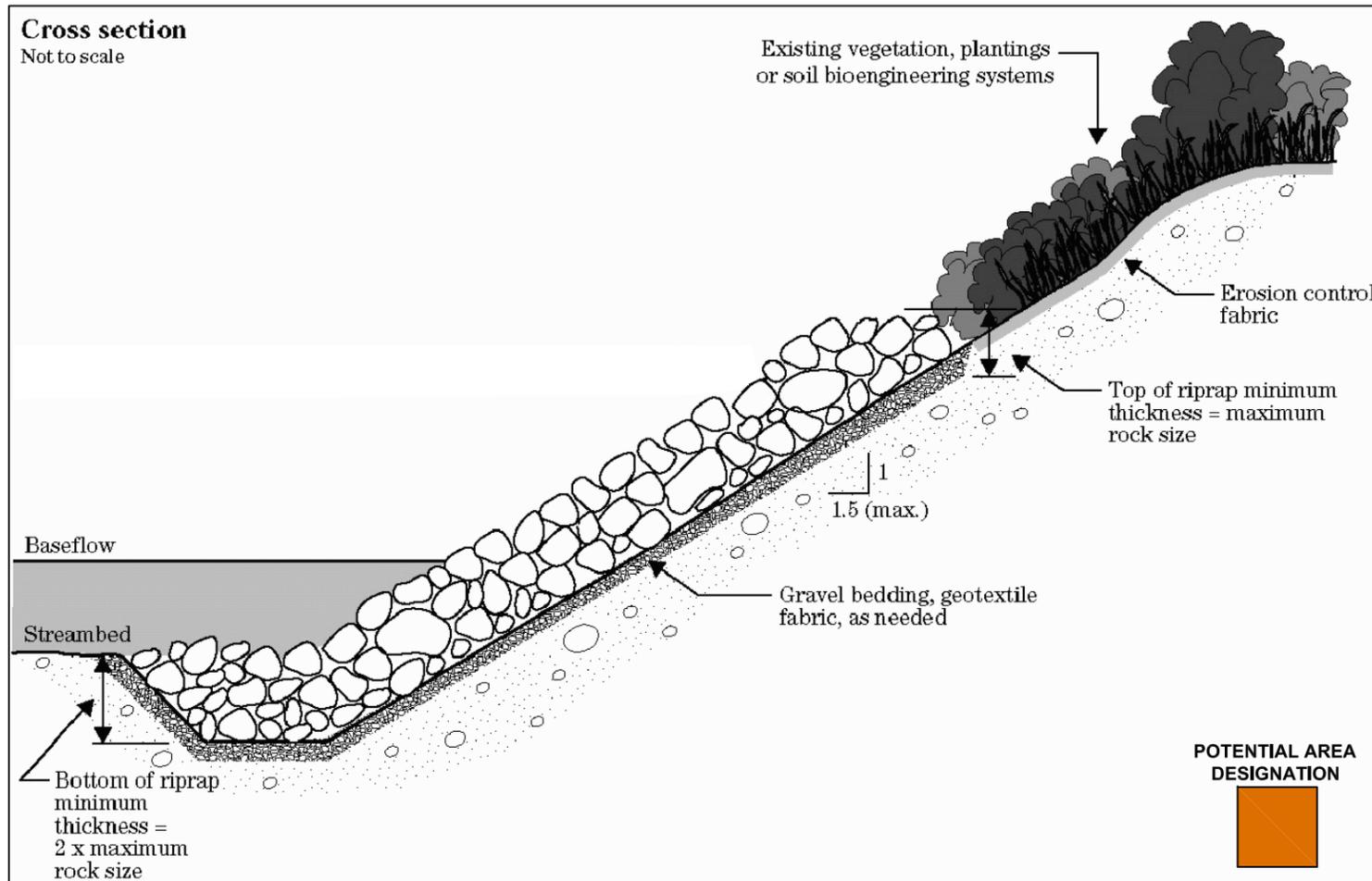
Attachment A

Table and Figures

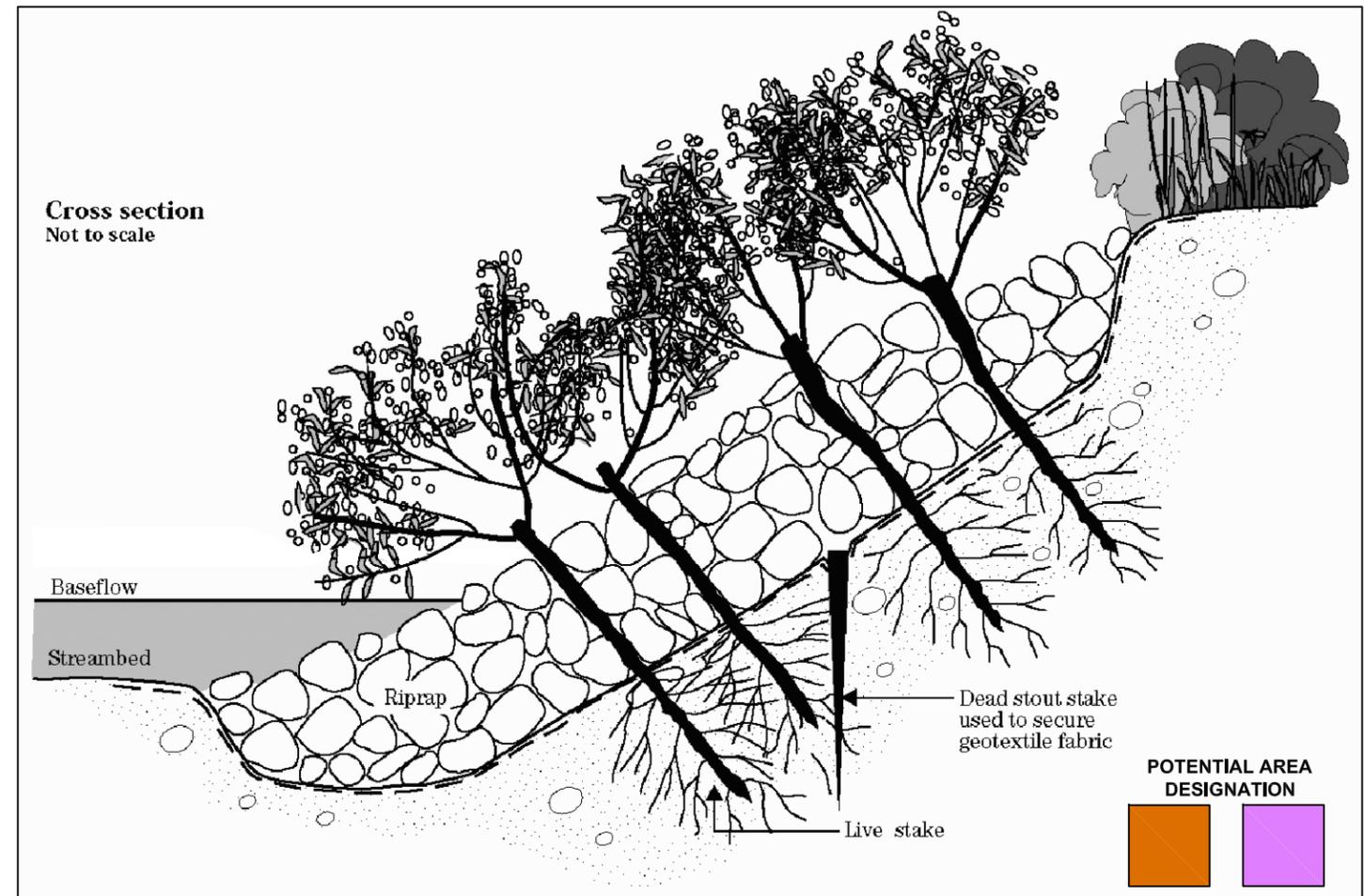
- Figure 1 Project Area Location
- Figure 2 Conceptual Site Operations Plan with Shoreline Restoration Scenario
- Figure 3 Riverbank Stabilization Details
- Figure 4 Riverbank Toe Stabilization and Bioengineering Option Details
- Figure 5 Bioengineered Stabilization Option Details
- Figure 6 Bioengineered Stabilization Option Details







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

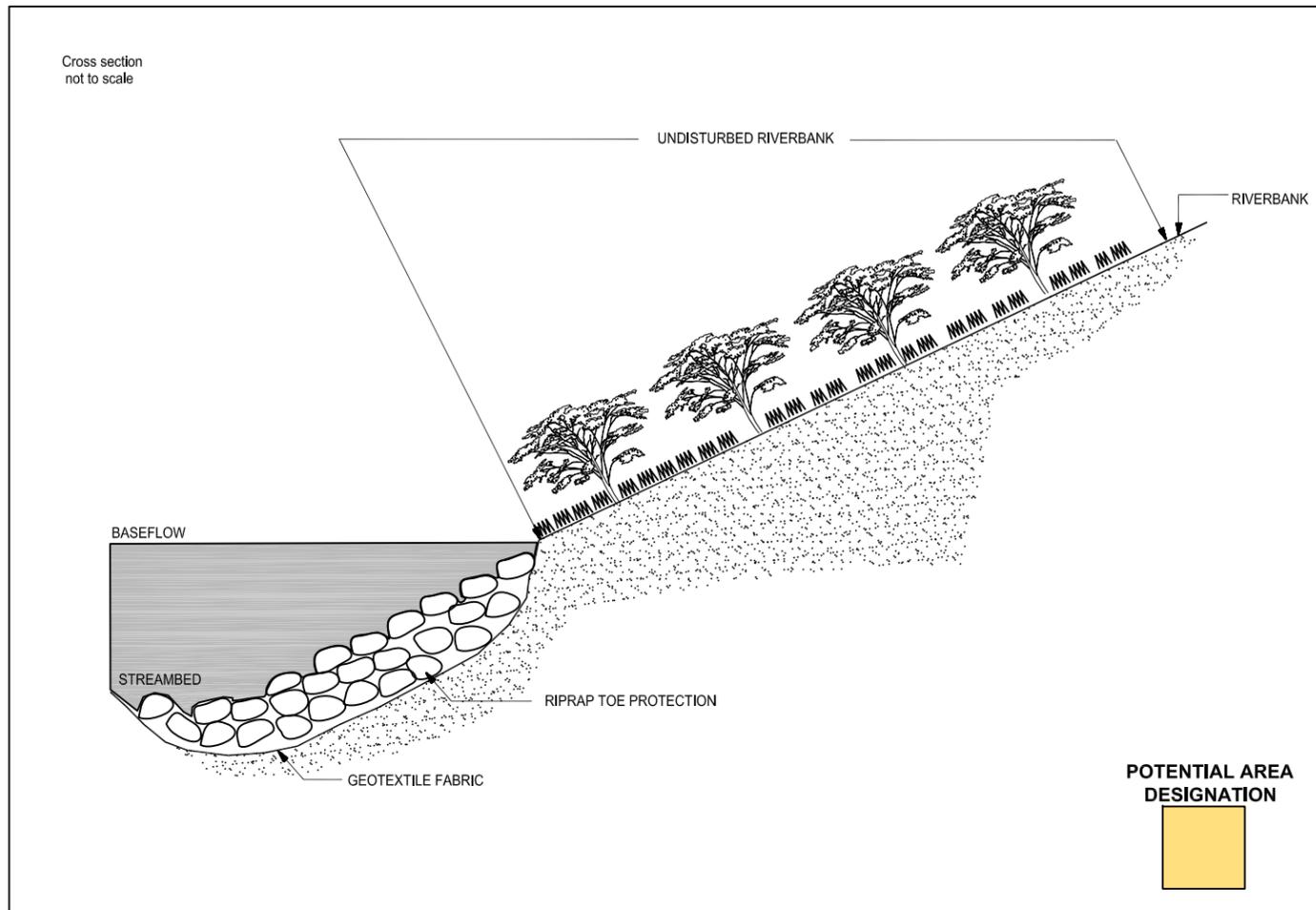


3-2 TYPICAL RIPRAP RIVER BANK STABILIZATION WITH JOINT PLANTING
(OR OTHER HARDSCAPE MATERIAL)

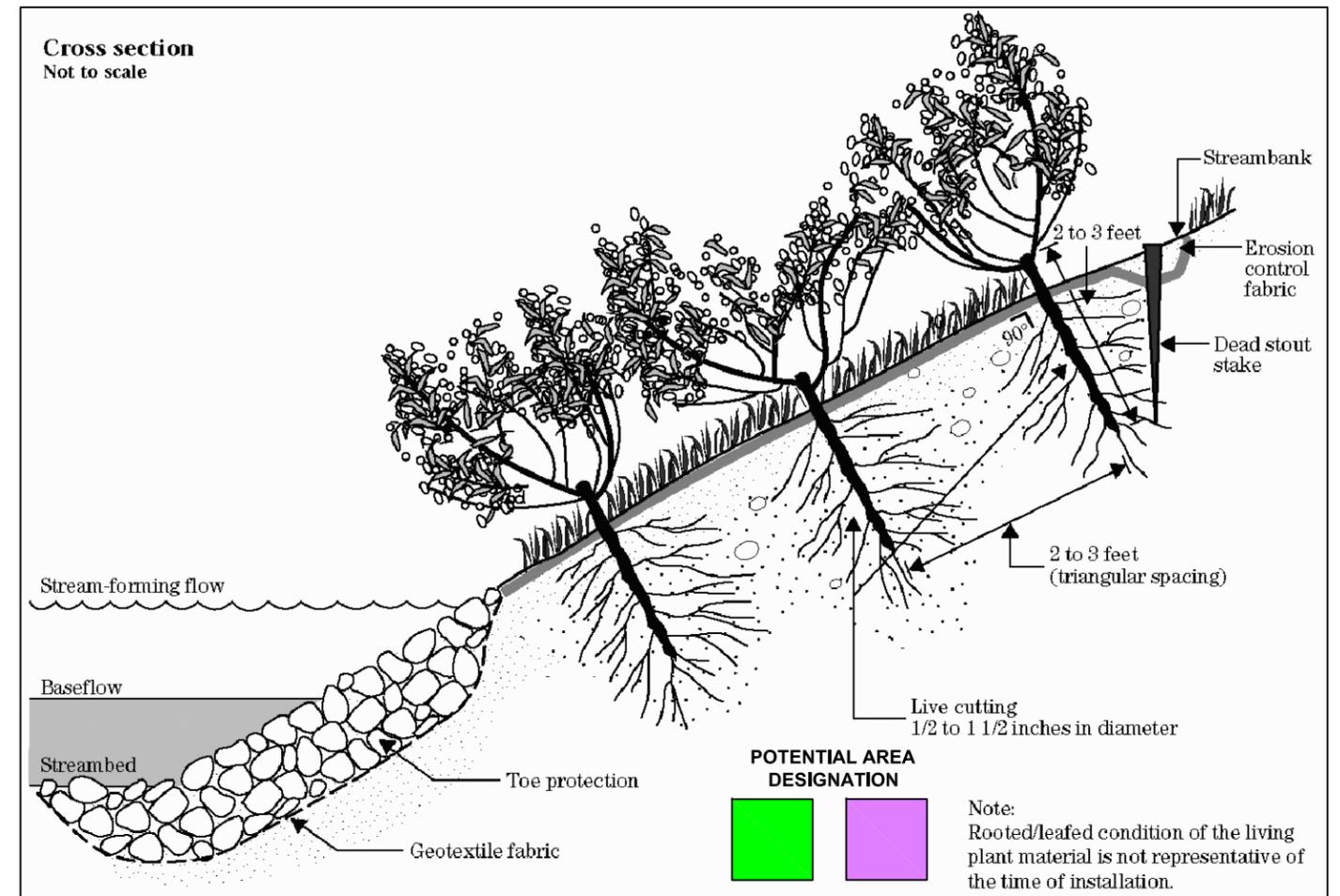
NOTES:

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.

<p>FIGURE 3 DOMINION ENERGY SOUTH CAROLINA, INC.</p>	
<p>RIVERBANK STABILIZATION DETAILS</p>	
<p>CONGAREE RIVER SEDIMENTS COLUMBIA, SOUTH CAROLINA</p>	
DATE: 5/4/20	FILE NAME: CONG547
<p>APEX COMPANIES, LLC</p>	



4-1 UNDISTURBED RIVER BANK TOE STABILIZATION

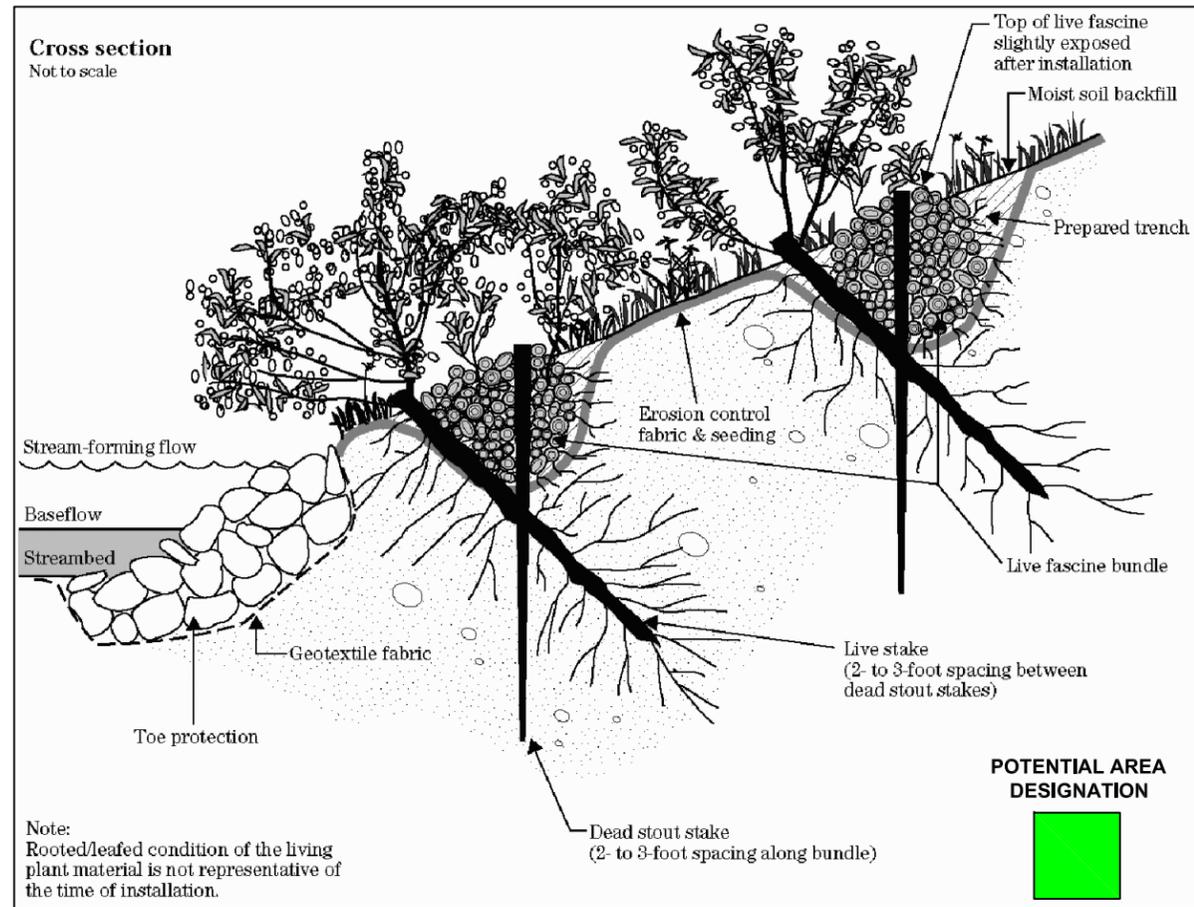


4-2 JOINT PLANTING BIOENGINEERED BANK STABILIZATION OPTION DETAIL

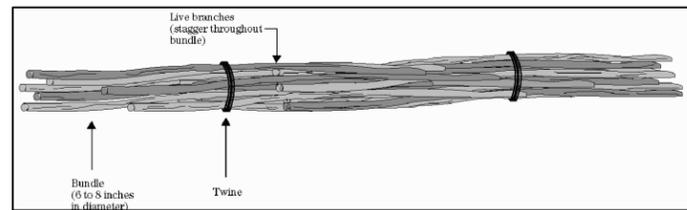
NOTES:

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.

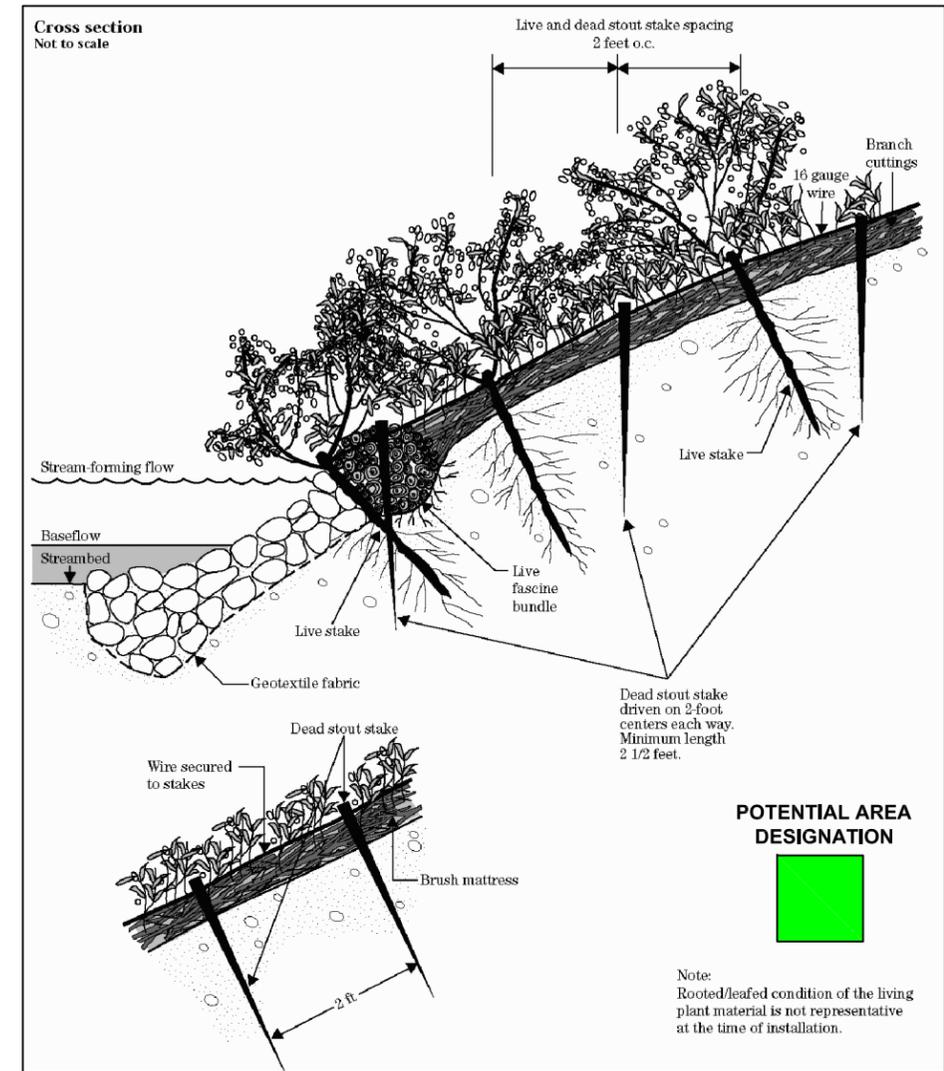
<p>FIGURE 4 DOMINION ENERGY SOUTH CAROLINA, INC.</p>	
<p>RIVERBANK TOE STABILIZATION AND BIOENGINEERING OPTION DETAILS</p>	
<p>CONGAREE RIVER SEDIMENTS COLUMBIA, SOUTH CAROLINA</p>	
DATE: 5/4/20	FILE NAME: CONG547
<p>APEX COMPANIES, LLC</p>	



5-1 LIVE FASCINE STABILIZATION OPTION



5-2 LIVE FASCINE DETAIL

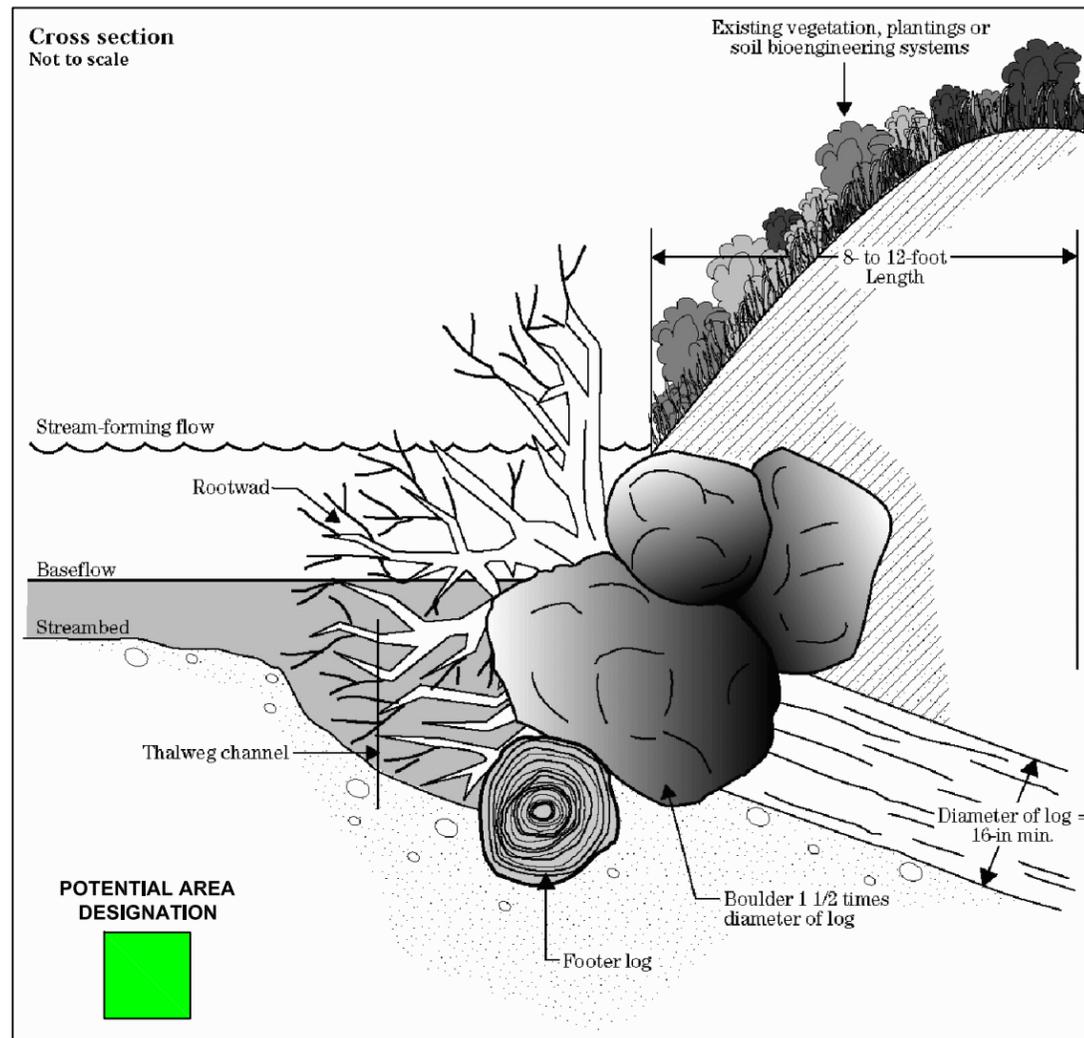


5-3 BRUSHMATTRESS BANK STABILIZATION OPTION DETAIL

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

**TABLE 1
GRASSES AND FORBES**

Scientific Name	Common Name	Soil Preference	Drought Tolerance	Shade Tolerance	Flood Tolerance
<i>Ammophila breviligulata</i>	American beachgrass	sands	fair	poor	
<i>Andropogon gerardii</i>	Big bluestem	loams	good	poor	fair
<i>Arundo donax</i>	Giant reed	sandy	good	poor	poor
<i>Herarthria altissima</i>	Limpoggrass	sandy	poor	poor	good
<i>Panicum amarulum</i>	Coastal panicgrass	sands to loams	good	poor	good
<i>Panicum virgatum</i>	Switchgrass	loams to sands	good	poor	good
<i>Paspalum vaginatum</i>	Seashore paspalum	sandy		poor	good
<i>Pennisetum purpureum</i>	Elephant grass			poor	
<i>Spartina pectinata</i>	Prairie cordgrass	sands to loams	good	fair	fair
<i>Zizaniopsis miliacea</i>	Giant cutgrass	loam	poor	poor	good

**TABLE 2
PLANTS SUITABLE FOR ROOTING**

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

**TABLE 3
WOODY PLANTS**

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

NOTES:

- LOG, ROOTWAD AND BOULDER REVETMENTS MAY BE UTILIZED SPORADICALLY TO PROVIDE OVERHEAD COVER AND HABITAT IMPROVEMENT ALONG THE DISTURBED SHORELINE.
- 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.
- INSTALLATION OF SHORELINE RESTORATION COMPONENTS WILL BE CONDUCTED IN ACCORDANCE WITH ESTABLISHED STANDARDS AS OUTLINE IN THE ABOVE REFERENCE ENGINEERING FIELD HANDBOOK.
- 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

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