Why is West Basin considering ocean water desalination?

The need for local water supplies has grown due to the increased frequency and duration of droughts, periodic restrictions on imported water and uncertainties surrounding climate change. Reliability and confidence in our water resources is critical to this region’s economy and quality of life.

To ensure water reliability for our customers and service area, the District has goals to achieve a diverse water supply portfolio, as detailed in the 2015 Urban Water Management Plan. For West Basin, water reliability can be achieved by: reducing dependence on imported water; increasing conservation; and developing locally-controlled, drought-resilient water supplies including recycled water and, potentially, ocean water desalination. West Basin has invested heavily in recycled water and will continue to expand its efforts. In addition, West Basin is investigating ocean water desalination, which also offers the benefit of being local, drought resilient and drinkable or potable today.

History has shown the need to be adaptable when considering water supply sources. Prior to the formation of West Basin in 1947, the area relied solely on groundwater. An overreliance on this water source, by a rapidly growing population and economy, has resulted in the intrusion of seawater into the local groundwater basin. West Basin was established as a result, shifting the primary water supply to imported water obtained through the Metropolitan Water District of Southern California (Metropolitan). Initially, 100 percent of the imported supply came from the Colorado River Aqueduct (CRA). By the 1970s, the water supply became a combination of water from the CRA and the State Water Project (SWP), which comes from Northern California. In the 1990s, West Basin began promoting conservation and increasing development of local supplies, through water recycling, in response to the declining reliability of imported water and a severe drought.

Presently, in pursuing the District’s mission to provide a safe and reliable supply of high-quality water to the community it serves, West Basin is examining ocean water desalination as a drinking supply. This source could further diversify the District’s water supply portfolio, to help offset imported water use. This added drinking water would enhance regional water reliability, especially during periods of drought and water scarcity (e.g., loss of snowpack in the Sierra Nevada Mountains, catastrophic interruptions of water supply and uncertain impacts of climate change).
What is the West Basin Ocean Water Desalination Project?

The proposed Ocean Water Desalination Project (Project) would produce between 20 to 60 million gallons per day (MGD) of drinking water from the ocean. The 20 MGD capacity facility (Local Project) would generate approximately 21,500 acre-feet per year of high-quality, drinking water to meet the demands locally. The project also considers a potential expansion of the facility to produce up to 60 MGD of drinking water (Regional Project), to account for future needs in the region. A 20 MGD ocean water desalination facility could add approximately 11% of reliable water to the service area, further diversifying the District’s water supply portfolio. The Regional Project could help address water reliability issues on a wider scale through partnerships with other local water agencies.

The Project (both Local and Regional) consists of: a desalination facility with membrane filtration and reverse osmosis technology; an ocean water intake system to deliver ocean water to the facility; a brine discharge system to return concentrated seawater back to the ocean; and a drinking water delivery system to distribute the drinking water produced to the local and regional water supply systems.

Targeted 2025 Water Supply Portfolio

- Groundwater (Cities + Retailers) 18%
- Non-potable Recycled Water (West Basin) 14%
- Conservation (West Basin + Retailers) 18%
- Imported Potable Water (West Basin) 39%
- Proposed Local Potable Desalinated Ocean Water (West Basin) 11%

Note: Parenthesis indicates the entity/entities that control the specified water supply. (Reference: 2015 Urban Water Management Plan)
Where will the Project be located?

The proposed Project site would be at an existing 33-acre industrially zoned location within the El Segundo Generating Station (ESGS) at 301 Vista Del Mar in the City of El Segundo, California.

Why is desalination important for the region?

West Basin is looking into solutions to address conditions that may impact service reliability such as drought, regulatory uncertainty, climate change and natural disasters. Drought and climate change are having a profound impact on California’s water resources, as seen in dramatic reductions in snowpack size, river flows and groundwater levels.

By the end of the century, the Sierra Nevada Mountains are anticipated to experience a 48-65 percent loss in snowpack. This is significant, as mountain snowpack from Northern California provides as much as a third of California’s water supply by accumulating snow during winter and releasing it slowly during the spring and summer. As temperatures continue to rise, snow will melt faster and earlier, which will make it difficult to store and use as a water supply in Southern California.

In addition, anticipated sea-level rise may have an adverse impact on the sustainability of the San Francisco Bay Delta (Bay Delta), a key water supply in the SWP and in the region. Imported water supplies will become increasingly restricted due to environmental and prolonged drought conditions. For example, water export restrictions have resulted in a shortage in allocations for Central and Southern California (including West Basin) in three of the past eight years.

The uncertainty of climate change and the vulnerability of imported water infrastructure to earthquakes reinforce the need for diversity when planning future water supplies. These challenges have also reinforced the importance of reducing the need for imported water and increasing locally-controlled, drought-resilient, potable water supplies in the District and region.

What are the objectives of the Project?

The Project is being explored as one component of the District’s mission to provide safe and reliable water to the communities it serves through the following objectives:

- Diversify the District’s water supply portfolio to increase reliability in the near and intermediate term (5-15 years) and long term (15-30 years), while reducing reliance on imported water;
- Improve ability to adapt by developing a water supply that is less vulnerable to climate variations;
- Improve water security by increasing local control of water supplies and infrastructure;
- Improve the District’s ability to control water costs and long term price stability; and
- Develop a potable water supply that is cost effective and environmentally responsible.
What ocean water desalination experience does West Basin have?

For more than 15 years, West Basin has researched ocean water desalination that include topics related to the operation and incorporation of desalination into the existing water supply. In 2002, West Basin initiated a Desalination Pilot Project (Pilot Project) at the El Segundo Generating Station (ESGS). The data collected during the Pilot Project led to the development of the Ocean Water Desalination Demonstration Facility (OWDDF) at the Science, Education, and Adventure Lab (SEA Lab) in Redondo Beach. The OWDDF conducted larger-scale testing and operated continuously from October 2011 to December 2014.

These efforts led to the development of a comprehensive 2013 Ocean Water Desalination Program Master Plan (PMP), which offered a full-scale design, permitting and operations approach for incorporating ocean water desalination into the West Basin water supply portfolio. The PMP contains a detailed analysis of over 2000 pages of desalination technical studies and can be viewed under “Project Materials” at www.westbasin.org/desal.

How does desalination work?

The main ocean water desalination process involves removal of dissolved salts and impurities to produce clean drinking water. The process involves the following steps:

a. **Intake**: Ocean water passes through screens specifically designed to minimize impact to marine life. The screens will be designed in accordance with the 2015 California Ocean Plan Amendment for desalination.
b. **Media Filtration**: Filters remove coarse materials from the water, such as sand and sea shell pieces.
c. **Membrane Filtration**: Fine membranes remove the microscopic material in the ocean water, such as bacteria.
d. **Reverse Osmosis**: The filtered water is pumped under high pressure through reverse osmosis (RO) membranes to purify it, removing salt, minerals and any remaining viruses. This results in water that meets or surpasses state and federal drinking water requirements. The discarded salt water is referred to as brine.
e. **Post-Treatment**: Due to the pure water quality that results from the RO process, the water is remineralized to stabilize it and prevent water pipes from corroding. The water is then disinfected so it is safe for drinking.
f. **Brine Disposal**: The brine from the RO process is returned to the ocean where it reaches ambient salinity levels within a 100-meter radius to minimize impacts on marine life. The brine discharge system will be designed in accordance with the 2015 California Ocean Plan Amendment for desalination.
Where is ocean water desalination used?

Ocean water desalination has been used around the world successfully for centuries, with over 18,000 facilities currently operating in 150 countries including Saudi Arabia, Israel, Australia, Japan, Italy, Spain, Portugal, India, and South Africa. The largest facility is in Saudi Arabia, which produces over 270 million gallons of fresh water per day.

What is the quality of desalinated water?

The desalination process produces high-quality drinking water. The quality of desalinated water surpasses all state and federal drinking water standards, based on the data reported by other facilities across the world as well as thousands of water quality tests conducted during the District-led pilot and full-scale equipment demonstration studies (2000-2017). It is also noted that desalinated water typically has much lower “hardness” (or dissolved mineral content, exhibited by the film deposits left on glassware after the dishwasher) when compared to groundwater and imported water sources. Blending desalinated water with other conventional water sources may help reduce this hardness.

How will the Project affect marine life?

Potential impacts to marine life and possible mitigation measures will be evaluated and made available for review and public comment in the draft environmental impact report (EIR).

Since 2002, West Basin has taken a responsible, science-based approach to its Ocean Water Desalination Program to protect marine life, maximize energy efficiency and minimize cost. West Basin has conducted numerous, methodical, ocean protection and operational efficiency research studies to meet California’s environmentally protective regulations and District commitments. The District’s commitments include water reliability, water quality, financial and resource management, environmental stewardship and customer service.

How much energy does desalination require?

West Basin research indicates that ocean water desalination will use approximately 50% more energy than imported water supply from Metropolitan. The energy required for an acre foot of water (kWh/acre foot) is estimated as follows:

- Ocean Water Desalination: 4,200 kWh
- California State Water Project: 3,500 kWh
- Colorado River Aqueduct: 2,500 kWh

Advancements in membrane technology, high-efficiency pumps and energy recovery systems make ocean water desalination more energy competitive than it has been in the past. West Basin is committed to evaluating all energy sources, including renewable energy, to power the Project and achieve a carbon neutral portfolio. Additional details and opportunities for energy efficiency will be provided in more detail if the project moves into the design phase.
How will the Project affect greenhouse gas emissions?

The Project will be consistent with Assembly Bill 32 (AB32) greenhouse gas (GHG) reduction goals on a Project and District-wide water supply portfolio level. The draft EIR will evaluate the Project’s potential effects on global climate change, including construction-related and operational GHG emissions. West Basin has committed to reducing the additional GHG emissions through methods that include carbon offsets. The Project will also strive to meet the State’s continued efforts to reduce GHG emissions, which the State has currently set to 80 percent below 1990 levels by 2050 (Senate Bill 350).

How much will the facility cost, and how will it affect water rates?

Based on a cost estimate performed, in accordance with the Association for the Advancement of Cost Engineering (AACE) International Recommended Practice, building a 20 MGD facility has a base estimate of approximately $480 million\(^1\). The impact on water rates is dependent on many factors ranging from the project delivery method (how the facility is designed, built and operated) to the number of gallons of water a household uses. The Project is currently in the environmental phase and a detailed design has not been developed to provide exact cost estimates. West Basin is planning to conduct a future study to evaluate the potential effect on water rates as a result of implementing the Project to provide drinking water, increase regional water supply reliability and improve drought resiliency. This analysis will be consistent with the Project objective of increasing West Basin’s ability to control future drinking water costs, and commitment to sound financial and resource management.

What phase is the Project in?

West Basin is currently conducting an environmental impact report review to evaluate the possible impacts and mitigation measures of a potential ocean water desalination facility to produce drinking water, in accordance with the California Environmental Quality Act (CEQA). If the final EIR is certified and the Project is approved, then it would then move into the design and construction phases.

CEQA is a statute that requires state and local agencies to identify adverse environmental impacts that projects may have, as well as identify ways to avoid or mitigate those impacts if possible. Through CEQA, an EIR must be prepared by the lead agency when there is sufficient evidence that significant environmental impacts may occur from the project. The District, the lead agency on the Project, determined that a full-scale ocean water desalination facility may have impacts that could be potentially significant and is preparing an EIR. To learn more about CEQA, please visit the California Natural Resources Agency website.

\(^1\) Within an accuracy range of +50 percent and -30 percent; Class V
15 What will be included in the draft EIR?

The following topics will be evaluated in detail in the draft EIR:

- Aesthetics, Light and Glare
- Air Quality
- Biological Resources – Terrestrial
- Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Marine Biological Resources
- Noise
- Public Services
- Recreation
- Transportation and Traffic
- Utilities and Service Systems

16 What is the CEQA Review Process?

The West Basin ocean water desalination CEQA and EIR were initiated by the Board of Directors in May 2015. The District released an EIR Notice of Preparation (NOP) in August 2015 and initiated a 45-day public comment period during the public scoping process. During this process, the District held publicly advertised meetings and provided opportunities for public input during the comment period.

The environmental process schedule is provided below. Dates will be updated accordingly. For more information about the NOP, please view the full notice under “Project Materials” at www.westbasin.org/desal.
West Basin is committed to a thorough environmental review process. The District will share the report findings and provide opportunities for public input on the draft EIR during the public comment period. Input from the public is a critical part of the CEQA process, as it helps inform and refine the Project. The public comment period also provides opportunities for stakeholders to ask questions. Please visit the Project website for a listing of public meetings at www.westbasin.org/desal.

Ocean water desalination projects in California require detailed coordination and permitting from local, state and federal agencies. West Basin is committed to environmental protection during its investigation of a responsible ocean water desalination facility. The California Ocean Plan, a set of standards created by the State Water Resources Control Board to protect the quality of the ocean waters, specifically addresses design requirements for ocean water desalination facilities. West Basin is actively working with agencies to explore a facility that meets and surpasses the State’s strict environmental protection goals, while providing water reliability and reducing the region’s dependence on imported water supplies.