

## **INTRODUCTION**

The Chesapeake Energy Center (Station), owned and operated by Virginia Electric and Power Company dba Dominion Virginia Power (Dominion), is located in Chesapeake, Virginia. The Station has been generating electric power for almost half a century to homes and businesses. With the decommissioning of the Station planned for December 2014, and inspection comments from O'Brien & Gere on behalf of the EPA, shoreline stabilization projects at the Chesapeake Energy Center were initiated in 2010. The initial shoreline stabilization project began in 2010, and consisted of improvements to the east and west shorelines of the bottom ash pond/sedimentation pond at the south end of the perimeter shoreline. These improvements were completed in January 2011. Additional improvements for the Priority 1 Area were permitted in February 2014, with work slated to begin in May 2014.

Dominion is currently pursuing the necessary repairs for the remainder of the perimeter shoreline. The remaining areas requiring repair are known as Priority 2 Area, Priority 3 Area, and the South Dike Area. Priority 2 Area is the west shoreline, adjacent to the Station's cooling water discharge channel (i.e., the "hot ditch"). Priority 3 Area is the section of the east shoreline, adjacent to the ash landfill and between the transmission tower and the southern ash ponds. The South Dike Area is the southwestern shoreline, adjacent to the largest southern ash pond. The purpose of the shoreline stabilization project is to stabilize the perimeter shorelines of the Station, with a long-term, low maintenance solution.

## **BACKGROUND**

Shoreline stabilization was previously conducted at the Chesapeake Energy Center in 2010. The 2010 work was done on the east and west shorelines of the Station's Bottom Ash Pond / Sedimentation Pond located at the south end of the property. In order to improve the stability of the east shoreline, sheet piling was installed along a 470 foot long portion of the shoreline. There were no wetlands impacted as a result of the east shoreline improvements. For the west shoreline, a riprap buttress was constructed to improve stability. This portion of the project impacted 3,800 ft<sup>2</sup> of non-vegetated tidal wetlands. On-site, in-kind compensatory mitigation was not feasible due to area constraints. Therefore, Dominion purchased 0.05 credits from the Libertyville Road Tidal Mitigation Bank. The Joint Permit Application (JPA) for the 2010 shoreline stabilization project was submitted on October 15, 2010, and the permit was issued November 18, 2010.

Subsequent to the 2010 work, Dominion submitted a JPA for shoreline stabilization in Priority 1 Area on August 1, 2013. Priority 1 Area at the Chesapeake Energy Center is an approximately 1,000 foot long area on the east side of Dominion's property. Shoreline stabilization in Priority 1 Area included reducing the width of the service road along the crest of the dike to one lane, steepening the bottom half of the slope from 2.5H:1V to 2H:1V, and modifying the riprap revetment geometry at the south end of the Priority 1 Area. The result was a smaller footprint and a more efficient tie-out of the proposed grading. The total affected area of wetlands impacted was 20,870 ft<sup>2</sup> (0.480 acres). The permit for the Priority 1 Area shoreline stabilization project was issued January 6, 2014, with construction slated to begin in May 2014.

## **DESCRIPTION**

### **Priority 2 Area**

Priority 2 Area at the Chesapeake Energy Center is an approximately 2,350-foot long area on the west side of Dominion's property. The area is bordered by the Station's cooling water discharge channel to the west, the Columbia Gas property to the northeast, and the Station's ash landfill to the southeast. An asphalt-paved service road runs along the crest of the north half of the shoreline in this area between the Station and the ash landfill. At the ash landfill, the road along the crest of the shoreline changes to gravel. The crest width of the shoreline varies from about 20 to 30 feet.

The condition of the approximately 20-foot high shoreline slope below the service road varies from about 1.75H:1V to 3H:1V with an average of about 2H:1V. As previously discussed, the Station's cooling water discharge channel is located along the downstream toe of the Priority 2 Area. Severe erosion along the toe of the slope has occurred below elevation 10 feet above mean sea level (AMSL) due to flow from the discharge channel. The toe of the slope is near vertical for a height ranging from about 5 to 10 feet above the mean low water surface.

The stabilization of Priority 2 Area involves placing a rock fill buttress along the toe of the existing slope below 3.0 AMSL. The slopes of the rock fill buttress will be at a 1.5H:1V slope in order to reduce subaqueous impacts. The portion of the existing slope above the buttress will be flattened to 2.5H:1V by excavation and/or fill placement. Additional riprap will be placed on the flattened slope from the top of the buttress up to 10.0 AMSL to provide erosion protection during high water events. The riprap will be underlain by a layer of bedding stone and a non-woven geotextile. The total affected area to be impacted by the proposed construction in Priority 2 Area includes **15,910 ft<sup>2</sup>** (0.365 acres) of non-vegetated tidal waters/wetlands and **36,800 ft<sup>2</sup>** of subaqueous impacts.

### Priority 3 Area

The Priority 3 Area is an approximately 1,450-foot long area on the east side of Dominion's property, immediately south of the Priority 1 Area. The Priority 3 Area is bounded to the east by the Elizabeth River and to the west by the ash landfill. A gravel service road runs along the crest of the shoreline in this area. The crest width of the shoreline varies from about 15 to 25 feet.

The condition of the approximately 20-foot high slope generally varies from about 1.75H:1V to 3H:1V with an average of about 2H:1V. The slope is heavily vegetated with trees, brush, and other woody vegetation. A shallow storm water collection ditch is located along the landward edge of the road. The ash landfill begins to slope up on the other side of the storm water collection ditch.

The stabilization for the Priority 3 Area involves flattening the existing slope to 2H:1V along the bottom half of the slope and 2.5H:1V along the top half of the slope. Riprap erosion protection will be placed along the bottom half and at the toe of the slope. The riprap revetment geometry at the north end of the Priority 3 Area was modified to result in a smaller footprint, fewer impacts, and a more efficient tie-in with the Priority 1 Area improvements. The width of the service road along the crest of the Priority 3 Area shoreline will also be reduced to one lane similar. The total affected area to be impacted by the proposed construction includes **44,800 ft<sup>2</sup>** of non-tidal wetlands and **840 ft<sup>2</sup>** of emergent tidal wetlands.

### South Dike Area

The South Dike Area includes an approximately 200-foot long section of the channelward slope of the south dike of the Station's Bottom Ash Pond / Sedimentation Pond around the pond's 24-inch diameter outfall pipe. This area is bounded to the south by Deep Creek, a tidal tributary of the Elizabeth River, and to the north by the Bottom Ash Pond / Sedimentation Pond. The toe of the slope around the outfall pipe has experienced some erosion similar to the erosion observed in the Priority 2 Area. The erosion scarp along the toe of the slope is approximately 3 to 4 feet high.

The proposed improvements for the section of the downstream slope of the south dike of the Bottom Ash Pond / Sedimentation Pond on either side of the pond's outfall pipe involve placing riprap at the toe to re-establish a 2H:1V slope. The riprap will also provide erosion protection under normal conditions and during high water events. The riprap will extend from 10.0 feet AMSL (i.e., approximately mid-slope) down to the anticipated scour elevation of -2.0 feet AMSL. The total affected area to be impacted by the proposed construction includes **2,050 ft<sup>2</sup>** of non-tidal wetlands and **1,750 ft<sup>2</sup>** of emergent tidal wetlands.

## **ALTERNATIVES ANALYSIS**

Dominion's primary objective for this project is to stabilize the perimeter shoreline in the Priority 2 Area, Priority 3 Area, and the South Dike Area with a long term, low maintenance solution that minimizes environmental impacts. From a regulatory perspective, the primary objective is to identify the least environmentally damaging practical alternative. To ensure that the most appropriate solution was selected, Dominion and their engineering consultant, Schnabel Engineering, considered multiple alternatives for repairing and stabilizing the perimeter shoreline in these areas.

Sheet piles were considered for the Priority 2 Area and Priority 3 Area. Sheet piles have a service life of 25-50 years. This service life is much shorter than natural materials such as soil and rock. Therefore, sheet piles do not achieve Dominion's objective of providing a long term, low maintenance solution. The installation of sheet piles would also be difficult to tie-in to the 2010 improvements at the south end of the shoreline, which were constructed through a combination of flattening the upper half of the slope and placing a riprap buttress on the lower half of the slope. Furthermore, due to the geometry of the shoreline in the Priority 2 Area and Priority 3 Area, sheet piles do not significantly reduce the amount of wetlands impacted per linear foot along the shoreline.

Additional alternatives considered included dewatering the channel to construct the shoreline improvements using primarily soil fill or filling in the channel. However, while technically feasible, Dominion did not consider dewatering of the manmade channel to be an environmentally sensitive or practicable alternative.

Finally, consideration was given to reducing the width of the service road along the crest of the Priority 2 Area shoreline to one lane similar to what was done in the Priority 1 Area. However, it was determined that this reduction in the width of the service road would not significantly reduce wetlands or subaqueous impacts and it would likely affect multiple underground utilities that run through the dike.

The purpose of the proposed work in the South Dike area is to address shoreline erosion on either side of the outlet end of the Bottom Ash Pond/Sedimentation Pond's outfall pipe. The erosion appears to have been caused by tidal fluctuations in Deep Creek. The desire is to prevent additional shoreline erosion that could ultimately affect the stability of the pond's embankment slope in this area.

Riprap is the most appropriate erosion protection solution for the South Dike area. Other similar erosion protection alternatives, such as articulated concrete blocks, were briefly considered. However, they would not have resulted in fewer impacts, and they are more expensive than riprap. The geometry of the riprap erosion protection system was designed in order to minimize impacts. Placing the riprap along the existing ground surface down to the estimated scour elevation of EL -2.0 would have resulted in significantly more wetlands and tidal impacts. Instead, the toe of the riprap system will be excavated and constructed at the toe of the existing embankment slope, thereby reducing both wetlands and tidal impacts.

Since Dominion plans to decommission the Chesapeake Energy Center in 2014/2015, a long term, low maintenance solution to the shoreline erosion issues is essential. In order to achieve this objective, and satisfy the regulatory objectives, the proposed construction was determined to be the most viable and least environmentally damaging alternatives. The proposed construction for the Priority 2 Area, the Priority 3 Area, and the South Dike Area require little maintenance and have a long service life.