Modern tunnels, such as those proposed for the Bay Delta Conservation Plan (BDCP), rely on highly advanced technology. This advanced technology has proven successful in the design, construction, and operation of tunnels in the United Kingdom, France, Japan, China, Mexico, New York, and California. Currently, the State Water Project (SWP) operates more than 15 miles of tunnels in California.

Proposed Delta tunnels would be excavated using a circular cutterhead that mines through the soil at approximately 150 feet below the surface. While no two tunnel projects are exactly alike, BDCP tunnels, and the specialized contractors building them, would utilize modern technologies developed from past projects with similar features, such as length, depth, diameter, and construction conditions. Water and biodegradable, eco-friendly soil conditioners are mixed with the soils to create a toothpaste-like material that is easily transported to the surface via conveyor belt or rail car. During construction, the excavated material will be tested and evaluated to determine suitability for various reuse options. The process for determining disposal and reuse of excavated materials is described in Appendix 3B of the Draft BDCP Environmental Impact Report/Environmental Impact Statement.

BDCP is evaluating numerous options for the reuse of excavated tunnel material to reduce local impacts from the proposed construction of water conveyance facilities, and would put the excavated material to beneficial use. Material excavated during construction, often referred to as “tunnel muck” (currently identified as reusable tunnel material), has been identified for many possible reuses, including strengthening levees, raising subsiding Delta islands, restoring natural habitats, and as structural fill associated with construction of conveyance facilities.
Uses and Location of Reusable Tunnel Materials

Excavated tunnel material has been successfully reused around the world, and California Department of Water Resources (DWR) recently completed a preliminary laboratory test study to evaluate geotechnical, environmental, and plant suitability properties. The test results indicate that the excavated tunnel materials would be suitable for the proposed beneficial reuses. The Reusable Tunnel Material Testing Report is available at http://baydeltaconservationplan.com/PlanningProcess/EnvironmentalReview/SupportingTechnicalStudies.aspx. DWR will consult with relevant governing regulatory agencies to obtain necessary permits prior to actual reuse.

Reuse of excavated tunnel material is expected to reduce impacts to locations within Delta communities previously identified as “tunnel muck disposal sites.” As part of the analysis of the refined project, potential reuses have been identified and are listed below:

- **Habitat Restoration** – Reuse of excavated tunnel material for habitat projects will contribute to the approximately 150,000 acres of habitat restoration and protection identified in the Draft BDCP. Tunnel material may be used to reverse Delta island surface subsidence and to create conditions beneficial to migratory birds, including greater sandhill cranes.

- **Levee Improvements/Flood Mitigation** – Tunnel material could be used to strengthen Delta levees identified for maintenance and repair.

- **Structural Fill** – Materials have potential use as structural fill for construction of conveyance facilities.

Case Study – San Francisco Public Utilities Commission

As part of a broad Water System Improvement Program, a 5-mile-long tunnel is under construction beneath the San Francisco Bay to update aging infrastructure transporting water to San Francisco and other parts of the Bay Area. The San Francisco Public Utilities Commission began construction of the tunnel in 2010 with a 15-foot-diameter tunnel boring machine. Of the nearly quarter-million cubic yards of excavated material, more than 98 percent has been reused for restoration of nearby sites, including the United States Fish and Wildlife Service’s Bair Island Restoration and restoration of a private quarry site. Tunnel excavation was completed in early 2013, approximately 6 months ahead of schedule, and no excavated material remains at the staging area near the Dumbarton Bridge.

Photo courtesy of San Francisco Public Utilities Commission, Bay Tunnel project.