INFORMATION ITEM

Desalination in the Delta: Antioch Brackish Water Desalination Plant

Summary

We often hear about desalinization projects as a method to reduce reliance on the Delta in the export areas of the state. However, desalinization is also a method to adapt local Delta communities to increasingly saline water supplies. Staff from Carollo Engineers will describe the City of Antioch's brackish water desalination plant, highlighting its objectives, its design, and the plant as an example of the type of adaptation strategies for water supply reliability for local communities in the Delta.

Background

The City of Antioch is located in eastern Contra Costa County along the south shore of the San Joaquin River and is home to approximately 115,000 residents. Antioch obtains its drinking water from an intake in the San Joaquin River. During periods of lower river outflow, more saline water from the San Francisco Bay extends farther upriver. When salinity became too high, Antioch previously purchased freshwater from neighboring Contra Costa Water District. These conditions are projected to occur more frequently in the future, as the region sees increased climate-change-driven drought conditions, stressing the reliability of Antioch's water supply and increasing costs to purchase water from Contra Costa Water District. To help address this in 2016, Antioch began a planning process to construct a desalination plant. Antioch submitted a certification of consistency for the Antioch Brackish Water Desalination Plant (Antioch desalination plant) to the Delta Stewardship Council (Council) in April 2020; the certification was not appealed. The Antioch desalination plant became operational in September 2025.

Desalinization projects help boost regional self-reliance. The Council's climate adaptation plan, Delta Adapts, lists desalinization as essential for water conservation and for increasing local and statewide water supplies.

Antioch Brackish Water Desalination Plant

Desalination is the process of removing salt from saline or brackish water. Globally, the predominant method used is reverse osmosis, where water is pushed at high pressure through a membrane that allows water to pass but not salt or many other substances. Brackish desalination refers to desalinating water that is not as salty as ocean water but has more salt than freshwater.[1] The Antioch desalination plant is the first desalination facility constructed in the Delta and only the second in the San Francisco Bay Area.[2]

Antioch identified the Antioch desalination plant as necessary to improve water supply reliability and water quality for the city's customers, develop a drought-resistant water source, and maximize and preserve the use of Antioch's pre-1914 water rights. The objectives of the Antioch desalination plant also include providing more operational flexibility and cost savings by decreasing reliance on purchased water supplies.

Design and Capacity

The Antioch desalination plant is co-located at Antioch's water treatment plant, which pre-treats the water coming from the intake in the San Joaquin River before being sent to the desalination plant. The Antioch desalination plant has the capacity to produce up to 6 million gallons per day (mgd) of water, enough to supply approximately 72,000 people.[3] Antioch has other, non-residential water users as well. In total, the Antioch desalination plant is expected to cover approximately 30-40% of its annual drinking water needs and up to 50% of demand during high-

[1] Brackish water generally refers to water with 1,000-10,000mg/L of Total Dissolved Solids (TDS). At the upper end of the range this is roughly equivalent to 10 grams of salt per liter of water or just under a half teaspoon of salt in an 8 oz. glass of water.
[2] The Newark Desalination Facility is the other operational facility and is run by the Alameda County Water District. Santa Clara Valley Water District has conducted studies on a potential desalination plant at the southern end of the San Francisco Bay (https://www.valleywater.org/your-water/water-supply-planning/desalination) and the five largest San Francisco Bay Area water agencies are exploring the potential for a Bay Area Regional Desalination Project (BARDP)(https://www.regionaldesal.org/).
[3] Based on average water use of approximately 83 gallons per person per day for 2024 and 2025 in the City of Antioch (residential only): https://data.ca.gov/dataset/urws-conservation-supply-demand.

salinity months. Antioch also operates two conventional surface water treatment plants with a combined capacity of 36 mgd.

Brine Management

Brine is created as a byproduct of desalination and must be disposed of in a safe manner. The Antioch desalination plant manages brine byproduct by conveying to the Delta Diablo Sanitation District's wastewater treatment plant in nearby Pittsburg, where the brine is diluted with treated municipal wastewater and discharged into the San Joaquin River.

Funding

The Antioch desalination plant cost approximately $116 million and was funded through several mechanisms, including, among others, the Department of Water Resources' Proposition 1 (2014) water desalination grant program ($10 million), a low-interest revolving fund loan from the State Water Resources Control Board ($60 million), a settlement agreement with the Department of Water Resources ($27 million), and Antioch capital improvement funds and reserve accounts ($19 million).

Fiscal Information

Not applicable

List of Attachments

No attachments

Contact

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A recording of the presentation will be available on the Delta Council's YouTube page at https://www.youtube.com/@DeltaCouncil.