# A CLOSER LOOK: ENGINEERING INNOVATIONS

## As part of the development of the Delta Conveyance Project Cost Estimate, the Department of Water Resources (DWR) directed the Delta Conveyance Design and Construction Authority (DCA) to consider potential design or construction innovations to further reduce construction schedule, costs, and/or project footprint to improve constructability.

DCA engineers and environmental scientists took a conservative approach to design and construction in the Engineering Project Report (EPR), analyzing likely worst-case scenarios in the Environmental Impact Report. But DCA engineers have identified 19 reasonable innovations for DWR's consideration as project design and engineering progresses. Preliminary figures estimate that these innovations could potentially further reduce construction impacts to local communities and collectively reduce the project cost by up to $1.2 billion.

The DCA identified a variety of potential improvements — or innovations — to the Engineering Project Report (EPR) conceptual design of the Delta Conveyance Project. To select potential innovations for further conceptual development, each potential innovation was considered through a multi-step process that included screening, ranking, and preliminary evaluation in collaboration with DWR.

- **Innovations** generally focused on potential alternative design or construction approaches aimed at reducing overall community and environmental effects, schedule, cost, or risk.
- **Evaluation of all potential innovations** focused on reducing construction materials, labor hours, and optimizing sequencing and construction activities to streamline the process while adhering to project requirements.

## None of the project innovations selected for further conceptual development would impact the safety of the project nor its operational abilities. The following highlight some examples of the potential innovations:

**Intakes Innovation: Raise Tee Screen Elevation**

The initial design concept for the intakes places the bottom of the cylindrical tee fish screens between 13 and 17 feet below the water surface. However, the minimum recommended submergence is one half of the screen diameter, or 4 feet for the current 8-foot-diameter tee screen units. An innovation proposes to increase the separation between the river bottom and the bottom of the tee screens and reduce the screen submergence to the minimum of 4 feet. This would reduce the overall height of the two intake structures by 4.6 to 4.7 feet. This height reduction would also reduce the materials required and duration of construction, thereby reducing concrete quantities and project costs.

**Tunneling Innovation:**
**Planning for Semi-Continuous Mining**

The EPR assumed tunnel excavation using a Tunnel Boring Machine (TBM) with separate phases for excavation and tunnel lining installation. In this manner, a full precast concrete segmental tunnel lining ring would be installed before the TBM rams push the machine forward from the leading edge of the lining to excavate the next section. The latest TBM technology allows a thrust forward from a partially completed segmental lining ring such that excavation and lining installation can happen concurrently. As a result, the time to complete tunnel reaches could be reduced by between 101-184 construction days, depending on the reach length.

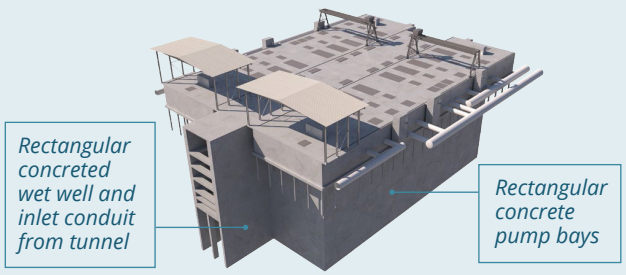
**Logistics Innovation: Hood Franklin Road Intersection Reconfiguration**

The EPR assumed the existing bridge over Snodgrass Slough on Hood-Franklin Road would be widened to accommodate left and right turn pockets onto the Intake Haul Road from Hood-Franklin Road. This innovation would instead involve the installation of a single-lane roundabout that would eliminate the need to widen the bridge and would provide efficient traffic movement. Construction costs of the roundabout would be slightly less than the cost of constructing a widened bridge; however, the primary benefit of this innovation would be a reduction in traffic effects.

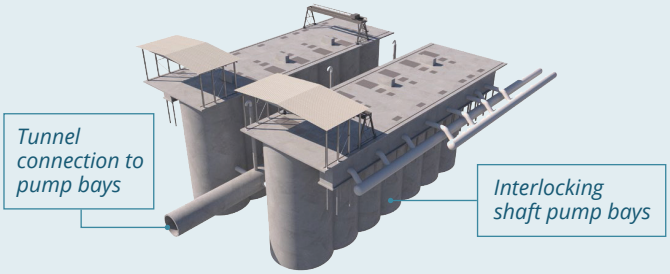
### Pumping Plant Innovation: Optional Belowground Configuration

In the EPR, the Bethany Reservoir Pumping Plant is an underground facility with vertical rectangular walls. It has separate areas for the pumping equipment and pipes, as well as a connected concrete wet well and inlet conduit. The proposed innovation would replace the current setup with interlinking shafts for the equipment and pipes and a tunnel to replace the wet well and inlet conduit. This innovation would replace the vertical, deep box diaphragm wall arrangement with interlinking shafts of diaphragm wall construction that would house the pumping plant equipment and piping and a tunnel that would replace the wet well and wet well inlet conduit, greatly reducing construction quantities and expediting schedule due to construction sequence improvements.

**Current Pumping Plant Design**




**Innovation Concept**

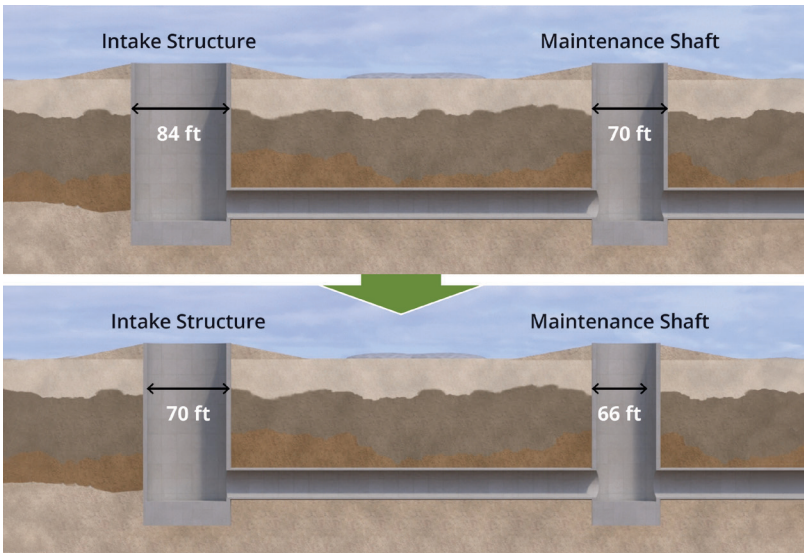



### Discharge Structure Innovation: Refined Configuration

The EPR design assumed four 55-foot-diameter shafts and four separate channels to convey flow from each shaft of the discharge structure to the Bethany Reservoir. Each flow channel would be isolated from the reservoir by two radial gates when not in operation. This innovation proposes raising the discharge elevation of each aqueduct pipeline just above the crest of the dam spillway which would provide isolation from the reservoir and eliminate the need for the isolation radial gates. In addition to cost savings, this innovation would reduce the discharge structure construction schedule by 554 construction days.

### Hydraulics and Operations Innovation: Reduced Diameter of Intakes and Maintenance Shafts

The EPR design assumed 83-foot-diameter shafts at the intake structures and five 70-foot-diameter maintenance shafts. This innovation would reduce the shafts at the intakes to 70-foot-diameter and the maintenance shafts to 66-foot-diameter. Cost savings are realized due to a reduction of the quantities of earthen and engineered materials required for shaft construction.




### Innovations Subject to Further Review

Further conceptual development of the potential innovations by DCA will focus on constructability, cost, and schedule consideration. Once the potential innovations are further developed by DCA and before DWR considers whether to approve any of the potential innovations, DWR will determine whether subsequent or supplemental environmental analysis is required under the California Environmental Quality Act (CEQA).