MODERNIZING THE SYSTEM:

CALIFORNIA WATERFIX PHYSICAL INFRASTRUCTURE

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The first in a series of three policy papers prepared for the consideration of Metropolitan's Board of Directors in advance of planned summer meetings and decisions in Fall 2017.

Modernizing and improving California's water system is essential for the reliable delivery of water supplies to much of the state. About 30 percent of the water that flows out of taps in Southern California homes and businesses comes from Northern California watersheds and flows through the Sacramento-San Joaquin Delta. But the Delta's declining ecosystem and 1,100 miles of levees are increasingly vulnerable to earthquakes, flooding, saltwater intrusion, climate change and further environmental degradation.

California WaterFix is the product of more than a decade of review, planning, and rigorous scientific and environmental analysis by water experts, engineers and conservationists, as well as unprecedented public comment. The proposed project will improve the security of our water system by fixing aging infrastructure and constructing new, state-of-the art facilities using innovative technologies and engineering practices. Significant planning work for the design and construction of the project has been performed by the state, water agencies, and construction and engineering firms, which have determined the project is buildable. Details of the project features, actions to address public comment, risk management, schedule projection and cost estimates are addressed in a new white paper and summarized below.

Approach to Design & Construction

An extensive planning process evaluated various alignments, facility configurations and system options.

- The system would be capable of diverting up to 9,000 cubic feet-per-second from the Sacramento River and capturing additional wet period water supplies after all environmental flow and water quality criteria are met.
- Proposed construction plans, including the use of dual 40-foot diameter tunnels, is well within common practices in the engineering construction industry and will provide operational redundancy.

Specific steps were taken during the design effort to reduce or eliminate the impact of the new facilities on the environment and Delta communities. As a result of input during the environmental planning process, the following changes were made:

- Reduced size of overall project
- Expanded use of tunnels for conveyance
- Revised tunnel alignment
- Reduced size and location of intermediate forebay
- Reduced pumping requirements
- Reduced construction impacts along Sacramento River

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Key Project Features

DUAL CONVEYANCE:
A flexible dual intake system will deliver water to state and federal pumping plants in the south Delta. New intakes farther upstream will reduce overall adverse environmental impacts on the Delta and provide higher quality water to water contractors' service areas.

MODERNIZED FACILITIES:
The existing system will be modernized with new facilities, equipment and technologies. State-of-the-art fish screens and intake structures will reduce harm to fish.

OPERATIONAL FLEXIBILITY:
The new intake facilities will work in conjunction with the existing south Delta intake system, delivering water from just one system or both, depending on fishery and water quality conditions. Dual intakes will provide greater flexibility to protect fish when they are present.

OPERATIONAL EFFICIENCY:
Gravity-fed tunnels will move water more naturally and efficiently. This will simplify overall operations and reduce long-term system and maintenance costs.

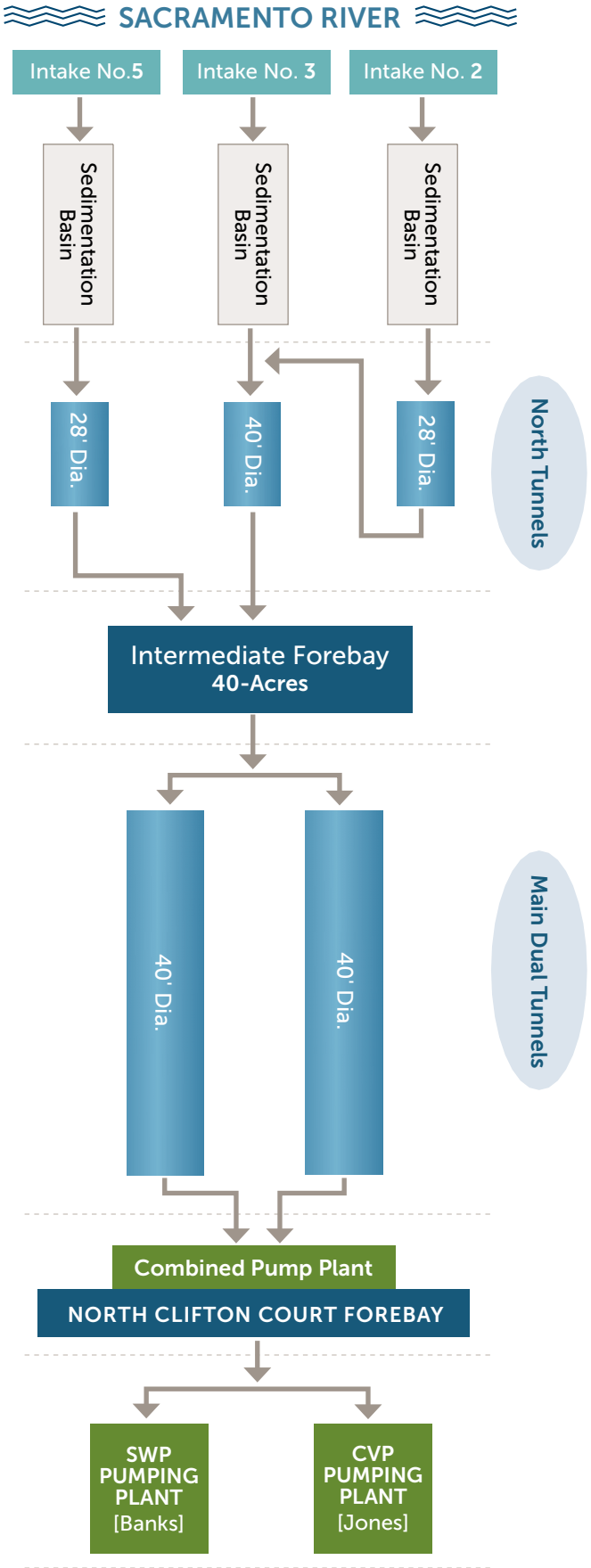
MAXIMIZES THE USE OF PUBLIC LANDS:
The project alignment uses more public lands, reducing the impact to private property and agriculture.

REDUCED ENVIRONMENTAL FOOTPRINT:
The proposed water facilities and operations have a greatly reduced project footprint compared to earlier proposals. This will reduce community impacts.

OTHER ENVIRONMENTAL CONSIDERATIONS:
The plan allows for a more natural flow direction in the Delta during critical fish protection periods and increases water supply reliability with greater flexibility to divert water in ways that protect sensitive fish species.

WATER SUPPLY RELIABILITY:
A modernized system can more reliably capture water from peak storms and flood flows to refill reservoirs and replenish groundwater basins.

EMERGENCY PREPAREDNESS:
A modernized system will ensure that water is available for drought and emergency needs and help protect supplies from earthquakes or other natural disasters that could disrupt the current system.



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Minimizing Risk

CRITICAL ISSUES RELATED TO DESIGN, CONSTRUCTION AND OPERATIONS HAVE BEEN ADDRESSED DURING THE PLANNING PROCESS:

Tunnels: Extensive work and surveys to identify best practices of large tunnel projects with similar design, construction and project management confirmed that the proposed California WaterFix tunnel boring machines are well within the existing industry knowledge and experience.

Leakage: The lining system will be designed to withstand the maximum internal pressure calculated for the conveyance system, resulting in negligible leakage.

Ground Vibration: Tunnels will be constructed at least 100 feet below ground. Material over the tunnels will dampen and absorb any energy generated during tunneling activities.

Surface Settlement: The project will use geotechnical information, monitoring and structure projection methods to mitigate the risk of settlement effects and structural damage.

Seismic Mitigation: Because the proposed tunnel alignment does not cross any major fault rupture or creep zones, the deep tunnels will not be subject to liquefaction potential. The tunnel design uses precast segmental lining systems which have been successfully used in seismically active areas around the world.

Geotechnical Considerations and Mitigations: At proposed tunnel depths, dense layers of silts, sands and clays are anticipated. This material will be suitable for the planned tunneling activities.

Flood Protection: Facilities will be engineered and designed to withstand water level rise resulting from both a 200-year storm event and from sea level rise of 18 inches in the Delta.

Construction Management

The Department of Water Resources is working with the State Water Contractors to resolve the final details of how the construction of California WaterFix will be managed to guarantee the project's safety and construction integrity and to ensure the project is delivered on time, on budget and in accordance with approved specifications, while managing risk prudently.

Cost

Cost estimates were determined through a rigorous analysis by industry professionals and will be updated as additional information becomes available.

Overall Cost	**$ 15.74 B**
Conveyance System Cost	**$ 14.94 B**
Program management, construction management and engineering	$ 1.91 B
Tunnels/shafts construction	$ 6.82 B
Remaining construction	$ 2.68 B
Contingency (~36% for tunnel/shafts and remaining construction)	$ 3.38 B
Land acquisition (includes 20% contingency)	$ 0.15 B
Environmental Mitigation (includes 35% contingency)*	**$ 0.80 B**

Program Estimate in 2014 Dollars

**Significant additional fishery habitat restoration will occur through California EcoRestore http://resources.ca.gov/ecorestore/*

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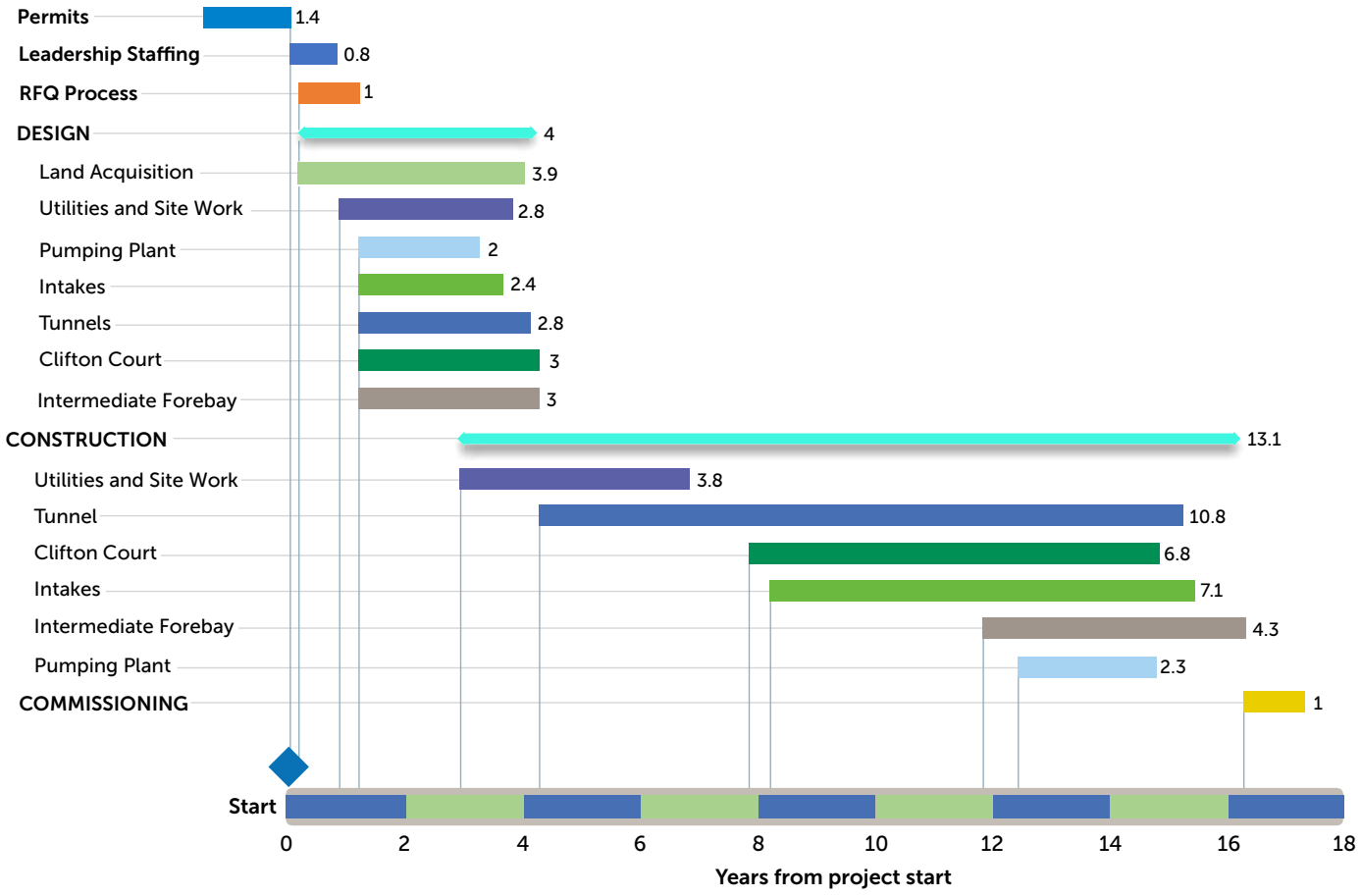
Schedule

The current schedule estimates it will take 12 to 15 months to fully staff the project, up to four years to complete the design phase and approximately 13 years to complete construction.

California WaterFix - Program Summary Schedule

Note: Years shown next to bars indicate task duration



OUR MISSION

The mission of the Metropolitan Water District of Southern California is to provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way.

ABOUT METROPOLITAN

The Metropolitan Water District of Southern California is a state-established cooperative of 26 member agencies – cities and public water agencies – that serve nearly 19 million people in six counties. Metropolitan imports water from the Colorado River and Northern California to supplement local supplies and helps its members develop increased water conservation, recycling, storage and other resource management programs.

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Photos courtesy CA Department of Water Resources

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