Sunset Gap Seawater Intrusion Barrier Feasibility Study

Orange County Water District
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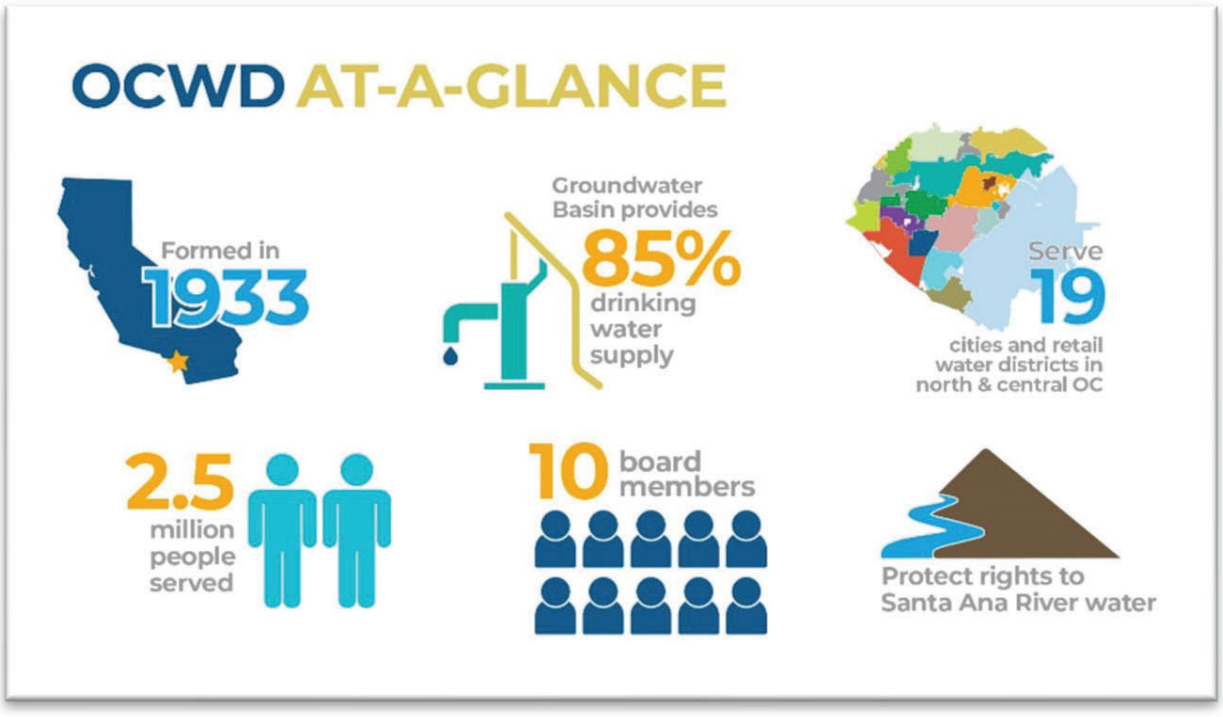
Notice of Funding Opportunity (NOFO) No. R23AS00109

Table of Contents



Executive Summary

Date:	April 2, 2024
Applicant Name:	Orange County Water District (OCWD or District)
City:	Fountain Valley
County:	Orange
State:	California
Task Area:	Task A: Water Strategy Grant for development of a new strategy
Applicant Category:	OCWD is a California special district; Category A.
Project Summary:	The OCWD manages the quantity and quality of the water in the Orange County Groundwater Basin (Basin) which provides 85% of the drinking water supply to 2.5 million people in north and central Orange County, California. Seawater intrusion threatens this key drinking water source, in part through sea level rise due to climate change. To protect Orange County water supplies, two seawater barriers have protected coastal aquifers since the 1970s. A third barrier is now necessary to address seawater intrusion in the Sunset Gap where elevated chloride concentrations have resulted in one drinking water well to be destroyed and multiple others impacted by chlorides. Groundwater modeling by the District has shown that at least nine drinking water wells, producing over 16,000 acre-feet per year, would be impacted if seawater intrusion is left unmitigated. The District has developed a Sunset Gap seawater intrusion barrier alternative and is currently conducting a Feasibility Study to determine the preferred injection barrier source water supply, extraction and injection well locations, treatment and wastewater discharge options, and cost estimates to design, construct and operate the barrier. The OCWD is seeking funding through the WaterSMART grant funding opportunity to help finance the Feasibility Study.
Project Duration:	September 2023 through October 2024
Federal Facility:	All or portions of the seawater barrier will be on Naval Weapons Station Seal Beach.

Project Location

The Project is in coastal Orange County, California near the Orange County/Los Angeles County lines, within the cities of Seal Beach, Huntington Beach, and Westminster at the approximate latitude and longitude of 33°45'22.88"N, 118° 3'44.91"W, respectively.

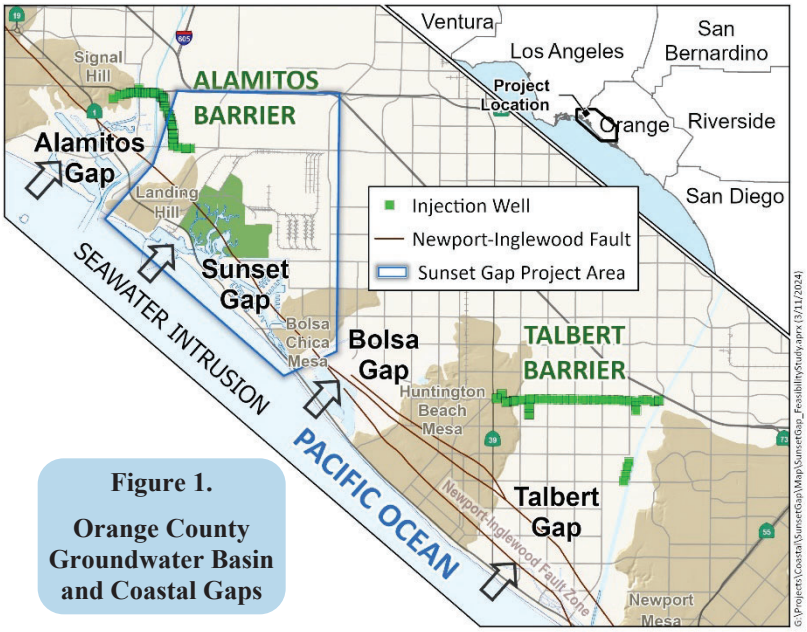


Figure 1.
Orange County Groundwater Basin and Coastal Gaps

Project Background

In coastal areas of the Orange County Groundwater Basin (Basin), saline groundwater has the potential to move inland towards municipal water supply wells. The primary source of saline groundwater is seawater intrusion through permeable aquifer sediments underlying topographic lowlands or gaps between the erosional remnants or mesas of the Newport-Inglewood Uplift. These gaps include, from north to south, the Alamitos Gap, Sunset Gap, Bolsa Gap, and Talbert Gap (Figure 1).

The Orange County Water District's (OCWD or District) policy regarding control of seawater intrusion is implemented through a comprehensive program that includes operating seawater intrusion barriers, monitoring and evaluating barrier performance, groundwater level and quality monitoring, evaluating susceptible coastal areas, and coastal groundwater pumping management. These activities enable OCWD to sustainably manage groundwater conditions in the Basin to prevent significant and unreasonable seawater intrusion and the resultant degradation of freshwater aquifers.

OCWD currently operates the Talbert Barrier in the Talbert Gap and works under a cooperative management agreement with the Los Angeles County Department of Public Works, which operates the Alamitos Barrier in the Alamitos Gap. Both barriers have been effective in maintaining chloride concentrations in coastal sentry wells below District-established threshold levels (typically 250 milligrams per liter, mg/L).

Although Sunset Gap has historically been considered a lower threat from seawater intrusion than Talbert and Alamitos gaps, within the last 20 years groundwater monitoring data indicate that seawater intrusion is occurring in Sunset Gap. Current (2022) chloride concentration contours indicating the farthest inland extent of seawater intrusion in the Beta aquifer (approximately 250-300 feet below ground surface) are shown in Figure 2. Elevated chloride concentrations also exist in the overlying Alpha aquifer, underlying Lambda aquifer, and the deeper Omicron-Upper Rho aquifer, but all with a lesser areal extent than the Beta aquifer. These elevated chloride concentrations resulted in a casing

failure in 2012 and the subsequent destruction of Huntington Beach drinking water well HB-12.

Over the past 20 years, the District has investigated the sources and extent of seawater intrusion in the Sunset Gap, including conducting geophysical surveys of subsurface materials, the installation of multi-depth groundwater monitoring wells, groundwater level measurements and water quality sampling, and numerical groundwater flow modeling.

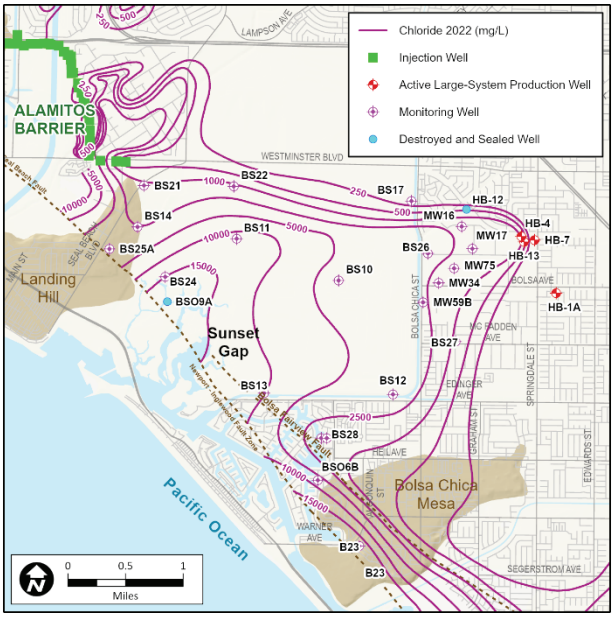


Figure 2. Beta-Lambda Aquifer Chloride (mg/L)

Through these investigations, OCWD has developed a conceptual seawater intrusion barrier (Figure 3) which comprises 34 injection wells at 20 sites with a combined annual average injection rate of 13 million gallons per day (MGD), and three extraction wells with a combined average extraction rate of 3 MGD. The 34 injection wells primarily target the Beta and Lambda aquifers and to a lesser extent the Alpha and Omicron/Upper Rho aquifers. The three extraction wells target the Beta and Lambda aquifers. The injection wells create a pressure ridge in the targeted aquifers that prevents inland migration of seawater, and the extraction wells provide a sink or drain between the injection wells and the ocean.

The District recently updated the groundwater flow and solute transport model and continues simulating various barrier scenarios including “no-barrier” scenarios that will help inform how seawater intrusion may progress in the absence of a seawater intrusion barrier. In combination with the results of the Feasibility Study (FS) for the current conceptual barrier, these model simulations will help inform the District’s board on the best option for addressing seawater intrusion in the Sunset Gap.

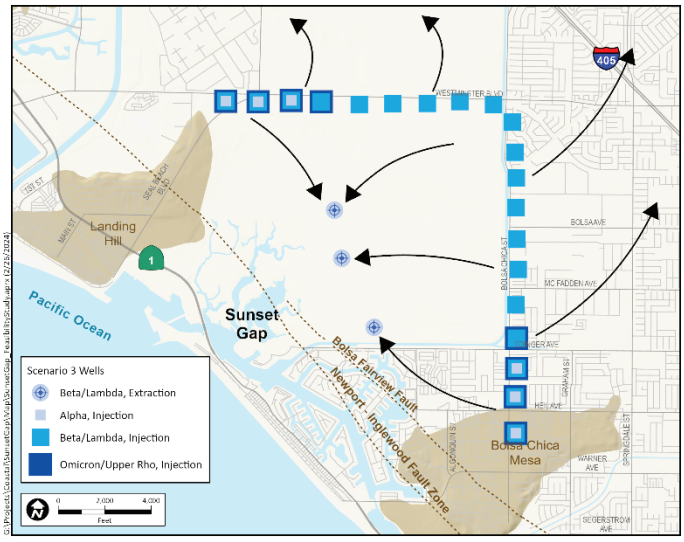


Figure 3. Conceptual Injection and Extraction Wells (arrows show direction of groundwater flow)

Project Description

The purpose of this project is to prepare a FS, including a preliminary design and cost estimate, for a potential seawater intrusion barrier in the vicinity of the Naval Weapons Station Seal Beach (NWSSB) and within the cities of Seal Beach, Huntington Beach, and Westminster. The conceptual barrier, which comprises 34 injection wells and three extraction wells, was the preferred scenario evaluated using groundwater modeling to best mitigate seawater intrusion through the Sunset Gap and is the conceptual starting point for the FS, with the understanding that the preliminarily estimated number of wells, flow rates, and alignment may change during the FS development.

Injection well source water is a critical factor in supplying the barrier and a primary focus of the FS. The District has identified the following as potential injection water supplies:

- Purified recycled water from the District's Groundwater Replenishment System (GWRS)
- Purified recycled water from Metropolitan Water District of Southern California's (MWD) future expanded Joint Water Pollution Control Plant in the city of Carson
- Treated imported water from MWD
- Groundwater extracted from the Basin's Deep aquifer
- Desalinated saline groundwater (i.e., from barrier extraction wells)
- Combination of the above

The total injection rate and individual well flow rates are not anticipated to be consistent throughout the year, as groundwater levels in and around the Sunset Gap are typically lower in the summer and higher in the winter, thus requiring lower injection flows in the winter and higher flows in the summer. For example, flows to the Talbert Barrier can vary by 100% seasonally as well as vary year-to-year depending upon basin storage conditions.

Another critical component of the Scenario 3 barrier concept is the fate of the extraction well discharge water. The estimated average 3 MGD of water will come from the Beta and Lambda aquifers, which are anticipated to be saline (20,000 mg/L total dissolved solids, TDS). Like the injection wells, the District anticipates seasonal variability in extraction rates, although to a lesser degree.

In August 2023, the District hired a consultant through a competitive selection process to prepare the *Sunset Gap Seawater Intrusion Barrier Feasibility Study*. The consultant's scope of work includes eight tasks detailing the approach to completing the FS and an implementation plan to conduct a preliminary design investigation. The eight tasks are described in detail below.

Task 1 – Project Management and Quality Assurance/Quality Control (QA/QC)

Efficient project management and careful QA/QC are necessary for a successful project outcome. Both the District and the consultant have dedicated project managers (PM). The District PM, Bill Leever, is a California Professional Geologist and Certified Hydrogeologist and responsible for the overall management of the project, including the project budget,

schedule, District staff and consultants, and QA/QC. The consultant PM, Cindy Miller, is a California Professional Engineer and is responsible for their project budget, schedule, sub-consultants and staff, and quality of the work products delivered to the District. Specific consultant PM activities include the following:

- Conduct the Project Kick-Off Meeting, which occurred on October 25, 2023.
- Conduct monthly progress meetings and participate in conference calls, stakeholder meetings, etc. as required to keep the project on schedule and budget.
- Prepare meeting agendas and minutes.
- Prepare monthly invoices and progress reports.
- Provide internal QA/QC on all work products and submittals (e.g., reports, calculations, cost estimates, etc.).

Project management activities specified in Section F of the NOFO, and more specifically, those in Section F.3 will be the responsibility of District PM, Bill Leever and will include:

- Submittal of SF-425 Federal Financial Reports (F.3.1) on a semi-annual basis and at project completion.
- Submittal of Interim Performance Reports (F.3.2) at least twice per year.
- Submittal of Final Performance Report (F.3.3) at project completion.

Task 2 – Background Information Collection

This task includes the identification and collection of information and data needed to conduct the FS. A written information request will be prepared for gathering relevant information (e.g., previous studies, reports, presentations, drawings, etc.) from the District and relevant agencies to aid in evaluation and project definition for the FS. This information and data will summarize the FS area characteristics, water supplies, existing seawater intrusion barrier projects and their water supplies, and hydrogeology of the Sunset Gap area relative to the barrier project.

Task 3 – Injection Well Water Supply

The injection barrier concept is preliminarily estimated to comprise 34 injection wells with an average combined injection rate of 13 MGD that will inject into the Alpha, Beta, Lambda, and Omicron/Upper Rho aquifers. The preliminary injection well alignments that have been used thus far for modeling scenarios are along Westminster Boulevard and Bolsa Chica Street. The feasibility of these *alignments* will be evaluated as part of Task 5.

The injection water supply assessment will identify all reasonable sources of water for injection well operation. The analysis assumes the injection barrier will operate beyond the foreseeable future, i.e., more than 50 years, and therefore, its water supply must also be available commensurately. At a minimum, the following will be performed as part of this task:

- Evaluate various injection well water supply alternatives, including, but not limited to:
    - purified recycled water from GWRS

  - purified recycled water from MWD's future expanded Joint Water Pollution Control Plant in the city of Carson
  - treated imported water from MWD via the Municipal Water District of Orange County (MWDOC)
  - groundwater extracted from the Basin's Deep aquifer
  - desalinated saline groundwater (i.e., from barrier extraction wells)
  - combination of the above
- Evaluate each water supply alternative's:
  - long-term reliability and availability
  - flexibility in seasonally adjusting flows as injection demands dictate
  - potential for increased flow requirements based on operational needs
  - water quality considerations related to injection, including the potential need for treatment to remove natural color, TDS, or other chemical constituents prior to injection
  - any other supply alternative characteristic that could impact its intended use
- Prepare preliminary facility designs sufficient to prepare a rough order of magnitude (ROM) cost estimate for each supply source, including:
  - treatment facility final design, siting, land acquisition, and construction for each water supply alternative requiring treatment prior to injection
  - design, siting, land acquisition, and construction of Deep aquifer supply wells and conveyance pipelines to proposed treatment facility
  - design, siting, land acquisition, and construction of pipelines and other facilities needed for water supply conveyance to the injection wells including potential alignments and siting
  - operation and maintenance (O&M), including energy, labor, chemicals, water purchase costs, sewer discharge fees, and other significant O&M cost items

A public workshop will be held with the District's board of directors to present the results of the injection well water supply assessment, solicit community and board input, and to identify one or more preferred injection well water supply sources.

The results of the water supply assessment will be summarized in a Technical Memorandum (TM) that identifies the water supply alternatives selected for evaluation, the evaluation criteria, results of and supporting rationale for the evaluation, a ROM unit cost ($/MGD) for each supply alternative, and a preferred water supply alternative.

Task 4 – Extraction Well Siting and Groundwater Discharge

The conceptual barrier assumes three groundwater extraction wells will be located seaward of the proposed injection well alignment to collectively produce an average of 3 MGD. These extraction wells are assumed to pump from the Beta and Lambda aquifers and are necessary to maintain a seaward gradient from the injection barrier. The water produced from the wells is expected to be saline, with TDS concentrations around 20,000 mg/L, and may require treatment prior to discharge.

Under this task the feasibility of constructing, operating, and maintaining three extraction wells that produce an average of 1 MGD each from the Beta and Lambda aquifers will be evaluated. In consultation with representatives of the NWSSB, potential well sites on the NWS that are compatible with the station mission and activities and can be connected to future pipelines to convey the extracted groundwater to treatment facilities and discharge points will be evaluated.

Additionally, discharge alternatives for groundwater produced by the extraction wells will be evaluated and will include:

- treatment and reuse as an injection well source water supply (Task 3)
- treatment and discharge to sanitary sewer
- treatment and discharge to surface waters

A preliminary design of treatment facilities necessary to meet state and federal discharge requirements for extracted groundwater for each of the above discharge alternatives will be performed such that a ROM unit cost ($/MGD) for treatment can be prepared. Based upon the preliminary design, a ROM unit cost for each discharge option will be prepared and will include the cost related to final design, construction, and O&M. The results of and supporting information and rationale for the ROM unit cost for treatment will be presented at a public workshop with the District's board to determine if one or more of the treatment/discharge alternatives should be screened from further consideration.

Based on the results of the extraction well siting evaluation and the retained treatment/discharge alternative(s), we will evaluate and identify feasible locations for the groundwater treatment facility and pipeline alignments to convey the extracted groundwater from the extraction wells to the treatment facility and from there to the point of use or discharge for the retained treatment/discharge alternative(s). This activity will be performed in close consultation with NWSSB representatives.

At the conclusion of this analysis, a TM that describes the results of and supporting information and rationale for the above evaluations of extraction well sites, discharge alternatives (including ROM $/MGD unit cost for groundwater treatment), treatment facility siting, and conveyance pipeline alignments that appear most feasible will be prepared.

Task 5 – Injection Barrier Alignment

The conceptual 34 injection wells located at 20 sites are along an L-shaped alignment with an east-west leg along Westminster Boulevard and a north-south leg along Bolsa Chica Street. The exact number and spacing of injection wells are subject to groundwater level influenced seasonal demands and will be determined based on aquifer hydraulics tests at future test wells and additional groundwater modeling that will be performed by the District. The injection wells are designed to inject into the Beta and Lambda aquifers along the entire length of the barrier and the Upper and Lower Alpha aquifers and Omicron/Upper Rho aquifers on each end of the barrier. The following will be performed to evaluate the feasibility of the injection barrier alignment:

- Evaluate the feasibility of constructing, operating, and maintaining injection supply

pipelines, laterals, approximately 34 injection wells at 20 sites, and appurtenant facilities in the vicinity of Westminster Boulevard from Apollo Drive to Bolsa Chica Street and continuing south in the vicinity of Bolsa Chica Street to Warner Avenue. The number of well sites may be modified based on future test well performance and modeling analysis. Each injection well casing will be constructed in a separate borehole such that a "well site" may comprise one to four injection wells (depending on the number of aquifers targeted for injection) spaced a minimum of 20 feet apart.

- Identify and evaluate potential injection alignment alternatives including, but not limited to:
    - transportation rights-of-way
    - NWSSB property
    - Orange County Flood Control property
    - private property
- Evaluate the feasibility of above-grade versus below-grade wellhead completions on a site-by-site basis, with above-grade completions generally preferable. Other relevant site conditions will be evaluated including, but not limited to, traffic safety, utilities, surface drainage, shallow groundwater, and NWSSB security requirements.
- Prepare a preliminary design of injection barrier facilities sufficient to prepare a ROM cost for each barrier alignment evaluated.
- Conduct a workshop with District board of directors to present the results of the injection barrier alignment evaluation and to identify a preferred barrier alignment.
- Prepare a TM summarizing the facility alignments and siting alternatives selected for evaluation, the evaluation criteria, the results of and supporting rationale for the evaluation, and the identification of a preferred alignment.

Task 6 – Detailed Analysis of Project Concept

A detailed evaluation of the project concept that integrates the preferred options identified in the TMs from Tasks 3-5 will be prepared and will include the following:

- conceptual level facility design (10% pre-design), including:
    - injection well water supply and conveyance
    - extraction well locations, conveyance, treatment, and discharge
    - injection well locations and conveyance
    - illustrations and maps to show potential facility locations and supporting infrastructure
- capital cost, O&M cost, and life cycle costs (AACE Class 4)
- property encroachment issues
- O&M staffing full-time equivalents

- community and stakeholder input received during the course of the work that may affect project feasibility and/or cost
- government agency (e.g., Navy, regulatory, city) input received during the course of the work that may affect project feasibility and/or cost
- implementability

At the conclusion of the detailed analysis, a workshop with District board of directors to present the project concept will be conducted.

Task 7 – Feasibility Study Report

A Feasibility Study report will be prepared that summarizes the work completed in Tasks 1 through 6 and will include, but not be limited to, the following:

- An executive summary
- A summary of the work conducted in Tasks 1 through 6 that includes the Task 3-5 TMs
- A detailed discussion of the preferred project concept, including all aspects of the evaluation conducted in Tasks 1 through 6

Task 8 – Test Well Implementation Plan

Once the FS is complete and upon District board of directors authorization, a test well implementation plan will be prepared that will, when implemented, generate representative hydrogeologic data sufficient to refine the groundwater model and underlying hydrogeologic assumptions (e.g., aquifer thickness, hydraulic conductivity, storage coefficient) needed to design the barrier project – specifically, the number, spacing, and refined estimated individual well flow rates of the injection wells, extraction wells, and Deep aquifer production wells (if that water supply source is preferred). It is anticipated that the following will be included in the test well implementation plan:

- Up to 9 test injection wells screened in the Beta, Lambda, and Omicron/Upper Rho at 5 sites located along the preferred barrier alignment identified in the FS
- One test extraction well and a pair of monitoring wells screened in the Beta and Lambda aquifers
- One test barrier supply well screened in the Deep aquifer (if identified in the FS as the preferred source water supply)
- Up to 10 monitoring wells screened in the Beta, Lambda, and Omicron/Upper Rho at 5 sites that will serve both the test well program and the potential future barrier project

If constructed, the test wells would be located and designed to be incorporated into the potential future barrier project.

The following will be included in the plan:

- 30% design drawings for all components of the test well implementation plan

- the number, location, depth, and rationale for each of the test wells proposed in the test well program (including injection, extraction, and monitoring wells)
- well site owner, parcel number, dimensions, and minimum construction and permanent easement sizes
- injection testing system components, layout, and testing methods
- source water supplies for injection well testing
- extraction well testing system components, layout, and testing methods
- extraction well and Deep aquifer production well (if applicable) testing discharge water disposal
- data collection equipment, including water level, water quality, and flow rate
- data analysis and interpretation methods
- identification of utilities
- permitting requirements for all components of the testing plan, including, but not limited to encroachment/rights-of-way, state coastal commission, state water board waste discharge requirements, and federal underground injection control
- Engineers estimate of cost to implement the plan from well construction through testing, data analysis, and reporting

Evaluation Criteria

Evaluation Criterion A. Project Benefits (35 Points)

Water supplies in California are under constant threat from climate change, decreasing availability, and emerging contaminants, to name a few. Climate change threatens increased and prolonged droughts, snowpack declines, and sea level rise. Decreased availability and increased environmental needs exert enormous pressure on regional water delivery systems like the Colorado River and the State Water Project. Emerging contaminants like per-and polyfluoroalkyl substances (PFAS) have only increased the threat to our drinking water sources. As such, our region and specifically our groundwater basin, must be managed as efficiently as possible to increase our ability to use our groundwater basin to its maximum extent and reduce our reliance on “imported” sources of water supply. Through the District’s groundwater management efforts, we can derive 85% of our water supply from the Basin. This not only benefits OCWD’s residents with low-cost water, but it also benefits all California and Colorado River Basin water users by reducing our need for imported water.

As detailed above, seawater intrusion into the Basin has occurred since the mid-1900’s and has been actively mitigated by the District since the 1960’s. More recently, the Sunset Gap is being intruded with seawater and is contaminating municipal water supply wells. Groundwater modeling by the District has shown that seawater intrusion will continue if not addressed. Sea-level rise, which is predicted to increase by ~1-foot by 2050 and up to

~2 feet by 2100 (NOAA, 2022[1]), will only increase the rate of seawater intrusion and exacerbate the contamination of our groundwater in the Sunset Gap.

How do the threats identified in your response to the above impact specific water uses or sectors in the geographic area of the planning or design project? District modeling, using a calibrated numerical groundwater flow and solute transport model, shows the inland migration of chloride will continue over the next 60 years, with the potential to impact at least nine municipal water supply wells. These nine wells produce ~16,000 acre-feet per year (AF/Y) of combined production, with peak production of ~ 20 MGD. To replace this lost groundwater with MWD water would cost an additional $11,152,000 per year at current OCWD replenishment assessment and MWD Tier 1 rates. In addition to the increased cost of water for the nine impacted wells, downgradient wells further to the northwest in Los Angeles County are also threatened from the Sunset Gap intrusion if left unmitigated.

How will the planning or design project help address the threats to water supplies and water uses identified in the above response? This project will provide the District's management and Board of Directors the information needed to make decisions on the feasibility of constructing a seawater intrusion barrier in the Sunset Gap, including ROM costs, barrier design alternatives, and an implementation plan for the preliminary design investigation. This project will also be used to advance planning efforts with the NWSSB, as it will further detail the barrier design, costs, and necessary involvement of the Navy in our barrier planning.

The primary beneficiary of this planning effort will be the 19 municipal groundwater producers and 2.5 million residents within the Basin. Protecting our ability to fully utilize our groundwater resources not only benefits our Basin users, but it also benefits the entire southwestern United States by incrementally reducing California's demand on imported water supplies. The MWD has made significant efforts over the past 20 years to reduce Colorado River use through increased conservation, recycled water reuse, and increased storage. OCWD has been at the forefront of sustainable groundwater management through our history of operating seawater intrusion barriers, recycled water reuse, and stormwater capture and recharge. The Sunset Gap Barrier project is another step in increasing the resilience of our groundwater supply.

Is the planning or design effort for the purpose of providing domestic water supplies to a Tribe, insular area, or disadvantaged community(ies) that do not have reliable access to water supplies? OCWD serves an ethnically, culturally, and economically diverse region and strives to manage its water resources in a conscious and equitable manner. And, although approximately 32% of the 2.5 million people within the OCWD are disadvantaged[2], these communities will receive the same benefits to water supply protection and reliability as the overall population through their water service providers. However, this reliability comes at increased cost from imported water or other alternative water supplies such as ocean desalination.

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[1] https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report.html#step1

[2] Climate and Economic Justice Screening Tool, V1.0, November 22, 2022. https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5

Does the planning or design effort involve the improvement of nature-based features? If so, please describe. This project has no direct improvement to nature-based features.

Is the project for the purpose of meeting existing environmental mitigation or compliance obligations under Federal or State law? Yes. The Sustainable Groundwater Management Act (SGMA) of 2014 mandates that all high- and medium-priority groundwater basins in California be managed sustainably. One of the sustainability criteria of SGMA is controlling seawater intrusion. The District submitted an Alternative Plan to the Department of Water Resources which identified seawater intrusion in the Sunset Gap as a threat. This project directly addresses that threat.

Evaluation Criteria B- Inclusion of Stakeholders, Stakeholder Support, and Previous Planning Efforts (25 Points)

Sub-Criterion B1: Task A - Water Strategy Grants and Task C - Drought Contingency Planning

Will the project help meet the water supply needs of a large geographic area, region, or watershed? Yes. The District manages the quantity and quality of groundwater in the Basin which provides 85% of the drinking water supply to 2.5 million people in north and central Orange County, California. Seawater intrusion threatens this key drinking water source, the Basin, in part through sea level rise due to climate change. To protect local water supplies, two seawater barriers, which inject fresh water into the coastal aquifers to prevent seawater encroachment, have protected the Basin since the 1970s. Challenges to southern California's water reliability, such as imported water supply restrictions and climate change, have furthered the need to maximize use of the Basin which is critical to Orange County's long-term economic vitality.

Furthermore, OCWD is in the southern portion of the Santa Ana River (SAR) watershed. The water quality and supply benefits of this project will positively meet the water supply needs of the SAR watershed by reducing the demands on expensive and less reliable imported water.

Will the Project support an existing water planning effort? Yes. The Basin is managed in accordance with the District-developed *2015 Groundwater Management Plan Update, SGMA Basin 8-1 2017 Alternative Plan,* and the *SGMA Basin 8-1 Alternative Plan 2022 Update*.

Does the referenced plan identify the project as a potential water management action? Yes. The *2015 Groundwater Management Plan* and the *SGMA Alternative Plan (2017 and 2022 Update)* identify the Sunset Gap Barrier as a water management action.

If identified in a plan, how is the project prioritized in the plan? Although none of the projects identified in the aforementioned plans are ranked, the Sunset Gap Barrier is included in the plans as critical to protecting the Basin.

If not identified in the plan, does the proposed project implement a goal or need identified in the plan? Not applicable.

Was the referenced plan developed or updated using a collaborative process with input from multiple and diverse stakeholders? The aforementioned plans were prepared by OCWD with input from the 19 groundwater producers (13 cities, 5 local water districts, and one

regulated private utility) representing 2.5 million residents in the Basin. The District meets with the producers monthly where they are apprised of District activities and solicited for input on those activities, including groundwater management actions.

Project stakeholders that have committed to being involved in the Sunset Gap Barrier FS planning process include local cities, wholesale water importers, and the Department of Defense. The city and water importers have committed to aid in the planning of the FS, particularly in the development of feasible injection water supplies. The Department of Defense has committed to contribute to the planning process by discussing the use of Federal land for project facilities, including injection and monitoring wells, conveyance pipelines, treatment facilities, and injection supply wells. Letters of support from the stakeholders are included herein. There is no known opposition to the project.

Evaluation Criterion C—Ability to Meet Program Requirements (20 Points)

This project meets the program requirements identified in Attachment 1 of the NOFO.

Outreach and Partnership Building OCWD has already begun outreach and partnership building with the cities of Huntington Beach, Westminster, Long Beach, and Seal Beach, the MWDOC and MWD, and Department of Defense by soliciting their input on water supply and project facilities. Public workshops have been built into the project schedule as a part of the deliverable for Task 3-5. These workshops will occur at the District with the involvement of the District Board of Directors (see attached project schedule). The FS document will be available for review by the stakeholders and the public through the Districts web page. This is demonstrated in the letters of support and meeting minutes of each agency.

Analysis, Scoping and Planning Activities This Project is a planning study to evaluate the feasibility of a seawater intrusion barrier in the Sunset Gap. As described above, various water supply, well siting, discharge, and treatment alternatives are being evaluated to find the most effective and economical solution to mitigate the seawater intrusion in the Sunset Gap area. The District has already identified the problem of seawater intrusion, and the need to mitigate it, which is the loss of freshwater aquifers. The FS will evaluate and compare the various alternative components of the barrier project and will identify the preferred alternatives during workshops. Finally, at the completion of the FS, an implementation plan will be developed to further refine the hydrogeologic understanding of the local project area, which will provide the data certainty to design the barrier most effectively.

Development of a Water Strategy Document The water strategy document for this project will be the FS report and Implementation Plan described in Tasks 7 and 8 of the Project Description. The FS will identify the components of the barrier, including the preferred injection supply source(s), extraction barrier and discharge option, and the injection barrier alignment. The FS will also include a 10% barrier design and Class 4 cost estimate. The Implementation Plan will detail the number, type, and depth of test wells needed to generate the hydrogeologic data required to update the groundwater flow model and finalize the barrier design.

The District contracted with a consultant and initiated the FS in September 2023. The consultant will have the responsibility of completing all work on the FS with project management provided by OCWD's Principal Hydrogeologist and Project Manager, Bill Leever. A current project schedule is provided below. Within the schedule, significant milestones, such as Board workshops, are identified for each critical task. It is anticipated that the FS and test well implementation plan will be substantially complete by September 2024.

Project Schedule

Task	Start Date	End Date
Project Management	Sep 2023	Dec 2023
Background Data	Sep 2023	Jan 2024
Injection Supply	Nov 2023	May 2024
Extraction Well Siting and Discharge	Oct 2024	May 2024
Injection Barrier Alignment	Oct 2024	May 2024
Detailed Project Concept	May 2024	Jul 2024
Test Well Implementation Plan	Apr 2024	Aug 2024
Feasibility Study Report	Jul 2024	Oct 2024

A groundwater flow model developed by OCWD will be used to support the FS development. Specifically, the model will be used to evaluate the seasonal water level changes in the Study Area and how they affect injection and extraction flow volumes necessary to mitigate intrusion. This information will then be used by the consultant to make design decisions related to water supply infrastructure and reliability. District staff have operated seawater intrusion barriers for decades and have extensive experience in conducting and managing similar types of projects. The contracted consultant preparing the FS was selected through a competitive process and was deemed the most qualified proposer. We do not anticipate needing any technical assistance from Reclamation.

We do not anticipate any new policies or administrative actions will be needed to implement the project. However, there will likely be regulations that apply to injection water recharge and extracted water disposal. Those regulations will be identified within the FS when the various source supplies and discharge options are evaluated.

E.1.4 Evaluation Criterion D—Presidential and Department of the Interior Priorities (15 points)

E.1.4.1 Sub-criterion No. D1. Climate Change

Does this proposed project strengthen water supply sustainability to increase resilience to climate change? Yes. This project, although geographically local, provides regional benefits to all of California and the states within the Colorado River Basin, as it further protects our local resources from climate change-induced sea level rise. The use of local water supplies (recycled water, stormwater, and groundwater) and the protection of and continued reliance on the Basin to sustainably provide 85% of the water supply for 2.5 million residents reduces the overall impact to the western States' water supplies, brings resilience to drought and the impacts from climate change.

Does the proposed project contribute to climate change resiliency in other ways not described above? The climate change resiliency benefits of this project are fully described above.

E.1.4.2 Sub-criterion No. D2. Disadvantaged or Underserved Communities

The Basin provides approximately 85% of the water supplies to 2.5 million people served by 19 cities and retail water districts within our service area. As shown in Figure 4, the blue shaded areas represent disadvantaged communities, with a population of over 800,000. These residents rely on the groundwater produced from the Basin as their most cost-effective source of water.

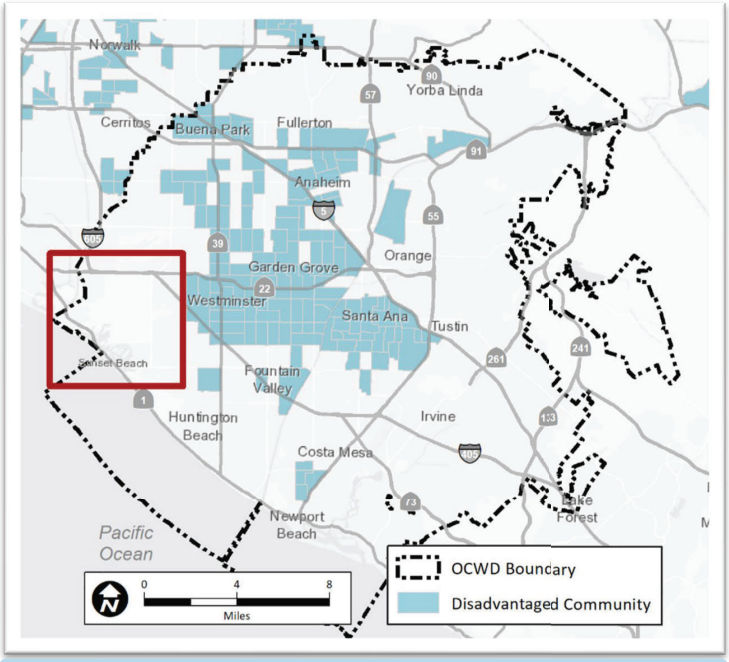

Figure 4. Disadvantaged Communities

Prioritizing and maximizing the protection and use of our local groundwater supplies and recycled water has many benefits, including:

- Reducing our reliance on imported water.
- Energy savings from not having to pump as much imported water over the mountains and into Orange County
- Decreasing wastewater discharges and pollution
- Creating and/or enhancing wetlands and riparian habitats through reduced imported water demand.
- Increasing water supply reliability and lowering the cost of water, which benefits disadvantaged communities and contributes to an increase in environmental justice.

E.1.4.3 Sub-criterion No. D3. Tribal Benefits

The project will indirectly help Reclamation meet trust responsibilities to Tribes as there is no direct impact to tribes in the Project area. However, the Project may help Reclamation meet trust responsibilities in the SWP or CRA areas since the Project will be reducing demand on these sources. Any increase in water reliability and greater availability in overall water supply resulting from water use efficiency efforts would help Reclamation in meeting the federal Indian trust responsibility, a legally enforceable fiduciary obligation on the part of the United States to protect tribal treaty rights, lands, assets, and resources of the tribes.

Does the proposed project directly serve and/or benefit a Tribe? Will the project improve water management for a Tribe? There are no tribal reservations or lands within the District's service area or within the project area. However, the indirect benefits of the project are the same as those for disadvantaged communities.

Does the proposed project support Tribal resilience to climate change and drought impacts or provide other Tribal benefits such as improved public health and safety by addressing water quality, new water supplies, or economic growth opportunities? Only as a larger benefit to the State Water Project, Colorado River Basin, and MWD where use of local groundwater supplies reduces the overall impact to the western States' water supplies.

Does the proposed project support Reclamation's Tribal trust responsibilities or a Reclamation activity with a Tribe? See above.

E.1.5 Evaluation Criterion E— Nexus to Reclamation (5 points)

Is there a Reclamation project, facility, or activity within the planning area? No

Is the planning area in the same basin as a Reclamation project, facility, or activity? No

In what way will the proposed project benefit a basin where a Reclamation project, facility, or activity is located? For example, will the project improve watershed health in a river basin that is adversely impacted by a Reclamation water project? Only as a larger benefit to the State Water Project, Colorado River System, and MWD where use of local groundwater supplies reduces the overall impact to the western States' water supplies.

Does the applicant have a water service, repayment, or O&M contract with Reclamation? No

If the applicant does not hold a type of contract named above, does the applicant receive Reclamation water through a Reclamation contractor or by any other contractual means? Only as a larger benefit to the State Water Project (SWP), Colorado River System, and MWD where use of local groundwater supplies reduces the overall impact to the western States' water supplies.

Reclamation manages the Colorado River system from which MWD imports water. The District and its member water agencies purchase 15 to 23% of their supply imported from the Colorado River and from northern California via the SWP depending on the total production of groundwater from the Basin. Groundwater modeling indicates nine groundwater production wells, producing approximately 16,000 AF/Y will be directly impacted by seawater intrusion if left unmitigated. However, a far greater volume of groundwater would be made undrinkable. Water savings associated with the project translate to more water remaining in these two fragile systems. The proposed project directly supports Reclamation's current efforts to further advance water use efficiency and conservation. The project benefits Reclamation water reliability activities because it reduces imported water supplies from the Colorado River and the Bay-Delta in northern California.

The water savings attained will be the result of avoided increased imports from the Bay-Delta and the Colorado River, thereby increasing water security to the Colorado River Basin supplies.

Budget Narrative

The total project cost is $412,457 and the District will provide matching funds of $212,457, or approximately 52%, in matching funds. Table 1 summarizes the funding sources for the project.

Table 1. Summary of Non-Federal and Federal Funding Sources

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
1. Orange County Water District	$212,457
Non-Federal Subtotal	**$212,457**
REQUESTED RECLAMATION FUNDING	**$200,000**

The District is seeking grant funding for only contractual costs related to our professional services consultant, Hazen and Sawyer. A narrative of the Object Class Categories for which funding is sought is provided below.

Personnel: Not requested.
Finge Benefits: Not requested.
Travel: Not requested.
Equipment: Not requested.
Supplies: Not requested.
Contractual: The District issued one professional services contract to Hazen and Sawyer to prepare the Sunset Gap Seawater Intrusion Barrier alternatives analysis/feasibility study report. The total contractual amount to complete the project is $412,457.
Construction: Not requested.
Other: Not requested.

Environmental and Cultural Resources Compliance

Due to the planning nature of the Water Strategy Grant, the District does not anticipate impacts to the surrounding environmental, cultural resources, National Historic Preservation Act, protected or endangered species, facilities, communities (including low income), Clean Air Act, buildings, or wetlands.

Required Permits or Approvals

The District does not anticipate the need for any permits or approvals given the Water Strategy Grant does not include any construction activities.

Overlap or Duplication of Effort Statement

The District is not seeking any other external funding for this project, nor does this application and project duplicate any proposal or project that has been or will be submitted for funding consideration from any other funding source.

Conflict of Interest Disclosure Statement

The District is unaware of any actual or potential conflict of interest at the time of this submission.

Uniform Audit Reporting Statement

The District does not anticipate the need for any Uniform Audit Report as the project budget does not exceed $750,000.

SF-LLL: Disclosure of Lobbying Activities

The District does not anticipate the need for any disclosure of lobbying statement, as there has been no lobbying activity related to this project.

Letters of Support

Letters of support for this project are included in Appendix A.

APPENDIX A - Letters of Support

City of Seal Beach

CITY HALL 211 EIGHTH STREET
SEAL BEACH, CALIFORNIA 90740
(562) 431-2527 • www.sealbeachca.gov

March 11, 2024

Mr. John Kennedy
General Manager
Orange County Water District
18700 Ward Street
Fountain Valley, CA 92708

SUBJECT: Sunset Gap Seawater Intrusion Barrier Feasibility Study
WaterSMART Water Strategy Grant

Dear Mr. Kennedy:

The City of Seal Beach ("City") is pleased to express its support for the Orange County Water District's ("District") application to the Bureau of Reclamation for its FY 2024 WaterSMART Water Strategy Grant. Seawater intrusion into the coastal aquifers of the Orange County Groundwater Basin continues to threaten the drinking water supply for over 2.5 million people in north and central Orange County. The District has been successful in combating seawater intrusion in other areas of the groundwater basin for over 50 years, and Seal Beach fully supports this project to help continue the sound stewardship of our local drinking water supplies.

Seawater intrusion into the Orange County Groundwater Basin is now occurring in the Sunset Gap where chloride levels continue to move inland and into some coastal municipal supply wells and it is evident some form of mitigation is necessary. The District is exploring alternatives for the seawater intrusion barrier, including source water supplies for injection wells, injection well and extraction well alignments, and extraction well discharge options.

The City supports the District in this effort, and we look forward to participating in relevant workshops and providing our perspective when exploring the possibility of a partnership between our two agencies in finding solutions to the issue of seawater intrusion in the Sunset Gap.

Should you have any questions, please feel free to contact me at (562) 431-2527 x1322, or ilee@sealbeachca.gov.

Sincerely,
CITY OF SEAL BEACH

Iris Lee
Director of Public Works

CITY OF HUNTINGTON BEACH

Public Works Department

Chau L. Vu
Director of Public Works

March 19, 2024

Mr. John Kennedy
General Manager
Orange County Water District
18700 Ward Street
Fountain Valley, CA 92708

Subject: Sunset Gap Seawater Intrusion Barrier Feasibility Study WaterSMART Water Strategy Grant

Dear Mr. Kennedy,

The City of Huntington Beach is pleased to express its support for the Orange County Water District's application to the Bureau of Reclamation for its FY 2024 WaterSMART Water Strategy Grant. Seawater intrusion into the coastal aquifers of the Orange County Groundwater Basin continues to threaten the drinking water supply for over 2.5 million people in north and central Orange County. The District has been successful in combating seawater intrusion in other areas of the groundwater basin for over 50 years, and Huntington Beach fully supports this project to help continue the sound stewardship of our local drinking water supplies.

Seawater intrusion into the Orange County Groundwater Basin is now occurring in the Sunset Gap where chloride levels continue to move inland and into some coastal municipal supply wells and it is evident some form of mitigation is necessary. The District is exploring alternatives for the seawater intrusion barrier, including source water supplies for injection wells, injection well and extraction well alignments, and extraction well discharge options. District staff and their consultant have met with us to discuss the project with the goal of developing the most feasible alternative for the barrier.

The City supports the District in this effort, and we look forward to participating in relevant workshops and providing our perspective when exploring the possibility of a partnership between our two agencies in finding solutions to the issue of seawater intrusion in the Sunset Gap.

Sincerely,

Alvin Papa, PE
Deputy Director of Public Works
Utilities Division
City of Huntington Beach

cc: Chau Vu, Director of Public Works

March 27, 2024

Mr. John Kennedy
General Manager
Orange County Water District
18700 Ward Street
Fountain Valley, CA 92708

Subject: Sunset Gap Seawater Intrusion Barrier Feasibility Study WaterSMART Water Strategy Grant

Dear Mr. Kennedy,

The Water Replenishment District (WRD) is pleased to express its support for the Orange County Water District's application to the Bureau of Reclamation for its FY 2024 WaterSMART Water Strategy Grant. Seawater intrusion into the coastal aquifers of the Orange County Groundwater Basin continues to threaten the drinking water supply for over 2.5 million people in north and central Orange County. The District has been successful in combating seawater intrusion in other areas of the groundwater basin for over 50 years, and the WRD fully supports this project to help continue the sound stewardship of our local drinking water supplies.

Seawater intrusion into the Orange County Groundwater Basin is now occurring in the Sunset Gap where chloride levels continue to move inland and into some coastal municipal supply wells and it is evident some form of mitigation is necessary. The District is exploring alternatives for the seawater intrusion barrier, including source water supplies for injection wells, injection well and extraction well alignments, and extraction well discharge options. District staff and their consultant have met with us to discuss the project with the goal of developing the most feasible alternative for the barrier.

The WRD supports the District in this effort, and we look forward to participating in relevant workshops and providing our perspective when exploring the possibility of a partnership between our two agencies in finding solutions to the issue of seawater intrusion in the Sunset Gap.

Sincerely,

Stephan Tucker, MBA, PE, PMP

General Manager

Water Replenishment District

DEPARTMENT OF THE NAVY
NAVAL WEAPONS STATION SEAL BEACH
800 SEAL BEACH BOULEVARD
SEAL BEACH, CA 90740-5000

IN REPLY REFER TO
11300
Ser N00/0043
April 2, 2024

Mr. John Kennedy
General Manager
Orange County Water District
18700 Ward Street
Fountain Valley, CA 92708

Dear Mr. Kennedy:

SUBJECT: SUNSET GAP SEAWATER INTRUSION BARRIER FEASIBILITY STUDY
WATERSMART WATER STRATEGY GRANT

The Naval Weapons Station Seal Beach concurs with the Orange County Water District on seeking solutions to saltwater intrusion in the Sunset Gap. The application to the Bureau of Reclamation for its FY 2024 WaterSMART Water Strategy Grant is critical in seeking the funds to better understand this problem, its consequences and possible engineering solutions.

The Navy supports the District in researching solutions to address this concern and we look forward to participating in relevant workshops and providing our perspective when exploring the possibility of a partnership between our two agencies in finding solutions to the issue of seawater intrusion in the Sunset Gap.

My point of contact is Mr. Jeff McGovern, Installation Environmental Program Director. He can be reached at (562) 626-6070, or at jeff.j.mcgovern.civ@us.navy.mil.

Sincerely,

J. J. O'BRIEN
Captain, U.S. Navy
Commanding Officer