

What it takes to Retrofit 1,200-acres of Urban Public Parks in San Francisco

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The San Francisco Public Utilities Commission (SFPUC) Westside Enhanced Water Recycling Project (Project) is part of SFPUC's Water System Improvement Program, which set a goal to save 2 million gallons per day (MGD) of drinking water by diversifying the City's water supply and using recycled water for non-drinking purposes. The Project will produce advanced treated recycled water, exceeding Title 22 standards, at a new state-of-the-art facility located at the existing Oceanside Water Pollution Control Plant, to serve irrigation customers on the western side of San Francisco.

Kennedy Jenks through a Joint Venture (KJ/Sheikh/WRE), in collaboration with Russel D. Mitchell Associates, worked with SFPUC to develop regulatory strategy, produce required permitting documents, and prepare retrofit designs with detailed irrigation upgrades for Golden Gate Park (GGP) and Lincoln Park Golf Course (LPGC) to receive recycled water. These two parks combined represent over 1,250 acres of urban recreation area and host over 13 million visitors every year with an irrigation and lake fill demand of 1,600 AFY (1.4 MGD on average).

The project required navigating complex intra-city jurisdictional partnerships between SFPUC, the Recreation and Parks Department (RPD) who operates and maintains the parks, and other City agencies. Developing a strategy to retrofit the parks involved close collaboration and coordination with RPD personnel to perform extensive field investigations, prepare as-built documentation, and identify system deficiencies and areas of concern that will need to be addressed before delivering recycled water to the parks and for the project to be permitted by the Division of Drinking Water (DDW).

Untangling the network of pipelines and infrastructure installed over the last century required significant investigation to evaluate aging infrastructure, uncover the source of leakages, and record unmapped irrigation components. Other challenges involved designing alternatives for the lakes to manage and contain recycled water to prevent overflow, considering the potential effects of recycled water quality on the variety of plants irrigated at the botanical gardens, conservatory of flowers, plant nursery, and the California Academy of Sciences green roof, and ensuring the retrofits do not significantly alter the current operation of the irrigation system. The facility statistics alone illustrate the magnitude of effort that is required by this project to:

- Avoid overspray of 64 drinking water fountains and more than 80 picnic tables,
- Verify the conditions of over 100 potable water meters and their connection to the irrigation system,
- Install more than 550 signs to notify the public about recycled water use within the parks,
- Provide more than 3,300 identification tags on irrigation system components,
- Replace more than 3,400 quick coupling valves with purple caps, and
- Install about 50 isolation valves to isolate irrigation sections and manage cross-connection control testing.

The construction cost for implementing these retrofits and improvements to the irrigation systems at GGP and LPGC is estimated to be \$4 million.

Implementation of the proposed retrofits requires accommodating the needs of a highly-used park with unique facilities and scheduling the work around park events to minimize disruption to planned activities. As an example, performing cross-connection control testing will require segregating the park into 34 independent zones so that two-way shut downs of the potable and recycled water supplies can be scheduled around park events, in coordination with visitor hours, irrigation schedules, and the different building and facility demands.

The successful completion of the Project and retrofitting the irrigation and lake fill systems at these parks will allow SFPUC to further increase the diversity, reliability, and resilience of its water supplies. Construction of the advanced treatment facility commenced in 2018, conveyance facilities will be initiating construction in 2019 and the irrigation retrofits will begin in 2020. The project is expected to be operational by 2021.