How to Implement Seawater Desalination

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CALLEGUAS MUNICIPAL WATER DISTRICT
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Calleguas MWD

- 21 purveyors
- Serving a population of 630,000
- 75% of purveyors’ water supply is imported
Virtually all of the imported water comes from the seismically vulnerable State Water Project.
The Problem:
Calleguas has limited local supplies to meet customer demands during extended outages of imported supplies.

>1 month
Seawater Desalination provides a high capacity, high volume, reliable supply

• Calleguas Board and purveyors wanted staff to determine the costs, benefits, and challenges

• Study completed in 2015

• Based on what we learned, following is the process to get a plant built and operational
Step 1 – Identify and implement other alternatives that will meet the project goal
The problems with Seawater Desalination...

Cost of Water ($/acre-foot)

- Imported Water: $1,400
- Seawater Desalination: $3,000
The problems with Seawater Desalination...

Note: Seawater desalination estimates do not include pumping to distribution system.
The problems with Seawater Desalination...

Fish Impingement
and Entrainment
What supply option(s) could meet Calleguas’ reliability need?

- Increase Lake Bard capacity
- Additional Purveyor Well Capacity
- Stormwater Capture
- Additional Aquifer Storage and Recovery Facilities
- Recycled Water
- Potable Reuse
- Water Use Efficiency Measures
- New Lake
- Storage in Another Agency’s Lake
- Seawater Desalination
- Other?
At the end of this alternatives analysis you will either...

- have found viable alternatives that meet the goal or
- have established the smallest possible seawater desalination plant that you need to meet the goal
Step 2 – Identify partners and the quantity of water that each will need
Governance structure will depend on selected implementation process

- Joint powers authority
- One agency in lead with contracts to provide water to other agencies
- Private entity with contracts to provide water to other agencies
Step 3 – Community Engagement
Outreach is important throughout the process

• People are concerned about:
  • Environmental impacts
  • Effect of intakes and outfalls on marine life
  • Greenhouse gas impacts
  • Growth inducement
  • Construction impacts
  • Water rate increases
Step 4 – Select an implementation process
Traditional public agency process

OR

Public-Private Partnership

OR

Hybrid
Step 5 – Determine what type of intake will be used and where it will be located
Considerations for Selecting an Intake

Ocean Plan says “the best site, the best design, the best technology, and the best mitigation measures to minimize intake and mortality of marine life.”

Major concern: Impingement & Entrainment
Types of Seawater Intakes

Subsurface
- Wells
- Infiltration Galleries

Open
- Power Plant (being phased out)
- Wedge-Wire Screens
Infiltration Galleries

Seafloor Infiltration Gallery (SIG)

Beach Infiltration Gallery (BIG)
Selection of an intake will require an expert panel and a formal public input process
Step 6 – Select a site for the plant
7 to 12 acres would be needed for a 125 cfs facility.
Step 7 – CEQA and Permitting
Major Permits

- SWRCB Division of Drinking Water Domestic Water Supply Permit Amendment (3-4 yrs)
- RWQCB NPDES Permit for Discharge (2-3 yrs)
- SWRCB Permit for Intake (new process – duration unknown)
- State Lands Commission Lease (2 yrs)
- California Coastal Commission Coastal Development Permit (2-3 yrs)
California Coastal Commission
Coastal Development Permit

• Requirements:
  • Hazardous chemical use documentation
  • Growth inducement potential
  • Intake alternatives analysis
  • Impingement and entrainment study
  • Impingement and entrainment minimization plan
  • Mitigation plan for impingement/entrainment and other environmental impacts
  • Brine discharge study and alternatives analysis
  • Plan for minimizing impact of brine discharge on marine life
  • Energy requirements
  • Energy minimization plan
• Greenhouse gas minimization and mitigation plan
• Water supply alternatives analysis, including:
  • Conservation (mandatory measures, voluntary measures, market-based incentives, etc.)
  • Recycled water
  • Reallocating existing supplies
• Treatment technology alternatives analysis, including an examination of:
  • Chemical use
  • Energy consumption
  • Emissions
  • Footprint
Other Permits and Approvals

- US Fish and Wildlife Service
- National Marine Fisheries Service
- U.S. Coast Guard
- U.S. Army Corps of Engineers
- SWRCB Coverage under NPDES General Permit for Storm Water Discharges Associated with Construction Activity
- Regional Water Quality Control Board Section 401 Water Quality Certification
- California Department of Fish and Wildlife
- California Department of Parks and Recreation Office of Historic Preservation Section
- Cities & county – coastal development permits & encroachment permits
Permitting Considerations

These will drive the schedule

- Permit agencies should be engaged early and often in the planning process

- Permitting must be closely coordinated with:
  - public engagement/outreach
  - CEQA/NEPA
  - technical project development, particularly for intakes
Step 8 – Design & Construction
Treatment
Seawater Intake
Brine Discharge Outfall
Renewable Energy Supply
Connection to Water Distribution Infrastructure

Facility locations and pipeline alignments are preliminary and provided for illustration purposes only. A thorough analysis will need to be performed to determine the locations of an intake, outfall, and desalination plant.

Legend
- Existing Calleguas Pipeline
- Potential Calleguas Pipeline
- Existing Reservoir
- Existing Regulating Station
- Existing Pump Station
- Potential Pump Station

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, U.S. Forest Service, National Geographic, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, CNES,mapbox
ESTIMATED PROJECT SCHEDULE - CALLEQUAS SEAWATER DESALINATION FACILITIES

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Units are years.