How to Implement Seawater Desalination

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CALLEGUAS MUNICIPAL WATER DISTRICT
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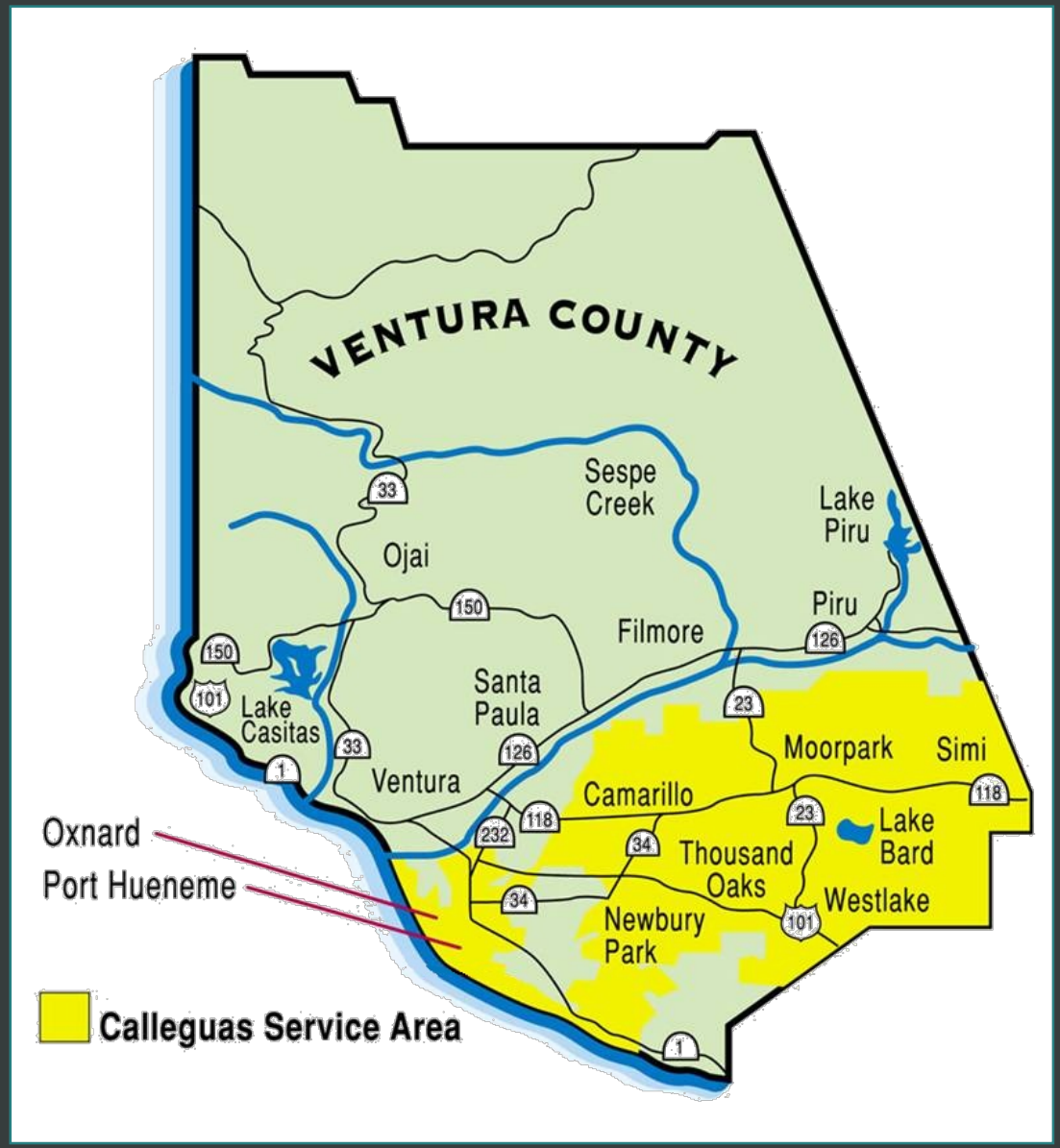
Calleguas MWD

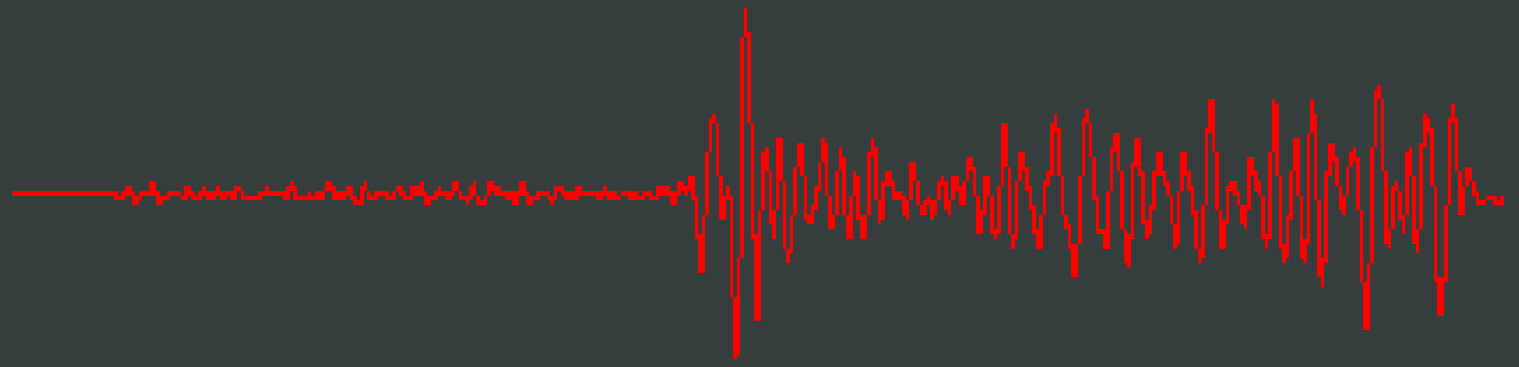
- 21 purveyors
- Serving a population of 630,000
- 75% of purveyors' water supply is imported



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.

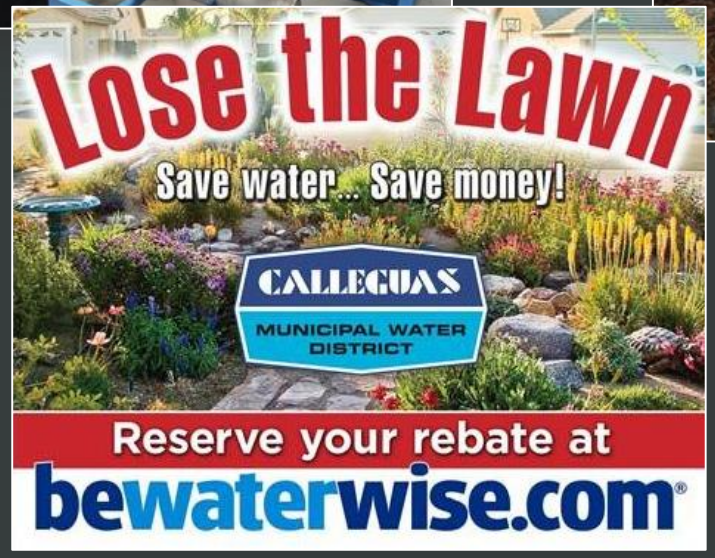


>1 month

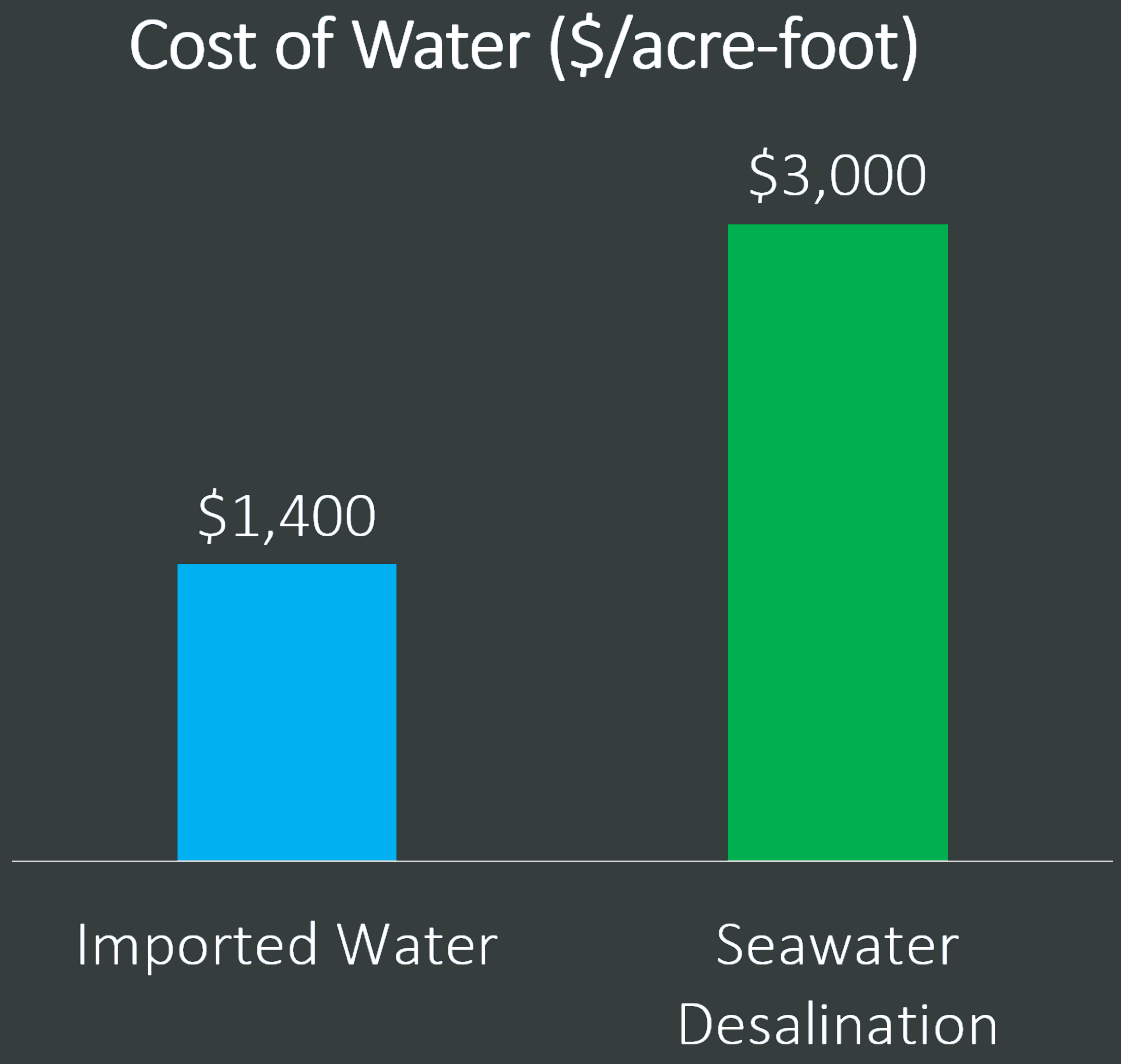
Seawater Desalination provides a high capacity, high volume, reliable supply

- 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…



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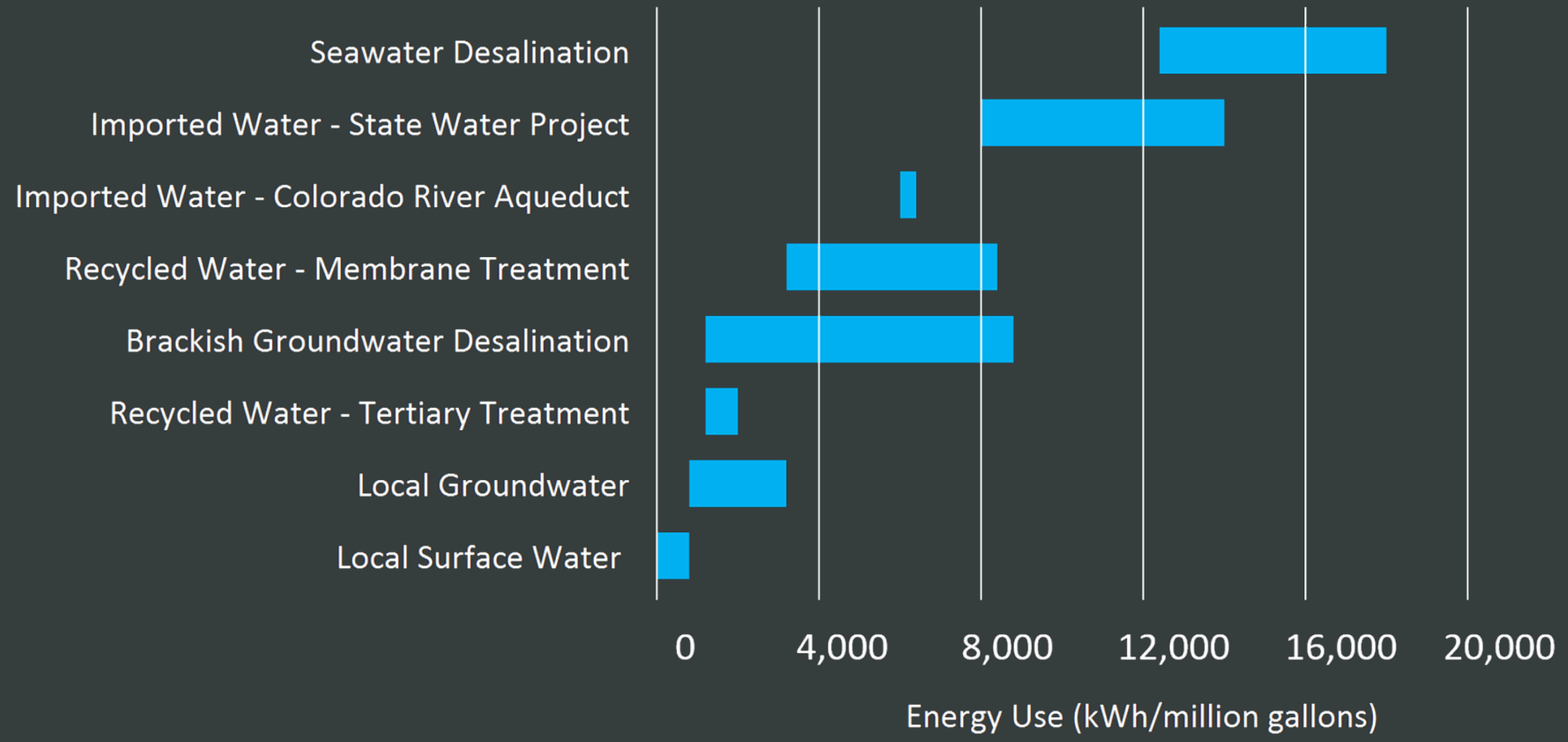

Note: Seawater desalination estimates do not include pumping to distribution system.

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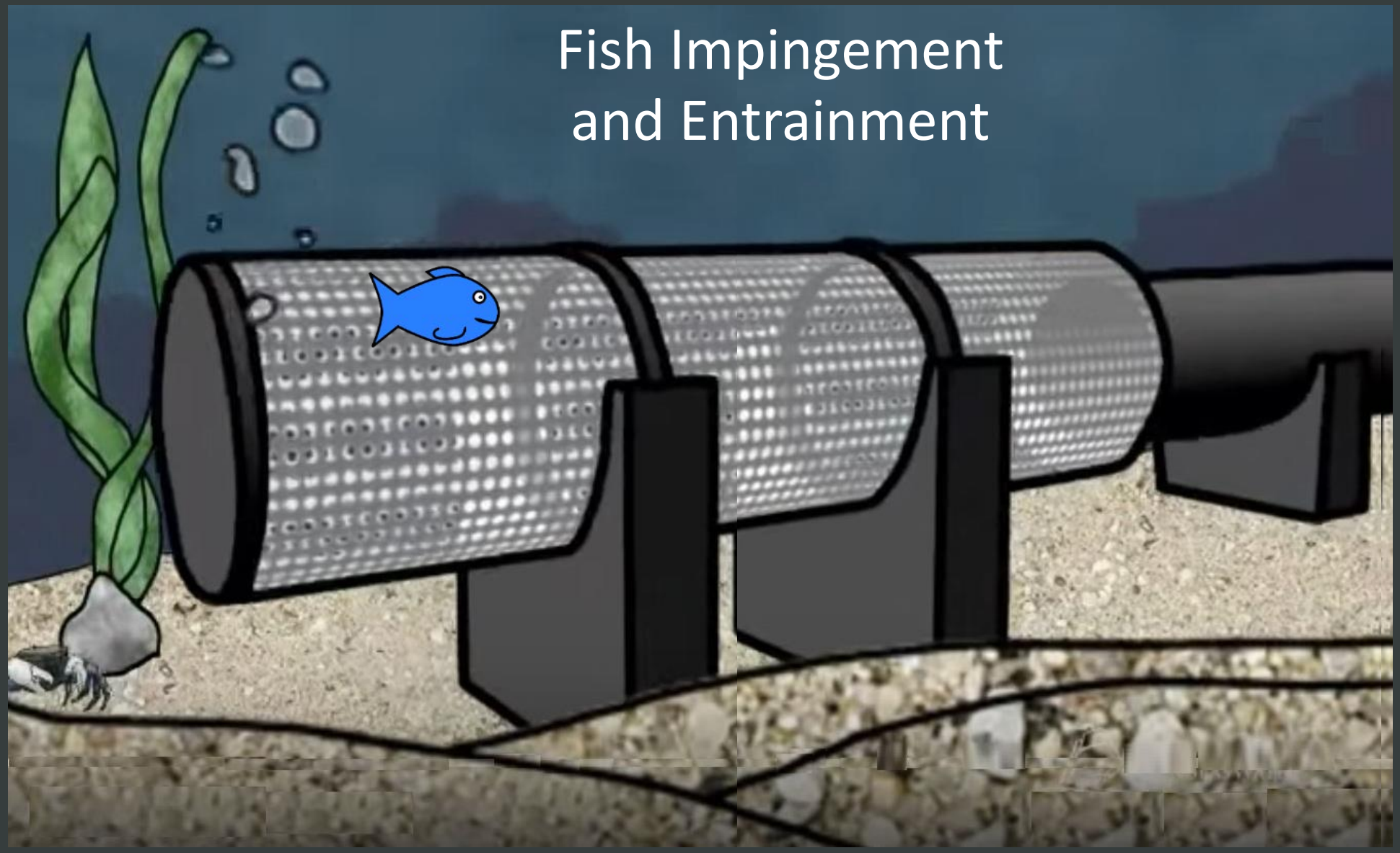


What supply option(s) could meet Calleguas' reliability need?

Increase Lake Bard capacity

Recycled Water

Potable Reuse

Additional Purveyor Well Capacity

Water Use Efficiency Measures

Other?

Stormwater Capture

New Lake

Additional Aquifer Storage and Recovery Facilities

Storage in Another Agency's Lake

Seawater Desalination

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

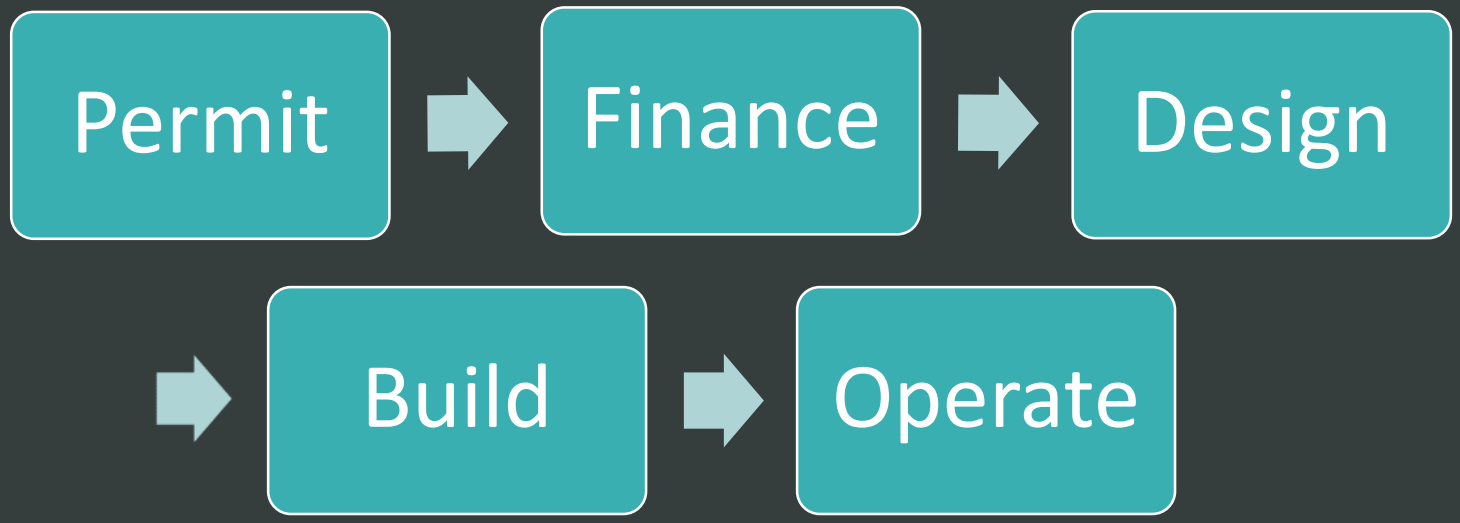
- Joint powers authority
- One agency in lead with contracts to provide water to other agencies
- Private entity with contracts to provide water to other agencies

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

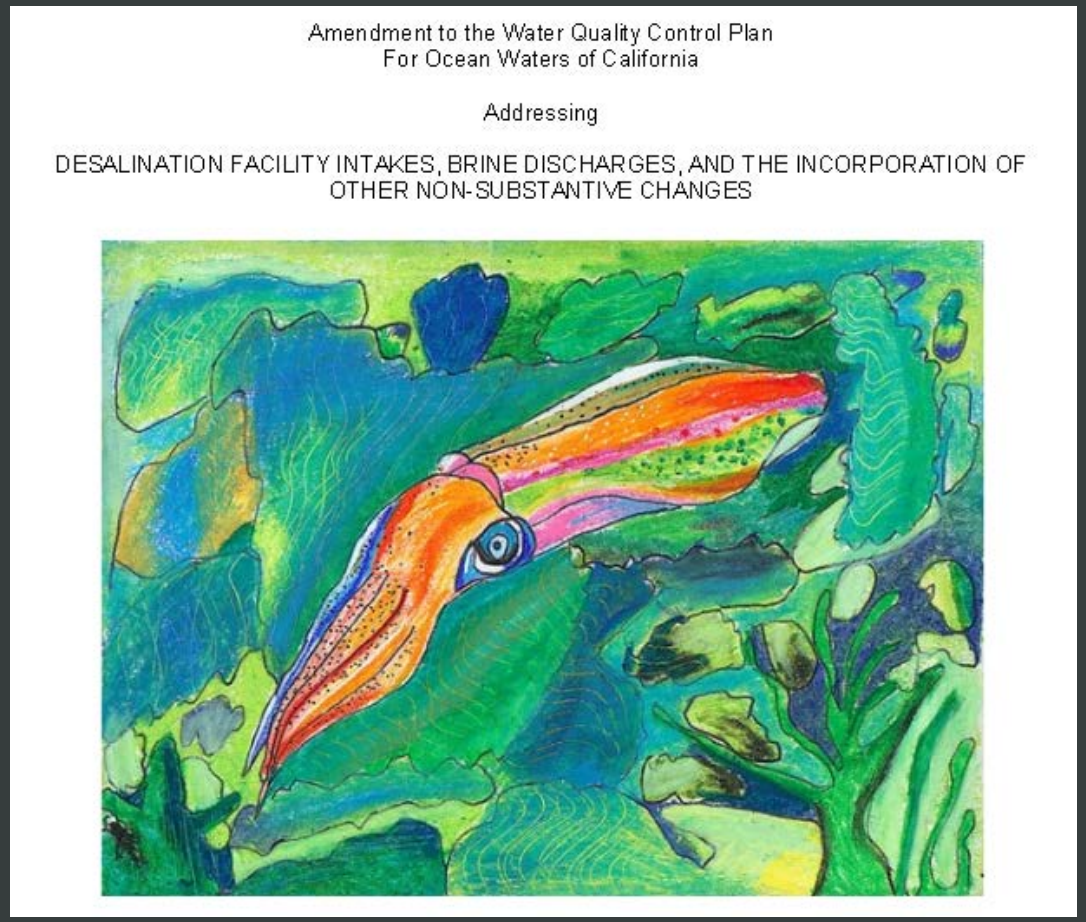
OR

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**.”



<u>Major concern</u>:
Impingement &
Entrainment

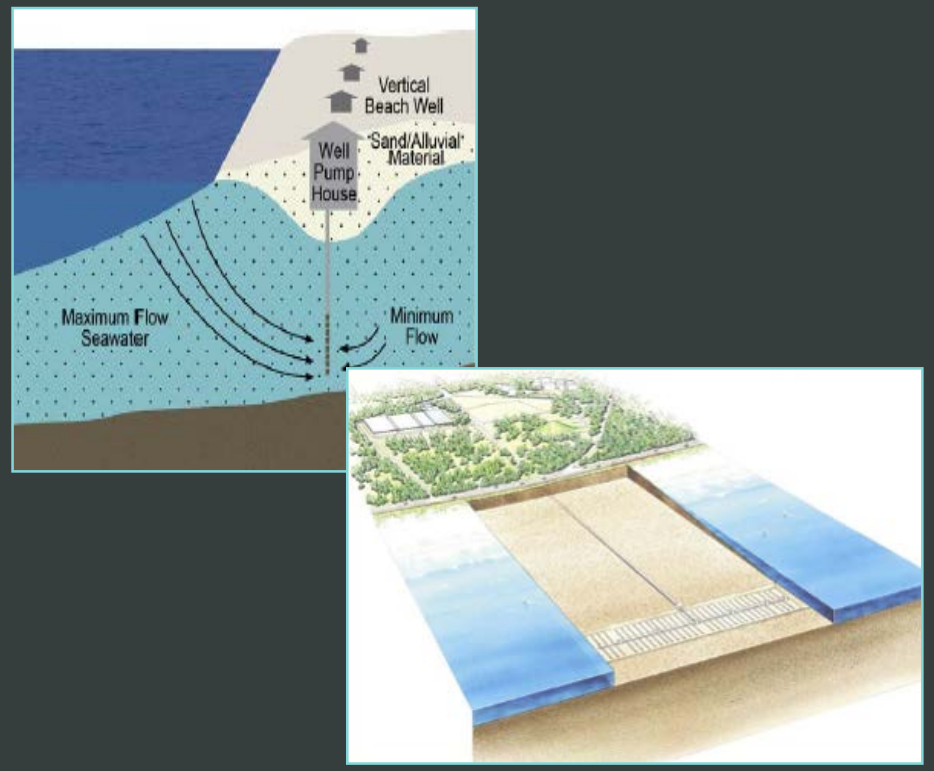
Types of Seawater Intakes

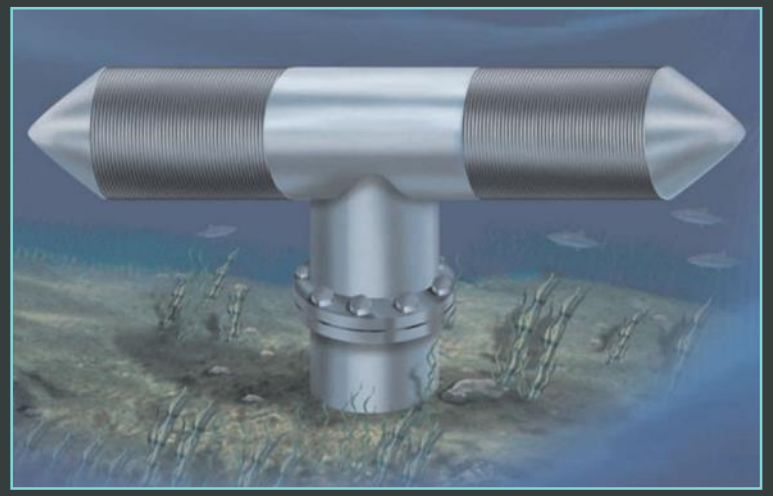
Subsurface

- Wells
- Infiltration Galleries

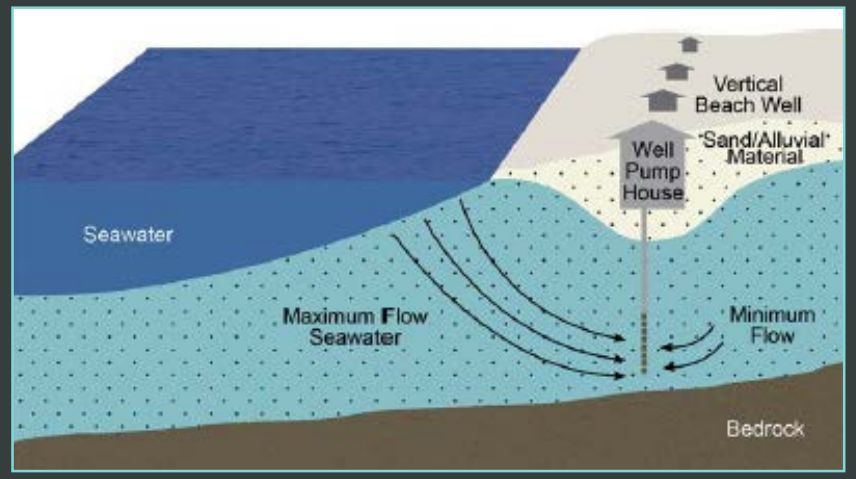
Open

- Power Plant (being phased out)
- Wedge-Wire Screens

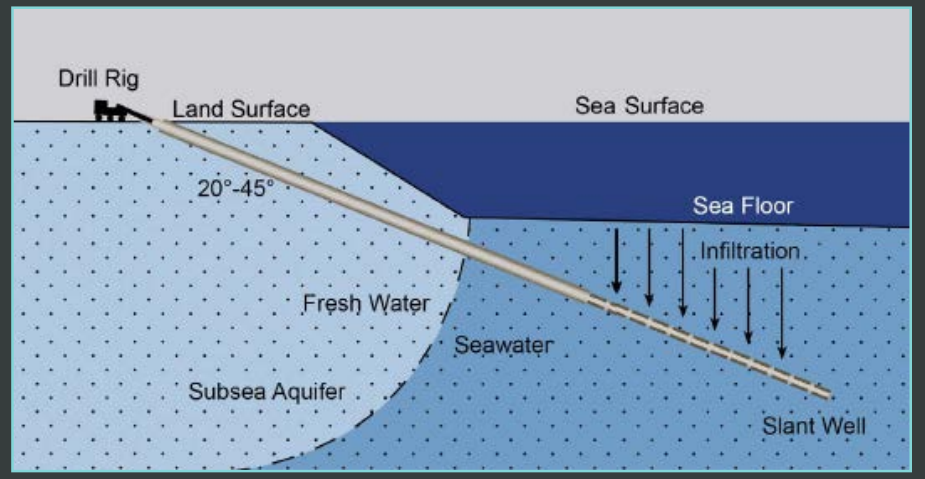




Wells

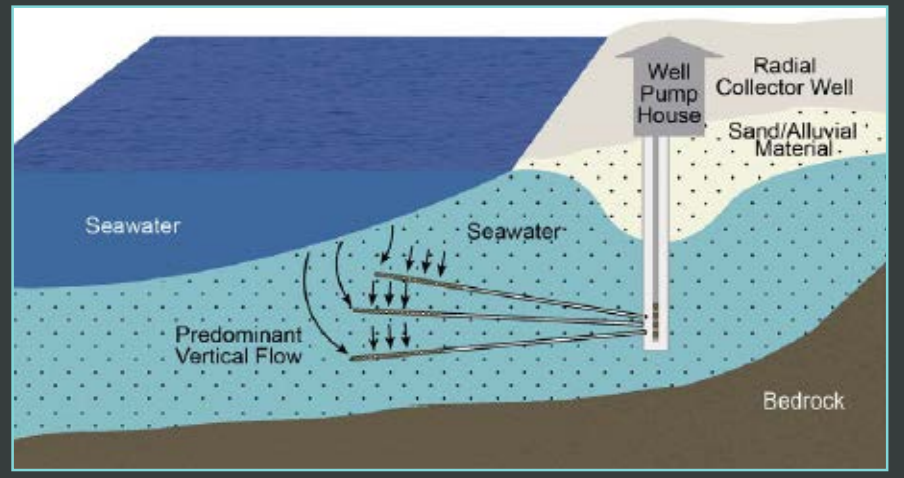


Beach Wells (Vertical Well)



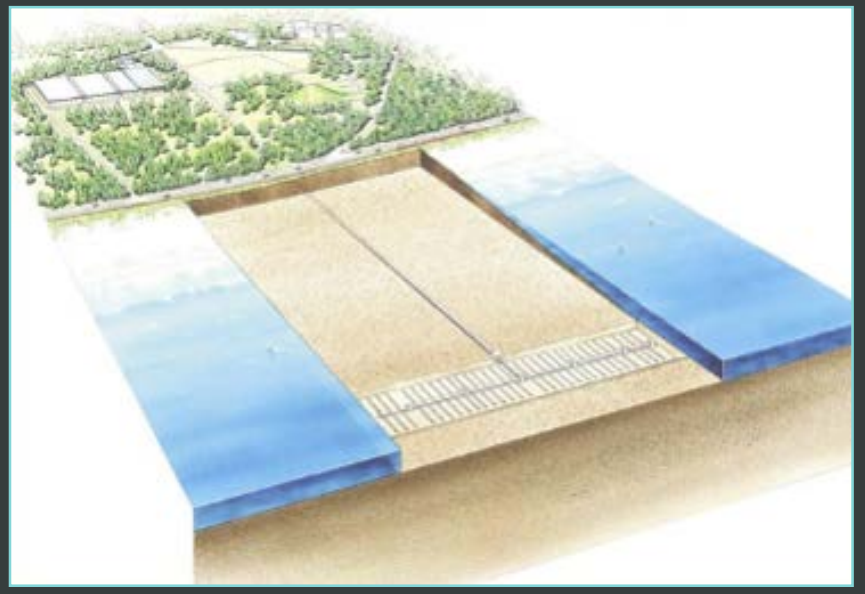
Slant Wells

Horizontal Directionally Drilled Wells

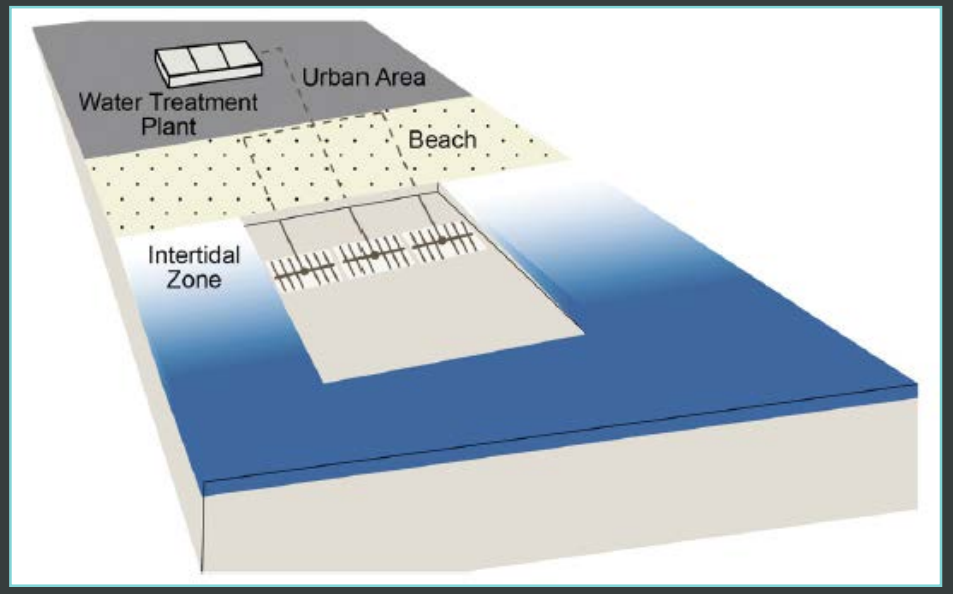


Collector Wells

Infiltration Galleries



Seafloor Infiltration Gallery (SIG)



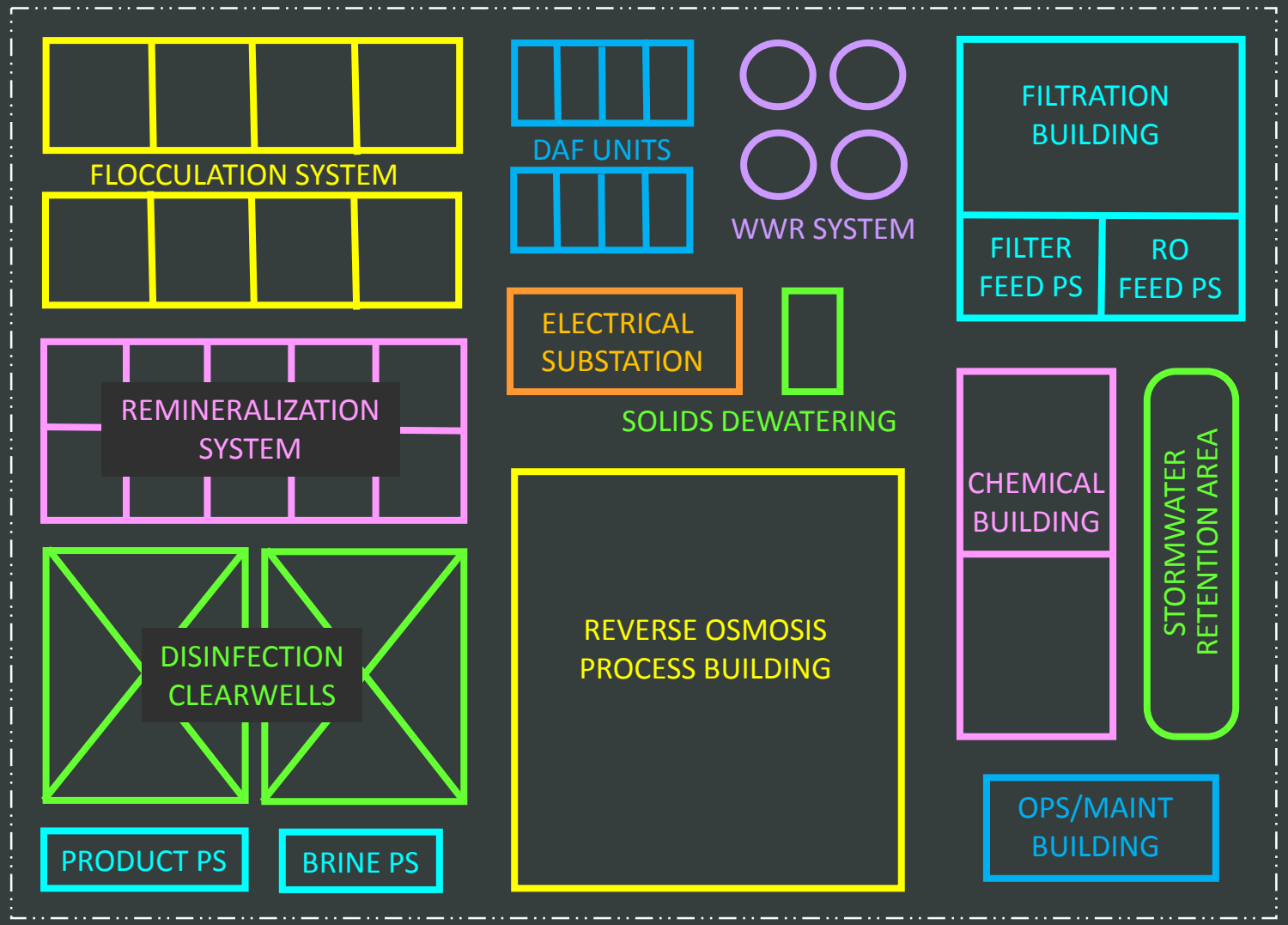
Beach Infiltration Gallery (BIG)

Selection of an intake will require an expert panel and a formal public input process

Step 6 – Select a site for the plant

Site Footprint and Layout

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

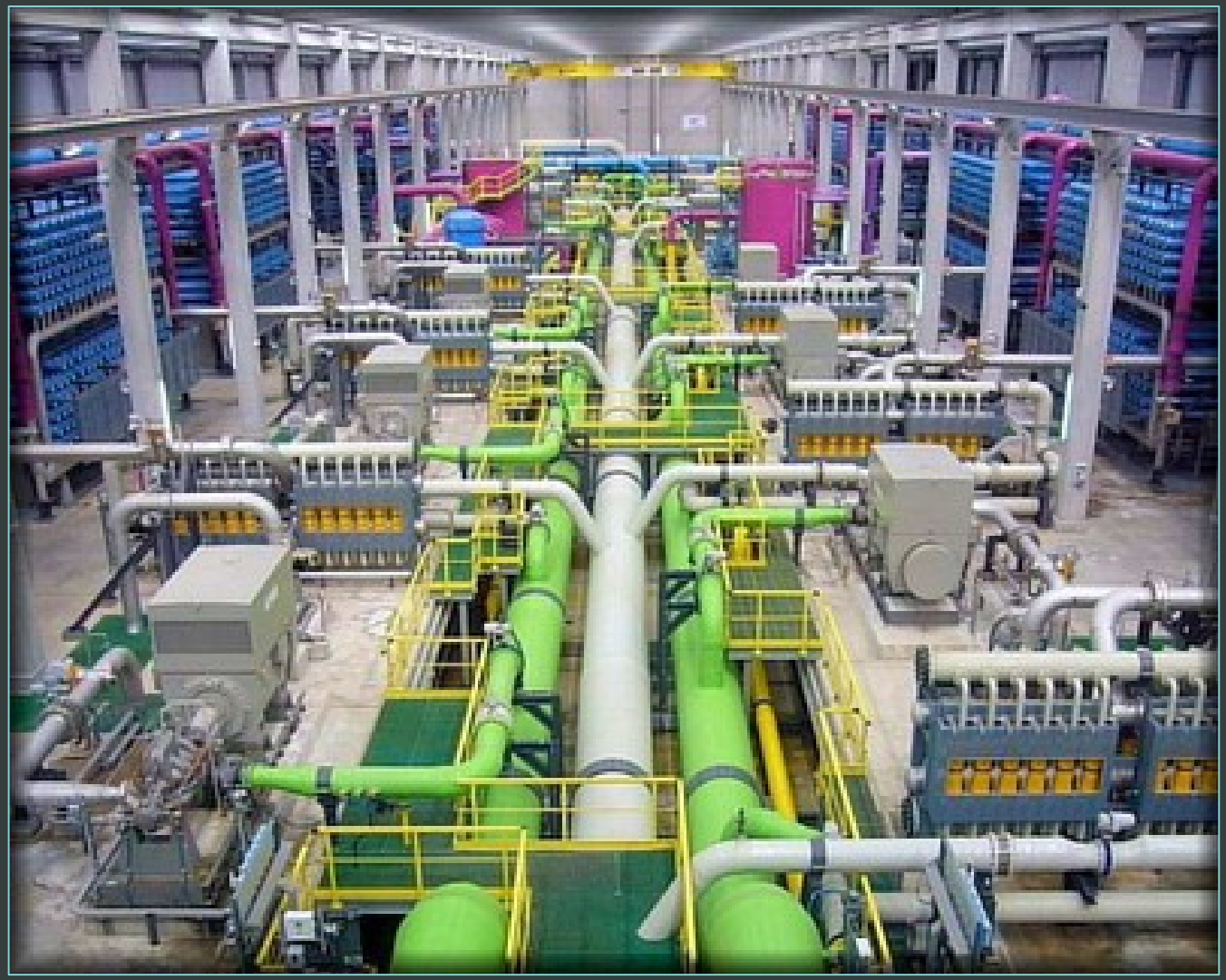
Permitting Considerations

These will drive the schedule

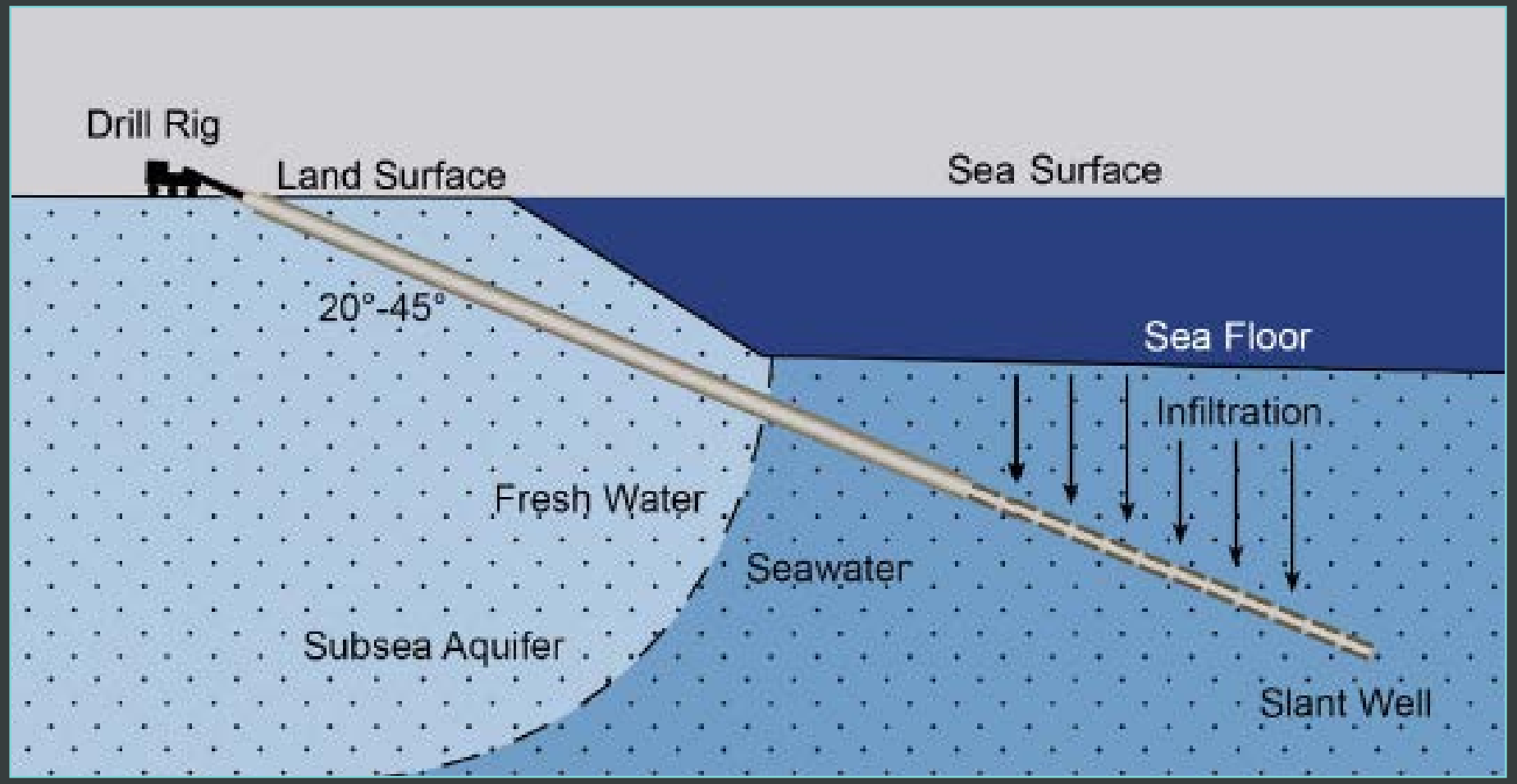
- Permit agencies should be engaged early and often in the planning process
- Permitting must be closely coordinated with:
  - public engagement/outreach
  - CEQA/NEPA
  - technical project development, particularly for intakes

Step 8 – Design & Construction

Treatment



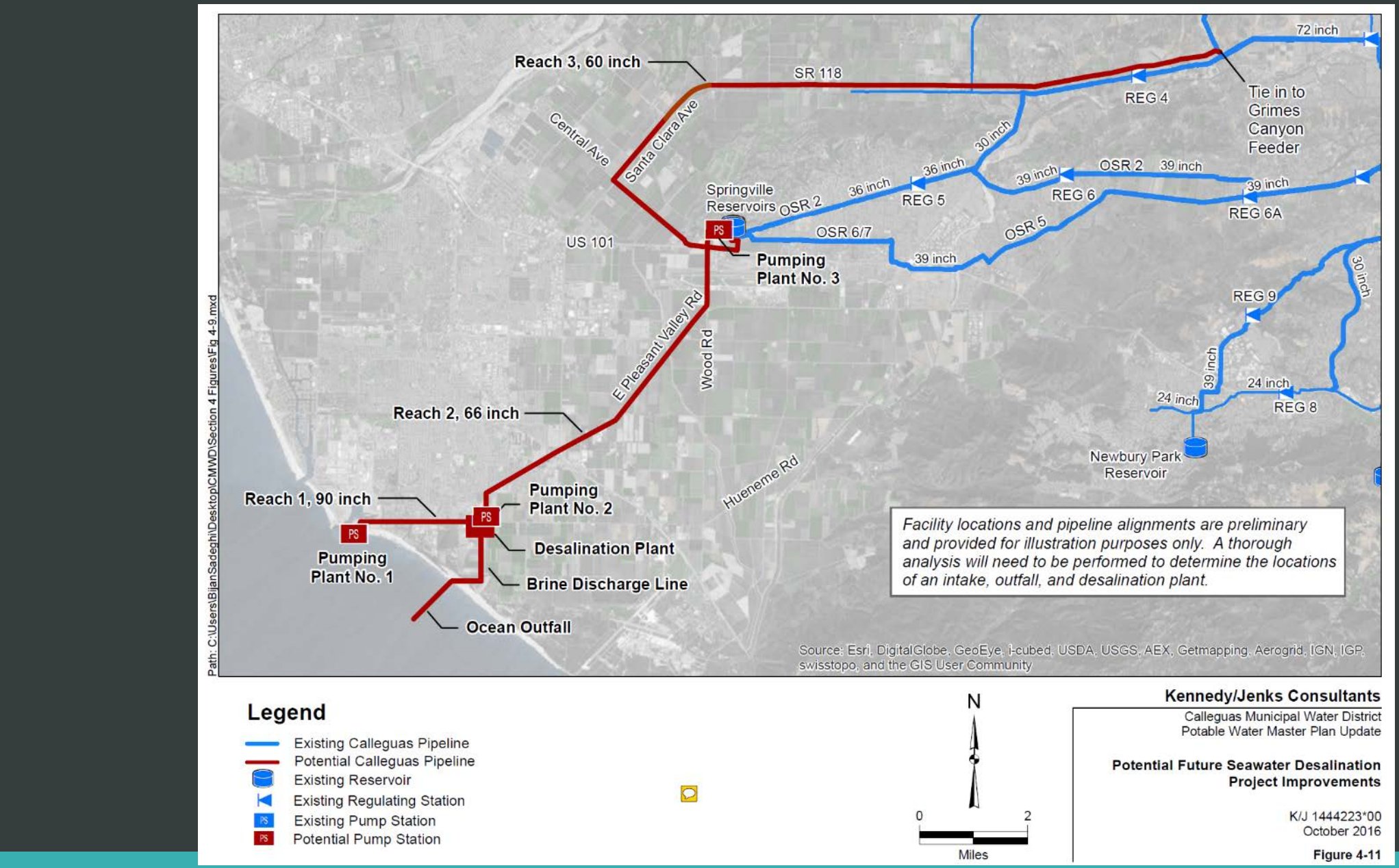
Seawater Intake



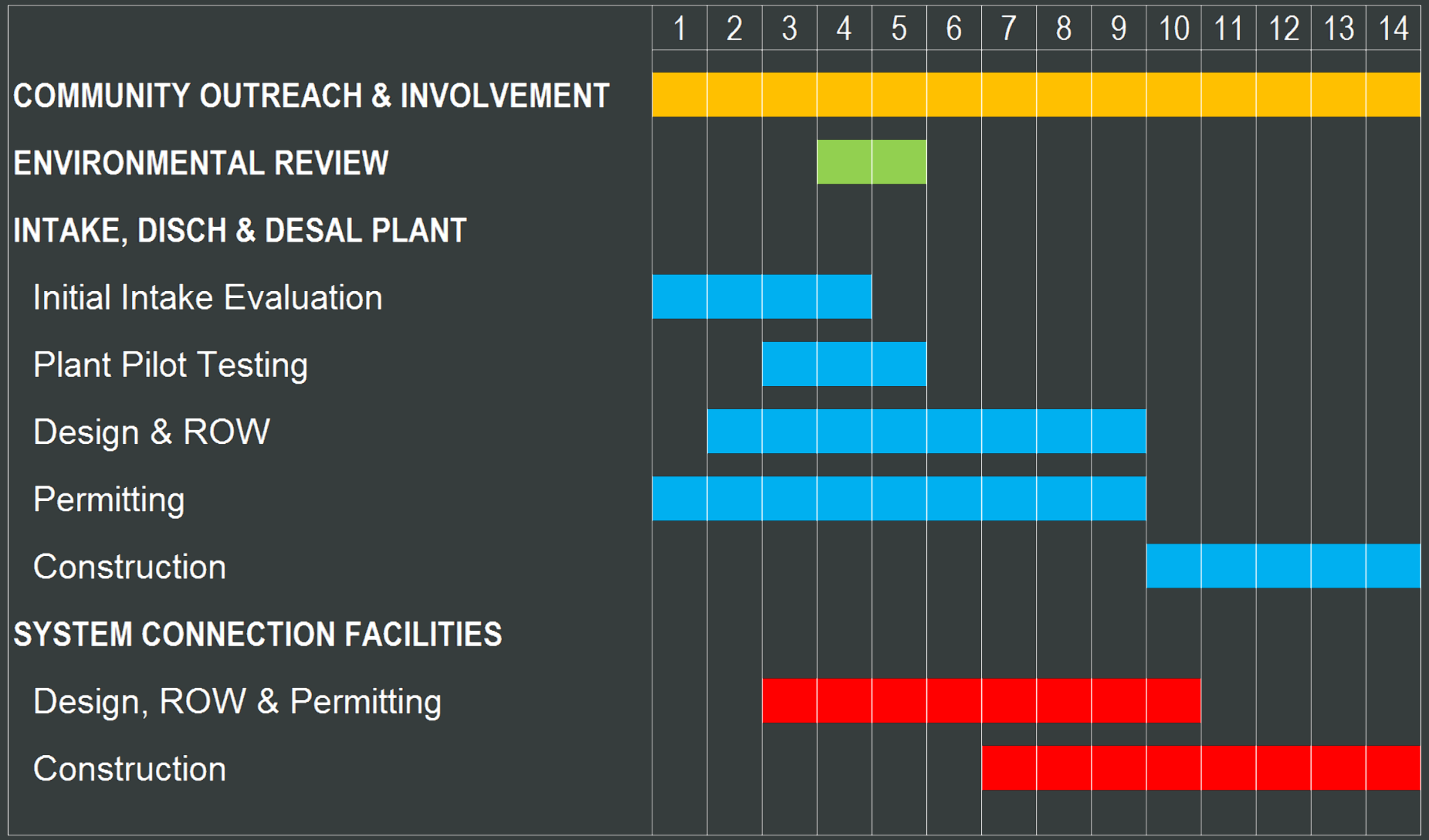
Brine Discharge Outfall

Renewable Energy Supply

Connection to Water Distribution Infrastructure



ESTIMATED PROJECT SCHEDULE - CALLEGUAS SEAWATER DESALINATION FACILITES



Units are years.