

Parallel Thimble Shoal Tunnel Project

Protecting Water Quality on the Parallel Thimble Shoal Tunnel Project

Large Infrastructure projects that deal with dredged material or tunneling often generate excess water. This includes both stormwater and construction process water, which must be removed from the site. Tunneling generates water from the interstitial water in the bored soil, and also uses water in cooling the Tunnel Boring Machine (TBM). Tunneling operations require water to be added at the cutterhead, similar to a machinist using lubricants with a drill bit. The Chesapeake Tunnel Joint Venture is taking care to dispose of water in the most environmentally appropriate way and within regulated water quality limits to protect the unique environment of the Chesapeake Bay. Each major construction element will result in a certain amount of water, each having unique properties. The purpose of this paper is to describe each of the major sources of water on the project.

Stormwater

Stormwater runoff comes from rainfall and sea spray topping over the splash walls. Standard control measures known as Best Management Practices (BMPs) have been employed on the Portal Islands to prevent erosion and control sediment from being discharged into the Bay. In accordance with Virginia Stormwater regulations, when rainfall hits the project site it is allowed to reach the Chesapeake Bay only after being filtered through perimeter barriers or other BMPs. Once the new tunnel is operational, stormwater will be managed under a permit which mandates monitoring of the cleanliness and clarity of the water.

TBM cooling water

The tunnel boring machine (TBM) is cooled with fresh potable water drawn from the city water system. The water recirculates within an enclosed system to prevent tunneling equipment from overheating. It can be reused indefinitely, and does not come in contact with the bored soil.

On excessively hot days, the temperature of the cooling water may exceed 95 degrees. If this happens, some water may be sent to a holding tank for cooling and later reuse, and replaced with new city water. If cooling water needs to be discharged, no on-site treatment is needed. It will be sent either to the Hampton Roads Sanitation District (HRSD) or directed to the on-site water treatment plant on Island 1 upon receipt of a permit from the Virginia Pollutant Discharge Elimination System (VPDES).

Construction process water

Construction process water comes from two sources: water drawn from the city or groundwater (interstitial water) that is naturally occurring within the Chesapeake Bay sediments. Fresh water is used in construction of the slurry walls at each tunnel portal for jet grouting to reinforce weak soils and for tunnel excavation. During tunneling, conditioning agents are added to fresh water. This lubricating solution is then used at the cutterhead to condition the soil for efficient removal. Testing has indicated that the soil conditioning agents bind with the excavated soil. Decant water from the excavated tunnel material will be sent to a water treatment plant on the island. Any conditioners that may remain in the decant water will be removed during this step in the process.

Construction process water will be treated and then tested for pH, total suspended solids, metals, total petroleum hydrocarbons, and salinity. During pre-tunneling construction, wastewater will be sent to the Hampton Roads Sanitation District (see figure 1).

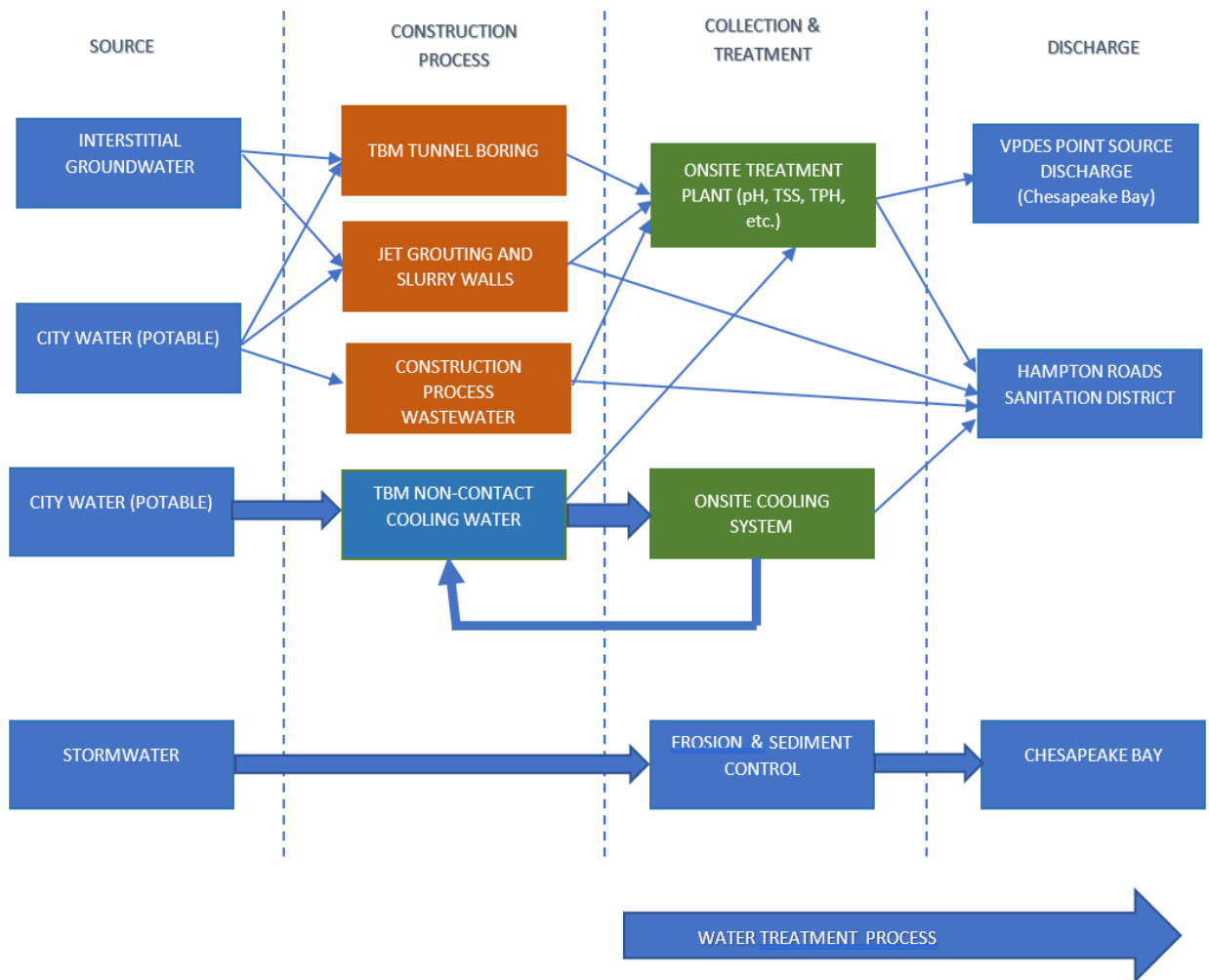


Figure 1. This chart illustrates sources of water, how it is used in the construction of the tunnel, how it is collected, treated and discharged. Laboratory testing of the discharge water takes place prior to discharge at both the HRSD and the VPDES point source discharge.

Water Treatment Plant

During the tunneling phase of construction, the process water will be sent to a water treatment plant on Portal Island 1. The treatment plant will be capable of adjusting pH, removing oil and grease, sediments, metals and any other constituents to meet DEQ regulatory requirements. This technology has been used recently on other tunnel projects in the United Kingdom and Seattle, Washington.

Prior to tunneling operations, decant water from jet grout residual decanting operations will be treated for pH, tested, and then pumped to the Hampton Roads Sanitation District in accordance with an HRSD permit. Once tunneling commences, an on-site water treatment plant will be made operational. During this transitional phase, discharge water will be sent to HRSD until it is certain that all VPDES requirements are being met. This will allow tunneling to progress at its optimal advancement rate.

The TBM's optimal advancement rate would make discharge of all process water to HRSD very impractical. If all process water were sent to HRSD, it would require upgrading the existing 4-inch sanitary line to an 8-inch line, changes to the trestle infrastructure, installation of a pump station at Island 1, laying new pipe in Virginia Beach and adding another lift station (see Figure 2). Because tunneling will occur for only one year, it is not practical to install all of these temporary upgrades. Therefore, 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.

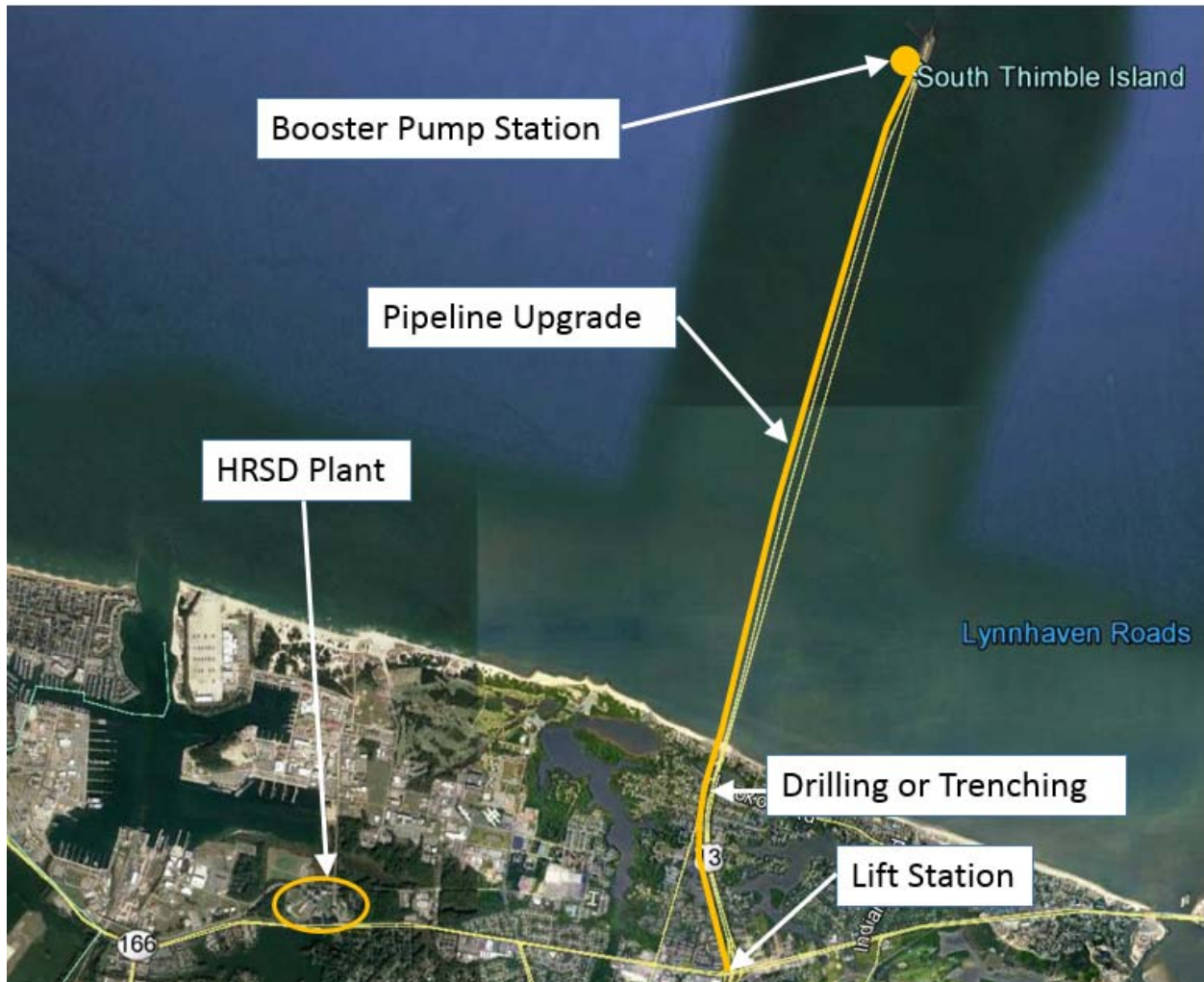


Figure 2. Possible upgrades to the water discharge capability of the existing line to HRSD from Portal Island No. 1 (South Thimble Island). This upgrade, if undertaken, is estimated to cost between \$25 and \$30 million.

Conclusion

CTJV is committed to environmental stewardship of the Chesapeake Bay. We understand the importance of clean water to the improving health of the Bay, and therefore plans are in place to properly capture, treat, test and dispose of all construction process water and stormwater in accordance with DEQ requirements.