

## Parallel Thimble Shoal Tunnel Project

# Minimizing the Environmental Impact of the Parallel Thimble Shoal Tunnel Project

Bordered by six states and the District of Columbia, the Chesapeake Bay is a unique and vital ecosystem. Over 300 species of fish and shellfish, including the striped bass, blue crab, and eastern oyster live within the Bay. The Bay also provides habitat for seals, right whales, and other marine mammals.

The Chesapeake Tunnel Joint Venture (CTJV) is committed to protecting this important resource and has succeeded in minimizing the environmental impact of the Parallel Thimble Shoal Tunnel project from the original proposed plan, drastically reducing the acreage of in-water impact and the volume of dredged material.

### Original estimated impact

The Chesapeake Bay Bridge and Tunnel District initially evaluated an immersed tube tunnel for developing a new two-lane tunnel between Portal Islands 1 and 2. The proposed immersed tube tunnel would have required expanding the two islands and dredging across the federal navigation channel. During the procurement phase, the tunneling industry requested that a bored tunnel be considered. The Environmental Assessment evaluated the largest impacts associated with both tunneling methods.

The estimated impacts of an immersed tube tunnel approach included the following:

- Approximately 59 acres of aquatic impacts in the Chesapeake Bay
- Dredging of approximately 1.8 million cubic yards of in situ sediments
- Placement of approximately 670,000 cubic yards of fill
- Placement of approximately 150,000 cubic yards of armor stone

This approach was also expected to result in increased shipping and vessel congestion during construction. Impacts to navigation, such as temporary closures of the navigation channel, would be required during dredging, placement of tunnel sections, and backfill activities.

### Finding a better way

During the design-build process, the Chesapeake Tunnel Joint Venture determined that a tunnel bored under the bay bottom was a feasible alternative, and an environmentally preferable one.

A tunnel bored underneath the bay bottom would greatly reduce the environmental impact of the project.

- Dredging would be reduced from 1.8 million cubic yards to 77,000 cubic yards.
- The need for ocean disposal at the Norfolk Ocean Disposal Site would be minimized.
- Material bored from beneath the Chesapeake Bay (approximately 524,000 cubic yards) does not need to be raised through the water column, thereby resulting in less turbidity and potential for impact to marine life.
- Bored material will be disposed at approved upland disposal areas.
- Disruption to the federal navigation channel would be avoided.
- The need to expand the portal islands would be eliminated.

- The amount of aquatic habitat that would be converted from sandy bottom to rock was reduced from the original 59 acres to 25.3.

### **Reducing environmental impact even further**

As part of its ongoing design refinements, the Chesapeake Tunnel Joint Venture developed a revised design that reduces environmental impact even further. By changing the slope of the engineered berms from 4:1 to 2:1, the amount of aquatic habitat impacted was reduced from 23.5 acres to approximately 13.8 acres. Much of this impact results in additional rocky habitat, well known as great fishing spots by local anglers.

### **Offsetting lost habitat**

The Chesapeake Tunnel Joint Venture worked with an extensive team of environmental scientists and engineers, as well as key environmental resource and regulatory agencies, to evaluate whether the project would cause a permanent loss of habitat value. Analyses showed that the area would support the same or greater amount of aquatic life (or biomass) after the project as before. This resulted from changing some of the project area from open water with flat sand bottom to open water with a three-dimensional rock substrate that provides additional habitat for some types of aquatic life.

Even though the project would not reduce the habitat value of the area, some bay bottom would still be converted to upland. The

Chesapeake Tunnel Joint Venture worked with the US Army Corps of Engineers and NOAA Fisheries to identify advance mitigation credits for tidal wetlands to offset the apparent loss of 1.5 acres of open water habitat. The Chesapeake Tunnel Joint Venture has purchased mitigation credits from the Virginia Aquatic Resources Trust Fund for this purpose.

**“Since construction, the islands have developed a hard-structure ecosystem that has important ecological and economic functions.”** Virginia Institute of Marine Science, May, 2018.

### **Protecting water quality**

The Chesapeake Tunnel Joint Venture has also implemented Stormwater Pollution Prevention Plans and Spill Prevention Control and Countermeasure (SPCC) plans, and will be implementing a comprehensive Water Quality Monitoring Plan during in-water construction.

Erosion and sediment controls and stormwater plans have been implemented in accordance with the Virginia Pollution Discharge Elimination System (VPDES) program. Phosphorus credits totaling 5.11 pounds were purchased to reduce the loading from Portal Islands 1 and 2 by 20% to comply with stormwater requirements.

Process waters are currently being discharged to the Hampton Roads Sanitation District (HRSD) sanitary sewer system. A water treatment plant will be installed on Portal Island No. 1, which will clean construction process water before discharge in accordance with Virginia Department of Environmental Quality (DEQ) permits. CTJV has applied for a VPDES permit to install on-site treatment and discharge

directly to the Bay, in accordance with DEQ water quality regulations. These stringent regulations will ensure that discharged water is as clean as water being discharged by HRSD, and will have no deleterious effects on water quality.

### **Protecting sea turtles, right whales, and other aquatic life**

Marine mammals, including seals and the endangered North Atlantic right whale, visit the Chesapeake Bay. Sea turtles and bottlenose dolphins also transit the bay. The use of mechanical dredging, using bucket dredges, will minimize impact on sea turtles. Special lenses and LED lights have been used for construction lighting to further minimize light pollution impact; and lighting has been angled toward the portal islands.

The Chesapeake Tunnel Joint Venture is committed to abiding by the provisions of the Marine Mammal Protection Act. To protect right whales, vessels longer than 65 feet going to and from the Norfolk Ocean Disposal Site, are limited to speeds of less than 10 knots, in compliance with the National Oceanic and Atmospheric Administration's Right Whale Ship Strike Reduction Rule (50 CFR 224.105).

A Marine Mammal Monitoring Plan with certified mammal observers will be implemented during pile driving activities. Cushion blocks will help minimize underwater pressure waves from pile driving, and a ramp-up/soft start protocol will allow marine animals time to avoid the zone of noise impact created during pile driving. In addition, bubble curtains will be used around the round piles to reduce the propagation of sound waves from pile driving.

### **Conclusion**

At each step along the way, from the initial concepts to the final design and construction, the Chesapeake Tunnel Joint Venture and Chesapeake Bay Bridge and Tunnel District have sought to minimize the environmental impact of the tunnel project, and to protect the species that inhabit the Bay. By changing the construction method from immersed tube to bored, the number of acres of bay bottom disturbed has been dramatically reduced from 59 acres to 13.8 acres.

During design, further reductions were made by reducing the cubic yards of dirt to be disposed, reducing the harmful impact of noise during pile driving, and ensuring the safeguarding of water quality through monitoring. Water quality and marine mammal monitoring plans have been developed. Plans are also in place to test and properly dispose of construction materials in accordance with all Virginia Department of Environmental Quality (DEQ) requirements.